### REVISIONS

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| SA-CATS – MR 67.00.2 | 01-October-2016 | Haematology: Applicants with sickle cell trait or other haemoglobinopathic traits are usually compatible with flying provided they submit a favourable Haematologist report and their condition is unlikely to cause sudden or subtle incapacitation.

| SA-CATS – MR 67.00.2 | 01-October-2016 | Gastroenterology: An applicant who has undergone a major surgical operation on the biliary passages or the digestive tract or its adnexa with a total or partial excision or a diversion of any of the organs should be assessed as medically unfit until such time as the medical assessor, having access to the details of the operation concerned, considers that the effects of the operation are not likely to cause incapacitation in flight.

| SA-CATS – MR 67.00.2 | 01-October-2016 | Health Prevention and Promotion: While physical medical and mental health forms the most important aspect of aviation medical examiner, it is important for the designated aviation medical examiners and medical assessors emphasize on health education and prevention of ill health to all applicants with special emphasis on applicants who are under 40 years of age.

| SA-CATS – MR 67.00.4 | 01-October-2016 | Medical Assessment: In the event that the medical examination is to be conducted by two or more medical examiners, the Director shall appoint one of those medical examiners to be responsible for coordinating the results of the examination, evaluating the findings with regard to medical fitness and the signing of the reports. SA-CATS 67.00.4:

| SA-CATS – MR 67.00.4 | 01-October-2016 | DAME shall receive training in aviation medicine and shall have practical knowledge and experience of the conditions under which the holder of licence and ratings carry out their duties. (b) The practical knowledge and experience shall include but not limited
to flight experience, simulator experience, on-site observation and any other practical experience considered necessary by the licensing authority. DAME must demonstrate to the Director of his or her competency in aviation medicine before designation.

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AUTORISATION

This Dames Guide is a living document. If, as a result of development in, or an amendment to the scope and functions of this Dames, or possibly even developments in the aviation industry that necessitate changes, changes must be made and this guide must be amended. Everyone affected by this manual is encouraged to propose ideas and changes to this document for the general improvement both of the content and of the professional execution of their duties.

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<td>Name in Block Letters</td>
<td>LESEGO BOGATSU</td>
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<tr>
<td>Approved by</td>
<td>EXECUTIVE: AVIATION SAFETY OPERATIONS</td>
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<tr>
<td>Name in Block Letters</td>
<td>SIMON SEGWABE</td>
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1. ACKNOWLEDGEMENTS

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b) Federal Aviation Authority DAMES Guide Published in 2016

2. ABBREVIATIONS USED IN THIS DOCUMENT

Abbreviations

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<td>ASD</td>
<td>Alcohol Screening device</td>
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<tr>
<td>ATF</td>
<td>Alcohol testing form</td>
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<tr>
<td>ATPL</td>
<td>Airline Transport Licence</td>
</tr>
<tr>
<td>BAT</td>
<td>Breath Alcohol Technician</td>
</tr>
<tr>
<td>DAME</td>
<td>Designated Aviation Medical Examiner</td>
</tr>
<tr>
<td>DCA</td>
<td>Director of Civil Aviation</td>
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<tr>
<td>EBTM</td>
<td>Evidential Breath testing device (Confirmatory breath test)</td>
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<td>ICAO</td>
<td>International Civil Aviation Organisation</td>
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<tr>
<td>PPL</td>
<td>Private Pilot Licence</td>
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<tr>
<td>QAP</td>
<td>Quality assurance plan</td>
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<td>RPAS</td>
<td>Remotely Piloted Aircraft System</td>
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<td>South African Civil Aviation Authority</td>
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<td>STT</td>
<td>Screening test technician</td>
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<td>USC</td>
<td>Urine Specimen Collection</td>
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<td>When referring to flight training, means the practical training required towards the first issue of a national pilot’s licence or PPL, issued in terms of Part 61 or Part 62, or for the endorsement of such a licence with an additional category of aircraft, and for the purpose of regulation 91.02.3 excludes cross-country flight training;</td>
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<td>Accredited medical conclusion</td>
<td>Means the conclusion reached by one or more medical experts acceptable to the Director for the purposes of the case concerned, in consultation with flight operations or other experts as necessary;</td>
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<td>Advisor</td>
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<td>Aerial work</td>
<td>Means an aircraft operation in which an aircraft is used for specialised services as determined by the Director such as –</td>
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<td>a) agricultural spraying, seeding and dusting;</td>
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<tr>
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<td>b) cloud spraying, seeding and dusting;</td>
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<td>c) culling;</td>
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<td>d) construction;</td>
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<td></td>
<td>e) aerial harvesting;</td>
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<td>f) aerial patrol, observation and survey;</td>
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<td>g) aerial advertisement, including banner towing and other towing of objects;</td>
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<td>h) search and rescue;</td>
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<td>i) parachuting;</td>
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<td>j) aerial recording by photographic or electronic means;</td>
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<td></td>
<td>k) fire spotting, control and fighting; and</td>
</tr>
<tr>
<td></td>
<td>l) spraying, seeding or dusting other than for agricultural purposes and clouds;</td>
</tr>
<tr>
<td>Aerobatic flight</td>
<td>Means manoeuvres intentionally performed by the PIC of an aircraft and involving an abrupt change in the attitude of the aircraft, an abnormal attitude or an abnormal variation in speed, not necessary for normal flight;</td>
</tr>
<tr>
<td>Aerodrome control service</td>
<td>Means an air traffic control service provided for the control of aerodrome traffic</td>
</tr>
<tr>
<td>Aerodrome control tower</td>
<td>Means an air traffic control unit established to provide an air traffic control</td>
</tr>
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<tr>
<td>Aeronautical Information Circular</td>
<td>Means circular containing information which does not qualify for the origination of a NOTAM or for inclusion in the AIP issued by the Director in terms of regulation 11.01.2;</td>
</tr>
<tr>
<td>Air ambulance</td>
<td>Means an aircraft used for the purposes of transporting a patient, or a person for whom there can be reasonable expectations that they will require medical attention during the transportation, and equipped in accordance with the provisions of Part 138;</td>
</tr>
<tr>
<td>Air traffic service assistant</td>
<td>Means the holder of an air traffic service licence and rating who provides –&lt;br&gt;a) assistant services to an air traffic controller; or&lt;br&gt;b) co-ordination services, clearance delivery services, flight information services or aerodrome flight information services;</td>
</tr>
<tr>
<td>Aviation recreation</td>
<td>Means flying microlight, glider, balloon, gyroplane, hang glider, paraglider, model aircraft, light sport aeroplane, touring motor glider, parachute or involvement in aviation events</td>
</tr>
<tr>
<td>Adulteration</td>
<td>Means any process by which an individual knowingly interferes with (or attempts to interfere with) the processes of specimen collection, transport or analysis with the intention of avoiding a legitimate test result. The actions undertaken can include (but are not limited to) the addition of water or foreign substances to the specimen, specimen substitution, damaging bottle seals or packaging and the deliberate consumption of interfering substances or copious volumes of water prior to specimen collection;</td>
</tr>
<tr>
<td>Aliquot</td>
<td>Means a fractional part of a specimen (taken as a sample representing the whole specimen) used for testing;</td>
</tr>
<tr>
<td>Authorising Scientist</td>
<td>Means a person who reviews all pertinent data and quality control results in order to attest to the validity of the laboratory's test reports. This person may also function as the Toxicologist (see Toxicologist);</td>
</tr>
<tr>
<td>Calibrator</td>
<td>Means a solution of known concentration used to calibrate a measurement procedure or to compare the response obtained with the response of a test sample/unknown sample. The concentration of the analyte of interest in the calibrator is known within limits ascertained during its preparation. Calibrators may be used as single point measurements or to establish a calibration curve over a range of interest;</td>
</tr>
<tr>
<td><strong>Chain of Custody</strong></td>
<td>Refers to procedures to account for each specimen by tracking its handling and storage from point of collection to final disposal. These procedures require that the donor identity is confirmed and that a chain of custody form is used from time of collection to receipt by the laboratory. Within the laboratory appropriate chain of custody records must account for the samples until disposal;</td>
</tr>
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</tr>
<tr>
<td><strong>Chain of Custody Form</strong></td>
<td>Means a form used to document the procedures from time of collection until receipt by the laboratory;</td>
</tr>
<tr>
<td><strong>Cabin Crew member</strong></td>
<td>Means a crew member licensed in terms of Part 64 who performs, in the interest of safety of passengers, duties assigned by the operator or the PIC of the aircraft, but who shall not act as a flight crew member;</td>
</tr>
<tr>
<td><strong>Cargo Aircraft</strong></td>
<td>Means any aircraft, other than a passenger aircraft, which is carrying goods or property;</td>
</tr>
<tr>
<td><strong>Collection cup</strong></td>
<td>Refers to a single-use container, made of plastic, large enough to easily catch and hold at least 55 mL of urine voided from the body. Must be individually wrapped in a sealed plastic bag or shrink wrapping; or must have a peelable, sealed lid or other easily visible tamper-evident system;</td>
</tr>
<tr>
<td><strong>Collecting officer</strong></td>
<td>Means a person trained to collect specimens from donors;</td>
</tr>
<tr>
<td><strong>Collection Site</strong></td>
<td>Means a place where individuals present themselves for the purpose of providing a specimen for subsequent analysis;</td>
</tr>
<tr>
<td><strong>Confirmation Test</strong></td>
<td>Means an analytical procedure to identify and quantify the presence of a specific drug or analyte which is independent of the initial test and which uses a different technique and chemical principle from that of the screen test in order to ensure reliability and accuracy;</td>
</tr>
<tr>
<td><strong>Cut-off</strong></td>
<td>Means a concentration level set to determine whether the sample is positive or negative for the presence of a drug;</td>
</tr>
<tr>
<td><strong>Customer</strong></td>
<td>Means the organisation requesting the drug testing service;</td>
</tr>
<tr>
<td><strong>Donor</strong></td>
<td>Means the individual from whom a specimen is collected;</td>
</tr>
<tr>
<td><strong>Critical phases of flight</strong></td>
<td>Includes all ground operations involving taxi, take-off, climb to cruise up to 10 000 feet and approach from cruise below 10 000 feet;</td>
</tr>
<tr>
<td><strong>Commercial air transport operator</strong></td>
<td>Means the provider of a commercial air transport operation;</td>
</tr>
<tr>
<td><strong>Co-pilot</strong></td>
<td>Means a licensed, type-rated pilot required by these Regulations to serve in</td>
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<tr>
<td>any piloting capacity other than as PIC, but excluding a pilot who is on board the aircraft for the purpose of receiving flight instruction;</td>
<td></td>
</tr>
<tr>
<td>Designated Aviation Medical Examiner</td>
<td>Means an aviation medical examiner designated by the Director in terms of regulation 67.00.4;</td>
</tr>
<tr>
<td>Enforcement Officer</td>
<td>Means an authorised officer, inspector or authorised person;</td>
</tr>
<tr>
<td>Fatigue</td>
<td>A physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member’s alertness and ability to safely operate an aircraft or perform safety-related duties;</td>
</tr>
<tr>
<td>Flight crew member</td>
<td>A licensed crew member charged with duties essential to the operation of an aircraft during flight time;</td>
</tr>
<tr>
<td>Flight time — aeroplanes</td>
<td>The total time from the moment an aeroplane first moves for the purpose of taking off Until the moment it finally comes to rest at the end of the flight. <strong>Note.</strong>— Flight time as here defined is synonymous with the term “block to block” time or “chock to chock” time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.</td>
</tr>
<tr>
<td>Flight time — helicopters</td>
<td>The total time from the moment a helicopter’s rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.</td>
</tr>
<tr>
<td>General aviation operation</td>
<td>Means an aircraft operation other than a commercial air transport, corporate aviation, air ambulance or aerial work operation;</td>
</tr>
<tr>
<td>Glider</td>
<td>Means a heavier-than-air aircraft, other than a hang-glider, that is supported in flight by the dynamic reaction of the air against its fixed, lifting surfaces, and whereof free flight does not depend on an engine;</td>
</tr>
<tr>
<td>Gyroglider</td>
<td>Means a non-power-driven heavier-than-air aircraft, supported in flight by the reactions of the air on one or more rotors which rotates freely on substantially vertical axes;</td>
</tr>
<tr>
<td>Gyroplane</td>
<td>Means a power-driven heavier-than-air aircraft, supported in flight by the reactions of the air on one or more rotors which rotates freely on substantially vertical axes;</td>
</tr>
<tr>
<td>Hang-glider</td>
<td>Means a non-power-driven heavier-than-air aircraft capable of being</td>
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carried, foot launched, and landed solely by the energy and use of the pilot’s legs, having –
- a rigid primary structure with pilot weight shift as the primary method of control; or
- a rigid primary structure with movable aerodynamic surfaces as the primary method of control in at least two axes,
and for the purposes of Parts 24, 94 and 96 includes a powered hang-glider;

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<tr>
<td>Helicopter</td>
<td>Means a heavier-than-air aircraft supported in flight mainly by the reactions of the air on one or more power-driven rotors on substantially vertical axes;</td>
</tr>
<tr>
<td>Human factors principles</td>
<td>Means the principles which apply to aeronautical design, certification, training, operations and maintenance of aircraft, and which seek safe interface between the human and other system components by proper consideration to human performance;</td>
</tr>
<tr>
<td>Human performance</td>
<td>Means the capabilities and limitations of a human being that have an impact on the safety and efficiency of aeronautical operations and services;</td>
</tr>
</tbody>
</table>
| Medical assessor                          | Means a physician, qualified and experienced in the practice of aviation medicine, who evaluates medical reports submitted to the Authority by medical examiners;  
  Note 1 — Medical assessors evaluate medical reports submitted to the Licensing Authority by medical examiners.  
  Note 2 — Medical assessors are expected to maintain the currency of their professional knowledge. |
<p>| Medical service provider                  | Means the person, associated with an air ambulance operator for the purposes of taking responsibility for the medical aspects of the operation and who is subject to the legislation administered by the Department of Health; |
| Micro-light aeroplane                     | Means an aeroplane of which the minimum flying speed and the maximum take-off mass have been restricted for classification purposes. The values of these restrictions are defined in Document SA-CATS 24; |
| Laboratory                                | Means the facility that is approved by SANAS (South African National Accreditation Standard providing the analytical services to detect drugs of abuse; |</p>
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<tr>
<td>Medical Review Officer (MRO)</td>
<td>Means a medical physician responsible for receiving laboratory results from the drug-testing laboratory that has knowledge of substance abuse and has appropriate training or experience to interpret and evaluate an individual's positive test result, in light of declared information;</td>
</tr>
<tr>
<td>Negative result (screen)</td>
<td>Means a preliminary result established by screening test that indicates a drug possibly present in the sample is not detected above a specified cut-off;</td>
</tr>
<tr>
<td>Negative result (confirmation)</td>
<td>Means a result reported by the laboratory that indicates that a suspected drug present in the sample is below a specified cut-off;</td>
</tr>
<tr>
<td>Non-negative result</td>
<td>Means a preliminary result established by screening test that indicates a drug possibly present in the sample is detected above a specified cut-off. A specimen that is reported as adulterated, substituted or invalid;</td>
</tr>
<tr>
<td>Positive result (confirmation)</td>
<td>Means a result reported by the laboratory as positive means that there is conclusive evidence that a drug is present in the sample tested at level greater than or equal to the confirmation cut-off concentration;</td>
</tr>
<tr>
<td>Pilot (to)</td>
<td>Means to manipulate the flight controls of an aircraft during flight time and may also be referred to as ‘pilot flying’ (PF);</td>
</tr>
<tr>
<td>Pilot-in-command</td>
<td>Means the pilot designated by the operator as being in command and charged with the safe conduct of a flight, without regard to whether or not he or she is manipulating the controls;</td>
</tr>
<tr>
<td>Pilot-in-command under supervision</td>
<td>Means a co-pilot performing the duties and functions of a PIC under the supervision of the PIC in accordance with a method of supervision acceptable to the Authority;</td>
</tr>
<tr>
<td>Power-assisted glider</td>
<td>Means a glider with a maximum all-up mass of not more than 850 kg, fitted with a retractable engine that is used mainly for the purpose of launch and climb and short periods of free flight;</td>
</tr>
<tr>
<td>Powered glider</td>
<td>Means an aircraft equipped with one or more engines which has, with the engine or engines not operating, the performance characteristics of a glider;</td>
</tr>
<tr>
<td>Powered hang-glider</td>
<td>Means a hang-glider, fitted with an engine attached either to the structure or to the pilot, and which also may be fitted with a detachable undercarriage, to support its launch and climb;</td>
</tr>
</tbody>
</table>
| Powered paraglider                        | Means a paraglider, fitted with an engine attached to the pilot to assist in its launch and in short local powered flights, and which may have a fixed or
| Problematic use of substances | The use of one or more psychoactive substances by aviation personnel in a way that:
| | a) constitutes a direct hazard to the user or endangers the lives, health or welfare of others; and/or
| | b) causes or worsens an occupational, social, mental or physical problem or disorder.
| Psychoactive substances | Means any substance with psychotropic effects, excluding caffeine and tobacco, but which includes the following:
| | a) narcotic analgesics such as opiates;
| | b) illicit substances such as cannabis and cocaine;
| | c) sedative hypnotics;
| | d) hallucinogens;
| | e) central nervous system depressants; and
| | f) central nervous system stimulants, including volatile solvents and alcohol;
| Quality control sample | Means a sample used to evaluate whether or not an analytical procedure is operating within pre-defined tolerance limits;
| Reference method | Means a method in analytical chemistry considered to be acceptable for confirmation of results (e.g. mass spectrometry, refractometry, pH electrode)
| Sample | Means a representative portion of a specimen submitted to a laboratory for testing
| Screen Test | Means a test to eliminate negative samples from further consideration and to identify the non-negative specimens that require confirmation testing;
| Specimen | Means the portion of (normally) urine, blood or breath that is collected from a donor;
| Standard (1) | Means a reference material of known purity or a solution containing a reference material at a known concentration;
| Standard (2) | Means an agreed protocol or procedure (e.g. ISO:17025);
| Standard Operating Procedure (SOP) | Means a written document giving the detailed steps to be followed when undertaking a particular task (e.g. the analysis of a given drug in a urine sample);
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<tr>
<td>Toxicologist</td>
<td>Means a person (holding a degree in the chemical sciences specializing in Analytical Chemistry and Toxicology) responsible for interpreting a positive analytical result for the customer or the customer’s designated Medical Review Officer (MRO). This person must have suitable training and experience in the theory and practise of all methods and procedures employed in the laboratory, including a thorough understanding of chain of custody procedures, quality control practices, and analytical procedures relevant to the interpretation of a result.</td>
</tr>
<tr>
<td>Rated air traffic controller</td>
<td>An air traffic controller holding a licence and valid ratings appropriate to the privileges exercised by him.</td>
</tr>
<tr>
<td>Rating</td>
<td>An authorization entered on or associated with a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence.</td>
</tr>
<tr>
<td>Safety management system</td>
<td>A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.</td>
</tr>
<tr>
<td>Safety pilot</td>
<td>In terms of Part 61 and Part 91 means a pilot whose sole purpose during flight time is to maintain a visual lookout for threats to an aircraft during simulated instrument flight and to monitor the aircraft’s engine and navigation instruments to ensure exceedences do not occur;</td>
</tr>
<tr>
<td>Safety-sensitive personnel</td>
<td>Persons who might endanger aviation safety if they perform their duties and functions improperly. This definition includes, but is not limited to, flight crew, cabin crew, aircraft maintenance personnel and air traffic controllers;</td>
</tr>
<tr>
<td>Second-in-command</td>
<td>Means a licensed pilot serving in a piloting capacity other than as PIC, who is designated as second-in-command, but excluding a pilot who is on board the aircraft for the sole purpose of receiving flight instruction;</td>
</tr>
<tr>
<td>Significant</td>
<td>In the context of the medical provisions in Chapter 6, significant means to a degree or of a nature that is likely to jeopardize flight safety</td>
</tr>
<tr>
<td>State safety programme</td>
<td>An integrated set of regulations and activities aimed at improving safety.</td>
</tr>
</tbody>
</table>
| Valid                                     | When used in connection with a licence, rating, certificate, validation, authority, approval or similar document means –  
  a) that the expiry date on the document, if any, has not been exceeded;  
  b) that the document has been issued legally and properly to its |
holder, and has not been suspended or cancelled by the issuing authority; and

c) that all requirements, prescribed by these Regulations in respect of the document, have been complied with;

3. FOREWORD

Flying is a highly skilled job that involves a complex interaction between the aviator and the machine in an environment that is full of stressors. Although the flying machine may fail occasionally, it is the human component that is the cause of aviation accidents more than 70% of the time. The aircraft environment differs from other occupational environments with respect to altitude stressors such as: hypoxia, noise and vibration, low humidity leading to dehydration, fatigue, decompression syndrome, acceleration and spatial disorientation. Because of these stressors, the aircrew is required to maintain a high level of physical and mental fitness, and is legally required to assess their medical fitness in order to carry out their professional duties.

Aviation personnel are legally required to assess their fitness in order to carry out their professional duties. Aeromedical decisions must be based on factual and objective data, which is evidence-based and supported by documentation to ensure aviation safety. Aviation medicine combines aspects of preventative, occupational, environmental and clinical medicine with the physiology and psychology of man-in-flight.

The medical standards and policies of a South African Civil Aviation Authority must be compliant with the Standards and Recommended Practices as stipulated by ICAO Chapter 6, Annex 1. ICAO performs safety oversight audits on Contracting States on a regular basis to monitor compliance with the minimum standards and recommended practices and States are required to notify ICAO when there is an inability to meet standards and recommended practices. A difference will then be filed for each specific requirement which is not being met.

Aviation medical examinations have evolved over the years for three reasons; to predict the success of training, especially in the military, to ensure a long productive career and to reduce the rate of accidents. Research in the west indicates that the risk of sudden incapacitation of aircrew is low; this is credited to the high standards of fitness required for initial screening medicals and follow-up surveillance. Despite the high medical standards imposed on aviation personnel, however extensive, there is no medical examination that can entirely exclude the possibility of incapacity; therefore, the problem must be solved with risk management. The incidence of incapacitation of aircrew due to the effect of medical conditions or physiological impairment is low, however; it represents a serious potential threat to flight safety.
Most potential pilots with a significant risk of incapacitation (e.g. Epilepsy, Type I Diabetes Mellitus) are screened out at the time of initial examination. The civil aviation authorities internationally permit airmen with certain medical conditions to be medically certified, provided that such permission does not compromise aviation safety. Unfortunately, a comprehensive review of the proportion of medical conditions leading to medical unfitness and incapacitation has not been conducted on the African continent. This has led to limited knowledge of the causes of in-flight incapacitation, medical causes of aircraft accidents and other issues specific to the African continent. The limited research creates a challenge to the local aviation regulatory authority, as development and revision of local medical policies are based on information from the west, which differs significantly with regard to the demography of those populations and diseases endemic on the African continent.

Over the years, a number of studies were documented about the medical conditions affecting the various aviation populations in the western world. Knowledge of these medical conditions has assisted in relation to the regulatory aspect of flight crew licensing and the development of appropriate, evidence-based medical standards, and this research has also provided information relating to medical conditions responsible for in-flight medical incapacitation.

In June 2010, the Director of Civil Aviation initially established a Committee known as the Aeromedical Committee and a number of committees has since been appointed. The Aeromedical Committee is an advisory body of medical, psychological, and industry partners (IAM, SAASMA, ATNS, RAASA, ALPA and other ancillary health experts serving to advise the Director on the medical risks of existing or prospective aviation personnel who are required in terms of the Civil Aviation Regulations (1997), as amended, to hold medical certificates. The role of the Aeromedical Committee is to apply the ICAO Flexibility Clause and Accredited Medical Conclusion. Currently the panel meets once per month on the 3rd Tuesday of the month and a yearly calendar is published on the SACAA websites. All panel cases for consideration have to be submitted to the SACAA seven working days (7) before the panel.

The establishment of the Aeromedical Committee has minimized unnecessary medical appeals, and with the involvement of the non-medical aviation industry, has led to a better understanding and definition of the operational, psychological, training, legal and human resource issues. Through the input of these partners, the SACAA has been able to review a number of medical protocols, by making use of the BSC honours in Aviation Medicine at the University of Pretoria.
The composition of the Aeromedical Committee was determined by the SACAA by using a research paper from the University of Pretoria, which assessed an analysis of common morbidity patterns that lead to medical unfitness among civil aviation aircrew in South Africa dating from 2000 to 2008. The study revealed that the commonest system accounting for the majority of disqualification was the central nervous system; with head injuries and convulsions being the most commonly encountered. The cardiovascular system accounted for the second most common cause of medical unfitness, with coronary artery disease and hypertension diseases accounting for the majority of the medical conditions and psychiatric conditions accounting for the third most common system affected, with depression and substance abuse being responsible for the majority of the cases. A small proportion of these candidates had more than one medical condition.

The recent analysis of the cases presented at the Aeromedical Committee dated 2010 to 2017 have informed the SACAA on which specialists to appoint and the areas of risk. Knowledge of common conditions will assist in the development of targeted protocols and the proactive training of aviation personnel. ICAO indicates that there is evidence that several fatal aviation accidents have been caused by psychiatric disorders or inappropriate use of psychoactive substances; it is reasonable that as part of the periodic aviation medical examination there should be questions that pertain to these issues. Further, the number of non-physical conditions that can affect the health of pilots and which can lead to long-term unfitness in those of middle age appears to be increasing. The SACAA has included the mental health questions in the routine examination of applicants and encourages DAMEs to spend time on health education and prevention.

The SACAA recognises the role and the wealth of knowledge at the Institute of Aviation Medicine and Designated Aviation Medical examiners, which has led to South Africa being the only country in Africa to host ICASM three times. There is a need for senior Designated Medical Examiners to mentor regular examiners, share their experience and participate more in decision-making. The SACAA is encouraged by the increase of the number of designated aviation medical examiners who have been committed to attending the workshops. The participation of the designated medical examiners will grant them CPD points.

Our office encourages a good and efficient relationship between the SACAA and the Institute for Aviation Medical Examiners, as this impacts on our client’s customer service as we all work on behalf of the Director. Numerous workshops have been held with the industry, and more of these will take place to promote aviation medicine, identify challenges, and identify increased areas of risks and possible solutions.

Designated Aviation Medical Examiners play a major role in safety management through information collected in routine medical examinations which may assist in medical causes of in-flight medical events. The results of
one such research have suggested that the conditions most likely to result in in-flight medical events were usually first observed during the period between routine examinations, they were not discovered during the periodic examination by a medical examiner.

ICAO requires the SACAA to conduct ad-hoc audits on designated aviation medical examiners, and to take action against non-compliant examiners. The purpose of these audits is not punitive, but to improve on the medical certification systems. The SACAA has submitted legislation which is currently with the Minister for promulgation; this law will ensure that the Medical Assessors at the SACAA conduct audits on DAMEs’ medical practices. The initial focus will be on new applicants and on those DAMEs who have been making errors.

Designated Medical Examiners are to participate in the regulatory review processes (medical protocols), and to familiarize themselves with the latest amendments to minimize unnecessary delays in the medical certification processes. This will also prevent the consequence, namely negligent or wrongful certification, which would permit a medically unqualified person to take control of an aircraft, which would be a serious situation for the medical examiner, the SACAA and the public. The designated aviation medical examiners are encouraged to visit the ICAO website or the CAA website to familiarize themselves with new SACAA developments and to read the ICAO (8980-AN 895) manual, which is extremely informative.

4. LEGAL RESPONSIBILITIES OF DESIGNATED AVIATION MEDICAL EXAMINERS

Part 67 of the Civil Aviation Regulations make provision for the Director to designate aviation medical examiners to conduct medical examinations and issue medical certificates on his/her behalf. Designated Aviation Medical Examiners are delegated the authority to examine applicants for aviation personnel (pilots, air traffic controllers and cabin crew) medical certificates and to issue or deny issuance of certificates. The first point of contact for aviation medical examinations are conducted by designated aviation medical examiners in their private practice on behalf of the Director of the SACAA. An Examiner is a designated representative of the SACAA Administrator with important duties and responsibilities and it is essential that Examiners recognize the responsibility associated with their appointment.

Designated Aviation Medical Examiners must consider their responsibilities in their capacity as an Examiner as well as the potential conflicts that may arise when performing in this dual capacity. The consequences of a negligent or wrongful certification, which would permit an unqualified person to take the controls of an aircraft or an air traffic controller position, can be serious for the public, for the Government, and for the Examiner. If the examination is cursory and the Examiner fails to find a disqualifying defect that should have been
discovered in the course of a thorough and careful examination, a safety hazard may be created and the Examiner may bear the responsibility for the results of such action. A number of aviation personnel and designated aviation medical examiners have been referred to the Legal Department due to non-compliance to the regulations and technical standards, resulting in penalties imposed.

Of equal concern is the situation in which an Examiner deliberately fails to report a disqualifying condition either observed in the course of the examination or otherwise known to exist. In this situation, both the applicant and the Examiner in completing the application and medical report form may be found to have committed a violation of in line with Part 185 of the Civil Aviation Regulations, which stipulates that:

**Part 185.00.1**

(1) A person commits an offence if that person—

a) hinders or obstructs an authorised officer, inspector or authorised person in the exercising of his or her powers or the performance of his or her duties;

b) when called upon by an authorised officer, inspector or authorised person to do so, refuses or fails to give his or her name and address, or gives a false name or address;

c) obstructs or impedes any other person acting in the exercising or performance of any privileges, powers or duties conferred on such other person by or under the regulations;

d) makes or causes to be made, either orally or in writing—

e) any fraudulent, misleading or false statement for the purpose of obtaining any licence, rating, certificate, permit, approval, authorisation, exemption or other document in terms of the regulations;(ii)

f) any fraudulent, misleading or false entry in any logbook, record or report which is required to be kept, maintained, made or used to show compliance with any provision of the regulations;

g) falsifies, counterfeits, alters, defaces or mutilates, or adds anything to, any licence, rating, certificate, permit, approval, authorisation, exemption or other document issued in terms of the regulations;

h) does or causes, or permits to be done or caused, any act contrary to, or who fails to comply with, any provision of the regulations, or a direction given or a prohibition made or a condition imposed in terms thereof;

i) exercises a privilege granted by, or uses, any licence, rating, certificate, permit, approval, authorisation, exemption or other document issued under the regulations, of which he, she or it is not the holder;

j) unless otherwise authorised in the regulations, permits a licence, rating, certificate, permit, approval, authorisation, exemption or other document issued under the regulations, of which he, she or it is the holder, to be used, or a privilege granted thereby, to be exercised, by any other person;

k) operates or attempts to operate any aircraft in respect of which no valid certificate of registration or valid certificate of airworthiness have been issued;

l) commits any act, whether by interference with any flight crew member, ATS personnel member or AME, by tampering with any aircraft, or any part thereof, or by disorderly conduct or otherwise, which is likely to endanger the safety of any aircraft or its occupants;

m) without the permission of an aerodrome or heliport operator, enters any place within the boundaries of a licensed aerodrome or heliport which has been closed to the public;
n) gives false information pertaining to the investigation of any aviation accident or incident; and

o) contravenes in any manner the provisions of the Act, and regulations promulgated in terms of the Act which are administered by the Authority.

(2) Any person who—

a) contravenes any provision of part 5 of the Act, except section 111; or

b) contravenes or fails to comply with any provision of a safety plan approved by the Minister and whereof the contents have been brought to his or her notice,

c) is guilty of an offence and shall be liable on conviction to a fine not exceeding R50 000 or imprisonment not exceeding 10 years or to both such fine and imprisonment.

(3) Any aviation participant who—

a) fails to comply with section 111 of the Act or fails to comply with the national Aviation security program instituted in terms of that section is guilty of an offence and on conviction liable to a fine or to imprisonment for a period not exceeding ten year or to both such fine or imprisonment.

(4) Any person who—

a) is convicted of an offence in terms of sub regulation (1), shall be liable to the penalties prescribed in section 144 of the Act, read with section 332 of the Criminal Procedure Act, 1977 (Act No. 51 of 1977).

The Designated Aviation Medical Examiner is delegated authority to:

a) Examine applicants for, and holders of medical certificates to determine whether or not they meet standards prescribed in Part 67 Regulations and Technical Standards for the issuance of a medical certificate.

b) Issue or deny medical certificates to applicants or holders of such certificates based upon whether or not they meet the applicable medical standards.

Oversight of Medical Practices by the Medical Assessors

The Medical Assessors of the SACAA conducts audits in the medical practices of the designated aviation medical examiners in line with ICAO requirements and part 67.00.4 of the Civil Aviation Regulations and technical Standards. The focus of the audits is based on but not limited to the following:

a) Medical Facility

b) Communications and IT Evaluation (EMPIC Medical Module)

c) HPCSA Compliance (Medical Confidentiality, Records Storage (hard copies and electronic) in line with relevant legislation including National Department of Health and others. DAMES are required to familiarize themselves with this legislation

d) Compliance to legislation and a number of errors conducted by DAMES
e) Knowledge of the SACAA Regulations and Technical Standards
f) DAMES knowledge of where to find the amended regulations
g) Practice Equipment (Calibration, others documentation is assessed based on the manufactures specifications)
h) How Test are conducted (e.g Conversation and Whisper Test)
i) EMPIC implementation and others

Designated Aviation Medical Examiners are required to have adequate facilities for performing the required examinations and possess the following equipment prior to conducting any SACAA examinations. History or current findings may indicate a need for special evaluations. Examiners shall certify at the time of designation, re-designation, or upon request that they possess (and maintain as necessary) the equipment specified. Designated Aviation Medical Examiners Practices are audited by the Medical Assessors of the SACAA. In their examinations DAMEs are required to ensure that the following mental health questions are asked in the Health Prevention and Promotion Section and the Medical Assessors during the audits will confirm that the questions are asked:

(a) Suggested questions for depression:
1. During the past three months, have you often been bothered by feeling down, depressed or hopeless?
2. During the past three months, have you often been bothered by having little interest or pleasure in doing things?
3. During the past three months, have you been bothered by having problems falling asleep, staying asleep, or sleeping too much, that is unrelated to sleep disruption from night flying or trans meridian operations?
4. In the past three months, has there been a marked elevation in your mood lasting for more than one week?

(b) Suggested questions for anxiety/panic attack:
1. In the past three months, have you had an episode of feeling sudden anxiety, fearfulness, or uneasiness?
2. In the past three months, have you experienced sensations of shortness of breath, palpitations (racing heart beat) or shaking while at rest without reasonable cause?
3. In the past year have you needed to seek urgent medical advice because of anxiety?

(c) Suggested questions concerning alcohol use:
1. Have you ever felt that you should cut down on your drinking?
2. Have people annoyed you by criticizing your drinking?
3. Have you ever felt guilty about your drinking?
4. Have you ever needed a drink first thing in the morning?
5. How many alcoholic drinks would you have in a typical week?
6. How many alcoholic drinks would you have on a typical day when you are drinking?

(d) Suggested questions concerning drug use:
1. Have you used drugs other than those required for medical reasons?
2. Which non-prescription (over-the-counter) drugs have you used? When did you last use this drug(s)?

5. IMPLEMENTATION OF THE EMPIC MEDICAL MODULE

On behalf of the South African Civil Aviation Authority, we wish to thank all the Designated Aviation Medical Examiners who actively participated, provided constructive feedback and attended the EMPIC Medical Training Module hosted by the SACAA, SYNOVA and an expert from Switzerland. The SACAA appreciates that you took time from your busy schedules and your demonstration of your willingness to accommodate change. The SACAA would like to officially thank and congratulate the DAMEs who went live on the 9th of September 2016. These DAMEs are considered to be change agents, who have been actively providing input on how the SACAA could improve the system, and shared the challenges that they experienced at the uncomfortable initial phase. The SACAA would like to update you on the developments relating to the implementation of the Enterprise Business System (EMPIC Medical Module). The process included sessions that took place nationally with the training of Designated Aviation Medical Examiners in various provinces (Gauteng, Mpumalanga, Kwa-Zulu stern Cape, Free, Kwa-Zulu Natal and Western Cape). The training was conducted by the SACAA IT, Medical, Synova Team and an expert from Switzerland representing EMPIC, Mr Roland Roulin who has been involved with the system for the past ten (10) years. The SACAA also consulted with other CAA Authorities internationally who have implemented medical IT Systems (FAA, Australia CAA, Transport Canada and Singapore) for lessons learned, to accommodate possible hurdles anticipated with the implementation of the electronic system. The HPCSA was also invited at the Gauteng Workshop to make presentations on the following:
   a) Security and duration of storage of medical documentation (manual and electronic records)
   b) Medical confidentiality
   c) Informed Consent
The role of EMPIC today extends to orchestrating the inputs from the user community to ensure the software continues to meet all regulatory requirements and at the same time keeps pace with the deployment of new technologies. EMPIC's responsibilities also include identification and induction of new collaborators to join the project. The software, EMPIC-EAP, is unique in that there is no other solution available, worldwide, that provides an off the shelf, fully integrated, scalable and configurable tool with a long-term development plan that comprehensively meets all of the requirements for oversight of Safety and Security Regulations by a National Aviation Authority. The implementation of the EMPIC Medical Module will improve the medical certification processes with the improved verification processes through by minimizing delay in submission of medical records for verification which is sometimes affected by postal strikes, incomplete medical examination forms which results with the SACAA and the Institute of Aviation Medicine spending time to address errors DAMEs which has time and costs implications. The implementation of the system will minimize medical tourism, delay in the medical verification processes, lost documents and immediate access of the SACAA of medical records. The following countries are using the system: Austria, Switzerland, Hungary, Greece, Netherlands, Sweden, Luxembourg, Kenya, Italy, Slovenia, Ireland, Norway, Latvia, Bosnia and Herzegovina, Belgium, Australia, France, Finland, Croatia, Myanmar and the list is growing with Namibia having signed up this year. The EMPIC® FCL-M application (now with integrated EMPIC® ANS-M) is a JAVA internet application, supporting the work of Aeromedical Examiners (AMEs). An AME or the AMEs at an AMC (Aeromedical Centre) get access to the system and can fill in all forms online. They can also upload additional documents to the electronic folder:

The following features characterize the application:

a) Calculating all necessary examinations and computing the validity of the medicals (even for different examinations of one person at a certain examination date).

b) Modelling a pilot's (and/or EMPIC® ANS) whole medical examination history-

c) Multi-user application: several persons can work on a pool of applicants using “worklist”.

d) Multi-Licence approach: one applicant can be examined for several different kinds of medical certificates in parallel.

e) Rights system to model different end-user roles with dedicated permissions within the system.

f) Access to complete history for AME/AMC (if "own" pilots). AME/AMC can grant read rights to other AMEs/AMCs to give access to historical data.

The following features characterize the application:

a) Numerous checks for completeness and dependency of the medical forms.

b) Re-usage of old data from prior examination by “EasyEntry” function.
c) Integration of data from external equipment (files such as PDF etc.).
d) Automatic data transfer from extended forms to medical examination report.
e) Printout of all forms and certificates completely filled in.
f) Printout of several different medical certificates (FCL, ANS etc.) per person.
g) Modelling specific work flows: expert consultation, temporary unfitness, unfitness, interim enquiry of AMS, allocating read-rights on certain examinations to other physicians, further transfer, transfer back (reject).

The following features characterize the application:

a) “Red alert flag” for suspicious applicants (message of the AMS to the user opening a suspicious candidate).
b) Ability to import or scan documents as part of the examinee file.
c) Decentralised user management for pilots physicians with larger surgeries (AMCs with shared workload).
d) Ability to distribute work within one surgery between several workstations (multiuser application). Possibility to define a responsible AME and the working AME.
e) Interface to EMPIC® CM and EMPIC® FCL (also to ANS module) via batch file transfer (due to installation in DMZ)
f) Export of statistical data.

The general procedures in EMPIC MED are:

a) Examination of a new applicant
b) Examination of a known applicant
c) Declaring an applicant “unfit” OR “fit” (Medical certificate is only issued for “fit” applicants)
d) Changing the medical status of an applicant, i.e. declaring him “temporarily unfit”
e) Expert examination of an applicant
f) Examination of a rejected applicant

N.B. - The decision browser supports the national aeromedical section to review the examinations of an applicant and to declare him fit or unfit or to reject him for further examination. Please note that the types of examinations chosen for aviation personnel is deliberated by the AVMED department, therefore “fit” or “unfit” is based on these examination results

**EMPIC-EAP –OTHET NON-MEDICAL MODULES**

a) EMPIC® CM: Customer Management (Contacts, Addresses, Groups)
b) EMPIC® SEC: Security, Permission Management to all Modules
c) EMPIC® SL: Surveillance Layer for Compliance Management
d) EMPIC® QS: Query Synthesizer, Query Tool for cross-module

e) Reports

f) EMPIC® ERP: Interface to Enterprise Resource Planning Software

g) EMPIC® WEB: Facilitating Stakeholder Engagement

h) EMPIC® WF: Workflow

i) EMPIC® DMS: Interface to Document Management System

j) EMPIC® FCL-M: Flight Crew Licensing – Medical

k) EMPIC® FCL: Flight Crew Licensing

l) EMPIC® ANS: Air Navigation Services Air Traffic

m) EMPIC® MPL: Maintenance Personnel Licensing

n) EMPIC® EXS: Examination System

6. SECTION 1

6.1 International Civil Aviation Organization

The International Civil Aviation Organization (ICAO) is a specialized agency of the United Nations, and it was created with the signing in Chicago, on 7 December 1944, of the Convention on International Civil Aviation. The ICAO is the permanent body charged with the administration of the principles laid out in the convention. The Convention establishes the privileges and restrictions of all Contracting States and provide for the adoption of International Standards and Recommended Practices (SARPs) regulating international air transport. The Convention on International Civil Aviation includes several articles which call for adoption of international regulations in all fields where uniformity facilitates and improves air navigation.

These regulations, known as Standards and Recommended Practices (SARPs), have been promulgated in ICAO Annexes to the Convention which are amended from time to time when necessary. Each Annex deals with a specific aspect of international civil aviation and those relating to medical regulations for licence applicants are included mainly in Annex 1 — Personnel Licensing and to some degree in Annex 2 — Rules of the Air and Annex 6 — Operation of Aircraft. Issues involving preparedness planning for a communicable disease of public health concern are considered in Annex 6, Annex 9 — Facilitation, Annex 11 — Air Traffic Services and Annex 14 — Aerodromes

6.1.1 ICAO Standards and Recommended Practices are defined as follows:
Standard

Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation, and to which Contracting States will conform in accordance with the Convention. In the event that a State finds it impracticable to comply in all respects with any such international standard but allows a less stringent practice, immediate notification to ICAO is compulsory under Article 38 of the Convention.

Recommended Practice

Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

6.1.2 History of Aviation Medicine (ICAO SARPS)

In 1970, the Personnel/Training/Medical (PEL/TRG/MED) Divisional Meeting considered that availability of suitable medical guidance material was of importance to the uniform application of the Standards and Recommended Practices (SARPs) in Annex 1, as well as in such fast-moving fields as accident investigation and human factors in aviation. The meeting also recommended that action be taken to provide expert advice to the ICAO Secretariat in support of the preparation of such medical guidance material. Since that time, advances have been made both in medical science generally and in aviation medicine. Assistance and advice have been provided by aviation medical specialists from many Contracting States, and their valuable contributions have enabled a second edition of the Medical Manual in 1985 and now this third edition to reflect those advances as they apply to civil aviation medicine in particular.1 (ICAO Manual 2012).

The 3rd edition ICAO was developed with the intended to complement existing texts by emphasizing the clinical problems encountered in medical certification in civil aviation. This ICAO (8980-AN 895) document is designed for the experienced designated medical examiner as well as for the aviation medical expert and medical assessor, to aid in the approach and management of intricate borderline cases1. When making a Medical Assessment, the medical examiner should consider the relevant operating environment were the applicant is engaged in, for example single pilot commercial operations carrying passengers clearly require the most careful medical evaluation in order to reduce the risk of in-flight incapacitation. Those engaged in multi crew operations, where there has been effective incapacitation training, may be considered less stringently. In many such cases flight safety may be adequately protected by an operational condition or limitation applied to the licence1.
ICAO states that over-regulation, apart from having an adverse financial impact on the State or the aviation industry, and why in the end it may not improve flight safety, instead; stringent national medical requirements can result in unnecessary restrictions or premature retirement of license holders. They may also have the consequence of license holders being reluctant to report illness to the medical examiner or the Licensing Authority, and this is important from the flight safety viewpoint since the value of the medical examination relies to a large extent upon an accurate medical history. Should States make demands in excess of those included in ICAO SARPs, the goal of harmonization across Contracting States will not be achieved and the transfer of skilled personnel from one State to another will be inhibited. This also encourages “medical tourism” where a license holder if refused a licence on medical grounds in one State because of stringent medical requirements, seeks to obtain one in another, less demanding State.

In case a more stringent regulation is adopted by States, notification to ICAO is compulsory only when such regulation is applied also on foreign license holders and aircraft. However, in a Resolution of 5 February 1999, the ICAO Council made it clear that, in principle, national requirements “more exacting” than the SARPs would be detrimental to the framework of the Chicago system within which international civil aviation has developed and continues to develop. In this Resolution the Council also called upon each Contracting State to utilize the multilateral mechanism of ICAO where it believes that changes to the content or level of implementation of the Standards and Recommended Practices in the Annexes to the Chicago Convention are necessary or desirable.

6.1.3 Safety Management

The different interpretations by States (countries) of the aeromedical standards established by the International Civil Aviation Organization has resulted in a variety of approaches to the development of national aeromedical policy, and consequently a relative lack of harmonization. However, in many areas of aviation, safety management systems have been recently introduced and may represent a way forward. A safety management system can be defined as “A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures”. There are four main areas where, by applying safety management principles, it may be possible to better use aeromedical data to enhance flight safety.

These are: adjustment of the periodicity and content of routine medical examinations to more accurately reflect aeromedical risk; improvement in reporting and analysis of routine medical examination data; improvement in reporting and analysis of in-flight medical events; and support for improved reporting of relevant aeromedical events through the promotion of an appropriate culture by companies and regulatory authorities. This paper explores how the principles of safety management may be applied to aeromedical systems to improve their contribution to safety.
Medical requirements for pilots were introduced during the early decades of the last century and although the content of the aeromedical examination has changed over time, few attempts have been made to monitor or quantify the safety benefits of the requisite aeromedical standards, it being self-evident that the license holder needs to be ‘fit’. The International Civil Aviation Organization (ICAO) sets medical Standards and Recommended Practices that have been agreed upon internationally. Despite this global agreement on a suitable international system, regulatory authorities interpret the medical Standards and Recommended Practices in different ways. In practice this leads to different fitness levels being required of license holders in different States (countries).

6.2 Basis for Regulatory Aeromedical Decision Making

Expert Opinion

Aeromedical policy and individual decisions are often based on expert opinion. Although expert opinion may be evidence-based, such an approach (which may also be termed ‘eminence-based’) is not as reliable as one that uses higher levels of evidence. However, expert opinion is often the easiest (quickest and least costly) to implement and may, therefore, be an attractive option for regulatory authorities. If a medical expert has experience in aviation medicine and their own specialty, such an opinion may be of great value (it may be the only possible approach for uncommon conditions), but often opinions vary greatly between experts presented with similar cases.

The potential for variation in expert opinion was noted in 2004 when a European Joint Aviation Authorities (JAA) survey was undertaken to assess the value of the electroencephalograph (EEG) in determining medical fitness. A selection of representative EEG recordings was distributed to neurologists who were advising the chief medical officers of the various JAA member states. Some EEG were assessed as being acceptable for unrestricted Class 1 certification by certain consultant neurologists, while the same recordings were assessed by others as justifying an ‘unfit’ assessment. Routine screening EEG was subsequently abandoned by the JAA for regulatory purposes*. Given this disparity of views, it is not unexpected that an individual may be assessed as fit in one State and unfit in another, depending on the view of the expert who is advising the Licensing Authority.

