Human Environment and Transport Inspectorate
Ministry of Infrastructure and Water Management

Additional Flowcharts & Guidance Material CAA-NL

to

Part MED of Regulation (EU) No 1178/2011

Version 2.0

15 March 2021

Preface

This revised version of additional Guidance Material (GM) and Flowcharts of the CAA-NL to Regulation (EU) No 1178/2011[1] and to the Acceptable Means of Compliance (AMC) and Guidance Material as published by EASA: Annex 1 of the Executive Directory Decision 2019/002/R, contains a large number of changes compared to the version of 22th June 2019.

Regulation (EU) No 1178/2011 is binding.

Acceptable Means of Compliance are non-binding standards adopted by EASA which may be used by persons and organisations to demonstrate compliance with Regulation (EU) No 1178/2011 and the delegated and implementing acts adopted on the basis thereof.

Guidance material is non-binding material developed by EASA which helps to illustrate the meaning of a requirement or specification and is used to support the interpretation of Regulation (EU) No 1178/2011 and the delegated and implementing acts adopted on the basis thereof.

This publication developed by CAA-NL is primarily intended as more detailed information to support the assessment of the medical fitness of class 1 and class 2 pilots. In a number of places, specific information has also been included for the assessment of LAPL pilots.

The forms for the Medical Flight Tests have been adjusted and are more focused on the disability of the pilot and the type of aircraft to be piloted. They can be found in the Appendix.

By means of a general table of contents and a table of contents per article, we hope that finding the correct guidelines will be easier.

Comments and questions about the content of this publication can be sent to:
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[1] Version June 2nd, 2020

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Flowchart – Catheter ablation for tachycardia certification (except WPW and AVNRT)

Flowchart – Catheter ablation for WPW syndrome and AVNRT certification

Flowchart – Implantation of a cardiac pacemaker certification

Flowchart – Brugada certification

General information

Extended cardiovascular assessment
An extended cardiovascular assessment should include a clinical report of an examination by an accredited physician/cardiologist, an exercise ECG and any other test that is clinically indicated.

Cardiovascular risk assessment
A cardiovascular risk assessment tool useful for AMEs.

Reporting of resting and exercise ECGs
All ECGs should be reported by the AME or an accredited specialist.

Peripheral Arterial Disease
If exercise electrocardiography cannot be performed (e.g. due to claudication), then a myocardial perfusion scan or stress echocardiogram may be an acceptable alternative investigation.

Mitral Valve Repair
After mitral valve repair, recertification to Class 1 OML/Unrestricted Class 2 level is possible 6 months postoperatively, subject to a satisfactory cardiology review, to include an echocardiogram. Follow-up should include annual echocardiograms.

Acute Benign Aseptic Pericarditis
Recertification can be considered 3 months after recovery to Class 1 OML/unrestricted Class 2 level, subject to a satisfactory cardiology review to include a 24hr ECG, echocardiogram and exercise ECG. Follow-up should initially be 6 monthly cardiology reviews to include a 12 lead resting ECG and echocardiogram. Unrestricted Class 1 can be considered after 2 years. Follow-up can usually be discontinued after 2 years.

Constrictive Pericarditis
Recertification can be considered after pericardiectomy to Class 1 OML/unrestricted Class 2 level subject to a satisfactory cardiological review, to include exercise ECG, echocardiogram and 24hr ECG. The applicant should be in sinus rhythm. Annual cardiological follow up is required.

Short PR interval
Defined as a PR interval of less than 100ms. Class 1 initial applicant, or new finding on ECG, requires cardiological review (to establish no history of tachyarrhythmia) and exercise test.

Long PR Interval
Defined as a PR interval of more than 240ms. Class 1 initial applicant, or new finding on ECG, requires cardiological review, exercise test and 24 hour ECG.

Arrhythmia Medication

Amiodarone:
Class 1 - Amiodarone is unacceptable for Class 1 medical certification.
Class 2 - Usually requires a VCL (day time flying only) limitation. If the applicant does not experience glare at night (usually noticed when they are driving) then, subject to a satisfactory AMS ophthalmological review, unrestricted Class 2 medical certification may be possible (i.e. night flying is permitted).
See also Flowchart Atrial fibrillation certification.

Flecainide:
Flecainide, used for the treatment of atrial fibrillation, may be acceptable. Some patients experience mild ocular side effects. Most commonly, up to 14% of patients may develop small corneal deposits[1]. These are asymptomatic and usually have no implications for vision.[1, 2] Less commonly, mild blurry vision on extreme lateral gaze may occur due to an effect on the vestibular apparatus[2], rather than on the eye itself. Pilots complaining of blurred vision on lateral gaze who found to have nystagmus should undergo tests of vestibular function[2] rather than further ophthalmological review.
No studies have shown abnormal visual function with flecainide. Ophthalmological review is only indicated if reduced visual function is clinically indicated; there is no case for routine ophthalmological screening of pilots on flecainide.

Note: Flecainide is not acceptable for certification if used for the treatment of ventricular arrhythmias even in a structurally normal heart.

Left anterior hemi block
Requires investigation by means of at least an exercise ECG. If left anterior hemi block (or left posterior hemi block) is noted in the presence of RBBB, the LBBB flowchart should be followed.

Sinus bradycardia
Requires investigation if the rate is <40bpm (usually by means of a 24 hour ECG).

Sinus tachycardia
Requires investigation if the rate is consistently >110bpm.

[1] Moller HU, Thygesen K, Kruit PJ. Corneal deposits asociated with flecainide. BMJ 1991; 302 (6775) 506-7.

[2] Ikaheimo K, Kettuven R, Montyjarvi M. Adverse ocular effects of flecainide. Acta Ophthal Scand 2001; 79 (2) 175-6.

Report specifications - Cardiology

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**

2. **History**
   - Presenting symptoms
   - Nature of condition, circumstances surrounding onset, precipitating factors
   - Other relevant medical history

3. **Examination and investigation findings**
   - Clinical examination
     - Blood Pressure within acceptable parameters (Flowchart – Hypertension certification)
     - Blood tests (Urea & Electrolytes, Renal and Liver Profile, Lipid Profile, Glucose)
     - Confirmation no end organ damage
   - Cardiovascular risk assessment
     - Family history, smoking, alcohol intake, weight (BMI), and lifestyle interventions
     - Resting ECG
     - Exercise Tolerance Test Report where indicated
       1. Protocol used (e.g. Symptom limited Bruce Protocol off cardioactive medication as directed by the investigating cardiologist)
       2. Walking time
       3. Symptoms experienced
       4. ECG changes
       5. Summary and conclusions
     - Echocardiogram where indicated
       1. Valve structure and function
       2. Standard chamber dimensions
       3. Ejection Fraction (indicate measurement technique)
       4. Summary and conclusions
     - 24-hour ECG where indicated
       1. Beats scanned
       2. Number/frequency of ectopics/aberrants
       3. Runs of abnormal rhythm (extracts)
       4. Summary and conclusion
     - Angiogram where indicated
       1. Full report
       2. Measurement of degree of stenosis in each affected artery (annotated diagram of coronary tree acceptable)
     - Cardiac MRI, Myocardial Perfusion Scan, Stress Echocardiogram (dobutamine or exercise), CT as indicated

Where investigations are abnormal or borderline the hard copy traces/images are likely to be required for review.

4. **Treatment**
   - Current and recent past medication (dose, frequency, start date and finish date)
   - Confirmation no side effects from medication

5. **Follow up and further investigations/referrals planned or recommended**
   - Plan of management and anticipated follow up

6. **Clinical implications**
   - Any concerns regarding disease progression, treatment compliance or risk of sudden incapacity

Table – Investigation of ECG abnormalities

1: Cardiologist review
2: Exercise ECG
3: 24hr Holter
4: Echocardiogram

Diagnosis	Class 1		Flowcharts and guidance material available (Class 1/2)	Class 2	
	Fitness assessment	Minimum investigations, others if clinically indicated		Fitness assessment	Minimum investigations, others if clinically indicated
Incomplete RBBB	AME	Investigate if other abnormalities are present	No	AME	Investigate if other abnormalities are present
Atrial fibrillation atrial flutter	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Sinoatrial dysfunction or sinus pauses	MA	1, 2, 3, 4	No	AME	1, 2, 3, 4
Mobitz type 2 AV block	MA	1, 2, 3, 4	No	AME	1, 2, 3, 4
Complete RBBB	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Complete LBBB (or RBBB+left axis deviation)	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Broad/narrow complex tachycardia	MA	1, 2, 3, 4	No	AME	1, 2, 3, 4
Pacemakers	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Mobitz type 1 AV block	MA	1, 3	No	AME	1, 3
SVEs/VEs simple	MA	1, 3 Then possibly 2, 4	Yes	AME	1, 3
SVEs/VEs complex	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
WPW	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Other inc AVNRT etc	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Asymptomatic QT prolongation	MA	1, 2, 3, 4	No	AME	1, 2, 3, 4
Brugada pattern	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Post ablation	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Coronary disease					
Pathological Q waves T inversion Q waves Poor R wave progression	MA	1, 2, 3, 4	Yes	AME	1, 2, 3, 4
Cardiomyopathy					
LVH, atrial enlargement, flat or inverted T waves	MA	1, 2, 3, 4	No	AME	1, 2, 3, 4
Miscellaneous – new finding of…					
Non-specific T wave changes	MA	1, 2	No	AME	1, 2
New or progressive left axis deviation	MA	1, 2	No	AME	1, 2
ST segment sag	MA	1, 2	No	AME	1, 2
ST segment depression	MA	1, 2	No	AME	1, 2
First degree AV block (>240 ms)	MA	1, 3	No	AME	1, 3
Bradycardia (rate <40 bpm)	MA	1, 3	No	AME	1, 3
Tachycardia (rate >100 bpm)	MA	1, 3	No	AME	1, 3
Asymptomatic long QT	MA	1, 2, 3	Yes	AME	1, 2

MA = Medical Assessor

Flowchart – Thoracic and Abdominal Aortic Aneurysms certification

Pre-repair
Thoracic and supra renal abdominal aortic aneurysms:

Class 1: unfit

Class 2: < 5 cm OSL/ORL with 6 monthly cardiological review (may be increased to annual if < 4 cm)
≥ 5cm unfit

Infra-renal abdominal aortic aneurysms:

Class 1: <5 cm OML
≥5 cm unfit

Class 2: < 5 cm unrestricted
5 - 5.5 cm OSL/ORL
>5.5 cm unfit

Post-repair
No sooner than 6 months after repair and following complete recovery the applicant should provide:

a. Report(s) from surgeon to include:
(The following points are for guidance purposes only and should not be taken as an exhaustive list)

- Medical history, including presentation, management and medication
- Segment of the aorta affected
- Other relevant medical history including underlying conditions associated with aneurysm (e.g. connective tissue disorders)
- Other co-morbidities e.g. hypertension, coronary artery disease
- Screening for other aneurysms (particularly abdominal aortic aneurysms)
- Priority with which the surgery was undertaken i.e. elective, emergency
- Type of repair
- Post-operative recovery
- Blood pressure
- Treatment – current and recent past medication (dose, frequency, start date)
- Reports from ultrasound scans/MRI/CT scans
- Plan for follow-up and further investigations/referrals planned or recommended
- Prognosis – risk of incapacity

b. Report from a cardiological review to include:

- Cardiovascular risk assessment
- Investigations used to screen for coronary artery disease prior to repair e.g.angiogram
- If not already screened for coronary artery disease:
  - Exercise ECG (Bruce protocol and symptom rather than target heart rate limited)
  - Echocardiogram

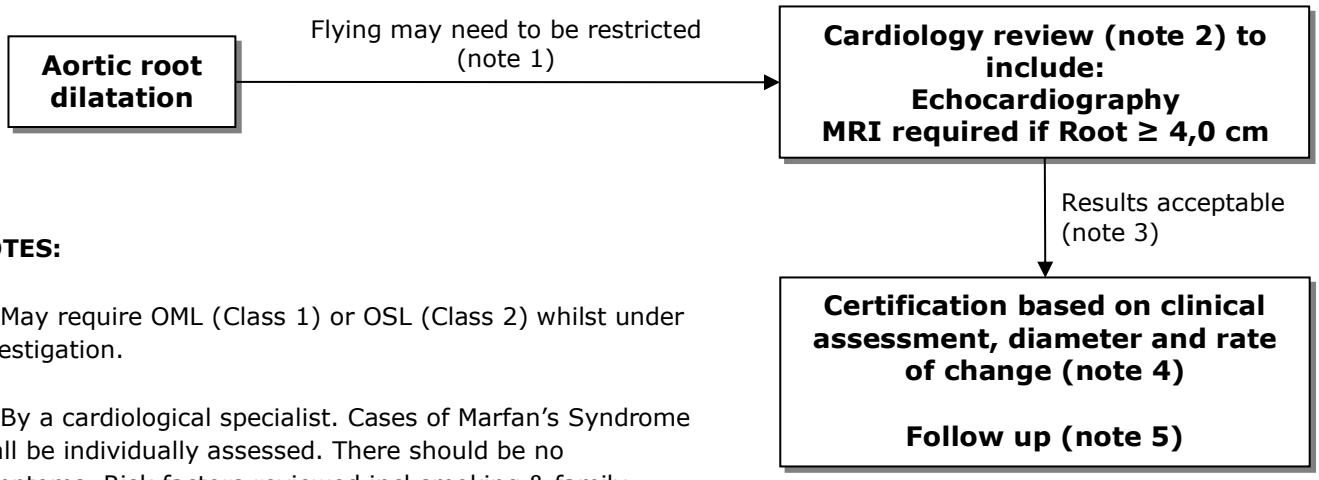
NOTES

It is unlikely that applicants with a congenital cause for developing aneurysms will be able to be assessed as fit for Class 1 or 2 following repair, although there may be a few younger applicants in this group, who have no other significant co-morbidities who could be considered for Class 2 OSL or ORL following an open repair.

Amongst applicants with spontaneous/acquired aneurysms, those below the age of 65 years, with few comorbidities, who develop an aneurysm of the ascending aorta and undergo elective repair may be able to obtain Class 1 OML or unrestricted Class 2 medical certification. Those who are older than 65 years, who survive 12 months beyond elective repair may be able to obtain Class 2 OSL or ORL certification. Emergency operations may have a higher perioperative mortality however annual risk of incapacitation may eventually match those who have had elective repairs after several years.

Post repair, applicants should be advised by their AME to avoid flying aerobatic/high 'G' manoeuvres and may need a limitation with this restriction on their medical certificate.

Flowchart – Aortic root dilatation certification



NOTES:

1) May require OML (Class 1) or OSL (Class 2) whilst under investigation.

2) By a cardiological specialist. Cases of Marfan's Syndrome shall be individually assessed. There should be no symptoms. Risk factors reviewed incl smoking & family history. Measurements should be made at end-diastole of:

- outflow tract diameter,
- sinuses of Valsalva,
- sinotubular junction and
- tubular ascending aorta.

The largest measurement should be utilised. CT is an acceptable alternative to MRI but repeated studies increases radiation exposure.

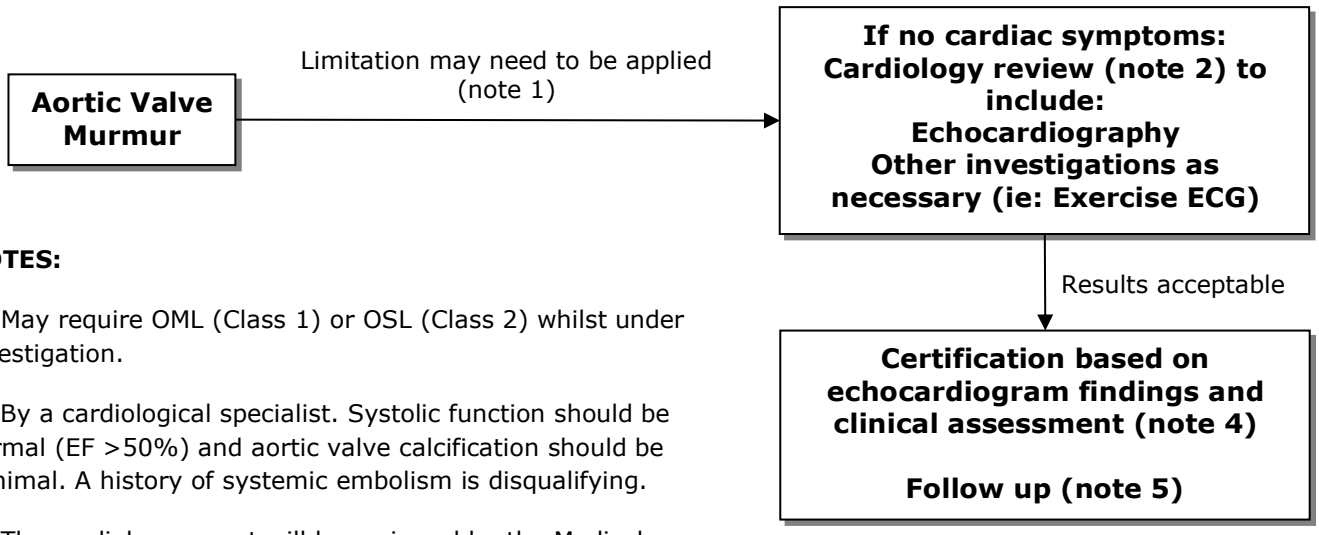
3) The cardiology report will be reviewed by the Medical Assessor for Class 1 and AME for Class 2. Applicants with Marfan will need special consideration. It may be necessary to see the investigations in which case the actual tracings/films/videos will be requested. In borderline cases a secondary review panel of cardiologists will be convened. An OSL may be applied to a Class 2 certificate.

4) The principal measurement to determine medical certification of pilots with aortic root dilatation is MRI. Indexing root area to Body Surface Area (BSA) standardises for large or small BSA. BSA indexed diameter (BSAID) = measured value x 1,73 ÷ BSA (m^2). The following parameters to be used as a guide:

	Bicuspid		**Tricuspid**	
	BSAID	Rate of change	BSAID	Rate of change
Unrestricted Class 1 & 2	<4,25 cm	<0,5 cm/yr	<4,5 cm	<0,5 cm/yr
Class 1 OML / Class 2 Unrestricted	<4,5 cm	<1 cm/yr	<4,75 cm	<1 cm/yr
Unfit	≥4,5 cm	≥1 cm/yr	≥5,0 cm	≥1 cm/yr

5) Follow up - at least annual echocardiography. MRI (or CT) is required at least 2 yearly where diameter > 4,25 cm or rate of change > 0,5 cm/yr.

Flowchart – Aortic valve stenosis certification



NOTES:

1) May require OML (Class 1) or OSL (Class 2) whilst under investigation.

2) By a cardiological specialist. Systolic function should be normal (EF >50%) and aortic valve calcification should be minimal. A history of systemic embolism is disqualifying.

3) The cardiology report will be reviewed by the Medical Assessor for Class 1 and by the AME for Class 2. It may be necessary to see the investigations in which case the actual tracings/films/videos will be requested.

4) Bicuspid valve: may be assessed as fit if no other aortic abnormality is demonstrated. The principal measurement to determine fitness for certification of pilots with aortic stenosis is aortic valve area during echocardiography. Suggested certificatory assessment, based on European Society of Cardiology Guidelines:

VALVE AREA	**MEAN** AORTIC GRADIENT (Echo-Normal flow conditions)	SEVERITY	CERTIFICATION
>1,5 cm²	0 – 20 mm Hg	Mild	Unrestricted Class 1/2
1,0 – 1,5 cm²	20 – 50 mm Hg	Moderate	Class 1 OML / Class 2 OSL of ORL
<1,0 cm²	>50 mm Hg	Severe	Unfit

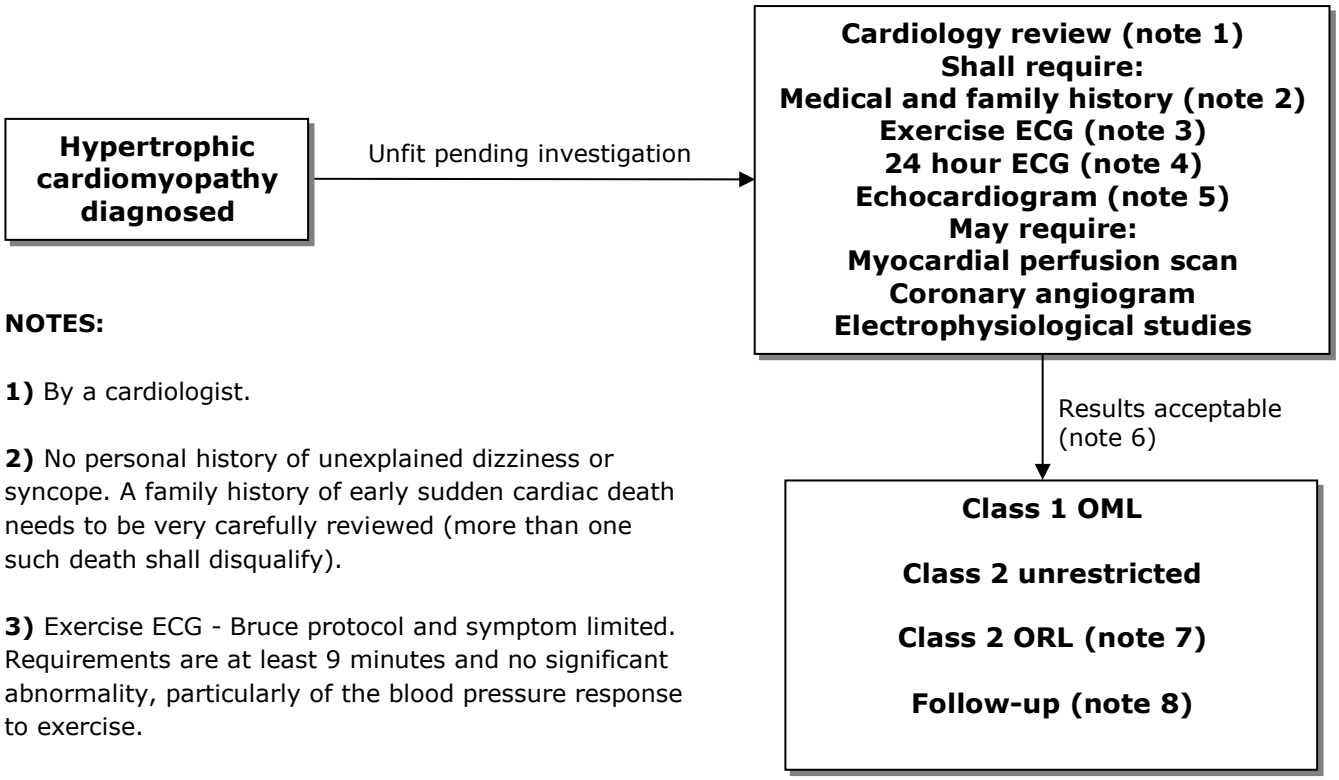
Indexing valve area to Body Surface Area (BSA) can be useful in cases of unusually large or small BSA (Moderate: 0,6 – 0,85 cm²/m²; Severe: <0,6 cm²/m²).

However, other factors need to be considered in each case, including:

- Left ventricular hypertrophy
- Reduced left ventricular diastolic function
- Reduced left ventricular ejection fraction
- Aortic regurgitation
- Pull back pressure gradients measured during catheter studies are 10-15 mm Hg lower than echocardiographically measured peak pressures

5) Follow up: at least annual echocardiography if mean pressure gradient 20 mm Hg or more.

Flowchart – Hypertrophic cardiomyopathy certification



NOTES:

1) By a cardiologist.

2) No personal history of unexplained dizziness or syncope. A family history of early sudden cardiac death needs to be very carefully reviewed (more than one such death shall disqualify).

3) Exercise ECG - Bruce protocol and symptom limited. Requirements are at least 9 minutes and no significant abnormality, particularly of the blood pressure response to exercise.

4) 24 Hour ECG - No significant rhythm/conduction disturbance. A non-sustained/sustained ventricular rhythm disturbance shall disqualify.

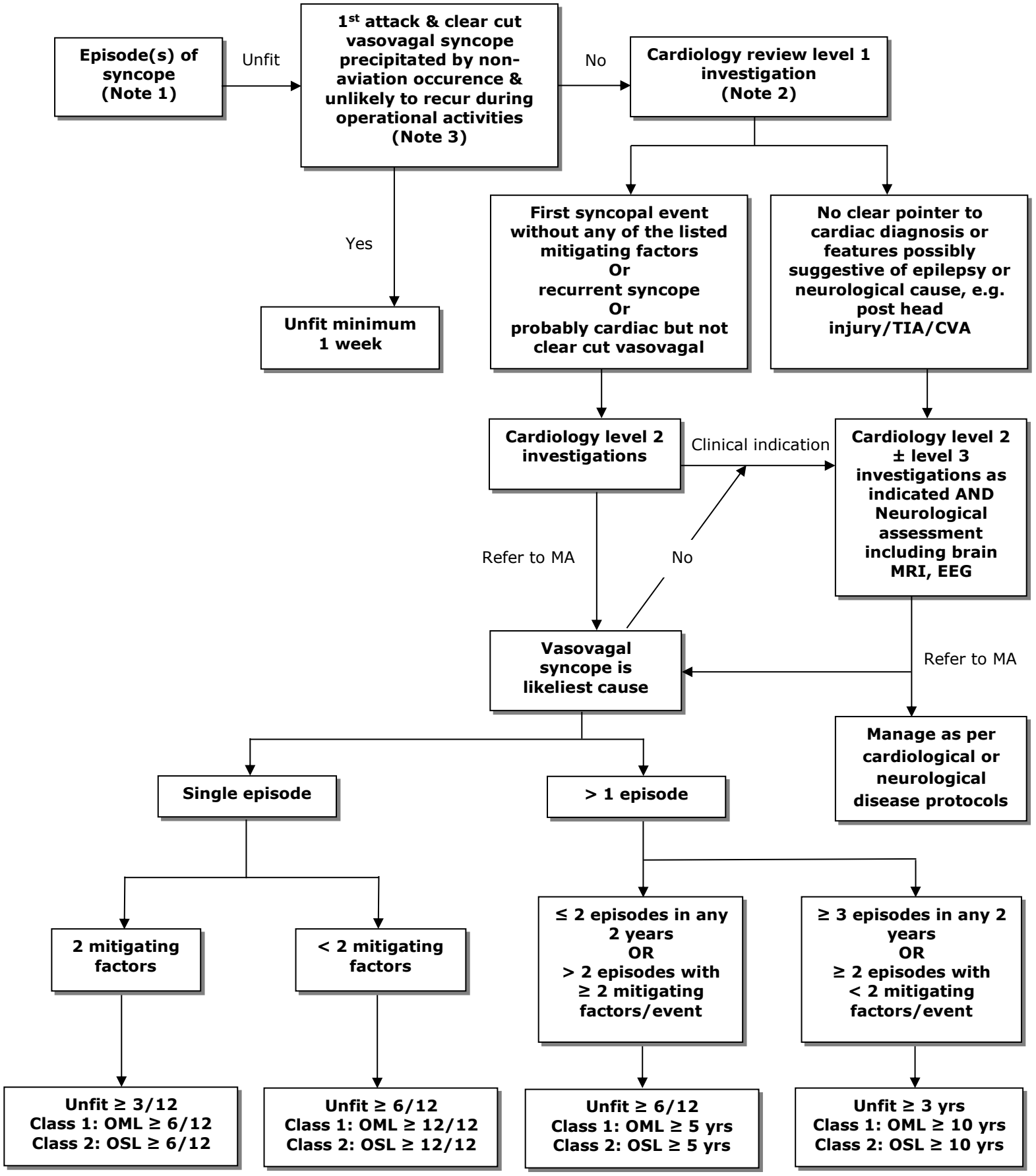
5) Echocardiography - Ejection fraction equal to or more than 50% with no significant abnormality of wall motion. Septal thickness should be less than 2,5 cm.

