

2.2.1 Introduction

This section details the requirements for cardiological assessment of an aircrew member or air traffic controller and provides guidance on the aeromedical disposition of pilots and cardiovascular disease.

The aim of the examination is to ensure that the applicant does not suffer from any cardiovascular condition which carries an increased risk of incapacitation or which produces a decrement of physiological functional reserve that may jeopardise operational safety.

The DAME should recognise that an individual with an unrestricted Medical Certificate must be capable of performing all of the activities that are possible under the licence held.

These activities could include:

- Aerobatics, with the possibility of high G forces being encountered
- Operations in extremes of temperature for long periods
- Operations at altitudes where the partial pressure of atmospheric oxygen is decreased to two-thirds that which exists at sea level.

2.2.2 The Cardiovascular Standard – CASR Part 67

[CASR 67](#) The cardiovascular standards are found in the following paragraphs of [CASR Part 67](#):

CASR 67.150	For medical standard 1	CASR 67.150(7) Table 67.150 1.9 – 1.11
CASR 67.155	For medical standard 2	CASR 67.155(7) Table 67.155 2.9 – 2.11
CASR 67.160	For medical standard 3	CASR 67.160(7) Table 67.160 3.9 – 3.11

2.2.3 Assessment

The DAME should note relevant risk factors for ischaemic heart disease in assessing an individual's cardiovascular system. The risk factors to be considered are:

- Age
- Total cholesterol (fasting estimation)
- The total cholesterol to HDL cholesterol ratio (fasting estimation)
- Blood glucose (fasting estimation)
- Cigarette smoking
- Systolic blood pressure
- Hypertension
- Diabetes Mellitus
- Obesity
- Lack of regular exercise
- Positive family history of cardiovascular disease.

Obesity—while not a strong independent risk factor for ischaemic heart disease—when present, should be a trigger for more intensive evaluation of risk factors.

An applicant with multiple coronary artery disease risk factors should be considered for more detailed examination such as stress ECG.

Mandatory Cardiovascular Risk Factor Profiling

This is required for all Class 1 applicants in the years when fasting lipids are required.

Risk factor profiling is also required for all diabetic applicants of all classes of certificate at initial assessment after a diagnosis of diabetes has been made and at 5-yearly intervals subsequently.

Reference should be made to the CHD Risk Factor Prediction Chart at:
<http://casa.gov.au/manuals/regulate/dame/riskchrt.pdf>.



A score should be calculated for the applicant with regard to age, lipid profile, systolic blood pressure, smoking, diabetes and LVH on ECG. At a score of 15 points, the 10-year probability of cardiac events approaches 1% per annum, which is the risk considered acceptable for professional aviators in a multi-crew environment. When the coronary risk score is 15 or above, applicants are required to have stress testing. It is a requirement for points-based stress tests, that the test is read and interpreted by a cardiologist. In situations where it is not feasible to have a cardiologist perform the stress test (eg, geographical access) then the test may be performed by a physician experienced in the performance of stress tests.

The requirements for mandatory 12-lead resting ECGs are detailed in section [1.4.1 Electrocardiographs](#) in [1. Administrative Aspects](#).

2.2.4 General Principles

The following conditions are statistically associated with reduced functional capacity in cardiac reserve or with unpredictable risk of sudden incapacitation. Applicants with such conditions should therefore be assessed as medically unfit for certification. In individual cases, after thorough assessment, some may be granted Medical Certification.

- Uncontrolled systemic or pulmonary hypertension
- Any structural and/or physiological defect of the heart or circulation which results in regional circulatory ischaemia of a critical circulatory bed, or in ventricular hypertrophy or ventricular dilatation
- Any structural or physiological defect of the heart which results in electrical instability, either dysrhythmia or conduction defects
- A diagnosis of haemodynamically significant aortic stenosis
- Any structural or physiological defect of the heart or lungs which results in veno-arterial shunting and desaturation of arterial blood
- Any structural or physiological defect (and/or its consequences) that require the use of cardiotoxic or vasoactive agents for compensation of cardiac reserve and for control.

2.2.5 Hypertension

Uncontrolled hypertension is disqualifying. A systolic pressure of 150 mm Hg and/or diastolic pressure of 90 mm Hg are the upper limits acceptable, but the applicant's age and sex should also be considered. If either or both the systolic and diastolic pressure repeatedly exceed(s) these limits, the applicant's blood pressure is not acceptable, even if on treatment. (These values accord with recommendations of the National Heart Foundation of Australia). Investigations by 24-hour ambulant blood pressure monitoring may assist diagnosis of borderline cases.