6.3 Acceptable Aeromedical Risk

Another area where a diversity of views can be found among regulatory authorities is the level of aeromedical risk that is acceptable. Further, authorities differ in their opinions as to whether it is possible to use objective numeric aeromedical ‘risk criteria’ as a basis for decision making in individual cases or for developing policy. Of the authorities that do use
such risk criteria, there are differences regarding the maximum acceptable level of risk for certification, although for professional pilots a commonly held norm of maximum risk is 1% per annum. However, 2% per annum has also been proposed (10) and is in use in at least one State. A pilot incapacitation risk of ‘1% per annum’ infers that if there were 100 pilots with an identical condition, 1 of them would be predicted to become incapacitated at some time during the next 12 months (and 99 would not). While the data for predicting incapacitation in the next 12 months for a condition is not always robust, there are some common medical conditions (e.g., ischemic heart disease) where high quality epidemiological data exist and can be used in assessing the aeromedical risk. Without any objective risk criteria, it can be unclear on what basis an aeromedical decision is being made, and expert opinion that seems ‘reasonable’, often based on similar precedents, is likely to hold sway.

6.4 Contribution to Aviation Safety of Medical Examinations

Routine Periodic Examination

There are few published studies on the safety value of the routine medical examination, yet millions of dollars are spent annually on the process. Regulatory authorities require license holders to undergo an aeromedical examination for license issue and each license or medical certificate renewal. This examination varies little throughout a pilot’s career, even though the incidence of most medical conditions varies with age, physical disease being less common in professional pilots under 40 years of age than in those over 40 years. Accordingly, physical disease is very rarely a significant factor in two-crew airliner accidents involving younger pilots. In the general population, behavioural factors such as anxiety and depression are more common in the under-40s age group and illicit drug use and alcohol consumption also cause a considerable, increasing disease burden.

Despite this, relatively little formal attention is given to these aspects in the routine periodic encounter with an aviation medical examiner; the emphasis is usually placed on the detection of physical disease. Indeed, although medical examiners may take it upon themselves to include some informal discussion of behavioural or mental health issues, the examination is often colloquially described as a pilot’s ‘physical’. Particularly in the younger license holder there is an apparent mismatch between the likelihood of the existence of particular pathologies of flight safety importance (mainly mental and behavioural problems) and the tools being used to detect them (the traditional medical examination). ICAO is currently in consultation with its member States concerning whether the current emphasis on the detection of physical disease is appropriate in the periodic medical examination for professional pilots under 40 years of age.

6.5 Stringent Medical Requirements
One approach to aeromedical certification embraces a concept that ‘more stringent’ medical standards result in ‘more effective’ medical standards. At the 2002 Aerospace Medical Association annual scientific meeting, Hudson reported that 1200 of the professional pilots who sought advice from the U.S. Air Line Pilots Association medical consulting service had been diagnosed with depression and recommended to take antidepressant medication.

On being advised of the Federal Aviation Administration’s policy of not permitting antidepressant use in operating pilots, 710 of the 1200 indicated they would not take the recommended treatment and would continue to fly; 180 indicated they would take the recommended medication and continue to fly while withholding information concerning the medication from their aviation medical examiner; and 300 indicated they would stop flying while taking the medication. If this pilot group acted on their intentions, approximately 75% of pilots diagnosed with depression would have continued to fly, unknown to the regulator.

These data are open to a number of possible interpretations. One conclusion may be that regulating against pilots flying while taking antidepressants is, paradoxically, detrimental to flight safety since this could result in information concerning an important medical condition being withheld from the regulatory authorities while pilots continue to operate after having had a diagnosis of depression, treated or not. Conversely it may be concluded that as the current standards are not being adhered to, additional regulatory action such as more focused interview or survey techniques (to detect depression) and blood testing (to detect antidepressant use) is warranted. In a recent AsMA position paper, Jones et al. indicated that the use of modern antidepressants by pilots, under adequate supervision, need not be detrimental to flight safety.

This suggests that there are safe subpopulations among those with depressive disorders. Also, if pilots wished to hide their depressive illness and its treatment it is unlikely that interview and survey methods would identify any except the most clinically depressed. Blood testing for antidepressant medications would be very expensive if applied to the entire pilot population. We argue, therefore, that this additional data sways the interpretation of the Hudson data in favour of the first argument: those more stringent standards are not necessarily beneficial to overall flight safety. This, in turn, suggests that it would be a more effective safety strategy both to accept the use of certain selected antidepressants and to structure the routine aeromedical examination to better identify those who may benefit from psychiatric intervention than it would be to try and continue to exclude all pilots with depressive disorders and to institute additional measures to try and increase their detection.

### 6.6 Safety Management as a Way Forward

#### Safety Management Principles
For some years the concepts of safety management have been applied in the aviation industry, but largely outside the field of aviation medicine. ICAO has mandated the incorporation of a safety management system into the management processes of air traffic and aerodrome operators since 2001 and 2005, respectively and safety management systems became mandatory in January 2009 for aircraft operator. When introducing a safety management system, an important first step is for a company to appoint a senior executive who takes direct responsibility for safety and who has some high-level influence on the distribution of funds. To fulfill this responsibility, the ‘accountable executive’ needs to set safety targets, monitor and measure safety-related events, and then revisit and if necessary revise, the safety targets. In other words, safety should be managed in a manner similar to other aspects of the business.

In the past, this has not always occurred, with responsibility for safety often being delegated by senior management to safety officers. Such personnel usually have little influence on the proportion of the company’s financial resources that are devoted to protecting safety, as opposed to other necessary expenditure items demanding management attention. If there is no high level accountability, in the event of an accident senior management may not see themselves as being responsible. In reality, top level management decisions often impact on safety, since the company culture is developed ‘top down’ and if little interest is shown in safety at the highest management levels, the same attitude is likely to prevail among other company employees. It is, however, difficult for a senior executive to take responsibility for aeromedical safety in a company (as opposed to other safety aspects), partly because of the confidential and personal nature of the information involved and partly because many companies do not have the necessary expertise among their staff for such a role. It is, therefore, probably more appropriate for the chief medical officer of the Licensing Authority to be the ‘accountable executive’ responsible for national aeromedical safety.

6.7 Collection and Analysis of Aeromedical Data

Just as the senior executives of a company need accurate information (concerning costs, profit, marketing, personnel, etc.) on which to base corporate management decisions, a chief medical officer (In SA it will be the Senior Manager of the SACAA and the team who is responsible for national aeromedical safety requires sound data on which to base aeromedical policy. Such data can be obtained from three main sources: in-flight medical events; medical events that occur between flights, but which would have been of importance had they occurred in flight; and medical conditions discovered by the medical examiner during a routine medical examination. The chief medical officer is responsible for using this aeromedical data, along with relevant information from the wider medical literature, to devise and implement appropriate aeromedical policies.
6.7.1 In-flight medical events

When considering what data might be useful to monitor aeromedical safety, a good starting point would be to include in-flight aeromedical events that affect the flight crew. However, while accurate information concerning in-flight medical events is of potential benefit to companies and States alike, there remain some significant challenges in obtaining such data: a minor event may not be obvious to the passengers or cabin crew and there may be a temptation not to report it if only the flight crew are aware of the event; the flight crew involved may fear adverse repercussions from the employer, or regulator; the paperwork regarding such an event may be onerous; confidentiality issues may be a concern; or the initial report will almost always be made by crewmembers with little or no medical training. This can hinder subsequent analysis.

A recent comparison between in-flight medical events in the United States and the United Kingdom demonstrated that, in the United Kingdom, relatively minor pilot-related in-flight medical events were reported to the Licensing Authority at a rate approximately 40 times greater (55:1.3 per 10 million flight hours) than in the United States. While it is possible that this observation reflects an actual difference between U.S. and U.K. pilots in the incidence of minor aeromedical events, it seems more likely that the explanation lies with differences in the reporting cultures in the United States and the United Kingdom, with relative under-reporting occurring in the former.

The same studies observed similar reporting rates for U.S. and U.K. pilots for more serious medical events. A regular analysis of in-flight events by individual States and a comparison of reporting systems in different States would be of value in helping to better understand why such differences exist. Efforts to gather and analyse in-flight medical events may also be hampered by the lack of a single, widely accepted, classification system. For example, incapacitation from smoke or fumes may be reasonably regarded as medically related, but there is usually little connection between such events and the fitness of the pilot, as determined by the medical examiner. In addition, classification of events may need to be undertaken with less than full (medical) information, which introduces an element of error and subjectivity. Ideally, in order to maximize benefit from the analysis of in-flight aeromedical events, categorization should be undertaken by an individual who understands both the aviation environment, and aviation medicine. Medical events that occur between flights: On average, professional pilots spend between 5 and 10% of their time in the air, so noting events that occur between flights would greatly increase the size and utility of any database of medical events that affect pilots. An analysis of the medical conditions that come to light between routine examinations would be particularly useful. Some States require significant medical events to be reported to the regulatory authority after a certain time period, which provides the basis of a useful database for medical conditions that may appear, or deteriorate, between routine examinations. Further, as a medical history is required at each routine medical examination, it should be possible to obtain data on such events, which could be analysed.
6.7.2 Information from routine medical examinations

There are two types of information available from routine examinations: information from the medical history, and findings from the examination (mental and physical, including any investigations, e.g., electrocardiogram). The aero medical literature contains few studies that have attempted to investigate the relationship between those medical conditions that are identified during the routine periodic medical examination and those that cause in-flight medical events. The results of one such study suggested that the conditions most likely to result in in-flight medical events were usually first observed during the period between routine examinations — they were not discovered during the periodic examination by a medical examiner. If this is the case, it would seem important that the Licensing Authority ensures that the license holder knows what action to take when such an event occurs so that flight safety is not eroded, and that the medical examiner and Licensing Authority are informed of the necessary information.

6.7.3 Reporting of Medical Conditions

Reporting of in-flight incidents involving operational errors may create a fear of adverse repercussions. An analogy can be made with medical events, both in flight and on the ground as a license holder may withhold information if he believes his career may be adversely affected should he report a medical condition. However, systems which encourage reporting of events of safety relevance generate information that can be used to enhance safety. It is reasonable to assume that if medical conditions of license holders are made known to the medical department of a Licensing Authority, a potential exists to improve safety.

Therefore, efforts should be made to encourage such reporting by license holders. To this end, a regulatory authority should have, as part of its regulatory regime, a fair, transparent, and consistent system, developed in consultation with the license holder’s representative bodies. Such a system should be based as much as possible on evidence of aeromedical risk and action in individual cases should be proportionate to the individual risk. Such an approach might include, as a formally stated goal, perhaps included in the mission statement of a regulatory authority’s medical department, the aim of returning license holders to operational status whenever possible. Experience shows that this is often mentioned as a desirable goal in aviation medicine circles, but rarely stated formally.

6.8 Conclusions

Despite the growth and acceptance of evidence-based practice throughout most fields of medicine, we still find ourselves routinely using the lowest level of evidence (expert opinion, unsupported by a systematic review) for regulatory aeromedical decisions. Such decisions are often not based on the explicit acceptance of any particular level of aeromedical risk. Without guidelines concerning acceptable risk levels, and with reliance on expert opinion for individual
aeromedical decisions, consistent decision-making is impeded, and comparisons between States are more difficult. A cornerstone of a successful future for regulatory aviation medicine is consistent decision making by Licensing Authorities using high-level evidence. Such an approach, if applied by different regulatory authorities, would assist global harmonization of medical fitness requirements. The principles of safety management can be used to help achieve both these goals. To promote these aims, several aspects of the aeromedical process should be reviewed and improved, such as:

1. The periodicity and content of periodic medical examinations should be adjusted to better reflect the medical demographics of applicants and the safety relevance of their medical conditions. For example, an increased emphasis on alcohol, drugs, and mental health may be warranted for younger pilots while it would be appropriate to give greater consideration to cardiovascular disease as pilots age.

2. Improvement in reporting and analysis of medical examination data. Few licensing authorities collect medical examination data in a format that is easily amenable to analysis and there is a lack of data concerning conditions of aeromedical significance that are discovered during routine medical examinations.

3. Improved reporting and analysis of in-flight medical event data. Few licensing authorities encourage the reporting of in-flight aeromedical data. Of those that do, it is rare that the reports are assessed in a systematic manner.

4. Support for better reporting through the development of an appropriate culture by companies and regulatory authorities’ more supportive approach to license holders who develop medical problems should improve the reliability of data on which aeromedical policies are based by encouraging reporting of medical conditions.

6.9 Mental health and behavioural questions for use by medical examiners

As there is evidence that several fatal aviation accidents have been caused by psychiatric disorders or inappropriate use of psychoactive substances, it is reasonable that as part of the periodic aviation medical examination there should be questions that pertain to these issues. Little guidance has been provided concerning how such aspects could be addressed in the periodic medical examination; although experienced medical examiners have often informally and spontaneously included them in their evaluation of the applicant.

Further, the number of non-physical conditions that can affect the health of pilots and which can lead to long-term unfitness in those of middle age appears to be increasing. The conditions addressed by the proposed questions have been shown to be amenable to preventive action before they develop into significant health problems and before there is an impact on the pilot’s medical status for flying. There are various questionnaires with various degrees of complexity available for assessing mental health and behavioural aspects of an individual’s health. The questions below may serve to promote a relevant discussion between the medical examiner and the pilot, air traffic controllers and cabin crew.
To encourage dialogue, it is recommended that no written record of the conversation is retained (other than a record that mental health and behavioural topics were discussed) unless some item of immediate flight safety risk is uncovered — this understanding should be made clear to the pilot at the outset, thus increasing the likelihood of a frank discussion. It is to be expected that only rarely will any formal action need to be considered by the medical examiner to protect flight safety in the light of response to such questions, since the main aim to discover behavioral patterns or mental aspects that are amenable to change before they become sufficiently severe to affect the medical fitness.

The questions suggested address those conditions that are most common in the age range of professional pilots and those which are most likely to affect performance on the flight deck. Statistics show that the main psychiatric conditions in this context are mood disorders and certain anxiety disorders, especially panic episodes. Additionally, in many Contracting States, excessive alcohol intake and use of illicit drugs in the general population are occurring with increasing frequency, and aviators are not immune from these social pressures. Questions have been developed to address these issues as well. In developing the questions, a review of the literature was undertaken by specialists in the field, with the aim of choosing simple questions that can be answered quite quickly. The vast majority of pilots will respond to all questions in the negative, and it is unnecessary to request pilots without any relevant problems to undertake a prolonged screening questionnaire.

Those who answer positively, or with uncertainty, can be engaged in further dialogue by the medical examiner. The aim is to encourage pilots to consider their lifestyle and thereby improve the likelihood that they will remain in good mental health during their careers; this, of course, includes the avoidance of problematic use of psychoactive substances. Occasionally, the medical examiner may find conditions that are amenable to medical support or even treatment; it is important to detect these at an early stage, before they become significant problems and before they have a long-term impact on the pilot's medical fitness and on flight safety.

The questions below may not represent the most suitable questions for the pilot populations of all States, but they offer guidance — a starting point — for States that intend to implement 6.3.1.2.1 and wish to develop an approach that includes these important aspects of medical fitness. The questions do not necessarily have to be posed verbally by the medical examiner but could, for example, be given to the applicant to read prior to the examination.

(a) Suggested questions for depression:
   1. During the past three months, have you often been bothered by feeling down, depressed or hopeless?
   2. During the past three months, have you often been bothered by having little interest or pleasure in doing things?
3. During the past three months, have you been bothered by having problems falling asleep, staying asleep, or sleeping too much, that is unrelated to sleep disruption from night flying or trans meridian operations?
4. In the past three months, has there been a marked elevation in your mood lasting for more than one week?

(b) Suggested questions for anxiety/panic attack:
1. In the past three months, have you had an episode of feeling sudden anxiety, fearfulness, or uneasiness?
2. In the past three months, have you experienced sensations of shortness of breath, palpitations (racing heart beat) or shaking while at rest without reasonable cause?
3. In the past year have you needed to seek urgent medical advice because of anxiety?

(c) Suggested questions concerning alcohol use:
1. Have you ever felt that you should cut down on your drinking?
2. Have people annoyed you by criticizing your drinking?
3. Have you ever felt guilty about your drinking?
4. Have you ever needed a drink first thing in the morning?
5. How many alcoholic drinks would you have in a typical week?
6. How many alcoholic drinks would you have on a typical day when you are drinking?

(d) Suggested questions concerning drug use:
1. Have you used drugs other than those required for medical reasons?
2. Which non-prescription (over-the-counter) drugs have you used? When did you last use this drug(s)?

6.10 Flexibility in the application of medical requirements

The range of variation between individuals is such that if medical Standards are laid down in rigid terms, they will inevitably exclude a number of applicants who, though not meeting the Standards in all respect might nevertheless be considered capable of performing duties safely in the aviation environment. Since the Chicago Convention lays on Contracting States the duty to promote efficient and safe aviation as well as to regulate it, provision has been made in Annex 1 for the exercise of a degree of flexibility in the application of medical Standards, thus avoiding the hardship and injustice which might otherwise occur. It is essential for the maintenance of flight safety that the manner in which flexibility is exercised should be reasonably uniform throughout the Contracting States if international acceptance of licences is to be maintained. In the past, flexibility has been used in widely differing ways by States. The application of the principles set out in this chapter will assist in achieving uniformity.

6.10.1 The exercise of flexibility
If the medical Standards prescribed for a particular licence are not met, the appropriate Medical Assessment shall not be issued or renewed unless the following conditions are fulfilled:

a) accredited medical conclusion indicates that in special circumstances the applicant’s failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the licence applied for is not likely to jeopardize flight safety;

b) relevant ability, skill and experience of the applicant and operational conditions have been given due consideration; and

c) The licence is endorsed with any special limitation or limitations when the safe performance of the licence holder’s duties is dependent on compliance with such limitation or limitations.

The provision of a degree of flexibility must not lead to a situation where its use becomes the rule rather than the exception. It has been worded clear in the ICAO manual, so that flexibility may be exercised only in the exceptional case. Failure to observe this requirement could result in routine approval of individuals not meeting specific medical requirements, such as visual standards, thus creating an abuse of the primary object of flexibility. When evidence accumulates that flexibility is being utilized repeatedly in a particular respect, then the appropriateness of regulations defining the medical requirements comes into question and the suspicion is raised that the regulations define a requirement, which is not in keeping with the demands of flight safety.

However, when decisions to exercise flexibility are backed by an accredited medical conclusion, it indicates that these decisions have not been regarded as a routine measure but that they have been taken following close examination and assessment of all the medical facts and their relationship to occupational demands and personal performance. The degree and intensity of investigation lying behind each decision accurately measures compliance with the principles behind the flexibility Standard. The just and safe exercise of flexibility should be confined to the exceptional case and it ought to be considered in relation to the expertise of those concerned in applying accredited medical conclusion. As a consequence “accredited medical conclusion” is a basic concept and has been specifically defined in Annex 1 as “the conclusion reached by one or more medical experts acceptable to the Licensing Authority for the purposes of the case concerned, in consultation with flight operations or other experts as necessary. The estimation of risk imposed by the individual upon flight safety is a most difficult task and one often requiring experts in a number of aspects of both medicine and aviation. Decisions should recognize that public interest and safety is the statutory basis for personnel licensing.

6.11 Medical deficiency compensation and flight safety

Where a medical deficiency exists, the extent to which flight safety is affected is the vital factor, rather than the extent to which failure to attain the medical requirements is capable of being compensated. In some cases the question of compensation for a deficiency will be irrelevant, for example where the risk is one of sudden incapacitation rather than
inability to physically carry out a required task. In other cases, the ability to compensate, for example, for an orthopaedic dysfunction may be an important factor in the overall assessment of the effect on flight safety. Previously acquired skill and experience may similarly be irrelevant or important to the overall assessment of the safety risk.

6.11.1 The terms “waiver” and “flexibility”

Standard but is frequently referred to as the “waiver clause”, and the term “medical waiver” in connection with medical certification and licensing is generally accepted. The use of the term “waiver”, which in legal usage means “an act of dispensing with a requirement”, and the verb “to waive” which is defined as “not to insist upon”, “to ignore, neglect or disregard”, “to refrain from applying or enforcing (a rule etc.) or “to make an exception”, is unfortunate. In fact the correct exercise of “flexibility” as described in is quite the opposite of “waiver” because the decision to apply the clause is only reached after subjecting the individual involved to a critical analysis, possibly involving detailed personal examination together with deliberations by those who formulate the “accredited medical conclusion” and the decision of the Licensing Authority.

6.12 Flight Crew Incapacitation

6.12.1 Introduction

The impressive growth of international civil aviation during the past decades has been accompanied by a continued concern for safety in air travel. The number of air carrier accidents per year will increase if industry growth continues and accident rates remain unchanged. It is, therefore, essential to continue to examine all areas which have an impact on flight safety. One such area is that of in-flight pilot incapacitation, which can be defined as any reduction in medical fitness to a degree or of a nature that is likely to jeopardize flight safety.

This might be regarded as a “medical definition” focusing as it does on medical fitness. Note, however, that incapacitation can also occur in a medically fit individual, e.g., smoke inhalation or effects of a laser beam on vision. A doctor practicing aviation medicine should be familiar with the relevant operational environment and of the wide variety of possible causes of incapacitation. Minor degrees of reduced medical fitness may go undetected by other crew members during normal flight operations and lowered levels of proficiency may be rationalized, e.g., poor handling may be attributed to lack of recent handling experience. However, when abnormal conditions or an emergency occurs, flight crew may have to perform complex physical and mental tasks under time constraints, and in such circumstances even a minor deficiency in performance could be operationally significant. Some effects of mild incapacitation include a reduced
state of alertness, a mental preoccupation which may result in a lack of appreciation of significant factors, increased reaction time, and impaired judgment.

6.12.2 Controlling the risk of pilot incapacitation

Pilot incapacitation has been of concern for as long as powered flight has existed. It represents an operational risk and it can therefore be defined operationally as “any physiological or psychological state or situation that adversely affects performance. There are sound reasons for considering an operational definition. From the operational standpoint, it is irrelevant whether degraded performance is caused by a petit mal episode, preoccupation with a serious personal problem, fatigue, problematic use of psychoactive substances or a disordered cardiac function. The effects may be similar, and often other crew members will not know the difference. A great deal about pilot incapacitation has been learned over the past decades. One of the most important things is that the risk to aviation safety in situations where a pilot is physically incapacitated can be virtually eliminated in air transport (multi-crew) operations by training the pilots to cope with such events. In 1984 the medical director of a major British airline reported the results of a study of pilot incapacitation that remains the most comprehensive to date (see Chapman, 1984). It included over 1 300 “subtle” incapacitations which were simulated to occur at critical phases of flight during routine competency checks in a simulator.

Five hundred of these incapacitations were deliberately planned to occur with other major failures in a “worst case” scenario. Major failures were not included in the remaining 800 incapacitations so that “the simulation was of a subtle incapacitation, still taking place at a critical phase of flight, but as an event in itself and not complicated by other major failures.” This latter scenario is the more realistic, since the risk of an incapacitation occurring simultaneously with a major technical failure is extremely remote. In the simulator it was found that only 1 in 400 “uncomplicated” incapacitations resulted in a simulator “crash”, because the second pilot successfully took control on the 399 other occasions. If certain assumptions about a typical multi-crew flight are made, this knowledge can be used to calculate an acceptable risk of incapacitation for an individual pilot.

These assumptions are:

a) Each flight lasts one hour.

b) Only 10 per cent of the flight time is critical, viz. take-off and initial climb, approach and landing (in a one-hour flight this comprises the first and last three minutes).

c) Pilot incapacitations occur randomly during a flight.

d) 1 in 100 real-life incapacitations occurring in the critical periods would result in a fatal accident, a more pessimistic view than that suggested by the simulator studies mentioned above (1 in 400), where simulated incapacitations could be anticipated by the flight crew. Based on these four assumptions, the so-called “1% rule” has been developed.
6.12.3 Causes of Incapacitation

A dramatic form of pilot incapacitation, although not necessarily its most hazardous, is death in the cockpit. A survey (1993-1998) of flight crew incapacitation on United States scheduled airlines recorded five deaths in the cockpit, all owing to cardiovascular diseases. The youngest pilot was 48 years of age when he died. No case resulted in aircraft damage or operational incident. It should be noted that ICAO introduced the requirement for incapacitation training in two-pilot operations in the 1970s and this has undoubtedly reduced the risk to flight safety from pilot incapacitation.

Incapacitations from self-limiting illness may be less dramatic but are considerably more frequent. In two studies of airline pilots, in 1968 and again in 1988, more than 3 000 airline pilots completed an anonymous questionnaire survey including questions about whether they had ever experienced an incapacitation during a flight. In both studies, which revealed remarkably consistent results, about 30 per cent answered “yes”. However, only about 4 per cent considered their incapacitation a direct threat to flight safety. In both studies the most frequently cited cause of incapacitation was acute gastroenteritis (see Table below)

Causes of incapacitation in airline pilots, in order of frequency: (Adapted from Buley, 1969; Green and James, 1991)

<table>
<thead>
<tr>
<th></th>
<th>Causes of incapacitation</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>1.</td>
<td>Uncontrollable bowel action (21%) and “other” gastrointestinal symptoms (54%)</td>
<td>75%</td>
</tr>
<tr>
<td>2.</td>
<td>Earache/blocking ear</td>
<td>8%</td>
</tr>
<tr>
<td>3.</td>
<td>Faintness/general weakness</td>
<td>7%</td>
</tr>
<tr>
<td>4.</td>
<td>Headache, including migraine</td>
<td>6%</td>
</tr>
<tr>
<td>5.</td>
<td>Vertigo/disorientation</td>
<td>4%</td>
</tr>
</tbody>
</table>

As can be seen, most of these incapacitations are caused by gastrointestinal upsets which are usually impossible to predict. Whilst they may represent little more than varying degrees of discomfort and inconvenience, they can also be completely incapacitating. Here is an example taken from a pilot’s report:

Trip was normal up to time of incident. Approximately half-way between LAS and LAX, shortly after reaching cruise, I experienced severe abdominal pains which soon rendered me incapable of operating a safe flight. I turned command over to the First Officer and put the Second Officer in the First Officer’s seat while I lay in great pain on the cockpit floor.

"Trip landed safety at LAX with First Officer . . . at the controls. An ambulance was requested by the crew..."
I was taken to the Daniel Freeman Hospital in LAX where . . . (I was given) . . . a diagnosis of gastroenteritis.

I think that spells food poisoning in our language. After some medication I felt wonderfully relieved and was released from the hospital.”

Fortunately, gastroenteritis rarely occurs so suddenly as to prevent a planned handover of control, thereby minimizing the flight safety risk. Pilot incapacitation is clearly both a traditional aeromedical problem and a straightforward training problem.

As long ago as 1970, a past Chief of ICAO’s Aviation Medicine Section wrote: It is suggested that acknowledgement of pilot on-duty incapacitation as a permanent part of the air transport industry scene in the foreseeable future constitutes a constructive rather than a defeatist medical position. Further, it appears essential that the design, management, operational, training, and licensing disciplines should recognize that pilot incapacitation must be given due weight in the overall judgment of what level of safety is practically available.”

Medical screening, by itself, cannot be relied upon to reduce the hazard of incapacitation to an acceptable minimum level, even if significantly more rigorous medical standards were to be applied. Other important aspects include pilot education in the causes of incapacitation, pilot training for safe handover of controls in such an event and, especially, good food hygiene and low-risk, separate meals for the fight crew. From the operational/training viewpoint, the maxim that “any pilot can become incapacitated at any time” is apposite.

6.12.4 Pilot incapacitation training

Pilot training in the early recognition of incapacitation and in safe handover of controls, pioneered in the United States, and has been highly effective in preventing accidents from physical incapacitation. It seems less effective in the case of mental incapacitation. Because the majority of accidents result from human failure of some sort, degradation of performance from commonly occurring sub-clinical conditions such as mild anxiety and depression, sleep loss and circadian rhythm disturbance is an important factor in this area of relative incapacitation. Although mostly a small problem amongst flight crew, the problematic use of psychoactive substances is likely to become more important as their general use in society increases.

Incapacitations can be divided into two operational classifications: “obvious” and “subtle”. Obvious incapacitations are those immediately apparent to the other crew members. The time course of onset can be “sudden” or “insidious” and
complete loss of function can occur. Subtle incapacitations are frequently partial in nature and can be insidious because the affected pilot may look well and continue to operate but at a less than optimum level of performance. The pilot may not be aware of the problem or capable of rationally evaluating it. Subtle incapacitations can create significant operational problems.

A series of 81 simulated obvious and subtle incapacitations showed that pilots needed help in two areas: their first need was for a method of detecting subtle incapacitations before they became operationally critical; their second need was for an organized method of handling the incapacitations once they were recognized. It was learned that all pilot incapacitations create three basic problems for the remaining crew. This is true whether the incapacitation is obvious or subtle and whether there is a two- (or more) member crew. Although this study was carried out many years ago, its recommendations are still valid. If an in-flight incapacitation occurs, the remaining flight crew has to:

a) Maintain control of the aircraft;

b) Take care of the incapacitated crew member; (An incapacitated pilot can become a flight deck hazard and, in any case, is a major distraction to the remaining crew. For this reason, responsibility for the incapacitated pilot, who should preferably be removed from the flight deck, should be given to the cabin crew.)

c) Reorganize the cockpit and bring the aircraft to a safe landing.

d) These three steps became the organized plan for handling in-flight incapacitation. They should be taken separately and in order.

6.12.4.1 “Two communication” rule

The “two communications” rule was developed to meet the need for a method of detecting subtle incapacitations before they become operationally critical. The rule states: “Flight crew members should have a high index of suspicion of a ‘subtle’ incapacitation any time a crew member does not respond appropriately to two verbal communications, or any time a crew member does not respond appropriately to any verbal communication associated with a significant deviation from a standard operating procedure or a standard flight profile.” This rule is easy, straightforward and effective.

6.12.5 Cognitive incapacitation

A particular category of incapacitations has been identified as “cognitive.” The problem created by these incapacitations is how to deal with a pilot who is “mentally disoriented, mentally incapacitated or obstinate, while physically able and vocally responsive.” In this category, the captain presents the most difficult case. While cognitive incapacitations may seem to be psychologically based, in some cases the underlying causes are pathological, as with a brain tumour, causing an erratic performance. Retrospectively, there often seems to have been ample warning of an impending
problem. In most cases of cognitive incapacitation, the pilot demonstrates manifestly inappropriate behavior involving action or inaction, and the inappropriate behavior is associated with failures of comprehension, perception, or judgment.

These kinds of incidents seldom occur in isolation because, in most cases, they represent a pattern of behaviour. Two excerpts from reports to NASA’s ASRS (National Aeronautics and Space Administration’s Aviation Safety Reporting System) illustrate the repetitive nature — or pattern — of what may be examples of this grey, but important, problem area.

a) “On two occasions we descended through our assigned altitude. I was the non-flying pilot and made all the call-outs. On both occasions, in addition to the required call-outs, I informed the flying pilot that we were descending through our assigned altitude. His corrections were slow and on one occasion we went 400 feet below, and on the other, 500 feet below the assigned altitude. In addition, his airspeed and heading control were not precise . . .”

The reporter elaborated further in a telephone call:

“.Captain reacted almost catatonically to his altitude call-outs and the additional call-outs that they were descending through the cleared altitudes. Definitely very delayed reactions. Other aspects of the trip were reasonably normal except that Captain missed several radio transmissions. `It was as if he simply didn’t hear them’ ”

b) From a telephone call to a pilot reporting a different incident:

“Reporter believes Captain has serious and persistent ‘subtle’ incapacitation problem. Reported incident (which included successive altitude deviations) . . . happened on first trip of the month . . . Remainder of month with Captain has had same pattern with many cases of very poor performance . . . Seems to be increasingly slow thinker in the aeroplane. Has to be reminded of things several times, even including getting his signature on required papers . . .”

The deliberate failure to follow established rules and procedures is a very old problem and the “maverick” pilot is by no means a new phenomenon. One Chief Medical Officer commented on the difficulties with dealing with aberrant behaviour in the medical context. The following paragraph is taken from his paper given at an aeromedical examiner symposium in the 1980s:

Psychiatric disturbances giving rise to unusual behavior are . . . like alcoholism . . . often covered up. There is, however, genuine difficulty here, for aviation attracts eccentrics — indeed, aviation has only reached its present state because of eccentrics. It is often very difficult to define the boundaries between normality, eccentricity, and
psychiatric disorder, and individuals, not uncommonly, cross over these boundaries from day to day. The ICAO definition — ‘manifested by repeated overt acts’ — is a useful indicator of the need for, at least, investigation.

The nature of air transport operations is such that the individuals in the best position to observe repeated overt acts and, from a practical standpoint, the only ones situated to do so, are other crew members. This creates a different sort of resource management problem. It is an obvious challenge for management. It is also a challenge for pilot-representative organizations.

Control of the incapacitation risk is dependent upon effective operational monitoring. A basic requirement for that monitoring is that all flight crew members must know what should be happening with and to the aeroplane at all times. This is one of the most important reasons for following standard operating procedures (SOPs) and flying standard flight profiles. The real importance of SOPs lies as much in the area of information transfer as it does with respect to the issue of the proper way to fly the aircraft. Routine adherence to SOPs helps to maximize information transfer in much the same way that the use of standard phraseology does in air traffic control communications.

Detection of subtle incapacitation may be indirect, i.e., as a result of a pilot not taking some anticipated action. If, for example, the pilot conducting the approach to land silently loses consciousness and his body position is maintained, the other pilot may not be aware of his colleague’s predicament until the expected order of events becomes interrupted. Regular verbal communication, built into standard operating procedures and use of the “two communication rule” are helpful to detect subtle incapacitation, especially when physical control inputs are unnecessary, e.g. automatic approach.

6.12.6 “Fail-safe crew”

The object of “fail-safe crewing” is to provide an adequate number of crew members to cope with flight crew workloads, and to make it possible fully to integrate the flight crew members into a flight crew team so as to establish a crew in which there is always at least one fully competent pilot at the controls. Ideally the actions of each crew member should continuously be monitored by his fellow crew member(s). The concept aims at achieving maximum safety in the operation of the aircraft and equitable distribution of cockpit workload so as to ensure the crew can cope with all requirements including peak demands in adverse weather or under emergency conditions — such as in-flight pilot Incapacitation.
The “fail-safe crew” concept is the key ingredient for successfully dealing with any form of pilot incapacitation. Support at all levels of management and pilot representation is needed for the "fail-safe crew" to, in practice, do justice to the concept. Meaningful simulator training, reinforced with a suitable education programme, is a requirement. The story of controlling the incapacitation risk in air transport is the story of a progress made in a series of small but important steps. Learning to manage the cognitive incapacitation risk remains an important goal.

7. CREW RESOURCE MANAGEMENT

In modern flight operations, line-oriented flight training (LOFT) emphasizes that resource management is making a substantial contribution to flight safety.

A captain representing a pilots association explained the concept as follows:

“. . . One of the basic fundamentals of this philosophy is that it is the inherent responsibility of every crew member, if he be unsure, unhappy or whatever, to question the pilot-in-command as to the nature of his concern. Indeed, it would not be going too far to say that if a pilot-in-command were to create an atmosphere whereby one of his crew members would be hesitant to comment on any action, then he would be failing in his duty as pilot-in-command…”

Training in crew cooperation, called crew resource management (CRM), is now provided by most major airlines but frequently not to the same extent by smaller operators. In smaller companies, procedures are less standardized and a greater degree of individuality is tolerated, so behavioural problems can be expected to be more common, and experience has shown that this is the case. Over several years CRM has been expanded to include the interaction between flight and cabin crew in recognition of the fact that cabin crew members can sometimes have operationally relevant knowledge that flight crew do not have.

This was dramatically demonstrated in the United Kingdom in 1989 when a flight crew shut down the wrong engine of a Boeing 737. Although the pilots believed their action was correct, the cabin crew had seen flames issuing from the other engine, but unfortunately this information was not communicated to the flight crew. In the ensuing crash several passengers and crew members were killed or severely injured. While most would agree that CRM training is helpful in promoting flight safety, its assessment is more controversial. Interpersonal relationships are not particularly amenable to measurement, and there is much suspicion among pilots about any process which attempts, or seems to attempt, to measure personality.
8. EVIDENCE-BASED DECISION MAKING

A continued assessment of in-flight crew incapacitation as a flight safety hazard requires collection of related data. Reporting of incapacitation incidents to ICAO is an integral part of an accident/incident reporting system on a worldwide basis, but suffers from two major difficulties: firstly, the data are incomplete as not all Contracting States send information on accidents and incidents, and secondly, the data are rarely assessed and classified by personnel who understand the medical implications. Moreover, Contracting States which have their own reporting system are often hampered by the confidential nature of the information supplied. For example, a report following an incapacitation is often filed by another crew member who does not reveal the name of the incapacitated person, making follow-up difficult.

Further, incapacitation data classified by means of a layman's diagnosis may be incorrect or misleading: a pilot who collapses with abdominal pain may be suffering from one of a number of medical problems, but is likely to be diagnosed by other crew members as having a gastrointestinal upset. The diagnosis might not be relevant at the time of incapacitation, but is important for monitoring medical standards and in determining where the maximum benefit for a given effort is achieved with respect to reducing the incidence of in-flight incapacitation. Attention needs to be given to devising a more accurate, preferably international, method of recording and classifying data on in-flight incapacitations.

In recent years ICAO has taken the initiative to require a Safety Management System (SMS) to be incorporated into the routine management of aerodromes, air traffic and airlines. An integral part of SMS is that of measuring and recording safety events, and of setting targets. In 2010 medical provisions became applicable in Annex 1 that recommend the application of safety management principles to the medical assessment process of licence holders, including the routine analysis of in-flight incapacitation events. It is to be hoped that this development will provide the stimulus towards a more evidence-based application of aeromedical standards. Safety management principles as applied to the medical certification process are addressed in more detail in Part I, Chapter 1, of this Manual.

9. CONCLUSIONS

In-flight pilot incapacitation is a safety hazard and is known to have caused accidents. Such incapacitation occurs more frequently than many other emergencies that are routinely trained for, such as sudden decompression. Incapacitation can occur in many forms, ranging from sudden death to a not easily detectable partial loss of function, and has occurred in all pilot age groups and during all phases of flight. It is important to recognize the operational ramifications of pilot incapacitation. Medical officers working for regulatory bodies should be fully aware of the operational aspects. Instruction and training of flight crew concerning action in the event of in-flight pilot incapacitation should include early recognition of incapacitation as well as the appropriate action to be taken by other flight crew members.
10. THE 1% RULE

During the last decades of the 20th century, a number of Contracting States were approaching a fatal Accident 2 rate of one in 10^7 flying hours. Some Contracting States therefore set as their target all cause maximum fatal accident rate a figure of one in 10^7 flying hours, with human “failure” constituting one tenth of the risk and human failure caused by medical incapacitation comprising one tenth of the human failure risk, or one hundredth of the total risk, i.e., medical incapacitation should not result in a fatal accident more often than one in 10^9 hours. Based on the assumptions stated above, a pilot flying a two-pilot aircraft can have an incapacitation risk of no more than one in 10^6 hours, and the operation will achieve the target medical cause fatal accident rate of no more than one in 10^9 hours, since the presence of a second pilot reduces the risk by a factor of 1 000. This is because: In a multi-pilot aircraft only 10 per cent of flight time is critical (risk reduced by a factor of 10) as incapacitations are assumed to occur randomly.

Therefore only one in ten in-flight incapacitations will occur during a critical stage of flight and thus pose a flight safety risk. Only one in 100 incapacitations occurring at a critical stage of flight is likely to result in a fatal accident (risk further reduced by a factor of 100). Therefore the total risk reduction with the addition of a second pilot is 1/10 × 1/100 = 1/1 000, i.e., the risk is one 000th of the risk of single pilot operations. For a pilot with an incapacitation risk of one in 10^6 hours, a second pilot therefore reduces the risk of a fatal accident from pilot incapacitation from one in 10^6 hours to one in 10^9 hours. In other words, only one fatal accident in one thousand in-flight pilot incapacitations would be expected to result in a fatal accident, because the other pilot would take over safely in the other 999 times. For an individual pilot flying a multi-crew aircraft the acceptable risk of incapacitation may therefore be increased by a factor of 1 000 from one in 10^9 to one in 10^6 hours.3

An incapacitation rate of one in 10^6 hours approximates to a rate of one per cent (or one in 102) per annum (since there are 8 760 - close to 10 000 (or 104) - hours in one year). More explicitly:

- 1 in 10^6 hours = 0.01 in 10^4 hours (dividing both figures by 100)
- in 10^4 hours = 1% in 10^4 hours
- 1% in 10^4 hours approximates to 1 per cent in one year (because there are 8 760 hours per year).

The acceptable maximum incapacitation rate of one per cent per annum outlined above has become known as the “1% rule”. This rule specifies a predicted annual medical incapacitation rate which, if exceeded, would exclude a pilot from flying in a multi-crew aircraft. This is widely regarded as an acceptable risk level and was adopted by the European Joint Aviation Authorities as the basis of aeromedical risk assessment. The “1% rule” cannot apply to a solo pilot flying in public transport operations, because it is derived from two pilot operations and the availability of a second pilot to
takeover in the event of one pilot becoming incapacitated. However, the “1% rule” has also been applied to the private pilot population by some States, on a pragmatic basis, such that a private pilot who develops a medical problem may be permitted to continue to fly as a solo pilot if his risk of an incapacitation is 1 per cent per annum or less.

This acceptance of an increased risk of incapacitation in a private pilot seems reasonable since the overall level of safety demanded of private operations is less than that of commercial operations, and it would therefore be out of place to demand a professional pilot medical standard for private pilot operations.

The “1% rule” provides a rational, objective method of assessing the fitness of applicants. However, other limits of acceptable incapacitation risk, such as 2 per cent per annum, or even greater, have been suggested. The important point is that States should endeavor to define objective fitness criteria to encourage consistency in decision-making and to assist in improving global harmonization of medical standards.

11. LICENSE LIMITATIONS

It should be noted that Annex 1 does allow for medical Standards to relate to the specific duties that may be undertaken by an individual licence-holder. This is indicated by relevant statements that appear in the Annex text referring to safe operation of an aircraft or to safe performance of duties while exercising the privileges of the licence. It follows that an applicant who has been assessed as unfit for one duty may be found fit for another, and it is possible to envisage a Licensing Authority deciding that an individual would be precluded from flying as a pilot while being judged capable of safely exercising the privileges of a flight engineer’s licence.

It is evident that many such possible operational restrictions exist but they should only be established after consultation with flight operations experts. An applicant may be found fit to operate an aircraft as a pilot under supervision or as a co-pilot but not as a pilot-in-command. In cases where prognosis cannot be given with the necessary degree of certainty, any potential risk to flight safety may, in general aviation where two pilots are not normally required, be mitigated by a restriction to fly without passengers, outside controlled airspace or with the carriage of a “safety pilot”. Such a pilot should receive adequate information about the medical condition which has led to the restriction “valid with safety pilot only”. In addition, he must be capable of acting as pilot-in-command in case of an emergency.

In commercial aviation, a restriction to multi-crew operations may serve a similar purpose. In such a manner it is often possible to fit individuals into aviation by restricting their licence or limiting their duties and thus mitigating the risk to flight safety while retaining the experience of individuals who would otherwise be denied a license.
12. SECTION 2

12.1 History of Aviation Medicine in South Africa

The Aeronautical Society of South Africa was formed in 1911, and the pilot’s medical requirements at the time included a good working knowledge of motorcycle/motorcars, a perfect short and distant eyesight, without the aid of glasses, a restriction on age (35), and marital status. Dr Danie Craven of rugby fame and Prof Jokkel, later of “Physical Fitness” at the Stellenbosch University, played a key role at Diskobolos near Kimberley in aircrew selection and fitness training. The formalisation of Aviation Medicine in South Africa took place when the Aviation Wing of the South African Medical Corps was established in 1922. At this time, a Royal Air Force medical officer was seconded to conduct the medical examination on the SAAF pilots, and train local physicians about the processes involved in the selection of pilots. Between the period of 1960 and 1990 the Air Force upgraded to Supersonic Aircraft and the need for Aviation Medicine grew apace. A new Institution for Aviation Medicine was built to house the new technologies including centrifuge, decompression chambers, re-compression chambers and other specialised equipment. Since the expensive equipment and technology was still housed at the Institute for Aviation Medicine, all disputes, reviews and appeals, were and still are referred to this institute for discussion.

After World War II, the civilian aviation environment expanded rapidly and the emphasis on aviation medicine shifted from the military to the civilian sector. In 1934, Union Airways was bought by the South African government, and renamed South African Airways on 1 February. The first cities served were Cape Town, Durban and Johannesburg. Dr Harry Z Gelman, a Consultant Ophthalmologist to the South African Airways wrote a letter on 10 June 1975 to Dr Marius Van der Spuy, the then Director of SAA’s medical division suggested that SA should host an International Congress of Aviation and Space Medicine. Dr Gelman also suggested that SAA should become a corporate member of the American Aerospace Medical Association, which to this very day is still maintained. Dr Harry Z and Mrs Joan Gelman managed against high odds to attend the 23rd ICASM conference in Mexico at the end of September 1975, and their plan was to win the 1976 ICASM for South Africa. This was during the years of SA’s worldwide isolation. Mrs Joan Gelman was chosen as chairperson of the International Reception Committee of the (big) American Aerospace Medical Association for two years in succession at that time, a unique honour which had never been given to a non-American citizen at the time, and in 1975 the 24th ICASM was awarded to SA to host. At this stage Dr Harry Gelman realized that SA should have its own aviation medicine association, and he formed the SA Aviation Medical Association, which is currently known as the SA Society of Aerospace and Environmental Medicine.

Prior to the establishment of the SACAA, all aviation medicine activities were overseen by the Institute for Aviation Medicine, a military institution that reports to the Department of Defence. At the time, all the aviation medicine activities
were centralized, until 1991, when a decision was made to decentralize the system, and delegate the authority to designated medical examiners to examine and certify applicants.

The Aviation Medical Department of the SACAA was established subsequent to an audit finding by ICAO in 1999, which indicated the need for an in-house medical establishment within the SACAA. With the adoption of Part 67 of the Regulations and the creation of the Aviation Medical Department, the medical certification oversight function was now under the SACAA. The SACAA is responsible for ensuring that licensed aviation personnel meet the medical fitness standards prescribed by the International Civil Aviation Organisation (ICAO) Annex 1 and the Civil Aviation Regulations (CAR) Part 67.

### 12.2 Establishment and management of the SACAA

The SACAA is a regulatory parastatal body, which was established in October 1998. The SACAA’s mandate is to control, regulate and promote aviation safety, security and the environment. The SACAA was formed in keeping with the new Government's priorities of policy development, economic restructuring and reducing the burden on the general taxpayer, which was consistent with international trends. Aviation medicine in South Africa continuous to be decentralized, with the SACAA being responsible for the designation of aviation medical examiners, development of medical standards, participation in training of medical examiners, processing of medical appeals, application of accredited medical conclusions and flexibility. The medical department is also responsible for the oversight of air ambulances, first aid training for cabin crew, and oversight of communicable diseases at airports, airlines and air traffic services.

The Institute of Aviation Medicine conducts medical verification processes on behalf of the Director; the institute also gives initial and recurrent aviation medicine training to designated examiners. The legal responsibility of the function of the Institute for Aviation Medicine is contained in Part 67.00.3 of the Civil Aviation Regulations. The SACAA is funded by a combination of user fees, levies and money paid by the Department of Transport for services performed on their behalf e.g. accident investigations. User fees are based on cost recovery. The SACAA is governed by a Board of Directors appointed by the Minister of Transport.