6) The cardiology report will be reviewed by the Medical Assessor for Class 1 and by the AME for Class 2. It may be necessary to see the investigations, in which case the actual tracings/films/videos will be requested. Further investigations (e.g. myocardial perfusion scan/angiography/electrophysiological studies) may be required.

7) Certification of Class 2 applicants who fail to meet the requirements may be possible with an ORL.

8) Periodic follow-up, initially annual. Investigation shall include an exercise ECG, 24 hour ECG and an echocardiogram. Further investigations as indicated.

Flowchart – Certification (recurrent) Syncope



NOTES

1) This flowchart should be followed from the beginning after each occurrence. The limitation and duration information that follows 'Refer to MA' is provided for guidance only. Shorter or longer periods of unfitness or restriction may be considered by the Medical Assessor.

2) Investigations
Level 1 – Physical examination, lying & standing BP, resting and 24hr Holter ECG
Level 2 – Add Echo and ETT and additional 24 hr ECGs may be required on clinical indication
Level 3 – Add tilt table +/- cMRI ± electrophysiological studies =/- implantable loop recorder
Exercise ECG – Bruce protocol and symptom limited. Requirements are at least 9 minutes and no significant ECG or blood pressure changes.
24 hr ECG – No significant rhythm or conduction disturbance.
Echocardiogram – Structurally normal heart and normal LV and RV function.
Tilt Table Test to a standard protocol. Drug provocation not necessary. Note that level 1 investigations do not need to be repeated within 1 month, nor level 2 investigations within 3 months unless clinically indicated or for diagnostic purposes.

3) Considered 'clear cut' if caused by venepuncture or prolonged standing in heat/sun, venepuncture, micturition or pain due to other conditions, with LOC < 30 sec, no loss of continence and complete rapid recovery and normal physical examination. If syncope is caused by pain or other condition, a specialist medical report confirming the history / findings is required before a return to flying.
Mitigating factors
Provocation – clearly identifiable (e.g. venepuncture)
Non-aviation and potentially avoidable
Prodrome – clear warning symptoms
Posture – occurred on standing but not sitting or while lying flat

Report specifications – Hypertension

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**

2. **History**
   - Presenting symptoms
   - Nature of condition, circumstances surrounding onset, precipitating factors
   - Other relevant medical history

3. **Examination and Investigation Findings**
   - Blood pressure stabilised within acceptable parameters
     - Three blood pressure readings each taken more than 18 hours apart or a 24 hour blood pressure recording. Readings should be taken no sooner than two weeks after commencing anti-hypertensive medication.
   - Blood tests
     - Urea and Electrolytes
     - Liver and Renal Function (Estimated Glomerular Filtration Rate)
     - Lipid Profile - serum total cholesterol and HDL cholesterol
     - Plasma glucose
   - Confirmation of no end organ damage
     - Renal disease
       1. Liver and Renal Function (Estimated Glomerular Filtration Rate)
     - Hypertensive retinopathy
   - Cardiovascular risk assessment
     - Family history, smoking, alcohol intake, weight (BMI)
     - Resting ECG
     - Exercise Tolerance Test Report where indicated (e.g. Class 1 multiple risk factors)
       1. Protocol used (e.g. Symptom limited Bruce protocol off cardioactive medication as directed by the investigating cardiologist)
       2. Walking time
       3. Symptoms experienced
       4. ECG changes
       5. Summary and conclusions
     - Echocardiogram where indicated
       1. Valve structure and function
       2. Standard chamber dimensions
       3. Ejection Fraction (indicate measurement technique)
       4. Summary and conclusions

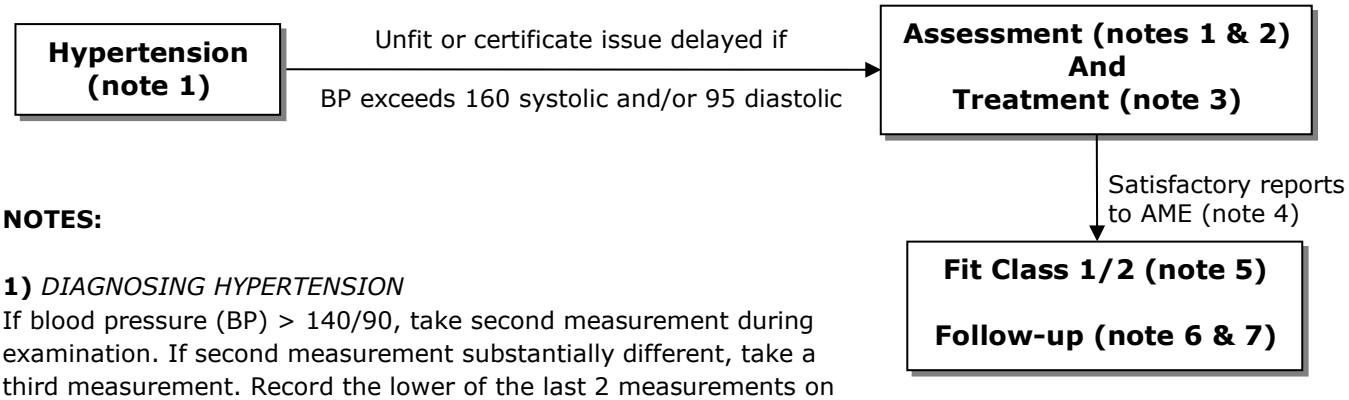
Where investigations are abnormal or borderline the hard copy traces/images are likely to be required for review.

4. **Treatment**
   - Current and recent past medication (dose, frequency, start date and finish date)
   - Confirmation no side effects from medication
   - Lifestyle interventions

5. **Follow up and further investigations/referrals planned or recommended**
   - Plan of management and anticipated follow up

6. **Clinical Implications**
   - Any concerns regarding disease progression, treatment compliance or risk of sudden incapacity

Flowchart – Hypertension certification



NOTES:

1) *DIAGNOSING HYPERTENSION*
If blood pressure (BP) > 140/90, take second measurement during examination. If second measurement substantially different, take a third measurement. Record the lower of the last 2 measurements on the Medical Examination Report. If BP > 140/90, perform 24hr ambulatory BP. Use mean value of at least 14 measurements during waking hours. If 24 hr ambulatory BP cannot be tolerated or for Class 2 certificate holders, home blood pressure monitoring is acceptable (for each blood pressure recording, take 2 measurements 1 minute apart, take 2 recordings a day for at least 4 days, discard 1st day measurements and use average value of remaining measurements).

2) *ASSESSMENT*
- Check for end organ damage: echocardiography should be performed if ECG shows LVH, repolarisation changes or LA overload; hypertensive retinopathy or chronic renal disease.
- Check urinalysis and urea, creatinine and electrolytes.
- Assess cardiovascular risk (using the NHG cardiovascular risk assessment tool).
- Certificate holders with hypertension should be referred to their GP or cardiologist for investigation and treatment

3) *BLOOD PRESSURE MEDICATION*
For pilots already established on a thiazide-like diuretic whose blood pressure is stable and well controlled, treatment can be continued, but if treatment plan is reviewed then alternative acceptable medications should be considered.
Acceptable medication:
- Non-Loop diuretics
- ACE inhibitors (e.g. Ramipril)
- Angiotensin II/AT1 blocking agents (sartans)
- Slow-release calcium channel blocking agents
- Beta-blocking agents (e.g. Atenolol)

Unacceptable medication:
- Centrally acting agents (e.g. methyldopa)
- Adrenergic blocking drugs (e.g. guanethidine)
- Alpha-blocking drugs (Doxazosin may be acceptable in exceptional cases, providing not used as first line treatment- consult Medical Assessor)
- Loop diuretics (e.g. furosemide)

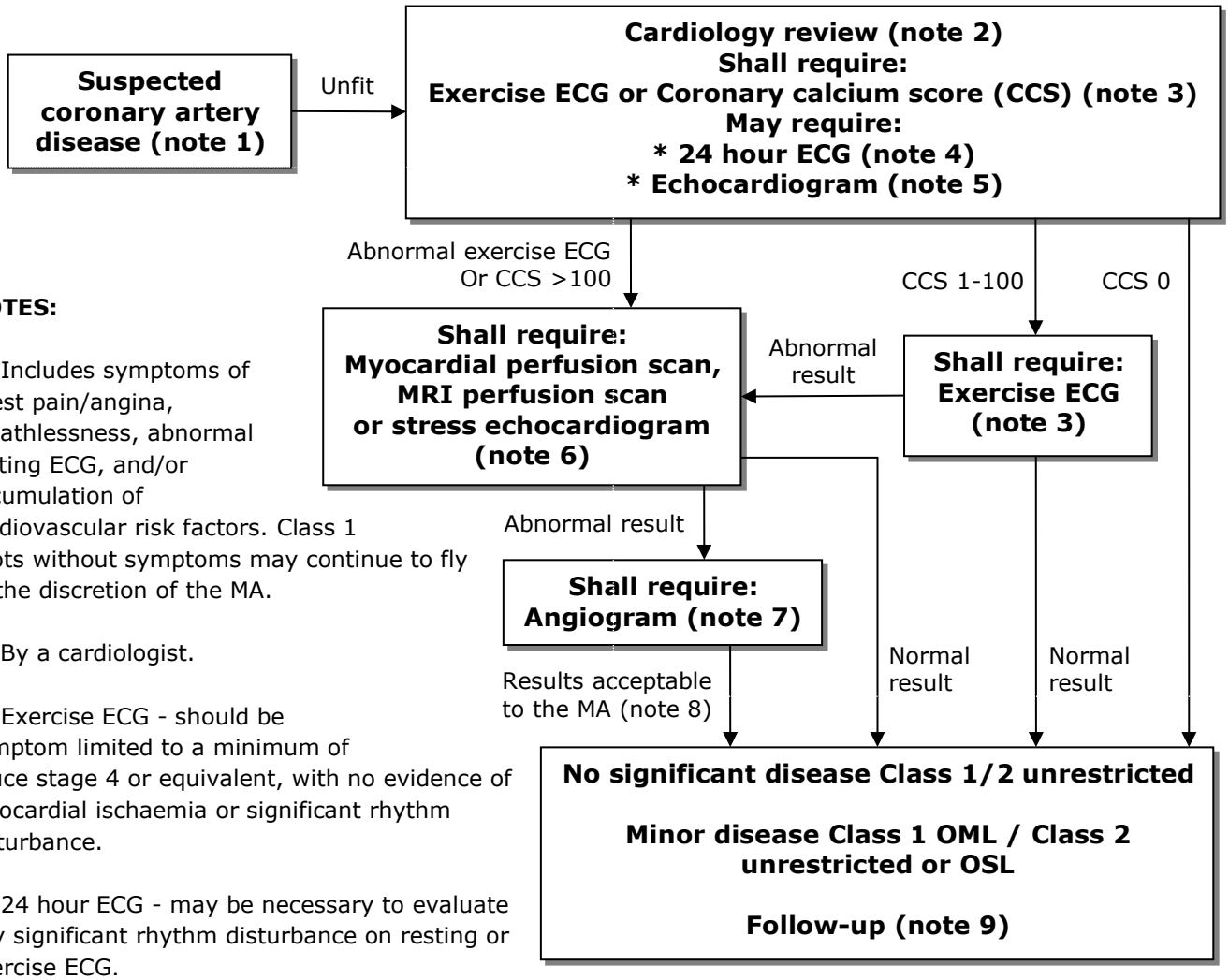
4) A full report from cardiologist or GP to the AME should confirm that the BP has stabilised on acceptable treatment (for a minimum of 2 weeks) and that the pilot has no treatment-related side-effects. If satisfactory a fit assessment can be made and/or a medical certificate issued. Reports should be sent to the Medical Assessor.

5) Pilots with complications of hypertension or multiple risk factors may need to be referred to (Class 1) or discussed with (Class 2) the Medical Assessor. Class 1 pilots with multiple risk factors (10 year cardiovascular risk ≥ 10%) should undergo periodic exercise testing. An OML may be required.

6) Pilots should provide evidence of BP stability to their AME at their periodic medical examinations.

7) Any changes in medication or dosage should be notified to an AME and will require a two week period of grounding. After two weeks the pilot should provide their AME with a report from their GP or treating specialist to confirm the changes, stability of BP and no treatment related side-effects.

Flowchart – Investigation of suspected coronary artery disease certification



NOTES:

1) Includes symptoms of chest pain/angina, breathlessness, abnormal resting ECG, and/or accumulation of cardiovascular risk factors. Class 1 pilots without symptoms may continue to fly at the discretion of the MA.

2) By a cardiologist.

3) Exercise ECG - should be symptom limited to a minimum of Bruce stage 4 or equivalent, with no evidence of myocardial ischaemia or significant rhythm disturbance.

4) 24 hour ECG - may be necessary to evaluate any significant rhythm disturbance on resting or exercise ECG.

5) Echocardiogram - may be necessary to assess myocardial structure/function and show no important abnormality of wall motion and a LV ejection fraction of 50% or more.

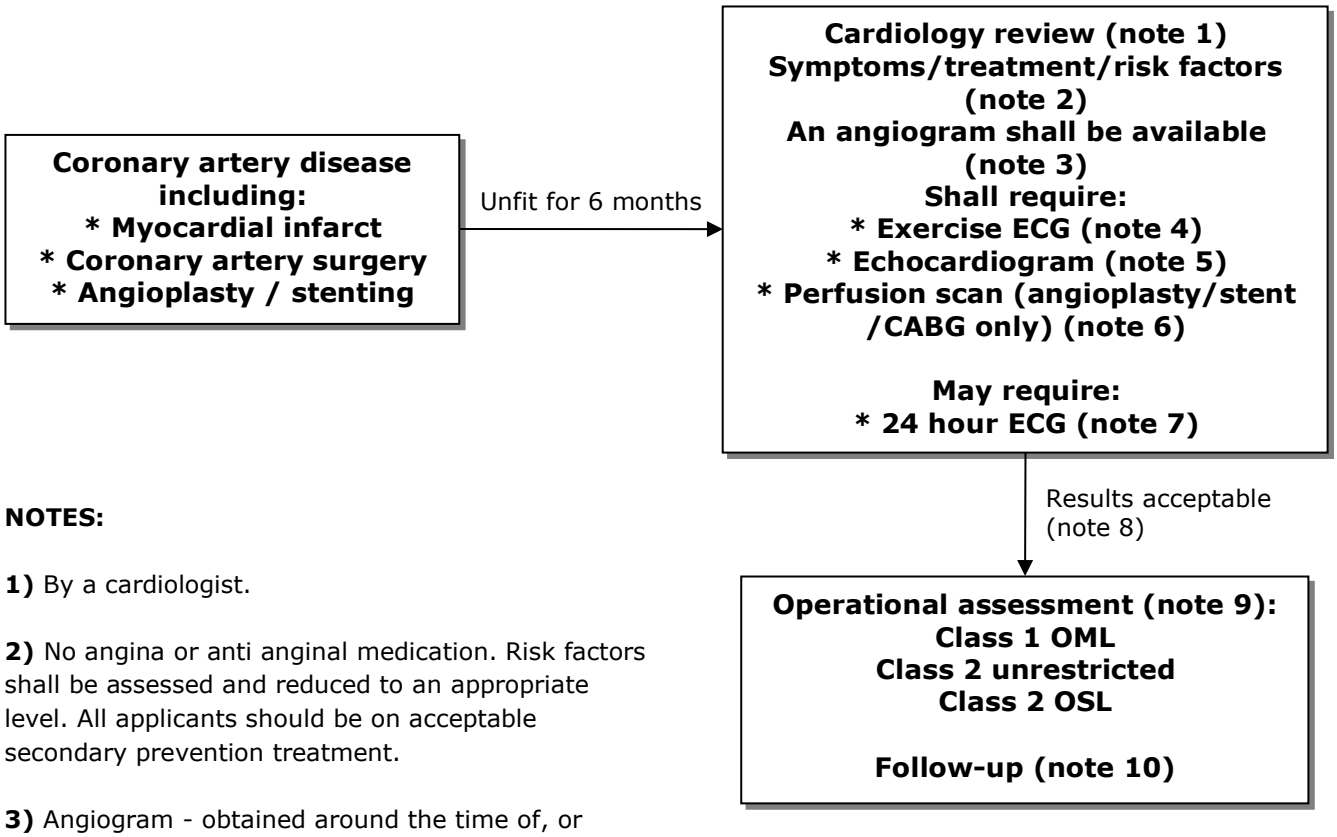
6) Myocardial perfusion scan, MRI perfusion scan, or stress echocardiogram (dobutamine or exercise) - showing no evidence of reversible ischaemia. Cases with suspicion of reversible ischaemia or silent infarction require angiographic evidence to decide if anatomical and functional evidence are congruent.

7) Angiogram – An invasive angiogram will normally be required. If a CT angiogram is performed it will only be acceptable when the coronary calcium score is less than 400 (this is to ensure good imaging of the vessels) and the anatomical requirements stated in note 8 are met.

8) The cardiology report will be reviewed by the MA for Class 1 or AME for Class 2. It may be necessary to see the investigations, in which case the actual tracings/films/videos will be requested. Further investigations may be required.
There shall be no stenosis more than 50% in any major vessel. More than two stenoses between 30% and 50% within the vascular tree should not be acceptable. The whole coronary vascular tree shall be assessed (particular attention should be paid to multiple stenoses). A stenosis greater than 30% in the left main or the proximal left anterior descending coronary artery should not be acceptable.
A normal angiogram (no stenoses >10%) is compatible with unrestricted certification. Class 1 certification of asymptomatic acceptable minor disease may require a multi-pilot limitation (OML). Unrestricted Class 2 certification is possible with acceptable minor disease; a safety pilot limitation (OSL) restriction may be appropriate in borderline cases.

9) Periodic follow-up (normally annual) for established disease shall include a specialist cardiology review, cardiovascular risk assessment and an acceptable exercise ECG (as in note 3 above).

Flowchart – Coronary artery disease certification



NOTES:

1) By a cardiologist.

2) No angina or anti anginal medication. Risk factors shall be assessed and reduced to an appropriate level. All applicants should be on acceptable secondary prevention treatment.

3) Angiogram - obtained around the time of, or during, the ischaemic myocardial event. There shall be no stenosis more 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 an infarct. More than two stenoses between 30% and 50% within the vascular tree should not be acceptable. The whole coronary vascular tree shall be assessed (particular attention should be paid to multiple stenoses and/or multiple revascularisations). An untreated stenosis greater than 30% in the left main or the proximal left anterior descending coronary artery should not be acceptable.

4) Exercise ECG - should be symptom limited to a minimum of Bruce stage 4 or equivalent, with no evidence of myocardial ischaemia or significant rhythm disturbance.

5) Echocardiogram - myocardial function shall be assessed and show no important abnormality of wall motion and a LV ejection fraction of 50% or more (Echo not required if ejection fraction measured by stress echocardiography or myocardial perfusion scan).

6) Myocardial perfusion scan (MPS) - showing no evidence of reversible ischaemia shall be required at least 6 months after an angioplasty/stenting/CABG, but not procedure. MPS is only required after myocardial infarction unless there if there is doubt about myocardial perfusion, or if angioplasty/stenting/CABG is performed in association with the infarction. Stress echocardiogram or MRI perfusion may be accepted in lieu of myocardial perfusion scan.

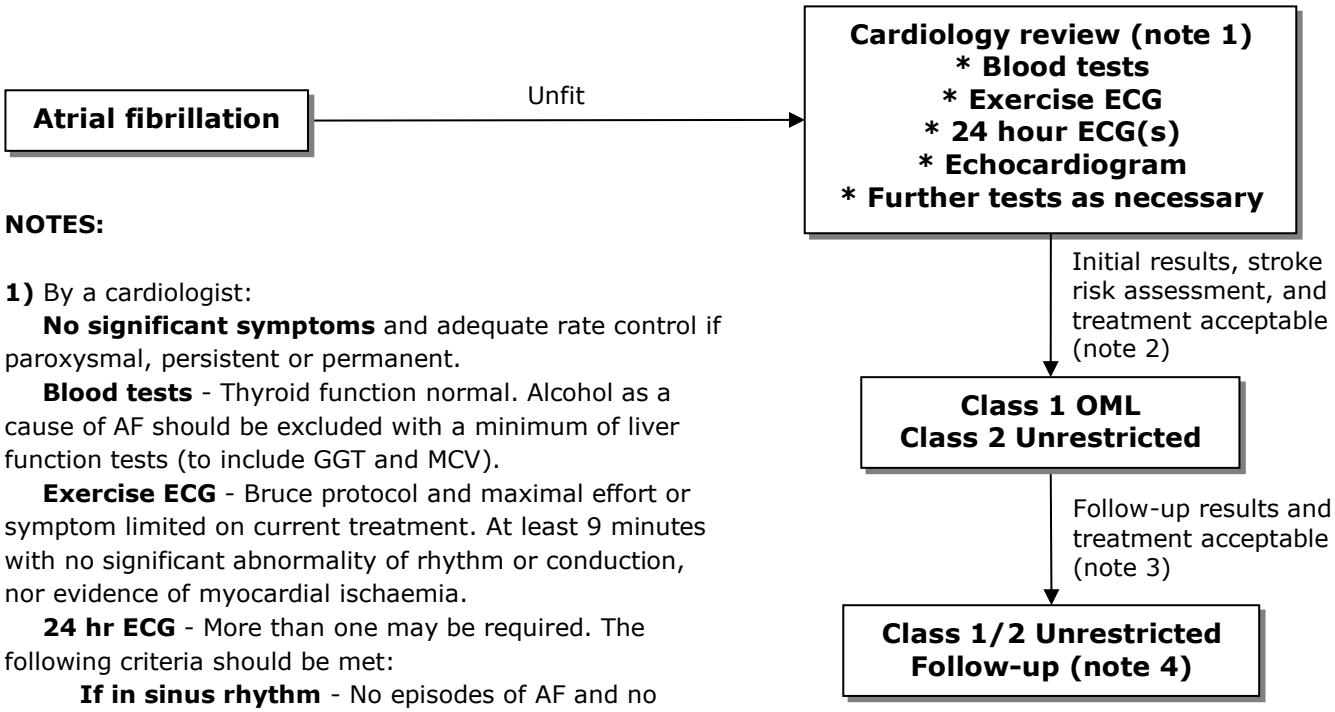
7) 24 hour ECG - may be necessary to assess the risk of any significant rhythm disturbance.

8) The cardiology report will be reviewed by the Medical Assessor (Class 1) or AME for Class 2. It may be necessary to see the investigations, in which case the actual tracings/films/videos will be requested. Further investigations may be required.

9) Class 1 recertification will require a multi-pilot limitation (OML). Unrestricted Class 2 certification is possible having completed all the above investigations. Class 2 applicants not fully meeting the requirements may be recertificated with a safety pilot limitation (OSL) having completed a satisfactory exercise ECG test (as in note 4).

10) Periodic follow-up (at least annually for the first 5 years) shall include a specialist cardiology review, cardiovascular risk assessment and an acceptable exercise ECG (as in note 4 above). In all cases coronary angiography and/or myocardial perfusion scanning (or equivalent) shall be considered at any time if symptoms, signs or non-invasive tests indicate cardiac ischaemia. In all cases of coronary artery bypass grafting (except Class 2 OSL) a myocardial perfusion (or equivalent) scan shall be performed 5 years after the procedure (if not done before).

Flowchart – Atrial fibrillation certification



NOTES:

1) By a cardiologist:

No significant symptoms and adequate rate control if paroxysmal, persistent or permanent.

Blood tests - Thyroid function normal. Alcohol as a cause of AF should be excluded with a minimum of liver function tests (to include GGT and MCV).

Exercise ECG - Bruce protocol and maximal effort or symptom limited on current treatment. At least 9 minutes with no significant abnormality of rhythm or conduction, nor evidence of myocardial ischaemia.

24 hr ECG - More than one may be required. The following criteria should be met:

If in sinus rhythm - No episodes of AF and no pauses >2,5s whilst awake. Ventricular arrhythmia should not exceed an aberrant beat count >2% of total, with no complex forms.

Established AF - RR interval >300ms and <3,5s (i.e. no very rapid rates or long pauses).

Paroxysmal, persistent & permanent AF - As above plus the longest pause on recapture of sinus rhythm should not exceed 2,5s whilst awake.

Echocardiogram - Should show no significant selective chamber enlargement, or significant structural or functional abnormality, and an LVEF of 50% or more.

Further tests - May include repeat 24 hour ECG recordings, electrophysiological studies, cardiac MRI, myocardial perfusion scanning and/or coronary angiography.

2) For Class 1 certificate holders the cardiology report(s) will be reviewed by the Medical Assessor. Class 2 applicants will be re-certificated by the AME in consultation with the Medical Assessor. It may be necessary to see the investigations, in which case the actual tracings/films/videos/CDs will be requested.

Risk Assessment The cardiology report on applicants with atrial fibrillation should include a risk assessment of the risks/benefits of anticoagulation taking into account the CHA2DS2Vasc score and, if > 0, the HASBLED score in accordance with the guidance published by the European Society of Cardiology. HASBLED ≥ 3 requires individual assessment.