Controlled (adequately treated) hypertension is allowable at all levels of licence provided that there is:

- No significant end organ damage
- Satisfactory ECG
- No adverse drug side effects.

Acceptable Medication

Most modern antihypertensive agents are acceptable for control of hypertension in aircrew, provided the applicant is established on the medication and has exhibited no adverse side effects from the drug(s).

The applicant must not pilot any aircraft or actively control air traffic following the commencement of antihypertensive therapy or of a changed treatment regimen until such time as there are no significant side effects from medication and, in any event, not within one week of the commencement of therapy or change in medication. Preferred drugs include diuretics, ACE inhibitors, calcium channel blockers, prazosin, angiotensin II antagonists and beta-blockers. Particular care should be taken with use of antihypertensive medications by aerobatic pilots, because of the reduction in G-tolerance produced by these agents.

2.2.6 Ischaemic Heart Disease

Technical Specifications of Investigative Procedures Required in these Protocols

Stress Electrocardiogram

1. Bruce protocol with a 12-lead ECG, with monitoring for at least five (5) minutes after cessation of exercise.
2. Applicant to reach at least 100% of predicted heart rate and at least nine minutes on the Bruce protocol or equivalent on the bicycle ergometer (maximum predicted heart rate = 220 beats per minute minus applicant's age in years for men, 200 beats per minute minus applicant's age in years for women).
3. Treadmill exercise is preferred but bicycle exercise is acceptable if the applicant is unable to perform on the treadmill.
4. Applicant should have been continuously in the time zone where testing is performed for at least 72 hours prior to the test.
5. Applicants should normally cease taking any beta-blocker 48 hours prior to the stress test, unless the medication is used to treat known ischaemic heart disease or a significant arrhythmia.

When a beta-blocker is not so ceased prior to stress testing an applicant, an explanation of the reason is required from the treating or investigating cardiologist who supervises the stress test.

6. All reports of stress tests should include the following details:
 - o duration of exercise (with comment if less than nine minutes);
 - o level of perceived exhaustion of the applicant; and
 - o any symptoms experienced by the applicant.
7. A positive stress electrocardiogram is defined by 1.0 mm or more of horizontal or down sloping ST segment depression at 0.08 sec after the J point.
8. A positive stress ECG is of adequate diagnostic validity if recorded when an applicant's exercise capacity, heart rate and blood pressure responses reach at least 85% of predicted for age, sex, height and weight, and where the ST segment shift is consistent with ischaemia.

Note: A rise of more than 20 mm in systolic blood pressure response is expected. If the applicant returns a positive stress ECG with ST changes before reaching 100% of designated criteria, it is a matter of even greater aeromedical concern. Exercise electrocardiograms are a screening test for the presence of Ischaemic Heart Disease (IHD) but do not provide conclusive evidence of the presence of IHD. Applicants need not refrain from exercising privileges simply because they are required to undertake a stress ECG.



9. If an applicant is unable to reach nine minutes or equivalent on stress ECG then a gated heart pool scan and cardiologist's opinion may be acceptable alternatives. In these circumstances, the reason for ceasing the test must be stated.
10. In appropriate circumstances (eg severe arthritis), pharmacological stress testing may be substituted. This should be discussed with CASA Aviation Medicine Section before it is undertaken.
11. The physician supervising the investigation should report exercise ECGs. Computer reporting of exercise ECGs is not acceptable to CASA. In addition, CASA expects that when a stress test is required for clinical reasons, the cardiologist or physician responsible for the test will clinically evaluate that applicant.
12. Where an applicant has undergone recurrent false positive stress ECGs with ischaemia ruled out by means of a stress nucleotide scan, future stress ECGs may be accepted as normal provided there is no significant change to the ECG findings from year-to-year and the level of exercise in METS remains satisfactory.