Following the establishment of the new SACAA in South Africa, the role of the SACAA in the practice of Civil Aviation Medicine had to be reviewed, as the authority's objective is to promote aviation safety by utilising resources cost-effectively and by establishing partnerships with the industry. The different options available to the SACAA were evaluated, based on international practice. The oversight functions of the SACAA pertaining to Aviation Medicine were specifically explored, as well as the need for continued review of standards to ensure compliance with ICAO requirements and to maintain comparable standards with best international practice. A doctor was appointed on a
contract basis in April 1999 to conduct research relating to international medical requirements and South Africa’s compliance thereto. ICAO performed an audit in November 1999 and recommended the establishment of an in-house medical department. The SACAA's Aviation Medicine Department was formally established in April 2000. It was initially established to focus on policy and other medical matters that had not previously received attention, but soon expanded to include various other functions and services.

### 12.3 Roles and Responsibilities of Stakeholders involved

#### 12.3.1 Structure and Relationships in Civil Aviation Medicine in South Africa

![Diagram of roles and responsibilities]

**Medical Assessor**

The SACAA utilises the services of medical assessors who are based at the Institute for Aviation Medicine and the SACAA office. The role of the Medical Assessor at the Institute of Aviation Medicine is to verify Class 4 (Recreational) and Class 2 (Cabin Crew) medical documents, both classes are a Non-ICAO requirement. The institute also provides administrative support to the SACAA through the licensing and scanning departments. ICAO defines medical assessors as physicians, qualified and experienced in the practice of aviation medicine, who evaluate medical reports submitted to
the Authority by medical examiners. The medical assessors evaluate medical reports submitted by medical examiners and are therefore required to maintain the currency of their professional knowledge.

Following medical examination, the medical examiner must forward the medical examination form and supporting documentation to the designated institution within 60 days of medical examination, where it will be reviewed by medical assessors at the Civil Aviation Authority and once the documents are audited a medical certificate may be issued. This certificate may be different from the one issued by the medical examiner. The medical assessors at the SACAA conduct verification of medical examinations performed by the designated medical examiners.

12.5 Targeted Medical Standards

The SACAA, in consultation with IAM, SAASMA, RAASA, ATNS and other medical stakeholders has identified a need to review the medical standards for Class IV, Air Traffic Controllers and Cabin Crew. The medical standards currently in force are not targeted towards the operational environment of licence holders, for example altitude vs non-altitude issues (ATC), terminology used (grounding vs medical withdrawal), multicrew vs single crew environment, etc. Based on the information mentioned above, medical standards for Class Four (4) medical medical applicants were approved by CARCOM and are waiting for the revision of the class four (4) category to be finalized and will be introduced at a later stage.

12.6 Aeromedical Committee of the Civil Aviation Authority (ICAO Flexibility)

The Director of the SACAA established the 1st civilian committee, known as the Aeromedical Committee (AMC), in June 2010 and the CAA has since appointed a number of committee members, as their contract is valid for 2 years. The Aeromedical Committee is an advisory body of medical, psychological, surgical and ancillary health experts charged with advising the SACAA on any medical risks posed by existing or prospective aviation personnel who are required, in terms of the Civil Aviation Regulations (2011), to hold a medical certificate. Intricate borderline, protocol and complicated cases are referred to the Aeromedical Committee of the Civil Aviation Authority for review. The primary role of the AMC is to review and make recommendations on the medical fitness of licensed aviation personnel referred by the Designated Medical Examiners (DAMES), Aviation Medical Assessors (AMA) and the Institute for Aviation Medicine (IAM) so that expert opinions can be tabled for the fair and consistent application of assessment.

The purpose of the Aeromedical Committee is to assess complex medical cases and to ensure that medical certificates are not issued or renewed unless the following conditions are fulfilled (ICAO’s Flexibility Clause): accredited medical conclusion; which indicates that in special circumstances the applicant’s failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the licence applied for, is not likely to jeopardize flight
safety; that the relevant ability, skill and experience of the applicant and operational conditions have been given due consideration and the licence is endorsed with any special limitation or limitations when the safe performance of the licence holder’s duties is dependent on compliance with such limitation or limitations.

12.6.1 Composition and Appointment of the Aeromedical Committee

The appointment of members of the Aeromedical Committee was based on the research conducted through the University of Pretoria (entitled Common Morbidity Pattern that leads to medical unfitness in civil aircrew in South Africa). The objective of this study is to: (1) determine the proportion of medical unfitness among the different medical classes of civilian aircrew in South Africa, (2) identify the medical conditions that lead to medical unfitness, (3) compare the morbidity patterns among the classes of medical certificate holders that lead to medical unfitness, and to assess the average age of crew found to be medically unfit, (5) compare the outcomes of the decision of the Institute for Aviation Medicine panel from 2000 to 2008. The SACAA continuous to assess morbidity patterns based on the cases presented, to continuously ensure that the relevant specialists are represented.

The specialists appointed to the Aeromedical Committee are required to be linked to the Medical Institutions and are nominated by the Deans of Medical Schools from the following institutions: the University of Pretoria, the University of Limpopo and the University of the Witwatersrand are represented. The committee also has representatives from the Institute of Aviation Medical Examiners, Southern African Aerospace Medicine Association, Airline Pilot Association, Air Traffic Control and Cabin Crew Representatives and Senior Designated Examiners with experience of occupational, regulatory and clinical aviation medicine. On occasion, the DCA may appoint specialists who are experts in their field but who are not linked to universities.

12.6.2 Responsibilities of the Aeromedical Committee and dates of The Meetings

The members are required to participate in committee meetings in an objective manner and in a way that enhances civil aviation safety and that benefits the Director and the civil aviation industry in general. They provide evidence-based medical opinions concerning specific medical cases and recommend action required to be taken. The members are required to conduct research; investigating and interacting with relevant medical societies or research institutions to ensure that appropriate medical advice is given to the Director. Members are also required to be familiar with the requirements of the International Civil Aviation Organisation, other Civil Aviation Authorities and the South African Civil Aviation Medical Requirements prescribed in Part 67 of the CAR, 2011. The Aeromedical Committee meets once a month, on the 3rd Tuesday of the month, and all documentation required to be presented at the Aeromedical Committee has to be submitted seven (7) working days before the meeting.

12.7 Designated Aviation Medical Examiners
Applicants for Class 1, Class 2 and Class 3 licences have to be examined by a designated aviation medical examiner who has been approved by the Director.

a) A Class 4 applicant may be examined by his general practitioner provided that:
b) The examination is conducted in accordance with the requirements in the Civil Aviation Regulations Part 67 and the corresponding technical standards (SA-CATS- MR).

The results are documented on the prescribed form and forwarded to the SACAA or designated institution for verification.

13. SECTION 3

13.1 Designation of Aviation Medical Examiners

13.1.1 Designated aviation medical examiner

An aeromedically qualified doctor designated by the Director, after consultation with the designated institution, and granted the authority to perform medical examinations or tests required for the issuing of Class 2 and Class 4 medical certificates.

13.1.2 Designated senior aviation medical examiner

A designated aviation medical examiner given the additional authority to perform medical examinations or tests required
for the issuing of Class 1 and Class 3 medical certificates.

13.1.2.1 Designation

The authority to exercise the powers and perform the duties of a designated aviation medical examiner, which commences on the date on which the document of designation is issued by the Director to the designated aviation medical examiner and remains in force for a period of 12 months following this date.

13.1.2.2 Termination of designation

The revoking of a designation before the expiry of the 12-month period

13.1.2.3 Responsibilities of designated medical examiners

Aviation medical examiners have the responsibility to ensure that only those applicants, who are physically and mentally capable of performing safely, may exercise the privileges of their certificates. To properly perform the duties associated with these responsibilities, DAMEs must:

a) Keep abreast of the general medical knowledge applicable to aviation.

b) Have detailed knowledge and understanding of all rules, regulations, policies and procedures relating to the medical certification of applicants.

c) Possess acceptable equipment and have adequate facilities necessary to carry out the prescribed examinations.

13.1.2.4 Selection and retention of DAMEs

In the selection and retention of DAMEs, the designated body or institution will recommend only professionally qualified, practicing physicians who have an expressed interest in promoting aviation safety. Only those physicians who enjoy the fullest respect of their associates and members of the public, whom they serve, shall be designated and retained as DAMEs.

13.1.2.5 Criteria for designation

Authority to perform Class 2 and Class 4 examinations

Credentials

a) DAME shall receive training in aviation medicine and shall have practical knowledge and experience of the conditions under which the holder of licence and ratings carry out their duties.
b) The practical knowledge and experience shall include but not limited to flight experience, simulator experience, on-site observation and any other practical experience considered necessary by the licensing authority.

c) DAME must demonstrate to the Director of his or her competency in aviation medicine before designation.

d) At the time of initial application for designation, the physician must submit the following documents or copies thereof:

Qualifications:

a) Medical Degree;

b) Certificate, diploma, or degrees of any postgraduate professional training;

c) Registration with the Health Professions Council and Proof of good standing;

d) Special consideration will be given to those applicants who are pilots, who have special training or expertise in aviation medicine, or who were previously designated but have relocated to a new geographical area; and

e) There should be no restrictions of medical practice;

f) No known investigations, charged indictments or pending actions in any court of law.

Distribution:

a) Must be a determined need for a DAME in the area.

b) Based on adequacy of coverage related to pilot population.

Applicant must agree to comply with the requirements.

Change of status:

a) DAME must promptly notify the SACAA, should there be a change in DAME status of authority to practice medicine.

Professionalism:

a) Be informed regarding the progress in aviation medicine;

b) Be thoroughly familiar with the relevant techniques of examination, medical assessment, as well as certification of applicants;

c) To abide by the policies, rules and regulations of the designated institution as approved by the director.

Examinations:
a) A DAME is required to personally conduct all medical examinations. Other physicians or paraprofessional personnel may perform specialized parts of the examinations under the general supervision of the DAME, who must sign the documents, and list his/her designation identification number, both on the application form and on the medical certificate. In all cases the DAME must review, certify, and assume responsibility for accuracy and completeness of the total report of examination.

b) In the event that the medical examination is to be conducted by two or more medical examiners, the Director shall appoint one of those medical examiners to be responsible for coordinating the results of the examination, evaluating the findings with regard to medical fitness and the signing of the reports.

c) The designated aviation medical examiner shall ensure that when submitting medical documentation manually or electronically for verification to the Medical Assessor that they list their identification number as prescribed in technical standard 67.00.4(7)."

Facilities and Equipment:

a) Must have adequate facilities for performing the required examinations and possess, or agree to obtain, such equipment, or access to the necessary facilities, prior to conducting any aviation medical examination.

Conduct:

Must comply with the policies, orders and regulations of the designated body or institution as approved by the Director.

13.1.2.6 Authority to perform Class 1 and Class 3 examinations

In addition to the criteria for designation as a DAME, the physician must demonstrate, by compliance with the requirements for continued service as a DAME, acceptable prior performance as a DAME authorised to perform Class 2 and Class 4 examinations for a period of at least 3 years.

13.1.2.7 Prohibited examinations

A DAME may not perform self-examination for the issuing of a medical certificate nor issue a medical certificate to himself or herself.

13.1.2.8 Duration of designation
b) Designation of physicians as DAMEs is effective for 1 year following the date of issue, unless terminated earlier by the Director of Civil Aviation or the designee. For continued service as a DAME, the designee must reregister annually.

c) In the event of office relocation or change in practice, a designation will terminate and may be reissued, on request, by the Director of Civil Aviation. In respect of the relocation, a determination of adequacy or coverage will be made.

13.1.2.9 Authority of a DAME

a) The DAME must personally conduct physical examinations in accordance with the guidance and practices as laid down by the designated institution.

b) He/she must issue, defer or deny medical certificates in accordance with the provisions of the CARs Part 67 subject to reconsideration by the designated institution.

13.1.2.10 Procedures for designation

a) Physicians must submit a written application to Director for designation;

b) The Director will inform the applicant in writing of his or her designation and will issue a Certificate of Designation;

c) The designated institution continuously evaluates the performance of each DAME;

d) Only physicians who have demonstrated satisfactory performance in the past and who continue to show a definite interest in the DAME programme, will be re-designated;

e) In addition, the designated institution must identify those DAMEs committing examination and certification errors and notify the Director, in writing, for appropriate action to be taken.

Information collected by the designated institution and the CAA includes:

a) Data on the adequacy of information on reports of medical examination;

b) Errors made on reports of aviation medical examinations;

c) DAME interest and participation in aeromedical programmes and conferences; and

d) Reports from the aviation and/or medical community concerning professional performance and personal conduct as it may reflect on the designated institution as well as the Director.

13.1.2.11 Basis for termination or non-renewal of designation

a) Failure to re-register punctually each year;
b) No examinations performed during the 12 months of initial designation;
c) Performing less than 15 examinations per year after 24 months and this figure shall be 30 examinations per year for senior examiners;
d) Disregard of, or failure to demonstrate knowledge of, the rules, regulations, policies and procedures of the designated body or institution;
e) Repeated errors after receiving warnings from the designated body or institution;
f) Failure to attend required conferences and/or continued aviation medical education;
g) Movement of the location of practice from where presently designated;
h) Failure to participate in any aviation medical programme when requested to do so by the designated institution or the Director;
i) Unprofessional conduct in performing examinations;
j) Failure to comply with the provisions of the CARs Part 67;
k) Personal conduct or public notoriety that may reflect adversely on the designated body or institution or the Director;
l) Loss, restriction or limitation of a licence to practice medicine;
m) Any action that compromises public trust or interferes with the DAMEs ability to fulfill the responsibilities of his or her designation;
n) Any illness or medical condition that may affect the physician's sound professional judgment or ability to perform examinations;
o) Arrest, indictment or conviction for violation of law;
p) Request by the physician for termination of designation or
q) Any other reason if it is determined to be in the best interest of aviation safety as determined by the Director.

13.1.2.12 Procedures for renewing designations

Before expiration of designation, the DAME concerned must apply for re-designation, in writing, to the Director. DAME whose re-applications are not received will not be re-designated.

13.1.2.13 Procedures for terminating or not renewing designations

The designated institution will advise the Director when to terminate or not renew a designation. When it is determined that a designation should be terminated or not renewed, the following procedures are applicable:

a) The DAME will be notified in writing, by certified mail, of the reason(s) for the proposed action;
b) The written notification will give the DAME the option to respond in writing or in person within 30 days of the date of letter;
c) In cases where a DAME is suspected of fraud or any other activity for which emergency action is necessary to assure aviation safety, the CAA will immediately direct the DAME in writing to cease all further examinations pending further investigation.

d) The investigation must be conducted expeditiously however; if the Medical Assessor believes that the DAMEs cessation of further examinations should continue pending final disposition of the matter by the Director, he or she may so direct the DAME in writing, by certified mail. The termination procedures must be accomplished expeditiously.

Whether by determination to not re-designate or termination of designation during the designation year, the DAME must return all CAA materials (including forms and certificate of designation) to the Director.

13.1.2.14 Fees related to designation

a) From 1 April 2005 the following fees will apply to designation of medical examiners:

- Regular examiners: R 490
- Senior examiners: R920

b) These fees will not be applicable to:

- Examiners in the employ of the designated institution;
- Military examiners provided that they perform examinations on military personnel only;
- Specialists providing consultation services to the Director;
- International examiners that have been approved by the Director

13.2 Legal Issues

13.2.1 Confidentiality of information

a) Examiners must at all times ensure that medical information remain confidential.

b) Should an examiner on basis of clinical findings require more tests, informed consent should be obtained from the applicant.

c) Information must be released to the CAA and the designated institution on request, for purposes of issuing a medical certificate or a licence or if the examiner believes that it may have an impact on flight safety. Medical information may not be released to other parties, nor should it be printed on the medical certificate without the consent of the applicant.

13.2.2 Medical examination forms and medical certificates
a) The medical examiner must send the original medical examination form to the SACAA or Institute for Aviation Medicine and issue the applicant with the original medical certificate;
b) For both the medical examination form and the medical certificate the following is required:
c) The medical certificate must be an original certificate obtained from the CAA or generated by the EMPIC System;
d) The medical examination form can be obtained from the CAA or can be downloaded from the CAA website;
e) No photocopies of medical certificates will be accepted;
f) No examination forms or medical certificates other than the ISO approved CAA documents will be accepted;
g) All documents must be signed by both parties in all the relevant places;
h) Forms with Tippex will not be accepted;
i) Incomplete/ illegible forms or certificates will not be accepted;
j) The medical examiner's code must be on all documentation;
k) If any changes or corrections are made on the medical examination form, corrections must be signed by both parties;
l) No corrections will be accepted on the medical certificate;
m) Pilot licences and medical certificates are regularly inspected abroad, and they may be detained or even charged with fraud if all the documentation is not in order. It is therefore essential that the applicant carries the original medical certificate on his person, that no alteration has been made on the medical certificate and that the medical certificate is complete.
n) All documentation must be sent to IAM within 60 days of the date of examination. All late submissions will render the medical certificate invalid.

13.3 Training of Medical Examiners

Medical Examiners are required to attend a refresher course or attend an acceptable conference every 4 years. In addition, examiners should remain current with changes in legislation and the latest developments in Aviation Medicine. This can be achieved by reading publications on the CAA website and the Safety Link.

13.4 Examination of South African Pilot in Foreign Countries

An applicant in a foreign country should contact an aviation medical examiner that has been approved by the Director to perform medical examinations on South African pilots. A list of these approved aviation medical examiners can be found on the CAA website.

The examination has to be conducted in accordance with the requirements of the Civil Aviation Regulations Part 67 and the corresponding technical standards (SA-CATS-MR). The findings of the medical examination must be documented on the prescribed form and must be sent to the designated institution for certification.
Alternatively, an applicant can contact an examiner registered with other foreign Civil Aviation Authorities to perform the relevant Authority’s examination. The examination forms and the medical certificate must be submitted to the CAA or the designated institution. The designated institution may request additional examinations on behalf of the Director of Civil Aviation. The foreign medical examiner must hold a qualification recognized by aviation authorities internationally and submit proof thereof to the Director.

A medical certificate will be issued by the designated institution or the CAA and may be different from the certificate initially issued by the medical examiner. Once the applicant has returned to South Africa, he/she will be required to undergo a new medical examination by a South African aviation medical examiner.

13.5 Certification Process of Medical Examinations

Applicant may appeal to the Director of Civil Aviation during any stage of this process.

13.6 Summary of Requirements for Designated Aviation Medical Examiners

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<th>Examiner</th>
<th>Requirements</th>
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1. Pass a 2-week Certificate Aerospace Medicine Course
2. Perform minimum of 15 examinations annually
3. Attend refresher course or conference every 4 years
4. Acceptable performance
5. Annual re-registration

Senior Examiner
1. Acceptable performance as regular examiner for 3 years
2. Perform minimum of 30 examinations annually

International aviation medical examiners
1. Approved by the Director
2. Has to complete South African medical examination form and submit to IAM or CAA

14. SECTION 4

14.1 Civil Aviation Regulations 67

14.1.1 Part 67: Medical Certification

List of regulations

- 67.00.1 Applicability
- 67.00.2 Classes of medical certificates
- 67.00.3 Functions of Director regarding medical examinations
- 67.00.4 Designation of aviation medical examiners
- 67.00.5 Class 4 medical certificates
- 67.00.6 Period of validity of medical certificates
- 67.00.7 Application for medical certificate
- 67.00.8 Issuing of medical certificate
- 67.00.9 Duties of holder of medical certificate
- 67.00.10 Validations
- 67.00.11 Foreign medical examinations
- 67.00.12 Period of validity of medical records
- 67.00.13 Substance abuse
- 67.00.14 Suspension or cancellation of medical certificate
- 67.00.15 Medical confidentiality

Applicability
67.00.1

a) This Part applies to the issuing of medical certificates for flight crew, cabin crew and air traffic service personnel.

b) The Director may designate medical officers to perform in terms of this Part any functions or duties on his or her behalf.

c) Where appropriate, the reference to the Director in this Part shall be deemed to include medical assessor referred to in sub-regulation (2).

Classes of medical certificates

67.00.2

(1) The classes of medical certificates are –

a) Class 1 –
   1. airline transport pilot: aeroplane and helicopter;
   2. commercial pilot: aeroplane and helicopter;
   3. flight test rating;
   4. commercial microlight aeroplane pilot;
   5. gyroplane pilot for commercial purposes;
   6. commercial glider pilot;
   7. airship pilot for commercial purposes;
   8. flight engineer; and
   9. powered paraglider pilot for commercial purposes;

b) Class 2 –
   1. private pilot: aeroplane and helicopter;
   2. student pilot;
   3. cabin crew member; and
   4. free balloon pilot for commercial purposes.

c) Class 3 –
   1. air traffic controller; and

d) Class 4 –
   1. microlight aeroplane pilot;
   2. glider pilot;
3. gyroplane pilot for non-commercial purposes;
4. airship pilot for non-commercial purposes;
5. free balloon pilot for non-commercial purposes;
6. hang-glider pilot;
7. paraglider pilot;
8. powered paraglider pilot for non-commercial purposes; and
9. air traffic service assistant

(2) A flight crew member who holds a valid Class 1 medical certificate shall be deemed to hold a valid Class 2 medical certificate and a valid Class 4 medical certificate.

(3) An air traffic service personnel member who holds a valid Class 3 medical certificate shall be deemed to hold a valid Class 4 medical certificate.

(4) Upon expiry of a Class 1 medical certificate, such medical certificate shall be deemed to be valid for the remainder of the period for which it would have been valid as a Class 2 medical certificate and a Class 4 medical certificate as specified in regulation 67.00.6.

(5) Upon expiry of a Class 3 medical certificate such medical certificate shall be deemed to be valid for the remainder of the period for which it would have been valid as a Class 4 medical certificate as specified in regulation 67.00.6.

(6) The medical requirements and standards to be complied with by an applicant for, or the holder of, a Class 1, 2, 3 or 4 medical certificate are as prescribed in Document SA-CATS 67.

Functions of Director regarding medical examinations

67.00.3

(1) The Director must –

a) exercise control over medical examinations or tests and over aviation medical examiners performing such examinations or tests;

b) determine standards for such examinations or tests and for the training of such aviation medical examiners;

c) issue or amend medical certificates and keep all books or documents regarding such examinations or tests;

d) apply basic safety management principles to the medical assessment process of licence holders by inter alia:

   I. routinely collecting and analysing medical findings during medical assessments to identify areas of increased medical risk;

   II. continuously re-evaluating the medical assessment process to concentrate on identified areas of increased medical risk;
III. routinely collecting and analysing incapacitation in-flight and on active duty; and

IV. ensuring that accredited medical conclusions are reached.

(2) The Director may designate a body or institution to –

a) exercise control over medical examinations or tests and over aviation medical examiners performing such examinations or tests;

b) determine standards for such examinations or tests and for the training of such aviation medical examiners;

c) issue or amend medical certificates and keep all books or documents regarding such examinations or tests; and

d) subject to the provisions of regulation 67.00.9, advise the Director on any matter connected with such examinations, tests or aviation medical examiners and on the training of flight crew and cabin crew in first aid.

(3) The designation referred to in sub-regulation (2) shall be made in writing and shall be published in the Gazette within 30 days from the date of such designation.

(4) The powers and duties referred to in sub-regulation (2) shall be exercised and performed according to the conditions, rules, requirements, procedures and standards prescribed in Document SA-CATS 67.

(5) The designated body or institution shall permit an authorised officer, inspector or authorised person to carry out such safety inspections and audits which may be necessary to verify the effective performance of the designated functions in terms of regulation 67.00.3 (2).

67.00.4: Designation of aviation medical examiners

(1) The Director may, after consultation with the designated body or institution, designate aviation medical examiners to perform medical examinations or tests required for the issuing of medical certificates.

(2) The conditions and requirements for and the rules, procedures and standards connected with a designation referred to in sub-regulation (1) shall be as prescribed in Document SA-CATS 67.

(3) The Director shall sign and issue to each DAME a document which shall state the full name of such aviation medical examiner and contain a statement that –

a) such aviation medical examiner has been designated in terms of sub-regulation (1); and

b) such aviation medical examiner is empowered to –

   I. perform the medical examination or test required for the issuing of the appropriate medical certificate;

   II. subject to the provisions of regulation 67.00.8, issue such medical certificate; or

   III. defer the issuing of such medical certificate pending an appropriate instruction from the designated body or institution.

67.00.5 Class 4 medical certificates
(1) Notwithstanding the provisions of regulation 67.00.4, any medical practitioner who is registered in terms of the Health Professions Council of South Africa, may perform a medical examination for the purpose of the issuing of a Class 4 medical certificate.

(2) The provisions of regulations 67.00.7(1) and (2) applies with the necessary changes to an application for the issuing of a Class 4 medical certificate.

(3) The medical practitioner concerned shall, within 60 days from the date on which the medical examination has been performed, submit the application together with any appropriate –
   a) supporting medical reports; and
   b) results of medical examinations or tests performed; to the designated body or institution for the verification of the application and the issuing of the medical certificate.

(4) An applicant who complies with the appropriate medical requirements and standard referred to in regulation 67.00.2(6), shall be entitled to a medical certificate.

(5) On receipt of the documents referred to in sub-regulation (3), the designated body or institution shall –
   a) verify the application concerned; and
   b) if the applicant complies with the appropriate medical requirements and standards referred to in sub-regulation 67.00.2(6), issue the medical certificate.

(6) The designated body or institution may, if a medical conclusion requires that –
   a) medical examinations or tests be performed at shorter intervals; or
   b) additional examinations or tests be performed, endorse the medical certificate with such requirement or limitation.

**Period of validity of medical certificates**

67.00.6

(1) A Class 1 medical certificate shall, subject to sub-regulation (5) be issued for a period of –
   c) twelve (12) calendar months, calculated from the last day of the calendar month in which the medical certificate is issued, where the applicant is less than 40 years of age on the date on which the medical certificate is issued;
   d) six (6) calendar months in the case of an airline transport pilot (aeroplane or helicopter), engaged in single-crew commercial air transport operations, calculated from the last day of the calendar month in which the medical certificate is issued, where the applicant is 40 years of age or more on the date on which the medical certificate is issued;
   e) twelve (12) calendar months in the case of an airline transport pilot (aeroplane or helicopter), engaged in multi-crew commercial air transport operations, calculated from the last day of the calendar month in which the
medical certificate is issued, where the applicant is 40 years of age or more, but less than 60 years of age, on the date on which the medical certificate is issued;
f) twelve (12) calendar months in the case of a commercial pilot (aeroplane or helicopter), calculated from the last day of the calendar month in which the medical certificate is issued, where the applicant is 40 years of age or more, but less than 60 years of age, on the date on which the medical certificate is issued;
g) six (6) calendar months in the case of a pilot as specified in subparagraph (c) and (d), where the applicant is 60 years of age or more.
h) Sixty months

(2) A Class 1 medical certificate referred to in sub-regulations (1) (c) and (d) shall be valid subject to the condition that the holder –

submits a six (6) monthly medical report, if he or she has a medical disease or risk factor for which he or she receives regular treatment by his or her treating physician or DAME, and the report shall include:

a) nature of disease or risk factor;
b) information regarding control of risk factors or disease;
c) complications that have developed as a result of the disease or risk factor; and
d) type of treatment and side-effects of treatment.
e) submits an annual follow-up blood test where applicable; and
f) adheres to the requirements of any Schedule or Protocol as detailed in Document SA-CATS 67, where applicable.

(3) A Class 2 and 3 medical certificate shall, subject to sub-regulation (5) be issued for a period of –

a) in the case of Class 2 certificate, 60 months calculated from the last day of the calendar month in which the medical certificate is issued where the holder is less than 40 years of age;
b) in the case of Class 3 certificate, 48 months calculated from the last day of the calendar month in which the medical certificate is issued where the holder is less than 40 years of age;
c) 24 months, in the case where the holder of a Class 2 or Class 3 medical certificate has passed his or her 40th birthday;
d) 12 months, when the holder of a Class 2 or Class 3 medical certificate has passed his or her 50th birthday.

(4) A Class 4 medical certificate shall, subject to sub-regulation (5), be issued for a period not exceeding –

a) sixty (60) calendar months, calculated from the last day of the calendar month in which the medical certificate is issued, where the applicant is less than 40 years of age on the date on which the medical certificate is issued; and
b) thirty-six (36) calendar months, calculated from the last day of the calendar month in which the medical certificate is issued, where the applicant is 40 years of age or more on the date on which the medical certificate is issued.

(5) Notwithstanding the provisions of sub-regulations (1), (2) (3) and (4), a DAME may –
a) if indications require that –
b) medical examinations or tests be performed at shorter intervals; or
c) additional examinations or tests be performed; or
d) when the safe performance of the duties essential to the operation of an aircraft executed by the holder of such medical certificate, depends on a reduction in the period of validity of such medical certificate or compliance with any special limitation, reduce the period of validity of such medical certificate and endorse the medical certificate with the reason for such reduction or with any such requirement or limitation.

67.00.7 “Application for medical certificate

(1) An application for the issuing of a medical certificate shall be made on the appropriate prescribed form.

(2) An applicant who attends a medical examination or test for the issuing of a medical certificate shall –

   a) produce proof of his or her identity; [and]
   b) produce for inspection any licence held for which the certificate is required and the most recent medical certificate held, if any; and
   c) provide the DAME with a personal statement of medical facts concerning personal, familial and hereditary history and sign a declaration confirming the accuracy, completeness and truthfulness of the information contained in the medical examination form.

(3) Subject to the provisions of regulations 67.00.3(2)(c) and 67.00.4(3)(b)(iii), an applicant who complies with the appropriate medical requirements and standards referred to in regulation 67.00.2(6), shall be entitled to a medical certificate.

(4) The DAME after completing the medical examination shall complete and sign the appropriate part of the medical examination form.

(5) The DAME shall report to the medical assessor any individual case where, in the DAME’s judgement, an applicant’s failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the license being applied for or held, is likely to jeopardize flight safety issuing of medical certificate.

67.00.8

(1) A medical certificate shall be issued by the DAME concerned on the appropriate prescribed form.

(2) The DAME concerned shall, within 60 days from the date on which the medical certificate has been issued, submit the original application together with any appropriate –
(3) On receipt of the documents referred to in sub-regulation (2), the designated body or institution shall verify that the holder of the medical certificate complies with the appropriate medical requirements and standards referred to in regulation 67.00.2(6).

(4) A medical certificate issued by a DAME, shall remain in force, subject to any requirement or limitation endorsed thereon and for the period for which it was issued: Provided that the designated body or institution may –

a) if the medical certificate has been issued to an applicant who does not comply with the appropriate medical requirements and standards referred to in regulation 67.00.2(6), cancel the medical certificate; or

b) if medical conclusion requires that –

   I. medical examinations or tests be performed at shorter intervals;

   II. additional examinations or tests be performed; or

   c) when the safe performance of the duties essential to the operation of an aircraft, of the holder of the medical certificate, depends on compliance with any special limitation, endorse the medical certificate with such requirement or limitation.

(4A) Notwithstanding the provisions of this Part, a medical assessor may, in exceptional circumstances, issue or renew a medical certificate to an applicant who does not meet some of the medical standards prescribed in this Part if—

a) accredited medical conclusion indicates that in special circumstances the applicant’s failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the licence applied for is not likely to jeopardize flight safety;

b) relevant ability, skill and experience of the applicant and operational conditions have been given due consideration; and

c) the licence is endorsed with any special limitation when the safe performance of the licence holder’s duties is dependent on compliance with such limitation.

(5) For the purposes of sub-regulation (2), the words "original application" includes any incomplete application.

**Duties of holder of medical certificate**

67.00.9

(1) The holder of a medical certificate shall –

a) carry such medical certificate on his or her person when carrying out the duties as a flight crew member, an air traffic service personnel member or a cabin crew member, as the case may be;

b) not under any circumstances act as a PIC, or in any other capacity as a flight crew member, an air traffic service personnel member or a cabin crew member, as the case may be –
I. while he or she is aware of any medical condition or medication which could affect the validity of such medical certificate;  
II. while she is pregnant during periods and under circumstances as prescribed in Document SA-CATS 67;  
III. if the holder has given birth in the preceding six weeks; or  
IV. after such medical certificate has expired;  
c) without undue delay, notify the designated body or institution of any –  
   I. injury;  
   II. hospitalisation;  
   III. surgical operation or invasive procedure;  
   IV. regular use of medication;  
   V. pregnancy;  
   VI. absence due to illness for a period of more than 21 days; or  
   VII. psychiatric treatment, which renders such holder unable to comply with the appropriate medical requirements and standards referred to in regulation 67.00.2(6).  

(2) For the purposes of sub-regulation (1)(c), the holder of a medical certificate shall, before such holder resumes the exercising of the privileges of the licence held by him or her, furnish the designated body or institution with proof that he or she has fully recovered from the decrease in medical fitness.  

(3) The holder of a Class 4 medical certificate shall, after the medical certificate has been issued to him or her, on an annual basis complete and submit to the designated body or institution the medical declaration as prescribed in Document SA-CATS 67.  

(5) No flight crew member shall –  
   a) consume any alcohol less than 8 hours prior to the specified reporting time for operational duty or the commencement of a shift;  
   b) commence an operational duty while the concentration of alcohol in any specimen of blood taken from any part of his or her body is more than 0,02 gram per 100 millilitres;  
   c) consume alcohol during the operational duty period or whilst on standby for operational duty; and  
   d) commence an operational duty period while under the influence of liquor or any drug having a narcotic effect.  

(6) Flight crew members shall not –  
   e) exercise the privileges of their licences and related ratings while under the influence of any psychoactive substance which might render them unable to safely and properly exercise these privileges; and  
   f) engage in any problematic use of substances.  

Validations  
67.00.10
1) The Director may, after consultation with the body or institution designated in terms of regulation 67.00.3, recognise a foreign medical report, medical assessment or medical certificate issued by an appropriate authority for the purpose of validating a foreign flight crew member’s licence, air traffic service personnel’s licence or cabin crew member’s licence.

2) If, because of duty in a State or territory outside the Republic, deferral of the issuing of a South African medical certificate for a flight crew member or a cabin crew member, as the case may be, has to be made, such deferral shall not exceed—
   a) a single period of six months in the case of a flight crew member of an aircraft used in non-commercial operations; or
   b) two consecutive periods, each of three months, in the case of a flight crew member or a cabin crew member, as the case may be, of an aircraft used in commercial operations: Provided that in each case a favourable medical report is obtained after examination by a designated examiner of the area concerned, or, in cases where such a designated medical examiner is not available, by a physician legally qualified to practice medicine in that area.

   A report of the medical examination shall be sent to the Authority where the licence is issued;
   c) in the case of a private pilot, a single period not exceeding 24 months where the medical examination is carried out by an examiner designated by the Contracting State in which the applicant is temporarily located. A report of the medical examination shall be sent to the Authority where the licence is issued.

(3) After the expiry of the periods referred to in sub-regulation (2), the applicant will be required to undergo the appropriate medical examination as soon as he or she returns to the Republic.

67.00.10

1) The Director may, after consultation with the body or institution designated in terms of regulation 67.00.3, recognise a foreign medical report, medical assessment or medical certificate issued by an appropriate authority for the purpose of validating a foreign flight crew member’s licence, air traffic service personnel’s licence or cabin crew member’s licence.

2) If, because of duty in a State or territory outside the Republic, deferral of the issuing of a South African medical certificate for a flight crew member or a cabin crew member, as the case may be, has to be made, such deferral shall not exceed—
   a) a single period of six months in the case of a flight crew member of an aircraft used in non-commercial operations; or
   b) two consecutive periods, each of three months, in the case of a flight crew member or a cabin crew member, as the case may be, of an aircraft used in commercial operations: Provided that in each case a favourable medical report is obtained after examination by a designated examiner of the area concerned, or, in cases where such a designated medical examiner is not available, by a physician legally qualified to practice medicine in that area.

   A report of the medical examination shall be sent to the Authority where the licence is issued;
c) in the case of a private pilot, a single period not exceeding 24 months where the medical examination is carried out by an examiner designated by the Contracting State in which the applicant is temporarily located. A report of the medical examination shall be sent to the Authority where the licence is issued.

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1) The Director may, after consultation with the body or institution designated in terms of regulation 67.00.3, recognise a foreign medical report, medical assessment or medical certificate issued by an appropriate authority for the purpose of validating a foreign flight crew member’s licence, air traffic service personnel’s licence or cabin crew member’s licence.

2) If, because of duty in a State or territory outside the Republic, deferral of the issuing of a South African medical certificate for a flight crew member or a cabin crew member, as the case may be, has to be made, such deferral shall not exceed—
   a) a single period of six months in the case of a flight crew member of an aircraft used in non-commercial operations; or
   b) two consecutive periods, each of three months, in the case of a flight crew member or a cabin crew member, as the case may be, of an aircraft used in commercial operations: Provided that in each case a favourable medical report is obtained after examination by a designated examiner of the area concerned, or, in cases where such a designated medical examiner is not available, by a physician legally qualified to practice medicine in that area. A report of the medical examination shall be sent to the Authority where the licence is issued;
   c) in the case of a private pilot, a single period not exceeding 24 months where the medical examination is carried out by an examiner designated by the Contracting State in which the applicant is temporarily located. A report of the medical examination shall be sent to the Authority where the licence is issued.

[Editorial note: See AIC 30.2 for fees payable in respect of paragraphs (a) and (b) above.]

3) After the expiry of the periods referred to in sub-regulation (2), the applicant will be required to undergo the appropriate medical examination as soon as he or she returns to the Republic.

Foreign medical examinations

67.00.11

(1) The Director may recognise any foreign medical report, history and examination form and investigations issued by an appropriate authority for the purposes of renewing a flight crew member’s licence.
(2) The holder of the licence referred to in sub-regulation (1) shall submit all the medical records, which may include, but is not limited to, a history and examination form signed by both the licence holder and the examining doctor registered with the appropriate authority, and all relevant investigations.

(3) All medical records submitted in terms of this regulation should be in English, or, if originally in a foreign language, translated into English by an official translator.

Period of validity of medical records

67.00.12

The records of a medical examination shall, for the purpose of issuing a medical certificate, be valid for a period not exceeding 90 days, and a medical certificate may not be issued after this period on the records of such examination.

Substance abuse

67.00.13

(1) If there is reasonable suspicion that the holder of a medical certificate is abusing substances, and thereby poses a risk to aviation safety, the medical officer designated in terms of regulation 67.00.1(2) may require such holder to undergo substance abuse testing, which shall be done as prescribed in Document SA-CATS 67.

(2) Reasonable suspicion may be as a result of but not limited to:
   a) Observation of physical symptoms;
   b) Physical-, behavioural-, performance indicators;
   c) Direct observation of substance use
   d) A pattern of abnormal conduct / erratic behaviour;
   e) Arrest or conviction for a drug related offence; or
   f) Being the target of a criminal investigation for such an offence;
   g) Evidence of tampering with previous substance test specimen;
   h) Post rehabilitation.

(3) The holder of a medical certificate must submit themselves within 48 hours of being required to do so, for preliminary substance abuse testing to a Collection Officer appointed by the Director, or to a DAME at the holder’s expense, as prescribed in Document SA-CATS 67.

(4) A holder of a medical certificate who has undergone preliminary testing must be informed of the results within three days of receipt thereof.

(5) The medical officer referred to in sub-regulation (1) may suspend the medical certificate of a person who has received a non-negative result and such person must be subjected to further confirmatory testing.

(6) The holder of a medical certificate who has received a negative result must be refunded of medical expenses incurred for collection and analysis of specimen in respect of the substance abuse testing.

(7) The holder of a medical certificate who submits himself or herself after 48 hours of being required to do so is required to undergo confirmatory testing, as prescribed in the SA-CATS 67.
The medical officer designated in terms of regulation 67.00.1(2) shall suspend, the medical certificate of a person who refuses to submit himself or herself to a substance abuse testing after being required to do so.

The holder of a medical certificate whose medical certificate is suspended in terms of sub-regulation (5) or (8) may appeal to the Director against the suspension within 14 days from the date of the suspension.

The provisions of regulation 185.00.6 apply, with the necessary changes, to an appeal lodged in terms of sub-regulation (9).

The site and specimen collection, packaging, transport and lab analysis must be done as prescribed in Document SA-CATS 67.

**Suspension or cancellation of medical certificate**

67.00.14

1. A medical officer designated in terms of regulation 67.00.1 (2) may suspend a medical certificate if there is a reasonable suspicion that the holder of the medical certificate does not comply with the requirements prescribed in regulation 67.00.9.

2. The medical officer may require the holder of a medical certificate whose certificate has been suspended in terms of this regulation, to undergo medical examination at the holder’s expense, at a medical specialist chosen by the medical officer.

3. A notice of the suspension of medical certificate contemplated in sub-regulation (1) must be given in writing, stating the reasons for the suspension.

4. Notwithstanding sub-regulation (3), the medical officer may notify the holder of the medical certificate of the suspension otherwise than in writing: Provided that a written notification of such suspension is submitted to the holder immediately thereafter.

5. A person whose medical certificate is suspended in terms of sub-regulation (1) may appeal to the Director against the suspension within 14 days from the date of the suspension.

6. The provisions of regulation 185.00.6 apply, with the necessary changes, with regard to the appeal contemplated in sub-regulation (5).

7. The holder of a medical certificate who succeeds in an appeal against the suspension shall be refunded the expenses referred to in sub-regulation (2).

**Medical confidentiality**

67.00.15

1. Subject to the provisions of sub-regulation (2), all information provided by or on behalf of an applicant for a medical certificate, which is personal medical information, shall be confidential, and shall be used only in respect of the medical certificate and the entire medical certification process, unless otherwise authorised by the applicant.
(2) Any medical practitioner employed by the designated body or institution shall ensure the protection of information referred to in sub-regulation (1) which is kept by such designated body or institution: Provided that when medical information appears to be fraudulent, false or misleading, or when such medical information will jeopardise aviation safety, or when it is necessary for the purpose of an appeal in terms of regulation 67.00.13, the medical practitioner shall release to the Director such information for appropriate investigation and action.

14.1.2 Classes of Medical Certificates

The medical requirements and standards to be complied with by an applicant for, or the holder of, a Class 1, 2, 3 or 4 medical certificate are the following:

14.1.2.1 General (All Classes)

a) Impairment or sudden or subtle incapacitation.

Applicants must be free from any risk factor, disease or disability, which renders them either unable, or likely to become suddenly unable, to perform assigned duties safely. These may include effects and/or adverse effects from the treatment of any condition and drugs or substances of abuse.

b) Medical deficiency.

- Applicants must be free from any of the following, if it results in a degree of functional incapacity likely to interfere with the safe operation of an aircraft or with the safe performance of their duties:
  - Congenital or acquired abnormality;
  - Active, latent, acute or chronic disability, disease or illness; Wound, injury, or outcome of operation.

While physical medical and mental health forms the most important aspect of aviation medical examiner, it is important for the designated aviation medical examiners and medical assessors emphasize on health education and prevention of ill health to all applicants with special emphasis on applicants who are under 40 years of age.”

14.1.2.2 Physical and Mental Standards (All 4 Classes)

Applicants must have no established medical history or clinical diagnosis-

Psychiatric
(1) Any of the following conditions that are of a severity which renders the applicant incapable of safely exercising the privileges of the licence, or makes it likely that within two years of the assessment the applicant will be unable to safely exercise the privileges of the licence, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation:
   a) A psychotic disorder, unless the psychosis was of toxic origin and there has been complete recovery;
   b) Alcohol or other psychoactive substance abuse or dependence;
   c) Character or behavior disorder, severe enough to have resulted in an overt act;
   d) Any other psychiatric disorder.

(2) An applicant who has a history of psychoactive substance abuse or dependence may apply for an exemption to the SACAA if the following circumstances exist:
   a) The applicant has been under medical treatment for psychoactive substance abuse and the medical practitioner concerned, approved by the CAA, certifies that the applicant is free from the effects of psychoactive substance abuse;
   b) The applicant provides the name of a sponsor who is prepared to certify that the applicant no longer takes a psychoactive substance in any form. Such a sponsor must be a person acceptable to the designated body or institution for this purpose;
   c) The applicant signs an undertaking not to take any psychoactive substance while holding a valid licence.

Neurological
(1) Any disease, injury or abnormality of the nervous system, the effects of which, according to medical conclusion, are likely to interfere with the safe exercise of the privileges of the licence or cause sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. In particular, the following are not acceptable:
   a) Epilepsy;
   b) Any seizure disorder;
   c) Any disturbance of consciousness without satisfactory medical explanation of the cause;
   d) Migraine;
   e) Incapacitating headaches.

Musculoskeletal
Any active disease of the bones, joints, muscles, or tendons, or any significant functional limitation from any previous congenital or acquired disease or injury will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
Functional abnormalities affecting the bones, joints, muscles, or tendons, compatible with the safe exercise of the privileges of the licence, may be assessed as fit.

An appropriate demonstration of ability via a practical test may be required.

**Gastrointestinal**

Any disease or abnormality, or result of disease or surgical operation, affecting the digestive tract and its attachments, including the biliary system and hernial orifices, of a severity likely to cause obstruction, significant functional disorder or infection, or sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

An applicant who has undergone a major surgical operation on the biliary passages or the digestive tract or its adnexa with a total or partial excision or a diversion of any of the organs should be assessed as medically unfit until such time as the medical assessor, having access to the details of the operation concerned, considers that the effects of the operation are not likely to cause incapacitation in flight.

The relevant protocol is contained in Schedule 5.

**Respiratory**

Any disease or abnormality, or result of disease or surgical operation, affecting the lungs, mediastinum, pleura, chest wall or respiratory passages of a severity likely to cause infection, functional disorder or sudden or subtle incapacitation at altitude, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

**Cardiovascular**

1. Any disease or abnormality, or result of disease or surgical operation, which affects the heart or circulatory system and is of a severity likely to cause functional disorder or sudden or subtle incapacitation.
2. Evidence of myocardial infarction, or significant hypertension, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
3. Disorders of cardiac rhythm requiring a pacemaker will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
4. Applicants with an abnormal cardiac rhythm shall be assessed as unfit unless the cardiac arrhythmia has been investigated and evaluated in accordance with the best medical practice and is assessed as not likely to interfere with the safe exercise of the privileges of the applicants’ license or ratings.
(5) Applicants with evidence strongly suggestive of coronary artery disease, including the presence of excessive cardiovascular risk factors, will be assessed as unfit unless adequate myocardial perfusion can be demonstrated and reversible risk factors controlled.

**Metabolic, nutritional and endocrine**

Any metabolic, nutritional or endocrine disorders likely to interfere with the safe exercise of the privileges of the licence, or to cause sudden or subtle incapacitation will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

Any applicant with a diagnosis of metabolic, nutritional or endocrine disorder will generally be assessed as unfit, but may be considered for special certification by the SACAA Aeromedical Committee.

**Haematologic and immunologic**

Any active disease of the lymphatic system or of the blood will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

Those with chronic diseases of these systems in a state of remission may be assessed as fit, provided appropriate specialist reports permit medical conclusion that the condition is not likely to affect the safe exercise of the privileges of the licence.

Applicants with any infectious diseases, the effects of which are likely to impede the safe exercise of the privileges of the licence or cause sudden or subtle incapacitation, must be assessed as unfit until such time as effective and acceptable treatment has removed such effects.

Applicants with sickle cell trait or other haemoglobinopathic traits are usually compatible with flying provided they submit a favourable Haematologist report and their condition is unlikely to cause sudden or subtle incapacitation.