Factor	Score	Notes
Cardiac failure/LV dysfunction	1	Likely to be unfit
Hypertension (treated or untreated)	1	
Age 65-74 = 1, Age ≥75 = 2	1 or 2	
Diabetes	1	
Vascular disease (coronary, carotid, peripheral)	1	Investigate
Female gender	1	
Stroke or TIA	2	Likely to be unfit

Factor	Score	Notes
Hypertension (BP>160 mm Hg)	1	Likely to be unfit
Abnormal renal and/or liver function (1 point each)	1 or 2	
Stroke or TIA	1	
Bleeding tendency	1	
Elderly (>65)	1	
Labile INR's on warfarin	1	
Drugs/med or XS alcohol (1 point each)	1 or 2	

The certification matrix set out below is based on the following aspects of risk:

a) The risk of embolic strokes or TIA's **caused** by atrial fibrillation

b) The benefits of any risk reduction due to taking anticoagulants to reduce 1)

c) The serious side effects of anticoagulants likely to cause acute incapacitation

> **Note:** *Warfarin therapy is well established and can be monitored, whereas the Direct (Novel) Oral Anticoagulants (DOACs) are new. While there is some evidence that some of the bleeding risks are lower in DOACs, longer term experience of the use of these medications is required. All DOACs require monitoring of renal function. Applicants treated with warfarin must comply with CAA-NL increased testing/surveillance requirements.*

<table>
<tr><th>CHA_2DS_{2Vasc}</th><th>Unrestricted Class 1</th><th>Class 1 OML or Unrestricted Class 2</th><th>Unrestricted LAPL</th><th>Class 2 OSL</th><th>LAPL ORL</th></tr>
<tr><td>0</td><td>No certification</td><td colspan="4">Nil anticoagulant treatment acceptable, Anticoagulant Treatment not applicable</td></tr>
<tr><td>1</td><td>No certification</td><td colspan="4">Nil anticoagulant treatment acceptable, anticoagulant treatment acceptable</td></tr>
<tr><td>2</td><td colspan="2">No certification</td><td>Anticoagulant treatment mandatory</td><td colspan="2">Nil anticoagulant treatment acceptable, anticoagulant treatment acceptable</td></tr>
<tr><td>3</td><td colspan="3">No certification</td><td colspan="2">Nil anticoagulant treatment acceptable, anticoagulant treatment acceptable</td></tr>
<tr><td>4 & 5</td><td colspan="3">No certification</td><td>Anticoagulant treatment mandatory</td><td>Nil anticoagulant treatment acceptable, anticoagulant treatment acceptable</td></tr>
<tr><td>>5</td><td colspan="4">No certification</td><td>Individual risk assessment of multiple pathology/treatment</td></tr>
</table>

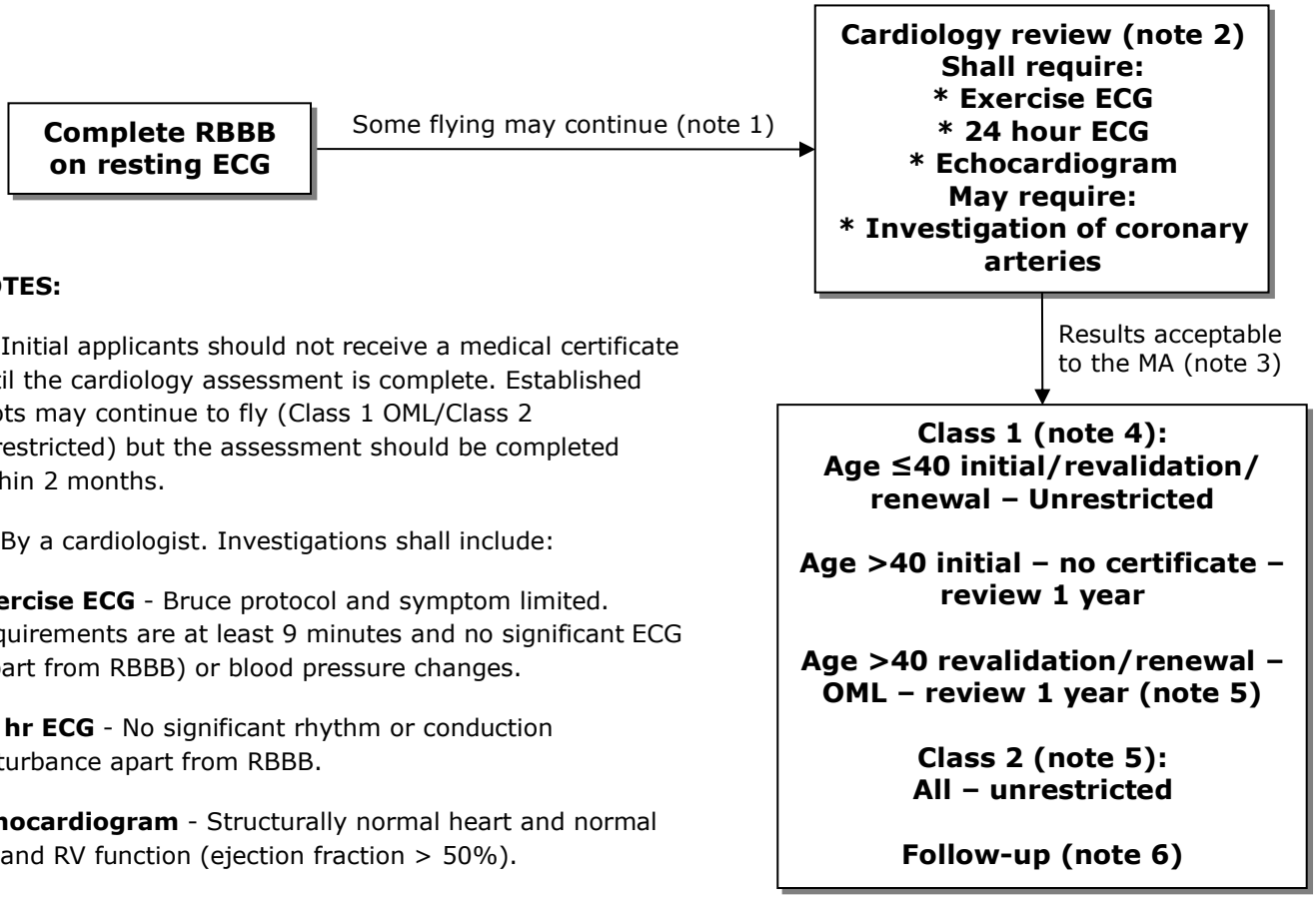
Acceptable treatment for rhythm control includes sotalol (with QT interval monitoring), bisoprolol or other beta-blocking drugs, digitalis, dronedarone (periodic blood testing required to check for hepatotoxicity), diltiazem and verapamil. Exceptionally flecainide or propafenone may be used in consultation with the Medical Assessor (with 6 months demonstrated stability). Amiodarone is normally unacceptable for Class 1, but may be acceptable for Class 2 (maximum dose 200 mg daily, night flying will require an ophthalmological review).

Acceptable treatment for anticoagulation includes Coumadins e.g. warfarin and members of the Direct Oral Anti Coagulant Class (DAOCs). If a pilot is anti-coagulated with a Coumadin (e.g. warfarin), 6 months stability of the INR (with at least 4 measurements within the target range) is required. Class 1 certification will require INR testing with a near patient testing device within 12 hours prior to flying and flight is only possible if the INR is within target range. A pilot taking a DOAC without side effects may return to flying at 3 months and renal function must be monitored. See also Information - Anticoagulant Therapy.

3) Initial cardiological follow-up should be 6 monthly to include a minimum of 24 hour ECG monitoring. Subsequent follow-up at the discretion of the Medical Assessor, normally annual cardiological review with 24hr ECG and echocardiogram. Other tests if clinically indicated.

4) After 2 years follow up for Class 1, only applicants with a single original episode of AF with no recurrence may be able to achieve unrestricted Class 1 certification. Subsequent follow up normally annual with 24hr ECG.

Flowchart – Complete Right bundle branch block (RBBB) certification



NOTES:

1) Initial applicants should not receive a medical certificate until the cardiology assessment is complete. Established pilots may continue to fly (Class 1 OML/Class 2 unrestricted) but the assessment should be completed within 2 months.

2) By a cardiologist. Investigations shall include:

Exercise ECG - Bruce protocol and symptom limited. Requirements are at least 9 minutes and no significant ECG (apart from RBBB) or blood pressure changes.

24 hr ECG - No significant rhythm or conduction disturbance apart from RBBB.

Echocardiogram - Structurally normal heart and normal LV and RV function (ejection fraction > 50%).

Further evaluation may be required (for example investigation of the coronary arteries) if any of the above investigations are abnormal.

3) For Class 1 applicants the cardiology report will be reviewed by the Medical Assessor. It may be necessary to see the investigations in which case the actual tracings/films/videos/CDs will be requested.

4) Class 1 applicants age 40 or under (initial and revalidation/renewal) may have unrestricted certification.

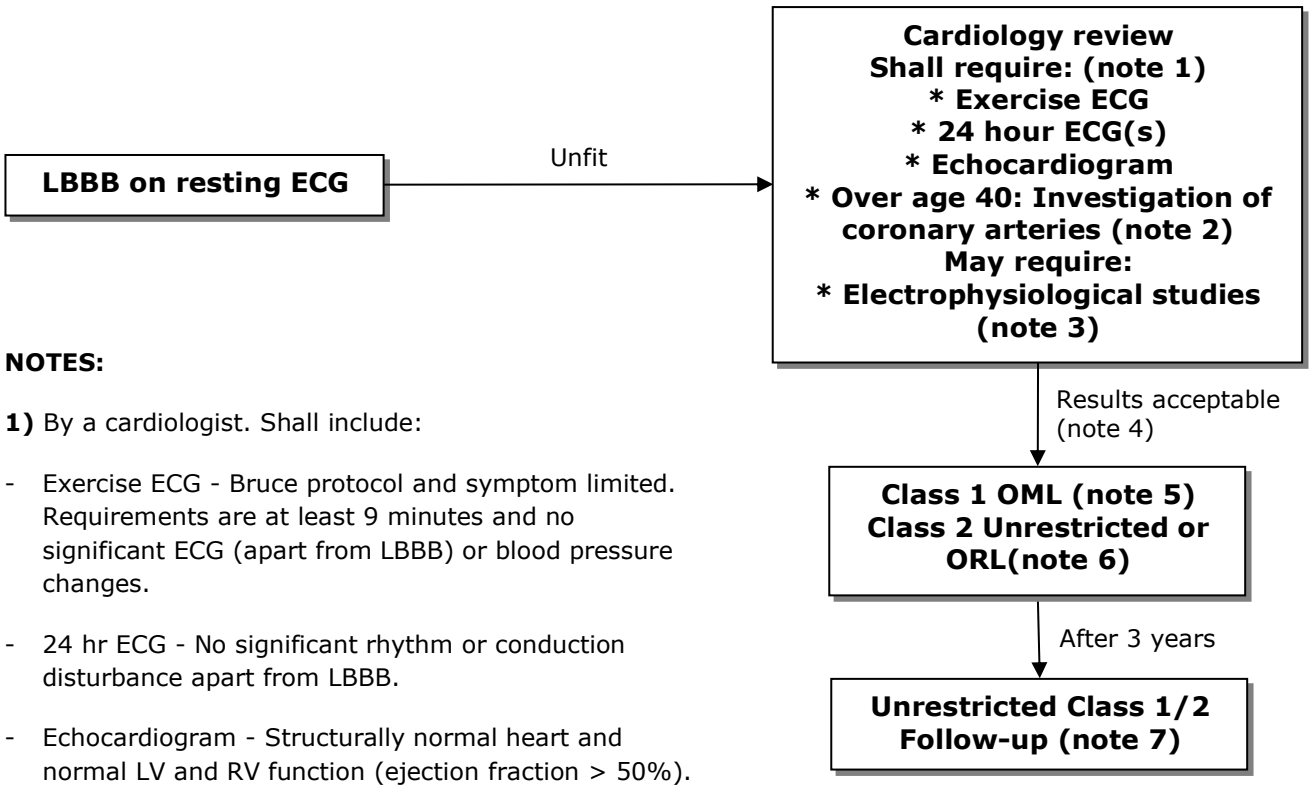
Initial Class 1 applicants over age 40 cannot be certificated until completing a satisfactory follow up review at one year to include an exercise ECG.

Class 1 applicants over age of 40 for revalidation/renewal will need an OML and a review again in a year to include an exercise ECG. At that time an unrestricted certificate can be issued if there is no change. If there has been a documented gradual progression from incomplete RBBB to complete RBBB over several years, there will be no requirement for an OML.

5) Class 2 applicants can have unrestricted certification if all the requirements are met. Certification with OSL may be possible if only some requirements are achieved.

6) Pilots with long standing RBBB should expect to be asked to have occasional cardiology reviews to check that all remains well, particularly if there is a change to the resting ECG.

Flowchart – Left bundle branch block (LBBB) certification



NOTES:

1) By a cardiologist. Shall include:

- Exercise ECG - Bruce protocol and symptom limited. Requirements are at least 9 minutes and no significant ECG (apart from LBBB) or blood pressure changes.
- 24 hr ECG - No significant rhythm or conduction disturbance apart from LBBB.
- Echocardiogram - Structurally normal heart and normal LV and RV function (ejection fraction > 50%).

2) Coronary artery investigation - shall be required in all applicants over the age of 40. A myocardial perfusion scan, stress echo, CT angiogram or cardiac MRI will normally be sufficient. Pharmacological stress should be used to avoid difficulties in the interpretation of septal perfusion.

3) Electrophysiological studies - should be performed if the PR interval is >200 msec, and possibly if the ECG shows an abnormal axis. The HV interval should be less than 100 msec.

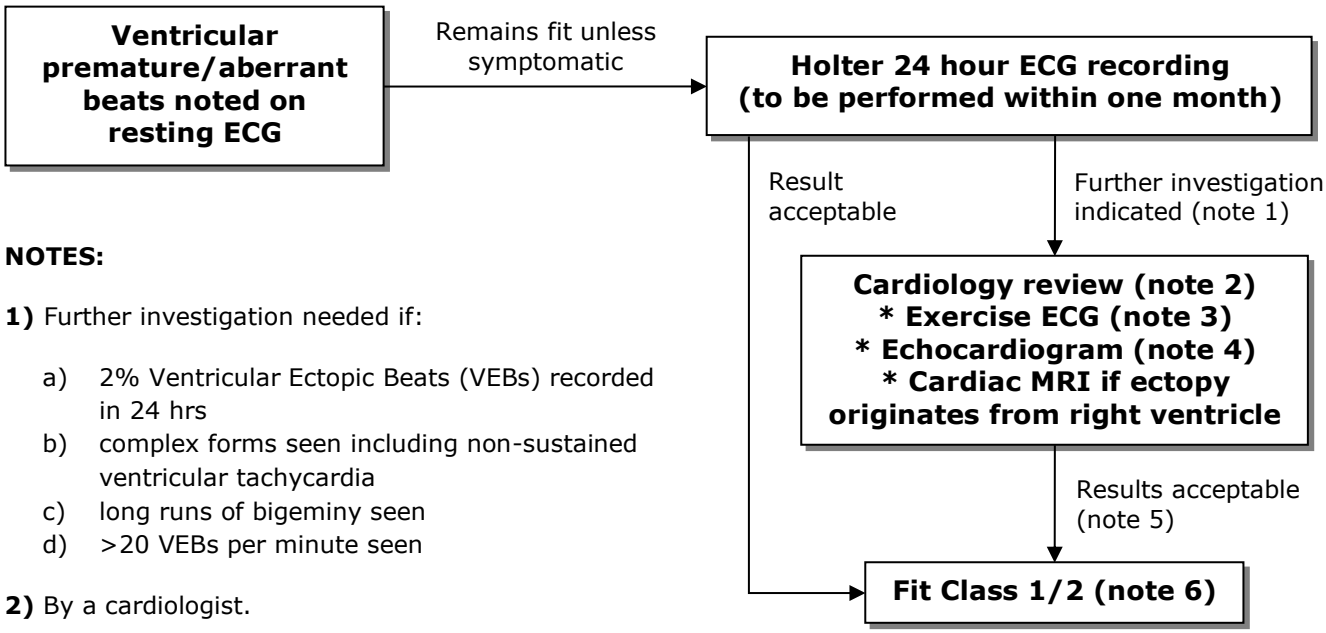
4) For Class 1 applicants the cardiology report will be reviewed by the Medical Assessor. It may be necessary to see the investigations in which case the actual tracings/films/videos will be requested.

5) Class 1 certification - Satisfactory investigations will allow Class 1 OML. Annual cardiology review with a minimum of an exercise ECG. Review at 3 years should also include a 24 hour ECG and echocardiogram. If satisfactory - unrestricted Class 1 can be issued. Initial Class 1 applicants will need to show a 3 year period of stability, as above, before a Class 1 certificate can be issued.

6) Class 2 certification - Satisfactory investigations will allow unrestricted Class 2. If coronary artery investigation was not done at the initial assessment, Class 2 applicants over the age of 40 may need to be restricted to ORL.

7) Follow up after the 3 year period: pilots with long standing LBBB will require an echocardiogram every 3 years to reassess left ventricular function. Other investigations or cardiology reviews may occasionally be required, particularly if any changes are noted on the resting ECG.

Flowchart – Ventricular ectopy certification



NOTES:

1) Further investigation needed if:

a) 2% Ventricular Ectopic Beats (VEBs) recorded in 24 hrs
b) complex forms seen including non-sustained ventricular tachycardia
c) long runs of bigeminy seen
d) >20 VEBs per minute seen

2) By a cardiologist.

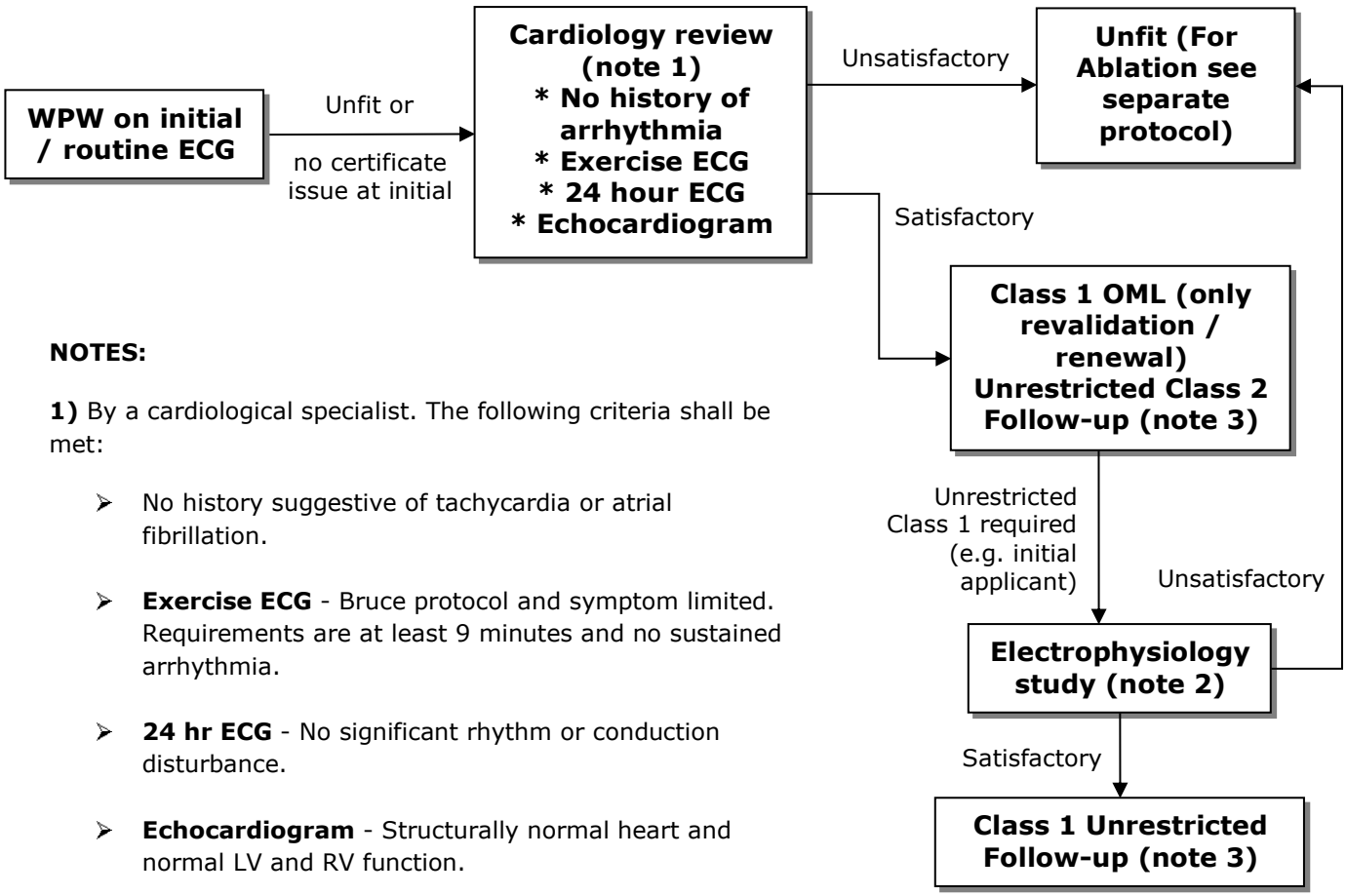
3) Exercise ECG - Bruce protocol and symptom limited. Requirements are at least 9 minutes and no significant ECG or blood pressure changes. Any abnormality may require further investigation.

4) Echocardiogram - Should reveal a structurally normal heart with normal LV/RV function.

5) The cardiology report will be reviewed by the AME. It may be necessary to refer cases to the Medical Assessor with the investigation results (the actual tracings/videos may be requested).

6) If the above investigations show a significant abnormality, an OML/OSL limitation may need to be applied by the Medical Assessor. An ectopic beat count of >7,5% of the total beat count on Holter recording will normally require an OML limitation. Periodic cardiological review may be required.

Flowchart – Wolff-Parkinson-White (WPW) pre-excitation certification



NOTES:

1) By a cardiological specialist. The following criteria shall be met:

- No history suggestive of tachycardia or atrial fibrillation.
- **Exercise ECG** - Bruce protocol and symptom limited. Requirements are at least 9 minutes and no sustained arrhythmia.
- **24 hr ECG** - No significant rhythm or conduction disturbance.
- **Echocardiogram** - Structurally normal heart and normal LV and RV function.

2) EPS study - The report must be made available to the Medical Assessor to confirm an adequate stimulation protocol. It must include an isoprenaline / adrenaline infusion sufficient to increase the sinus rate by 25%.

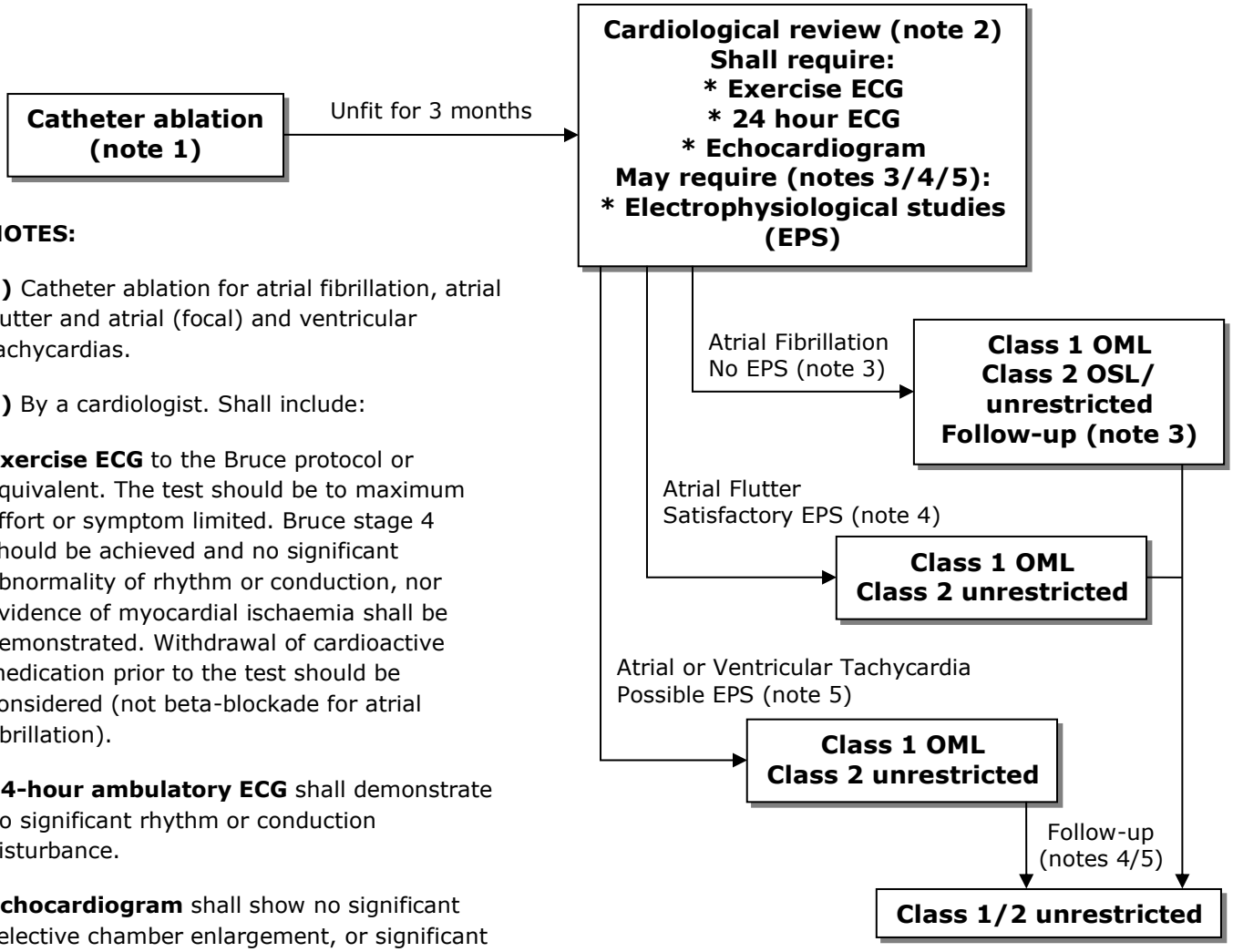
The following criteria shall be met:

- No inducible atrioventricular re-entry tachycardia
- Delta-delta interval during atrial fibrillation >300 ms (>250 ms with isoprenaline)
- Antegrade refractory period of accessory pathway >300 ms (>250 ms with isoprenaline)
- Cycle length with 1:1 accessory pathway conduction >300 ms (>250 ms with isoprenaline)
- No evidence of multiple pathways

The report will be reviewed by the Medical Assessor.

3) Class 1 follow up shall be at the discretion of the Medical Assessor.

Flowchart – Catheter ablation for tachycardia certification (except WPW and AVNRT)



NOTES:

1) Catheter ablation for atrial fibrillation, atrial flutter and atrial (focal) and ventricular tachycardias.

2) By a cardiologist. Shall include:

Exercise ECG to the Bruce protocol or equivalent. The test should be to maximum effort or symptom limited. Bruce stage 4 should be achieved and no significant abnormality of rhythm or conduction, nor evidence of myocardial ischaemia shall be demonstrated. Withdrawal of cardioactive medication prior to the test should be considered (not beta-blockade for atrial fibrillation).