Stress Echocardiogram

1. To be performed by an experienced laboratory, using standard recognised protocol, because of possible difficulty with interpretation.
2. Aim should be to achieve 100% of predicted heart rate, as for stress electrocardiogram, without developing any symptoms or signs of myocardial ischaemia.
3. For applicants undergoing pharmacological stress echocardiography using sympathomimetic stressors, atropine may be administered following the maximal dose of dobutamine.
4. A positive stress echocardiogram is defined by severe or extensive new wall motion abnormalities, horizontal or down sloping ST segment depression $> 1\text{mV}$ at 0.08 seconds after the J point compared with baseline; new ST segment elevation $>0.1\text{mV}$ in applicants without a previous myocardial infarction, or significant tachyarrhythmia. Applicants who have a positive stress Echocardiogram should not exercise privileges until their cardiac status is clarified.
5. If an applicant is unable to achieve 100% of predicted heart rate or if the test is terminated for other reasons, the reasons for ceasing the test must be stated.
6. ECG recordings should be carried out contemporaneously during the exercise test, and should be commented upon by the interpreting physician.



Stress Nucleotide (Thallium or Sestimibi) Scan

1. Single Photon Emission Computerised Tomography.
2. Bruce protocol stress to a minimum of 100% of predicted maximal heart rate and at least nine minutes exercise time.
3. Applicant should have been continuously in the time zone where testing is performed for at least 72 hours prior to the test.
4. Applicant should continue to take his/her usual medication(s) until tested.
5. Re-injection or 24 hour view if defects are present. This additional requirement may be omitted if the defect(s) is/are demonstrated to be non-reversible.
6. A satisfactory exercise nucleotide scan is recorded when the exercise or nucleotide scanning does not reveal defects consistent with myocardial ischaemia. Applicants who have a positive stress radio nucleotide scan should not exercise privileges until their cardiac status is confirmed.
7. ECG recordings should be carried out contemporaneously during the exercise test, and should be commented upon by the interpreting physician.

Coronary Angiogram

1. The angiogram is to demonstrate all major vessels, their tributaries, and grafts if present.
2. Left ventriculogram should be performed.
3. A significant stenosis is considered to be present if there is greater than 50% narrowing of any artery.
4. A satisfactory coronary angiogram is recorded when there is no significant stenosis seen in the native coronary circulation and/or where coronary artery bypass grafts appear without discernible wall pathology or have only minor irregularities.
5. The report should include a diagrammatic representation of the coronary arteries.

Gated Blood Pool Scan

1. Measurement of the ejection fraction gated heart pool scan may be required for uncertain cases where the ejection fraction is borderline or unreliable on stress nucleotide scan or stress echocardiogram.
2. The scan should show an ejection fraction greater than 45%.



Electron Beam Computed Tomography and 'Calcium Scores'

1. Aviation Medicine is considering the potential use of this technology. However, in common with other regulators, it does not currently accept the results of these investigations as substitutes for any other required tests.

Cardiologist's Assessment

This is to include recording of:

1. Clinical status.
2. Control of risk factors, including smoking and obesity.
3. Hyperlipidemia, hypertension, or diabetes mellitus.
4. A satisfactory gated heart pool scan, which should demonstrate no wall motion abnormalities associated with moderate hypokinesis.
5. An overall ejection fraction greater than 45%.
6. An acceptable fasting lipid profile, where total cholesterol is less than 5.5 mmol/L and the HDL fraction is greater than 1.0 mmol/L. Note that both HDL and LDL fractions should be recorded.

Cardiologist's Review

This is to occur at six-monthly intervals and should include recording of:

1. Clinical status.
2. Control of risk factors, including smoking and obesity.
3. Hyperlipidemia, hypertension, or diabetes mellitus.
4. An acceptable fasting lipid profile, where total cholesterol is less than 5.5 mmol/L and the HDL fraction is greater than 1.0 mmol/L. Note that both HDL and LDL fractions should be recorded.

Issue of Aviation Medical Certificate Following Myocardial Infarction

Class 1, 2 or 3 Medical Certificates

Following the infarction, inform CASA Aviation Medicine Section of the diagnosis and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA. This will not be considered until six months after the event.



Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment at six-monthly intervals
- Stress nucleotide scan (preferred) or stress echocardiogram.
- Ejection fraction estimation
- Coronary angiogram, unless this has already been undertaken.

If all of the above investigations are satisfactory, the subject may be recertificated for 12 months without restriction.

Subsequent Reviews

12 months post myocardial infarction:

- Routine aviation medical examination
- Cardiologist's review every six months
- Stress nucleotide scan (preferred) or stress echocardiogram (refer protocol described under [Stress Echocardiogram](#)).

At yearly intervals thereafter:

- Routine aviation medical examination
- Cardiologist's review every six months
- Stress ECG at yearly intervals.