Splenic infarctions have repeatedly been reported occurring due to sickling of red blood cells.
Sickle-cell disease, which includes sickle-cell anemia (SS), sickle-cell haemoglobin C disease (SC), sickle-cell thalassemia (STh), sickle-cell haemoglobin D disease (SD) and other pathological genotypes involving haemoglobin S with other genetic variants, is disqualifying for flying. A clear distinction must be made between sickle-cell disease (SS, SC, SD and STh) and sickle-cell trait (AS). The diagnosis of sickle-cell trait should be based on the following findings (including results from sickling tests): the patient should not be anaemic, and should have normal red cell morphology, normal levels of haemoglobin F, and a haemoglobin electrophoretic pattern of haemoglobins A and S in which A predominates for example the concentration of Hb S is less than 45 per cent of total haemoglobin.

The relevant protocols are contained in Schedules 15, 16, 17 and 18

**Genitourinary**

Any active disease or abnormality, or result of disease or surgical operation, affecting the kidneys, urine, urinary tract, menstrual function or genital organs, to a degree likely to impede the safe exercise of the privileges of the licence, or cause sudden or subtle incapacitation such that the applicant will be unable to safely exercise the privileges of the licence will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

Urine examination shall form part of the medical examination and abnormalities shall be adequately investigated.

**Ophthalmology**

All cases should be referred to the CAA Aeromedical Committee for consideration, refer to the relevant protocols.

**Effect of the flight environment**

Proper visual performance is essential for flight crew and air traffic controllers if they are to carry out their duties safely and efficiently. In the flight environment the following factors should be kept in mind because they may reduce visual performance significantly:

a) high speed;
b) altitude;
c) inadequate cockpit illumination;
d) glare;
e) Acceleration;
f) Vibration;
g) Poor ergonomics;
h) Adverse cabin environment.

The high speeds of modern aircraft while cruising and during take-off or landing make good static and dynamic vision and rapid reaction time particularly important. Visual perception is usually the first step in the reflex chain which initiates the motor activity to avoid collision.

Altitude affects the quality and quantity of electromagnetic radiation to which the flight crew are exposed. During flight above clouds, sunlight is reflected upwards. This inverse light distribution leaves the instrument panel in shadow while the outside is very bright. The human visual system is designed to function best with illumination coming from above; in some aircraft with "bubble" canopies, flight over brightly lit clouds may be very uncomfortable. With increasing altitude, the sky becomes darker, and the contrast between objects seen against the sky increases.

In most commercial aircraft, cabin pressure is controlled but the slight degree of hypoxia experienced even in pressurized aircraft may impair dark adaptation, reduce visual fields and visual acuity and cause a small increase in intraocular pressure. In prolonged flight, the low humidity of the cabin air may cause dryness and irritation of the mucous membranes — especially of the eyes and the nasopharynx. Space myopia, empty field myopia or night myopia may occur at high altitude or at any altitude when it is dark, owing to lack of visual targets outside the cockpit. Under low-contrast conditions a functional myopia of up to several dioptres may occur with blurred vision and loss of contrast sensitivity. Studies have shown that this kind of myopia is relatively common.

Inadequate cockpit illumination may produce visual problems. Low light levels cause reduced visual acuity and aggravate the symptoms of presbyopia making reading of small print difficult. Coloured maps may be difficult to see.

These problems may be accentuated when red lighting is used because of the chromatic aberration of the human eye. As much of the in-flight information in commercial aviation is gained from instruments, the minor gain in dark adaptation level using red light or low levels of white light is generally considered to be outweighed by the loss in overall visual performance.

Furthermore, runway illumination on international airports throughout the world has now reached levels well above the absolute threshold of light perception. On the other hand, there are numerous situations in general aviation where some degree of dark adaptation is necessary. High acceleration forces are important in military aviation, agricultural flying and in aerobatics but less so in ordinary commercial flying. High G-forces may produce grey-out, blackout or red-out depending on the direction of the acceleration force.
Vibration of cockpit instruments and printed material, especially in the 22–64 Hz range, may impair vision significantly. This is particularly troublesome in helicopters. Low frequency vibrations of 2–10 Hz encountered in turbulence or on rough runways can also degrade vision. Application of ergonomic principles and consideration of human factors have done a good deal to improve cockpit design and facilitate information flow to flight crew. Better instrument displays and thoughtful location of controls are found in many new aircraft but there is still room for improvement. Good visual function and adequate colour perception are necessary for proper use of the wide variety of maps, dials and gauges found in modern cockpits.

The Electronic Flight Instrument System (EFIS) in particular employs many different colours. Although these systems are designed to provide critical information in monochrome in the event of colour failure, it has been shown that the addition of colours facilitates the perceptual process and improves the understanding of geometrical figures. Colours are likely to be increasingly important in the virtual cockpit environment of the future. With ever-increasing sophistication of aircraft, the tendency for information overload remains, and colour discrimination in all parts of the spectrum is desirable. The older colour perception testing methods which were mainly concerned with congenital red-green defects in men will not suffice because they fail to detect yellow-blue defects which are frequently seen in gender-neutral acquired colour vision deficiencies.

14.1.2.2.1 Visual Standard

14.1.2.2.1.1 Class I

14.1.2.2.1.1.1 General

1) An applicant may not have –
   a) any condition or congenital abnormality of either eye or its attachments likely to impede the safe exercise of the privileges of the licence;
   b) any abnormality of visual fields or significant defect of binocular function;
   c) any manifest squint, or large errors of eye muscle balance (phoria).
   d) any anatomical or functional monocularity or substandard vision in one eye at initial issue of a Class 1 medical certificate. However, medical conclusion may permit experienced licence holders who develop monocularity or substandard vision to be granted a medical certificate with appropriate restrictions after an adaptation period of at least 6 months following the loss of vision.
2) Monocularity means that either an eye is absent, or its vision cannot be corrected to better than 6/24. Such applicants require evaluation by an ophthalmologist to determine the cause of the visual loss. Fitness to fly will be determined on a case by case basis. The assessment will include practical flight testing by SACAA.

3) For monocularity, the appropriate minimum restrictions initially are as follows:

4) “If flying open cockpit aircraft, protective goggles not restricting visual field must be worn”. (This must remain as a permanent restriction);
   a) “Any accompanying pilot must be made aware of the holder’s monocular vision”. (This must remain as a permanent restriction);
   b) “Not valid for flight as pilot-in-command by day or night until a satisfactory flight test has been completed with a flight examiner in each case”. (This restriction may be removed at subsequent assessment, according to the results of the flight test, or amended to the endorsement in (d) below);
   c) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the result of the flight test).

5) Substandard vision in one eye means one eye meets the required standards for a particular class of licence but the visual acuity of the other eye cannot be corrected to the required standards i.e. central vision better than 6/24 but worse than 6/9, with normal visual fields. Such applicants require evaluation by an ophthalmologist to determine the cause of the visual loss. Fitness to fly will be determined on a case by case basis. A practical flight test by SACAA, to evaluate visual performance may be required.

6) For substandard vision in one eye (vision between 6/12 and 6/24), the appropriate minimum restrictions are as follows –
   a) “Any accompanying pilot must be made aware of the holder’s substandard vision in one eye”. (This must remain as a permanent restriction);
   b) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the results of the flight test).

7) The relevant protocols are contained in Schedules 21 and 22.

14.1.2.1.1.2 Near vision and intermediate vision

1) Near vision: Applicants must be able to read N5 at a distance of 30-50 cm or have equivalent visual acuity of 6/9, 20/30

2) Intermediate vision: An applicant must be able to read N14 at a distance of 100 centimetres or have equivalent visual acuity of 6/18, 20/100 at 100 cms.

3) An applicant who meets this standard only by use of spectacles may be granted a medical certificate provided this is endorsed with the following limitation:

4) “Suitable corrective lenses must be readily available”.

5) This means that these must be available for immediate use when exercising the privileges of licence. This limitation may be satisfied by the availability of appropriate bifocal, trifocal or multifocal spectacles which permit the reading of instruments and a chart or manual held in one hand, without impeding the use of distance vision through the windscreen when wearing the spectacles. Single-vision near correction (full lenses of one power only, appropriate to reading) is not acceptable, since wearing these significantly reduces distance visual acuity.

6) Near vision and intermediate vision should be recorded by ticking in the appropriate box if the pilot is able to see N5 at 30 – 50 cms and N14 at a distance of 100 cms respectively.

7) Near Vision and Intermediate Vision should be tested using a Pocket Vision Screener.

14.1.2.2.1.1.3 Distance vision

1) Distant vision is to be examined with a 6m Snellen Chart. A different chart is to be used for each eye. Visual acuity with and without correction must be recorded at each examination.

2) Distant visual acuity with or without correction shall be 6/9 or better in each eye separately, and binocular visual acuity shall be 6/6 or better. No limits apply to uncorrected visual acuity. Where this standard of visual acuity can be obtained only with correcting lenses, the applicant may be assessed as fit provided that –

3) the medical certificate is endorsed with the following limitation: “Suitable corrective lenses must be worn for distance vision”;

4) such correcting lenses are worn during the exercise of the privileges of the licence or rating applied for or held; and

5) in addition, a pair of suitable correcting spectacles is kept readily available during the exercise of the privileges of the applicant’s licence;

6) An applicant accepted as meeting these provisions is deemed to continue to do so unless there is reason to suspect otherwise, in which case an ophthalmic report is required at the discretion of the SACAA. Both uncorrected and corrected visual acuity are normally measured and recorded at each re-examination. Conditions which indicate a need to obtain an ophthalmic report include: a substantial decrease in the uncorrected visual acuity, any decrease in best corrected visual acuity, and the occurrence of eye disease, eye injury or eye surgery.

7) Applicants may use contact lenses to meet this requirement provided that –
   c) the lenses are monofocal and non-tinted;
   d) the lenses are well tolerated; and
   e) a pair of suitable correcting spectacles is kept readily available during the exercise of the licence privileges.

8) Applicants who use contact lenses may not need to have their uncorrected visual acuity measured at each re-examination provided the history of their contact lens prescription is known.

9) Applicants with a large refractive error shall use contact lenses or high-index spectacle lenses.

10) Applicants whose uncorrected distant visual acuity in either eye is worse than 6/60 shall be required to provide a full ophthalmic report prior to initial medical assessment and every five years thereafter. The purpose of the required ophthalmic examination is to ascertain normal visual performance, and to identify any significant pathology.
11) Applicants who have undergone surgery affecting the refractive status of the eye shall be assessed as unfit unless they are free from those sequelae which are likely to interfere with the safe exercise of their licence and rating privileges.

12) An applicant shall have the ability to read, while wearing the correcting lenses, if any, required by subsection (2), the N5 chart or its equivalent at a distance of 30 to 50 cm and the ability to read the N14 chart or its equivalent at a distance of 100 cm. If this requirement is met only by the use of near correction, the applicant may be assessed as fit provided that this near correction is added to the spectacle correction already prescribed in accordance with subsection (2). If no such correction is prescribed, a pair of spectacles for near use shall be kept readily available during the exercise of the privileges of the licence. When near correction is required, the applicant shall demonstrate that one pair of spectacles is sufficient to meet both distant and near visual requirements.

13) An applicant who needs near correction to meet this requirement will require “look-over”, bifocal or perhaps multifocal lenses in order to read the instruments and a chart or manual held in the hand, and also to make use of distant vision, through the windscreen, without removing the lenses. Single-vision near correction (full lenses of one power only, appropriate for reading) significantly reduces distant visual acuity and is therefore not acceptable. Whenever there is a requirement to obtain or renew correcting lenses, an applicant is expected to advise the refractionist of reading distances for the visual flight deck tasks relevant to the types of aircraft in which the applicant is likely to function.

14) When near correction is required in accordance with the above paragraph, a second pair of near-correction spectacles shall be kept available for immediate use.

15) The applicant shall be required to have normal fields of vision.

16) The applicant shall be required to have normal binocular function.

17) Reduced stereopsis, abnormal convergence not interfering with near vision, and ocular misalignment where the fusional reserves are sufficient to prevent asthenopia and diplopia need not be disqualifying.

14.1.2.1.1.4 Dioptrre limits
A need for corrective lenses for either eye within the range of plus or minus 5 dioptres (spherical equivalent) may be accepted, provided that the distance visual acuity without correction is not worse than 6/60 in each eye separately. Spectacle lenses outside this range are not routinely acceptable, but medical conclusion may permit an applicant to be assessed as fit on production of satisfactory specialist reports. The medical certificate will, where appropriate, be endorsed with the following –

a) “Contact lenses must be worn”; and
b) “Spare spectacles must be readily available”.

14.1.3 Class II Medical Certificates
14.1.3.1 Visual standards
1) An applicant may not have –
a) any condition or congenital abnormality of either eye or its attachments likely to impede the safe exercise of the privileges of the licence;
b) any abnormality of visual fields or binocular function;
c) any manifest squint, or large errors of eye muscle balance (phoria).
d) any anatomical or functional monocularity or substandard vision in one eye at initial issue of a Class 2 medical certificate. However, medical conclusion may permit experienced licence holders who develop monocularity or substandard vision to be granted a medical certificate with appropriate restrictions after an adaptation period of at least 6 months following the loss of vision.

2) Monocularity means that either an eye is absent, or its vision cannot be corrected to better than 6/24. Such applicants require evaluation by an ophthalmologist to determine the cause of the visual loss. Fitness to fly will be determined on a case by case basis. The assessment will include practical flight testing by SACAA.

3) For monocularity, the appropriate minimum restrictions initially are as follows –
   a) “If flying open cockpit aircraft, protective goggles not restricting visual field must be worn”. (This must remain as a permanent restriction);
   b) “Any accompanying pilot must be made aware of the holder’s monocular vision”. (This must remain as a permanent restriction);
   c) “Not valid for flight as pilot-in-command by day or night until a satisfactory flight test has been completed with a flight examiner in each case”. (This restriction may be removed at subsequent assessment, according to the results of the flight test, or amended to the endorsement in (d) below);
   d) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the result of the flight test).

4) Substandard vision in one eye means one eye meets the required standards for a particular class of licence but the visual acuity of the other eye cannot be corrected to the required standards i.e. central vision better than 6/24 but worse than 6/18, with normal visual fields. Such applicants require evaluation by an ophthalmologist to determine the cause of the visual loss. Fitness to fly will be determined on a case by case basis. In doubtful cases, a practical flight test by SACAA, to evaluate visual performance may be required.

5) For substandard vision in one eye (vision between 6/18 and 6/24), the appropriate minimum restrictions are as follows –
   a) “Any accompanying pilot must be made aware of the holder’s substandard vision in one eye”. (This must remain as a permanent restriction);
   b) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the results of the flight test).

6) The relevant protocols are contained in Schedules 21 and 22.
14.1.3.2  Near vision and Intermediate Vision

1) Near Vision: Applicants must be able to read N5 at a distance of 30-50 cms or have equivalent Visual acuity of 6/9, 20/30

2) Intermediate Vision: An applicant must be able to read N14 at a distance of 100 centimetres or have equivalent visual acuity of 6/18, 20/100 at 100 cms.

3) An applicant who meets this standard only by use of spectacles may be granted a medical certificate provided this is endorsed with the following limitation: “Suitable corrective lenses must be readily available”.

4) This means that these must be available for immediate use when exercising the privileges of licence. This limitation may be satisfied by the availability of appropriate bifocal, trifocal or multifocal which permit the reading of instruments and a chart or manual held in one hand, without impeding the use of distance vision through the windscreen when wearing the spectacles. Single-vision near correction (full lenses of one power only, appropriate to reading) is not acceptable, since wearing these significantly reduces distance visual acuity.

5) Near vision and intermediate vision should be recorded by ticking in the appropriate box if the pilot is able to see N5 at 30 – 50 cms and N14 at a distance of 100 cms respectively.

6) Near Vision and Intermediate Vision should be tested using a Pocket Vision Screener.

14.1.3.3  Distance vision

1) Distant vision is to be examined with a 6m Snellen Chart. A different chart is to be used for each eye. Visual Acuity with and without correction must be recorded at each examination.

2) Distant visual acuity with or without correction shall be 6/12 or better in each eye separately, and binocular visual acuity shall be 6/9 or better. No limits apply to uncorrected visual acuity. Where this standard of visual acuity can be obtained only with correcting lenses, the applicant may be assessed as fit provided that:
   a) the medical certificate is endorsed with the following limitation: “Suitable corrective lenses must be worn for distance vision”.
   b) such correcting lenses are worn during the exercise of the privileges of the licence or rating applied for or held; and
   c) in addition, a pair of suitable correcting spectacles is kept readily available during the exercise of the privileges of the applicant’s licence.

3) An applicant accepted as meeting these provisions is deemed to continue to do so unless there is reason to suspect otherwise, in which case an ophthalmic report is required at the discretion of the SACAA. Both uncorrected and corrected visual acuity are normally measured and recorded at each re-examination. Conditions which indicate a need to obtain an ophthalmic report include: a substantial decrease in the uncorrected visual acuity, any decrease in best corrected visual acuity, and the occurrence of eye disease, eye injury or eye surgery.

4) Applicants may use contact lenses to meet this requirement provided that:
   a) the lenses are monofocal and non-tinted;
   b) the lenses are well tolerated; and
   c) a pair of suitable correcting spectacles is kept readily available during the exercise of the licence privileges.
5) Applicants who use contact lenses may not need to have their uncorrected visual acuity measured at each re-examination provided the history of their contact lens prescription is known.

6) Applicants with a large refractive error shall use contact lenses or high-index spectacle lenses.

7) Applicants whose uncorrected distant visual acuity in either eye is worse than 6/60 shall be required to provide a full ophthalmic report prior to initial Medical Assessment and every five years thereafter. The purpose of the required ophthalmic examination is to ascertain normal visual performance, and to identify any significant pathology.

8) Applicants who have undergone surgery affecting the refractive status of the eye shall be assessed as unfit unless they are free from those sequelae which are likely to interfere with the safe exercise of their licence and rating privileges.

9) The applicant shall have the ability to read, while wearing the correcting lenses, if any, required by (2), the N5 chart or its equivalent at a distance of 30 to 50 cm. If this requirement is met only by the use of near correction, the applicant may be assessed as fit provided that this near correction is added to the spectacle correction already prescribed in accordance with (2); if no such correction is prescribed, a pair of spectacles for near use shall be kept readily available during the exercise of the privileges of the licence. When near correction is required, the applicant shall demonstrate that one pair of spectacles is sufficient to meet both distant and near visual requirements.

10) An applicant who needs near correction to meet this requirement will require "look-over", bifocal or perhaps multifocal lenses in order to read the instruments and a chart or manual held in the hand, and also to make use of distant vision, through the windscreen, without removing the lenses. Single-vision near correction (full lenses of one power only, appropriate for reading) significantly reduces distant visual acuity and is therefore not acceptable. Whenever there is a requirement to obtain or renew correcting lenses, an applicant is expected to advise the refractionist of reading distances for the visual flight deck tasks relevant to the types of aircraft in which the applicant is likely to function.

11) When near correction is required in accordance with the above paragraph, a second pair of near-correction spectacles shall be kept available for immediate use.

12) The applicant shall be required to have normal fields of vision.

13) The applicant shall be required to have normal binocular function.

14) Reduced stereopsis, abnormal convergence not interfering with near vision, and ocular misalignment where the fusional reserves are sufficient to prevent asthenopia and diplopia need not be disqualifying.

### 14.1.3.4 Dioptre limits

A need for corrective lenses for either eye within the range of plus or minus 5 dioptres (spherical equivalent) may be accepted, provided that the visual acuity without correction is not worse than 6/60 in each eye separately. Spectacle lenses outside this range are not routinely acceptable, but medical conclusion may permit an applicant to be assessed as fit on production of satisfactory specialist reports. The medical certificate will be, where appropriate, endorsed with the following:

a) "Contact lenses only must be worn"; and
b) “Spare spectacles must be readily available”.

14.1.4 Class III Medical Certificates

14.1.4.1 Visual standards

14.1.4.1.1 General

An applicant may not have –

a) any condition or congenital abnormality of either eye or its attachments likely to impede the safe exercise of the privileges of the licence;

b) any abnormality of visual fields or binocular function;

c) any manifest squint, or large errors of eye muscle balance (phoria);

d) any anatomical or functional monocularity or substandard vision in one eye at initial issue of a Class 3 medical certificate. However, medical conclusion may permit experienced licence holders who develop monocularity or substandard vision to be granted a medical certificate with appropriate restrictions after an adaptation period of at least 6 months following the loss of vision.

1) Monocular means that either an eye is absent, or its vision cannot be corrected to better than 6/24. Such applicants require evaluation by an ophthalmologist to determine the cause of the visual loss. Fitness to be licensed will be determined on a case-by-case basis. Practical testing in the Air Traffic Control environment is a requirement.

2) Substandard vision in one eye means one eye meets the required standards for a particular class of licence but the visual acuity of the other eye cannot be corrected to the required standards i.e. central vision better than 6/24 but worse than 6/12, with normal visual fields. Such applicants require evaluation by an ophthalmologist to determine the cause of the visual loss. Fitness to be licenced will be determined on a case-by-case basis. Practical testing in the Air Traffic Control environment may be required.

3) The relevant protocols are contained in Schedules 21 and 22.

14.1.4.1.2 Near vision and intermediate vision

1) Near Vision: Applicants must be able to read N5 at a distance of 30-50 cms or have equivalent Visual acuity of 6/9, 20/30.

2) Intermediate Vision: An applicant must be able to read N14 at a distance of 100 centimetres or have equivalent visual acuity of 6/18, 20/100 at 100 cms.

3) An applicant who meets this standard only by use of spectacles may be granted a medical certificate provided this is endorsed with the following limitation: “Suitable corrective lenses must be readily available”.

4) This means that these must be available for immediate use when exercising the privileges of licence. This limitation may be satisfied by the availability of appropriate bifocal, trifocal or multifocal spectacles which permit the reading of displays and a chart or manual held in one hand, without impeding the use of distance vision when wearing the spectacles. The wearing of single vision near correction (full lenses of one power only, appropriate to reading),
significantly reduces distance visual acuity, and is not acceptable in an air traffic control tower. Nevertheless, full lenses may be acceptable in a radar room in which case the medical certificate must be endorsed with the following:

5) “Suitable corrective lenses must be readily available (full lenses permitted in radar room)”, to indicate this option has been permitted. Whenever there is a requirement to obtain or renew corrective lenses, an applicant must advise the refractionist of reading distances for the air traffic service unit in which the applicant is likely to function.

6) Near vision and intermediate vision should be recorded by ticking in the appropriate box if the pilot is able to see N5 at 30 – 50 cms and N14 at a distance of 100 cms respectively.

7) Near Vision and Intermediate Vision should be tested using a Pocket Vision Screener.

14.1.4.1.3 **Distance vision**

1) Distant Vision is to be examined with a 6m Snellen Chart. A different chart is to be used for each eye. Visual Acuity, with and without correction must be recorded at each examination.

2) Distant visual acuity with or without correction shall be 6/9 or better in each eye separately, and binocular visual acuity shall be 6/6 or better. No limits apply to uncorrected visual acuity. Where this standard of visual acuity can be obtained only with correcting lenses, the applicant may be assessed as fit provided that:

   a) the medical certificate is endorsed with the following limitation: “Suitable corrective lenses must be worn for distance vision”.

   b) such correcting lenses are worn during the exercise of the privileges of the licence or rating applied for or held; and

   c) in addition, a pair of suitable correcting spectacles is kept readily available during the exercise of the privileges of the applicant’s licence.

3) An applicant accepted as meeting these provisions is deemed to continue to do so unless there is reason to suspect otherwise, in which case an ophthalmic report is required at the discretion of the SACAA. Both uncorrected and corrected visual acuity are normally measured and recorded at each re-examination. Conditions which indicate a need to obtain an ophthalmic report include: a substantial decrease in the uncorrected visual acuity, any decrease in best corrected visual acuity, and the occurrence of eye disease, eye injury or eye surgery.

4) Applicants may use contact lenses to meet this requirement provided that:

   a) the lenses are monofocal and non-tinted;

   b) the lenses are well tolerated; and

   c) a pair of suitable correcting spectacles is kept readily available during the exercise of the licence privileges.

5) Applicants who use contact lenses may not need to have their uncorrected visual acuity measured at each re-examination provided the history of their contact lens prescription is known.

6) Applicants with a large refractive error shall use contact lenses or high-index spectacle lenses.

7) Applicants whose uncorrected distant visual acuity in either eye is worse than 6/60 shall be required to provide a full ophthalmic report prior to initial medical assessment and every five years thereafter. The purpose of the required ophthalmic examination is to ascertain normal visual performance, and to identify any significant pathology.
8) Applicants who have undergone surgery affecting the refractive status of the eye shall be assessed as unfit unless they are free from those sequelae which are likely to interfere with the safe exercise of their licence and rating privileges.

9) The applicant shall have the ability to read, while wearing the correcting lenses, if any, required by (2), the N5 chart or its equivalent at a distance of 30 to 50 cm and the ability to read the N14 chart or its equivalent at a distance of 100 cm. If this requirement is met only by the use of near correction, the applicant may be assessed as fit provided that this near correction is added to the spectacle correction already prescribed in accordance with (2); if no such correction is prescribed, a pair of spectacles for near use shall be kept readily available during the exercise of the privileges of the licence. When near correction is required, the applicant shall demonstrate that one pair of spectacles is sufficient to meet both distant and near visual requirements.

10) An applicant who needs near correction to meet this requirement will require “look-over”, bifocal or perhaps multifocal lenses in order to read the instruments and a chart or manual held in the hand, and also to make use of distant vision, through the windscreen, without removing the lenses. Single-vision near correction (full lenses of one power only, appropriate for reading) significantly reduces distant visual acuity and is therefore not acceptable. Whenever there is a requirement to obtain or renew correcting lenses, an applicant is expected to advise the refractionist of reading distances for the visual flight deck tasks relevant to the types of aircraft in which the applicant is likely to function.

11) When near correction is required in accordance with the above paragraph, a second pair of near-correction spectacles shall be kept available for immediate use.

12) The applicant shall be required to have normal fields of vision.

13) The applicant shall be required to have normal binocular function.

14) Reduced stereopsis, abnormal convergence not interfering with near vision, and ocular misalignment where the fusional reserves are sufficient to prevent asthenopia and diplopia need not be disqualifying.

14.1.4.1.4 Dioptre limits
A need for corrective lenses for either eye within the range of plus or minus 5 dioptres (spherical equivalent) may be accepted, provided that the visual acuity without correction is not worse than 6/60 in each eye separately. Spectacle lenses outside this range are not routinely acceptable, but medical conclusion may permit an applicant to be assessed as fit on production of satisfactory specialist reports. The medical certificate will be, where appropriate, endorsed with the following:

a) “Contact lenses only must be worn”; and

b) “Spare spectacles must be readily available”.

Colour perception standards (Class I and II Pilots)-Refer to the Colour Assessment Protocol

Colour perception standards Class III
1) Required to undergo Ishihara Test (24 and 38 Plates) as per the Colour Vision Protocol
2) Applicants who fail the Ishihara Plates are required to undergo Lantern Testing at the Institute of Aviation Medicine
   Note: Research for ATC for Colour Assessment Diagnosis (CAD) still under investigation

Colour perception standards (Class 4)

Not applicable.

14.1.5 Ear, Nose and Throat and Hearing Standards

14.1.5.1 Class I Medical Certificate

Ear, nose and throat and hearing standards

1) Applicants must have no established medical history or clinical diagnosis of the following:
   a) Any pathological process, acute or chronic, of the internal ear or middle ear cavities;
   b) Any unhealed (unclosed) perforation of the tympanic membranes, except that an applicant with a single dry
      perforation may be eligible for a certificate if the defect does not prevent compliance with the hearing standards;
   c) Any chronic or serious recurrent obstruction of the Eustachian tubes;
   d) Any serious or recurrent disturbance of the vestibular system;
   e) Any obstruction to free nasal air entry to both sides;
   f) Any serious malformation, or serious acute or chronic condition of the buccal cavity or upper respiratory tract;
   g) Any speech defect likely to interfere with the safe performance or duties in exercising the privileges of the
      licence.

2) Applicants must be free from any hearing defect, which would interfere with the safe exercise of the privileges of the
   licence.

3) Applicants for Class 1 medical certificate shall be tested by pure-tone audiometry at first issue of the Assessment,
   not less than once every five years up to the age of 40 years, and thereafter not less than once every two years.

4) Alternatively, other methods providing equivalent results may be used.

5) Applicants shall demonstrate a hearing performance sufficient for the safe exercise of their licence and rating
   privileges;

6) At medical intervals prescribed in subsection (3), where audiometry is not performed, applicants shall be tested in a
   quiet room by whispered and spoken voice test.

7) For the purpose of a hearing test, a quiet room is a room in which intensity of background noise is less than
   35db(A).

8) For the purpose of a hearing test, the sound level of an average conversational voice at 1m from the point of output
9) (lower lip of the speakers) is c.60dB(A) and that of a whispered voice c.45dB(A), at 2cm from the speaker, the sound level is 6 dB(A) lower.

10) The pure-tone audiometry shall be calibrated as per the standard of the current Audiometric Test Method.

11) Applicants who are unable to hear an average conversational voice in a quiet room, using both ears, at a distance of 2m from the examiner and with the back turned to the examiner, shall be assessed as unfit.

12) When tested by pure-tone audiometry, an applicant with a hearing loss in either ear separately, of more than 35 dB at any of the frequencies 500, 1 000 or 2 000 Hz, or more than 50 dB at 3 000 Hz, shall be assessed as unfit.

13) An applicant with a hearing loss greater than the one prescribed in subsection (11) may be declared fit provided that the applicant has normal hearing performance against a background noise that reproduces or simulates the masking properties of flight deck noise upon speech and beacon signals.

14) It is important that the background noise be representative of the noise in the cockpit of the type of aircraft for which the applicant’s licence and ratings are valid.

15) In the speech material for discrimination testing, both aviation relevant phrases and phonetically balanced words shall be used.

16) Alternatively, a practical hearing test conducted in flight in the cockpit of an aircraft of the type for which the applicant's licence and ratings are valid may be used.

14.1.5.2 Class II Medical Certificate

Ear, nose and throat and hearing standards

1) Applicants must have no established medical history or clinical diagnosis of the following:
   a) Any pathological process, acute or chronic, of the internal ear or middle ear cavities;
   b) Any unhealed (unclosed) perforation of the tympanic membranes, except that an applicant with a single dry perforation may be eligible for a certificate if the defect does not prevent compliance with the hearing standards;
   c) Any chronic or serious recurrent obstruction of the Eustachian tubes;
   d) Any serious or recurrent disturbance of the vestibular system;
   e) Any obstruction to free nasal air entry to both sides;
   f) Any serious malformation, or serious acute or chronic condition of the buccal cavity or upper respiratory tract;
   g) Any speech defect likely to interfere with the safe performance or duties in exercising the privileges of the licence.

2) Applicants must be free from any hearing defect which would interfere with the safe exercise of the privileges of the licence.

3) Applicants for Class 2 medical certificate shall be tested by pure-tone audiometry at first issue of the assessment and, after the age of 50 years, not less than once every two years.

4) Applicants shall demonstrate a hearing performance sufficient for the safe exercise of their licence and rating privileges.
5) At medical intervals prescribed in subsection (4), where audiometry is not performed, applicants shall be tested in a quiet room by whispered and spoken voice test.

6) For the purpose of a hearing test, a quiet room is a room in which intensity of background noise is less than 35db(A).
   a) For the purpose of a hearing test, the sound level of an average conversational voice at 1m from the point of output (lower lip of the speakers) is c.60dB(A) and that of a whispered voice c.45dB(A), at 2cm from the speaker, the sound level is 6 dB(A) lower.

7) The pure-tone audiometry shall be calibrated as per the standard of the current Audiometric Test Method.
   a) Applicants who are unable to hear an average conversational voice in a quiet room, using both ears, at a distance of 2m from the examiner and with the back turned to the examiner, shall be assessed as unfit.
   b) When tested by pure-tone audiometry, an applicant with a hearing loss in either ear separately, of more than 35 dB at any of the frequencies 500, 1 000 or 2 000 Hz, or more than 50 dB at 3 000 Hz, shall be assessed as unfit.
   c) An applicant with a hearing loss greater than the one prescribed in subsection (10) may be declared fit provided that the applicant has normal hearing
   d) performance against a background noise that reproduces or simulates the masking properties of flight deck noise upon speech and beacon signals.

8) It is important that the background noise be representative of the noise in the cockpit of the type of aircraft for which the applicant's licence and ratings are valid.

9) In the speech material for discrimination testing, both aviation relevant phrases and phonetically balanced words are normally used.”

14.1.5.3 Class III Medical Certificate

Ear, nose and throat and hearing standards

1) Applicants must have no established medical history or clinical diagnosis of the following –
   a) any pathological process, acute or chronic, of the internal ear or middle ear cavities;
   b) any unhealed (unclosed) perforation of the tympanic membranes, except that an applicant with a single dry perforation may be eligible for a certificate if the defect does not prevent compliance with the hearing standards;
   c) any serious or recurrent disturbance of the vestibular system;
   d) any serious malformation, or serious acute or chronic condition of the buccal cavity or upper respiratory tract; or
   e) any speech defect likely to interfere with the safe performance of duties in exercising the privileges of the licence.

2) Applicants must be free from any hearing defect which would interfere with the safe exercise of the privileges of the licence
3) Applicants for Class 3 medical certificate shall be tested by pure-tone audiometry at first issue of the assessment, not less than once every four years up to the age of 40 years, and thereafter not less than once every two years.

4) Alternatively, other methods providing equivalent results may be used.

5) At medical intervals prescribed in subsection (3), where audiometry is not performed, applicants shall be tested in a quiet room by whispered and spoken voice test.

6) For the purpose of a hearing test, a quiet room is a room in which intensity of background noise is less than 35db(A).

7) For the purpose of a hearing test, the sound level of an average conversational voice at 1m from the point of output (lower lip of the speakers) is c.60dB(A) and that of a whispered voice c.45dB(A), at 2cm from the speaker, the sound level is 6 dB(A) lower.

8) The pure-tone audiometry shall be calibrated as per the standard of the current Audiometric Test Method.

9) When tested by pure-tone audiometry, an applicant with a hearing loss in either ear separately, of more than 35 dB at any of the frequencies 500, 1 000 or 2 000 Hz, or more than 50 dB at 3 000 Hz, shall be assessed as unfit.

10) An applicant with a hearing loss greater than the one prescribed in subsection (9) may be declared fit provided that the applicant has normal hearing performance against a background noise that reproduces or simulates that experienced in a typical air traffic control working environment.

11) The frequency composition of the background noise is defined only to the extent that the frequency range 600 to 4 800 Hz (speech frequency range) is adequately represented.

12) In the speech material for discrimination testing, both aviation-relevant phrases and phonetically balanced words are normally used.

13) Alternatively, a practical hearing test conducted in an air traffic control environment representative of the one for which the applicant’s licence and ratings are valid may be used.”

14.1.6 Electro - Cardiography

14.1.6.1 Applicability
This Protocol is applicable to Class 1, 2, and Class 3 applicants.

14.1.6.2 Resting ECG

Resting ECG shall be performed at the following intervals:

1) Class 1 –
   a) at initial medical examination;
   b) every 2 years between the age of thirty (30) and fifty (50);
   c) annually after the age of fifty (50).

2) Class 2 –
a) at initial medical examination;
b) first exam after the age of 40
c) every 2 years after the age of fifty (50).

3) Class 3 –
a) at initial medical examination;
b) every 2 years after the age of fifty (50).

14.1.6.2.1 Procedure for Resting ECG
1) A resting ECG shall be recorded with the subject at rest in a warm environment.
2) The skin should be prepared with spirit or abrasive, or both.
3) Resting ECG is performed using a 12-lead standard ECG machine and chest leads should be placed accurately.
4) Leads V1 and V2 should be placed in the fourth inter-costal spaces on either side of the sternum.
5) Lead V4 is placed at the position of the apex of the normal heart – the fifth inter-costal space in the mid-clavicular line.
6) Lead V3 is placed midway between V2 and V4. Leads V5 and V6 are placed at the same level as V4 in the anterior and mid-axillary lines, respectively.
7) The limb leads are placed on the right and left arms, and the right and left legs respectively.

14.1.6.2.2 Interpretation
1) All ECGs are to be interpreted by a DAME trained in ECG reading who would refer to a cardiologist or specialist physician when in doubt.

14.1.6.2.2.1 Stress ECG
Indications for stress ECG
1) Stress ECG shall be performed in the following circumstances:
   a) Any abnormal resting ECG;
   b) The following risk indications should be considered in determining the necessity of a stress ECG: Hypertension, Smoking, Dyslipidaemia, Diabetes Mellitus, Raised BMI, waist circumference/abdominal obesity, family history of early onset of cardiovascular disease.
   c) In accordance with the cardiovascular risk assessment algorithm: for all applicants classified as Moderate, High or Very High risk in accordance with the algorithm;
   d) Provided that:
   e) Stress ECG for moderate risk applicants may be performed by a DAME
   f) Stress ECG for High or Very High risk applicants shall only be performed by a cardiologist or a specialist physician.
Cardiovascular risk assessment

1) Cardiovascular risk assessment shall be done based on the South African Hypertension Guidelines. Cardiovascular risk assessment shall be done in accordance with the tables below.

Table 1

<table>
<thead>
<tr>
<th>MAJOR RISK FACTORS</th>
<th>TARGET ORGAN DAMAGE</th>
<th>ASSOCIATED CLINICAL CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levels of systolic and diastolic BP</td>
<td>Left ventricular hypertrophy: based on ECG</td>
<td>Coronary heart disease</td>
</tr>
<tr>
<td>Smoking</td>
<td>Microalbuminuria: albumin/creatinine ratio 3 –30 mg/mmol</td>
<td>Heart failure</td>
</tr>
<tr>
<td>Dyslipidaemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cholesterol &gt;6.5 mmol/l, OR creatinine ratio &gt;30 mg/mmol LDL &gt;4 mmol/l, OR HDL men &lt;1 and women &lt;1.2 mmol/l</td>
<td>Slightly elevated creatinine Men 115–133 μmol/l Women 107–124 μmol/l</td>
<td>Chronic kidney disease: albumin creatinine ratio &gt;30 mg/mmol</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men &gt;55 years</td>
<td></td>
<td>Stroke or transient ischaemic attack</td>
</tr>
<tr>
<td>Women &gt;65 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family history of early onset of cardiovascular disease</td>
<td></td>
<td>Peripheral arterial disease</td>
</tr>
<tr>
<td>Men aged &lt;55 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women aged &lt;65 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waist circumference – abdominal obesity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men ≥102 cm</td>
<td></td>
<td>Advanced retinopathy</td>
</tr>
<tr>
<td>Women ≥88 cm</td>
<td></td>
<td>Haemorrhages OR Exudates Papilloedema</td>
</tr>
<tr>
<td>The exceptions are South Asians and Chinese: men &gt;90 cm and women &gt;80 cm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**TABLE 2**

Stratification of risk to quantify prognosis

<table>
<thead>
<tr>
<th>Other risk factors and disease history</th>
<th>BP (mmHg)</th>
<th>Normal (SBP 120–129 or DBP 80–84)</th>
<th>High-normal (SBP 130–139 or DBP 85–89)</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Severe hypertension (SBP &gt;180 or DBP &gt;110)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No other major risk factors</td>
<td>Average risk</td>
<td>Average risk</td>
<td>Low added risk</td>
<td>Moderate added risk</td>
<td>High added risk</td>
<td>Very high added risk</td>
<td></td>
</tr>
<tr>
<td>1–2 major risk factors</td>
<td>Low added risk</td>
<td>Low added risk</td>
<td>Moderate added risk</td>
<td>Moderate added risk</td>
<td>Very high added risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 3 major risk factors or target-organ damage or diabetes mellitus</td>
<td>Moderate added risk</td>
<td>High added risk</td>
<td>High added risk</td>
<td>High added risk</td>
<td>Very high added risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associated clinical conditions</td>
<td>Very high added risk</td>
<td>Very high added risk</td>
<td>Very high added risk</td>
<td>Very high added risk</td>
<td>Very high added risk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Legend*

- **Average Risk and Low Added Risk**

Bloods (Fasting Glucose, Fasting Lipogram, U&E-including Creatinine)
Resting ECG: less than the age of 40 years

Stress ECG: 40 years of age and above (to be done by a DAME)

Moderate Added Risk

Annual Stress ECG (done by a DAME-Designated Medical Examiner)

Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipo-gram) for all Classes

Applicable Protocol for Co-morbidity

High Added Risk

Stress ECG (to be done by a Cardiologist – minimum stress level should be 85%)

Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipo-gram)

Applicable Protocol for Co-morbidity

Very High Added Risk

Stress ECG (to be done by a Cardiologist – minimum stress level should be 85%)

Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipo-gram)

Applicable Protocol for Co-morbidity

Procedure for Stress ECG

1) Stress ECG is performed using a 12-lead standard ECG machine displaying at least 3 leads simultaneously and optimally filtered and damped. The leads should be placed as for a standard resting ECG except the limb leads are positioned on the shoulders and the iliac crests on each side.

2) Recordings should be made at rest in the erect and supine positions, and after hyperventilation for 10 seconds. The subject should be exercised to 85% of maximal heart rate or symptom limitation, whichever comes first, and be expected to complete at least 3 stages (nine minutes) of the Bruce Protocol or achieve an Oxygen uptake equivalent
to 11 metabolic equivalents (METs). The age-predicted maximum heart rate is calculated by subtracting the age in years from 220 beats per minute (bpm). The test is most sensitive when taken to symptom limitation rather than any percentage of the age-predicted maximum. If exercise needs to be terminated due to symptom development, license holder should be referred to a cardiologist (if stress is performed by DAME). The reason for discontinuing the test should be recorded together with the presence or absence of any symptom.

3) Immediately post-stress, while the license holder is in the upright position, twelve (12) second recordings should be made at the following intervals: 0, 3, 5 and 7 minutes. If there is any indication, recordings can be taken at two (2) minute intervals up to 11 minutes. Any abnormalities on stress ECG shall be referred to a cardiologist, if the stress ECG is performed by a DAME.

4) A standardized protocol such as the Bruce treadmill protocol 3 or equivalent should be employed. The Bruce protocol is not the only one available but it is the most widely used.

**Intervals**

1) Stress ECG shall be performed in accordance with the cardiovascular risk assessment algorithm.

2) Applicants classified as Moderate, High or Very High risk shall have an annual stress-ECG (if some positive actions are taken to reduce or mitigate the risk of those classified as moderate, an annual stress-ECG is probably not necessary, assuming the first one was negative).

### 14.1.7 Chest Radiography Requirements

#### 14.1.7.1 Class I Medical Certificate

1) Chest radiography, anterior-posterior, and lateral views, must form part of the respiratory system assessment for the initial issue of a Class 1 medical certificate.

2) Periodic chest radiography is usually not necessary but may be a necessity in situations where asymptomatic pulmonary disease can be expected.

3) It is, however, understood that a degree of interpretation and flexibility must always be exercised at the discretion of the medical examiner and the medical assessor, taking into consideration not only medical but also operational and environmental factors of relevance for the overall aviation medical fitness of an applicant.

4) All license holders who have a clinical indication for chest radiography may be required to submit chest radiography at more frequent intervals.

5) License holders may be referred to the relevant protocols.

#### 14.1.7.2 Class 2 Medical Certificate

1) Chest radiography, anterior-posterior, and lateral views, must form part of the respiratory system assessment for the initial issue of a Class 2 medical certificate.

2) Periodic chest radiography is usually not necessary but may be a necessity in situations where asymptomatic pulmonary disease can be expected.
3) It is, however, understood that a degree of interpretation and flexibility must always be exercised at the discretion of the medical examiner and the medical assessor, taking into consideration not only medical but also operational and environmental factors of relevance for the overall aviation medical fitness of an applicant.

4) All license holders who have a clinical indication for chest radiography may be required to submit chest radiography at more frequent intervals.

5) License holders may be referred to the relevant protocols.

14.1.7.3 Class 3 Medical Certificate
1) Chest radiography, anterior-posterior, and lateral views, must form part of the respiratory system assessment for the initial issue of a Class 3 medical certificate.

2) Periodic chest radiography is usually not necessary but may be a necessity in situations where asymptomatic pulmonary disease can be expected.

3) It is, however, understood that a degree of interpretation and flexibility must always be exercised at the discretion of the medical examiner and the medical assessor, taking into consideration not only medical but also operational and environmental factors of relevance for the overall aviation medical fitness of an applicant.

4) All license holders who have a clinical indication for chest radiography may be required to submit chest radiography at more frequent intervals.

5) License holders may be referred to the relevant protocols.

14.1.7.4 Class 4 Medical Certificate
1) Chest radiography, anterior-posterior, and lateral views, must form part of the respiratory system assessment for the initial issue of a Class 4 medical certificate.

2) Periodic chest radiography is usually not necessary but may be a necessity in situations where asymptomatic pulmonary disease can be expected.

3) It is, however, understood that a degree of interpretation and flexibility must always be exercised at the discretion of the medical examiner and the medical assessor, taking into consideration not only medical but also operational and environmental factors of relevance for the overall aviation medical fitness of an applicant.

4) All license holders who have a clinical indication for chest radiography may be required to submit chest radiography at more frequent intervals.

5) License holders may be referred to the relevant protocols.

14.1.8 Flow Volume Lung Function Test

14.1.8.1 Class 1 Medical Certificate
1) Flow-volume lung function testing must form part of the respiratory assessment for the initial issue of a Class 1 medical certificate under the age of 40 years.
2) The flow-volume lung function testing shall be done again at the first medical examination after the age 40, and again at the first medical examination after the age of 50.

3) For active smokers*, the requirement for flow-volume lung function testing shall be not less than every 24 months (biennially) for licence holders under the age of 40 and not more than every 12 months (annually) after the age of 40.

4) All licence holders who have a clinical indication for Lung Function Testing will be required to submit a Lung Function Tests at more frequent intervals.

5) Licence holders may be referred to the relevant protocols.

14.1.8.2 Class 2 Medical Certificate
1) Flow-volume lung function testing must form part of the respiratory assessment for the initial issue of a Class 2 medical certificate under the age of 40 years.

2) The flow-volume lung function testing shall be done again at the first medical examination after the age 40, and again at the first medical examination after the age of 50.

3) For active smokers*, the requirement for flow/volume lung function testing shall be not less than every 24 months (biennially) for licence holders under the age of 40 and not more than every 12 months (annually) after the age of 40.

4) All licence holders who have a clinical indication for Lung Function Testing will be required to submit a Lung Function Tests at more frequent intervals.

5) Licence holders may be referred to the relevant protocols.

14.1.8.3 Class 3 Medical Certificate
1) Flow-volume lung function testing must form part of the respiratory assessment for the initial issue of a Class 3 medical certificate under the age of 40 years.

2) The flow-volume lung function testing shall be done again at the first medical examination after the age 40, and again at the first medical examination after the age of 50.

3) For active smokers*, the requirement for flow/volume lung function testing shall be not less than every 24 months (biennially) for licence holders under the age of 40 and not more than every 12 months (annually) after the age of 40.

4) All licence holders who have a clinical indication for Lung Function Testing will be required to submit a Lung Function Tests at more frequent intervals.

5) Licence holders may be referred to the relevant protocols.

14.1.8.4 Class 4 Medical Certificate
1) Flow-volume lung function testing must form part of the respiratory assessment for the initial issue of a Class 4 medical certificate under the age of 40 years.
2) The flow-volume lung function testing shall be done again at the first medical examination after the age 40, and again at the first medical examination after the age of 50.

3) For active smokers*, the requirement for flow/volume lung function testing shall be not less than every 24 months (biennially) for licence holders under the age of 40 and not more than every 12 months (annually) after the age of 40.