24-hour ambulatory ECG shall demonstrate no significant rhythm or conduction disturbance.

Echocardiogram shall show no significant selective chamber enlargement, or significant structural or functional abnormality, and a left ventricular ejection fraction of at least 50%. The cardiology report(s) will be reviewed by the Medical Assessor for Class 1 and the AME for Class 2. It may be necessary to see the investigations, in which case the actual results will be requested.

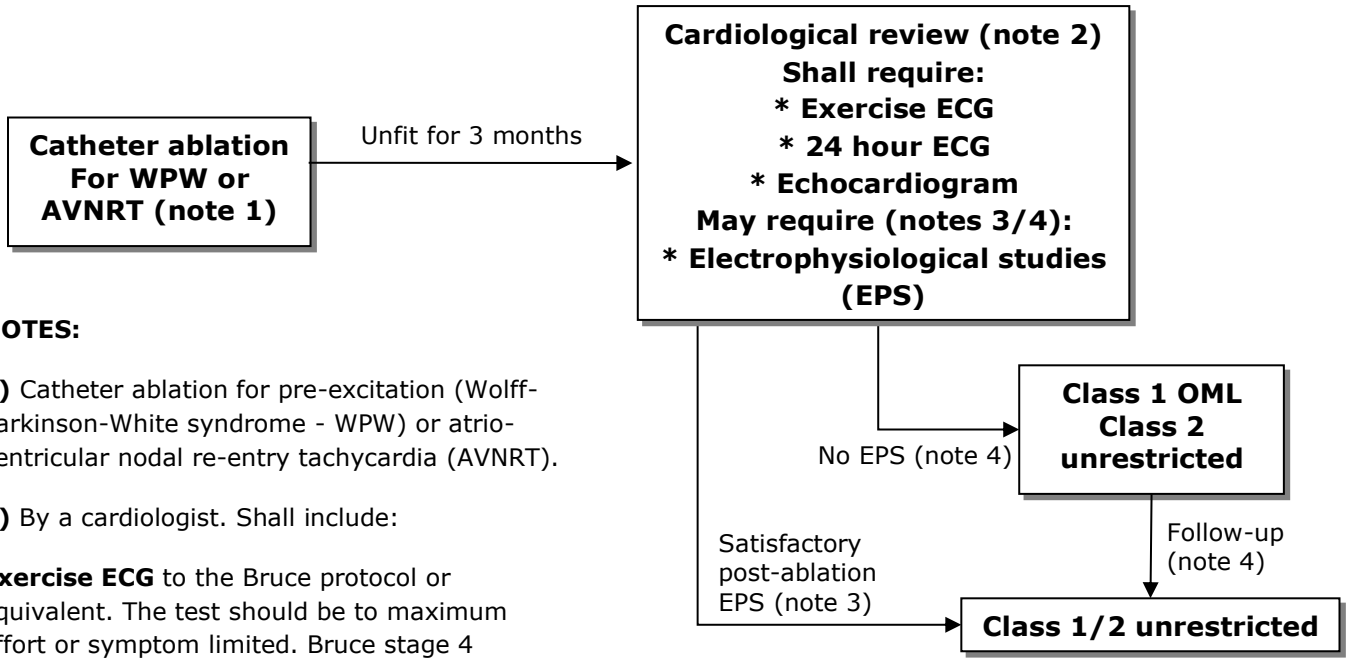
3) Atrial Fibrillation: Post ablation EPS may not predict recurrence and is not a requirement. However, because of the relatively high risk of recurrence, Class 1 applicants require an OML. Unrestricted Class 1 may be considered after 2 years of satisfactory follow up. Class 2 applicants who were symptomatic pre-ablation may need an OSL. Follow-up: usually annual with 24hr ECG.

4) Atrial Flutter: Post ablation EPS (bi-directional isthmus block) will be required in most cases 2 months after the ablation procedure to demonstrate abolition of flutter circuit. Because of the subsequent unpredictable risk of atrial fibrillation, Class 1 applicants shall have an OML for 1 year, which may be removed with a satisfactory review. Unrestricted Class 2 certification may be appropriate, also with annual review.

5) Atrial and Ventricular Tachycardia: Class 1/2 applicants with a pre-ablation history of significant tachycardia (syncope or haemodynamic compromise) will require post ablation EPS to check that tachycardia is no longer inducible. For all applicants (with or without EPS) Class 1 OML and unrestricted Class 2 certification is likely to be appropriate with review at 1 year. If satisfactory the OML can be removed.

In all cases, failure to meet the standards may require OML/OSL and/or extended follow-up.

Flowchart – Catheter ablation for WPW syndrome and AVNRT certification



NOTES:

1) Catheter ablation for pre-excitation (Wolff-Parkinson-White syndrome - WPW) or atrio-ventricular nodal re-entry tachycardia (AVNRT).

2) By a cardiologist. Shall include:

Exercise ECG to the Bruce protocol or equivalent. The test should be to maximum effort or symptom limited. Bruce stage 4 should be achieved and no significant abnormality of rhythm or conduction, nor evidence of myocardial ischaemia shall be demonstrated. Withdrawal of beta blockade or other anti-arrhythmic treatment should be considered prior to the test.

24-hour ambulatory ECG shall demonstrate no significant rhythm or conduction disturbance.

Echocardiogram shall show no significant selective chamber enlargement, or significant structural or functional abnormality, and a left ventricular ejection fraction of at least 50%.The cardiology report(s) will be reviewed by the Medical Assessor for Class 1 and by the AME for Class 2. It may be necessary to see the investigations, in which case the actual results will be requested.

3) Applicants seeking unrestricted Class 1 certification and any applicant (Class 1/2) with a history of significant tachycardia (syncope or haemodynamic compromise) shall have a satisfactory post ablation EPS:

Pre-excitation - No evidence of accessory pathway conduction pre or post isoprenaline/adrenaline. For WPW where antegrade conduction was present pre-ablation, a satisfactory adenosine test may be sufficient.

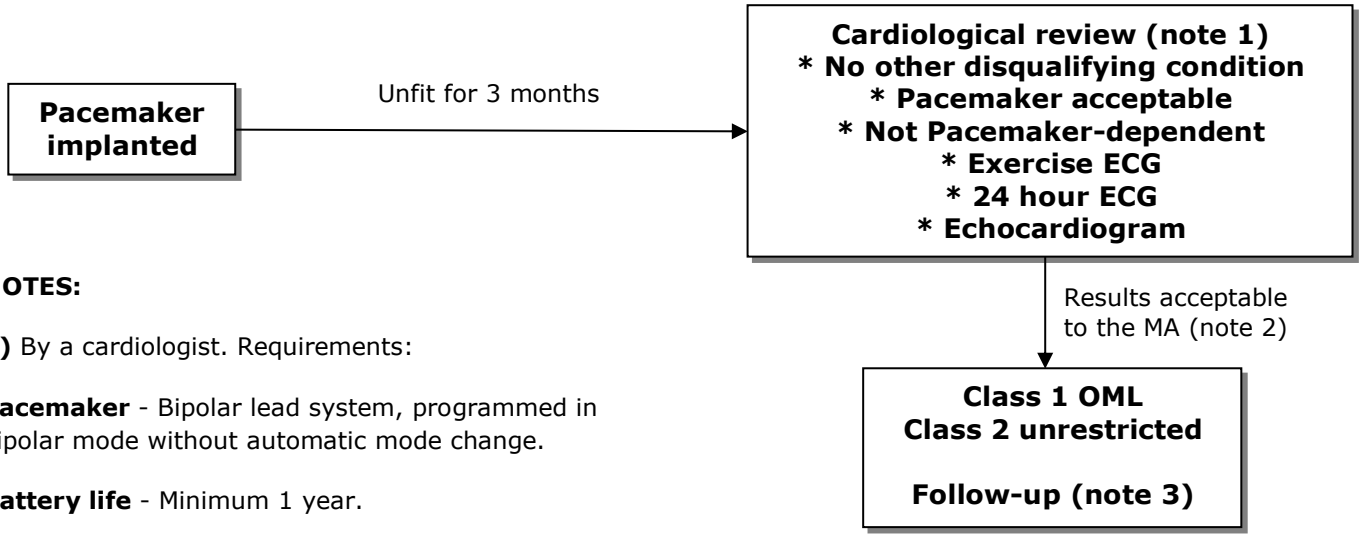
AVNRT - No inducible tachycardia pre or post isoprenaline/adrenaline. Dual pathways and single echoes are acceptable.

Failure to reach these requirements will require a period with an OML/OSL and follow up as in note 4 below.

4) Other Class 1 applicants with satisfactory tests as in note 2 above, who elect not to have a post ablation EPS will require an OML and follow up. Satisfactory review in 1 year should allow unrestricted Class 1 certification.

Other Class 2 applicants who elect not to have a post ablation EPS may gain an unrestricted certificate with satisfactory tests as in note 2 above. Further review may not be necessary. Failure to achieve the requirements may require an OSL.

Flowchart – Implantation of a cardiac pacemaker certification



NOTES:

1) By a cardiologist. Requirements:

Pacemaker - Bipolar lead system, programmed in bipolar mode without automatic mode change.

Battery life - Minimum 1 year.

Exercise ECG to the Bruce protocol or equivalent. The test should be to maximum effort or symptom limited. Bruce stage 4 should be achieved and no significant abnormality of rhythm or conduction, nor evidence of myocardial ischaemia shall be demonstrated. Withdrawal of cardioactive medication prior to the test should be considered.

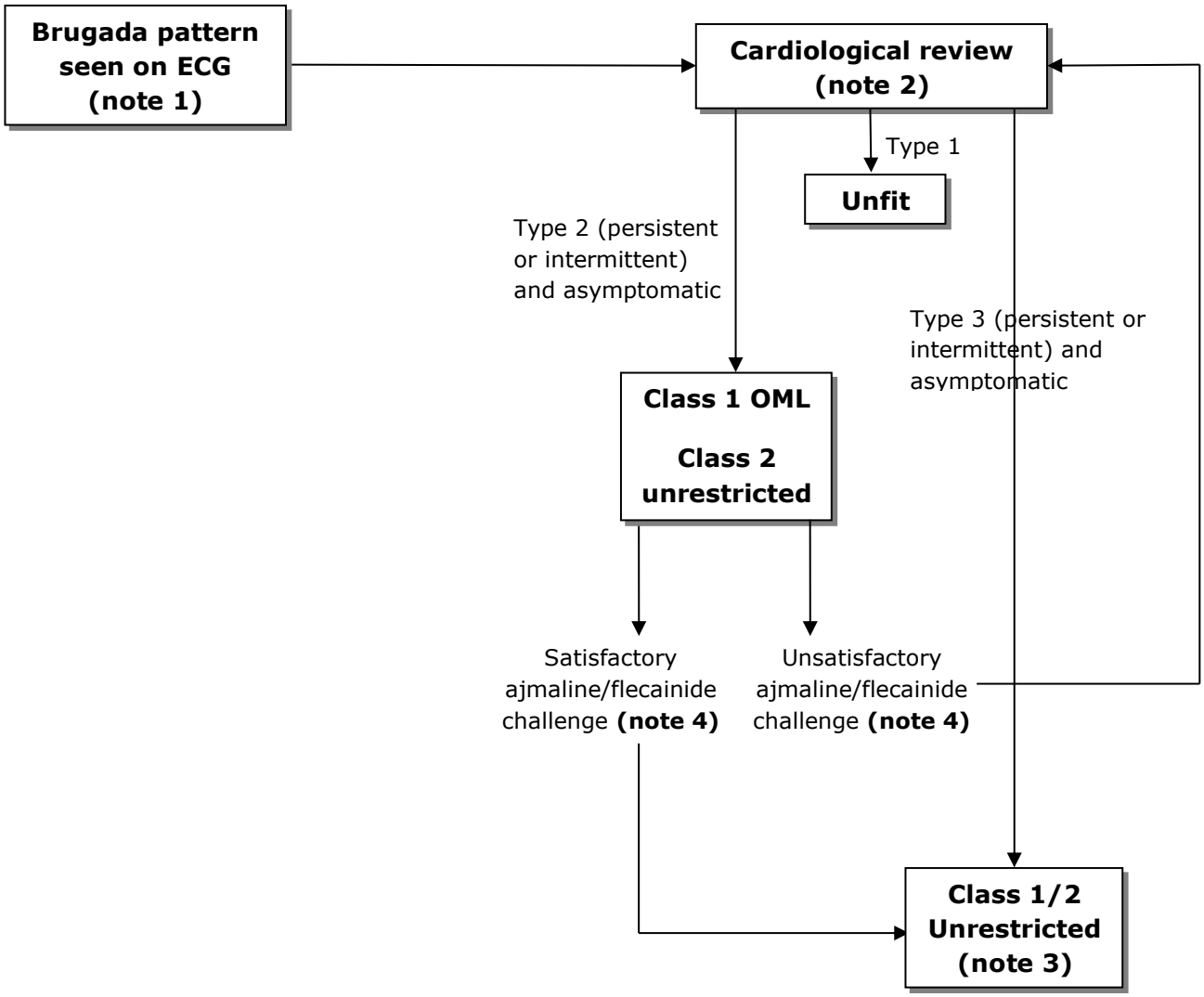
24-hour ambulatory ECG shall demonstrate no significant rhythm or conduction disturbance.

Echocardiogram shall show no significant selective chamber enlargement, or significant structural or functional abnormality, and a left ventricular ejection fraction of at least 50%.

2) For Class 1 applicants, the cardiology report will be reviewed by the Medical Assessor. It may be necessary to see the investigations, in which case the actual tracings/videos will be requested.

3) Follow-up will normally be a minimum of a six monthly pacemaker check and an annual cardiology review.

Flowchart – Brugada certification



NOTES:

1) Diagnostic criteria for Brugada pattern: ST segment abnormalities in leads V1-3.

	Type 1	**Type 2**	**Type 3**
J point	≥2 mm	≥2 mm	≥2 mm
T wave	Negative	Positive or biphasic	Positive
ST-T configuration	Coved type	Saddleback	Saddleback
ST segment (terminal portion)	Gradually descending	Elevated ≥ 1 mm	Elevated < 1 mm

Asymptomatic type 2 cases may continue to fly with Class 1 OML / Class 2 unrestricted.

2) Type 2 and 3 cases need review by a cardiologist. Investigations should include:

- **Exercise ECG:** to the Bruce protocol or equivalent. The test should be to maximum effort or symptom limited. Bruce stage 4 should be achieved and no significant abnormality of rhythm or conduction, nor evidence of myocardial ischaemia shall be demonstrated. Withdrawal of cardioactive medication prior to the test should be considered (not beta-blockade for atrial fibrillation).

- **24-hour ambulatory ECG:** shall demonstrate no significant rhythm or conduction disturbance.

- **Echocardiogram:** shall show no significant selective chamber enlargement, or significant structural or functional abnormality, and a left ventricular ejection fraction of at least 50%.

- **Cardiac MRI:** should exclude ARVD.

The cardiology report(s) will be reviewed by the Medical Assessor. It may be necessary to see the investigations, in which case the actual results will be requested.

3) At least annual ECG. All ECGs performed to be submitted to the Medical Assessor for reading by a CAA-NL cardiologist.

4) Applicants wanting to be considered for unrestricted Class 1 will need to undergo a challenge test consisting of Ajmaline 1mg/kg over 5 minutes intravenously or Flecainide 2mg/kg over 15 minutes (maximum dose 150 mg). Indications for termination are to be determined by the prescriber; they may include:

- Development of Type 1 Brugada ECG
- Greater than or equal to 2 mm increase in ST elevation in patients with Type 2 Brugada ECG
- The development of VPBs or other arrhythmias
- Widening of QRS greater than or equal to 30% above baseline

If acceptable, applicants will be considered for unrestricted Class 1. If Type 1 changes are seen during Ajmaline or Flecainide challenge, the applicant will need to comply with note 2.

MED.B.015 – Respiratory system

Guidance material

Report specifications – Respiratory system

Lung function investigation

Asthma

Pneumothorax

Flowchart – Sarcoidosis certification

Flowchart – Obstructive sleep apnoea (OSA)/OSA syndrome certification

Report specifications – Respiratory system

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**

2. **History**
   - Current/presenting symptoms
     - Shortness of breath, wheeze or bronchospasm, nocturnal symptoms
     - Circumstances surrounding onset, precipitating factors
     - Residual impairment or loss of function
   - Confirmation of any systemic involvement
   - Details of respiratory events within past 5 years (including treatment and admissions)
   - Childhood and other relevant medical history
   - Family history

3. **Examination and Investigation Findings**
   - Clinical findings
   - Standard spirometry and/or lung function investigation
   - Bronchial reactivity/reversibility test (if indicated)
   - Radiology imaging reports (e.g. x-ray, serial imaging if indicated)
   - Other investigations (e.g. bronchoscopy/thoracoscopy if performed)

4. **Treatment**
   - Current and recent past medication (dose, frequency, start date and finish date)
     - Include frequency of bronchodilator use (as applicable)
   - Confirmation no side effects from medication
   - Current and past history of systemic steroids
   - Other treatments must be detailed (BTS guidelines)
     - For OSAS CPAP report included with medical report
   - Surgical reports (where performed)

5. **Follow up and further investigations/referrals planned or recommended**
   - Anticipated follow up/frequency of clinical reviews and investigations
   - Prognosis and risk of recurrence
   - Confirmation of full recovery or remission on maintenance dose of acceptable medication and well controlled at date of report

6. **Clinical Implications**
   - Any concerns regarding disease progression, treatment compliance or risk of sudden incapacity

Lung function investigation

Lung function investigation is required if there is any of the following:

1. Abnormal Lung function

Class 1: FEV_1/FVC <70%
Class 2: FEV_1/FVC <70%

2. History of asthma:

Class 1 current of within last 5 yrs
Class 2 current of within last 2 yrs
Asthma needing regular (>once per 3 months) use of any inhaler

3. Any other indication

Asthma

Initial Class 1 and Class 2 applicants with a diagnosis of asthma require review by a pulmonologist, to include lung function testing and details of medication required.
Class 1 and Class 2 holders with a new diagnosis of asthma require review by a pulmonologist, to include lung function testing and details of medication required.

A history of asthma attacks requiring acute medical intervention/admission within past 5 years for Class 1 and 2 years for Class 2 and/or repeated courses of oral steroids/frequent exacerbations is normally disqualifying.

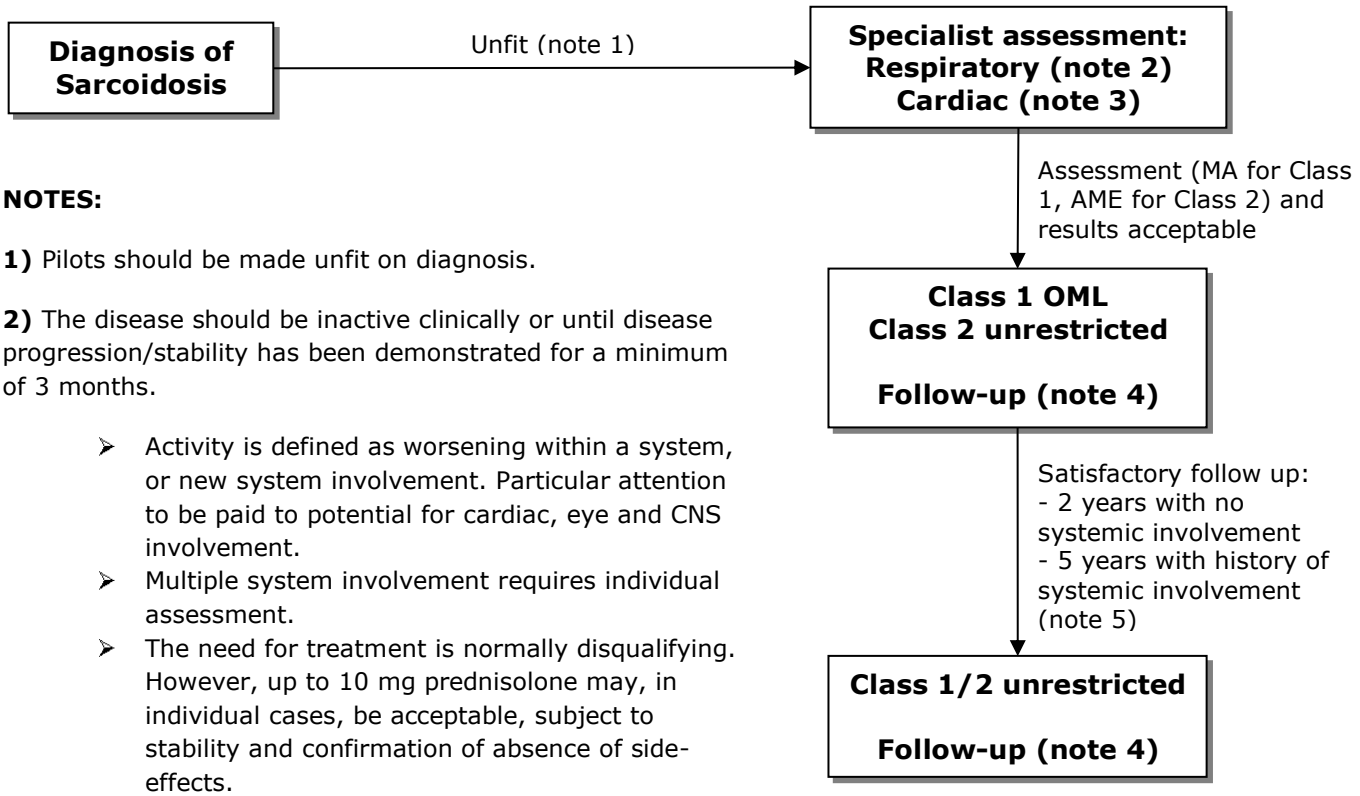
Asthma Medication
Oral steroids are disqualifying for certification. Inhaled beta 2 agonists, anticholinergic medication, corticosteroids, cromoglycate and the leukotriene receptor antagonists, such as montelukast, are acceptable for certification.

Pneumothorax

Acceptable surgical treatment includes thoracotomy, oversewing of apical blebs, parietal pleurectomy and Video Assisted Thoracic Surgery (VATS) pleurectomy.

In case of a **single spontaneous pneumothorax,** a fit assessment may be considered six weeks following full recovery and a satisfactory respiratory evaluation; Class 1 applicants will be assessed as fit with an OML for at least one year due to the possible risk of recurrence.
In case of **recurrent pneumothorax** applicants may be assessed as fit following acceptable surgical treatment and satisfactory recovery.
In case of **traumatic pneumothorax** a fit assessment may be acceptable once full absorption of the pneumothorax is demonstrated.

Flowchart – Sarcoidosis certification



NOTES:

1) Pilots should be made unfit on diagnosis.

2) The disease should be inactive clinically or until disease progression/stability has been demonstrated for a minimum of 3 months.

- Activity is defined as worsening within a system, or new system involvement. Particular attention to be paid to potential for cardiac, eye and CNS involvement.
- Multiple system involvement requires individual assessment.
- The need for treatment is normally disqualifying. However, up to 10 mg prednisolone may, in individual cases, be acceptable, subject to stability and confirmation of absence of side-effects.
- Non-progressive serial imaging, and stable lung function (<10%/yr fall in FVC or <15%/yr fall in gas transfer factor (no lower than 70% of predicted)).

3) Cardiology review to include:

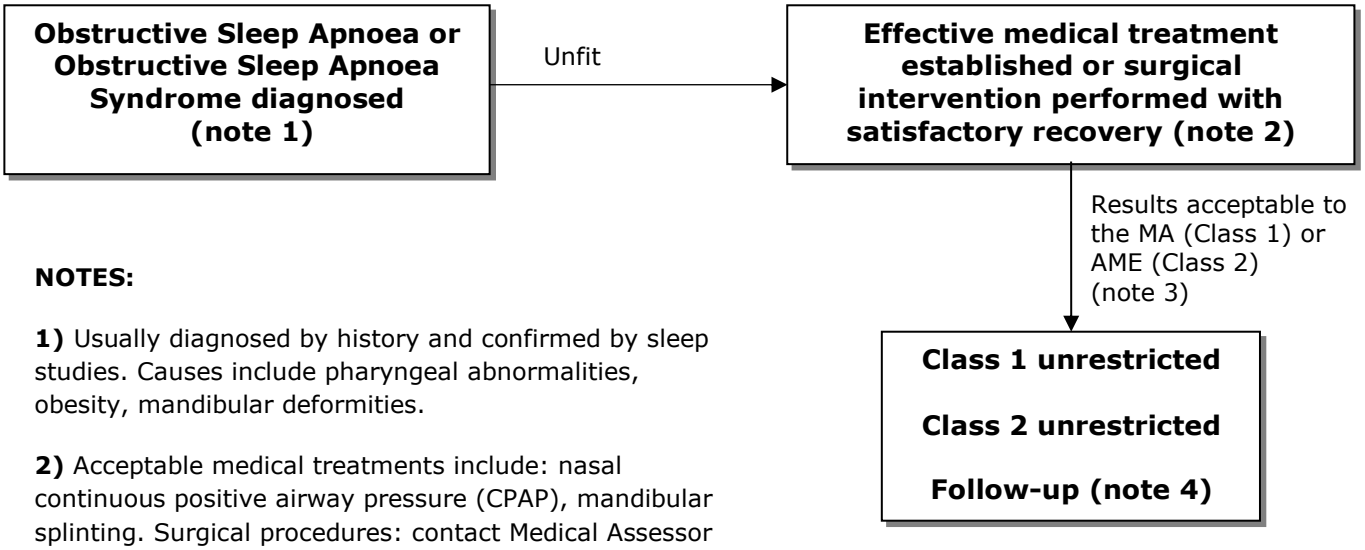
- 12 lead resting ECG;
- 24 hour ECG
- Echocardiogram

Any cardiac symptoms or investigation abnormality will require further evaluation to include cardiac MRI. Evidence of cardiac sarcoidosis likely to cause incapacitation will disqualify.

4) Class 1 follow-up should be 6 monthly for 2 years then annually. Class 2 follow up should be annual. Review to include Chest Xray if clinically indicated, pulmonary function tests, resting ECG and 24hr ECG. Remains fit if <10%/yr fall in FVC or <15%/yr fall in gas transfer factor (no lower than 70% of predicted). Other tests may be indicated. Follow up may cease with resolution of disease and at the discretion of the Medical Assessor.

5) A previous history of systemic involvement includes: skin (except erythema nodosum), bone, eye, heart, central nervous system and lung parenchyma.

Flowchart – Obstructive sleep apnoea (OSA)/OSA syndrome certification



NOTES:

1) Usually diagnosed by history and confirmed by sleep studies. Causes include pharyngeal abnormalities, obesity, mandibular deformities.