Issue of Aviation Medical Certificate Following Coronary Artery Bypass Graft (CABG).

Class 1, 2 or 3 Medical Certificates

Following the graft, inform CASA Aviation Medicine Section of the diagnosis and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

This will not be considered until six months after the surgery for Class1, 2 or 3.

Recertification

Investigations required for recertification are:

- Routine aviation medical assessment
- Cardiologist's assessment
- Stress nucleotide scan
- Ejection fraction estimation.



If all of the above investigations are satisfactory, the subject may be recertificated for 12 months without restriction.

Subsequent Reviews

12-month intervals post coronary artery bypass graft:

- Routine aviation medical examination
- Cardiologist's review every six months
- Stress ECG yearly.

Note: Angiography is no longer routinely required every five years, but may be required if an applicant develops new symptoms or other evidence suggesting worsening IHD despite treatment.

Issue of Aviation Medical Certificate Following Coronary Artery Angioplasty

Class 1, 2 and 3 Medical Certificates

Following angioplasty, inform CASA Aviation Medicine Section of the diagnosis and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

This will not be considered until six months post angioplasty for all classes. While preliminary data suggested that drug-eluting stents may reduce the incidence of post angioplasty stenosis, more recent studies reveal that drug-eluting stents are associated with an increased risk of late thrombosis. As such, bare metal stents are preferable in the aviation context. CASA is not prepared to reduce the six-month post-treatment period at this time. CASA will continue to monitor this issue.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Stress nucleotide scan (preferred) or stress echocardiogram
- Ejection fraction estimation.

If all of the above investigations are satisfactory, the subject may be recertificated for 12 months without restriction at all classes.



Subsequent Reviews

12-month intervals post angioplasty:

- Routine aviation medical examination
- Cardiologist's review completed six-monthly
- Stress ECG.

Note: Angiography is no longer routinely required every five years, but may be required if an applicant becomes symptomatic or has other evidence suggesting worsening HID despite treatment.

Issue of Aviation Medical Certificate Following Evidence of Ischaemic Heart Disease

Class 1, 2 or 3 Medical Certificates

When an applicant presents with:

- Ischaemic heart disease symptoms such as angina, arrhythmia; or
- Cardiac failure or other evidence of ischaemic heart disease, inform CASA Aviation Medicine Section of the diagnosis and advise applicant not to exercise the privileges of his/her licence until cleared to do so by CASA.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment conducted six-monthly
- Stress nucleotide scan (preferred) or stress echocardiogram
- Ejection fraction estimation.

If the stress nucleotide scan or stress echocardiogram is positive, the applicant must proceed to an angiogram.

If all investigations up to and including the stress nucleotide scan or stress echocardiogram are negative, the subject may be recertificated.

If the stress nucleotide scan or stress echocardiogram is positive but a subsequent angiogram is reported as satisfactory, the applicant may be recertificated.

Subsequent Reviews

This will depend on individual case assessment.

2.2.7 Valvular Heart Disease

Uncorrected Aortic Incompetence

Class 1, 2 and 3 Medical Certificates

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's review
- ECG
- Doppler echocardiogram
- Chest X-ray.

If all of the investigations and cardiologist reports are satisfactory, the applicant may be recertificated for a period of one or two years depending on the severity of the condition and the rate of deterioration.

Subsequent Reviews

At annual or biennial intervals:

- Routine aviation medical examination
- Cardiologist's review
- Echocardiogram
- ECG.

Corrected Aortic Incompetence

Class 1, 2 and 3 Medical Certificates

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results are assessed as satisfactory by CASA.



Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- ECG
- Doppler echocardiogram
- Chest X-ray.

If all of the investigations and cardiologist's reports are satisfactory, the applicant may be recertificated for a period of 12 months.

Where a tissue valve is used and there is no requirement for anticoagulation and certification may be unrestricted.

Where a mechanical valve is used, the applicant is to have evidence of clinically satisfactory, well-controlled anticoagulation and Class 1 medical certification will be restricted to multi-crew operations.

Subsequent Reviews

Classes 1, 2 and 3 require yearly review by a cardiologist.

Uncorrected Aortic Stenosis

Class 1, 2 and 3 Medical Certificates

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Electrocardiogram
- Doppler echocardiogram
- Chest X-ray.