4) All licence holders who have a clinical indication for Lung Function Testing will be required to submit a Lung Function Tests at more frequent intervals.

5) Licence holders may be referred to the relevant protocols.

*Note: Active smoker refers to an individual who engages in the act of intentional inhalation of tobacco smoke from any tobacco product, including but not limited to, manufactured and hand rolled cigarettes, cigars, pipe tobacco and cigarillos. Active smoking does not refer to passive smoking which is the unintentional inhalation by non-smokers of tobacco smoke introduced into the atmosphere by smokers, or smoking of any other substances such as herbal cigarettes or marijuana. The consumption of tobacco products by other means, such as chewing, is also excluded from this standard.

15. TECHNICAL STANDARDS (MEDICAL PROTOCOLS)

The SACAA in consultation with the relevant stakeholders is currently in the process of reviewing this section.

15.1 Neurological or Neuropsyglycal Protocols

a) Head Injuries
b) Post-traumatic epilepsy (PTE)
c) The post-traumatic syndrome
d) Epilepsy
e) Syncope
f) Narcolepsy
g) Transient memory loss
h) Headache
   - migraine
   - cluster
   - tension
   - other
i) Stroke
j) Brain Tumours
k) Parkinson's disease
15.2 Cardiovascular Protocols
   a) Hypertension
   b) Coronary Artery Disease Protocol

15.3 Respiratory Protocols
   a) Asthma
   b) Pneumothorax
   c) Chronic obstructive airways disease
   d) Pulmonary Tuberculosis

15.4 Endocrinology
   a) Diabetes mellitus
   b) Addison's disease

15.5 Oncology
   a) Malignant Melanoma
   b) Oesophageal cancer
   c) Colorectal Cancer
   d) Breast cancer
   e) Testicular Cancer
   f) Prostate Cancer
   g) Renal carcinoma
   h) Bladder Cancer
   i) Lymphomas
   j) Leukaemia

15.6 Psychiatry
   a) Mood Disorder Protocol

15.7 Others
a) Obstetrics and Gynecology
b) Single Kidney Protocol
c) HIV/AIDS Protocol
d) Substance Abuse
e) Warfarin Protocol
f) Colour Perception Deficiency Protocol
g) Lasik
h) Rheumatoid Arthritis
i) The use of Plavix
j) Bone Marrow Transplant

15.8 List of Acceptable Medication
16. SECTION 5

16.1 Protocol on Neurological or Neurosurgical Problems

Mild head injury

A. Characteristics:
   a) LOC / PTA < 30 min
   b) No neurological deficit

16.2 Head Injuries

   a) No compounding factors (skull #, vertigo, headache)

Decision:

It is recommended that all applicants who sustain a head injury and have impaired consciousness (no LOC) be grounded for at least 7 days, as even they may develop post-traumatic epilepsy.

Those who have even a fleeting LOC and amnesia should be grounded for a period of 6 weeks. These applicants tend to recover fully, and may then fly without restrictions.

16.2.1 Moderate head injury

Characteristics:
   a) LOC / PTA >30 min but <24h
   b) Focal neurological deficits
   c) Skull base #
   d) Surgical penetration of the Dura

Decision:

Following a moderate head injury (particularly if the duration of post-traumatic amnesia is >12h) the applicant should be made temporarily unfit for a period of 2 years (this decision is usually made/confirmed by the Aviation Medical Panel.)

After 2 years, the applicant may apply for re-certification. The examination should preferably be coordinated by the designated body or institution and a series of special investigations are required (E.g. sleep deprivation /
photostimulation EEG, CT / MRI scans of the brain, neuropsychological evaluation etc.) in addition to these special investigations, a practical flight test is usually required. Pilots may then be made fit, fit with restrictions, or unfit by the Panel.

### 16.2.2 Severe head injury

**Characteristics:**

- a) LOC / PTA 1 to 7 days
- b) Neurological/intellectual impairment
- c) Traumatic penetration of the Dura
- d) Depressed skull #
- e) Traumatic intracranial haemorrhage
- f) EEG abnormalities persisting for >2 years

**Decision:**

These applicants will most likely be unfit for flying duties.

Exceptional cases with a full clinical recovery may be considered for recertification after 5 years following rigorous assessment (with several specialist reports and special investigations) co-ordinated from the designated body or institution.

### 16.2.3 Very severe head injury

**Characteristics:**

- a) LOC / PTA >7 days
- b) Missile penetration of the brain
- c) Brain abscess
- d) Debilitating neurological deficit

**Decision:**

These applicants will be unfit for flying duties.

**Considerations:**

### 16.3 Post-Traumatic Epilepsy (PTE)

a) Post-traumatic epilepsy is the chief cause of concern in a flight crew member following a head injury. It is subdivided, on clinical-pathophysiological grounds, into early (within 7 days), and late (after 7 days) types.
b) Convulsions that occur during or immediately after impact are a distinct, more benign entity, which will probably not influence the applicant's flying career.

c) Where LOC and PTA are indicative of the extent of diffuse brain injury, post-traumatic epilepsy is indicative of the extent and localisation of localised brain injury.

d) Time distribution of PTE:

  I. 15% develops within the first week.
  II. 30% develops within the first 3 months.
  III. 52% develops within the first 6 months.
  IV. 75% develops within the first year.
  V. 95% develops within the first 2 years.
  VI. ~100% develops within the first 5 years (but cases still occur many years later).

Decisions:

a) The diagnosis of epilepsy is usually made after the second convulsion, but the applicant is unfit to fly after the first convulsion. If there are 3 or more convulsions in the first year, the incidence of persistent epilepsy is as high as 85%.

b) After a head injury, the applicant is seen after 7 days, one month, and then 3 monthly for 2 years to observe for post-traumatic epilepsy and the post-traumatic syndrome. If an applicant does develop convulsions, he/she is seen weekly until they are controlled.

Considerations:

16.4 The Post-Traumatic Syndrome

a) Following a head injury, some symptoms occur quite often e.g. headache, dizziness, impaired concentration, memory impairment, and impaired thought processing. This often leads to irritability, depression or even irrational behaviour.

b) The incidence of headache and dizziness after a head injury is approximately 50%. It is often those with mild head injuries who exhibit the post traumatic syndrome.

c) These symptoms tend to resolve with time, with virtually all resolving within 2 years.

Decisions: the importance of this syndrome is that, if present, the applicant should be observed (and grounded) for a longer period then he/she would otherwise have been.

16.5 Epilepsy

16.5.1 Important concepts:

a) Diagnosis of even a single epileptic attack means that the applicant is permanently unfit to fly.

b) No applicant who has had a convulsion after the age of 5 years should be considered for pilot training.
c) Any inexplicable LOC should be regarded as epilepsy until proven otherwise.

d) An applicant with a history of a single, uncomplicated febrile convulsion between the age of 1 and 5 years will still be eligible for pilot training. If, however, the convulsion was complicated, the applicant will no longer qualify, i.e.

I. A convulsion before the age of 1 year. This holds the risk for mental retardation and epilepsy later in life.

II. Multiple febrile convulsions.

III. Duration of convulsions longer than 5 minutes.

IV. Lateralising signs during febrile convulsions.

16.5.2 Provocation testing:

a) There are certain techniques, which can be used to determine whether an applicant has a high risk of developing convulsions.

b) These include vagal stimulation, hypoxia, hyperthermia, alcohol, photic stimulation, certain drugs, sleep deprivation and hyperventilation.

c) An applicant who develops EEG abnormalities in response to such provocation tests will be evaluated very thoroughly before he/she is allowed to fly.

d) An applicant who develops convulsions in response to such provocation tests will be unfit to fly.

16.5.3 Electroencephalography

a) Certain EEG patterns are associated with an increased risk of developing convulsions. Applicants who exhibit these patterns must be fully assessed.

b) An applicant should not be made unfit only on the grounds of an isolated EEG abnormality.

Considerations:

16.6 Syncope

a) Syncope is a loss of consciousness (usually fleeting) due to decreased cerebral perfusion.

b) Applicants who give a history of syncope must be fully assessed, as there are many organic (cardiovascular, neurological) diseases that may cause syncope.

Decision

a) Any unexplained LOC:

I. Unfit for initial pilot training until a five year period (without any further incidents) has elapsed.

II. Unfit for re-certification until a 2 year period (without any further incidents) has elapsed.

b) The cause of the syncope may also be disqualifying. (E.g. cardiomyopathy)
16.7 Narcolepsy/Sleep Apnoea Syndrome

These applicants are unfit to fly.

16.8 Transient Memory Loss

a) Loss of memory concerning a period of time (minutes to hours) is not uncommon. Causes include alcohol, epilepsy, migraine, TIA's, certain drugs (e.g. benzodiazepines) and psychiatric disturbances (e.g. psychogenic fugue).

b) These applicants must be evaluated according to the underlying cause. The vast majority will be unfit to fly.

16.9 Headache

The importance of individualising the approach to headaches cannot be overemphasised. The following must be considered:

- Frequency of headaches
- Degree of incapacitation caused by the headache.
- Drugs used to treat the headache.

16.9.1 Migraine

An applicant who gets migraine headaches will be unfit to fly if diagnosed as:

a) Classical migraine or migraine with aura
b) Vertebrobasilar migraine
c) Migraine equivalents
d) Migraine prophylaxis.

Thus an applicant who gets migraine headaches will be unfit to fly unless he/she has very mild headaches, with no neurological deficit (one might then begin to doubt the diagnosis of migraine.) Also note that many applicants who give a history of "migraine" do not in fact get migraine headaches at all.

16.9.1.1 Migraine protocol

1) An applicant who gives a history of migraine should be made temporarily unfit and has to submit the following documents at initial application (for approval by the Aviation Medical Panel).

a) Full neurological examination
b) EEG.

2) Only pilots that fulfill the criteria for migraine without aura will be certified fit to fly provided that:

a) The headaches are not of such severity as to incapacitate the pilot from safely operating the aircraft.
b) He/she does not have nausea and/or vomiting.
c) He/she does not have photo- and/or phonophobia.
d) If there is any change in the pilot's medical status with the migraine, he/she would automatically be unfit.
e) If the pilot needs disallowable medication to abort, treat or prevent the
f) migraine attack he/she is unfit

3) Factors to be taken into consideration:
   a) Individual/personality factors.
   b) Family history.
   c) Predisposing factors.
   d) Frequency of the headaches.
   e) Severity and duration of the headaches.
   f) Associated symptoms.
   g) Any complications
   h) Medication

4) Recommendation:
   He/she should be advised not to fly at altitudes above 8000 ft.

Considerations:
   a) Characteristics:

16.9.1.2 Cluster headache
   • Deep, "boring" retro-orbital pain.
   • Patient usually remains ambulatory.
   • Duration between 15 minutes an 2 hours.
   • Occur a few times daily.
   • This pattern lasts for 4 to 8 weeks, after which there is an attack free period of 6 months to several years.
   a) Applicants who get cluster headaches are assessed according to frequency and severity of headaches, and need for medication.

Decision:
   a) Frequent/chronic cluster headaches are disqualifying, as is the medication.
   b) b. If an applicant has been attack free, without medication, for 2 years, he/she will be considered for re-certification.

16.9.1.3 Tension headache
1) The severity of the headaches and the need for medication are the deciding factors.
2) The chronic use of medication is against fitness to fly.
3) Associated depression or anxiety should also be considered.

16.9.1.4 Other headaches
1) Temporal arteritis:
   • ESR normal, no steroid treatment, asymptomatic for 1 year - fit.
2) "Sexual headache":
   - Usually benign, and responds to β-blockers.
   - Fit (abstinence before flying is recommended.)
3) Trigeminal neuralgia:
   - On medication - unfit.
   - After surgical treatment, asymptomatic for 2 months - fit.
4) Conversion headaches:
   - Usually on disqualifying medications.
   - Mental condition of applicant per se probably disqualifying.
5) Atypical facial pain:
   - On medication - unfit.
6) Post-traumatic headache:
   - Assess according to original head injury.
   - On medication - unfit.

16.10 Protocol on Strokes
1) An applicant who presents with symptoms suggestive of a TIA should be thoroughly assessed.
2) The presence of an asymptomatic bruit is associated with an increased risk for a stroke, and 6 monthly examinations should be done thereafter.
3) The following conditions are disqualifying:
   - Cerebral infarct, embolism, or haemorrhage.
   - Cerebral aneurysm or A-V malformation.
   Applicants may be made fit again after surgical repair (not proximal ligation or "packing") if angiogram done after 1 year shows successful repair.
4) Incidental discovery of an asymptomatic occlusion of a cerebral vessel will not necessarily make an applicant unfit - he/she must be fully assessed.

Considerations:

16.11 Protocol on Brain Tumours
a) Is there neurological deficit that is incompatible with flying?
   b) Is the tumour likely to recur?
1) Supratentorial meningioma
   a) These applicants should be made temporarily unfit upon diagnosis.
   b) Following successful surgery, they must be asymptomatic, and have no neurological deficit for a period of 2 years before being considered for re-certification by the Panel.
   c) They will require a MR scan of the brain that shows no tumour, and an oncologist's report which states that:
I. The applicant is in remission.
II. That he/she never had convulsions.

d) The Panel may find the applicant fit, with the restriction of an annual medical examination (including specialist's report).

2) Infratentorial meningioma, acoustic neuroma, pituitary adenoma, and benign extra-axial tumours:
   a) Require the same conditions as a supratentorial meningioma.
   b) Except that the stipulated minimum period before re-certification is considered, is 1 year.

3) Pseudotumour Cerebri:
   These applicants are temporarily unfit until they have been headache free, and have had normal visual fields, for a period of 6 months.

4) Other CNS tumours: Unfit to fly.

16.12 Protocol on Parkinson's Disease
1) Parkinson's disease per se is not a disqualifying condition.

2) The applicant is assessed on bradykinesia, rigidity, tremor, balance disturbances, fast eye tracking and voice quality.

3) If an applicant has been stable on therapy for 6 months and exhibits no drug side effects, the panel will consider him/her for flying fitness.

16.13 Protocol on Multiple Sclerosis
1) It is unsafe for an applicant with multiple sclerosis to pilot an aircraft for the following reasons:
   - There is a risk of sudden loss of vision, vertigo, or convulsions.
   - High temperatures and stress situations tend to precipitate an attack.
   - It is a progressive disease.
   - It tends to repeat.

2) Diagnosis is made on the history and physical examination. Special examinations, which can confirm the diagnosis, include:
   - Evoked potentials:
     - Visual.
     - Somatosensory.
     - Auditory.
     - Brain stem.
   - Cerebrospinal fluid:
     - IgG index.
     - Oligoclonal bands.
   - MRI:
     - Demonstration of periventricular plaques.
3) As a rule, the pattern that the disease takes in the first 3 years is the pattern that the disease will follow. It remains, however, an unpredictable disease.

4) When the diagnosis of multiple sclerosis is made, the applicant should be made temporarily unfit and referred to the Panel for a decision.

5) If an applicant is asymptomatic, the Panel may make him/her fit to fly with the restriction that he/she must have a 6 monthly examination, including a neurologist’s assessment.

6) If, at any of the follow-up examinations, any of the following are found, the applicant may be declared unfit:
   - Sudden visual loss.
   - Sensory disturbances in the hands.
   - Mood changes.
   - Vertigo or convulsion.
   - Exacerbations during stress situations or exposure to high temperatures.

16.14 Cardiovascular PProtocols

16.14.1 Protocols on Hypertension

A blood pressure which is consistently >160/100 mmHg disqualifies a person from all classes of medical certification. A person is deemed unfit, until such time the person can prove control on acceptable medication.

16.14.1.1 Mild Hypertension
1) A person is considered to be having mild hypertension if his or her systolic BP is 140–159 or diastolic BP is 90–99.

2) In the case of a mild hypertension referred to in paragraph (1), a person shall –
   a) undergo regular 3 monthly BP checks for a year;
   b) undergo Lifestyle Modification (According to the National Guidelines on the Management of Hypertension);
   c) adjust or alter medication if already on therapy;
   d) undergo Cardiovascular Risk Assessment; and
   e) may continue to fly, in the case of a pilot.

16.14.1.2 Moderate Hypertension
1) A person is considered to be having moderate hypertension if his or her systolic BP is 160–179 or diastolic BP is 100–109.

2) In the case of a moderate hypertension referred to in paragraph (1), a person shall –
   a) Exclude reactive hypertension
   b) If hypertension established:
I. Urine Dipstix for Microalbuminuria
II. Clinical examination.
III. Blood tests:
   (aa) Urea and Electrolytes
   (bb) Fasting Glucose
   (cc) Fasting Total Cholesterol, and if Total Cholesterol is >5.00 a fasting Lipogram should be done
c) Begin therapy with an acceptable agent.
d) Cardiovascular Risk Assessment.
e) Ground pilot for two weeks.
f) After one month a clinical evaluation will be done.

16.14.1.3 Moderate/Severe Hypertension
1) A person is considered to be having moderate/severe hypertension if his or her Systolic BP is 160–179 mmHg or Diastolic BP is 100–109 mmHg (for moderate) or Systolic BP of >180 or Diastolic BP of >110 (for severe).
2) In the case of a moderate/severe hypertension referred to in paragraph (1), a person shall –
   a) review medication (therapy);
   b) be considered medically fit and not exercise the privileges of his or her licence until hypertension is adequately controlled on acceptable medication.

16.14.1.4 Once Normotensive/Diagnosed Reactive Hypertension
1) A person is considered to be normotensive if his or her Systolic BP is 120–129 or Diastolic BP is 80–84.
2) Once the licence holder is normotensive or diagnosed to have reactive hypertension as per paragraph (1), a person shall –
   a) be deemed fit to fly, with 6-monthly follow-up for one year, consisting of –
      I. Clinical examination
      II. Resting ECG (<40 or falls into the Blue or Green Risk Categories – see Table 2)
      III. Stress ECG (>40 or falls into the Yellow, Orange, or Red Risk Categories – see Table 2) See note*
      IV. Blood tests:
         (aa) U & E including Creatinine
         (bb) Fasting Glucose
         (cc) Fasting Lipogram

Note *Stress ECG for Yellow Risk Category to be done by AME. Stress ECG for Orange and Red Risk Categories to be done by a Cardiologist. Risk categories as per Table 2.
   b) undergo annual follow-up thereafter consisting of:
      I. Clinical examination
      II. Resting ECG (<40 or falls into the Blue or Green Risk Categories – see Table 2)
      III. Stress ECG (>40 or falls into the Yellow, Orange, or Red Risk Categories – see Table 2) See
IV. Blood tests (U&E including Creatinine, Fasting Glucose, Fasting Lipogram).
Note *Stress ECG for Yellow Risk Category to be done by AME. Stress ECG for Orange and Red Risk Categories to be done by a Cardiologist. Risk categories as per Table 2.

16.15 Cardiovascular Risk Assessment

Cardiovascular Risk Assessment shall be done based on the South African Hypertension Guidelines.

### TABLE 1

<table>
<thead>
<tr>
<th>MAJOR RISK FACTORS</th>
<th>TARGET ORGAN DAMAGE</th>
<th>ASSOCIATED CLINICAL CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levels of systolic and diastolic BP</td>
<td>Left ventricular hypertrophy: based on ECG</td>
<td>Coronary heart disease</td>
</tr>
<tr>
<td>Smoking</td>
<td>Microalbuminuria: albumin/creatinine ratio 3–30 mg/mmol</td>
<td>Heart failure</td>
</tr>
<tr>
<td>Dyslipidaemia</td>
<td>Slightly elevated creatinine</td>
<td>Chronic kidney disease: albumin/creatinine ratio &gt;30 mg/mmol</td>
</tr>
<tr>
<td>Total cholesterol &gt;6.5 mmol/l, OR creatinine ratio &gt;30 mg/mmol</td>
<td>Men 115–133 μmol/l</td>
<td></td>
</tr>
<tr>
<td>LDL &gt;4 mmol/l, OR HDL men &lt;1 and women &lt;1.2 mmol/l</td>
<td>Women 107–124 μmol/l</td>
<td></td>
</tr>
<tr>
<td>Diabetes mellitus Men &gt;55 years Women &gt;65 years</td>
<td></td>
<td>Stroke or transient ischaemic attack</td>
</tr>
<tr>
<td>Family history of early onset of: cardiovascular disease Men aged &lt;55 years Women aged &lt;65 years</td>
<td></td>
<td>Peripheral arterial disease</td>
</tr>
<tr>
<td>Waist circumference – abdominal</td>
<td></td>
<td>Advanced retinopathy</td>
</tr>
</tbody>
</table>
obesity
Men ≥102 cm
Women ≥88 cm
The exceptions are South Asians
and Chinese: men >90 cm and
women >80 cm

Haemorrhages OR
Exudates
Papilloedema

**TABLE 2**

<table>
<thead>
<tr>
<th>Other risk factors and disease history</th>
<th>BP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>High-normal</td>
</tr>
<tr>
<td>SBP 120–129 or DBP 80–84</td>
<td>SBP 130–139 or DBP 85–89</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>No other major risk factors</td>
<td>Average risk</td>
</tr>
<tr>
<td>1–2 major risk factors</td>
<td>Low added risk</td>
</tr>
<tr>
<td>≥ 3 major risk factors or target-organ damage or diabetes mellitus</td>
<td>Moderate added risk</td>
</tr>
<tr>
<td>Associated clinical conditions</td>
<td>Very high added risk</td>
</tr>
</tbody>
</table>

* Legend
Average Risk and Low Added Risk

Bloods (Fasting Glucose, Fasting Lipogram, U&E-including Creatinine)
Resting ECG: less than the age of 40 years
Stress ECG: 40 years of age and above (to be done by a DAME)

Moderate Added Risk

Annual Stress ECG (done by a DAME-Designated Medical Examiner)
Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipogram) for all Classes
Applicable Protocol for Co-morbidity

High Added Risk

Stress ECG (to be done by a Cardiologist – minimum stress level should be 85%)
Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipogram)
Applicable Protocol for Co-morbidity

Very High Added Risk

Stress ECG (to be done by a Cardiologist – minimum stress level should be 85%)
Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipogram)
Applicable Protocol for Co-morbidity

16.16 Coronary Artery Disease Protocol

16.16.1 General

a) Aviation medical standards as laid down in Annex 1 of the Convention on International Civil Aviation by the International Civil Aviation Organisation to which South Africa is a contracting State, have identified broad medical conditions that, on the basis of expected risk of incapacitation, disqualify aviation personnel from flying.

b) South Africa is one of the countries that previously applied strict standards to initial applicants with a history of coronary heart disease who applied for a medical certificate. This previous protocol was also applied to aviation
personnel regarding whom the risk of sudden incapacitation was reduced as a result of risk factor modification or rehabilitation, including therapeutic interventions.

c) The SACAA has since reviewed this protocol, and is now making provision for aviation personnel with a history of Coronary Artery Disease. Initial and experienced applicants may be considered for any class of medical certificate. This consideration will be based on the individual medical condition of the applicant and risk factor involved.

d) This protocol applies to all applicants (initial and experienced) presenting with coronary artery disease (such as Myocardial Infarction, Angina Pectoris or asymptomatic coronary artery disease detected on investigation following assessment of risk factors). The protocol is applicable to isolated coronary artery disease and its risk factors only.

e) The presence of ischaemia /inducible ischaemia remains an exclusion factor.

16.16.2 Applicability

Operational Restrictions

CLASS I

ATPL Multi-crew – As/or with a co-pilot

Commercial Pilots

a) Instructor – Student must have completed first solo flying

b) Game Capturing – Applicant can fly solo only if there are no passengers.

c) Crop Spraying – Applicant can fly solo if there are no passengers.

CLASS II – no restrictions

CLASS III – no restrictions

CLASS IV – no restrictions

16.16.3 General Medical Requirements Applicable To All Applicants

1) Applicants will be temporarily taken off flying or controlling duties for a duration of not less than six months following the index event.

2) Applicants must be asymptomatic for at least six months following adequate intervention; the medical certificate will be withdrawn during this period.

3) Applicants on medication will be considered only if the medication is approved by the Medicine Control Council of South Africa and is compatible with flying.

4) All initial medical reports must be submitted to a panel of specialists for consideration, and should include the following –

a) Hospital admission summary (History and Physical).
b) If catherisation and/or angiography have been performed, all reports and actual films/CDs must be submitted for review. A cardiothoracic report, in cases of CABG/PTCI, detailing the cardiac event and procedures must be submitted.

c) Applicants presenting with more than two stenoses of more than 30% within a vascular tree, shall be assessed as unfit.

d) An Angiogram shall not reveal stenosis of greater than 50% in any major untreated vessel, in any vein/artery graft or at the site of an angioplasty/stent, except in a vessel supplying the infarct.

e) The medical certificate of applicants presenting with any major vessel stenosis of 50% will be withdrawn, until appropriate intervention is undertaken.

16.16.4 Cardiovascular Evaluation
1) General physical and clinical cardiology assessment.
2) Family and medical history.
3) Functional capacity using New York Heart Association Functional Classification or Canadian Cardiovascular Score.
4) Prognosis of incapacitation.
5) Treatment
6) Blood chemistry (fasting Lipid Profile, Urea, Urate and Creatinine and Fasting Blood Glucose).
7) Risk Factors For Ischaemic Heart Disease
8) The following are major modifiable risk factor for ischaemic heart disease and should be under control:
   a) Smoking
   b) An applicant with known ischaemic heart disease who continues to smoke should be assessed as “medically unfit”.
   c) Weight Reduction
   d) Weight reduction in obese and overweight patients should be encouraged. Applicants are theoretically encouraged to set a goal to achieve a body mass index (BMI) <25kg/m or a waist circumference <102cm in men and 88cm in women.
   e) Abnormal Lipid Profile
   f) Applicants are encountered to be aware of their serum cholesterol levels and to maintain a normal level. Statins are recommended early for all applicants with a history of Non-ST elevation acute coronary syndrome- (NSTE-ACS) in the absence contraindications, irrespective of cholesterol levels, with the aim of achieving Low Density Lipoprotein (LDL) levels <2.6mmol/L.
   g) Blood Pressure Control
   h) Applicants are required to have a blood pressure control of <140/90, and <130/80 mmHg for those suffering from diabetes mellitus or renal dysfunction.
   i) Maximal Stress ECG
      I. Applicants are required to be symptom-free and must complete a minimum of Bruce Stage 3 or 8.5 metabolic equivalents (METS).
II. A minimum of 85% of the required target rate must be achieved

III. The applicant must be free from inducible myocardial ischaemia or significant rhythm disturbances during the study. A 24-hour Holter ECG tracing is necessary to assess any significant rhythm disturbances.

IV. A stress Echocardiogram/Stress MRI/MIBI Scan or Coronary CT Scan will be required six months after the incident.

V. If any of the above-mentioned tests show any significant abnormality, a Coronary Angiogram will be required; it must be within previously described limits.

VI. The left ventricular ejection fraction as a measure of left ventricular function using echocardiogram or gated radionuclide scintigraphy should be 50% or more at rest, and should not show a decrease of more than 5% with satisfactory exertion (85% predicted maximum heart rate or >8 (METS)

VII. A threshold ejection fraction of 45% applies with the use of single proton emission computerised tomography (SPECT).

VIII. In applicants with an ejection fraction between 40% and 50%, restricted medical certification may be considered after review of a 24 hour Holter. This should reveal no more 30 Ventricular ectopic beats per hour in the absence of anti-arrhythmic medication, with no more than 3 consecutive beats and a cycle length that is not less than 500msec.

IX. A Myocardial Perfusion Scan shall be required at least six months after Angioplasty/Stenting, but not necessarily after other events (Myocardial Infarction or Coronary Artery Bypass Grafting), unless there is doubt about the diagnosis Myocardial Infarction or adequacy of Bypass Grafting.

16.17 Therapeutic Considerations

Only medication that is compatible with flying will be allowed.

16.18 Follow-up Certification

16.18.1 Annual cardiologist’s report, including –
   a) Resting and Maximal Stress ECG 12 lead ECG, symptom limited, with no evidence of myocardial ischaemia or ischaemia equivalent. (Some applicants will continue to have an “abnormal” stress test. A cardiologist’s opinion should be sought for these cases and if necessary, MIBI or stress ECHO may be required);
   b) A normal 24 Hour Holter ECG will be required.

16.18.2 Blood chemistry shall include –

   a) Urea & Creatinine.
   b) Fasting Lipid Profile.
   c) Fasting Blood Glucose.
d) Haemoglobin & Platelets.

16.18.3 An angiogram will be required –

a) if there is any cardiac abnormality detected, including symptom relapse.

16.18.4 Chest pain –

a) regardless of whether typical or atypical for ischaemic heart disease, precludes medical certification insofar as it indicates an elevated probability of significant coronary artery disease and an increased risk of an incapacitating cardiac event.

16.18.5 An applicant may be considered fit if –

a) diagnostic testing indicates that the chest pain is not due to myocardial ischaemia.

b) the initial assessment, including a review of the symptom history, must be without the effect of anti-ischaemic medication that could possibly mark adverse findings.

c) If coronary arteriography reveals normal coronary arteries, coronary vasospasm should be excluded.

16.19 Four-Yearly

a) A stress cardiolite/MIBI Scan/Stress MRI/Stress Echo or coronary Scan will be required.

b) If any of the tests show any abnormality, a repeat Angiogram will be required.

16.20 Respiratory System

16.20.1 Protocol on Asthma

ICAO Annex 1 – Personnel Licensing 6.3.2.8. states: “There shall be no acute disability of the lungs nor any active disease of the structures of the lungs, mediastinum or pleura.”

In the ICAO guidelines on Medical Assessment of the Respiratory System – Chapter 2, the following is stated: “Applicants with bronchial asthma should in general be assessed as unfit unless the clinical course is extremely mild and drug treatment is not required.”

In South Africa there is a slightly more lenient approach. Although applicants who comply with the following protocols are able to fly, all cases that fall outside the minimum standards must be referred to the Aviation Medical Panel for certification.
16.20.1.1 Special examinations
1) Lung function tests –
   a. Interval: Same as ECG or more frequently on indication
2) Chest X-ray: PA and Lateral on initial examination. Subsequent CXRs on indication only.

16.20.1.2 Minimum lung function standards
1) FEV1 and FVC ≥ 70% of predicted values (to exclude restrictive lung disease) N.B. If one or both of these values are <70% refer for X-ray and pulmonologists report.
2) FEV1/FVC ≥ 70% to exclude obstructive airways disease. N.B. Do not use % predicted values here.

16.20.1.3 Initial pilots
1) If FEV1/FVC ≤ 75%
   Determine cause –
   a) Infection (e.g. bronchitis):
   b) Temporarily unfit. Repeat after 7 to 14 days when cured and off medication.
   c) Reactive airways –
      I. Any form of asthma in the last 5 years or previous hospitalisation due to asthma: Temporarily unfit. Pulmonologists report.
      II. Exercise induced asthma only: Temporarily unfit. Inhaled steroids for 4 weeks. Re-examine with provocation test (e.g. stress ECG).
2) Acceptable lung function with –
   a) History of asthma in past 5 years. Temporarily unfit. Pulmonologists report.
   b) Use of bronchodilators. Unfit to fly with bronchodilators. Pulmonologists report.

16.20.1.4 Experienced pilots
1) If FEV1/FVC ≤ 70%
   Manage according to the cause:
   a) Infection (e.g. bronchitis):
      I. Temporarily unfit. Repeat after 7 to 14 days when cured and off medication
      II. Reactive airways:
         • Treated for asthma in the last 5 years or previous hospitalisation due to asthma. Temporarily unfit. Pulmonologists report.
         • Exercise induced asthma:
         • Unless severe (e.g. FEV1/FVC ≤ 70%) provisionally fit. Inhaled steroids for 4 weeks. Re-examine after provocation test.
2) Acceptable lung function with:
   a) History of wheezing in the absence of infection. Not taking medication and never admitted to hospital due to asthma.
      Provisionally fit (if medication is taken – temporarily unfit) pending the pulmonologist’s report.
b) Use of bronchodilators.
   Unfit to fly with bronchodilators. Pulmonologists report.

3) Any applicant who has had an FEV1/FVC ≤ 70% for reasons other than infections, should have an initial
   pulmonologists report followed by an annual lung function test.

4) The only medication that may be used in the management of asthma is –
   a) Inhalation steroids (e.g. Becotide™, Becloforte™, Becodisks™, Pulmicort™, Clenil™, Inflammide™,
      Flixotide™, Viarox™, Ventzone™, etc.)
   b) Sodium cromoglycate (i.e. Lomudal™) and Nedocromil (Tilade™) – are also acceptable.

16.20.2  Protocol on Pneumothorax

16.20.2.1  Traumatic Pneumothorax
1) Uncomplicated cases. Fit to fly 6 weeks after discharge from hospital. Confirmatory chest x-ray and lung function
   test required.
2) Complicated cases (e.g. empyema, chronic pneumothorax, other serious injuries, etc.) – refer to pulmonologist.
   Decision by Aviation Medical Panel.

16.20.2.2  Spontaneous Pneumothorax
1) Initial pilots –
   History of previous spontaneous pneumothorax. Temporarily unfit. Refer to pulmonologist.
2) Experienced pilots –
   a) First episode –
      May be considered for recertification 6 weeks after discharge from hospital. Confirmatory chest x-ray, lung
      function and pulmonologists report (stipulating state of recovery, chance of recurrence and underlying
      pathology) required.
   b) More than one episode –
      Temporarily unfit. May be recertified 6 to 12 weeks following successful pleurodesis.

16.20.3  Protocol on Chronic Obstructive Airway Disease
1) Applicants with COAD are assessed according to the minimum lung function standards.
2) If they have irreversible airways obstruction outside the minimum standard, they should be referred to pulmonologist
   for assessment of vital capacity reduction, increased residual volume, presence of bullae, diffusion capacity, oxygen
   saturation and carbon dioxide retention.
3) Bi-annual CXRs are recommended.
16.20.4 Protocol on Sarcoidosis

Sarcoidosis is the disease of unknown aetiology characterized by granulomatous lesions which can affect multiple organ system? It can cause pulmonary manifestations, skin lesions, uveitis, hepatic cirrhosis, renal calculi, hypersplenism and cardiac arrhythmias. Full evaluation of pulmonary, cardiovascular, neurological, ophthalmic and renal systems may be indicated to exclude or determine the extent of the disease. The main hazard of sarcoidosis in aviation is the involvement of the central nervous system and the heart. Cardiac sarcoidosis has no ominous reputation with high incidence of sudden death (which may be presenting feature). The commonest form seems to be affecting the respiratory system, it is often symptom less and detected on routine chest x ray as bilateral lymphadenopathy.

For the first application after the disease process started, the following must be submitted, in addition to a flying medical examination, after which a panel decision will be taken:

a) Blood tests:
   - ESR
   - Angiotensin Converting Enzyme
   - Ca2+
   - Uric Acid
b) Stress ECG
c) CXR
d) Lung Function Test.

Every six months after the first application was granted, the following must be submitted:

a) Blood tests:
   - ESR
   - Angiotensin Reversal Enzyme
   - Ca2+
   - Uric Acid.
b) Lung Function Test.
c) Aviation medical examination.

Annually after the first application was granted, the following must be submitted:

a) CXR
b) Specialist Physician/ Pulmonologist report.

Stress ECG can be submitted at the normal intervals for the specific age group.
16.20.5  **Tuberculosis**

**General and Medical requirements**

I. An initial applicant with active tuberculosis or undergoing treatment shall be assessed as temporarily unfit for a minimum period of 6 months, from the date of confirmation of disease and initiation of treatment.

II. The Applicant can be assessed as fit after completion of treatment if:
   1. Normal lung function tests are demonstrated
   2. Chest radiograph shows no significant lung damage
   3. A recognized course of medication has been completed
   4. (e.g. Rifafour®)
   5. Treating physician report is favorable
   6. The applicant will be required to submit a chest radiograph report quarterly (every three (3) months) for a period of two (2) years compared carefully with the original to show no signs of extension of the disease and a treating physician report that states that there are neither general symptoms nor symptoms referable to the chest

B. **Applicable restrictions**

I. Class 1:

II. May be assessed as fit as a Multi-pilot (Class 1 ‘OML’)

III. Class 2:
   1. May be assessed as fit as a safety pilot (Class 2 ‘OSL’)

IV. Class 3:
   1. May be assessed as fit as with or as second controller

V. Class 4:
   1. May be assessed as fit in a Multi-crew (Cabin crew), and recreational pilots: no restriction

VI. In case of an applicant undergoing treatment, a special waiver after 3 months may be given if:
   1. The applicant does not have open cavitory TB and the sputum is negative for TB
   2. He/she is on appropriate medication and demonstrates no drug resistance
   3. The medication exhibits no undesirable side effects that may impair flight safety
   4. Pulmonologist report is favorable
   5. Underlying medical conditions are evaluated and appropriately managed

VII. Applicants with recurrent or re-activation tuberculosis, post TB-Bronchiectasis with recurrent chest infections or large cavities and MDR and XDR TB shall be deemed unfit pending pulmonologist report and special waivers may be given on a case-to-case basis by the aeromedical committee and on Re-certification will require a pulmonologist report

16.21  **Endocrinology System**
16.21.1 Protocol on Diabetes Mellitus

16.21.1.1 General

Aviation medical standards as laid down in Annex 1 of the Convention on International Civil Aviation by the International Civil Aviation Organisation to which South Africa is a Contracting State, have identified broad medical conditions that, on the basis of expected risk of incapacitation, disqualify aviation personnel from flying.

South Africa is one of the countries that previously applied strict standards to applicants with a history of Diabetes Mellitus on Insulin. The previous protocol did not take into consideration new therapeutic interventions, risk factor modification or rehabilitation, all of which reduced the risk of sudden incapacitation.

The South African Civil Aviation Authority (SACAA) has since reviewed this protocol, and is now making provision for aviation personnel with a history of Type II Diabetes Mellitus or Type 1 Diabetes Mellitus on Insulin to apply for the privileges of the licence they wish to apply for. This consideration will be based on the individual medical condition of the applicant and risk factor involved.

16.21.1.2 Background

Diabetes is defined as a metabolic disease with some genetic predisposition; it is characterised by an impaired ability to break down, store and utilise carbohydrates effectively. This may be due to failure of production of Insulin from the beta-cells in the islets of Langerhans in the pancreas or the presence of Insulin resistance impeding the action of the endogenously produced hormone. Diabetes is divided into two categories –

Type I Diabetes Mellitus, formerly “childhood, juvenile or Insulin-dependent” diabetes islet cell failure (possibly autoimmune) destruction Insulin-producing B cells pancreas, significant Insulin deficiency; require Insulin.

Type 2 (non Insulin dependent diabetes) Insulin resistance due to impaired Insulin secretion (“burn out” b cells), Insulin resistance (peripheral Insulin receptors), and increased hepatic glucose production, may or may not require Insulin.

From a number of studies, the risk factors for severe hypoglycemia include previous hypoglycemia, long duration of diabetes and impaired hypoglycemic awareness. The risk to flight safety is greater in Type 1 Insulin-treated Diabetic
patients than for Type 2. Type 1 applicant may obtain a medical certificate, but this is only applicable to Class 2 and Class 3 applications.

The methods used to treat diabetic patients have improved over recent years, and individuals that require Insulin to maintain satisfactory blood glucose levels may apply, or re-apply, for a license to fly or to undertake air traffic control work. The key areas of concern in certificating aircrew with Insulin treated diabetes mellitus are hypoglycemia and the enhanced risks of micro- and macrovascular disease.

16.21.1.3 Estimated Incapacity Risk

Using data from literature review, the rate of severe hypoglycemia using, i.e. hypoglycemia requiring the help of another in Type 2 treated Insulin, is of the order of 3% per annum. These data comes from a hospital population, and is not representative of the pilot population, who are highly selected, well-motivated, and may be meticulous in managing their Diabetic.

16.21.1.4 General medical examination requirements applicable to all applicants

All initial applicants must submit their medical reports to the medical panel for assessment.

Applicants are required to monitor their blood glucose frequently, including daily fasting glucose measurements.

Extra snacks and glucagon should be readily available.

Applicants are required to test and record blood glucose levels before and during all flights and present the information to the SACAA on a six monthly basis.

16.21.1.5 Protocol for Diabetes Mellitus Type II controlled on Diet and Exercise

A blood glucose test is not a routine part of the SACAA medical evaluation, however; the examination includes routine urine test. Applicants with a history of diabetes mellitus controlled on diet alone are considered medically fit for all the classes of medical certificates, provided that they have no evidence of associated disqualifying cardiovascular, neurological, renal, or ophthalmological disease. These applicants are required to submit an annual comprehensive endocrinologist/physician report.
16.21.1.6 Protocol for Diabetes Mellitus Type II Medication controlled-Oral Medication

Applicants requiring oral hypoglycemic agents to control their blood glucose may be assessed as fit for all categories of licence, provided they have no cardiovascular, neurological, ophthalmological or renal complications of diabetes, or any condition which could result in sudden or subtle incapacitation while exercising the privileges of their license.

16.21.1.7 Acceptable Oral Medication

- Biguinaides
- Arcabose
- Thiazolidenediones

16.21.1.8 Initial follow up for medical certification

Following initiation of medication, applicant’s medical certificate will be withdrawn for a period of three (3) months; this is to ensure stabilisation, adequate control, the absence of side effects, or complications from side effects. Should the applicant’s medication be changed, a comprehensive endocrinologist report indicating the reason to change the medication and stating the name of the new information will be required.

The following conditions must be adhered to –

- An initial report from a treating physician, confirming no complications of diabetes including cardiovascular, neurological, ophthalmological or renal complications of diabetes;
- A statement regarding medication used dosage, presence or absence of side effects or complications, clinical significant episode of hypoglycemia and an indication of a satisfactory of the diabetes;
- The applicant must not experience any adverse symptoms or effects from the oral hypoglycemic agent; or
- The applicant may not use any medication interacting with the oral hypoglycemic agent;
- Glucose: Fasting, Post-prandial peak <6.7 mmol/L <9.0 mmol/L;
- HbA1c <7.0% with risks, HbA1c <7.5% with no other risk factors;
- Cardiovascular assessment including:
  - Symptom limited exercise ECG
  - Clinical review by cardiologists
  - CVD risk factor profile; the proposed optimal Risk factor profile is hereunder:

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A complete fasting Lipid Profile must be submitted. The ideal Lipid Profile for a patient with Diabetes is as above and should be strived for.

### 16.21.1.9 Protocol for Diabetes Mellitus Type II on Insulin treatment

#### Applicability

- **Class I**
- **Operational Restrictions**
- **CLASS I**
  - ATPL/CPL with a multi-crew – as/or with a co-pilot only, restricted to fly in the South African airspace only.
- **Class II**
  - Only applicable to cabin crew.
- **This protocol is currently not applicable to Private Pilots and Students Pilots.**
- **Class III**
  - Air Traffic Controllers – Required to inform their supervisors of the medical condition.
- **Class IV**
  - Protocol not applicable to Class IV applicants
  - Initial follow-up for medical certification

The applicant must have been on Insulin for a minimum of one year and the dosage should have been stable for at least six months, this is to ensure stabilisation, adequate control, the absence of side effects, or complications from side effects.

An initial report from a treating physician, confirming no complications of diabetes including cardiovascular, neurological, ophthalmological or renal complications of diabetes should be submitted.

The following considerations must be adhered to –

- The applicant will be required to carry and use a blood glucose monitoring device with memory and report to the treating physician any hypoglycemic incidents.
- The applicant must not have a history of hypoglycemic episode requiring intervention of another party, during the previous one year.
- Applicant must have no history of recurrent (2 or more) hypoglycemic reactions resulting in a loss of consciousness or seizure within the past 5 years.
• Applicants must have no evidence of hypoglycemic unawareness, and a good diabetes education and understanding.
• Applicants are required to have a satisfactory HBA1c of 7–7.5% within the past 30 days.
• Positive attitude – monitoring and self-care.
• Applicants are required to have adequate blood glucose self-monitoring using a calibrated memory chip glucose meter.
• Applicants are required to maintain 90% of blood glucose measurements >5.5mmol/L.

Annual follow-up for medical certification
The applicant will be required to carry and use a blood glucose monitoring device with memory and report to the treating physician any hypoglycemic incidents.

Quarterly (3 monthly) interval evaluation reports by treating physician for –
• Physical examination
• HbA1c
• Review of daily blood glucose measurements.

Results of the quarterly evaluations must be accumulated and submitted annually to the medical panel.
Glucose: Fasting, Postprandial peak <6.7 mmol/l <9.0 mmol/l respectively.
HbA1c <7.0% with risks, HbA1c <7.5% with no other risk factors.

Cardiovascular assessment including:

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A complete fasting Lipid Profile must be submitted. The ideal Lipid Profile for a patient with Diabetes is as above and should be strived for.

Annual report from a treating physician to confirm no complications of diabetes including renal, neurological and visual complications.

**Monitoring and Actions required during Flight Operations**

A regularly calibrated glucometer with a memory chip and 10g portions of readily absorbable carbohydrate (cho) should be included on the treatment pack to cover duration of flight.

Applicants must measure blood glucose prior to flight, blood glucose must be >6.0mmol/L.

During flight, the applicants blood glucose should be monitored every 30–60 minutes, if the blood glucose <6.0mmol/l, then 10g absorbable carbohydrate ingested.

The frequency of glucose monitoring on flight duty periods over two hours may be reduced depending on the individual circumstances, in consultation with the endocrinologist and the designated aeromedical committee.

Applicants involved in short-haul operation, are required to monitor their blood glucose at midpoint of flight. Blood sugar will fluctuate slightly over one to two hours.

Applicants presenting with blood glucose of >15mmol/l, appropriate corrective measures should be applied.

Blood glucose should be monitored 30–45 minutes prior to landing, should measurement reading fall <6.0mmol/l, 10g of cho consumed.

The crew members would need to be made aware of the potential for hypoglycemic events because of his Insulin use and should be trained on management strategies.

Applicants are required to test and record blood glucose levels before and during all flights and present the information to the SACAA on a six monthly basis.

**Acceptable Insulin**

- Basal Insulin
- Bolus Insulin

**16.21.1.10 Diabetes Type 1 Protocol**

**Applicability**

**Class I**
- Not applicable

**Class II:**
- Applicable to cabin crew.
- Applicable to Private Pilots and Students Pilots (with operational Safety Pilot Limitation)

**Class III**
- Air Traffic Controllers – with another ATC in close proximity.
- Required to inform their supervisors of the medical condition.
Class IV
- Protocol not applicable to Class IV applicants

16.21.1.11 Initial follow up for medical certification
The following conditions must be adhered to:

- An initial report from a treating physician confirming:
  - No complications of diabetes including cardiovascular, neurological, ophthalmological or renal complications of diabetes;
  - A statement regarding medication used, dosage, presence or absence of side effects or complications,
  - Clinical significant episodes of hypoglycemia
  - Indication of diabetes control being satisfactory;

- Cardiovascular assessment including:
  - Symptom limited exercise ECG
  - Clinical review by cardiologists
  - CVD risk factor profile; the proposed optimal Risk factor profile is hereunder:

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- A complete fasting Lipid Profile must be submitted. The ideal Lipid Profile for a patient with Diabetes is as above and should be strived for.

- An Ophthalmologist report confirming the absence of clinically significant Diabetic Eye Disease

- Applicants are required to have a satisfactory HBA1c of < 6, 5 to 8, 0 % within the past 30 days. If HBA1C < 6,5 then there should be no clinically significant hypoglycaemic events in the last year.