2) Acceptable medical treatments include: nasal continuous positive airway pressure (CPAP), mandibular splinting. Surgical procedures: contact Medical Assessor for advice. If CPAP is used, it should be utilised for at least 5 hours per night and for 6 nights per week. It must be used during the sleep period just prior to flight. Full benefit from CPAP usually takes 6 weeks of use. The machine usage report should be assessed by the Medical Assessor (Class 1) or AME (Class 2) with any clinical reports. Applicants with excess cardiovascular risk shall undergo cardiological evaluation.

3) Epworth Sleepiness Scale score should be less than 10. In cases of doubt, a Multiple Sleep Latency Test should be performed.

4) Pilots are not to fly if they experience any problems with their treatment or experience a recurrence of their symptoms and/or an Epworth Sleepiness Scale score is greater than or equal to 10. If CPAP is used, the machine usage report should be submitted to the AME (initially every 3 months for the first year) together with copies of your flying logbook for the same period to demonstrate compliance with (2) above.

EPWORTH SLEEPINESS SCALE

Use the following scale to choose the most appropriate number for each situation: 0 = would *never* dose or sleep, 1 = *slight* chance of dozing or sleeping, 2 = *moderate* chance of dozing or sleeping, 3 = *high* chance of dozing or sleeping.

Situation	**Chance of dozing or sleeping**
Sitting and reading	
Watching TV	
Sitting inactive in a public place	
Being a passenger in a motor vehicle for an hour or more	
Lying down in the afternoon	
Sitting and talking to someone	
Sitting quietly after lunch (no alcohol)	
Stopped for a few minutes in traffic while driving	
Total score (add the scores up)	

MED.B.020 Digestive System

Guidance material

Report specifications - General

Irritable bowel syndrome

Diverticular disease

Peptic ulceration

Inflammatory bowel disease

Certification following surgical procedures of the digestive tract

Guidance Material for liver transplant

Medication used in GI conditions

Report specifications – General

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**

2. **History**
   - Presenting symptoms
   - Nature of condition, circumstances surrounding onset, precipitating factors
   - Other relevant medical history

3. **Examination and Investigation Findings**
   - Clinical findings
   - Impairment or loss of function

4. **Investigation findings**
   - Blood test results (Urea & Electrolytes, liver function tests including GGT, Thyroid function tests, full blood count)
   - Radiology imaging reports (e.g. x-ray, ultrasound, CT, MRI)
   - Histology reports
   - Other procedures and investigation reports

5. **Treatment**
   - Recent, past and ongoing treatment must be detailed
   - Current and recent past medication (dose, frequency, start date and finish date)
   - Confirmation no side effects from medication
   - Surgical reports

6. **Follow up and further investigations/referrals planned or recommended**
   - Anticipated follow up/frequency of clinical reviews and investigations
   - Prognosis and risk of recurrence
   - Confirmation of full recovery or remission on maintenance dose of acceptable medication and well controlled at date of report

7. **Clinical Implications**
   - Any concerns regarding disease progression, treatment compliance or risk of sudden incapacity

Irritable bowel syndrome

Assessment by a consultant gastroenterologist is required to exclude other medical conditions such as inflammatory bowel disease. Underlying stress should be addressed. If symptoms persist, increased physical activity and dietary modification may be helpful. Symptom targeted medication may include antispasmodics, laxatives, antimotility medication and analgesics.
Certification for Class 1 or 2 is possible if symptoms are well controlled with acceptable medication. In intermittently symptomatic cases, an OML may be appropriate for Class 1 certificate holders.

Diverticular disease

Peppermint oil is acceptable for aeromedical certification when symptoms are controlled. If broad spectrum antibiotics are prescribed the licence holder should be considered unfit until the course is completed and symptoms have settled. If there is evidence of bleeding or during episodes of diverticulitis the licence holder is unfit. If colectomy is required for severe complications or failure to respond to medical treatment, the licence holder will be unfit pending full recovery. See also Certification following surgical procedures of the digestive tract.
In intermittently symptomatic cases, an Operational Multipilot Limitation (OML) may be appropriate for Class 1 certificate holders.

Peptic ulceration

Aeromedical certificate holders will be assessed unfit while undergoing H. pylori eradication therapy. Following successful eradication of H. pylori proton pump inhibitors and H2 receptor antagonists are acceptable for maintenance therapy.

Inflammatory Bowel Disease

An aeromedical certificate holder with inflammatory bowel disease is assessed unfit unless the condition is in remission.
For Class 1 the pilot must have been in remission on minimal medication without systemic steroids for six months for aeromedical certification. Initially this will be with an Operational Multipilot Limitation (OML). This limitation can be reviewed after a further 6 months of remission. The applicant should be warned of the risk of significant interruptions in their ability to exercise licence privileges if their condition relapses.

Certification following surgical procedures of the digestive tract

Return to flying following abdominal surgery depends on the pilot being able to sit comfortably for long periods and undertake physical activity such as evacuating the aircraft in an emergency, the risk of complications arising when ready access to hospital care is not available and complications directly due to the aviation environment, the most important being reduced atmospheric pressure. Gas expansion in the gut can cause pain, possibly associated with vasovagal syncope, gut perforation, loss of integrity of surgical repair or anastomosis and acute haemorrhage. Air trapped in the peritoneal cavity following laparotomy is absorbed within one week and carbon dioxide following laparoscopy within 24 hours.

A pilot can normally be considered fit for Class 1 and 2 certification 2-3 months after major abdominal surgery such as hysterectomy or colectomy depending on full symptomatic recovery and satisfactory post-operative follow-up.

Less time is required after laparoscopic procedures because there has usually been less tissue damage. Flying can resume one week after diagnostic laparoscopy if symptoms of the underlying condition permit and 3-4 weeks after more major laparoscopic procedures such as inguinal hernia repair or cholecystectomy. Unrestricted certification may be considered earlier in individual cases pending full recovery.

Following lower gastrointestinal tract endoscopy with biopsy or polypectomy a pilot should not fly for at least 48 hours and should advise their AME of the procedure.

Guidance Material for liver transplant

A fitness assessment will depend on a number of factors and the associated ongoing risks. For Class 1 the highest level of aeromedical certification is with an operational multi-pilot limitation (OML) because of the ongoing risk of complications. For Class 2, 3 and LAPL unrestricted certification may be possible.

The earliest a fitness decision may be considered is 1 year post transplant when postoperative infection and rejection risks have sufficiently diminished and the applicant is likely to be on monotherapy (i.e. stopped oral steroids). LAPL and restricted Class 2 medical certification may be considered earlier, 6 months or more after transplant.

Reports should be obtained from the applicant's consultant specialists (e.g. transplant surgeon and hepatologist) which should include details of:

- Underlying condition causing liver failure and any ongoing risks associated with the condition • Liver function
- Outcome of the transplant procedure and the post-operative period and complications associated with the underlying condition or transplant, including:
  - hepatic artery thrombosis
  - infection post-transplant
  - acute and chronic graft rejection
  - post-transplant lymphoproliferative disorders and other malignancies
- Medication including steroids
- Ongoing follow-up plan

Screening for diabetes and cardiovascular assessment (to include exercise ECG) will also be required prior to recertification and then as part of ongoing follow-up.
Applicants are also likely to have ongoing screening for malignancies. AMEs should assess functional ability following transplant, obtain reports and then for Class 1 applicants refer to a CAA Medical Assessor and for Class 2 and LAPL assess the applicant in consultation with the CAA Medical Assessor.

Medication used in GI conditions

Although some medications may be acceptable while flying or controlling, the underlying medical condition may be disqualifying. Aeromedical advice must be sought following a new diagnosis or recurrence/flare up of a medical condition.

Antacids, simeticone and alginates
These medications are acceptable for the short-term treatment of dyspepsia and acid reflux provided symptoms are well controlled.

H2-receptor antagonists
Cimetidine, ranitidine, famotidine and nizatidine are acceptable for relieving symptoms of gastro-oesophageal reflux disease and as maintenance therapy following H pylori eradication. The licence holder is unfit if there is evidence of peptic ulceration.

Proton pump inhibitors
Omeprazole, lansoprazole, esomeprazole, pantoprazole and rabeprazole are acceptable for relieving symptoms of gastro-oesophageal reflux disease, as maintenance therapy following H pylori eradication and for prevention of peptic ulceration in licence holders requiring long term NSAIDs. The licence holder is unfit if there is evidence of peptic ulceration.

Antiemetics
Cinnarizine or cyclizine can be used for the prophylaxis of motion sickness provided the medication is taken for at least two days when licence privileges are not being exercised without causing sedation or other adverse reactions. The taking of these medications should only be considered in consultation with the AME and absence of side-effects documented. Other indications for antiemetics, including any condition causing nausea, vomiting or vertigo, will require an unfit assessment.

Motility stimulants
Metoclopramide or domperidone may be helpful in dyspepsia and are acceptable provided they are taken for at least two days when licence privileges are not being exercised to ensure no adverse side-effects (including dystonic reactions).

Antispasmodics
Antimuscarinic drugs – atropine, dicycloverine, hyoscine and propantheline are not acceptable for aeromedical certification. While using this type of medication the pilot will be assessed unfit and the medical certificate will be temporarily suspended.
Smooth muscle relaxants - alverine, mebeverine and peppermint oil are acceptable if effective in relieving symptoms associated with irritable bowel disease and diverticulosis while the disease is controlled/quiescent.

Laxatives
Osmotic laxatives – lactulose and macrogol are acceptable.
Stimulant laxatives are not acceptable for aeromedical certification.

Antimotility drugs
Loperamide can be used for control of diarrhoea provided it has been taken for at least two days when licence privileges are not being exercised and has not caused adverse side-effects.
Analgesic opiate medications such as codeine and dihydrocodeine, are incompatible with flying. While using this type of medication the pilot will be assessed unfit and the medical certificate will be temporarily suspended.

Corticosteroids (Prednisolone, beclomethasone, budesonide and hydrocortisone)
Corticosteroids administered orally or rectally, can be effective in the treatment of active inflammatory disease. The use of oral steroids is disqualifying; therefore while using this type of medication the pilot will be assessed unfit and the medical certificate will be temporarily suspended. (Note: certification may in exceptional cases be considered where no more than 7.5 mg prednisolone daily has been prescribed; such cases should be assessed in consultation with the AMS). Recertification can be considered when the certificate holder has been off oral steroid therapy for a minimum of two weeks with no recurrence of symptoms and the condition is confirmed quiescent.
Certification may be considered for applicants who require rectal steroids* to maintain remission, however these applicants are likely to require a longer period of grounding to demonstrate stability and an operational limitation (OML or OSL) may be required (*see Table 1 on Aeromedical certification below).

Aminosalicylates, medications affecting the immune response, and cytokine modulators see Table 1
The certificate holder is unfit on each occasion that a 'flare up' of the condition occurs and must seek aeromedical advice following any change in clinical condition, or medication.
Aminosalicylates (f.e. Mesalazine, Olsalazine, Sulfasalazine) see Table 1
Medication affecting the immune response (f.e. Ciclosporin, Mercaptopurine Azathioprine and Methotrexate) see Table 1
Cytokine Modulators (f.e. Adalimumab, Infliximab) see Table 1
If indicated for the treatment of active inflammatory disease these medications are disqualifying. These medications may be acceptable for maintaining remission of the disease provided the disease is quiescent, the certificate holder does not experience side-effects and regular review is undertaken.

Table 1. Aeromedical certification – Aminosalicylates, medications affecting the immune response, and cytokine modulators*

ACCEPTABLE MEDICATION	Mesalazine, Olsalazine, Sulfasalazine Ciclosporin, Mercaptopurine, Azathioprine and Methotrexate	Adalimumab and Infliximab* Rectal Steroids*
ACTION	Unfit after flare up of condition or starting medication or an increase in dose until: Minimum of 2 weeks on a stable maintenance dose of medication The disease is demonstrated to be stable and well controlled In case of methotrexate dose > 10mg: No side effects and grounded on the day of ingestion/injection	Unfit after flare up of condition or starting medication or an increase in dose until: Minimum of 2 weeks on a stable maintenance dose of medication The disease is demonstrated to be stable and well controlled Adalimumab: Grounded on the day of injection Infliximab: Grounded for 3 days after injection
INVESTIGATIONS	Medical reports and up to date blood test results within normal parameters will be required for aeromedical assessment. Ensure satisfactory symptom control and free of side-effects of medication.	Medical reports and up to date blood test results within normal parameters will be required for aeromedical assessment. Ensure satisfactory symptom control and free of side-effects of medication.
CERTIFICATION	Class 1 Unrestricted/OML Class 2 Unrestricted/OSL	Class 1 OML Class 2 Unrestricted/OSL/OPL
FOLLOW UP	The result of each clinical review should be copied to the AME on an ongoing basis. To continue to maintain certification an assessment of the clinical condition and up to date blood test results must be included in the follow up report/letter.	The result of each clinical review should be copied to the AME on an ongoing basis. To continue to maintain certification an assessment of the clinical condition and up to date blood test results must be included in the follow up report/letter.
ADDITIONAL NOTES	Applicants will be having periodic blood testing (pre-treatment, bi-weekly, monthly, three monthly, and annual), of blood count, liver and renal functioning to identify bone marrow suppression/blood dyscrasias, hepatic or renal impairment, liver cirrhosis and pulmonary toxicity. The results of blood tests which are not within normal parameters must be notified to the AME immediately. **Limitations** Some medications are likely to require a longer period of grounding (*up to 4 weeks) to demonstrate stability and for professional pilots an OML limitation (permitting flights as or with a qualified co-pilot), and for private pilots an OSL (operational safety pilot) limitation may be required.	

MED.B.025 – Metabolic and Endocrine Systems

Guidance material

Benign pituitary tumours Class 1 and 2

Information – Obesity and medical certification

Flowchart - Obesity certification

Information – Thyroid dysfunction certification

Information – Diabetes certification

Report specifications - Diabetes

Benign pituitary tumours Class 1 and 2

Applicants with symptoms and/or on first diagnosis should be assessed as unfit.

A fit assessment can be considered subject to a satisfactory endocrinologist's report and visual fields assessment after 3 months of being stable on treatment.

Annual follow-up with endocrinology report and visual fields is required.

Cabergoline is used for the treatment of **microprolactinomas**. It is acceptable for any Class of certification, providing the pilot has been stabilised on this medication for a period of not less than three months on the ground and has no adverse side-effects from the therapy.

Information - Obesity and medical certification

Obesity is defined as a body mass index (BMI) in excess of 30 by the 'Nederlands Huisartsen Genootschap' (NHG). The NHG guidelines regarding BMI can be found in the NHG-Standaard Obesitas. The BMI is calculated by dividing the person's mass in kilograms by the square of his height in metres. A BMI calculator can be found here. Obesity substantially increases the risk of acute and chronic medical conditions summarised below:

Definition of obesity

Classification	BMI (kg/m^2)
Healthy weight	18.5 – 24.9
Overweight	25.0 – 29.9
Obesity I	30.0 – 34.9
Obesity II	35.0 – 39.9
Obesity III	40 or more

Risks of health problems associated with obesity

Greatly increased risk	Moderately increased risk	Slightly increased risk
Type 2 diabetes	Coronary heart disease	Some cancers
Insulin resistance	Hypertension	Reproductive hormone abnormality
Gallbladder disease	Stroke	Impaired fertility
Dyslipidaemia	Osteoarthritis	Polycystic ovary disease
Breathlessness	Hyperuricaemia (gout)	Low back pain
Sleep apnoea	Psychological factors	Anaesthetic risk

Treatment that affects medical certification

Medication which reduces the absorption of dietary fat, when combined with a change in lifestyle, can be used to treat obesity in individuals with a BMI in excess of 30 or 28 if other risk factors such as hypertension, diabetes or high cholesterol are present. Although sometimes available over-the-counter all treatments should be discussed with your GP or AME. If you do commence treatment you must notify your AME and ground yourself for two weeks to ensure you have no adverse effects from the medication. Side-effects might include flatulence, oily or leaky stools, abdominal pain and bloating, headaches and anxiety. Appetite suppressants are disqualifying for medical certification and are not recommended for the treatment of obesity.

Surgery

Bariatric surgery promotes weight loss by altering the anatomy of the digestive system and limiting the amount of food that can be eaten and digested, for example by a gastric bypass or gastric banding. It is a major procedure that is usually considered as an option if individual's BMI is 40 or more, or between 35 and 40 if other risk factors that could be improved by a reduction in weight are present. Other criteria also need to be fulfilled and this option should be discussed with your AME. If it is deemed acceptable for treatment for you and you decide to proceed, you must notify your AME as you will be assessed as unfit for a period of up to 3 months post-surgery which will be dependent upon the type of procedure performed and your recovery. Endoscopic procedures will significantly reduce this period. Detailed reports will be required to confirm that you have made a full recovery from the procedure, are not experiencing any incapacitating side-effects, and a final assessment with your AME will be required before you can be assessed as 'fit' again. Any other treatment or procedure that you might be considering must be discussed with your AME. See also Certification following surgical procedures of the digestive tract.

Aeromedical considerations

Beside the potential impact to your health, the nature of your operating environment in relation to your BMI should also be considered.

A Medical Flight Test may be required to ensure that you can safely complete your checks, and have full and free movement to reach all switches and controls without any impedance. You will also need to demonstrate that you can sagely and quickly prepare and evacuate the aircraft in case of an emergency. Separate tests may be required if you fly substantially different types of aircraft e.g. a commercial pilot who also undertakes private flying.

Pilots or light aircraft are reminded that crew (and passenger) weights are important factors for aircraft performance and centre of gravity, and that accurate weights should be measured before flight.

Regulatory requirements

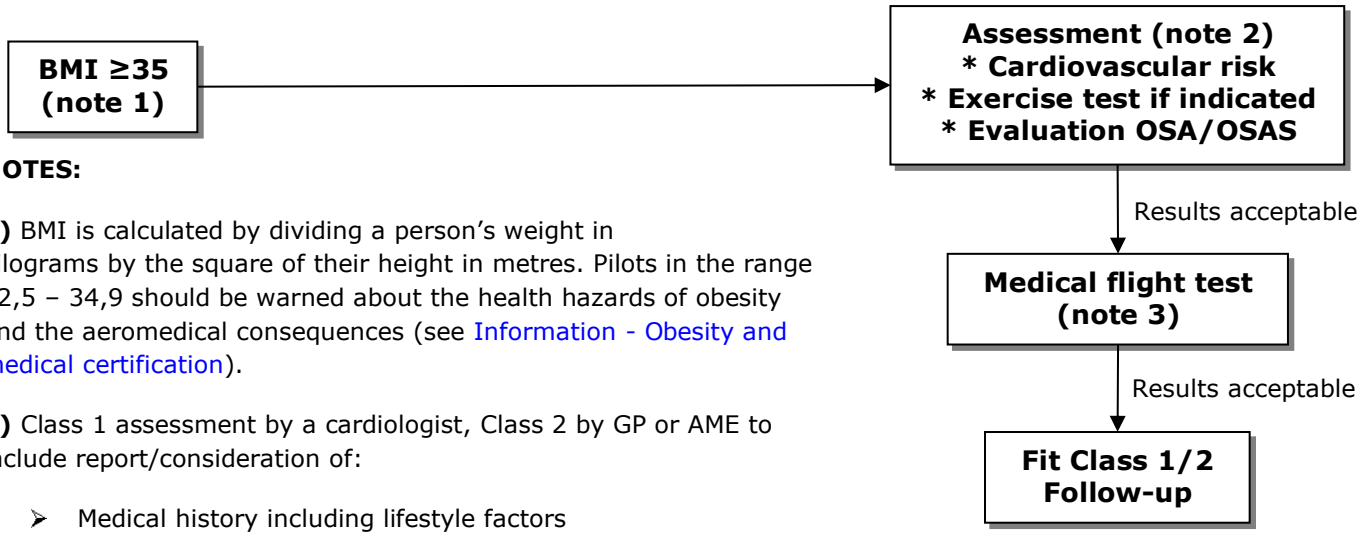
Initial applicants for a medical certificate issue will be referred for further assessment if their BMI is 35 or above. Existing pilots whose BMI exceeds 35 require investigation within 2 months.

- Assessment
  - Medical history & risk factors to include, BMI, waist & neck circumference, lipid profile, blood glucose, urinalysis, blood pressure, Epworth score
  - Class 1: Review by cardiologist to include annual exercise test
  - Class 2/LAPL: AME or GP to investigate include cardiovascular risk score. If risk above 20% in 10 years an exercise ECG is likely to be indicated.

- Medical Flight Test
  - For Class 1 by TRE, Training Captain, or FI(E)
  - For Class 2 or LAPL by CFI or FI(E)

If acceptable, further reviews with either your AME or GP will be required 6 monthly until the BMI falls below 35. Class 1 pilots will require an annual cardiological review to include exercise test. If the BMI increased by 2,5 points since the last medical flight test, the test shall be repeated.

Flowchart – Obesity certification



NOTES:

1) BMI is calculated by dividing a person's weight in kilograms by the square of their height in metres. Pilots in the range 32,5 – 34,9 should be warned about the health hazards of obesity and the aeromedical consequences (see Information - Obesity and medical certification).

2) Class 1 assessment by a cardiologist, Class 2 by GP or AME to include report/consideration of:

- Medical history including lifestyle factors
- BMI
- Waist and neck circumference
- Lipid profile
- Blood sugar
- Urinalysis
- Blood pressure
- Risk of sleep apnoea (see Flowchart Obstructive sleep apnoea (OSA)/OSA syndrome certification)

Cardiovascular risk score should be calculated using appropriate tools, and an annual exercise test performed if risk exceeds 20% in next 10 years.

Pilot must notify AME or referral for investigation and/or treatment.

3) Medical Flight Test Form can be found in the Appendix of this document.
Class 1 with a training Captain or FI(E)
Class 2 with a CFI or FI(E)

4) Follow-up review as above: 6 monthly Class 1, annual Class 2. If BMI increases by ≥2,5 then the Medical Flight test must be repeated.

Information – Thyroid dysfunction certification

1. Initial applicants with an established diagnosis of thyroid dysfunction will have the issue of their medical certificate referred until acceptable reports have been received. On diagnosis of thyroid dysfunction a certificate holder shall be assessed as unfit.

2. A report from an endocrinologist or GP will be required to confirm details of history, investigations, diagnosis and treatment, optimised thyroid function, no side-effects from either the disorder or the treatment and plans for follow-up care.

- **Hypothyroidism**

Any changes in management, including medication changes, must be notified to the AME. If the certificate holder is asymptomatic then no grounding period will be required for minor (up to 25mcg) changes in dose of thyroxine. If any symptoms are present then the certificate holder will be assessed as unfit until symptom free.

- **Hyperthyroidism**
  - Anti-thyroid drugs in the absence if side-effects are not disqualifying
  - Class 1 certificate holders will undergo review with an ophthalmic specialist to ensure satisfactory eye movements and no diplopia. If normal, a fit assessment can be made by the AME, otherwise review by the Medical Assessor will be required. An OML may be required.
  - Class 2 holders will undergo review with an AME to ensure satisfactory eye movements and no diplopia.

3. An annual report as detailed above will be submitted to the AME for review.

4. All changes in management will be notified to an AME and the certificate holder will be assessed as unfit until clinically euthyroid and a satisfactory report has been received.

Thyroidectomy

Following thyroid surgery (complete or partial) the certificate holder will be assessed as unfit. A fit assessment can be made following full surgical recovery, and demonstrated stability of thyroid function. A report from the specialist will be required confirming details of the surgery, recovery and ongoing treatment and confirmation of euthyroid state. Minimum follow up is annual blood test confirming euthyroid status.

Radioactive iodine treatment

The certificate holder will be assessed as unfit until all treatment is complete and a euthyroid state has been achieved. A report from the specialist will be required and should confirm details of treatment and follow-up care including confirmation of euthyroid state. Minimum follow up is for an annual blood test confirming euthyroid status.

Information – Diabetes certification

Abnormal Glucose Metabolism Class 1 and 2
Glycosuria should always be investigated with a minimum of random blood sugar. Symptomatic individuals should have an oral glucose tolerance test.

Class 1 applicants with impaired glucose tolerance should be reviewed annually.
All potentially hypoglycaemic treatment is disqualifying. This includes all insulins, sulphonylureas and glinides.

Applicants with non-hypoglycaemic treatment (includes glitazones, gliptins, incretin mimetics, biguanides, alphaglucosidase inhibitors) can be certified with an OML limitation for Class 1 and unrestricted for Class 2. Diet only treatment can be certified with unrestricted Class 1 and 2.

Surveillance requirements

	Class 1	**Class 2**
Review of clinical reports, data logging of operational blood sugars and review of flying log	Annual AME	Annual AME
Reporting / review of symptoms	Mandatory	Mandatory
HbA1c frequency	Six-monthly	Annual
Renal & liver profiles lipids	Annual	Annual
Diabetology review including: • Symptom review • Cardiovascular status / risk • Nephropathy status • Neuropathy status • Opthalmic screening	Local specialist annual	Local GP or specialist annual
Cardiology review including exercise test	On diagnosis, then: <40 yrs two-yearly >40 yrs annual	If 10 yr cardiovascular risk >20% then annual if 10 yr risk remains >20%

Target ranges for clinical variables

Variable	**Target**	**Review treatment (may need period of unfitness)**	**Unfit**
HbA1c	<8,5 % (<69 mmol/l)	8,5% – 10% (69 – 86 mmol/l)	>10% (>86 mmol/l)
Systolic BP	<140 mmHg	140 – 160 mmHg	>160 mmHg
Diastolic BP	<80 mmHg	80 – 95 mmHg	>95 mmHg
Cholesterol	4,0 – 4,5 mmol/l	>4,5 mmol/l	n/a
Triglycerides	<2,5 mmol/l	>2,5 mmol/l	n/a

Fitness / unfitness status

- Change of non-hypoglycaemic medication type or dose: 2 weeks unfit. Stability should be reviewed/confirmed by GP or AME.
- Episodes of severe hypoglycaemia must be reported and shall entail unfitness. Specialist review will be required before consideration of any resumption of flying.
- Development of any retinopathy requires ophthalmological assessment and is likely to result in further restriction or unfitness if there is any field loss or reduction in visual acuity.

- Presence of significant nephropathy significantly increases cardiovascular risk and is likely to entail unfitness.
- Non-declaration of symptoms, medical history or provision of incomplete testing records/flying logbook is likely to entail unfitness.