If all of the investigations and the cardiologist's report are satisfactory, the applicant may be recertificated solo for a period of 12 months, provided the following criteria are met:

- Aortic valve calcification grade 1 or 2
- Valvular Doppler jet velocity <3m/s
- Valve area >1.0cmsq
- Asymptomatic.

Subsequent Reviews

At annual intervals:

- Routine aviation medical examination
- Cardiologist's review
- ECG
- Doppler echocardiogram
- Chest X-ray.

If all of the investigations and the cardiologist's report are satisfactory, the applicant may be recertificated solo for a period of 12 months, provided the following criteria are met:

- Aortic valve calcification grade 1 or 2
- Valvular Doppler jet velocity <3m/s
- Valve area >1.0cmsq
- Asymptomatic.

Corrected Aortic Stenosis

Class 1, 2 and 3 Medical Certificates

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.



Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- ECG
- Doppler echocardiogram
- Chest X-ray.

If all of the investigations and the cardiologist's reports are satisfactory, the applicant may be recertificated for a period of 12 months.

Where a tissue valve is used and there is no requirement for anticoagulation, medical certification may be unrestricted.

Where a mechanical valve is used, the applicant is to have evidence of clinically satisfactory well-controlled anticoagulation, and Class 1 medical certification will be restricted to multi-crew operations.

Subsequent Review

Class 1, 2 and 3 all require annual review by a cardiologist.

Aortic Root Dilatation

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results are assessed as satisfactory by CASA.

Yearly assessment by echocardiogram is required once the aortic root size reaches 3.8-4.0cm/m² due to the risk of rupture.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- ECG
- Doppler echocardiogram.

If all of the investigations and the cardiologist's reports are satisfactory, the applicant may be recertificated for a period of 12 months.



Subsequent Review

At annual intervals:

- Routine aviation medical examination
- Cardiologist's review
- ECG
- Doppler echocardiogram.

Uncorrected Mitral Incompetence

Class 1, 2 and 3 Medical Certificates

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- ECG
- Doppler echocardiogram.

If all of the investigations and cardiologist's reports are satisfactory, the applicant may be recertificated for a period of 12 months without restriction.

Subsequent Reviews

At annual intervals thereafter:

- Routine aviation medical examination
- ECG
- Doppler echocardiogram
- Cardiologist's review.



Corrected Mitral Incompetence

Class 1, 2 and 3 Medical Certificates

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Doppler echocardiogram.

If the valve is replaced, a significant risk of embolism may remain, particularly if factors such as poor left ventricular ejection fraction, left atrial dilatation, atrial fibrillation and poor INR control are present.

Cases will be considered on an individual basis. Assessments will not be made until at least six months post surgery.

For valve repairs, if reports are favourable, applicants may initially be recertificated for 12 months.

Subsequent Reviews

Valve Replacements:

For Classes 1, 2 and 3, annual routine aviation medical examination. All applicants require cardiologist's review with Doppler echocardiogram.

Valve Repairs:

All applicants require a routine annual aviation medical examination and cardiologist's review with Doppler echocardiogram.



Uncorrected Mitral Stenosis

Class 1, 2 and 3 Medical Certificates

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- ECG
- Doppler echocardiogram.

Applicants with mild uncorrected mitral stenosis (where the valve area is greater than 1.5 cm², the heart is in sinus rhythm, where there is no history of atrial fibrillation and the left atrial diameter is less than 4.5 cm), are permitted recertification for 12 months.

Other applicants will be considered on a case-by-case basis.

Subsequent Reviews

At annual intervals:

- Routine aviation medical examination
- Cardiologist's review
- ECG.

Corrected Mitral Stenosis

Class 1, 2 and 3 Medical Certificates

Recertification

Investigations required for recertification following mitral valvotomy are:

- Routine aviation medical examination
- Cardiologist's assessment, which is to include assessments of the incompetence and stenosis
- Doppler echocardiogram
- ECG.

If all of the investigations and cardiologist's reports are satisfactory following mitral valvotomy, the applicant may be recertificated for a period of 12 months.



Following Mitral Valve Replacement

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results are assessed as satisfactory by CASA. This will not be considered until at least three months following mitral valvotomy or replacement.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Doppler echocardiogram
- ECG.

Following mitral valve replacement, applicants will be considered on a case-by-case basis on consideration of individual risk factors. Those with significant echocardiographic changes such as LA dilatation or atrial fibrillation may be subject to more stringent restrictions to their certificate.