The following considerations must be adhered to:
• The applicant will be required to carry and use a calibrated memory chip glucose meter and report to the treating physician any hypoglycaemic incidents.
• The applicant must not have a history of hypoglycaemic episode requiring intervention of another party, during the previous one year.
• Applicant must have no history of recurrent (2 or more) hypoglycaemic reactions resulting in a loss of consciousness or seizure within the past 5 years.
• Applicants must have no evidence of hypoglycaemic unawareness, and a good diabetes education and understanding.
• Positive attitude – monitoring and self-care.
• Acceptable Glucose: Fasting < 7 mmol/l and Postpandrial Peak: < 10 mmol/l.
• Applicants are required to maintain 90% of blood glucose measurements >5.5mmo/L.

16.21.1.12 Annual follow-up for medical certification
• The applicant will be required to carry and use a blood glucose monitoring device with memory and report to the treating physician any hypoglycaemic incidents.
• Quarterly (3 monthly) interval evaluation reports by treating physician for –
  - Physical examination
  - HbA1c
  - Review of daily blood glucose measurements.
• Results of the quarterly evaluations must be accumulated and submitted annually to the medical panel.
• Annual report from a treating physician as detailed above under initial certification.
• Annual cardiovascular assessment, including Lipogram, as detailed above under initial certification.
• Acceptable Glucose: Fasting < 7 mmol/l and Post pandrial Peak: < 10 mmol/l.
• Applicants are required to maintain 90% of blood glucose measurements >5.5mmo/L.

16.21.1.13 Monitoring and Actions required during Flight Operations
• To ensure safe flight, the insulin-using diabetic aviator must carry:
  - Two recording devices during flight, a regularly calibrated glucometer with a memory chip and a backup glucometer
  - Adequate supplies to obtain blood glucose samples (lancets, swabs, etc.) and
  - Amount of rapidly absorbable glucose, in 10g portions of readily absorbable carbohydrate (cho) should be included appropriate to the planned duration of the flight.

The following actions shall be taken in connection with flight operations:
• Applicants must measure blood glucose prior to flight, at least 1 hour before reporting for flight/duty period or at least 2 hours before commencing flight/controlling. Blood glucose must be >6.0mmol/L.
• Glucose must be checked < 30 mins before flight duty period.
During flight, the applicants blood glucose should be monitored every 60 minutes, if the blood glucose <6.0mmol/l, then 10g absorbable carbohydrate must be ingested and a retest performed within 30 mins.

The frequency of glucose monitoring during flight duty periods over two hours may be reduced depending on the individual circumstances, in consultation with the endocrinologist and the designated aeromedical committee.

Applicants involved in short-haul operations, are required to monitor their blood glucose at midpoint of flight. Blood sugar will fluctuate slightly over one to two hours.

Blood glucose should be monitored 30–45 minutes prior to landing, should measurement reading fall <6.0mmol/l, 10g of CHO consumed.

Applicants presenting with blood glucose of >15mmol/l, appropriate corrective measures should be applied. If >15 mmol/l, should not commence flight/controlling and/or cease carbohydrate ingestion until blood sugar reduces.

Episodes of severe hypoglycaemia must be reported to the SACAA.

The crew members would need to be made aware of the potential for hypoglycemic events because of his Insulin use and should be trained on management strategies.

Applicants are required to test and record blood glucose levels before and during all flights and present the information to DAME on a 3 monthly basis and to the SACAA on a yearly basis.

16.21.2 Protocol on Diagnosed Addison’s Disease

1) Before an applicant for a pilot licence may be considered, he/she must comply with the following standards:
   a) Normal physical examination.
   b) The following blood test results must be normal before exercise:
      - Urea and electrolyte
      - Blood glucose (random)
      - Serum cortisol
      - Liver function test.
   c) Exercise must then be undertaken, and a series of blood samples must be taken, both during and after the exercise.
      - The exercise must be on a treadmill, with the applicant running until he/she is exhausted, or until a heart rate equivalent to a 100% stress ECG is achieved.
      - The blood test results required during exercise are the following:
        I. Urea and electrolyte screen (X 1).
        II. Blood glucose (X 3).
        III. Serum cortisol (X 1).
      - The blood tests must be repeated after exercise.
d) The blood pressure and pulse rate must be monitored throughout the exercise, and any changes must be appropriate for the intensity of the exercise.

2) If all the above standards are achieved, the applicant may be certified, but with the following restrictions:
   a) May only fly with or as a co-pilot.
   b) May not fly when suffering from any infection, or when pyrexial. Must be re-examined following resolution of the infection before he/she can resume flying.

3) All surgical procedures will result in the applicant becoming unfit, until cleared by the designated body or institution. Will remain unfit for at least 6 weeks following surgery.

4) Must always wear a Medic Alert disk specifying that he/she has Addison’s Disease.

5) Must always carry an emergency supply of Cortisone when flying.

6) The following blood tests must be performed at least 3 times during the year
   a) Urea and electrolyte
   b) Blood glucose (random).
   c) Serum cortisol.
   d) Liver function test.
   e) Serum Renin determination.

7) The applicant must be fully informed as to the disease, its treatment and possible complications.

8) The applicant is required to submit an annual specialist Physician’s report to the designated body or institution.

16.21.3 Oncology Protocols

16.21.3.1 Aeromedical consideration
1) Impairment or sudden or subtle incapacitation
   Applicants must be free from any risk factor, disease or disability which renders them either unable, or likely to become suddenly unable, to perform assigned duties safely. These may include effects and/or adverse effects from the treatment of any condition and drugs or substances of abuse.

2) Medical deficiency
   Applicants must be free from any of the following, if it results in a degree of functional incapacity likely to interfere with the safe operation of an aircraft or with the safe performance of their duties:
   a) Congenital or acquired abnormality;
   b) active, latent, acute or chronic disability, disease or illness;
   c) wound, injury, or outcome of operation.
   Every applicant who has been treated for malignant disease will need an individual assessment before exercising licence privileges. Recovery from surgery or radiotherapy should be assessed. Current curative or adjuvant
Chemotherapy is incompatible with certification, and recovery from the effects of such treatments will demand a period of unfit assessment after it has finished.

If the pilot has recovered from the primary treatment and, as far as can be assessed with available techniques, there is no residual tumour, then the level of certification will depend on the likelihood of recurrent disease. In addition to ensuring that treatment has been effective, pre-requisites for certification after treatment for malignant disease include satisfactory haematological parameters and no on-going side effects from therapy.

16.21.3.2 Treatment Modalities available for cancer

16.21.3.2.1 Surgery

Surgery is the commonest primary treatment for malignant disease, and is frequently the only treatment. A return to flying, from the purely surgical aspect, depends on the extent of the surgical operation.

16.21.3.2.2 Radiotherapy:

This is usually given as an intensive course. The aim of radiotherapy maybe curative, for example when given to an isolated group of lymph nodes which have proved by biopsy to contain lymphoma; or as adjuvant treatment, for example to the abdominal nodes following orchidectomy for a seminoma of the testis, on the assumption that they may contain metastatic tumours.

Many patients undergoing radiotherapy suffer non-specific systemic effects (tiredness, malaise and nausea) which make it inadvisable for any pilot to fly whilst receiving such treatment.

16.21.3.2.3 Chemotherapy:

Pilots, ATC’s, CCM’s and other aviators should be assessed as unfit during any period of treatment with cytotoxic chemical agents. The only exception to an unfit assessment during adjuvant treatment for malignancy is endocrine therapy. Certain adjuvant hormone and anti-hormone treatments following (for example) breast or prostate cancer treatment may be acceptable if there are no side effects.

16.21.3.2.4 Stem Cell transplantation:

It is possible to return to flying after stem cell transplantation if there is sustained remission.
16.21.3.2.5 Complementary and Alternative medicine:

Where such treatments are used in the presence of continued active disease, the applicant is assessed as unfit. Where the treatment is used to prevent onset of malignancy or recurrence, the treatment will be considered on a case-by-case basis, with regard to the individual’s overall health and the potential effect of the treatment.

16.21.3.2.6 Hormonal Therapy:

Endocrine therapy is used as part of the treatment of some cancers (such as hormone and anti-hormone treatment following breast and prostate cancer). Pilots, ATCs, CCM’s and other aviators may be returned to flying or controlling if there are no side effects from their hormonal therapy.

16.21.3.2.7 Acceptable aviation risk:

The primary treatment, be it surgery, radiotherapy, chemotherapy or a combination of these, should have removed all signs of tumour/malignancy when measured clinically or by investigation. Thus the risk to flight safety is the possibility that local or metastatic recurrence will cause sudden or insidious incapacitation whilst the pilot is flying. After treatment of malignancy, the prognosis improves with recurrence-free time after the original episode. Following “successful” primary treatment, the risk that tumour / malignancy will cause an insidious or sudden incapacitation depends on two factors.

a) The actual risk of recurrence, which will depend on the pathological stage of the tumour or its TNM classification.

b) The site of that recurrence and this will depend on the primary tumour type.

16.21.3.2.8 Principle of Aeromedical Certification of Pilots, ATC’s, CCM’s and other aviators with malignancy:

When considering the aero-medical risk (and therefore the risk to aviation safety) posed by a pilot, CCM or ATC suffering from a malignancy, the SACAA will evaluate the following:

Cancer specific issues: such as type of cancer (tissue and histological diagnosis), the likelihood of recurrence, site of recurrence, presence of any para-neoplastic syndromes, potential for a recurrence to cause overt or subtle in-flight incapacitation:
Issues related to the treatment of the cancer: When assessing the aero-medical risk of a pilot, ATC, or CCM with a malignancy, accurate tissue diagnosis of the malignancy is essential:

Complications of Malignancy: The common complications of the malignancy are usually pain, wasting, neuropathy, nausea, anorexia, seizures, hypercalcaemia, hyperuricaemia, viscus obstruction, organ failure, and para-neoplastic syndromes:

Likelihood of Recurrence: The overall survival curve for individuals diagnosed with a theoretical malignancy must be considered. For most cancer types, annual recurrence rates can be calculated from survival curves. (As cure following recurrence is rare, overall survival approximates recurrence).

Staging: Recurrence rates are greatly influenced by the stage of disease when primary treatment occurred. Many cancers are staged using a TNM (Tumour, Node, and Metastasis) classification. The variation in survival rates for a theoretical cancer according to the degree of spread evident at diagnosis.

Site of recurrence: Each tumour has a characteristic pattern of recurrence. Thus for a theoretical tumour, metastases might occur according to the distribution.

Risk of particular metastasis causing incapacitation: Several assumptions are made when assessing the risk of a particular metastasis causing incapacitation (either subtle or overt). For a theoretical cancer, recurrence in a regional lymph node carries a relatively small risk of incapacitation. On the other hand, brain metastasis has a near-100% potential for incapacitation (whether sudden due to a fit or bleed, or subtle as a result of pressure effects or headache etc.).

Tumour Markers: The relapse or active progression of certain tumours may be effectively followed by measuring tumour markers.

16.21.4 Protocol for Specific Cancers

The following cancers/malignancies are discussed for the purpose of this protocol:
The rest of the cancers not discussed here will be considered by the Aeromedical committee on a case by case basis using the similar principles of certification.

16.21.4.1 **Malignant Melanoma**

A diagnosis of Malignant Melanoma is disqualifying and upon diagnosis, the applicant shall be deemed medically unfit to exercise the privileges of the class of the licence they hold.

**Medical requirements**

The following examinations and procedure reports are required before the applicant's case can be considered with regard to medical certification/recertification:

a) Specialist Report including staging  
b) Pathology report including the following:  
c) TNM Staging  
d) Breslow Depth Classification for Stage 1 and 2  
e) Excision Margins  
f) Location  
g) Sex  
h) Sentinel node assessment  
i) Radiology reports: CT Brain with contrast/MRI/ PET Scan  
j) Laboratory tests: LDH; ALP

Waiver requirements are dependent on the above reports, and may be applied once all above reports have been received. The specific requirements are as detailed below:

**Stage 1 & 2 (T1-4, N0, M0) requirements**

1) If Breslow <0.76 mm:  
   - 4 weeks grounding  

**On recertification:**

- Annual clinical examination,
2) If Breslow 0.76 – 1.49 mm:
   - 6 Months grounding

**On recertification:**

Annual clinical Examination, CT scan with contrast/MRI/PET scan, and CXR for 3 yrs. (PET scan is the preferred investigation)

   - Annual LDH, ALP

1) If Breslow 1.5 - 2.49 mm;
   - 6 Months grounding

**On recertification:**

6 Monthly clinical examination and annual specialist report

Annual CT scan/MRI/PET Scan; CXR for 3 yrs. (PET scan is the preferred investigation)

   - Annual LDH, ALP

1) If Breslow 2.50 – 3.99 mm;
   - 6 Months grounding

**On recertification:**

6 Monthly clinical Examination, and 6 monthly specialist report for the first year

6 Monthly clinical examinations with annual specialist report for 10 yrs.

6 Monthly LDH, ALP

Annual CT brain scan with contrast /MRI/PET scan for 3 yrs. (PET scan is the preferred investigation)

1) If Breslow >4 mm;
   - 6 Months grounding

**On Recertification:**

6 Monthly clinical Examination, and 6 monthly specialist report for the first year

6 Monthly clinical examinations with annual specialist report for 10 yrs.
6 Monthly LDH, ALP

Annual CT brain scan with contrast /MRI/PET scan for 3 yrs. (PET scan is the preferred investigation)

**Stage 3 (any T, N1/N2, M0)**

Minimum 1 year grounding period

**On recertification:**

6 Monthly clinical Examination, and 6 monthly specialist report for the first year

6 Monthly clinical examinations with annual specialist report for 10 years

6 Monthly LDH, ALP

Annual CT/MRI/PET scans for 3 years (PET scan is a preferred investigation)

**Stage 4 (any T, any N, M1)**

Disqualifying

**Restrictions:**

Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for a restriction to be lifted.

**16.21.4.2 Oesophageal cancer**

A diagnosis of oesophageal cancer is disqualifying and upon diagnosis, the applicant shall be deemed medically unfit to exercise the privileges of the class of the licence they hold. Oesophageal cancer is uncommon, but is not rare! It is very common over age 55, with the average age at diagnosis being 72. Oesophageal cancer does not usually cause any noticeable symptoms until the cancer has spread beyond the oesophagus and into nearby tissue. Therefore, the outlook for oesophageal cancer is poor compared with other types of cancer. On average, 30% of people with oesophageal
cancer will live for one year after diagnosis. Average of 8% will live for five years after the diagnosis. Even with early
diagnosis an estimation of 34% to 42% of people will live for 2 years after the diagnosis.

Two main types of Oesophageal Cancer are:

1) Squamous cell carcinoma (90% – 95%) – upper part of the oesophagus
2) Adenocarcinoma of the oesophagus (50% – 80%) – lower part of the oesophagus

Medical requirements:

Recertification is possible as most patients return to their regular level of activities within 2 months after surgery.

The following examinations and procedure reports are required before the applicant’s case can be considered with
regard to medical certification/recertification:

1) Specialist report including Staging and/ or with Tumour Grading
2) Histology report
3) Radiological reports; Barium swallow, CXR, CT/MRI/PET scan (PET scan is the preferred investigation)
4) Bloods: e.g. FBC, LFT, U&E (Creat), Ca2+

Stage 1 &2

Patients without lymph node involvement have a significantly better prognosis and 5-year survival rate compared to
patients with involved lymph nodes. Follow-up treatment may include evaluation with CT scans and upper endoscopy to
watch for possible recurrence. In stage 0, the cancer is confined to the superficial lining of the eosophagus. In stage 1,
the cancer has not invaded the outer muscle layer of the oesophagus. Surgery to remove the tumour offers the best
chance for cure.

If the disease is caught early, the five-year survival rate is much higher — 75% for patients diagnosed in stage 0 and
50% for those diagnosed in stage 1.

Follow up:

6 monthly Specialist report
6 monthly Radiological reports for 3 years, then annually till year 5
Barium swallow, CXR, CT/MRI/PET scan (PET scan is a preferred investigation)
Endoscopic examination at 6 monthly to yearly intervals as per clinical indication
Bloods e.g. FBC, LFT, U&E (Creat), Ca^{2+}

Restrictions:
Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for a restriction to be lifted.

Stage 3
Stage 3 oesophageal cancer is generally disqualifying. The 5 year survival rate is about 20% to 30%.

Recertification may be considered on case by case basis if the cancer is operable, there is no lymph node involvement and the applicant is at least 6 months post treatment.

Follow up:
6 monthly Specialist report
6 monthly Radiological reports for 3 years, then annually till year 5
Barium swallow, CXR, CT/MRI/PET scan (PET scan is a preferred investigation)
Endoscopic examination at 6 monthly to yearly intervals as per clinical indication.
Bloods e.g. FBC, LFT, U&E (Creat), Ca^{2+}

Restrictions:
Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

Stage 4
Stage 4 lesions are associated with a 5-year survival rate of less than 5%.
Stage 4 disease is disqualifying.

16.21.4.3 Colorectal cancer

A diagnosis of Colorectal cancer is disqualifying and upon diagnosis, the applicant shall be deemed medically unfit to exercise the privileges of the class of the licence they hold.

Medical requirements

The following examinations and procedure reports are required before the applicant’s case can be considered with regard to medical certification/recertification:

1) Specialists reports, which must include clinical staging, and/or with Tumour Grade, colonoscopy findings and an indication whether adjuvant therapy is indicated or not.
2) Histology report including Duke’s/TNM Staging
3) Blood test results: FBC, ESR; LFT including, LDH & ALP.
4) Tumour markers e.g. CEA
5) Presence of occult blood in the faeces – Haemoccult
6) Radiological reports: CXR
7) If clinically indicated according to the colonoscopy and CEA findings, a CT scan of the abdomen, Lungs and Brain will be required.

A minimum period of three months is required following colectomy before an applicant can be considered for recertification.

If Dukes A/Stage 1, requiring no adjuvant therapy:

Recertification is possible after 3 months post-surgery.

Requirements are:

- The applicant must submit 6 monthly specialist’s report for 2 years, thereafter annually for 5 yrs.
- Radiological assessments: Annual CXR/CT chest, CT Abdomen and Pelvis for 5 yrs. (stage 1, 2, 3).
- Colonoscopy to be done 1 year after completion of treatment and repeated annually if new polyps are noted or every 3 years if no polyps are noted.
- 6 monthly Laboratory tests; FBC, and ESR; LFT including: LDH & ALP; and tumour markers, i.e. CEA
Restrictions:

Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

Dukes B&C /Stage 2&3 requirements:

- Must do full course of chemotherapy and radiotherapy.

Recertification possible after 3 months post-surgery if on reapplication:

- Is clinically disease free and fully recovered from all treatments
- Has no side effects including cardiac side effects

Follow up

- Must submit 6 monthly detailed specialists’ reports (surgeon, radiologist, oncologist, etc.)
- Must do faecal occult blood tests 6 monthly
- Report from Radiation Oncologist specifying exposure areas and any sequelae
- CXR, CT/MRI scan; colonoscopy or adequate air-contrast Ba Enema annually.
- 6 monthly Bloods: FBC, ESR, LFT including LDH, Serum CEA,

Restrictions:

Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

Duke’s D/Stage 4

- Disqualifying.

16.21.4.4 Breast cancer
A diagnosis of Breast Cancer is disqualifying and upon diagnosis, the applicant shall be deemed medically unfit to exercise the privileges of the class of the licence they hold. Clinical management of patients with early breast cancer is determined on individual basis, taking into account many factors, including the risk of cancer recurrence. The clinical management of breast cancer is directly linked to pathological assessment of the cancer. So, accurate pathological assessment of the breast cancer specimen is vital. Common factors have been identified for predicting the risk of recurrence in patients with breast cancer.

Node negative status at diagnosis has commonly been associated with a favourable outcome. But the risk of recurrence still exist for women with early breast cancer regardless of nodal status, oestrogen receptor status, age, chemotherapy regimen, time on Tamoxifen or time from initial diagnosis.

Adjuvant Tamoxifen therapy has significantly improved patient outcomes. However, even with adjuvant therapy, more than 20% of node-negative patients had their disease recur within 15 years after diagnosis.

Recurrences can occur after five years of being disease free, even with the successfully treated early breast cancer. Risk of recurrence is greatest during the first two years following surgery. After two years, there is a steady decrease in the risk of recurrence until 5 years. After 5 years the risk of recurrence averages 4.3% per year. Up to at least 12 years, the risk of recurrence remains appreciable and even some patients considered low risk have some risk of the cancer coming back.

Medical requirements

The following examinations and procedure reports are required before the applicant’s case can be considered with regard to medical certification/recertification:

- a) Specialist reports including clinical staging
- b) Histology reports
- c) Radiological assessment: CXR, CT/MRI/PET scan/Mammograms
- d) Nodal assessment: lymph node biopsies
- e) Bloods, e.g. FBC, LFT, U&E (Creat)
- f) Tumour markers such as HER2

Restrictions:
Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

16.21.4.5 Testicular Cancer

A diagnosis of Testicular cancer is disqualifying and upon diagnosis, the applicant shall be deemed medically unfit to exercise the privileges of the class of the licence they hold.

Medical Requirements:

- An orchidectomy must have been performed successfully, without complications.

The following examinations and procedure reports are required before the applicant’s case can be considered with regard to medical certification/recertification:

- A specialist report from an oncologist or urologist including staging.
- Radiological reports: CXR and/or CT/MRI/PET scan reports (if considered necessary by the specialist).
- Tumour marker levels: α fetoprotein; Lactate dehydrogenase (LDH); Human chorionic gonadotropin (HCG)

The applicant is temporarily unfit to fly while on chemotherapy (and for at least one week after cessation of medication).

Stage 1 (Non Metastatic disease):

Certification will be after full recovery. Cure rates of 100% are possible

Follow up

Due to the great differences in the management of the multiple types of testicular carcinomas, the follow up requirements will be as per Oncologist/Urologist plan.

The applicant will be required to submit;

- Specialist’s reports (Oncologist or Urologist) along with tumour marker levels 3 to 4 monthly or as per specialist follow up plan for 2 years, then 6 monthly for 3 years thereafter submit annually till year 10.
Restrictions:
Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

Stage 2 (Pelvic and Abdomen L/N spread)
Certification will be after full recovery: Survival rates of 97% are possible

Follow up:
Due to the great differences in the management of the multiple types of testicular carcinomas, the follow up requirements will be as per Oncologist/Urologist plan.

The applicant will be required to submit:
- Specialist's reports (Oncologist or Urologist) along with tumour marker levels 3 to 4 monthly or as per specialist follow up plan for 2 years, then 6 monthly for 3 years thereafter annually till year 10.

Restrictions:
Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

Stage 3/4 (Local and Distant metastatic disease)
Certification will be after full recovery: Prognosis remains good (65 to 85% cure rates)

Follow up
Due to the great differences in the management of the multiple types of testicular carcinomas, the follow up requirements will be as per Oncologist/Urologist plan.
The applicant will be required to submit:

- Specialist’s reports (Oncologist or Urologist) along with tumour marker levels 3 to 4 monthly or as per specialist follow up plan for 2 years, then 6 monthly for 3 years thereafter annually till year 10

While chemotherapy is required, there will be no certification.

Restrictions:

Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

16.21.4.6 Prostate Cancer

A diagnosis of Malignant Melanoma is disqualifying and upon diagnosis, the applicant shall be deemed medically unfit to exercise the privileges of the class of the licence they hold.

The outcome of Prostate cancer varies greatly. It is mostly affected by whether the cancer has spread outside the prostate gland and how abnormal the cancer cells are (the Gleason score) upon diagnosis. Many patients with prostate cancer that has not spread can be cured, as well as some patients whose cancer has not spread very much outside the prostate gland. Even for patients who cannot be cured, hormone treatment can extend their life by many years.

Medical Requirements:

Cancer of the prostate has a generally good prognosis, and tends to metastasize locally or to bone. Once primary treatment has been completed, unrestricted certification will be possible where:

- There is no evidence of metastatic spread
- PSA has returned to acceptable limits
- There are no significant consequences of treatment, such as incontinence.

The following examinations and procedure reports are required before the applicant’s case can be considered with regard to medical certification/recertification:

- Specialist report, which must include clinical staging and/ or with Gleason score.
• Histology report.
• Blood test results: PSA (usually every 3 months to 1 year)
• Initial radiological reports, CXR/Bone scans/CT/MRI (done during diagnosis or staging)

Should there be metastatic spread which has been controlled and PSA has returned to less than 10, certification may also be considered.

Should the medical waiver be granted in cases of metastatic spread mentioned above, the follow up medical examinations and reports must be accompanied by a:

• 6 monthly progress report from a urologist or oncologist for 3 years
• Annual PSA level for 3 years

If the applicant shows no signs of recurrence after three years from initial diagnosis, no further follow-up is required.

Restrictions:

Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

16.21.4.7 Renal Cancer

A diagnosis of Renal Cancer is disqualifying and upon diagnosis, the applicant shall be deemed medically unfit to exercise the privileges of the class of the licence they hold.

Medical requirements:

As the outcome of renal cancer is unpredictable, and as cerebral metastases are common, SACAA will determine aero-medical disposition on a case-by-case basis. There would at least be 6 months grounding period following completion of treatment.

The following examinations and procedure reports are required before the applicant’s case can be considered with regard to medical certification/recertification:
- Detailed specialists reports including staging
- Radiological reports
- CXR, Abdominal CT/MRI /PET scan reports, renal arteriography, Bone scan, U/S
- Bloods: FBC, LFT, U&E, GFR
- Urine tests

**Restrictions:**

Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

### 16.21.4.8 Bladder Cancer

A diagnosis of Bladder cancer is disqualifying and upon diagnosis, the applicant shall be deemed medically unfit to exercise the privileges of the class of the licence they hold.

Impairment to flying may result from urinary frequency/urgency and tumour(s) or clots causing urinary tract obstruction with resultant pain. Metastatic disease could cause any number of symptoms, including sudden incapacitation or subtle decrement of higher cognitive function. The clinical course of bladder cancer carries a broad spectrum of aggressiveness and risk. Low grade, superficial bladder cancers have minimal risk of progression to death. However, high-grade non-muscle invasive cancers frequently progress to death. Muscle-invasive cancers are often lethal.

Upon presentation, 55-60% of patients have a low-grade non-invasive disease, which is usually treated conservatively with transurethral resection and periodic cystoscopy. The remainder of patients have a high-grade disease, of which 50% is muscle invasive and is typically treated with radical cystectomy. Carcinoma in situ is managed by instilling chemotherapeutic or immunotherapeutic agents.

Bladder cancer has the highest recurrence rate of any malignancy, thus creating a great need for accurate and diligent surveillance. Because of a fairly high risk of recurrence for both invasive and non-invasive disease, there will always be a need for scheduled follow-up evaluation.
Early after treatment, the patient may be required to undergo urologic evaluation (urinalysis, cytology, cystoscopy, imaging, and additional labs) every three months. After two years without recurrence, indefinite annual examinations are usually recommended.

**Medical requirements:**

A minimum of 6 months Grounding period is applicable.

The following examinations and procedure reports are required before the applicant’s case can be considered with regard to medical certification/recertification:

- Specialist reports including staging
- Bladder exams every 3 to 6 months after treatment
- Urological evaluation
- Urinalysis (if bladder not removed)
- Cytology, (urine cytology)
- Cystoscopy
- IVP

After two years without recurrence, indefinite annual examinations are required along with the following:

- Histology reports
- Radiological and imaging
- CXR, Bone scans/ CT
- Lab tests; FBC

**Stage 1 &2**

The outlook for stage 0 or I cancers is fairly good. Although the risk of the cancer returning is high, most bladder cancers that return can be surgically removed and cured.

**Follow up:**

- 3 to 6 monthly Urologist and reports

After two years without recurrence, indefinite annual examinations are required along with the following:

- Annual radiological reports
• CXR, Bone scans/ CT

Restrictions:

Licence holders will be required to operate under a multi-crew environment, as or with co-pilot, or under-supervision (depending on their environment) etc., until the aeromedical risk has been assessed and deemed favorable for the restriction to be lifted.

Stage 3 & 4

The cure rates for people with stage 3 tumours are less than 50%. Patients with stage IV bladder cancer are rarely cured. So both stage 3 and 4 would be disqualifying.

16.21.4.9 Lymphomas (outdated)

Hodgkin’s Lymphoma:

1) Applicants with active Hodgkin’s disease or applicants undergoing therapy for Hodgkin’s disease should not be certified because of the risk of sudden incapacitation.

2) Applicants with stages I and II-A who have had no evidence of disease for two years after completion of treatment are certifiable. Stages II-B through IV-B should be free of disease after completion of therapy for at least five years before consideration of certification, and should be re-evaluated every 6 months for 10 years.

3) Numerous long-term complications of treatment for Hodgkin’s disease includes the development of acute leukemia and second malignancies of other types, radiation-related heart disease, pulmonary fibrosis, and hypothyroidism. Frequent re-evaluation. After 10 years there should be annual appraisals.

16.21.4.10 Non-Hodgkin’s Lymphoma:

1) Well-differentiated and poorly-differentiated lymphocytic lymphoma, mixed lymphocytic lymphoma and histiocytic lymphoma of either nodular or diffuse type, are usually not curable, and these applicants should be disqualified permanently.

2) B-cell, diffuse histiocytic lymphoma, particularly in the early stages, may be cured by radiation therapy and/or chemotherapy and, if they are free from disease without therapy for at least three years, they may be certified with re-evaluation to occur every three months for three years and then every 6 months.

3) T-cell, diffuse histolytic lymphoma, including immunoblastic lymphoma and T-cell lymphoblastic sarcoma, should not be certified because of their unpredictability. Burkitt’s lymphoma should not be certified.
Plasma-cell Dyscrasia:

a) Applicants with multiple myeloma, Waldenstrom's macroglobulinemia or multiple plasmacytomas should not be certified.

b) These disorders are not curable, require frequent therapy that is toxic, and are associated with sick effects such as neurological impairment that may lead to sudden incapacitation.

c) Applicants with a single plasmacytoma may be cured and, if they are free of disease more than three years after therapy has been discontinued, they may be considered for certification with frequent follow-up.

d) Applicants with benign monoclonal gammopathy with a monoclonal spike comprising less than 2 g/dl of protein, with fewer than 55 plasma cells in the bone marrow, and with a haematopoietic compromise or osteolytic lesions may be certified if they have no evidence of progression of the disease for three years; they should be recertified every six months.

e) The major risks of monoclonal gammopathy are progression to multiple myeloma and an increase in serum viscosity leading to neurological impairment.

f) Applicants with amyloidosis associated with plasma cell dyscrasia should not be certified because of the high incidence of organ infiltration and the risk of sudden impairment.

g) Applicants with gammopathy of alpha chain disease should not be certified. The median survival is approximately 12 months for gamma heavy chain disease, and the alpha chain disease is often associated with abdominal lymphoma, which is a progressive and fatal disorder.

h) Applicants with cold agglutinin disease should not be certified because of the risk of sudden haemolysis.

i) Applicants with cryoglobulinemia syndrome should not be certified because of the risk of sudden vascular incidents and neurological dysfunction.

16.21.5 Protocol on Previously Diagnosed Acute Leukaemia

Any applicant who has a previous history of having had any type of acute leukaemia in the past will be required to comply with the following requirements before recertification may be considered –

1) Must comply with the criteria for complete remission i.e. –

1. Clinical: the disappearance of any abnormal clinical findings due to the leukaemia, and return to good physical health.

2. Haematological –

   a) The peripheral blood must have returned to normal, with reference to:

      I. Haemoglobin (Hb).

      II. Total, and differential, white cell count.
III. Platelet count.

b) Recognizable leukaemia cells may not be present in a bone marrow preparation, and there may have been not more than 5% normal blast cells present in a marrow preparation of normal cellularity.

2) The applicant must have completed his/her last treatment at least two years before submitting his/her application to the designated body or institution. (This includes all modalities of treatment for leukaemia).

3) The applicant must have undergone at least six-monthly medical follow-up in an appropriate specialised unit. A report detailing the follow-up programme and the applicant’s medical record must be submitted with the application to the designated body or institution.

4) During the initial post-remission period of two years his/her blood picture should have been closely monitored. Although the specific results are unlikely to be required by the designated body or institution, it is necessary that he/she has been monitored as follows –

1. During the first year after treatment has been stopped –
   a) 6-weekly blood profile.
   b) 12-weekly bone marrow evaluation.
   c) 12-weekly lumbar puncture.

2. During the second year after treatment has been stopped –
   a) 8-weekly blood profile.
   b) 16-weekly bone marrow evaluation.

5) After two years of documented remission the applicant may submit an application for certification. If the results of the above tests are within acceptable limits the applicant may be granted certification, with the following restrictions –

   a) Must continue with follow-up at a suitable specialist unit, and submit six monthly reports to the designated body or institution.

   b) Must continue to have blood profile monitored at 8–12 weekly intervals (for a year, then 6 monthly).

   c) Must undergo an Aviation Medical Examination at least annually (or more frequently if indicated).

   d) Must do an ECG and stress ECG with each aviation medical examination.

16.21.6 Obstetrics and Gynaecology

(a) General Requirements

The provision for aviation personnel with obstetrics and gynaecology medical conditions to obtain a medical certificate may be considered for any class of medical certificate based on individual medical condition of the applicant and risk factor management.

(b) Background
Approximately thirty per cent of pregnant women experience nausea and vomiting, and this can result in dehydration and malnutrition. Approximately fifteen per cent of embryos will abort in the first trimester. Cardiac output rises in early pregnancy, accompanied by an increase in stroke volume, heart rate, and plasma volume. Haemoglobin (and haematocrit) begins to fall between the third and fifth month of pregnancy and is lowest by the eighth month. Adequate diet with supplementary iron and folic acid is necessary, but self-medication and prescribed medicine should be avoided. The incidence of venous varicosities is three times higher in females than males and deep venous thrombosis and pulmonary embolism are among the most common serious vascular diseases occurring during pregnancy.

As the uterus enlarges, it compresses and obstructs the flow through the vena cava. Progressive growth of the foetus, placenta, uterus and breasts, and the vasculature of these organs, leads to an increased oxygen demand; and increased blood volume and oxygen demands produce a progressive increase in workload on both the heart and lungs. Hormonal changes affect pulmonary function by lowering the threshold of the respiratory centre to carbon dioxide, thereby influencing the respiratory rate.

In order to overcome pressure on the diaphragm, the increased effort of breathing leads to greater consciousness of breathing and possibly greater cost in oxygen consumption. The effect of hypoxia at increased altitude further increases the ventilatory effort required to provide for increasing demands for oxygen in all tissue.

Aviation personnel must inform their Designated Medical Examiner (DAME) if they become are aware of any medical condition that would make them unable to meet the requirements of the licence they are applying for or if they are taking medication that is not compatible with flying.

The medical examiner should consider the important physiological changes associated with pregnancy, which might interfere with the safe operation of an aircraft at any altitude throughout a prolonged or difficult flight –

Factors which may considerably reduce flight safety and classify an “abnormal” pregnancy include:

- A history of multiple pregnancies,
- Previous pre-term deliveries,
- Cervical incompetence,
- Bleeding, increased uterine activity,
- Reduced oxygen carrying capacity in the blood (anemia),
- Reduced placental respiratory reserve such as intrauterine growth retardation,
- Post maturity,
- Pre-eclampsia,
- Chronic hypertension or
- Placental infarction.
- Flight during pregnancy increases the risk for oedema (swelling) and blood clot formation due to obstruction of the vena cava from uterine compression and lack of mobility.

16.21.6.1 Menstrual Disturbances

Applicants for all classes of medical assessments, with gynecological disorders that are likely to interfere with the safe exercise of their licence and rating privileges shall be assessed as unfit to fly.
Dysmenorrhea is a common condition with symptoms ranging from mild discomfort to severe abdominal pain, headache and backache, nausea and vomiting, diarrhea, dizziness and fatigue. Usually, the condition is limited to 24–48 hours around the onset of the menstrual flow and fitness for aviation duties is rarely reduced to a significant degree. Treatment with oral contraceptives and NSAIDs (non-steroidal anti-inflammatory drugs) is very efficient and is generally well tolerated.

The use of oral contraceptives is acceptable in the aviation environment, but when medication with a NSAID is first used, an initial off-duty trial should take place so that the medical examiner can ascertain that there are no significant side effects such as gastro-intestinal symptoms, visual disturbances and drowsiness. In severe cases, especially when an underlying disease such as endometriosis or pelvic inflammatory disease is suspected (secondary dysmenorrhea), appropriate diagnostic evaluation is important and specialist opinion should be sought.

Premenstrual syndrome (PMS) may occur during the week before the onset of menstruation. The symptoms are partly mental such as mood swings, anxiety and depression, and partly physical such as bloating, headache and poor coordination. Because of the broad spectrum of symptoms and their varying severity and the many different kinds of medication usually prescribed, each case has to be assessed on its own merits. In most cases pharmaceutical therapy will prove unsatisfactory, and fitness for aviation duties is often reduced for a number of days every month.

**16.21.6.2 Endometriosis**

Endometriosis can cause quite severe discomfort such as lower abdominal or suprapubic pain, usually just before or during the first days of the menstruation period. There are several medical and surgical treatment options. If symptoms are well controlled by oral contraceptives or mild analgesics, this condition is usually compatible with aviation duties. Those who undergo surgical treatment with a successful outcome will normally be cured and able to fly safely after a suitable period of recovery.

The middle group, consisting of patients with moderate symptoms but on medication and with decreased fitness several days per month, is more difficult to evaluate and assess. Usually the final decision should be deferred to the medical panel for further evaluation. The medical panel, in consultation with a gynaecologist, should weigh all relevant factors carefully before making a recommendation.

**16.21.6.3 Genitourinary System**

Applicants for all classes of Medical Assessments with sequelae of disease of or surgical procedures on the kidneys or the genito-urinary tract, in particular obstructions due to stricture or compression, shall be assessed as unfit to fly unless the applicant's condition has been investigated and evaluated in accordance with the best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

Major gynaecological surgery will normally entail unfitness to fly for a period of two to three months and some procedures such as hysterectomy may require more extensive periods of recovery.

Applicants who are pregnant shall be assessed as unfit to fly, unless obstetrical evaluation and continued medical supervision indicate a low-risk uncomplicated pregnancy.

Once pregnant, a report from a gynaecologist and an aviation medical examiner to confirm the pregnancy.

It is advisable that a treating obstetrician is aware of the type of flying the applicant intends to carry out. Common complications of pregnancy can be detected and treated, by careful prenatal evaluation, observation, and care.

Low-risk uncomplicated pregnancy must be evaluated and supervised. Pregnancy is considered a normal,
uncomplicated and low-risk, if there is supporting medical information from her obstetrician, family physician and/or midwife supporting that the applicant may continue to exercise the privileges of her licence.

Close medical supervision must be established for the part of the pregnancy where the applicant continues to carry out their duties, and all abnormalities should be reported to the medical examiner.

(a) Applicability

Medical Requirements for Pregnant Class I, II & IV

Applicant may continue to exercise the privileges of her licence from the end of the 12th week (first trimester) until the end of the 26th week of the gestational period –

- Applicant will be declared to be medically fit to fly if her pregnancy is considered normal, uncomplicated and low-risk.
- A medical report from a treating obstetrician, family physician and/or midwife will be required.
- Close medical supervision where the pilot continues flying, and all abnormalities should be reported to the medical examiner.

(b) Medical Requirements for Class III

During the gestational period, precautions should be taken for the timely relief of an air traffic controller in the event of early onset of labour or other complications –

- The fit assessment should be limited to the period until the end of the 34th week of gestation.
- Once pregnancy is confirmed, the pregnant air traffic controller should report to the medical examiner. If declared fit, she may continue to exercise the privileges of her licence.

(c) Medical requirements following confinement or termination of pregnancy

Miscarriage (spontaneous abortion) occurs in about fifteen per cent of all pregnancies and is terminated spontaneously. Observation for a few days to ensure that bleeding has stopped may be all that is needed, but vacuum suction or dilatation and curettage to ensure completion of the abortion is frequently performed.

Induced abortion, usually by vacuum suction or by dilatation and curettage, will in the majority of cases entail unfitness for less than a week as these procedures are generally very safe, the rate of serious complications is <1% and the mortality rate is <1 in 100 000 cases. Complication rates increase as gestational age increases. Although uncommon, post abortion bleeding and pelvic inflammation, peritonitis and septicemia may occur.

The “abortion pill” (mifepristone, a progesterone-receptor blocker) is used within the first seven weeks of pregnancy. A second drug (prostaglandin) is given two days later to start uterine contractions and complete the abortion. This method is very safe and unfitness is limited to a few days. For most women, abortion has no adverse mental sequelae but for those who have a desired pregnancy terminated for medical reasons (maternal or fetal) or who have considerable ambivalence, the mental sequelae may be pronounced. The medical examiner should therefore pay particular attention to the psychological effects of induced abortion before allowing return to aviation duties.

The applicant shall not be permitted to exercise the privileges of her licence, until she has undergone re-evaluation in
acCORDANCE with best medical practice and it has been determined that she is able to safely exercise the privileges of her licence and ratings. Uncomplicated pueperium and full recovery: able to resume aviation duties six weeks after confinement.

16.21.7 Warfarin Protocol

GENERAL

Aviation personnel presenting with coagulation disorders should be disqualified if there is a history of a serious bleeding episode and factor replacement.

The provision of medical certification for aviation personnel on Warfarin may be considered for any class of medical certificate based on the individual medical condition of the applicant and risk factor management.

Applicants on Warfarin may not take part in aerobatic activities.

APPLICABILITY

CLASS I ATP:

The applicant will only be considered with a restriction as a Multicrew, with or as a Co-pilot

CLASS I COMM:

A. Applicant may fly solo if they comply with the following restrictions:
   - The applicant must not have associated co-morbidities.
   - Proof of INR control, 80% of the time in three months after initiation of Warfarin, while grounded.

B. Applicant may fly with a safety pilot if:
   - Applicant has associated co-morbidities that are poorly controlled
   - Safety pilots must not have any restrictions other than corrective lenses or glasses
   - Proof of INR control, 80% of the time in three months after initiation of Warfarin, while grounded

CLASS II:

A. Applicant may fly solo if:
   - There are no associated co-morbidities
   - Proof of INR control 80% of the time in three months while grounded

B. Applicant may fly with a safety pilot if:
   - Applicant has associated co-morbidities that are poorly controlled.
   - Safety pilot must not have any restrictions other than corrective lenses/ glasses
   - Proof of INR control, 80% of the time in three months after initiation of Warfarin, while grounded
CLASS III: Applicants will be considered if they meet the prescribed criteria

CLASS IV: Applicants will be considered if they meet the prescribed criteria

16.21.7.1 General Medical Examination Requirements Applicable to all Certificate Holders

a) All initial medical reports will be submitted to the panel of specialists for approval

b) Applicants will be required to submit the initial baseline INR and a cardiologist report before the initiation of Warfarin, then he/she will submit a weekly INR report after initiation of Warfarin until there is proof of stability; the applicant can then submit one monthly INR reports

c) The applicant will submit his/her INR reports to the DAME on a monthly basis

d) The applicant will submit a full medical examination report, including INR and a cardiologist report to the medical panel on a six monthly basis

e) Medication must be well-tolerated by the aviation personnel for a three-month observation period (during which the applicant will be grounded to ensure safety)

f) All applicants must submit proof of stability of the INR, 80% of the time in three months, prior to consideration for medical certification

g) Licensed aviation personnel presenting with INR outside the required range will be grounded for a four-week observation period, in which he/she will be required to submit four reports separately (weekly) to prove INR stability to the panel

h) Applicants should not take any other medication without approval, either by the DAME, or by the specialist managing his condition.

i) Applicants who present with an acute illness will be grounded until they are fully recovered and their INR reassessed.

16.21.7.2 General Medical Conditions

A. Deep Vein Thrombosis

Certification should be denied for the period of the episode, and for three months post initiation of anticoagulation therapy

The applicant will be grounded for a three month observation period, in which he/she will be required to submit three months’ INR reports (baseline INR reports, weekly INR report until stability is reached, then one monthly reports) the levels of which must be between 2 and 3, 80% of the time

The applicant will submit his/her monthly INR reports to the DAME

Underlying contributing factors such as malignancies must be evaluated according to the guidelines set for those conditions.

B. Atrial Fibrillation
Certification should be denied for the initial period of the episode, while the condition is being investigated

The applicant will be grounded for a three month observation period, in which he/she will be required to submit three months’ INR reports (baseline INR reports, weekly INR report until stability is reached, then one monthly reports) the levels of which must be between 2 and 3, 80% of the time

The applicant will submit his/her monthly INR reports to the DAME

Underlying contributing factors must be evaluated according to the guidelines set for those conditions

C. Valvular Replacement

Certification should be denied for the period of the episode

The applicant will be grounded for a three month observation period, in which he/she will be required to submit three months’ INR reports (baseline INR reports, weekly INR report until stability is reached, then one monthly reports) the levels of which must be between 2 and 3, 80% of the time

The applicant will submit his/her monthly INR reports to the DAME

Underlying contributing factors must be evaluated according to the guidelines set for those conditions

D. Pulmonary Embolism

Certification should be denied for the initial period of the episode, while the condition is being investigated

The applicant will be grounded for a three month observation period, in which he/she will be required to submit three months’ INR reports (baseline INR reports, weekly INR report until stability is reached, then one monthly reports) the levels of which must be between 2 and 3, 80% of the time

Underlying contributing factors must be evaluated according to the guidelines set for those conditions

Recurrent atrial emboli is disqualifying under any circumstances

A single episode of pulmonary embolism, not associated with chronic deep venous thrombosis, should be considered disqualifying from the date of the embolisation and for at least three months after anti-coagulation treatment has been initiated

More than one episode of pulmonary embolisation documented by CT Scan method should be denied certification permanently

The applicant will submit his/her monthly INR reports to the DAME.

16.21.8 HIV/ AIDS Protocol

APPLICABILITY

This protocol applies to all Classes of Medical Certificates (1, 2, 3 & 4)

A. General and Medical requirements

Following an initial diagnosis of HIV seropositivity, the applicant will be assessed as temporarily unfit for a period of three months, pending submission of the following favourable reports:
1) HIV specialist* review with following
   a) History of infection
   b) Current and previous symptoms
   c) Stability of condition
   d) History of opportunistic infections or associated illnesses
   e) History of CD4+ T cell counts
   f) History of viral load measurements
   g) Medication history (including “over the counter” medications and alternative medicines)
   h) Report concerning side effects of medications
   i) Laboratory testing to include:
      1. Hepatitis B and C, cytomegalovirus, toxoplasma, tuberculosis.
      2. Full blood count, urea, creatinine and electrolytes, liver function tests, fasting glucose, lipogram.

2) Neurological review – can be undertaken by a neurologist or specialist o physician.
   a) Assessment for neurological sequelae including assessment of primitive reflexes because of their association
      with cognitive decline.

3) Neuropsychological review
   a) Baseline neuropsychological assessment.
      Tests should include timed psychomotor tasks and memory tasks requiring attention, learning, active monitoring
      and retrieval of information.

4) Psychiatric review (only if clinically indicated)
   Assessment for psychiatric sequelae related to HIV seropositivity and
   antiretroviral treatment.

5) Cardiologist review (only if indicated)
   a) Cardiologist review is recommended if the following exist:
   b) Lipodystrophy or metabolic syndrome (dyslipidaemia — raised total cholesterol, low high density lipoprotein
      cholesterol and raised triglycerides or insulin resistance with hyperglycaemia);
   c) Cardiac risk factors are present, including:
      1. Hypertension, evidence of left ventricular hypertrophy, smoking, raised lipids, diabetes, and age over 40
         years.
B. Medications include:

I. Acceptable medications include abacavir, didanosine, emtricitabine, lamivudine, tenofovir, zidovudine, atazanavir, fosamprenavir, lopinavir/ritonavir, nevirapine, saquinavir, nevirapine, Fuzeon, Fosamprenavir, Amprenvir, Mapavir, Etravitine, Darunavir, Raltegravir, Nelfinavir, Saquinavir, Logan, Ritonavir, Tenoforvir, Niveperine, Tenofovir, Emtricitabine, Abacavir, didanosine, lamivudine, retrovir, zidovudine.