Report specifications – Diabetes

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**
   - Type
   - Comorbidities

2. **History**
   - Presenting complaint and symptoms (including date of diagnosis)
   - Nature of condition, circumstances surrounding onset, precipitating factors
   - Number of severe hypoglycaemic episodes in past year
   - Loss of hypoglycaemic awareness
   - Other relevant medical history

3. **Examination and Investigation Findings**
   - Blood tests (as per Diabetes Certification guidance)
     - $HbA1_c$ and glucose
     - Liver and renal function (eGFR)
     - Lipids
   - Confirmation of stable blood sugars, correlated with symptom review
   - Screening for complications
     - Retinopathy (for Class 1 by an ophthalmologist/specialist clinic)
     - Neuropathy
     - Nephropathy
   - Cardiovascular risk assessment confirming no evidence of cardiovascular disease
     - With consultant cardiologist to include an exercise tolerance test to the Bruce Protocol
     - Risk factors including family history, smoking, alcohol and weight
   - Blood pressure within acceptable parameters

4. **Treatment**
   - Recent, past and ongoing treatment must be detailed
   - Current and recent past medication (dose, frequency and start date)
   - Confirmation no side effects from medication

5. **Follow up and further investigations/referrals planned or recommended**
   - Anticipated follow up/frequency of clinical reviews and investigations
   - Confirmation of full recovery or remission on maintenance dose of acceptable medication and well controlled at date of report

6. **Clinical Implications**
   - Any concerns regarding disease progression, treatment compliance or risk of sudden incapacity

MED.B.030 – Haematology

Guidance material

Haemoglobin

Haemochromatosis

Haemoglobinopathy

Thrombocytopaenia

Thrombocytosis

Haemophilias

Von Willebrand disease

Guidance material for applicants considering bone marrow donation (All applicants)

Information – Anticoagulant therapy

Information – Certification after treatment for malignancy of the immune system

Certification following treatment for lymphoid malignancy

Class 1 **Haemoglobin** should be measured at every medical with appropriately maintained and calibrated testing equipment. Abnormalities on near patient testing should be confirmed with a full blood count assessed in a haematology laboratory.

The table below shows the certificatory outcome for both male and female applicants following haemoglobin testing.

Male		**Female**	
Hb	**Outcome**	**Hb result**	**Outcome**
<7,5 mmol/l	Investigation required	<6,8 mmol/l	Investigation required
<7,2 mmol/l	Unfit	<6,5 mmol/l	Unfit
>11,2 mmol/l	FBC to exclude polycythaemia	>11,2 mmol/l	FBC to exclude polycythaemia

Iron Overload Status including Haemochromatosis
An applicant with a diagnosis of Haemochromatosis or other iron overload state should be assessed as unfit. A cardiology assessment is required to include an echocardiogram, Holter and Exercise ECG and ongoing cardiology follow-up is required. Applicants should not fly within 48hrs of having venesection as treatment. Applicants should have normal serum ferritin following treatment.
Unrestricted medical certification can be considered by the Medical Assessor (Class 1) or AME (Class 2), once treatment is stabilised, on receipt of acceptable cardiology and haematology medical reports.
Follow up haematology reports are required on at least an annual basis.

Haemoglobinopathy
Applicants with thalassaemia trait may be assessed as acceptable for unrestricted certification subject to the receipt of a haematology report.
Applicants with sickle cell trait may be assessed as acceptable for unrestricted certification.

Thrombocytopaenia
Applicants with a diagnosis of thrombocytopenia should be assessed as unfit. Medical certification is considered subject to a haematologist report acceptable to the Medical Assessor (for Class 1 applicants) or AME who performed the periodic medical examination (Class 2). Class 1 applicants with thrombocytopenia with a platelet count below 75 x 10^9/l should be assessed as unfit.

Thrombocytosis requires referral to the Medical Assessor.

Haemophilias
Applicants with a diagnosis of Haemophilia A (factor VIII deficient) or Haemophilia B (Factor IX deficient, Christmas disease) should be assessed as unfit. Medical certification is considered for applicants with a diagnosis of very mild forms with >30% coagulation factor subject to a haematologist report acceptable to the Medical Assessor (Class 1) or an AME (Class 2). History of spontaneous bleeding is not acceptable for medical certification.

Von Willebrand disease
Applicants with a diagnosis of Von Willebrand disease should be assessed as unfit. Medical certification is considered subject to a haematologist report acceptable to the Medical Assessor (Class 1) or an AME (Class 2) confirming that the phenotype is mild, that there is no history of significant bleeding and that therapy is not required.

Guidance material for applicants considering bone marrow donation (All applicants)

Once applicants commence pre-donation treatment, a daily injection to increase the number of stem cells in their circulating blood, they should inform their AME and be assessed as unfit.
Treatment usually starts four days prior to the donation itself. Common side-effects of the treatment are bone or muscle pain, nausea, headaches, and fatigue. Less commonly chest pain, insomnia, dizziness, and night sweats have been reported. Donation takes place on the fifth day and may need to be repeated on the sixth day if not enough cells were collected. Bone marrow is collected by one of two methods:

- **Peripheral blood stem-cell donation (PBSC)**
  Stem cells are collected from the circulating blood. No anaesthetic is required. If the applicant feels fully recovered after 48 hours they should contact their AME for advice on fitness to return to operational duties. If there is any doubt about fitness the AME may request a report regarding any side-effects or complications.

- **Bone Marrow Aspiration**
  A syringe is used to aspirate bone marrow from the hip bone and this procedure is usually performed under a general anaesthetic. The applicant may need to stay in hospital for up to 48 hours and is likely to be advised to rest at home for up to 5 days afterwards.

  Once fully recovered the applicant should contact their AME for advice on fitness to return to operational duties. Assessment earlier than 5 days will require the applicant to be seen by their AME. If there is any doubt about fitness the AME may request a report regarding any side-effects or complications.

Information – Anticoagulant therapy

Certification is possible provided that

1. the pilot has recovered from the underlying condition or the condition has been stabilised and does not in itself preclude flying

AND

2. the total incapacitation risk of the medication, the condition for which anticoagulation is indicated and any other conditions is acceptable.

Acceptable DOACs are Dabigatran, Rivaroxaban and Apixaban.

Likely indications for Warfarin and DOACS include:

- Deep Venous Trombosis (DVT) /Pulmonary Embolism (PE): Screening should have been undertaken for underlying causes, including coagulation abnormalities. DVT is likely to be the least problematic for certification. For pilots taking warfarin target INR is normally within the range 1.8-2.5 (with an ideal 2.0-2.3) - see stability requirement below. In all cases of PE follow-up reviews should be with a chest physician and reports should include relevant investigations.
- Atrial fibrillation may be associated with other risk factors, which require assessment using the CHA2DS2Vasc score (See Flowchart – Atrial fibrillation certification)
- Cardiac valve replacement (Warfarin only). The target INR following valve replacement and other co-morbidities should be taken into account. Certification is permitted after an aortic valve replacement but not a mitral valve replacement due to complication risks.

Prior to certification, for pilots taking warfarin, the INR should be demonstrated to be within the target range for 6 months (4 results at 2 monthly intervals) and 2 monthly laboratory testing should be continued on an ongoing basis. If the INR varies considerably within the target range on the initial readings, a longer period of surveillance may be required. Pilots taking DOACs should be free of side effects for a period of 3 months prior to fitness reassessment.
Class 1 applicants treated with warfarin are required to measure their INR on a 'near patient' testing system (such as CoaguChek S) 12 hours prior to flight and only fly if the INR is within the target range. The INR should be recorded in the Log Book. The Log Book should be reviewed at each medical certificate revalidation examination.
For LAPL pilots, a shorter period of stabilisation (6 weeks for DOACs and 4 months for warfarin) may be acceptable provided there are no side effects and there is reliable evidence of INR stability in pilots taking warfarin.

Aspirin and Clopidogrel are acceptable anti-platelet medications.
Anagrelide inhibits platelet formation. Applicants requiring this medication should be assessed as unfit. Medical certification for Class 1/OML can be considered by the Medical Assessor no sooner than 2 weeks after commencing this treatment, subject to a satisfactory haematologist's report to include comment on any side-effects.

Information –Certification after treatment for malignancy of the immune system

All Class 1 assessments shall be referred to the Medical Assessor

Class 2 assessments may be referred to the Medical Assessor by the AME

- Fitness for Class 1 OML is considered equivalent to unrestricted Class 2 certification.
- Class 2 certification with an Operational Safety pilot Limitation (OSL) is possible for all tumour types of the immune system provided the overriding prerequisites for certification have been satisfied.

Introduction

The assessment of an individual's fitness to fly after treatment for a malignancy of the immune system is complex as such tumours are a heterogeneous group and vary markedly in terms of clinical patterns of spread, response to treatment, sites of relapse and prognosis. There are more than 25 diseases Classified as lymphoid malignancies in the current World Health Organization Classification. (Table 1)

Table 1

Modern Classification of malignancies involving the immune system (according to the World Health Organisation)

Precursor cell Lymphoma

- Lymphoblastic lymphoma
  - T-cell
  - B-cell

Peripheral B-cell Neoplasms

- B-chronic lymphocytic leukaemia/small lymphocytic lymphoma
- B prolymphocytic lymphoma
- Lymphoplasmacytic lymphoma
- Mantle cell lymphoma
- Follicular lymphoma
- Marginal zone B-cell lymphoma
  - Extranodal (MALT)
  - Nodal
- Hairy cell leukaemia
- Diffuse large B-cell lymphoma
- Burkitt lymphoma and Burkitt-like lymphoma
- Plasmacytoma and myeloma

Peripheral T and NK Cell Neoplasms

- T prolymphocytic leukaemia
- T cell granular lymphocytic leukaemia
- Aggressive NK cell leukaemia
- Mycosis fungoides and Sezary syndrome
- Peripheral T-cell lymphoma not otherwise characterised
- Angioimmunoblastic T-cell lymphoma
- Extranodal NK/T cell lymphoma of nasal and nasal type
- Enteropathy-type T-cell lymphoma
- Hepatosplenic gamma delta T-cell lymphoma
- Subcutaneous panniculitis-like T-cell lymphoma
- Anaplastic large cell lymphoma (T/null cell)
  - Primary systemic type
  - Primary cutaneous type
- Adult T-cell lymphoma/leukaemia (HTLV1 positive)

Hodgkin's Lymphoma

Legend:
HTLV = Human T-cell Lymphoma/Leukaemia Virus 1
MALT = Mucosa-Associated Lymphoid Tissue
NK = Natural Killer

Prerequisites for certification

A detailed oncology report will be required and the following criteria should be satisfied before certification can be considered:

- Normally a minimum of 6 weeks since completion of radiotherapy. If radiotherapy has been given to the chest and cardiac tissue was included within the radiation field, cardiac evaluation should be satisfactory;
- Minimum of 2 months since completion of chemotherapy (excluding anthracyclines);
- Minimum of 6 months since completion of anthracycline chemotherapy, and cardiac evaluation should be satisfactory;
- Satisfactory haematological parameters Haemoglobin >7,45 mmol/l (male) or >7,14 mmol/l (female), Platelets >100.000/mm³, (or > 50.000 mm³ provided the trend is upwards and thrombocytopaenia is secondary to therapy and not disease), White Cell Count (WCC) > 3.000/mm³ and Neutrophils >1.000/mm³;
- In continuing clinical remission without symptoms of potential flight safety importance;
- No history of central nervous system involvement;
- No continuing side-effects from treatment;
- 6 monthly Full Blood Count (to include WCC and differential) and Biochemical Profile (to include Liver function tests) for 5 years then annually (exception - see group G below);
- Regular clinical follow up is being undertaken and satisfactory reports submitted to the Medical Assessor.

Certificatory assessment

Malignancies of the immune system, including lymphoid leukaemias, may be grouped according to potential for long-term complete remission ('cure') and prolonged relapse-free survival. All assessments are after treatment for primary disease except where specifically stated. A longer time period should normally elapse before returning to flying after treatment for relapse than is required after primary treatment.
The prognosis for some patients within a particular diagnostic category may be very different from the median and an assessment of prognostic factors can allow a more accurate prediction of the probability of relapse-free-survival, event-free-survival and overall survival. These probabilities will change with time as the clinical condition progresses. In addition transformation to a higher grade of lymphoma may occur. Relevant clinical information should be taken into account on a continuous basis when considering fitness for pilot certification.
The 'potential cure' for each group is an 'average' for the diagnoses listed. Within each group an individual may be assessed as having a better prognosis (good prognostic factors) or worse prognosis (adverse prognostic factors) than the 'average'. This may allow an earlier return to certification or delay the return to flying, according to individual circumstances. Relapses may present with an acute incapacitating event such as a retinal bleed, neuropathy, seizure or abdominal pain. However, it is more likely to be associated with symptoms such as fatigue, fever, sweats, headache, nausea, vomiting or diarrhoea. Any of these could adversely affect flight safety.

Certification following treatment for Lymphoid Malignancy

Group	Potential Cure Rates	Diagnosis	Minimum time to certification after completion of treatment	
			Class 1 OML Class 2 unrestricted	Class 1 unrestricted
A	>80%	MZ MALT (stage I/II) DLBC (stage I/II) ALCL (stage I/II) Solitary Plasmacytoma	Once pre-requisites satisfied	2 – 6 months (dependent on type of chemotherapy)
B	50%	Primary Mediastinal Lymphoma	6 months	2 years
C	30%	DLBC (stage III/IV) ALCL (stage III/IV) including ALK negative MZ MALT (stage III/IV)	1 year	2 years
D	30%	Burkitt's/Burkitt-like Lymphoma Pre-B Lymphoblastic Lymphoma/Leukaemia B-cell Lymphoblastic Lymphoma/Leukaemia Multiple myeloma (post BMT-csd)	2 years	3 years
E	10 – 20%	Pre-T ALL Pre-T LBL Mantle cell lymphoma (2 years symptom free)	2 years	3 years
F	<10% and moderately aggressive	Other Peripheral T-cell and NK Lymphoma/Leukaemia Adult T-cell Lymphoma (HTLV+) Mantle Cell Lymphoma Multiple Myeloma (Other) Subcutaneous panniculitis T-cell lymphoma	5 years (see text)	10 years
G	Considered incurable using current therapy but indolent	Follicular Lymphoma SLL B-cell CLL Lymphoplasmacytic Lymphoma T-cell Prolymphocytic Leukaemia T-cell Granular Lymphocytic Leukaemia Hairy Cell Leukaemia MZ B-cell Lymphoma (nodal/splenic)	See text 3months	See text 1 year
H	A miscellaneous group with a generally good prognosis	Primary Cutaneous Lymphoma	Once wound healed	Once wound healed
I	Poor prognosis	Mycosis fungoides/Sezary syndrome	See text	See text
J	>60%	Hodgkin's lymphoma	6 months	2 years

Legend:
ALCL = Anaplastic Large Cell Lymphoma
ALK = Anaplastic Lymphoma Kinase
BMT-csd = Bone Marrow Transplantation – compatible sibling donor
CLL = Chronic Lymphocytic Leukaemia
DLBC = Diffuse Large B-cell Lymphoma
HTLV = Human T-cell Lymphoma/Leukaemia Virus 1
MZ = Marginal Zone Lymphoma
MALT = Mucosa-Associated Lymphoid Tissue
NK = Natural Killer
Pre-T ALL = Precursor T-cell Lymphoblastic Leukaemia
Pre-T LBL = Precursor T-cell Lymphoblastic Lymphoma
SLL = Small Lymphocytic (B-cell) Lymphoma

Group F
Most of these conditions have a very poor prognosis and relapse is common. However, in some, a durable remission may be achieved and individual consideration can be given to cases that have been in continuous remission for 3 years.

Group G
A remission of an indolent lymphoma may be complete or associated with the presence of small amounts of residual disease after treatment. Licence holders with a good partial remission (minor residual bone marrow involvement or a small amount of residual lymphadenopathy present on Computerised Tomography (CT) scan), which is not progressive, may be certificated. Persistent evidence of liver involvement or palpable enlargement of the spleen will disqualify.

Follicular Lymphoma
A monthly full blood count to include a differential white cell count and biochemical profile to include liver function tests is required. Six-monthly follow up is acceptable after 5 years complete remission.

a) Certification after primary treatment
This may be possible if the International Prognostic Index (IPI) is low and there is no evidence of progressive disease.

Class 1 OML at 3 months
Unrestricted at 1 year

Class 2 Unrestricted at 3 months

b) Certification after treatment for relapse
This may be possible if the relapse was only nodal, performance status was good and serum lactate dehydrogenase was normal at the time of relapse. Additionally for Class 1, if the relapse occurred within 3 years of previous treatment, an OML will be applied to the licence. Thereafter unrestricted certification is only possible if sustained remission is achieved (more than 3 years).

Class 1 OML at 3 months
Unrestricted at 2 years (unless initial remission period <3 years)

Class 2 Unrestricted at 3 months

Chronic Lymphocytic Leukaemia/Small Lymphocytic (B-cell) Lymphoma

a) Stable stage A disease – not requiring treatment
Certification is possible as soon as the disease can be shown to be stable and non-progressive.

Class 1 Unrestricted at 3 months

Class 2 Unrestricted at 3 months

b) Certification after treatment
Treatment may be indicated for progressive Stage A (lymphocytosis alone or with a small amount of lymphadenopathy) or Stage B + (with substantial lymphadenopathy, splenomegaly, hepatomegaly or cytopaenias). If a good partial remission is achieved with treatment and there is no evidence of progressive disease, certification may be possible.

Class 1 OML at 3 months
Unrestricted at 1 year

Class 2 Unrestricted at 3 months

Marginal Zone B-cell Lymphoma (nodal/splenic)

Class 1 OML at 2 years
Unrestricted at 3 years

Class 2 OSL once pre-requisites for certification satisfied
Unrestricted at 2 years

Lymphoplasmacytic Lymphoma
Certification is not possible if the performance status is poor at presentation, if two or more cytopaenias are present or there is hepato/splenomegaly.

a) Stable early disease not requiring treatment
Certification is possible if there is low IPI at presentation and the disease can be shown to be stable and non-progressive.

Class 1 OML at 3 months
Unrestricted at 1 year

Class 2 Unrestricted at 3 months

b) Certification after primary treatment
Certification is possible for those who achieve a complete or good partial remission.

Class 1 OML at 6 months
Unrestricted at 2 years

Class 2 OSL once pre-requisites for certification satisfied
Unrestricted at 6 months

Hairy Cell Leukaemia

a) Stable early disease not requiring treatment

Class 1 OML at 3 months
Unrestricted at 1 year

Class 2 Unrestricted at 3 months

b) Certification after primary treatment
Certification is possible for those who achieve a complete or good partial remission following interferon therapy. A relapse less than 3 years after treatment and requirement for chemotherapy will disqualify.

Class 1 OML at 2 months
Unrestricted at 2 years

Class 2 OSL once pre-requisites for certification satisfied
Unrestricted at 2 years

Group H

Primary Cutaneous Lymphoma
When primary therapy or treatment for relapsing lymphoma only involving the skin has been completed, and at least a partial remission has been achieved with recovery from any complications of therapy, unrestricted Class 1 certification is possible.

Group I

Sezary Syndrome and Mycosis Fungoides
This is characterised by involvement of the blood and bone marrow and in view of the poor prognosis requires more careful consideration. In those who achieve a stable, good partial remission following primary treatment certification may be considered.

Group J
Hodgkin's Lymphoma
The overall survival of patients with Hodgkin's Lymphoma depends on stage (10 year survival rate of 95% for stage IA, 60% for stage IV) and prognostic factors at presentation. Adverse prognostic factors include serum albumin <40 g/l, haemoglobin <6,5 mmol/l, <45 years, male, WCC >15,000/mm^3, lymphocytes <600/mm^3.
80% of relapses occur within the first 2-3 years after treatment. Relapses are extremely unlikely to present with symptoms that cause sudden incapacitation.
Substantial improvements in radiotherapy and combination chemotherapy during the late 20th century dramatically increased survival. The use of autologous stem cell transplantation has recently provided a further treatment option for relapse and approximately 50% will achieve prolonged survival using this method.
Long term follow up is important as radiotherapy and chemotherapy both result in an increased risk of second malignancy, either a solid tumour or a further lymphoid malignancy, beyond ten years after treatment. The relative risk is higher for younger patients as malignancy is uncommon in this age group.

Prolonged Long-Term Complete Remission
Unrestricted Class 1 is possible for all tumour types of the immune system if a period of 5 years or more has elapsed since completion of treatment with no evidence of relapse of disease during this period.

Bone Marrow Transplantation
Fitness for recertification after bone marrow transplantation will be dependent on the individual circumstances. Lack of adverse prognostic features and the underlying diagnosis will be important and, in the case of allogenetic transplantation, the lack of continuing graft-versus-host disease or immunosuppression.

Autologous Stem Cell Transplantation:

Class 1	OML at 1 year after transplantation Unrestricted at 2 years after transplantation
Class 2	Unrestricted at 1 year after transplantation

Allogeneic Transplantation:

Class 1	OML at 2 years after transplantation Unrestricted at 3 years after transplantation
Class 2	OSL at 1 year afters transplantation Unrestricted at 2 years after transplantation

Definitions

International Prognostic Index (IPI)
The IPI is the scoring system frequently used as a prognostic indicator for lymphoid malignancies. It takes the clinical features at presentation into account. The overall prognosis is related to the histological diagnosis (World Health Organization Classification) and the IPI. A low score is 0-2, a high score is 3-5.

Prognostic factor	Score	Prognostic factor	Score
Age <60 years	0	Serum Lactate Dehydrogenase High	1
Age >60 years	1	Number of extranodal sites <2	0
Stage I-II	0	Number of extranodal sites >2	1
Stage III-IV	1	Performance status 0-1	0
Serum Lactate Dehydrogenase Low	0	Performance status 2+	1

Staging System
The accepted staging system is a modification of the Ann Arbor staging system.
Stage I 1 lymph node site involved;
Stage II 2 or more lymph node sites involved either above or below the diaphragm;
Stage III Nodel sites involved both above and below the diaphragm;
Stage IV Extranodal sites such as bone marrow, lung and liver involved in addition to the above.
When there is only a single localised extranodal site of involvement such as salivary gland, thyroid, orbit, testis, tonsil, stomach or cervix, the appropriate stage would be annotated with E 'Patients who present with weight loss or fever/sweats are Classified as having B symptoms' (designated B).

Performance Status
0 Fully active
1 Ambulatory
2 Confined to bed/chair <50% of the daytime
3 Confined to bed/chair >50% of the daytime
4 Completely confined to bed/chair

MED.B.035 – Genito-urinary system

Guidance material

Haematuria

Proteinuria

IgA Nephropathy/Thin Basement Membrane Disease

Chronic Renal disease

Polycystic Renal Disease

Acceptable medication for erectile dysfunction

Renal transplant

Information – Medication for Benign Prostatic Hyperthrophy

Information – Medication for the Treatment of Bladder Instability

Flowchart - Abnormal urinalysis certification

Flowchart – Renal stones certification

Haematuria
Please note revised terminology for haematuria: now called 'visible' and 'non-visible' (otherwise referred to as 'microscopic' or 'dipstick positive' haematuria).
Urine dipstick of a freshly voided urine sample containing no preservative is considered a sensitive means of detecting the presence of haematuria.
Routine microscopy for the confirmation of dipstick positive haematuria is not necessary.

Significant haematuria is defined as:
1. Any single episode of visible haematuria
2. Any single episode of symptomatic non visible haematuria (in the absence of a urinary tract infection (UTI) or other transient cause)
3. Persistent asymptomatic non visible haematuria (in the absence of UTI or other transient cause).

'Persistent' is defined as: 2 out of 3 dipsticks positive for non-visible haematuria.
NB: Trace haematuria can be considered as negative although not in the presence of significant proteinuria (see below).

Proteinuria
Trace proteinuria is acceptable except in the presence of trace haematuria. When trace proteinuria and trace haematuria are both present, a repeat test is indicated.
(Note: 24 hour protein collection for the assessment of proteinuria is no longer recommended).
Urine protein: creatinine ratio (PCR) or albumin: creatinine ratio (ACR) is preferred. ACR has the greater sensitivity.

Significant proteinuria is defined as: ACR >30 or PCR >50

IgA Nephropathy/Thin Basement Membrane Disease
Applicants are requested to submit an annual renal review to confirm blood pressure level and no evidence of proteinuria or impaired renal function. A creatinine clearance below 20ml/min is unacceptable for medical certification. If the review is acceptable, the applicant can be assessed as fit for unrestricted certification.

Chronic Renal Disease
Applicants require regular renal review. In the absence of nephrotic syndrome and its associated thrombotic potential, and in the absence of uncontrolled hypertension, unrestricted certification may be

permitted. A creatinine clearance below 20 ml/min is unacceptable for medical certification. An albumin level below 0,52mmol/l (35 g/l) is also disqualifying.

Polycystic renal disease
The diagnosis of autosomal dominant polycystic kidney disease requires an OML for Class 1 certificate holders. Berry aneurysms need to be excluded by means of Magnetic Resonance Angiography and cardiac valve disease (including aortic root dilatation) by means of an echocardiogram. Abdominal aortic aneurysm also needs to be excluded.

Acceptable medication for erectile dysfunction

The main aeromedical concerns are the side effect profile of these drugs which includes colour vision changes in the blue/green and purple spectrum and sudden hearing loss.

Generic name	NL trade name*	Minimum time between dose and flying
Sidenafil	Viagra	12 hrs
Vardenafil	Levitra	12 hrs
Tadalafil	Cialis	36 hrs

*** Other trade names are used outside the Netherlands**

Notes for pilots:
1. You should discuss the appropriate dose with your GP/AME.
2. PDE5 inhibitors should never be taken in conjunction with any other medication without first discussing potential interactions with your GP/AME.
3. Choose an extended off duty period to try the medication for the first time in case of side effects.
4. Side effects that are important for flying include changes in blood pressure, visual disturbance including a change in colour vision, headaches, musculoskeletal pain and a sustained erectile effect with the potential for distraction from the flying task.

5. You should not obtain this medication other than by prescription to ensure product quality. The contents of medication obtained in other ways, in particular over the internet, cannot be assured.

Renal Transplant

Applicants who have undergone a renal transplant are assessed as unfit. Medical certification can be considered 12 months post-transplant. Renal function must be stable with no underlying systemic disorder that is likely to cause sudden change and blood pressure must be within normal limits. The use of approved anti-hypertensive drugs is permitted. Prednisolone doses more than 7.5 mg daily are not acceptable. Levels of anti-rejection drugs must be within therapeutic range to minimize side effects. Cardiovascular risk must be assessed by a cardiologist to include an exercise (stress) ECG. To maintain certification, applicants are required to provide a regular annual renal report. Class 1 holders also require an annual cardiology assessment, including an exercise ECG. Class 1 certificates will be restricted with OML.