Subsequent Reviews

At annual intervals:

- Routine aviation medical examination
- Cardiologist's review
- ECG
- Doppler echocardiogram.

Uncorrected Mitral Valve Prolapse

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- ECG
- Doppler echocardiogram.

Applicants will be assessed on a case-by-case basis. Those with mitral valve prolapse with minimal or trivial mitral incompetence should require no more stringent follow up than clinically indicated. Those with more significant sequelae will be considered in accordance with their ongoing risk and rate of deterioration of their condition.

2.2.8 Bundle Branch Blocks

Partial or Complete Left Bundle Branch Block (Not Including Left Anterior Hemiblock)

Class 1, 2 & 3 Medical Certificates

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Stress nucleotide scan
- Doppler echocardiogram
- Left ventricular gated blood scan to measure ejection fraction
- 24 hour Holter monitor recording.

If all of the investigations and cardiologist's reports are satisfactory, the applicant may be recertificated for 12 months.

Subsequent reviews

At annual intervals:

- Routine aviation medical examination
- Cardiologist's review.

Incomplete Right Bundle Branch Block

This is a common finding. There are no specific requirements.



Complete Right Bundle Branch Block

Class 1, 2 and 3 Medical Certificates

Note: This may be a normal variant in young applicants. A cardiologist's opinion should however be obtained in these cases.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Echocardiogram
- Stress ECG if combined with LAHB as the combination is associated with ischaemic heart disease.

If all of the investigations and cardiologist's reports are satisfactory, the applicant may be recertificated for the maximum period permitted for the relevant medical certificate.

Left Anterior Hemiblocks

Class 1, 2 and 3 Medical Certificates

This is a common finding, however if this is a newly acquired condition, a stress ECG should be performed. If this is normal, there is no requirement for further reviews.

Atrio-Ventricular Blocks

First Degree

The only specific investigation required for those with first degree AV block is for a resting ECG, taken after exercise to ensure the block normalises with exercise. This may practicably be done in the DAME office.



Second Degree — Class 1, 2 and 3 Medical Certificates

Otherwise, on diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.

Recertification

Investigations required for recertification are:

- Cardiologist's assessment
- 24 hour Holter monitor recording
- Stress ECG.

If all of the investigations and cardiologist's reports are satisfactory, the applicant may be recertificated for 12 months. Applicants with untreated heartblocks of 2:1 or greater will not be recertificated for any class of medical certificate.

Subsequent Reviews

An annual ECG is required.

Third Degree Heart Block

Restricted certification may be available with the use of pacemakers.

Class 1, 2 and 3 Medical Certificates

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Stress ECG (to assess cardiac function)
- 24 hour Holter monitor recording.

Note: The pacemaker is to be dual chambered with bipolar leads, due to the unacceptable risk of electrical interference with pacemakers that have unipolar leads. The pacemaker is to have a technical check every 12 months, with the outcome reported to the Aviation Medicine Section.



Atrial Fibrillation and Atrial Flutter

Class 1, 2 and 3 Medical Certificates

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment, with particular reference to history and presence of any congenital abnormalities
- ECG
- 24 hour Holter monitor
- Doppler echocardiogram
- Stress test (to evaluate rate control at high workload)
- Biochemical profile, including: thyroid function studies, liver function studies, serum magnesium and potassium levels, fasting blood glucose (FBG).
- Haemoglobin estimation.

If drug treatment is required, there must be adequate rate control (as assessed by a cardiologist), without significant side effects. There should be no underlying structural heart disease. In these circumstances, all applicants may be recertificated for 12 months without restriction, unless prescribed warfarin. Where Warfarin is prescribed, CASA will require evidence of good INR control.

Subsequent Reviews

At annual intervals:

- Routine aviation medical examination
- Cardiologist's review.

Bradycardias

Bradycardia should be taken in context. In a normally fit and healthy person or in an athletic individual there is nil concern. If the individual is generally unfit, has symptomatic bradycardia or if other ECG anomalies are associated with the bradycardia, then the applicant should be referred for cardiological assessment.



Ventricular Tachycardias

Ventricular tachycardias is most commonly picked up in the context of a stress test, in which case it may be normal. If VT arises in other contexts, the applicant should be referred for cardiological assessment.

Supraventricular Tachycardias

Most individuals with frequent episodes of supraventricular tachycardias will receive radiofrequency ablation, which, if successful, will be of no further concern. If controlled by medication, cardiological review should be sought with each medical examination. Applicants with SVT will be assessed on a case-by-case basis, however those with frequent episodes, and particularly those who experience significant symptoms with SVT may not be considered fit.