II. Unacceptable medications include enfuvirtide, zalcitabine, indinavir, efavirenz, and stavudine.

III. Recently available medication, e.g., tipranavir, darunavir, raltegravir and maraviroc, may be acceptable on an individual basis.

IV. Particular attention needs to be given to the toxicity and side-effect profile of such medications.

V. A “temporary unfit” assessment should be made when initiating, modifying or discontinuing ART.

VI. When stable, recertification after three months of monitoring may be permitted providing that:

1. There has been an acceptable serological response (as evidenced by increase CD4 count and a decrease in the viral load)
2. No on-going side effects
3. Full blood count (FBC), liver function tests (LFTs), lipids and fasting blood glucose are within normal limits.

VII. Reviews should take account of any over-the-counter medications and alternative therapies being taken.

VIII. Applicants whose condition is stable, asymptomatic, with an acceptable CD4+ count of >350, viral load of <1000 copies per millilitre of plasma and acceptable co-infection can be considered for any class of the medical certificate.

IX. All cases will be assessed individually taking into consideration a favourable clinical and serological response.

C. Regular follow-up is required, to include:

I. 3-monthly CD4 count and viral load measurements.

II. 6-monthly neurological assessment (by HIV specialist or neurologist including consideration of the need for psychiatric evaluation - for follow up assessment a specialist physician may conduct the neurological examination).

III. If taking ART: 6-monthly LFTs, FBC with minimum Haemoglobin of 12g/dl, Renal Function, Lipogram and Fasting glucose.

IV. Annual cognitive function assessment.

V. Impaired performance will require further neuropsychological assessment to be compared with baseline testing, and any deficits will require that the pilot is declared temporarily unfit.

VI. Neuropsychological assessment should be undertaken if there are any clinical concerns about cognitive
impairment.

VII. Further co-infection testing should be undertaken where clinically indicated and those with new positive tests must be deferred for further evaluation.

VIII. If an applicant develops new symptoms and/or fails to achieve the nominal levels listed above he must be declared temporarily unfit and referred to the Aeromedical Committee.

D. Withdrawal of the medical certificate

I. The medical certificates of applicants presenting with the following complications/side effects will be withdrawn if there is:

1. Presence of acute or serious opportunistic infection
2. The use of any substance or medication that is not compatible with flying
3. Safety threatening side effects of any medication
4. Co-existing disqualifying medical conditions or disease
5. Very low CD 4 count of 350 or less and Viral load of more than 5000 copies per milliliter of plasma

*HIV Specialist is any medical practitioner with training in HIV Medicine

16.21.9 Bone Marrow Protocol

1) The holder of medical certificate is to be grounded from the date of harvesting.

2) Date of harvesting is calculated from the date of when the first injection of Granulocyte-Colony Stimulating Factor (G-CSF) is given.

3) The holder of medical certificate submits a Full Blood Count 2 weeks after completion of the procedure.

4) If the Full Blood Count is normal, the holder of medical certificate may be considered to exercise the privileges of their license they are applying for, if the Full Blood Count is abnormal, holder of medical certificate will remain grounded until all abnormalities have been corrected.

16.21.10 Protocol - Plavix

A. GENERAL

The provision of medical certificate for aviation personnel on Plavix may be considered for any class of medical certificate based on individual medical condition of the applicant and risk factor management.

Applicants on Plavix may not take part in Aerobatic activities.

B. APPLICABILITY

Class I ATP
Any restrictions placed on the pilot would be in keeping with the underlying condition for which Plavix was prescribed.

**CLASS I Comm**

Any restrictions placed on the pilot would be in keeping with the underlying condition for which Plavix was prescribed.

**CLASS II PPL**

Any restrictions placed on the pilot would be in keeping with the underlying condition for which Plavix was prescribed.

**CLASS III and CLASS IV**

Any restrictions placed on the pilot would be in keeping with the underlying condition for which Plavix was prescribed.

### C. GENERAL MEDICAL EXAMINATION REQUIREMENTS

All initial medical reports should be submitted to the Panel of Specialists for approval.

Medication must be well tolerated by the aviation personnel for a three-month observation period (during which the applicant will be grounded to ensure safety).

Each case can be dealt with on a case to case basis.

If any severe side effects develop the relevant Specialist Report will be required. (i.e. Neurology/Psychiatry for CNS/Psychiatric S/E)

16.21.11 Protocol on Mood Disorder (Depressions)

### A. GENERAL

1) Aviation medical standards as laid down in Annex 1 of the convention on International Civil Aviation by the International Civil Aviation Organization, to which South Africa is a contracting State, have identified broad medical conditions that, on the basis of expected risk of incapacitation, disqualify aviation personnel from flying.

2) South Africa is one of the countries that previously applied strict standards to applicants with a history of depression.

3) The previous protocol did not take into consideration new therapeutic interventions, risk factor modification or rehabilitation, all of which may reduce the risk of sudden incapacitation.

4) The SACAA has since reviewed this protocol, and is now making provision for aviation personnel with a history of depression to apply for the privileges of the license they wish to apply for.
5) This consideration will be based on the individual medical condition of the applicant and risk factors involved.

B. BACKGROUND

1) Depression is a disorder that defines a certain component of psychopathology that is grouped as “Mood Disorders”.

2) Mood disorders are psychopathologic states in which a disturbance of mood is either a primary determinant or constitutes the core manifestation of the condition.

3) These conditions, especially the depressive forms, are heterogeneous and are common in both psychiatry and general medicine.

4) These conditions are becoming even more common as the stigmata associated with such a diagnosis are having less impact in the social spectrum of life.

5) The methods used to treat patients suffering from mood disorders have improved over recent years, and individuals that require pharmacotherapy may apply, or re-apply, for a license to fly or to undertake air traffic control work.

6) The key areas of concern in certification of aircrew with mood disorders are the risk of suicidal ideation, suicide, lack of concentration, chronic tiredness, insomnia /hypersomnia and general malaise, with all the ramifications resulting in a detrimental effect on global functioning of an individual.

C. ESTIMATED INCAPACITY RISK

1) The lifetime prevalence of major depression in males is about 5% to 12% and in females about 10% to 25%.

2) There is no specific association with ethnicity, social status, income or marital status. The risk for a second episode after remission is 60%, 70% for a third episode and 90% for a fourth episode.

3) This leads to the clinical conclusion that for the purpose of risk management in the aviation industry, a person should be treated optimally and permanently with the appropriate pharmacologicals, thereby reducing the risk of recurrence.

4) During the initial phase of therapy there may be a higher incidence of suicidal tendencies brought on by the appropriate therapeutic interventions.

5) Without diligent care by the professional therapist and adequate protocol parameters disallowing the privileges of execution of an aviation-related license in the initial phase of treatment, the incapacity risk would be unacceptably high.

16.21.12 Protocol for Mood Disorder Class Applicability

C. Applicability

1) Any class of certification may be applied for, subject to the following requirements:
   a) Class I
      I. Commercial passenger air transport operations - Multicrew restriction
      II. Flight Instruction - Student must have completed first solo flight
a) Class II – no restriction
b) Class III – may operate under supervision
c) Class IV – no restriction

D. General medical requirements applicable to all applicants for initial consideration

1) All symptoms of the psychiatric condition for which treatment is indicated must be eliminated by the single medication and the applicant must be symptom-free for 4 weeks prior to application for certification.

2) An applicant must have no aeromedically significant side effects of the prescribed medication for a period of four (4) weeks.

3) Applicants will be required to submit psychiatrist's and clinical psychologist's reports to the Aeromedical Committee for consideration.

4) A consultation status report from the treating psychiatrist must attest to and describe the applicant's diagnosis, length and course of treatment, type and dosage of the antidepressant medication taken, Hamilton Scale (HAMD 17) score (must be consistently below 7) and presence of any side effects from the antidepressant the applicant takes or has taken in the past;

5) Any additional information that may be required by the Aeromedical Committee.

6) Applicants who meet the requirements prescribed above will be required to submit a monthly psychiatrist's report for a period of six (6) months following initial certification.

7) A follow-up psychiatrist's report will be required at nine (9) months, then at twelve months (12) post-certification.

8) Should other co-morbidities exist or develop after the issuing of a certificate of fitness, then certification will not be granted (in the case of existing) or will be withdrawn by the Aeromedical Committee without re-assessment.

16.21.12.1 Protocol diagnostic inclusions

The following mood disorders are acceptable for the purpose of this protocol:

a) Major Depressive Disorder (mild to moderate degree) either single episode or recurrent episode before commencement of therapy.

b) Dysthymic Disorder.

c) Adjustment Disorder with depressed mood.

16.21.12.2 Disqualifying Conditions

1) Any history of depressive disorder of a severe degree is disqualifying.

2) The following conditions will by virtue of their risk profile exclude a person from obtaining a Certificate of Aviation-medical fitness:
a) History of psychosis
b) Impairment of arousal
c) History of electro-convulsive therapy
d) Concurrent treatment with multiple antidepressant medications
e) History of multi-agent drug use (prior use of other psychiatric drugs in conjunction with antidepressant medications)
f) History of discontinuation of acceptable medication and then a subsequent onset of depression.
g) Any other manifestation of mood disorder as specified at the time of promulgation, or at the discretion of the treating psychiatrist.

16.21.12.3 Acceptable oral medication

a) Fluoxetine
b) Sertraline
c) Citalopram
d) Escitalopram
e) Other oral medication deemed acceptable by the Director.

16.21.12.4 Annual follow-up for medical certification

After twelve (12) months, the applicant will be required to submit a psychiatrist's report at 6 monthly intervals to the Aviation Medical Department, until such time as cancellation of his/her license.

16.21.13 Protocol on Rheumatoid Arthritis

a) All pilots suffering from rheumatoid arthritis, need a rheumatologists report stating whether or not the disease is in remission or controllable on acceptable medication.
b) The only acceptable medication at present is MethotrexateTM in dosages not exceeding 5 mg per day.
c) Gold salts, NSAID's, anti-malarials (in anti-rheumatic dosages), etc. are not compatible with flying.
d) The DAME must determine whether the arthritic damage already incurred would compromise the pilot's flying safety.

16.21.14 Protocol on Coagulation and Thrombotic Disorders
A. General

a) Inherited disorders of coagulation should be disqualified if there is any history of factor replacement or serious bleeding episodes.

b) Haemophilia:
   • Factor VIII deficiency should be denied certification.
   • Von Willebrand's disease as well as other specific factor deficiencies should be denied certification if there is a history of factor replacement or serious bleeding episodes.

c) Haemorrhagic platelet abnormalities
   • Decreased circulating platelet count due to any cause may result in debilitating haemorrhagic episodes.
   • Haemorrhage can also occur when platelet counts are normal but platelet function is abnormal.

d) Congenital / Genetic Disorders: E.g. Protein S or Protein C Deficiency. All unfit

16.21.15 Monocular/Amblyopic Protocol

1) To be applicable if optimally corrected vision in the weak eye is 6/12 or worse.

2) Pre-conditions:
   a) There must be no active ocular pathology.
   b) Vision (uncorrected or corrected) in the better eye must be 6/6 or better (distance vision) and 6/9 or better (near vision).

3) Initial applicants: In addition to the required standards, initial applicants must pass a practical flight test by a CAA approved instructor before being declared fit according to the protocol.

16.21.16 Colour Vision Protocol

A. Applicability
This technical standard is applicable to the following categories:

Class I
   a) Air Transport Pilots
   b) Commercial Pilots

Class II
Private Pilots with the following:
a) Night Flying
b) IF Rating
c) Flying a Glass Cockpit Aircraft

B. Ishihara Test
All applicants will be required to submit themselves for Ishihara Test;

a) Applicants must be able to demonstrate ability to perceive readily those colours the perception of which is necessary for the safe performance of duties;

b) The use of tinted lenses to obtain adequate colour perception is not permitted;

c) The medical examiner shall instructs the person being tested to report the number on a plate they can see and warns the subject that on some occasions they may not see a number;

d) Ishihara test to be conducted as per manufacturer’s instructions test at a distance 75cm with plane of plates at right angles to line of vision under daylight or daylight simulated light;

e) Applicants should see this number with a viewing time of about 3 seconds allowed for each plate, undue hesitation on the part of the subject may be the first indication of colour deficiency;

f) Ishihara plates should be updated periodically or if showing any signs of fading;

g) The SACAA will only allow, 24 or 38 plates test version to be used for screening of colour vision;

h) The Ishihara test is to be considered passed for the 24 Plates, if the 1st -15th are identified correctly, with no errors, presented in a random order;

i) The Ishihara test is to be considered passed for the 38 Plates, if the 1st -24th are identified correctly, with no errors presented in a random order;

Class II medical certificate Applicants who fail to obtain a satisfactory score of the Ishihara Tests may nevertheless be assessed as fit;

A medical certificate may be issued if medical conclusion indicates that the applicant has a colour perception defect which is compatible with the safe exercise of the privileges of the license, provided the certificate is endorsed with the following limitations:

a) “For private pilot license privileges only”;

b) Not valid for night flying,

c) Not valid for IFR flying or flying of EFIS equipped aircraft where the EFIS is the Primary Flight Instrument;

A medical certificate may be issued if medical conclusion indicates that the applicant has a colour perception defect which is compatible with the safe exercise of the privileges of the license, provided the certificate is endorsed with the following limitations:

A medical certificate may be issued if medical conclusion indicates that the applicant has a colour perception defect which is compatible with the safe exercise of the privileges of the license, provided the certificate is endorsed with the following limitations:

a) “For private pilot license privileges only”;

b) Not valid for night flying,

c) Not valid for IFR flying or flying of EFIS equipped aircraft where the EFIS is the Primary Flight Instrument;

d) Meet visual criteria for a Class II Medical Certificate; and

e) The applicant shall submit a satisfactory report from an ophthalmologist every 2 years if the if < 40 years of age and every year if > 40 years of age
Applicants who fail to pass in the Ishihara test and who wish to apply for a Class II PPL without restrictions and Class I medical certificate shall undergo further colour perception testing to establish whether they are colour safe using the Colour Assessment Diagnosis (CAD)

C. For Class I and Class II PPL without restrictions

CAD tests should be conducted under CAA protocols as indicated below.

The CAD test will only pass as colour safe, those individuals who perform as well as individuals with colour vision in the normal range on the most difficult aviation colour vision tasks

D. Applicants will be required to present the Ishihara

The Definitive CAD will assess red/green colour vision and yellow/blue colour vision. The test can be done simultaneously or individually but will run somewhat faster if you only assess one type of colour vision at a time. The CAD will establish class of colour vision loss and whether pass (colour safe) or fail (colour unsafe).

1) Applicants will be required to produce identity documents prior to examination

2) Applicants may not wear coloured contact lenses

3) A report from an Ophthalmologist that confirm that there are no visual defects, which must include:
   - Refraction errors
   - Peripheral vision
   - Exclusion of any acute or chronic eye disease
   - Lens abnormality
   - Absence of any medication that may cause colour vision defect.

The procedure for testing for colour deficiency using the Colour Assessment and Diagnosis (CAD) shall be as follows:

- The applicant’s eye will be positioned at display height and at a distance of 1.4 meters.
- The illumination in the room will be arranged such that no light falls directly on the display
- The ambient illumination on the display surface will not exceed 1 lux.
- During this test, the applicant will see a coloured target moving diagonally across a central square in one of four possible directions (top-right, top-left, bottom-right, or bottom-left).
- The response box has four buttons laid out to form a square.
- The applicant’s task is to press the appropriate button to indicate the corresponding direction of movement.
- When unsure, the applicant has to make their best guess
• For best results, the applicant will be instructed to maintain fixation on the Centre of the square and not to track the moving target.
• The applicant can request for representation of the current presentation if, for any reason, the subject failed to attend to the task, but not more than twice.
• The applicant will start with the learning mode to familiarize themselves with thefools before being exposed to the definitive test.

E. Interpretation of the CAD Results

In the case of class 1 medical certificates, applicants shall have normal perception of colours or be colour safe;

a) Colour Assessment and Diagnosis (CAD) test is considered passed if the threshold is equals to or less than 6SU for deutan deficiency, or equals or less than 12 SU for protan deficiency;

b) A threshold greater than 2 SU for tritan deficiency will be disqualifying;

c) A threshold greater than 2 SU for tritan deficiency indicates an acquired cause which should be investigated.

Applicants who fail further colour perception testing shall be assessed as unfit;

A medical certificate may be issued if medical conclusion indicates that the applicant has a colour perception defect which is compatible with the safe exercise of the privileges of the license, provided the certificate is endorsed with the following limitations:

a) “For private pilot license privileges only”;

b) Not valid for night flying;

c) Not valid for IFR flying or flying of EFIS equipped aircraft where the EFIS is the Primary Flight Instrument;

d) Meet visual criteria for a Class II Medical Certificate; and

e) The applicant shall submit a satisfactory report from an ophthalmologist every 2 years if the if < 40 years of age and every year if > 40 years of age

F. Operational Colour Vision Test and Medical Practical Flight Test

Applicable

Class I-Commercial Pilots only

Class II- with no colour vision restrictions on the medical certificate.

Operational Colours Vision Test

1) An applicant for a Class I(Commercial) or Class II who has defective color vision, must demonstrate the the ability
to pass an OCVT which includes:

a) The ability to read and correctly interpret in a timely manner aeronautical charts and Jeppesen chart legents:

I. Including print in various sizes, colors, and typefaces; conventional markings in several colors; and terrain colors.

II. Aeronautical chart reading may be performed under any light condition where the chart will normally be read.

1. Medical Practical Flight Test

   1) The Director may require applicants to demonstrate their ability to perceive color in a

   2) EFIS-equipped aircraft or EFIS Cockpit Simulator with the panel lighting set to the comfort of the applicant day and night and must include the interval from dawn to dusk;

   3) Medical Practical Flight Test shall be conducted in a Level C or D simulator, or such lesser device as determined by the Director in the instance of a specific

   4) The Test shall be conducted by a panel of specialists appointed by the Director and will be coordinated by Authorized Officers (Medical Assessor) of the CAA;

   5) The panel shall comprise of the following:

       a. A representative Authorized Officers from the CAA;
       b. Designated Aviation Medical Examiner with either preferred experience in flying,
       c. An Ophthalmologist;
       d. Designated Flight Examiner as determined by the Director; and the
       e. The procedure for the medical practical flight test shall be approved by the Directors;

1) Applicants must have the ability to demonstrate the following:

   a. Must read and correctly interpret in a timely manner aviation instruments or displays, particularly those with colored limitation marks;
   b. Must read and interpret colored instrument panel lights, especially marker beacon lights, warning or caution lights, weather displays, etc
   c. Must recognize terrain and obstructions in a timely manner; have the applicant select several emergency landing fields, preferably under marginal conditions, and describe the surface
   d. Must visually identify in a timely manner the location, color and significance of aeronautical lights.
   e. An applicant may be issued a medical with operational limitations should the panel appointed by the Director deem it necessary finds necessary for safety
   f. Applicants will be afforded a single opportunity for a Medical Practical Flight Test.
   g. Operating limitations required by physical deficiencies may restrict holders to certain aircraft types, special equipment or control arrangements, or special operating conditions.
2. Considerations for Applicants with Class I Comm who fail a CAD and pass the OCVT and PMFT tests

To Fly as CPL in a Multi-Crew environment by day and night as a Deuteranope with the following restrictions:

a. The holder does not meet the ICAO medical standard as per Annex 1 and is therefore restricted to fly within the South African borders on a South African registered aircraft only

b. Applicants who fail the CAD will not qualify for Air Transport Pilot License operations;

c. Annual ophthalmological assessment will be required to determine any refractory, visual field or lens translucency change every two years is < 40 years and annually if > 40 years;

d. The applicants must inform his/her employer and cockpit crew members of his Red-Green Colour deficiency

e. Restricted to a Cabin Altitude of maximum 8000ft AMSL at night or during IFR conditions;

f. May not perform any CAT II approaches

g. Apply a minimum required flight hours as prescribed in SA-CARS/CATS Part 61 before allowing him to fly as PIC with CPL. The amount of additional hours required was not determined.

h. The decision and restrictions will be reviewed, should there be a change in his condition or new evidence become available regarding Deuteranopia and flight safety.

Colour Vision for Class III (Air Traffic Controllers)

16.21.17 Radial Keratotomy/PRK/Lasik Protocol

A. GENERAL

1) Applicants contemplating refractive surgery must take cognisance of the risks involved and shall be aware that having the surgery might result in a delay in return to duties as aircrew or air traffic controller or, if complications occur, that it may result in the permanent loss of medical certification.

2) The visual acuity result meets the visual requirements of technical standard 67.00.3 and the assessment must be based on measurements made by an ophthalmologist.

Initial application

a) An applicant presenting with a pre-operative refractive error of up to 6.00 D spherical equivalent at initial application will be considered medically unfit for the periods prescribed below:
b) an applicant who has undergone a Radial Keratotomy (RK), for a period of three months;
c) an applicant who has undergone a Photorefractive Keratectomy (PRK), for a period of three months;
d) an applicant who has undergone a Laser-assisted in situ Keratomileusis (LASIK), for a period of two months.

3) An applicant presenting with a pre-operative refractive error of up to 10.00 D spherical equivalent at initial application will be considered medically unfit for the periods prescribed below:
   a) an applicant who has undergone a Radial Keratotomy (RK) procedure, for a period of six months;
   b) an applicant who has undergone a Photorefractive Keratectomy (PRK) procedure, for a period of six months;
   c) an applicant who has undergone a Laser-assisted in situ Keratomileusis (LASIK) procedure, for a period of two months.

4) An applicant with pre-operative refractive error greater than 10.00 D spherical equivalent will be considered medically unfit for the periods prescribed below:
   a) an applicant who has undergone a Radial Keratomy (RK) procedure, for a period of six months;
   b) an applicant who has undergone a Photorefractive Keratectomy (PRK) procedure, for a period of six months;
   c) an applicant who has undergone a Laser-assisted in situ Keratomileusis (LASIK) procedure, for a period of six months.

5) An applicant who have had refractive surgery and who is considered for medical certification or recertification shall meet the following criteria:
   a) the surgery must have been without complications;
   b) the vision must be stable; and
   c) there must be no corneal haze or complaints of glare, halos or “ghosting”.

Follow-up requirements

6) An applicant shall submit a post-operative assessment report by an ophthalmologist at the following intervals:
   a) At six (6) weeks after the procedure;
   b) At six (6) months after return duty; and
   c) Annually, thereafter.

B. SUBSTANCE ABUSE

1.1 General
These technical standards are based on the general principles that have been established internationally and are designed to ensure that the entire drug & alcohol testing process is conducted to give accurate and reliable information about a donor's drug & alcohol use.

1.2 Procedure for Substance and Alcohol Testing

1) Specimens must be collected by suitably trained personnel (Collecting Officers) who have a thorough understanding of the principles of chain of custody.

2) Collecting officers must be able to provide evidence of their training, and/or the instructions that they must follow during the collection process.

The following restrictions apply:

   a) The immediate supervisor of a donor may not serve as the collector when that donor is tested, unless there is no feasible alternative.

   b) A co-worker who is in the same testing pool or who works with a donor on a daily basis may not serve as a collector when that donor is tested, unless there is no feasible alternative.

   c) An individual who has a personal relationship with the donor (e.g., spouse, exspouse, relative, close personal friend) may not serve as the collector, unless there is no feasible alternative.

   d) The collector should have identification with his/her name address, and telephone number and be able to provide it upon request of the donor.

   e) The following items should be available to the collecting officer before specimen donation occurs:

   Chain-of-Custody form

   I. The original copy accompanies the sample to the confirmatory laboratory and all persons involved in the transport and receiving of the sample should record their name and signature on the chain-of-custody form and

   II. A copy should be handed to the licence holder, the medical review officer (MRO), the Collection officer

      a) A link between the chain-of-custody form and collection cup.

      b) A demonstrably clean and unused collection cup which can hold a minimum of 50mL.

      c) At least two collection cups for split specimen collection.

      d) Each cup must be able to hold a minimum of 20 mL.

      e) In the case of single specimen collection, it must be able to hold a minimum of 40 mL.

 NOTE: In case of the use of immunoassay integrated test cup kits (also referred to as an “integrated split specimen cup”), the collection cup and sample bottle is integrated into the same device, hence a single specimen collection may be performed.

      a) Blueing agent that must be added to toilet bowl water/tank before donor enters the collection area.

      b) Temperature measurement device able to determine temperatures between 32-38°C.

      c) Secure tamper-evident seal for each bottle.

      d) Leak resistant plastic bag.
e) Disposable gloves for collector when handling donor specimens.
f) Packaging components that satisfy current mail and courier regulations.
g) A collection site is a permanent or temporary facility where a donor provides a urine specimen for a drug test.
h) The site must have all necessary personnel, supplies, equipment, facilities, and supervision to provide for specimen collection, security, and temporary storage.
i) A urine specimen collection site must provide for donor privacy while he or she provides the urine specimen.
j) An observed collection must only be performed when required (e.g. as part of a recollection in adulteration suspicion).
k) The following facilities provide adequate privacy for urine collections:

   I. A single-toilet restroom with a full-length door;
   II. A multi-stall restroom with partial-length doors
   III. A mobile restroom (e.g., a vehicle with an enclosed toilet stall).
   IV. A source of water for washing hands must be provided.
   V. The water source should be external to the restroom where urination occurs.
   VI. If the only source of water available is inside the restroom, the collector must secure the water source before the collection, and restore the water source to allow the donor to wash his or her hands after the collection.
   VII. If a water source is not available, providing moist towelettes outside the restroom is a suitable alternative.
   VIII. A suitable clean surface for the collector to use as a work area must be available.
   IX. Collector work area may be located outside the restroom or inside the restroom, only if the donor can have privacy while providing the urine specimen.
   X. The collector must maintain line-of-sight custody or provide for the secure temporary storage of specimens from the time the specimen is collected until it is sealed in a shipping container prior to transfer to an express carrier or courier for shipment to a laboratory.
   XI. Either the collection officer or the donor, with both of them present, must unwrap or break the seal of the collection container.
   XII. During the collection process the collection site must be dedicated solely to drug testing and comply with all local health and safety requirements.
   XIII. The collection officer and the donor must be present throughout all the procedures outlined in the paragraphs of this section and the entire process must be transparent.
   XIV. When a donor arrives at the collection site, the collection officer will request that the donor presents photographic identification (passport, national identity document, drivers licence, SACAA license etc).
   XV. If the donor does not have proper photographic identification, the collection officer will obtain a positive identification of the donor by an authorised supervisor or manager within the parent organisation.
   XVI. If the donor's identity cannot be established, the collection officer will not proceed with the collection and notify an authority.
   XVII. The collection officer will ask the donor to provide voluntary written informed consent before the collection commences.
   XVIII. The following minimum precautions shall be taken to ensure that unadulterated specimens are obtained and correctly identified:
To deter the dilution of specimens at the collection site, toilet water colouring agents should be placed in toilet tanks wherever accessible or in the toilet bowl, so the reservoir of water in the toilet bowl always remains coloured.

I. Any other sources of water in the enclosure where urination occurs (e.g. taps, shower) will be secured prior to collection.

II. The collection officer will ask the donor to remove any unnecessary outer garments that might conceal items or substances that could be used to tamper with or adulterate the donor's urine specimen.

III. The donor will be instructed to wash and dry his or her hands prior to urination with inspection of the hands afterwards by the collection officer.

IV. After washing hands, the donor will remain in the presence of the collection officer and will not have access to any unregulated source of water, soap dispenser, cleaning agent, or any other materials that could be used to adulterate the specimen.

V. The collection officer will give the donor a clean specimen collection cup.

VI. The donor will be instructed not to flush the toilet until the specimen is handed to the collection officer.

VII. The collection officer will note any unusual behaviour of the donor on the chain of custody form.

VIII. Upon receiving the specimen from the donor, the collection officer will:

a. Check the volume of urine in the specimen container and check the temperature of the urine specimen.

b. The temperature-measuring device used must accurately reflect the temperature of the specimen and not contaminate the specimen.

c. If a thermometer is used it may only be done on the residual urine in the collection cup after the specimen has been transferred to the sample bottles earmarked and secured for possible confirmatory analysis (split or single).

d. The thermometer may under no circumstances be brought into contact with the urine that is designated for possible confirmatory analysis.

e. The time from urination to temperature measurement should not exceed 4 minutes.

f. Inspect the specimen to determine its colour and appearance for any signs of contaminants.

g. Any unusual findings will be noted on the chain of custody form.

h. A re-collection may be performed and both specimens forwarded for testing by a laboratory with special notice on the chain of custody form.

i. For a split specimen collection, the volume must be approx. 50 millilitres (mL) or more and the temperature within the acceptable range of 32°C - 38°C, the collection officer may then proceed with step

j. If the volume is less than 50 mL, the specimen will be discarded and a second specimen will be collected.

k. For a single specimen collection, the volume must be approx. 20 millilitres (mL) or more and the temperature within the acceptable range of 32°C -38°C, the collection officer may then proceed with step

l. The donor may be offered a reasonable amount of liquid to drink for the purpose of re-collection (e.g., 250ml of water every 30 min, but not to exceed a maximum of 1 litre).

m. If the temperature of the urine specimen is outside the acceptable range of 32°C-8°C, a second specimen will be collected (as above).
n. If there is any reason to believe (temperature outside of range, visible contamination etc) that a donor may have adulterated, diluted, altered or substituted the specimen, another specimen will be obtained as soon as possible and both specimens will be forwarded to the laboratory for testing.

o. Both the donor and the collection officer will keep the specimen container /specimen bottles in view at all times prior to the urine specimen being sealed and labelled.

p. For a split collection, the specimen is split into a minimum of two specimen bottles (Sample A and Sample B).

q. When the specimen is transferred from the specimen container to the specimen bottles, it will be poured and the collection officer will request the donor to observe the transfer of the specimen and the attachment of the tamper-evident seal/tape on the bottles.

r. The sealed specimens together with the corresponding chain of custody documentation in a tamper evident container must be dispatched to the laboratory.

s. In split collections one bottle will be used for the drug test (Sample A) while the second bottle (Sample B) will remain sealed at the analytical laboratory in case the donor wishes to challenge a positive confirmation result.

t. In single collections (including integrated test cups) the specimen is split immediately after reception at the laboratory, before any testing, into a sample for analysis (Sample A) and a stored challenge specimen (Sample B)

u. At an appropriate time after the urine specimen has been collected and sealed into the transport bottles the collection officer will invite the donor to wash his/her hands.

v. The specimen bottle will have an identification label that contains at a minimum the date, the donor's specimen number and the donor’s signature/initials.

w. The collection officer will enter all information on the chain of custody form to identify the origin of the specimen.

x. Specimen bottles and all pages of the chain of custody will be labelled at the time of collection with a unique identifier.

y. The donor will be asked to read and sign a statement on the chain-of-custody form certifying that the specimen identified on the form was in fact the specimen provided by the donor and giving informed consent. The collection officer will complete the specimen chain-of-custody form and package with the urine specimen ready for dispatch as soon as possible.

z. Specimens should be stored at 4°C (do not freeze).

(aa) The specimens will be placed in containers designed to minimise the possibility of damage during shipment.

(bb) The collection officer will keep a register of the transfer of the specimens to the courier from the collector.

(cc) Laboratory urine analysis

(dd) Specimens are received at the laboratory where initial checks on the chain of custody documents and sample appearance are done

The following specimens will be deemed invalid:

a) No chain of custody documentation accompanied the sample

b) Chain of custody documentation incomplete (collector/donor details not filled in, donor consent absent)

c) Identification parameters (name/ID/barcode/numerical) mismatched on sample and documentation
d) No seals on specimens or seals broken/tampered with on any sample bottle

e) Insufficient sample volume

f) After the initial checks are complete samples may be placed in temporary storage at 2°C-10°C before further analysis.

g) Upon reception of a split specimen (Sample A and Sample B) samples are separated and one sample is placed in long term storage at -20°C (only Sample B) for possible challenges to results by the donor.

h) Upon reception of a single specimen (only Sample A) the sample is documented on the chain of custody and opened for a split performed by the laboratory before any further analysis.

i) The sample is poured from Sample A into a clean sample bottle (Sample B) containing the unique identifier of Sample A, sealed and placed in long term storage at -20°C for possible challenges to results by the donor.

NOTE: the basic protocol of specimen collection, sample validity testing, initial drug screen test (on-site or laboratory) and confirmation of all non-negative results must be followed.

Analysis performed by the laboratory is done utilizing separate aliquots from the testing sample (Sample A).

Aliquots are taken in a manner to exclude contamination of the sample.

The following validity tests must be performed to ensure the collected specimen is unadulterated urine:

a) temperature

b) pH

c) specific gravity/creatinine.

d) nitrite

e) oxidants (e.g. halogens, chromium (VI), pyrindinium chlorochromate),

f) gluteraldehyde

g) surfactants (e.g. benzalkonium chloride)

Any result that indicates adulteration (non-negatives) should be reported to the customer who may request additional confirmatory testing for adulterants.

All preliminary drug tests must fulfill the following minimum requirements:

a) All preliminary test results must be reviewed with regard to the validity of the results

b) All assays must be calibrated against appropriate analytical standards.

Where the assay has significant cross-reactivity or selectivity to related compounds the assay must be calibrated against one named standard, and where necessary the sensitivity to other compounds must be indicated.

a) The SACAA must be informed of the expected sensitivity and specificity to assayed compounds of interest.

b) Suitable cut-offs from Substance Abuse and Mental Health Services Administration (SAMHSA) are to be employed (Table 1).

Table 1. SAMHSA recommended cut-off concentrations for preliminary drug tests
NOTE: All prescription medication needs to be declared at all times by the licence holder and it is then the prerogative and responsibility of the employer to withdraw him/her from any safety sensitive duties. Prescription medication should be declared upfront before a drug test commences and should be noted on either of the "voluntary informed consent form" or the "chain-of-custody form".

<table>
<thead>
<tr>
<th>Screening drug class</th>
<th>Cut-off (ng/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabis metabolites</td>
<td>50</td>
</tr>
<tr>
<td>Opiate metabolites</td>
<td>2000</td>
</tr>
<tr>
<td>Cocaine metabolites</td>
<td>300</td>
</tr>
<tr>
<td>Amphetamines</td>
<td>1000</td>
</tr>
<tr>
<td>Phencyclidine</td>
<td>25</td>
</tr>
<tr>
<td>Prescription medication (Benzodiazepines, Bartiturates etc) See NOTE</td>
<td>Therapeutic ranges</td>
</tr>
</tbody>
</table>

Table 2. SAMHSA recommended cut-off concentrations for confirmatory drug tests

1 Acetylmorphine as evidence for heroin use is better associated (reduced false-negatives) within the unconjugated fraction of opiate metabolites. Analysis of un-conjugated morphine and codeine allows better discernment between codeine and morphine usage (from scientific literature).

2 Positive confirmation of methamphetamine use at this cut-off requires amphetamine concentration greater or equal to 200ng/mL.
a) Only drugs which have been confirmed by a recognised confirmation test (like GC-MS) can be reported as positive.

b) Before any laboratory test result is released, the results are reviewed and certified as accurate by an authorising scientist.

c) The laboratory must report all non-negative test results for a specimen. For example, a specimen can be positive for a specific drug in addition to being adulterated.

d) An analytical positive result may be due to medication (prescribed or over-the-counter) or to dietary causes.

e) Interpretation is best carried out by a qualified toxicologist who may consult with the MRO, the donor, and the donor's GP.

f) The toxicologist cannot issue a negative report for a positive analytical result even if the test result is likely to be due to the use of declared medication.

g) Results are reported to the MRO within a maximum of 5 working days.

h) The laboratory report must include:

i) The specimen identification number

j) The quantitative result/s for each sample submitted as well as the 99% confidence interval.

k) The limit of detection (LOD) and the limit of quantitation (LOQ).

l) Challenges to results by the donor for re-testing must be made within 72 hours of reporting results to the MRO.

m) The stored sample (Sample B) should be released for analysis to a drug-testing laboratory able to demonstrate that they can accurately determine the concentration of a drug or metabolite at 50% of the confirmation cut-off concentration employed.

n) The release must be supported by a chain of custody that can withstand legal scrutiny and requires authorisation from the customer and the donor.

o) Long-term frozen storage (-20°C or below) ensures that positive urine samples will remain suitable for a retest.

<table>
<thead>
<tr>
<th>Confirmation drug or metabolite</th>
<th>Cut-off (ng/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabis metabolites</td>
<td></td>
</tr>
<tr>
<td>11-Nor-Δ⁹-Carboxy-THC</td>
<td>15</td>
</tr>
<tr>
<td>Opiate metabolites</td>
<td></td>
</tr>
<tr>
<td>Morphine (Total)</td>
<td>2000</td>
</tr>
<tr>
<td>Codeine (Total)</td>
<td>2000</td>
</tr>
<tr>
<td>Morphine (Free)</td>
<td>100</td>
</tr>
<tr>
<td>Codeine (Free)</td>
<td>100</td>
</tr>
<tr>
<td>6-Acetylmorphine (Free/Total)</td>
<td>10</td>
</tr>
<tr>
<td>Cocaine metabolites</td>
<td></td>
</tr>
<tr>
<td>Benzylecgonine</td>
<td>150</td>
</tr>
<tr>
<td>Amphetamines</td>
<td></td>
</tr>
<tr>
<td>Amphetamine</td>
<td>500</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>500</td>
</tr>
<tr>
<td>Phencyclidone</td>
<td>25</td>
</tr>
<tr>
<td>Prescription medication (Benzodiazepines, Barbiturates etc) See NOTE</td>
<td>Therapeutic ranges</td>
</tr>
</tbody>
</table>
p) Unless otherwise authorised in writing by the SACAA, the laboratory will retain all samples confirmed positive in properly secured long-term frozen storage for a minimum of 1 year.

q) Within this one-year period the SACAA may request the laboratory to retain the sample for an additional period of time.

r) If no such request is received, the laboratory may discard the sample after the end of 1 year, except that the laboratory shall be required to maintain any samples known to be under legal challenge for a further agreed period.

s) The laboratory will maintain and make available for an agreed period (minimum 2 years), documentation of all aspects of the testing process involved in the generation of a positive result including the following:
   I. Chain-of-custody forms
   II. Quality assurance records
   III. Computer generated data
   IV. Breath Specimen Collection for Alcohol Testing
   V. The SST or the BAT who administers the alcohol must have qualification training and demonstrated proficiency in the alcohol testing device he or she will be using.

The qualification training for BAT’s and STT’s must contain the following elements:
   a) In depth knowledge in the operation of the alcohol testing device to be used. Their responsibility for maintaining the integrity and credibility of the testing process, ensuring privacy of the donors being tested, and avoiding conduct or statements that could be viewed as offensive or inappropriate.
   b) Trainers should provide their students with certificate of completion.

The BAT student should successfully demonstrate that he/she can:
   a) Respond to the device’s messages and commands or displays.
   b) Take appropriate actions when an error message or malfunction occur within the device
   c) Recognize that an air blank has been conducted.
   d) Identify and explain actions the technician will take when the device does not function properly.
   e) Explain when an external calibration check is required, if applicable to the device being used, and identify the procedures used to perform the check
   f) Mock tests
   g) After completion of training, the student must complete at least seven consecutive errorfree mock tests for initial BAT qualification and at least five consecutive error-free mock test for initial STT qualification.
   h) The mock tests must be conducted on the same device(s) the BAT/STT will use.
   i) If the device involves colour changes, contrasts, or colour readings, the technician must demonstrate that he/she can see the changes.
   j) The mock tests must portray a real event conducted with someone acting as the test subject
   k) The BAT and STT should go for refresher training every three years to remain eligible to conduct alcohol tests.
   l) The content of the refresher training must include material equivalent to the initial training but updated as needed.
m) The refresher training includes conducting error-free mock tests monitored by the trainer.

n) Error correction training

o) A BAT or STT who makes an error causing a screening test/confirmatory test to be invalid or cancelled must undergo correction training within 30 days of notification of the error. (He/she may continue with the normal testing duties, however, the goal is to complete the error correction training as soon as practical after the error occurred).

p) The employer or agent designated by the SACAA should be responsible for notifying the alcohol testing site of the error and the retraining requirement and for ensuring that the training takes place.

q) Error correction training is not required for errors related to equipment failure, unless the failure is related to the BAT’s failure to maintain EBT.

r) Error correction failure is also required if, in the event of equipment failure, the BAT does not try to accomplish the test using another, alternative device, provided that the device is reasonably available.

s) Error correction training should focus on the mistake(s) made and must include three error-free mock collections (at least two of which are related to the area in which the error was made).

t) Breath and blood specimens for legally defensible alcohol testing need to be collected under circumstances which respect the dignity of the individual.

u) Suitable records must be made when the specimen is collected to prove that:

v) Breath alcohol test result can be traced back to the donor.

w) The blood specimen collected and the sample received by the blood alcohol testing laboratory is one and the same.

x) This is the first link in the chain of custody process which, when reconstructed at a later date, can be used to prove that the final result belongs to the specimen collected.

The following restrictions apply to collecting officers:

a) The immediate supervisor of an employee may not serve as the collector when that employee is tested, unless there is no feasible alternative.

b) A co-worker who is in the same testing pool or who works with an employee on a daily basis may not serve as a collector when that employee is tested, unless there is no feasible alternative.

c) An individual who has a personal relationship with the employee (e.g., spouse, ex-spouse, relative, close personal friend) may not serve as the collector, unless there is no feasible alternative.

d) The collector should have identification with his/her name and his/her employer’s name, address, and telephone number and be able to provide it upon request of the donor.

e) A breath alcohol test site requires setup to an extend that ensure the testing devices are fully functional.

f) Each alcohol test should be conducted with reasonable visual and auditory privacy so that bystanders cannot know or infer the results.

g) A breath alcohol technician (BAT) is authorized to perform both screening and confirmation test.

h) A screening test technician (SST) is authorized only to perform screening tests for alcohol.

i) When a donor arrives at the collection site, the collection officer will request that the donor presents photographic identification (passport, national identity document, drivers licence etc).

j) If the donor does not have proper photographic identification, the collection officer will obtain a positive identification of the donor by an authorised supervisor or manager within the parent organisation.
k) If the donor’s identity cannot be established, the collection officer will not proceed with the collection and notify an authority.

l) The collection officer will ask the licence holder to provide voluntary written informed consent before the collection commences.

m) Only one donor is tested at a time.

n) The BAT explains the procedure and shows the donor the instructions on the back of the alcohol testing form.

o) The BAT completes Step 1 of the ATF and asks the donor to complete Step 2.

p) If the donor refuses to sign Step 2 this is a refusal to test and the BAT documents the refusal to test on the ATF, then notify the SACAA.

q) The alcohol test is initially performed with an ASD or EBT.

r) If the initial concentration is at or above 0.10 mg ethanol / 1000 mL exhaled breath, the test is repeated 15-30 minutes later using an EBT.

s) During the 15-20-minute interval, the BAT tells the donor to not eat, drink or belch, and to wait nearby within view of the BAT or another employer representative who will watch the donor to help ensure he or she complies.

t) Prior to the confirmation test the BAT must ensure that an air blank reading zero is displayed, demonstrating that no alcohol is present in the EBT.

u) The BAT should complete the confirmation test prior to collecting a urine specimen or conducting other tasks in which the donor cannot remain under direct observation of the BAT.

v) If circumstances delay confirmatory testing beyond 30 minutes, the BAT still performs a confirmation test and not another screening test and notes why the delay occurred.

w) The breath sample may be screened (preliminarily tested) for the presence of alcohol with an alcohol screening device (ASD).

x) If the screen results are negative no further analysis is necessary.

y) If the screen/preliminary test resulted to be non-negative for the possible presence of alcohol above a predefined cut-off level, a confirmation test to obtain the exact breath alcohol concentration must be carried out utilizing an evidentiary breath testing device (EBT).

z) Oral fluid preliminary testing may also be performed for preliminary testing purposes.

aa) If the screen results are negative no further analysis is necessary.

bb) The BAT shows the donor the result as displayed on the EBT and the EBT then prints the test result.

c) The BAT ensures that the results are affixed or directly printed on all three copies of the ATF, preferably in the designated space on the front of the ATF.

dd) Fixing of the result printout can take place either by:

- A label that is tamper evident
- Affixing the printout to the ATF with tamper evident tape.
- The BAT signs and dates Step 3 of the ATF
- The result is expressed on these copies as a number, rather than as positive or negative

If the confirmation test is at or above 0.10 mg ethanol / 1000 mL exhaled breath, the BAT asks the donor to sign Step 4 of the ATF.

- If the donor refuses to sign Step 4, the BAT makes a note of the refusal on the ATF (but this is not a refusal to test).
- The BAT then immediately sends/faxes the ATF to the SACAA.
• On a positive breath alcohol test
• The donor may ask for a blood alcohol test that should be performed by a recognized confirmatory analytical technique like HS-GC-FID.
• If the result is at or above 0.10 mg ethanol / 1000 mL exhaled breath, the BAT should instruct the donor to remain at the testing site until the employer arranges transportation for the donor.

Analytical procedure

a) An evidential breath test device (EBT) must be able to print the result on triple ply paper or on three labels after an analysis.

b) EBT devices to be utilized should be listed in the National Road Traffic Act, 1996 (Act No. 93 of 1996)

c) The manufacturer of each ASD or EBT should have a quality assurance plan (QAP) that describes the accuracy checks, 95% confidence intervals or tolerance ranges, maintenance requirements and quality control procedures according to ISO 17025 guide.

d) Each EBT’s QAP should include external calibration checks for accuracy.

e) An accuracy check is performed with known alcohol standards in a liquid solution or compressed dry gas.

f) These standards should originate from laboratories complying to ISO 17025 for calibration.

g) The EBT’s measured value when analysing the standards must be within the tolerance limits designated by the manufacturers QAP, which is typically ± 0.005mg / 1000ml exhaled air. The site should perform an accuracy check once a month and as soon as conveniently possible after every positive test.

h) If the EBT fails a check, it should be taken out of service according to the manufacturer’s QAP.

i) Every result of 0.01mg/ 1000ml or above obtained on the EBT since the last valid check will be declared invalid.

j) A logbook of calibration records needs to be kept with each device for a minimum of 2 years.

Table 3 Scheme of a breath alcohol analysis with integral scientific safeguard steps
The term “Shy-Lung” refers to a situation where the donor does not provide a sufficient amount of breath to permit a valid breath test.

The donor must be given a minimum of two attempts to provide an adequate sample. If the donor does not provide an adequate sample based on the EBT requirement, the BAT should:

- Repeat the procedure if the BAT believes there is a strong likelihood of success with additional attempts.
- Try to conduct the test in annual mode if the EBT has this capability.
- Consider using an oral fluid device if the donor fails after two attempts, and the BAT is also a qualified STT.
- Breath will still be required if confirmation testing is necessary.
- Records the circumstances on the ATF and immediately informs the SACAA.
- If the BAT believes the donor is purposefully not blowing adequately or forcefully into the breath testing device, then the BAT notes in Step 3, “Refusal to Test”.
- Alternatively, a blood alcohol test may be performed as confirmation, after an elevated screening result.
• The donor shall be sent for a Shy-Lung assessment to be conducted by a Specialist Physician or experienced MRO.

• The evaluating physician will communicate his/her determination directly to the SACAA.

• If the physician states that there was a valid medical condition for the insufficient amount of breath, the test is deemed invalid.

• If the physician identifies no valid medical reason, the donor is deemed to have refused testing.

• Alcohol test errors

• If a BAT or STT becomes aware of an event that will cause the test to be deemed invalid, he/she must try to correct the problem promptly, if practicable.

• This may require repeating the test, using a new ATF and, if needed, a new alcohol screening device or different EBT.