Information – Medication for Benign Prostatic Hypertrophy

Acceptable Medication	SELECTIVE ALPHA BLOCKERS - Tamsulosin 400 µg OD - Alfuzosin 10 mg OD	5 ALPHA-REDUCTASE ENZYME INHIBITORS - Finasteride 5 mg OD - Dutasteride 500 µg OD
Action	Grounded for a minimum period of 2 weeks after starting medication or an increase in dose.	Grounded for 48 hours after first dose of medication.
Investigations	Ensure satisfactory symptom control and free of side-effects of medication e.g. headache, dizziness (especially on standing), palpitations, blurred vision. AND AME/GP to document three separate sets of lying and standing blood pressures to confirm absence of postural hypotension.	Ensure satisfactory symptom control and free of side-effects of medication that may affect ability to fly e.g. hypersensitivity reactions, testicular pain.
Certification	Class 1 & 2 UNRESTRICTED	Class 1 & 2 UNRESTRICTED
Additional Notes	1). Once daily formulations permitted only. 2). Combination therapy: An alpha blocker prescribed together with a 5 alpha-reductase enzyme inhibitor is acceptable for unrestricted Class 1 or Class 2 certification, following the alpha blocker policy above.	

Information – Medication for the Treatment of Bladder Instability

Oxybutynin MR (Lyrinel XL)
It is not acceptable for short-term use prior to bladder surgery. Only the sustained-release formulation is permitted.

Tolterodine MR (Detrusitol XL)

Solifenacin (Vesicare)

Darifenacin (Emselex)

Trospium IR and MR (Regurin)

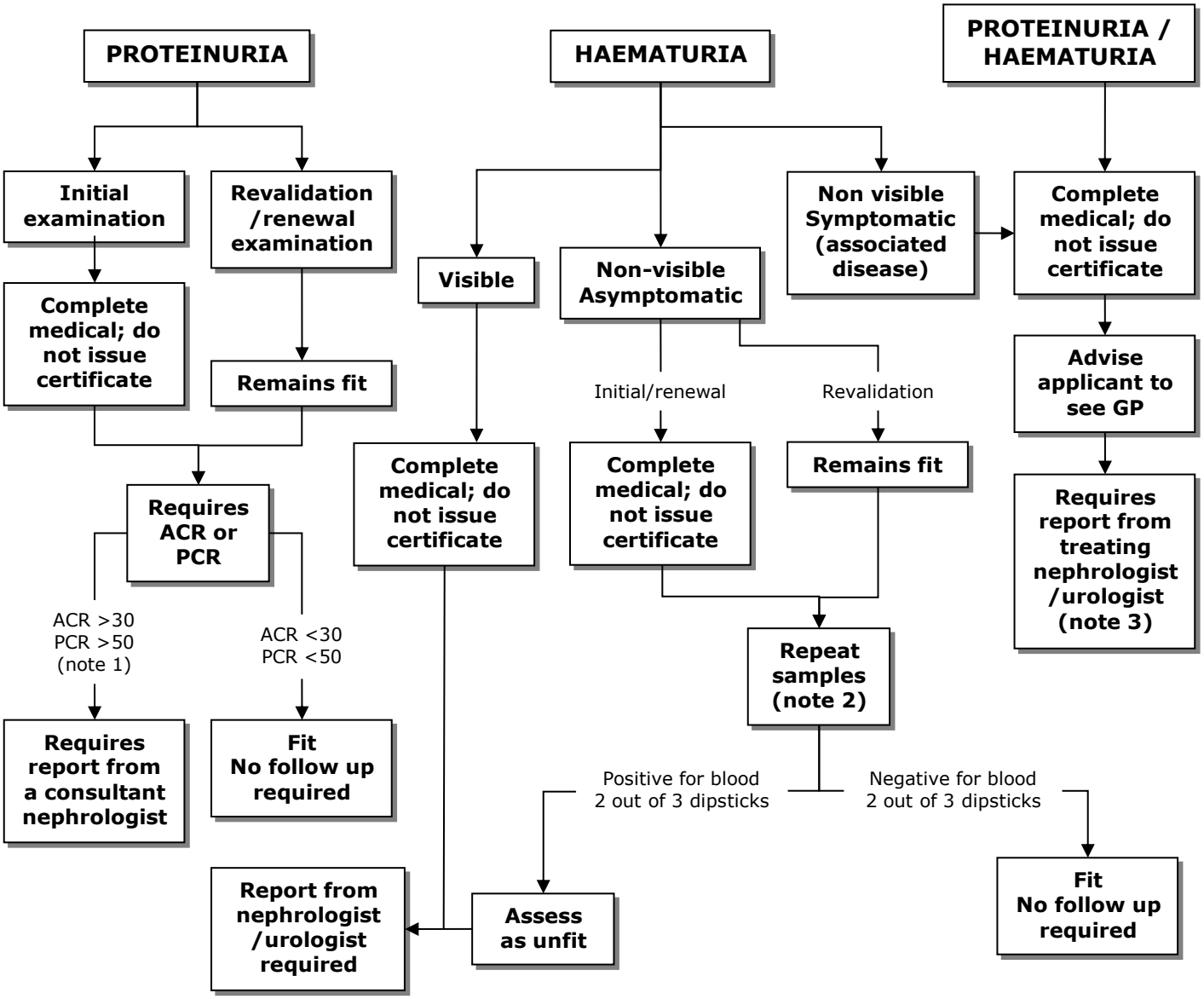
Side-effects to enquire about are mainly anti-cholinergic such as dry mouth, blurred vision and drowsiness. If these do not occur in the first few months they are extremely unlikely to occur later.

Class 1
Unfit for a minimum of four weeks or until a stable dose is achieved with adequate symptom control. OML for at least four months.

If the dose of drug remains stable with satisfactory symptom control and no reported side-effects, then unrestricted certification can be considered at four months. Any change in dosage should entail a grounding period of four weeks followed by reassessment. Pilots should be advised to keep themselves hydrated before and during flights.

Class 2
Unfit for a minimum of four weeks or until a stable dose to achieve with adequate symptom control. If the dose of drug remains stable with satisfactory symptom control and no reported side-effects, then unrestricted certification can be considered at four weeks. Any change in dosage should entail a grounding period of four weeks, followed by reassessment.

Flowchart – Abnormal urinalysis certification



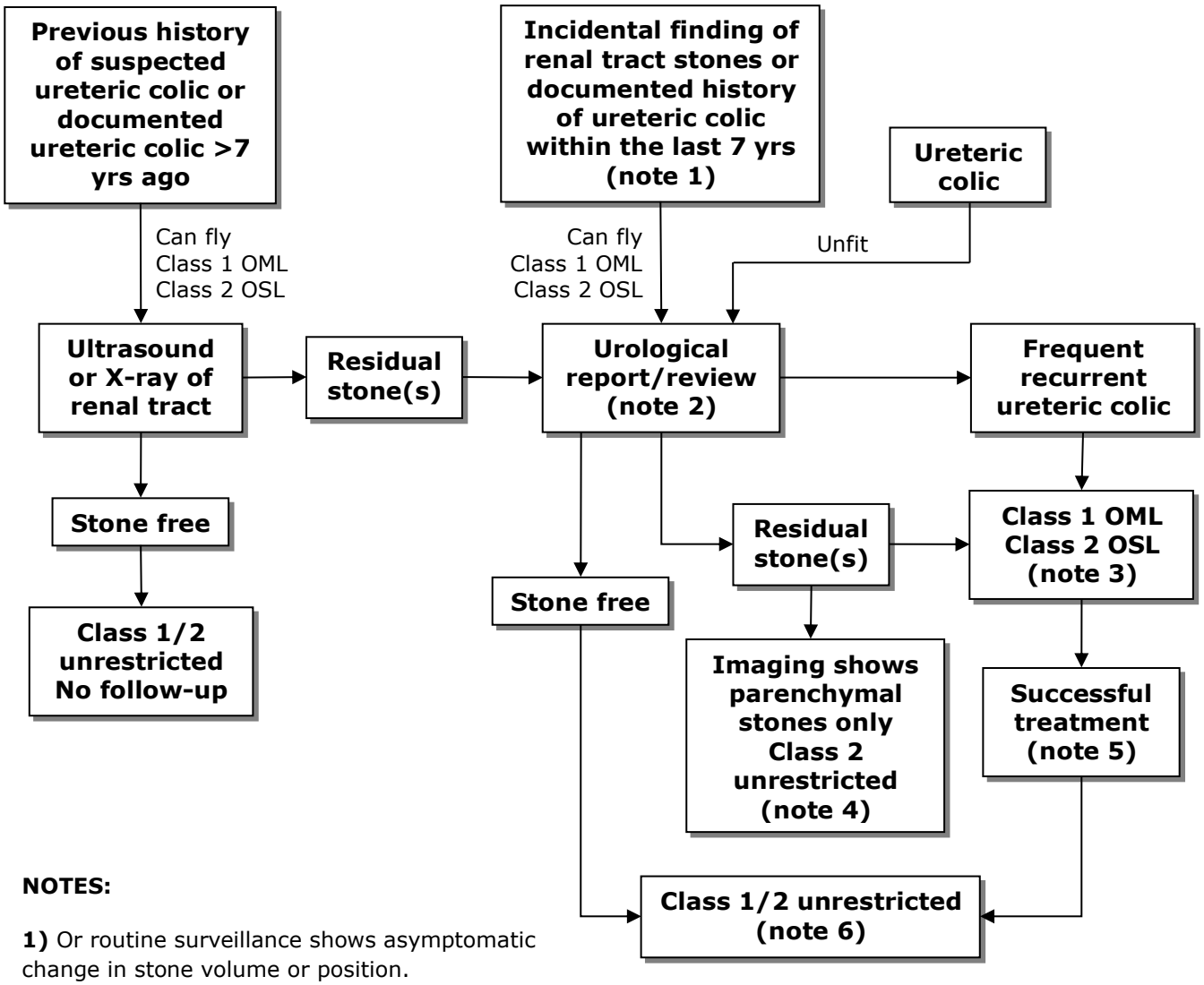
NOTES:

1) PCR >100 mg/mmol or ACR >70 mg/mmol precludes applicants from medical certification.

2) Transient causes of non-visible haematuria should be excluded, i.e. urinary tract infection, exercise induced, menstruation. Repeat samples to be tested within 1 months if pilot to remain fit.

3) For medical certification to be considered a report is required detailing the diagnosis, outcome of any investigations and treatment.

Flowchart – Renal stones certification



NOTES:

1) Or routine surveillance shows asymptomatic change in stone volume or position.

2) To include CT / intravenous urogram / ultrasound / Biochemistry results as appropriate.

3) Applicants with frequent / recurrent stone formation require individual assessment and follow up. In some cases a permanent limitation or unfit assessment may be necessary.

4) If imaging shows stones not in calyces or collecting system, unrestricted certification (Class 2 only) may be considered by the Medical Assessor.

5) Results acceptable and no stones in calyces or collecting system.

6) Surveillance imaging shows no recurrence and/or change in volume or position of stone(s): AXR or Ultrasound of renal tract at years 2 and 7.

MED.B.040 – Infectious diseases

Guidance material

Infectious hepatitis

Interferon

Information – Certification for HIV positive applicants

Information – Pre-Exposure Prophylaxis (PrEP) for the prevention of HIV infection

Information: Malaria

Infectious hepatitis

Hepatitis A
Hepatitis A infection is disqualifying. A fit assessment may be considered once the applicant has become asymptomatic.

Pilots are required to submit a medical report to include:
- History of infection
- Symptoms experienced, course and duration
- Laboratory confirmation of infection (HAV serology)
- Liver Function Tests
- Report of ultrasound of the liver (if performed).

Hepatitis B
Acute hepatitis B is disqualifying. Certification may be considered in pilots in the 'immune tolerant' or 'inactive HBV carrier state' of chronic hepatitis B. Requirement for ongoing treatment is disqualifying.

Pilots are required to submit a report from a liver specialist, to include:

- History of infection
- Symptoms experienced and course of infection
- Liver Function Tests, and markers (e.g.Alpha-foetoprotein (AFP)) where appropriate
- HBV serology including HBV DNA levels
- All Laboratory HBV serology performed
- Report of ultrasound of the liver

Other reports and laboratory testing may be required to assess risk.
Requirement for ongoing treatment is normally disqualifying.

Hepatitis C
Acute hepatitis C is disqualifying. Certification may be considered following successful treatment which has rendered the pilot disease free from chronic hepatitis C.

Pilots are required to submit a report from a liver specialist, to include:

- History of infection
- Current symptoms including any CNS effects
- Stability of condition
- Liver function tests
- All HCV serology performed
- HCV RNA and genotype
- Report of ultrasound of the liver. Report of biopsy results if available.

Pilots may be required to undergo neuropsychological assessment.

Requirement for ongoing treatment is normally disqualifying.

Interferon
Interferon is used for the treatment of active Hepatitis B and C, HIV/AIDs and Multiple Sclerosis.
Interferon is widely documented to have a large number of side-effects. The majority of these side-effects are incompatible with safely undertaking flight duties.
Commonly experienced side-effects include: nausea, vomiting, dyspepsia, diarrhoea, raised serum amylase and lipase, headache, fatigue, dizziness, sleep disturbances; less commonly, thrombocytopenia, rash, alopecia.
Interferon is also associated with psychiatric health problems including an increased risk of suicide, although some authors are not sure whether this is due to the medication or the underlying disease. Some authors noted that side-effects occurred in virtually all patients treated with peginterferon and ribavirin.
A study published in AIDS Care in 2007 reported that a large number of patients treated with interferon developed neuropsychiatric side effects. All those affected reported that they became symptom free after cessation or completion of treatment.
Therefore a requirement for, or treatment with, Interferon is disqualifying for aeromedical certification.

Information – Certification for HIV positive applicants

Following diagnosis or on declaration of HIV infection, the pilot should be declared unfit until reports have been obtained from the reviews described in **(a)** to **(e)** below. These can be used to assess functional fitness and the prospective incapacitation risk.

(a) HIV Specialist Review

An accredited HIV specialist should undertake this review. The report submitted should include:

- A history of infection
- Current symptoms
- Stability of the condition
- History of AIDS defining opportunistic infections or associated illnesses
- CD4+ T cell counts and viral load measurements
- Medication and start dates (describing side-effects if any)
- Results of co-infection testing (including Hep B/C, Cytomegalovirus, Toxoplasmosis and, in at risk cases, tuberculosis)
- HT, Urea and electrolytes, Liver function tests, fasting glucose and lipids

(b) Neurological Review

Assessment should be undertaken to look for neurological sequelae either of HIV positivity or therapy by an HIV specialist or neurologist.

(c) Neuropsychological Review

The pilot should undertake a baseline neuropsychological assessment. The tests should assess timed psychomotor tasks and memory tasks which require attention, learning and active monitoring or retrieval of information. These baseline tests may be used as a future comparator.

(d) Psychiatry Review (if clinically indicated)

Assessment should be undertaken by a consultant psychiatrist with particular attention paid to the psychiatric symptoms and signs related to HIV seropositivity and or Anti Retroviral Therapy (ART). There is evidence in the immediate post diagnosis phase of a higher risk of developing a depressive illness. Some medication may also have side-effects such as mood changes and/or depressive illness. An initial assessment of these conditions can be made by the treating HIV specialist with a further assessment by a psychiatrist if indicated.

(e) Cardiology Review (if clinically indicated)

Lipodystrophy and metabolic syndrome may arise as an interaction between HIV disease and or immune recovery and ART. This may manifest as a dyslipidaemia with raised total cholesterol, low HDL cholesterol and raised Triglycerides or insulin resistance and hyperglycaemia. Cardiology review is required in the presence of significant cardiac risk factors e.g.:

- Hypertension
- Family history
- Smoking
- Raised Lipids
- Diabetes
- Age
- Evidence of Left Ventricular Hypertrophy

Aeromedical Certification Assessment

Pilots whose condition is stable, asymptomatic, with an acceptable CD4+ count and viral load, with acceptable co-infection serology and therefore an acceptable risk of disease progression may be considered for a Class 1 with an Operational Multi-pilot Limitation. These applicants should be referred to the Medical Assessor. Class 2 applicants who are similarly well and have an acceptable risk of disease progression can be considered in consultation with the Medical Assessor.

Medication

All medications should be discussed with the AME or Medical Assessor.
Certificate holders should be declared unfit whilst initiating, modifying or discontinuing antiretroviral treatment (ART) and may be reassessed after a period of 2 months, although in some cases it may be at least 6 months before recertification, by means of a report from their treating HIV specialist, to include recent CD4+ counts and viral loads and confirmation of an absence of ongoing side-effects from medication or symptoms related to HIV seropositivity.

Follow Up

3 monthly	Viral loads and CD4+ count (can be submitted as part of a 6 monthly report from HIV specialist to include neurology review, if applicant remains stable with no symptoms related to infection or treatment).
6 monthly	Report HIV specialist with neurology review - see **(b)** above. If on ART, blood results should include Liver function tests and HT.
12 monthly	If on ART, blood results should include lipids and fasting glucose.

Frequency of follow up may be reduced if indicated by HIV specialist and based on (international) HIV guidelines.

Cognitive Function Assessments

(can be Licence Proficiency Check or Medical Flight Test with Flight Examiner where risk of disease progression is low). Impaired performance will require further neuropsychological assessment to be compared with baseline testing. Any deficits will require that the pilot is declared unfit.
Further co-infection testing will be required as clinically indicated, and those with positive tests need to be referred to the Medical Assessor in the case of Class 1 certificate holders or assessed in consultation with the Medical Assessor in the case of Class 2 certificate holders.
New symptoms or results outside acceptable limits are likely to lead to an unfit assessment and should be referred to/assessed in consultation with the Medical Assessor in accordance with the Class of certificate held.

Information – Pre-Exposure Prophylaxis (PrEP) for the prevention of HIV infection

Emtricitabine/tenofovir disoproxil has now received European marketing approval for prevention of HIV in combination with other measures, because of a number of trials demonstrating considerable clinical effectiveness at preventing HIV infection.

PrEP may be taken as a daily dose or dosing around sexual activity (so called "EventBased" or "on-demand" dosing). Side effects such as headache, nausea/vomiting or diarrhoea may occur soon after commencing medication but will tend to subside within a few days. As a result, some people may opt to take medication continuously, although EventBased Dosing (EBD) reduces the risk of renal toxicity that might arise from the drugs used for PrEP.

Prior to commencing PrEP, people should have a baseline assessment of renal function with a creatinine clearance above 80ml/min. In individuals without risk factors for renal disease, it is recommended that renal function is monitored after two to four weeks of use, after 3 months of use and every 3-6 months thereafter. Hepatitis B status is also assessed (either evidence of vaccination or testing negative) and Hepatitis B vaccination is advised where appropriate.

Certificatory Guidance

- Applicants should be assessed as unfit for aeromedical certification or have their medical certificate suspended when starting PrEP.
- Fitness can be reassessed 7 days after starting continuous PrEP or for EBD, with tenofovir and emtricitabine, after at least 2 doses taken at least a week apart with no evidence of disabling side-effects (fit 2 days after second dose if no side-effects and should report any side-effects associated with future doses). Applicants should provide their AME with a copy of the baseline assessment results for renal function (e.g. creatinine clearance).
- Applicants should provide a copy to their AME of their monitoring results assessed 3 months after commencing PrEP.
- Applicants should continue to undertake 3-6 monthly monitoring and inform their AME if there are any abnormalities associated with the monitoring tests (e.g. renal function) and associated STI follow-up.

It is recommended that people taking PrEP engage with general practitioner or GGD to ensure HIV testing and testing for other Sexually Transmitted Infections (STIs) every 3 months.

Information - Malaria

The majority of malaria cases involve travellers. to West Africa. Malaria is in essence a preventable disease. Unfortunately, each year there are several deaths associated with malaria and a number of patients develop ongoing serious health problems (malaria of the brain, enlargement of the spleen etc.) It goes without saying that anyone with acute malaria will be unfit to exercise the privileges of their medical certificate, but there are also potential issues for fitness to fly related to chemoprophylaxis.

Malaria precaution ABC

The 3 cornerstones (ABC) for the management of the risk of malaria infections are:

Awareness

Recognition that Malaria is a serious and preventable disease. Increased awareness raises compliance with preventative measures and ensures that those who develop symptoms of the disease seek early treatment:

- a high temperature (fever) of 38°C (100.4F) or above
- sweats and chills
- generally feeling unwell
- muscle pains
- headaches
- cough
- diarrhoea

This includes that air crew, who recently (up to 3 months ago) visited areas affected by malaria, make health care staff aware of this risk.

Bite prevention

Prevention is better than cure.

- The use of repellents – DEET based repellents are the most effective
- Use of insecticide to kill any mosquitoes present in accommodation
- Use of mosquito nets – impregnation with repellents increases their effectiveness by 50%
- Wearing of appropriate (long-sleeved) clothing and the impregnation of clothes with repellents
- Use of room protection (air conditioning and ceiling fans)

Chemoprophylaxis

Medication which prevents exposure to malaria from becoming an infection. Malaria prophylaxis should normally be started before travelling to affected areas, taken throughout the stay in the area and, depending on the specific medication being taken, for up to 4 weeks after leaving countries where malaria is present.

Mefloquine (Lariam®) is not compatible with flying duties.

Other medication used for prophylaxis is safe to take from an aero-medical perspective but individual tolerance to, and absence of, side-effects incompatible with aviation duties has to be established.

Advice on the appropriate prophylactic medication regimes for individuals needs to be sought from appropriate sources GGD and Landelijk Coördinatiecentrum Reizigers (LCR) which will take into account the traveller's individual health needs and the area of intended travel.

As fake medication is in circulation both on the internet and abroad. The advice to travellers is to obtain medication by prescription.

The following **do not work** for the prevention of malaria: homeopathic remedies/herbal remedies/electronic buzzers/vitamin B supplements/garlic/Marmite/bath oils.

Summary

- Malaria remains a serious risk to international travellers
- All aircrew should take sensible precautions – ABC see above
- Up to date advice on preventative medication should be sought from health care providers (HPC) who have expertise in infectious diseases and knowledge of the aviation environment.
- Aircrew developing symptoms of malaria during their stay in malaria-affected areas or upon their return should seek urgent medical advice and inform their HCP of their visit to such an area.

MED.B.045 – Obstetrics and Gynaecology

Guidance material

Polycystic Ovary Syndrome (PCOS)

Endometriosis

Hormone Replacement Therapy

Gynaecological Surgery

Menorrhagia

In Vitro Fertilisation

Miscarriage or termination of Pregnancy

Information – Pregnancy and Flying

Polycystic ovary syndrome
Ongoing medical certification is subject to a specialist gynaecologist report. This should include a cardiovascular and metabolic risk assessment and review of any symptoms of obstructive sleep apnoea syndrome(OSAS). A diagnosis of cardiovascular, metabolic disease or OSAS entails unfitness and risk factors should be addressed.

Hormone manipulation therapy is acceptable subject to confirmation of no side effects and adequate symptom control.

Note: Metformin & thiazolidinediones are unlicensed for use in PCOS and may only be used in consultation with the Medical Assessor on a case-by-case basis.

Endometriosis
Applicants with a first diagnosis of endometriosis should be assessed as unfit. Recertification is considered subject to a specialist gynaecologist report. Recertification is considered if the applicant is symptom free, on minimal analgesics and/or has minimal side effects from hormone manipulation therapy. Surgery entails unfitness (See below).

Hormone Replacement Therapy
Applicants undergoing, or changing, hormone replacement therapy (HRT) should refrain from flying/controlling for at least 2 weeks to ensure they have no side effects from the medication. Failure to control symptoms of concern should entail unfitness until stability on appropriate medication is achieved. A report from a gynaecologist or General Practitioner (GP) which should include a cardiovascular risk assessment, confirmation of no side effects of therapy and adequate symptom control, should be reviewed by the AME.

Gynaecological Surgery
Return to flying following gynaecological surgery depends on the pilot being able to sit comfortably for long periods and undertake physical activity such as evacuating the aircraft in an emergency, the risk of complications arising when ready access to hospital care is not available and complications directly due to the aviation environment, the most important being reduced atmospheric pressure. Air trapped in the peritoneal cavity following laparotomy is absorbed within one week and carbon dioxide following laparoscopy within 24 hours.

A pilot can normally be considered fit for Class 1 and 2 certification 2-3 months after abdominal hysterectomy and 4-6 weeks after vaginal hysterectomy depending on full symptomatic recovery and satisfactory post-operative follow-up.

Less time is required after laparoscopic procedures because there has usually been less tissue damage. Flying can resume one week after diagnostic laparoscopy if symptoms of the underlying condition permit and 3-4 weeks after more major laparoscopic procedures such as hysterectomy, depending on full symptomatic recovery and satisfactory post-operative follow-up.

A minimum period of 1 week should elapse after a Dilatation and Curettage (D&C) or hysteroscopy.

Menorrhagia
Applicants requiring specialist investigation for menorrhagia should be assessed as unfit. Recertification is considered subject to a satisfactory specialist gynaecologist report. The applicant should be symptom free and/or have minimal side effects from hormone manipulation therapy. Haemoglobin should be within normal limits. Surgery entails unfitness until symptom-free following recovery (See above).

In Vitro Fertilisation
Applicants undergoing a first cycle of IVF should be declared unfit. Recertification may be considered subject to an acceptable specialist gynaecologist report. The report should confirm no evidence of continuing ovarian hyperstimulation or other associated side effects and intended future management including medication. The applicant should remain assessed as unfit if pregnancy is confirmed.
Periods of unfitness for subsequent cycles should be determined according to the issues experienced during previous cycles.

Miscarriage or termination of Pregnancy
Applicants who suffer a miscarriage or have a termination of pregnancy should be assessed as unfit. Recertification is considered subject to a General Practitioner or gynaecologist report. The report should confirm they have fully recovered, with no residual symptoms, a normal haemoglobin and comment on psychological status. Before returning to flying Class 1 applicants should undergo an assessment by their AME of their psychological state.

Information – Pregnancy and flying

Pregnancy is a normal physiological process, but is accompanied by major anatomical and hormonal changes, that increase the risk of disability correspondingly. The pregnant pilot must also consider the cumulative effects of pressure changes and radiation exposure on the developing fetus, although they are not directly relevant to flight safety.

Flying is a demanding task, changes due to pregnancy which normally cause only inconvenience can have significant safety implications in the aviation environment.

A pilot should ground herself and notify a specialist in aviation medicine should she feel unwell or if any of the following occur during the period when flying is permitted (up to the end of the 26 week of pregnancy*). Medical advice should be sought from your doctor or midwife:

1) Faintness, dizziness or vertigo

2) Nausea or vomiting

3) Anaemia (Haemoglobin 6.2 mMol/L or less)

4) Glycosuria or proteinuria (Sugar or protein in urine)

5) Urinary tract infection

6) Any kind of vaginal bleeding (including "spotting")

7) Abdominal pain

8) High blood pressure

It may be helpful for you to give ~~one~~ a copy of this Information sheet to your midwife or doctor for inclusion in your notes.