Wolff-Parkinson-White Syndrome

Class 1, 2 and 3 Medical Certificates

On diagnosis of the condition, inform CASA Aviation Medicine Section and advise applicant not to exercise the privileges of his/her licence until investigations have been completed and results assessed as satisfactory by CASA.

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Electrophysiological studies.

If WPWS is confirmed, the applicant is assessed as unfit until radiofrequency ablation of aberrant conduction pathways has been performed and the treating cardiologist has certified that conduction has been normalised.

Individuals who have demonstrated long refractory periods, where the WPW abnormality normalises on exercise may be considered for restricted certification on a case-by-case basis.



Subsequent Reviews

At six months, 12 months and 24 months post successful radiofrequency ablation of aberrant conduction pathways, the following are required:

- Routine aviation medical examination
- Cardiologist's review.

If there is no recurrence of abnormal conduction within 24 months of successful radiofrequency ablation, further recertification without restriction should follow the normal pattern for the applicant's age and class of medical certificate.

Prolonged QT Syndrome

Those applicants with long QT syndrome will generally be disqualified due to the risk of sudden death. Individuals will be assessed on a case-by-case basis, based on cardiological opinion.

Brugada Syndrome

Applicants with Brugada syndrome on ECG will require individual assessment by an electrophysiologist and cardiologist. Stratification is difficult; however there may be a subgroup with a relatively good prognosis. However, most individuals with Brugada syndrome will be assessed as unfit. Insertion of implantable defibrillator is not adequate risk mitigation in these individuals.

Defibrillators

Applicants requiring implantable defibrillators will be assessed as unfit. Studies show that 15% of shocks delivered are inappropriate. They are also potentially affected by EMF emissions. In addition, the risk of acute incapacity associated with a shock, regardless of the underlying pathology, is considered incompatible with aeromedical certification.

Corrected Congenital Heart Anomalies

In many cases, residual haemodynamic defects may preclude medical certification at any level for these applicants. Each case will be dealt with on its individual merits. A comprehensive cardiological work-up and report should be completed and full details forwarded to Aviation Medicine Section for assessment.



Other Cardiological Abnormalities

These can be extremely varied and range from trivial conditions to those which absolutely preclude medical certification at any level for these applicants. Each case will be dealt with on its individual merits. A comprehensive cardiological work-up and report should be completed and full details forwarded to Aviation Medicine Section for assessment.

2.2.9 Cardiomyopathies

Dilated Cardiomyopathy

Class 1, 2 and 3 Medical Certificates

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- ECG
- Doppler echocardiogram
- Two recordings of 24 hours Holter monitor studies
- Gated blood pool scan or echocardiogram assessment of cardiac output.

If ejection fraction is greater than 45% with no symptoms and a normal Holter monitor report, then a restricted certificate, on the basis of cardiological assessment of ongoing risk of arrhythmia etc, may be allowed. Individuals will be assessed on a case-by-case basis.

Subsequent Reviews

Class 1: Cardiologist's review with gated blood pool scan or echocardiogram.

Hypertrophic Cardiomyopathy

Class 1, 2 and 3 Medical Certificates

Recertification

This condition is generally disqualifying. In all cases, further certification will be appropriately restricted.

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment, including detailed family history
- Stress ECG
- Doppler echocardiogram
- 24 hour Holter monitor recording.

If all of the investigations and the cardiologist's report are satisfactory, and septal thickness is less than 1.5 cm, restricted recertification may be available.

Subsequent Reviews

Requirements will be individually determined and notified.



2.2.10 Cardiac Transplant

Applicants for Class 1 certification will be assessed as unfit.

Class 2 and 3

Recertification

Investigations required for recertification are:

- Routine aviation medical examination
- Cardiologist's assessment
- Coronary angiogram (for detection of atherosclerosis)
- 24 hour Holter monitor recording
- Doppler echocardiogram.

If all of the investigations and the cardiologist's report are satisfactory, Class 2 and Class 3 applicants may be recertificated on an individually determined basis.



Subsequent Reviews

At six-monthly intervals:

- Routine aviation medical examination
- Cardiologist's review.

At annual intervals:

- Stress nucleotide scan
- Coronary angiogram (to assess coronary atherosclerosis)
- Doppler echocardiogram.