Some errors cannot be corrected; Some errors are potentially correctable by amending the ATF

• If a valid test cannot be performed, the BAT or STT cancels the test and immediately informs the SACAA.

• If the error is a fatal flaw, the test must be deemed invalid and the SACAA must be informed within 48 hours of the cancellation.

• An invalid test is neither positive nor negative and does not count toward any required random rate or number of follow-up tests.

• Reporting of Results

• All results are to be communicated to the donor and to the SACAA.

• The BAT should notify the SACAA within 48 hours of any test that had a fatal flaw.

If the alcohol testing result is confirmed to be at or above 0.1mg / 1000mL:

a) The licence holder shall be removed from all duties

b) The BAT should instruct the licence to remain at the testing site until transportation for the donor is arranged.

c) Blood specimen collection

d) The collecting officer must be a medical/health professional registered at the Health Provisions Council of South Africa (HPCSA) including a Medical doctor, phlebotomist, nursing sister etc

• The collector should have identification with his/her name and his/her employer’s name, address, and telephone number and be able to provide it upon request of the donor.

The following restrictions apply to collecting officers:

a) The immediate supervisor of an employee may not serve as the collector when that employee is tested, unless there is no feasible alternative.

b) A co-worker who is in the same testing pool or who works with an employee on a daily basis may not serve as a collector when that employee is tested, unless there is no feasible alternative.

c) An individual who has a personal relationship with the employee (e.g., spouse, exspouse, relative, close personal friend) may not serve as the collector, unless there is no feasible alternative.

The collection site must have the following:

a) All necessary personnel, supplies, equipment, facilities, and supervision to provide for specimen collection, security, and temporary storage.

b) A blood specimen collection site must provide for donor privacy while the blood is drawn.
c) A suitable clean clinically sterile surface for the collector to use as a work area must be available.

d) A bed for the donor to lie down.

For the collection of blood specimens for alcohol analysis:

a) Blood is collected from the cubital veins of the forearm

b) Needles should be clean and dry and not contaminated in any manner, including water (as per standard clinical practice)

c) The disinfectant used to clean the arm should not contain ethanol, isopropanol, or other volatile compounds

d) Sodium fluoride (1%) is effective as preservative.

e) Alcohol testing should be performed in whole blood.

f) Potassium oxalate or EDTA will suffice as an anticoagulant.

g) After properly labelling the two (2) tubes with all the required information, the specimen, a laboratory request form, and a chain-of-custody form should be sealed in an appropriate container.

h) The samples must be stored in a fridge as soon as possible (2-4°C) until collection by the courier

i) The collector must maintain line-of-sight custody or provide for the secure temporary storage of specimens from the time the specimen is collected until it is sealed in a shipping container prior to transfer to an express carrier or courier for shipment to a laboratory.

Suitable records must be made when the specimen is collected to prove that:

- The blood specimen collected and the sample received by the blood alcohol testing laboratory is one and the same.
- This is the first link in the chain of custody process which, when reconstructed at a later date, can be used to prove that the final result belongs to the specimen collected.
- The original copy accompanies the sample to the confirmatory laboratory and all persons involved in the transport and receiving of the sample should record their name and signature on the chain-of-custody form

One of three carbon copies of the chain-of-custody forms should be handed to each of the following:

a) The licence holder

b) The medical review officer (MRO)

c) Collection officer

d) The specimens and accompanying documents should be sent to the laboratory as soon as possible.

e) On receipt by the laboratory, specimens should be stored in a fridge by the laboratory and after analysis kept in a frozen or refrigerated state

f) Collection officers will arrange to dispatch the collected specimens to the drug-testing laboratory.

g) The specimens will be placed in containers designed to minimise the possibility of damage during shipment.

h) Transfer of the specimens to the courier from the collector, and in turn from the courier to the laboratory, should be documented on the chain of custody.

i) Laboratory Analysis of a Blood Specimen

j) If the screen results are negative no further analysis is necessary.

k) Preliminary blood alcohol testing may be performed by Immuno-assay and enzymatic assays
l) If the screen/preliminary tests are non-negative, a confirmation test to obtain the exact alcohol concentration must be carried out on another portion of the same blood sample.

m) A screening/preliminary test is not a required if the client prefers the blood sample to be subjected to the confirmatory analytical procedure directly.

n) The confirmatory test should not involve a repetition of the same analytical technology as was employed for the preliminary testing, but has to be performed by an Internationally recognized confirmatory technique (typically Head space- Gas Chromatography with Flame ionization detection, HS-GC-FID).

o) Positive results are only reported after laboratory confirmation and may require further interpretation.

NOTE: It is of prime importance to note that immunoassay and enzymatic assays are not regarded as confirmatory techniques for ethanol in blood but rather as preliminary testing techniques.

If the confirmatory breath alcohol test result is 0.10mg ethanol / 1000mL or higher in exhaled breath, the BAT then immediately sends/faxes the test result to the SACAA.

a) If a laboratory performs the analysis (e.g. blood testing), the result may be reported to the MRO or directly to the SACAA if the test results is higher than 0.02g ethanol /100mL blood.

b) If the MRO receives the result, he/she relays it to the SACAA without interpretation.

c) Challenges to results by the licence holder for re-testing must be made within 72 hours of reporting results to the MRÖ or SACAA.

d) The stored sample (Sample B) should be released for analysis to a drug-testing laboratory able to demonstrate that they can accurately determine the concentration of a drug or metabolite at 50% of the confirmation cut-off concentration employed.

e) The release must be supported by a chain of custody and requires authorisation from the customer and the donor.

f) Suitable records must be made during the analytical process to prove that the sample received by the laboratory and the sample, about which the final report is written, are one and the same.

All blood samples which prove positive above the cut-off concentration of 0.02g / 100mL and all records of the analytical process must be kept for:

- 1 year – Records of alcohol tests with a concentration of less than the company cut-off concentration and cancelled alcohol tests.
- 2 years – Documentation of the inspection, maintenance, and calibration of EBT’s
- 5 years – Alcohol test results for both blood and breath at or above the SACAA cut-off, and documentation of refusals and follow-up alcohol tests.
- If the customer requires an independent toxicological review, the laboratory must make available, if requested, the analytical data upon which it based its final report.
- Long-term frozen storage of samples will be at 0°C -4°C or below
- The laboratory will retain all samples confirmed positive in properly secured long-term cold storage for a minimum of 3 months.
- Within this three-month period the SACAA or licence holder may request the laboratory to retain the sample for an additional period of time.
- If no such request is received, the laboratory may discard the sample after the end of three months, except that the laboratory shall be required to maintain any samples known to be under legal challenge for a further agreed period.
Pharmacology

List of Acceptable Medication

1) This Chapter outlines the general principles for the use of medications in flying.

2) Any intake of medicine or narcotic substance must be declared in the formal declaration signed by aviation personnel and handed to physicians in charge of the evaluation of flying fitness at each medical examination. In principle, pilots taking medication either prescribed or obtained ‘over the counter’ have to be regarded as unfit unless a DAME /IAM / SACAA have been contacted and endorsed resumption of flying duties. The use of herbal medication and alternative treatment modalities requires particular attention to possible side effects and should also be reported to the DAME/IAM and the SACAA.

3) The decision as to whether an aviation personnel is medically fit for the privileges’ of the license they apply for whilst taking medication has always to be taken in conjunction with knowledge of the applicants clinical situation, the dosage and side effects associated with the medication. The consumption of such substances may have consequences on qualification for three reasons:
   a) the disease requiring treatment may be cause for disqualification;
   b) flight conditions may modify the reactions of the body to a treatment (e.g. jet lag, dehydration, moderate hypoxia)
   c) and most importantly, medication may cause adverse side effects that impair flight safety.

4) It should be noted that the effects of medication do not necessarily immediately appear when treatment is started or disappear when the treatment is stopped, and that the subject may be temporarily disqualified during the withdrawal period.

5) Flying personnel should nevertheless not be deprived of an efficient treatment because of their professional occupation. What is important is to find a compromise between flying fitness requirements, medical treatment and illness that is the most suitable both for the patient and flying safety.

6) Flying personnel must be declared fit by their DAME according to the circumstances and not by their medical practitioner. One of the goals of the DAME must be to make flying personnel aware of the problems caused by treatment so that they refrain from taking unreported medication whose side effects may not have been assessed.

7) It is possible that new therapeutic agents will become available that offer significant treatment advantages. If such agents are considered by the SACAA to be appropriate for use by aircrew, due consideration given to aero medical and safety aspects, their use may be approved. However, as a general rule, medication shall only be endorsed by the DAME, if the applicant has taken the respective medication whilst not on flying duty for an appropriate period of time (temporary disqualification) with proven efficacy and without any side effects that could interfere with flying duties.

Guidelines

a) The medical condition is the primary concern, and a clinical assessment of being unfit to exercise aviation related task will determine the period of unfitness.

b) The class of medical fitness determines which medical conditions will be allowable for the exercise of the aviation license, or how it may be waivered.

c) Knowledge of existing criteria and protocols as produced by SACAA is mandatory for proper interpretation of aviation medical fitness.

d) All drugs not published in the SA-CATS 67 need to be verified by SACAA before prescribing.
e) Central acting drugs generally are unacceptable and unsafe as medication for aviation personnel.

f) The side effect profile needs careful attention to determine acceptability.

g) The applicant’s co-morbidities may cause medical unfitness.

h) The applicant’s possible adverse reactions to the medication must be monitored before a decision regarding fitness may be made.

i) The period of being unfit after the use of unacceptable medications largely depends on the manner and time of elimination of the drug.

### Central Nervous System

Central nervous system stimulants: All pharmacological in this group is unacceptable. The disease condition per se does preclude aviation related activity.

<table>
<thead>
<tr>
<th>Name</th>
<th>Acceptable</th>
<th>Unacceptable</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzodiazepines</td>
<td>Tamazepam</td>
<td></td>
<td>No Flying within 72 h; this drug is addictive and should not be used with alcohol at the same time</td>
</tr>
<tr>
<td>Other</td>
<td>Zopiclone</td>
<td></td>
<td>Applicants must wait 24-48 hours after these medications have been taken before flying. These drugs must not be used more than twice a week to avoid habituation</td>
</tr>
<tr>
<td></td>
<td>Zolpidem</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zaleplon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Supplement</td>
<td>Melatonin (not generally recommended for flight crew and cabin crew)</td>
<td></td>
<td>If considered, it should be given a ‘ground trial’ during a period when the crew member will not be engaged in flying duties and any unwanted side effects can be assessed.</td>
</tr>
<tr>
<td>SSIR</td>
<td>Fluoxetine</td>
<td></td>
<td>Selected non-sedating selective serotonin reuptake inhibitors (SSIR) require a minimum of three (3) months grounding period. The CAA will evaluate affected applicants on a case-by case basis and will issue medical certificates based on medical findings, refer to the protocol</td>
</tr>
<tr>
<td></td>
<td>Sertraline</td>
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<tr>
<td></td>
<td>Citalopram,</td>
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<td></td>
<td>Escitalopram</td>
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<td></td>
<td>Paroxetine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication Type</td>
<td>Acceptable</td>
<td>Notes</td>
<td></td>
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<td>--------------------------</td>
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<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Barbiturates</td>
<td></td>
<td>These agents are unacceptable</td>
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<tr>
<td>Anxiolytics</td>
<td></td>
<td>These agents are unacceptable</td>
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<tr>
<td>Anti-psychotics</td>
<td></td>
<td>These agents are unacceptable</td>
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</tr>
<tr>
<td>Anti-epileptics</td>
<td></td>
<td>These agents are unacceptable to Pilots &amp; ATC. Including Gabapentin which is used for conditions other than epilepsy These medications may be considered for cabin crew, case-case presentation. A 3-month stabilisation period is required. Refer to protocol.</td>
<td></td>
</tr>
<tr>
<td>Anti-Parkinson agents</td>
<td></td>
<td>These agents are unacceptable</td>
<td></td>
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<tr>
<td>Anti-vertigo and anti-emetics</td>
<td></td>
<td>These agents are unacceptable</td>
<td></td>
</tr>
<tr>
<td>Anti-migraine agents</td>
<td>Triptans</td>
<td>Triptans Maxalt</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>The underlying condition is disqualifying. The Authority will evaluate affected applicants on a case – by case basis and will issue medical certificates based on the medical findings. Applicants allowed on these medications may not fly for 24 hours after being treated with these medications. Beta-blockers may be considered acceptable for prophylaxis. Refer to Protocol</td>
<td></td>
</tr>
<tr>
<td>Alzheimer's disease</td>
<td></td>
<td>These agents are unacceptable</td>
<td></td>
</tr>
</tbody>
</table>
| Anaesthetics             | Acceptable | A minimum of 24 hours following local or regional (including dental) anesthetics. (The condition for which the anesthetic has been administered must also be considered prior to returning an
A minimum of 72 hours following general, spinal or epidural anesthetic. This prescription includes drug-induced sedation. (The condition for which the anesthetic has been administered must also be considered prior to returning an individual to flying or controlling duties).

<table>
<thead>
<tr>
<th>ANALGESICS &amp; ANTI-INFLAMMATORIES</th>
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</thead>
<tbody>
<tr>
<td>Central Nervous System</td>
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<tr>
<td>Doxylamine</td>
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<td>Promethazine</td>
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<td>Meprobamate</td>
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<tr>
<td>Orphenadrine</td>
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<tr>
<td>Propoxyphene</td>
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<tr>
<td>Diphenhydramine</td>
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<tr>
<td>Tramadol</td>
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<tr>
<td>Acetyl Salicylic Acid</td>
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<tr>
<td>Non-Selective Cox-Inhibitors</td>
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<tr>
<td>Substance</td>
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<tr>
<td>Acetaminophen</td>
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<td>Salicylates</td>
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<td>Propionic acid derivatives</td>
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<tr>
<td>Acetic acid derivatives</td>
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<td>Enolic acid (Oxicam)</td>
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<td>Fenamic acid derivatives</td>
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<td>COX Inhibitors</td>
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<td>Selective COX2 inhibitors</td>
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<tr>
<td>Musculoskeletal Agents</td>
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<td>Condition</td>
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<td>Anti-Gout</td>
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<td>Topical agents</td>
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<td>Gold</td>
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<td>Osteoporosis</td>
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<td>Autocoids</td>
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<td>Antihistamines</td>
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<tr>
<td>Medications</td>
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<td>-------------------------------------------------</td>
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<tr>
<td>Acrivastine Fexofenadine</td>
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<tr>
<td>Serotonin antagonists</td>
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<td>Fexofenadine</td>
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<td>Neurokinin1 (NK1) Antagonists</td>
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<td>Neurokinin1 (NK1) Antagonists</td>
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<td>Neurokinin1 (NK1) Antagonists</td>
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<tr>
<td>Category</td>
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<td>--------------------------------</td>
</tr>
<tr>
<td>Beta-receptor blockers</td>
</tr>
<tr>
<td>Sympathetic nervous blockers</td>
</tr>
<tr>
<td>Direct-acting vasodilators</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
</tr>
<tr>
<td>ACE inhibitors</td>
</tr>
<tr>
<td>Angiotensin Receptor Antagonists</td>
</tr>
</tbody>
</table>
### Guide for Aviation Medical Examiners

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<table>
<thead>
<tr>
<th>Anti-Angina Agent</th>
<th>Telmisartan</th>
<th>Valsartan</th>
<th>Angina pectoris per se is disqualifying.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics</td>
<td>Hydrochlorothiazide (&lt; 25 mg/day)</td>
<td>Furosemide</td>
<td>Bumetanide</td>
</tr>
<tr>
<td></td>
<td>Potassium/ magnesium sparing diuretics such as amiloride and spironolactone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other vasodilators</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Vasoconstrictors</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hypolipidaemic Agents</td>
<td></td>
<td></td>
<td>Dyslipidaemia in flying personnel should be treated in conjunction with an appropriate diet and weight reduction if appropriate.</td>
</tr>
<tr>
<td>Fibrates</td>
<td></td>
<td></td>
<td>Treatment with fibric acids (e.g. fenofibrate or gemfibrozil) should be discontinued in the case of gastrointestinal side effects or elevated transaminase concentration</td>
</tr>
<tr>
<td>Cholestryamine</td>
<td><em>All except exclusions</em></td>
<td>Fluvastatin</td>
<td>Lovastatin</td>
</tr>
<tr>
<td>Statins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Acipimox (niacin derivative) used in low doses and accepted on a case-by-case basis.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th><strong>Plasma Expanders</strong></th>
<th>All agents in this group are unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood and Haemopoetic</strong></td>
<td>Anticoagulants-Warfarin- refer to the protocol- acceptable</td>
</tr>
<tr>
<td>Haematological agents</td>
<td>Haemostatics, the indications for use are disqualifying</td>
</tr>
<tr>
<td>Platelet aggregation inhibitors, Injectables</td>
<td>Disprin/Aspirin in low-dose (≤100mg/day) acceptable</td>
</tr>
<tr>
<td></td>
<td>All agents in this group are unacceptable</td>
</tr>
<tr>
<td></td>
<td>All agents in this group are unacceptable</td>
</tr>
<tr>
<td><strong>Sclerosing</strong></td>
<td>All agents in this group are unacceptable</td>
</tr>
<tr>
<td><strong>Haematinics</strong></td>
<td>Prophylactics in pregnancy are acceptable</td>
</tr>
<tr>
<td></td>
<td>Anaemia has to be corrected before consideration.</td>
</tr>
<tr>
<td>Haemoglobin-based Oxygen carrier</td>
<td>This medication is not considered</td>
</tr>
</tbody>
</table>

**Respiratory System**

<table>
<thead>
<tr>
<th><strong>Coughs and Cold</strong></th>
<th>Drugs containing only carbocysteine, guaifenesin or acetylcysteine without an alcohol base are accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tripolidine</td>
</tr>
<tr>
<td></td>
<td>Pseudoephedrine</td>
</tr>
<tr>
<td></td>
<td>Ephedrine</td>
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<tr>
<td></td>
<td>Codeine &amp; modifieds</td>
</tr>
<tr>
<td></td>
<td>Theophylline</td>
</tr>
<tr>
<td></td>
<td>Dextromethorphan</td>
</tr>
<tr>
<td></td>
<td>Diphenhydramine</td>
</tr>
<tr>
<td></td>
<td>Promethazine</td>
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<tr>
<td></td>
<td>Noscapine</td>
</tr>
<tr>
<td></td>
<td>Phenytoxolamine</td>
</tr>
<tr>
<td></td>
<td>Methadone</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Bronchodilators</strong></th>
<th>Spiriva</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sympathomimetics: The use of Short-acting Beta Agonists(SABA) /Long-acting Beta Agonists(LABA) should be restricted to eight(8) hours or</td>
</tr>
</tbody>
</table>
more prior to flying, but may be used in an unusual asthmatic attack in flight to allow the safe completion of the flight.

<table>
<thead>
<tr>
<th>Combustion agents and</th>
<th>All agents in this group are unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticholinergics</td>
<td>All agents in this group are unacceptable</td>
</tr>
<tr>
<td>Combinations</td>
<td>Only acceptable combinations are</td>
</tr>
<tr>
<td></td>
<td>Salmeterol</td>
</tr>
<tr>
<td></td>
<td>Fluticasone</td>
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<tr>
<td></td>
<td>Budesonide</td>
</tr>
<tr>
<td></td>
<td>Formoterol</td>
</tr>
<tr>
<td>Mucolytics</td>
<td>Carbocysteine</td>
</tr>
<tr>
<td></td>
<td>Acetylcysteine</td>
</tr>
<tr>
<td></td>
<td>Bromhexidine</td>
</tr>
<tr>
<td>Anti-Asthmatics</td>
<td>Inhaled Glucocorticoids</td>
</tr>
<tr>
<td></td>
<td>Leucotrine receptor</td>
</tr>
<tr>
<td>Chromones</td>
<td>Cromolyn Sodium</td>
</tr>
<tr>
<td></td>
<td>Nedocromil Sodium</td>
</tr>
<tr>
<td>Other Anti-asthmatics</td>
<td>All agents in this group are unacceptable</td>
</tr>
<tr>
<td>Surfactants</td>
<td>This medication is not compatible with flying.</td>
</tr>
</tbody>
</table>

The drugs are also called cromoglycates. They are alternative choices when initiating regular controller therapy in patients with mild asthma, although inhaled corticosteroids (ICS) are the preferred agents. They have the advantage of having a lower side effect profile than ICS.

Ear, Nose and Throat

Topical nasal | These medications are

<table>
<thead>
<tr>
<th>Medication</th>
<th>Compatibility with flying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbocysteine</td>
<td></td>
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<tr>
<td>Acetylcysteine</td>
<td></td>
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<tr>
<td>Bromhexidine</td>
<td></td>
</tr>
<tr>
<td>Cromolyn Sodium</td>
<td></td>
</tr>
<tr>
<td>Nedocromil Sodium</td>
<td></td>
</tr>
<tr>
<td>Preparations</td>
<td>Acceptable</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Ear drops and ointments</td>
<td>These medications are acceptable.</td>
</tr>
<tr>
<td>Mouth and Throat preparations</td>
<td>These medications are acceptable.</td>
</tr>
</tbody>
</table>

**Gastro-Intestinal tract**

<table>
<thead>
<tr>
<th>Digestants</th>
<th>These medications are acceptable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appetite suppressants</td>
<td>All agents in this group are unacceptable</td>
</tr>
</tbody>
</table>

**Anti-Spasmodics**

| Mebeverine | Alverine | Peppermint Oil | Hyoscine | Diphenhydramine | Alcohol substrates | Belladonna | Chlordiazepoxide | Propantheline | Methixene | Antimuscarinics (e.g. dicyclomine, mepenzolate, pipenzolate, poldine and propatheline) are used to reduce smooth muscle spasm in non-ulcerative dyspepsia, irritable bowel syndrome and diverticular disease. They all have atropine-like side-effects of confusion, dry mouth, reduced power of accommodation, difficulty with micturition and constipation, which preclude their use. |

**Acid Reducers**

<table>
<thead>
<tr>
<th>Antacids</th>
<th>Magnesium as a single drug is unacceptable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antacids and combinations</td>
<td>Dicyclomine</td>
</tr>
<tr>
<td>Magnesium dominant drugs</td>
<td>Oxethazaine(To confirm with Bernice)</td>
</tr>
</tbody>
</table>

**Bronchodilators**

<p>| Spiriva                                          | Sympathomimetic: The use of Short-acting Beta Agonists (SABA) /Long-acting Beta Agonists (LABA) should be restricted to eight (8) hours or more prior to flying, but may be used in an unusual asthmatic |</p>
<table>
<thead>
<tr>
<th>Category</th>
<th>Medicine / Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2 receptor antagonists</td>
<td>Cimetidine allowable if taken more than 8 hours before aviation activity.</td>
<td>Remind the patient about the need to take the medication before air travel.</td>
</tr>
<tr>
<td></td>
<td>Ranitidine allowable if taken more than 12 hours before aviation activity</td>
<td></td>
</tr>
<tr>
<td>Proton pump inhibitors</td>
<td>Omeprazole</td>
<td></td>
</tr>
<tr>
<td>Cycloprotective</td>
<td>Misoprostol</td>
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<tr>
<td>Motility Enhancers</td>
<td>All agents in this group are unacceptable</td>
<td></td>
</tr>
<tr>
<td>Laxatives</td>
<td>Magnesium Salts</td>
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</tr>
<tr>
<td>Antidiarrhoeals</td>
<td>Loperamide not to be taken less than 6 hours before aviation activity.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Codeine phosphate</td>
<td>[Cophenotrope]</td>
</tr>
<tr>
<td></td>
<td>Co phenotrope</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Morphine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Atropine (Lomotil)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aminopentamide</td>
<td></td>
</tr>
<tr>
<td>Liver, gall bladder and bile</td>
<td>These agents are unacceptable due to disease profile</td>
<td>Treatment for the dissolution of gallstones is not compatible with flying status as it may cause diarrhoea and cholecystitis.</td>
</tr>
<tr>
<td>Suppositories and anal...</td>
<td>These agents are acceptable</td>
<td>Soothing preparations containing bismuth subgallate, zinc oxide and haemamelis often mixed with a small dose of corticosteroid may be acceptable in short courses for topical application.</td>
</tr>
<tr>
<td>Others</td>
<td>Sulfasalazine enteric coated may be used with 6 monthly ophthalmology reporting, FBC, UKE, and</td>
<td>Sibutramine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Budesonide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Infliximab</td>
</tr>
</tbody>
</table>
### Anti-inflammatory agents for Bowel Disease

<table>
<thead>
<tr>
<th>Urinalysis</th>
<th>Orlistat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesalazine</td>
<td>Humira</td>
</tr>
<tr>
<td>Asacol: 5-aminosalicylic acid</td>
<td>Salofalk</td>
</tr>
</tbody>
</table>

**Case-by-case presentation, individual medication may be considered**

Sulfasalazine enteric coated may be used with 6 monthly ophthalmology reporting, FBC, UKE, and urinalysis.

The use of sulfasalazine in inflammatory bowel disease has declined due mainly to the fact that it yields the metabolite sulfapyridine which gives rise to side-effects such as agranulocytosis and hypospermia. However, the other metabolite of sulfasalazine, 5-aminosalicylic acid (5-ASA) is credited with causing the drug’s therapeutic effect. Therefore, 5-ASA and other derivatives of 5-ASA, are now usually preferred and given alone (as mesalazine), despite their increased cost, due to their more favourable side-effect profile.

Sulfasalazine, and its metabolite 5-ASA, are poorly absorbed from the small intestine. Its main mode of action is therefore believed to be inside the intestine. Approximately one third of a dose of sulfasalazine is absorbed from the small intestine. The remaining two thirds pass into the colon where it is split by bacteria into 5-ASA and SP. SP is well absorbed from the colon (estimated bioavailability 60%); 5-ASA is less well absorbed (estimated bioavailability 10% to 30%).
<table>
<thead>
<tr>
<th>Category</th>
<th>Medications</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antihelmintics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mebendazole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albendazole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Praziquantel</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dermatological</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-bacterial antiseptic agents</td>
<td>These medications are acceptable.</td>
<td></td>
</tr>
<tr>
<td>Anti-parasitics</td>
<td>These medications are acceptable.</td>
<td></td>
</tr>
<tr>
<td>Fungicides</td>
<td>These medications are acceptable.</td>
<td></td>
</tr>
<tr>
<td>Cortico-steroids</td>
<td>These medications are acceptable.</td>
<td></td>
</tr>
<tr>
<td>Psoriasis</td>
<td>Systemic Etretinate, Actretin</td>
<td>Systemic etretinate for psoriasis may cause serious drying of the skin and mucosa and particularly of the conjunctival tissues, intensified by flying conditions. It is not recommended for aircrew.</td>
</tr>
<tr>
<td>Acne</td>
<td>Tretinoin, Isotretinoin, Cyproterone acetate, Minocycline</td>
<td></td>
</tr>
<tr>
<td>Melanin inhibitors and stimulants</td>
<td>These medications are unacceptable</td>
<td></td>
</tr>
<tr>
<td>Emollients and Protectives</td>
<td>These medications are acceptable</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Imiquimod, Minoxidil</td>
<td></td>
</tr>
<tr>
<td><strong>OPHTHALMICS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aviation activities only to commence once all visual normality is regained</td>
</tr>
<tr>
<td>Anti-infective and antiviral</td>
<td>Chloramphenicol</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Corticoids</td>
<td>These medications are acceptable</td>
<td></td>
</tr>
<tr>
<td>Combinations</td>
<td>All treatment containing Aminoglycosides are unacceptable</td>
<td></td>
</tr>
<tr>
<td>Decongestants</td>
<td>These medications are unacceptable.</td>
<td></td>
</tr>
<tr>
<td>Mydriatics</td>
<td>These agents are unacceptable</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Injectable</td>
<td>Verteportin</td>
</tr>
<tr>
<td>Urinary System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-diuretics</td>
<td>This medication is not compatible with flying</td>
<td></td>
</tr>
<tr>
<td>Urinary alkalinizes</td>
<td>The chronic use of this medication is not compatible with flying</td>
<td></td>
</tr>
<tr>
<td>Urinary antiseptics</td>
<td>Pipemidic Acid</td>
<td>Nalidixic Acid</td>
</tr>
<tr>
<td>Others</td>
<td>Tamsulosin</td>
<td>Lanthanum</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------</td>
<td>-----------</td>
</tr>
</tbody>
</table>

**Genital System**

<table>
<thead>
<tr>
<th>Contraceptives</th>
<th>These medications are acceptable</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal Preparations</td>
<td>These medications are acceptable</td>
<td></td>
</tr>
<tr>
<td>Oxytocics</td>
<td>These agents are unacceptable</td>
<td></td>
</tr>
<tr>
<td>Uterine Antispasmodics</td>
<td>These agents are unacceptable</td>
<td></td>
</tr>
<tr>
<td>Sexual dysfunction</td>
<td></td>
<td>Temporary colour vision disturbance have been reported after the use of phosphodiesterase-type-5 inhibitors (e.g. vardenafil, sildenafil). 72 hours should elapse after use prior to flying.</td>
</tr>
</tbody>
</table>

**Anti-Viral Agents**

<table>
<thead>
<tr>
<th>Anti-Viral Agents</th>
<th>Acyclovir</th>
<th>Anti-Retroviral-case-by-case management, refer to protocol</th>
</tr>
</thead>
</table>
## Anti-Microbials

| Anti-Microbials | Beta-lactams, Erythromycin (short course) Azithromycin (short course) Other Macrolides, Chloramphenicols Sulphonamides and combinations Quinolones Clindamycin (short course) Na-Fusidate Fosfomycin Doxycyclin | Telithromycin Roxithromycin Aminoglycosides Tetracycline | All antibiotics should be used for 48 hours without any side effects before commencing aviation activities. Injectables are not acceptable. |

## Anti-Fungal Agents

| Anti-Fungal Agents | Fluconazole Itraconazole Nystatin Terbinafine Griseofulvin Ketoconazole |

## Anti-Protozoa Agents

| Anti-Protozoa Agents | Metronidazole Atovaquone Chloroquine Pirimethamine Tinidazole Halofantrine Mefloquine |

## Anti-retroviral agents

<p>| Nucleoside Reverse | Zidovudine | Efavirenz | Initially - monthly |</p>
<table>
<thead>
<tr>
<th>Transcriptase Inhibitors (NRTI's)</th>
<th>Retrovir</th>
<th>Lamivudine</th>
<th>Didanosine</th>
<th>Abacavir</th>
<th>Emtricitabine</th>
<th>Tenofovir</th>
<th>FBC for 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Nucleoside Reverse Transcriptase Inhibitors</td>
<td>Nevirapine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Initially- ALT &amp; AST – 2 weeks, 6 weeks</td>
</tr>
<tr>
<td>Proteases Inhibitors (PI)</td>
<td>Atazanavir</td>
<td>Lopinavir/Ritonavir</td>
<td>Saquinavir</td>
<td>Nelfinavir</td>
<td></td>
<td></td>
<td>Indinavir (check)</td>
</tr>
<tr>
<td>Others</td>
<td>Raltegravir</td>
<td>Darunavir</td>
<td>Etravirine</td>
<td>Maraviroc</td>
<td>Amprenvir</td>
<td></td>
<td>Tipranavir</td>
</tr>
<tr>
<td>Fusion Inhibitors</td>
<td>Fosamprenavir</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrine System</td>
<td>Fuzeon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-Diabetic agents</td>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metformin</td>
<td>Thiazolidenediones</td>
<td>Pioglitza</td>
<td>Rosiglitazone</td>
<td>Acarbose:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glargine</td>
<td>Detemir</td>
<td>Glulisine</td>
<td>Lispro</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glipizide</td>
<td>Tolbutamide</td>
<td>Gliclazide</td>
<td>Glibenclamide</td>
<td>Glimepiride</td>
<td>Chlorpropamide</td>
<td></td>
<td>Refer to Diabetic Protocol</td>
</tr>
<tr>
<td>Thyroid</td>
<td>Thyroxine</td>
<td>Repaglinide Nateglinide</td>
<td>Neo-Mercazolne</td>
<td>Refer to Protocol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>-------------------------</td>
<td>---------------</td>
<td>------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parathyroid</td>
<td>Corticosteroids, only low dose Prednisone is acceptable</td>
<td>Calcitonin,</td>
<td></td>
<td>Refer to Protocol</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hormones

<table>
<thead>
<tr>
<th>Androgens and Anabolic steroids</th>
<th>Testosterone</th>
<th>Metenolone</th>
<th>Mesterolone</th>
<th>Nandrolone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mesterolone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oestrogens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Progestogens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tibolone</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tropic Hormones</th>
<th>Clomiphene</th>
<th>Injectables and implants</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Hormone Inhibitors</th>
<th>Tamoxifen</th>
<th>Anastrazole</th>
<th>Case-by-case basis and 3 months stabilisation period required.</th>
</tr>
</thead>
</table>

### Vitamins, Tonics, Minerals and Electrolytes

<table>
<thead>
<tr>
<th>Vitamins</th>
<th>These agents are acceptable.</th>
<th>In general, pilots, cabin crew, and ATCs should not exceed the Recommended Daily Allowances for these products.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonics</td>
<td>Alcohol based combinations unacceptable</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minerals and electrolytes</th>
<th>These agents are acceptable</th>
<th>In general, pilots, cabin crew, and ATCs should not exceed the Recommended Daily Allowances for these products</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Amino-Acids</th>
<th>These agents are acceptable</th>
<th>In general, pilots, cabin crew, and ATCs should not exceed the Recommended Daily Allowances for these products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cytostatics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunological</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunosuppressant's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunostimulants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chelating agents, Ion exchange Preparations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>These agents are unacceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunisation regimens are acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No aviation-related duties for 24 hours after receiving the following vaccinations (primary and boosters):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult diphtheria and tetanus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poliomyelitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A &amp; B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, mumps, rubella</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typhoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuberculosis (Mantoux Test or Bacille Calmette-Guerin);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influenza</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholera.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After receiving the following immunisations (primary and boosters):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
there should be no aviation-related duties for a minimum of 72 hours: Japanese Encephalitis.

<table>
<thead>
<tr>
<th>Biologics</th>
<th>Revellex</th>
<th>Humira</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Enzymes</th>
<th>These agents are unacceptable</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Poison Antidotes</th>
<th>Bupropion is unacceptable</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Others</th>
<th>Nicotine adjuvants are acceptable</th>
<th>Bupropion is unacceptable</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Biological</th>
<th>Immunisation regimens are acceptable</th>
<th>No aviation-related duties for 24 hours after receiving the following vaccinations (primary and boosters): Adult diphtheria and tetanus Poliomyelitis Hepatitis A &amp; B Measles, mumps, rubella Yellow fever Typhoid Tuberculosis</th>
</tr>
</thead>
</table>


(Mantoux Test or Bacille Calmette-Guerin);
Influenza
Varicella
Meningococcal
Pneumococcal
Cholera.

After receiving the following immunisations (primary and boosters) there should be no aviation-related duties for a minimum of 72 hours: Japanese Encephalitis.
16.21.19 Charts and Forms

Fig. 1  Structure and relationships in Civil Aviation Medicine in South Africa  9
Fig. 2  Medical examiner requirements  14
Fig. 3  Certification process of medical examinations  21
Fig. 4  Summary of medical examination requirements  2

16.21.20 Examination and Documentation Procedure

D. GENERAL INFORMATION

The aviation medical examiner may be the only physician an applicant will consult for the issuance of a medical certificate. The aviation medical examination differs from other medical examination procedures in that the examiner has to detect problems that may lead to sudden or subtle incapacitation in the near future. It is therefore essential for the examiner to form an accurate impression of the applicant by discussing various health issues with the applicant and by performing a thorough examination.

<table>
<thead>
<tr>
<th>Enzymes</th>
<th>These agents are unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poison Antidotes</td>
<td>These agents are unacceptable</td>
</tr>
<tr>
<td>Others</td>
<td>Nicotine adjuvants are acceptable</td>
</tr>
</tbody>
</table>

Since applicants are at risk of losing their medical certificate, and in some cases their employment, their medical examination is a source of stress to them, leading to apprehensiveness and the “white-coat-syndrome”. Examiners must reassure the applicant and create an environment of good will that is conducive for discussion of the applicant's health.

It is required by legislation to request the applicant's identity document, previous medical certificate and aviation licence for confirmation. Equally important is to note any indication of possible alcohol abuse, substance abuse and mental or psychological problems that may impact adversely on aviation safety.
E. INSTRUCTIONS FOR COMPLETION OF THE NEW MEDICAL EXAMINATION FORM

F. HISTORY

The history section on the examination form has to be completed by the applicant in the presence of the medical examiner. Alternatively the medical examiner has to verify the information with the applicant prior to performing the physical examination. The examiner must ask direct questions and must make use of this opportunity to provide advice to the applicant.

Remarks such as "previously documented" or "refer to previous records", will not be accepted. The document will be considered as incomplete. Incomplete forms will not be accepted and will be sent back to the medical examiner.

The information on the following 2 pages should be considered carefully when completing the history section:

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 17</td>
<td>Self-explanatory</td>
</tr>
<tr>
<td>15</td>
<td>Only class i.e. class 1 or 2 or 3 or 4 (do not specify ATP, Comm etc.)</td>
</tr>
</tbody>
</table>
| 18       | Provide details of previous restrictions/ protocols  
|          | Include date of implementation |
| 17       | Hours must be provided by pilot |
| 18       | This refers to the ultimate intention and not short-term goal  
|          | State present licence type i.e. ATP, Comm etc |
| 19       | Applicant must present previous medical certificate to DAME to confirm |
| 17       | All types of medication must be noted, whether it is prescription medication, OTC drugs, herbs, vitamins etc. |
| 22 (1-5) | When recording family history, details of the family member, age and details of disease should be supplied |
| 22 (6-9) | These questions should be answered to determine latent medical problems that may have an effect on medical fitness |
| 22 (10)  | The following should be noted:  
|          | Number and type of cigarettes smoked daily  
|          | Number of years that has elapsed since applicant started smoking  
|          | If the applicant has stopped smoking, number of years since cessation should be noted |
| 22 (11+19) | Dates, frequency and type of drugs should be noted  
<p>|          | If applicant is still using drugs recreationally, he/she must be found temporary unfit and be referred |
| 22 (12-42) | A detailed explanation must be provided with all affirmative questions |</p>
<table>
<thead>
<tr>
<th>22 (20)</th>
<th>The following should be noted:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Number and type of alcohol used on a weekly basis</td>
</tr>
<tr>
<td></td>
<td>• Number of years that has elapsed since applicant started using alcohol</td>
</tr>
<tr>
<td></td>
<td>• If the applicant has been abusing alcohol, number of years since abuse has stopped should be</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>22 (43)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Make use of the opportunity to provide education to the applicant related to the disease and the possible effects it might have on aviation safety</td>
</tr>
<tr>
<td></td>
<td>• Hand the applicant the document related to encouraging voluntary testing and disclosure as well as a copy of the present HIV protocol</td>
</tr>
<tr>
<td></td>
<td>• Provide counselling or refer for counselling and testing if so requested by the applicant.</td>
</tr>
<tr>
<td></td>
<td>• <strong>At this point in time, the applicant is not legally bound to disclose a positive HIV status.</strong></td>
</tr>
<tr>
<td></td>
<td>• However, it is important to remind the applicant that he/she may not fly while aware of any condition that might impact on aviation safety.</td>
</tr>
</tbody>
</table>

| 22 (44-46) | These questions should be answered to determine latent medical problems or forgotten facts that may have an effect on medical fitness |

<table>
<thead>
<tr>
<th>23 + 24</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Any affirmative answer must be documented fully by the aviation medical examiner in the space provided.</td>
</tr>
<tr>
<td></td>
<td>• If there is insufficient space, the examiner must attach a separate sheet to the examination form.</td>
</tr>
</tbody>
</table>

<table>
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<th>25 and 26</th>
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<tr>
<td></td>
<td>• The DAME must bring the contents of these 2 paragraphs to the attention of the applicant.</td>
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<td>• The applicant should be aware that it is an offence to knowingly make a false declaration.</td>
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<td></td>
<td>• The declaration made by the applicant is a legal declaration that the applicant has supplied complete and accurate information.</td>
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<td>• It also releases information to the Director of Civil Aviation for Civil Aviation</td>
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<th>27 - 29</th>
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<td></td>
<td>• The applicant must read, date and sign the declaration and the signature must be witnessed.</td>
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<td>• The DAME must sign as witness.</td>
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**G. PHYSICAL EXAMINATION**

A comprehensive physical examination must be performed. Any finding on the physical examination must be documented fully by the aviation medical examiner in the space provided. If there is insufficient space, the examiner must attach a separate sheet to the examination form.

Remarks such as "previously documented" or "refer to previous records", will not be accepted. The document will be considered as incomplete. Incomplete forms will be sent back to the medical examiner.

Should the examiner decide that more tests are indicated, he/she should obtain informed consent and perform the test or refer the applicant for further evaluation. The details must be provided on the form in the space provided.

The information on the following 2 pages should be carefully considered when completing the examination section:
<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
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<tr>
<td>31</td>
<td>• BMI is calculated by dividing the weight of the applicant by the square of the height of the applicant&lt;br&gt;• Underweight – less than 18,5&lt;br&gt;• Normal – 18,5 to 25&lt;br&gt;• Overweight – 25 to 30</td>
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<tr>
<td>33</td>
<td>Pulse rate and rhythm must be noted</td>
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<td>45</td>
<td>• The gynaecological examination and the rectal examination may be performed by the applicant's gynaecologist, urologist or general practitioner.&lt;br&gt;• Should this be the case, it should be remarked as such on the examination form.&lt;br&gt;• The applicant should be made aware of the importance of these examinations.</td>
</tr>
<tr>
<td>46</td>
<td>• It is essential not to rush the examination and to engage the applicant in discussions to enable the examiner to evaluate the applicant psychologically.&lt;br&gt;• The medical examiner should inspire confidence in the applicant, create a trusting and friendly environment and should get to know the applicant well to enable him/her to identify possible problems or changes in behaviour during future examinations.</td>
</tr>
<tr>
<td>63</td>
<td>If applicant has been referred for further evaluation, the name of the person as well as the reasons for the referral should be provided.</td>
</tr>
<tr>
<td>64-66</td>
<td>• Distance and near vision for each eye separately as well as for binocular vision must be determined.&lt;br&gt;• Criteria for intermediate vision has not yet been determined, but may be required in future</td>
</tr>
<tr>
<td>67</td>
<td>• Details of colour vision determination must be provided.&lt;br&gt;• If a Lantern test has been performed on the applicant, the date and result of the test must be provided as well</td>
</tr>
<tr>
<td>70</td>
<td>• CVD risk factor assessment must be completed&lt;br&gt;• The result of this assessment may be used in future to determine the necessity for a stress-ECG&lt;br&gt;• Medical examiners must make use of this assessment to educate the applicant about a healthy life style</td>
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<tr>
<td>71-75</td>
<td>All 4 columns must be completed even if test is marked as not applicable for this specific examination date.</td>
</tr>
<tr>
<td>76</td>
<td>• Any finding must be documented fully by the aviation medical examiner in the space provided.&lt;br&gt;• If there is insufficient space, the examiner must attach a separate sheet to the examination form</td>
</tr>
<tr>
<td>77</td>
<td>• In this section the medical examiner must document his/her findings and decisions.&lt;br&gt;• It also serves as a summary of the aviation medical examination</td>
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</table>
The declaration made by the medical examiner is a legal declaration that the examiner
◆ Has personally reviewed the history
◆ Has personally examined the applicant
◆ Has supplied complete and accurate information.

The medical examiner must supply all the details as requested in this section as this is a legal document; incomplete documents will not be accepted.

This section **should not be completed by the medical examiners.** This is for official use by the designated institution only.

### H. OPERATIONAL RESTRICTIONS AND MEDICAL REQUIREMENTS

I. Examination form
   a) The medical examiner must indicate all operational restrictions and medical requirements in detail on the examination form.

II. Medical certificate
   a) Operational restrictions should be documented clearly on the medical certificate according to the table below.
   b) In order to maintain confidentiality of information, the medical examiner may not provide details of any medical condition, requirement or protocol on the medical certificate.
   c) If medical reports are required for future examinations, the following restriction must be documented:
   d) "Medical reports to be submitted with next medical examination"
   e) If the medical examiner has found the applicant to be temporary unfit, the following restriction must be documented:
   f) "Medical reports to be submitted before medical certificate can be issued"

III. Examination reminder
   a) The medical examiner must issue the applicant with a separate document detailing the tests required for the next aviation medical examination.
   b) This will be the property of the applicant and need not be presented to anyone unless the applicant chooses to do so.
   c) This document will serve as a reminder to the applicant or as an information sheet to a different aviation medical examiner, should the specific medical examiner be unavailable.

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<th>Operational restrictions</th>
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I. PRACTICAL FLIGHT TESTS

In some cases, it will be necessary to perform a practical medical flight test with an applicant to determine medical fitness and ability to control the aircraft e.g. pilots with monocular vision, disabled pilots, etc. In these cases, the medical examiner must refer the case to the CAA medical department of the CAA to arrange for a practical flight test with a CAA flight inspector.

Borderline medical conditions should first be referred to a specialist for a thorough investigation as outlined in the following chapters of this manual. This should include an evaluation of whether or not the condition is progressive, to what extent functions is impaired, and whether there is any risk of future deterioration or sudden incapacitation.

If the applicant fails to meet the medical requirements but the condition, in the examiner's opinion, does not affect the regular and safe performance of duties, the CAA might wish additionally to assess any skill and experience demonstrated during practical flight tests, in order to make certain that the applicant is capable of performing duties without endangering flight safety.

A practical flight test is usually most appropriate for assessing static physical conditions, and not for those with normal physical function but who have an increased risk of rapid incapacitation. It is likely to be undertaken mainly for private pilots, for whom the medical standards are less rigorous and where modification to aircraft controls may be feasible, although professional pilots may also require practical testing for certain conditions. Special medical flight testing, appropriate to the applicant's deficiencies, is conducted to help the CAA to estimate the applicant's ability to perform under normal as well as adverse flight conditions.

Therefore, testing of the applicant could include marginal or simulated marginal conditions such as might be encountered in emergency operations, in adverse weather, in twilight or at night, in haze or cloudiness, and in flight towards the sun as appropriate to the condition being assessed. The flight test report should comment on the conditions...
under which tests were given. Reasonable simultaneous tasks should be introduced during medical flight testing (such as map reading and navigation, operation of flight equipment, maintenance of communications, and even equipment or engine malfunction) to estimate the applicant's ability to perform more than one task simultaneously. Specifications for such special medical flight tests provide guidelines to help in determining the applicant's abilities and limitations.

The CAA medical department is currently in consultation with the relevant stakeholders to review the practical flight test for the following conditions, however; in the meantime below is a guideline from ICAO:

i. **Deforbmity or absence of extremities**

   a) An applicant might be assessed as fit if able to demonstrate: ability to reach readily and operate effectively all controls that would normally require use of the deficient extremity (or extremities), noting any unusual body position required to compensate for the deficiency;

   b) ability to perform satisfactorily emergency procedures in flight, such as recovery from stalls and power-off control, as well as on the ground, including evacuation of the aircraft.

ii. **Defective hearing**

Defects in hearing need not normally necessitate tests under actual flight conditions since all pertinent factors may be simulated. Whether conducted on the ground or in flight conditions, the main considerations to be assessed in such cases are:

   a) ability to hear radio voice and signal communications;

   b) ability to understand ordinary conversational voice on the ground, in the cockpit with engine on and engine off. (The examiner should guard against the applicant lip-reading.)

iii. **Speech defects — stammering, stuttering**

An applicant might be assessed as fit, if able to demonstrate ability to converse and be clearly understood in direct conversation and over the radio.

END