* Class 1 pilots with OML

MED.B.050 – Musculoskeletal system

Guidance material

Arthritis

Ankylosing spondylitis

Examination of the musculoskeletal system

Information – Examination of the musculoskeletal system

Report specifications – Musculoskeletal

Information – Assessment of prosthetic limbs

Information – Certification of pilots with a musculoskeletal disability

Information - Medications used in musculoskeletal conditions

Arthritis
Inflammation or degenerative disease of joints causes pain and swelling which may interfere with the safe operation of an aircraft. Applicants with arthritis presenting for initial medical certification may be assessed fit if their condition is in remission or their symptoms are under control with acceptable medication but should be warned that they may have to be assessed unfit if their medical situation changes. Applicants presenting for recertification should be pain free and have a satisfactory range of movements and strength.

Ankylosing spondylitis
Ankylosing spondylitis is a chronic autoimmune inflammatory arthritis mainly affecting the spine and sacroiliac joints, with pain, restricted movement and permanent skeletal deformity. It is commonly associated with iritis and uveitis causing pain, impaired vision and photophobia, and with fatigue. It is progressive and all aviation licence holders suffering from the condition will require frequent assessment of musculoskeletal function to ensure they can sit comfortably in an acceptable posture with a range of pain-free movement sufficient to keep a satisfactory lookout, monitor the instruments and operate the controls safely. Moderate to severe cases have an increased risk of fracture (e.g. following an accident or heavy landing) and this should be considered by AMEs during their assessment. All cases where there is evidence on examination of limitation of movement should undergo a medical flight test with a CAA Flight Instructor Examiner (Class 2) or Training Captain (Class 1). Episodes of inflammatory eye disease will entail an unfit assessment.

Examination of the musculoskeletal system
At routine medical examination much information on musculoskeletal function is obtained informally by observation of the applicant as they walk, sit, climb onto the examining couch etc. At the initial examination, following musculoskeletal injury or if there is any other reason to suspect impaired function, formal examination is required. This will include, as a minimum, demonstration of a satisfactory range and strength of neck and limb movement, of stability of joints likely to be subjected to prolonged or sudden

stress and the absence of pain or medication side-effects likely to affect concentration or judgement. More detailed examination will be required for applicants with musculoskeletal disease/injury and supplementary notes can be found in: Information – Examination of the musculoskeletal system.

The Medical Flight Test Form can be found in the Appendix of this document.

Information – Examination of the musculoskeletal system

To perform the tasks involved in inspecting, flying and evacuating an aircraft safely and effectively a pilot must be free of pain and have sufficient strength and range of movement in the spine and limbs.
At routine medical examination information on musculoskeletal function is obtained informally by observation of the applicant as they walk, sit, climb onto the examining couch etc. At the initial examination, following musculoskeletal injury or if there is any other reason to suspect impaired function, formal examination is required. This will include, as a minimum, demonstration of a satisfactory range and strength of neck and limb movements, of stability of joints likely to be subjected to prolonged or sudden stress and the absence of pain or side effects of medication likely to affect concentration or judgement.
Neck movement is essential to keep a satisfactory lookout and the initial applicant must show a good range of flexion, extension, lateral flexion and rotation of the cervical spine.
Examination of lumbar spine movements will help to identify painful conditions which might cause distraction in flight. The initial applicant should demonstrate a good range of flexion, extension, lateral flexion and rotation of the lumbar spine.

Putting the hands behind the head and then behind the back tests elbow and shoulder movements and is usually sufficient to demonstrate satisfactory reach. Observing the applicant writing, tying shoe-laces etc may alert the examiner to the need for further examination of manual dexterity.
If the applicant can squat and stand up comfortably without support he or she has demonstrated sufficient range of movement and strength to operate the brake and rudder pedals.

Physical Disability and Aviation Medical Certification
In the aviation environment impairment of the musculoskeletal system including obesity may cause difficulty in entry to and exit from an aircraft and safe operation of controls. Restricted mobility may adversely affect ability to read instruments or keep a satisfactory lookout. Applicants for pilot licensing with musculoskeletal disabilities require assessment to ensure they have adequate strength and range of movement, with aids or modifications to controls as appropriate, and that they are not experiencing symptoms or side effects of medication likely to impair judgement and concentration. A medical flight test will be required to assure satisfactory function in the cockpit environment if there is any major physical disability or any minor disability that has the potential to cause difficulty with any control movement or other required in-flight function, access or egress. See also Information – Obesity and medical certification

Medical Certification following Musculoskeletal Injury
Significant injury warrants an unfit assessment. The doctor responsible for treating the injury should provide full details of damage sustained and treatment provided. The AME must confirm satisfactory functional recovery. The pilot must show a full pain-free range of movement with sufficient strength to carry out the relevant flying tasks.
For example, a pilot returning to flying after a lower limb injury would have to demonstrate hip, knee and ankle mobility and strength sufficient to assist passengers in aircraft evacuation and to operate rudder and brakes in difficult circumstances such as cross-wind landings.

Report specifications – Musculoskeletal

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**

2. **History**
   - Presenting symptoms, injury, impairment
   - Nature of condition, circumstances surrounding onset, precipitating factors
   - Other relevant medical history

3. **Examination findings at time of clinical report**
   - Stability of joints (stable/unstable)
   - Muscular strength and control (normal/diminished)
     - Relevant forces required (e.g. in the cockpit, arms for stick controls and legs for pedal control)
   - Range of movement and control (restricted/unrestricted)
     - Relevant to limb movements for operation of controls and neck movements for look out

4. **Results of any investigation performed**
   - Blood test results (e.g. HT, urea and electrolytes, liver function tests, erythrocyte sedimentation rate, C-reactive protein)
   - Radiology imaging reports (e.g. x-ray, bone scan, CT, MRI)
   - Other procedures and investigation reports

5. **Treatment**
   - Recent, past and ongoing treatment must be detailed
   - Current and recent past medication (dose, frequency, start date and finish date)
   - Confirmation no side effects from medication
   - Surgical reports

6. **Follow up and further investigations/referrals planned or recommended**
   - Anticipated follow up/frequency of clinical reviews and investigations
   - Prognosis and risk of recurrence
   - Confirmation of full recovery or remission on maintenance dose of acceptable medication and well controlled at date of report

7. **Clinical Implications**
   - Any concerns regarding stability deficits, disease progression, treatment compliance or risk of sudden incapacity

Information – Assessment of prosthetic limbs

See – Information - Certification of pilots with a musculoskeletal disability

Class1 and Class 2 applicants with a (new) prosthetic limb will require a musculoskeletal assessment by their AME and submission of the details of the prosthesis by their rehabilitation physician. More careful consideration will be required for upper limb prosthetics, including a satisfactory thumb-grip function on each hand.

In the case of initial Class 1 applicants, a fit assessment may be made for Class 2 privileges, with Class 1 certification being considered after successful completion of PPL training and a suitable period of demonstrated proficiency.

Any manuals or manufacturers guides for prostheses should be submitted at the time of assessment. It may be necessary to refer the case to the CAA department responsible for airworthiness for consideration of any electronic components or any components that need to be fixed to the aircraft.

All Class 1 applicants will need a medical flight test/simulator check before an assessment is completed.

Medical Flight Test Form - Musculoskeletal (PDF). Comment should be made about the impact of failure of the prosthesis (e.g. falling off the stump) and the possibility of complete loss of control of the aircraft.

Class 1 applicants will require an OML, APL and OAL restriction.

All new Class 1 cases should be referred to the Medical Assessor. Class 2 cases may be assessed by an AME in consultation with the Medical Assessor.

Class 2 applicants will require safety pilot (OSL) and APL (valid only with approved prosthesis) limitations. On completion of a satisfactory medical flight test with a chief flying instructor, the OSL may be removed and OAL (restricted to demonstrated aircraft type) shall be added.

Class 1 applicants will usually be required to carry a spare prosthesis. Class 1 and 2 applicants wishing to extend the aircraft types that they are permitted to fly will have to complete a satisfactory MFT for each aircraft type.

Information – Certification of pilots with a musculoskeletal disability

Class 1 Applicants
Pilots with disabilities who wish to fly professionally will need to undertake an initial Class 1 medical at an Aeromedical Centre (AeMC), as is the case for all Class 1 applicants. An MFT is likely to be required (as above) with the report submitted to the AeMC who will refer the applicant to the Medical Assessor. During the MFT the applicant will be required to demonstrate that they can assist passengers with emergency egress from an aircraft.
Class 1 certificate applicants with upper limb prosthetic(s) will be required to demonstrate the presence of a satisfactory thumb grip function on each hand.

Class 2 Applicants
An initial applicant with a disability should attend an Aeromedical Examiner (AME) for a medical examination. In consultation with the Medical Assessor a Class 2 medical certificate may be issued with a safety pilot limitation (OSL) and any other appropriate limitations providing the examination is satisfactory in all other respects, apart from the disability. Once the student pilot's instructor feels that the pilot is ready to go solo, the pilot can undertake a Medical Flight Test (MFT) with a Chief Flying Instructor. The test should include an assessment of the ability of the pilot to evacuate the aircraft in an emergency. The MFT form should be submitted to the AME and if satisfactory, the AME should reissue the Class 2 medical certificate with the safety pilot limitation removed, in consultation with the Medical Assessor. This will allow the pilot to continue flying training, which can include solo flying. The pilot will usually be limited to demonstrated aircraft types only and, therefore, the "OAL" limitation should be added to the medical certificate following the MFT. Additional types may be added by undertaking a check ride with a Chief Flying Instructor (CFI) following which the CFI signs the pilot's logbook, stating that the pilot can safely fly the additional aircraft type and the pilot should submit a further MFT form to their AME.

Flying with a disability
The most common types of disability which prospective pilots present with are spinal cord injuries and amputations. Other disabilities are assessed on an individual basis and the advice of the Medical Assessor should be sought.

Paraplegia – Fixed wing flying
Student pilots with paraplegia usually adapt quickly to the flying environment but do need to use a hand controller to operate the rudder and fly an aircraft that is fitted with hand-operated brakes rather than toe operated brakes. There is usually a preference for low wing monoplanes, as the access to the cockpit on these aeroplanes is easier for a paraplegic pilot. The most popular aircraft used by people with paraplegia are the PA28 series.

Hand controllers
Hand controllers must have EASA approval and proper use must be demonstrated with a Medical Flight Test before certification (private flying only, Class 2/LAPL).
EASA is the approving body for hand controllers, which means manufacturers will need to approach them directly for approval.

Medication
Aeromedical considerations include the use of muscle relaxants which have significant Central Nervous System side effects, analgesics (often opioid based) and bladder control medication, including the anticholinergic and tricyclic groups. Unfortunately, most of these medications are unacceptable for certification and applicants will need either to stop these medications or not take them for a suitable period before flying, in order to hold a valid certificate. Sometimes, on stopping the muscle spasm relieving drugs, individuals with paraplegia develop significant muscle spasm and clonus which may represent a significant inflight safety hazard.

Paraplegia – Rotary flying
CAA-NL has not yet certificated a paraplegic helicopter pilot and there is currently no EASA approved hand controller to operate the yaw controller on helicopters.

Amputees

Upper limb
Pilots often use a prosthesis which can be clamped to the yoke and in general the prosthesis does not need to be certificated by the Medical Assessor, providing that failure of the prosthesis (e.g. falling off the stump) would not result in the pilot losing complete control of the aircraft. This should be considered during any medical flight test or simulator check. In the case of double upper limb amputees, the prostheses need to be certified by EASA to ensure that they are manufactured to the same standard as aircraft parts. In this circumstance they are considered as part of the aircraft control system.

Lower limb
Bilateral lower limb amputees will usually require an approved hand controller whereas single lower limb amputees usually do not. Below knee amputees, usually wear their prosthesis and operate the rudder and toe brake controls with their prosthetic leg. A fixed ankle prosthesis is generally preferred by pilots rather than an articulated ankle which tends to make fine rudder and brake inputs somewhat difficult. Above knee amputees generally do not wear their prosthesis whilst flying and can operate the rudder either by means of a toe-strap being fitted to the rudder pedal which is operated by the remaining leg, or the so-called "dancing" technique. This technique was first developed in the USA and utilises the remaining leg to control both rudder pedals by swiftly transferring the foot from the right to left rudder peddle. Initially, there were some concerns that in an "on limits" cross wind landing, this would compromise flight safety, but it is now felt that it is an acceptable technique.

Aeromedical concerns with amputees
Consideration must be given to the possibility of phantom limb pain in amputees. If present, the medication used to control or alleviate this symptom is likely to be disqualifying for flight.

Hand injuries
Many pilots with hand injuries or deformities have devices manufactured which enable them to operate controls which their own hands could not operate. An example of this is a pilot with very severe rheumatoid hands who uses a specially manufactured device to operate the fuel flow control. A medical certificate may be issued with a limitation that requires the pilot to carry this device at all times. Applicants should be referred to the Medical Assessor for assessment.

Information – Medications used in musculoskeletal conditions

Although some medications may be acceptable while flying or controlling, the underlying medical condition may be disqualifying. Aeromedical advice must be sought following a new diagnosis or recurrence/flare up of a medical condition.

Analgetics
Paracetamol (acetaminophen) is similar in analgesic efficacy to aspirin but has no anti-inflammatory activity. It has less irritant effect on the stomach and is preferable to non-steroidal anti-inflammatory drugs for relief of mild to moderate pain. Paracetamol is acceptable for pilots provided the underlying reason for requiring pain relief has been considered and is compatible with flying.
Analgesic opiate medications such as codeine and dihydrocodeine, are incompatible with flying. While using this type of medication the pilot will be assessed unfit and the medical certificate will be temporarily suspended.

Non-steroidal anti-inflammatory drugs
NSAIDs,in single doses, have similar analgesic activity to paracetamol. When used regularly they also have an anti-inflammatory effect. Pilots may fly unrestricted while taking NSAIDs provided the condition for which they are being taken is adequately controlled without side effects. Proton pump inhibitors can be used to control dyspepsia and for prevention of peptic ulceration in licence holders requiring long term NSAIDs.
Selective cyclo-oxygenase-2 inhibitors (e.g. celecoxib, etoricoxib) are licensed for the relief of pain in osteoarthritis, rheumatoid arthritis and ankylosing spondylitis. Etoricoxib is also licensed for use in gout. These medications are as effective in relieving pain as non-selective NSAIDs such as diclofenac and naproxen with less risk of upper gastrointestinal bleeding. These medications are acceptable for flying with the proviso that the degree of underlying pain and mobility should be assessed prior to, and be satisfactory for, certification.

Other medication
Glucosamine is licensed for mild to moderate osteoarthritis of the knee. It is acceptable for aviators to use although there is limited evidence of its effectiveness.

Corticosteroids (Prednisolone, Beclomethasone, Budesonide and Hydrocortisone)
Local corticosteroid injections may be given intra-articularly in inflammatory joint disease and directly into the soft tissues in conditions such as tennis or golfer's elbow or compression neuropathies. Flying can be resumed a minimum of 48 hours after the injection provided the condition being treated is adequately controlled. Clinical examination by an AME may be required to assess range of movement, strength and dexterity.
Corticosteroids administered orally or rectally, can be effective in the treatment of active inflammatory disease. The use of oral steroids is disqualifying therefore, while using this type of medication, the pilot will be assessed unfit and the medical certificate will be temporarily suspended. (Note: certification may in exceptional cases be considered where no more than 7.5 mg prednisolone daily has been prescribed to reduce the rate of joint destruction in rheumatoid arthritis; such cases should be assessed in consultation with the AMS). Recertification can be considered when the certificate holder has been off oral steroid therapy for a minimum of two weeks with no recurrence of symptoms and the condition is confirmed quiescent.

DMARD's (Disease Modifying Anti Reumatic Drugs) See Table 1
The certificate holder is unfit on each occasion that a 'flare up' of the condition occurs and must seek aeromedical advice following any change in clinical condition, or medication.

- Aminosalicylates (f.e. Sulfasalazine)
- Medication affecting the immune response (f.e. Ciclosporin, Azathioprine and Methotrexate)
- Cytokine Modulators (f.e. Adalimumab, Etanercept and Infliximab)*

If indicated for the treatment of active inflammatory disease these medications are disqualifying. These medications may be acceptable for maintaining remission of the disease provided the disease is quiescent, the certificate holder does not experience side-effects and regular review is undertaken.

Table 1. Aeromedical certification – Aminosalicylates, medications affecting the immune response, and cytokine modulators*

ACCEPTABLE MEDICATION	Sulfasalazine Ciclosporin, Azathioprine and Methotrexate	Adalimumab, Etanercept and Infliximab*
ACTION	Unfit after flare up of condition or starting medication or an increase in dose until: Minimum of 2 weeks on a stable maintenance dose of medication The disease is demonstrated to be stable and well controlled In case of methotrexate dose > 10mg: No side effects and grounded on the day of ingestion/injection	Unfit after flare up of condition or starting medication or an increase in dose until: Minimum of 2 weeks on a stable maintenance dose of medication The disease is demonstrated to be stable and well controlled Adalimumab: Grounded on the day of injection Etanercept and Infliximab: Grounded for 3 days after injection
INVESTIGATIONS	Medical reports and up to date blood test results within normal parameters will be required for aeromedical assessment (Report specifications – Musculoskeletal) Ensure satisfactory symptom control and free of side-effects of medication	Medical reports and up to date blood test results within normal parameters will be required for aeromedical assessment (Report specifications – Musculoskeletal) Ensure satisfactory symptom control and free of side-effects of medication
CERTIFICATION	Class 1 Unrestricted/OML Class 2 Unrestricted/OSL	Class 1 OML Class 2 Unrestricted/OSL/OPL
FOLLOW UP	The result of each clinical review should be copied to the AME on an ongoing basis. To continue to maintain certification an assessment of the clinical condition and up to date blood test results must be included in the follow up report/letter.	The result of each clinical review should be copied to the AME on an ongoing basis. To continue to maintain certification an assessment of the clinical condition and up to date blood test results must be included in the follow up report/letter.
ADDITIONAL NOTES	Applicants will be having periodic blood testing (pre-treatment, bi-weekly, monthly, three monthly, and annual), of blood count, liver and renal functioning to identify bone marrow suppression/blood dyscrasias, hepatic or renal impairment, liver cirrhosis and pulmonary toxicity. The results of blood tests which are not within normal parameters must be notified to the AME immediately. **Limitations** Some medications are likely to require a longer period of grounding (*up to 4 weeks) to demonstrate stability and for professional pilots an OML limitation (permitting flights as or with a qualified co-pilot), and for private pilots an OSL (operational safety pilot) limitation may be required.	

MED.B.055 – Mental health

Guidance material

Fear of flying

Report specifications – Mental Health

Flowchart – Alcohol/substance misuse certification

Information – Dyslexia, Asperger syndrome and ADHD

Flowchart – Depression certification

Information – Centrally acting medication

Fear of flying
Although fear of flying affects about 15% of the general population, it is unlikely those affected will opt for a career as a pilot and, if they do, habituation with consequent resolution of anxiety will have taken place during training. The development of fear of flying in experienced fliers is normally due to the development of an underlying psychiatric disorder such as adjustment disorder, acute stress disorder, PTSD, agoraphobia, with or without panic disorder, or depression. Management should be appropriate to the diagnosis.

Report specifications – Mental health

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**

2. **History**
   - Presenting symptoms, including reason for referral
   - Nature of condition, circumstances surrounding onset, precipitating factors
   - Other relevant medical history

3. **Nature severity and course of illness**
   - Current symptoms
     - Specifically include details of any sleep deprivation, suicidal ideation, deliberate self-harm or delusions
   - Results of clinical questionnaires e.g. Hamilton Scale Assessment or equivalent.

4. **Treatment**
   - Received to date (e.g. Cognitive Behavioural Therapy/counselling - past and ongoing treatment should be detailed)
   - Current and recent past medication (dose, frequency, start date and finish date)
   - Details of any side effects from medication
   - Details of referral for further treatment to other healthcare professionals

5. **Personal History**
   - Childhood/development
   - Social history
     - Relationships
     - Smoking/Alcohol/other drugs
   - Financial/forensic history

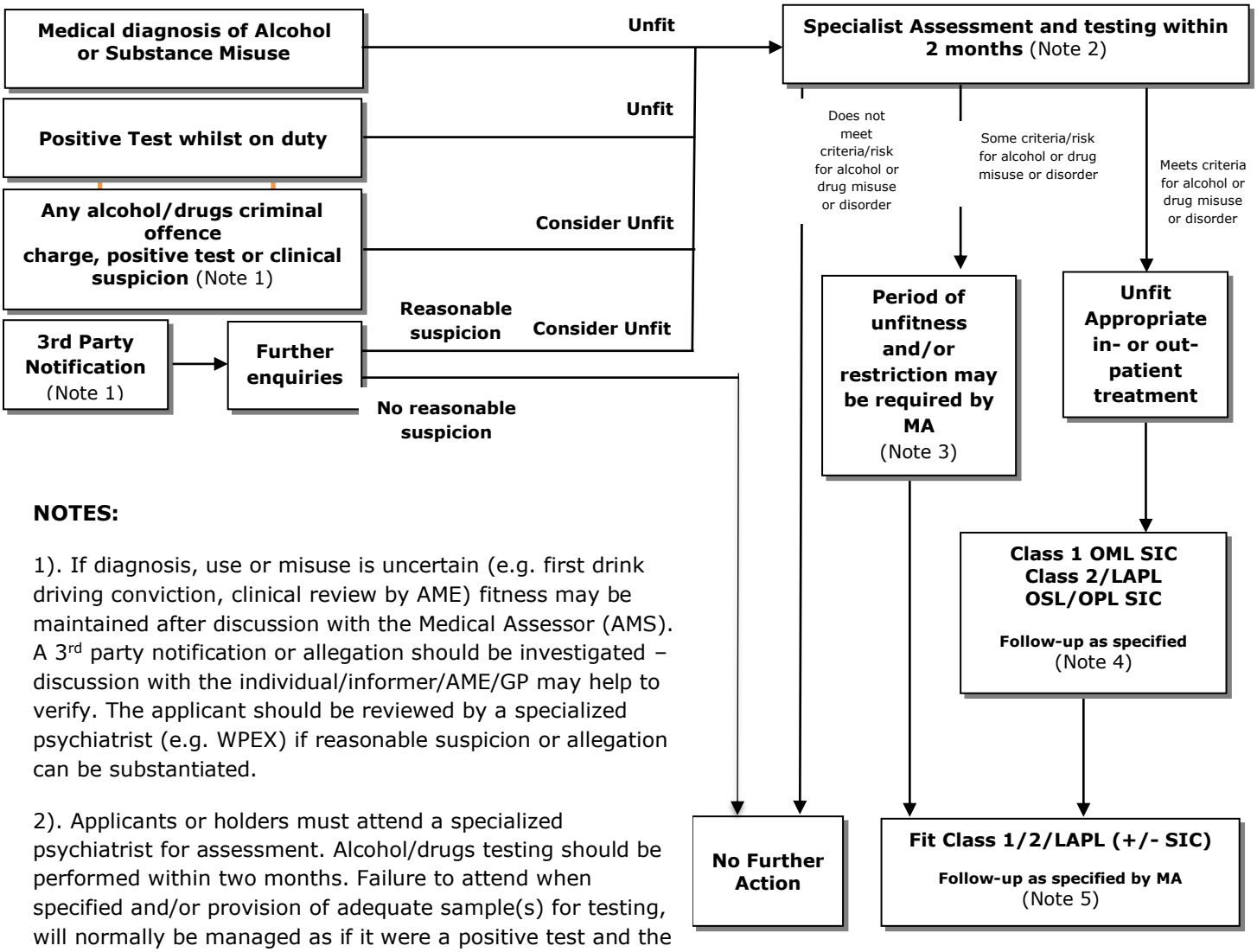
6. **Previous Medical History/Family history**

7. **Follow up anticipated**
   - Anticipated follow up/frequency of clinical reviews and investigations

8. **Likelihood of recurrence**
   - Prognosis and risk of recurrence

9. **Clinical implications**
   - Any concerns regarding symptom and diagnosis progression, treatment compliance or risk of incapacity

Flowchart – Alcohol/substance misuse certification



NOTES:

1). If diagnosis, use or misuse is uncertain (e.g. first drink driving conviction, clinical review by AME) fitness may be maintained after discussion with the Medical Assessor (AMS). A 3rd party notification or allegation should be investigated – discussion with the individual/informer/AME/GP may help to verify. The applicant should be reviewed by a specialized psychiatrist (e.g. WPEX) if reasonable suspicion or allegation can be substantiated.

2). Applicants or holders must attend a specialized psychiatrist for assessment. Alcohol/drugs testing should be performed within two months. Failure to attend when specified and/or provision of adequate sample(s) for testing, will normally be managed as if it were a positive test and the applicant will be made unfit. Testing for alcohol includes blood for: Full Blood count to include MCV, Liver Function Tests including GGT, % Carbohydrate Deficient Transferrin (% CDT, Axis-Shield method) and ethyl-glucuronide in urine. Testing for drugs includes cannabis, amphetamines, metamphetamines, cocaine, opiates and benzodiazepines for substance misuse. Other tests may be indicated.

3). Depending on the individual case and at the discretion of the Medical Assessor (Class 1) or AME I consultation with the Medical Assessor (Class 2/LAPL), the applicant may be assessed as fit with or without a multicrew limitation (OML) for Class 1 and with or without a OSL/OPL for Class 2/LAPL and subject to ongoing periodic assessment and testing (SIC).

4). Depending on appropriate treatment, a fit assessment with a SIC and OML or OSL/OPL (Class 2/LAPL) may be considered, with mandatory testing to demonstrate abstinence as instructed by the Medical Assessor. After a period of two years documented sobriety or freedom from alcohol or substance misuse, removal of the OML OSL/OPL restrictions may be considered at the discretion of the Medical Assessor.

5). Periodic review and testing may be required to demonstrate absence of use/misuse. Once returned to flying with only a SIC limitation, removal may be considered after at least one year of compliance, satisfactory follow-up and satisfactory psychiatric evaluation. If relapse occurs, a further period of grounding will be required, pending further assessment/treatment. More than one episode of relapse is disqualifying.

Information – Dyslexia, Asperger syndrome and ADHD

Dyslexia

Dyslexia is a long term impairment which can have an adverse effect on an individual's ability to perform normal day to day activities. Someone with dyslexia should, therefore, be entitled to reasonable adjustments to enable them to obtain and remain in employment. However, it can never be considered reasonable to make adjustments that will compromise safety.

Although it is considered reasonable for students of most disciplines to have help from a scribe when writing essays, sitting exams etc. it cannot be considered reasonable for a pilot to have to rely on someone else when reading checklists, weather reports, instrument displays, charts etc. in flight. Scribes or other aids to word recognition should not be permitted in pilot training for this reason.

Provided a pilot has been able to successfully complete the written work involved in training, he or she will have demonstrated a level of reading and writing ability sufficient to safely pilot an aircraft. If an applicant for pilot licensing is unable to complete training without assistance with reading and writing there are no reasonable adjustments, with current technology, that can be made to enable him or her to safely fly solo or pursue a career in aviation.

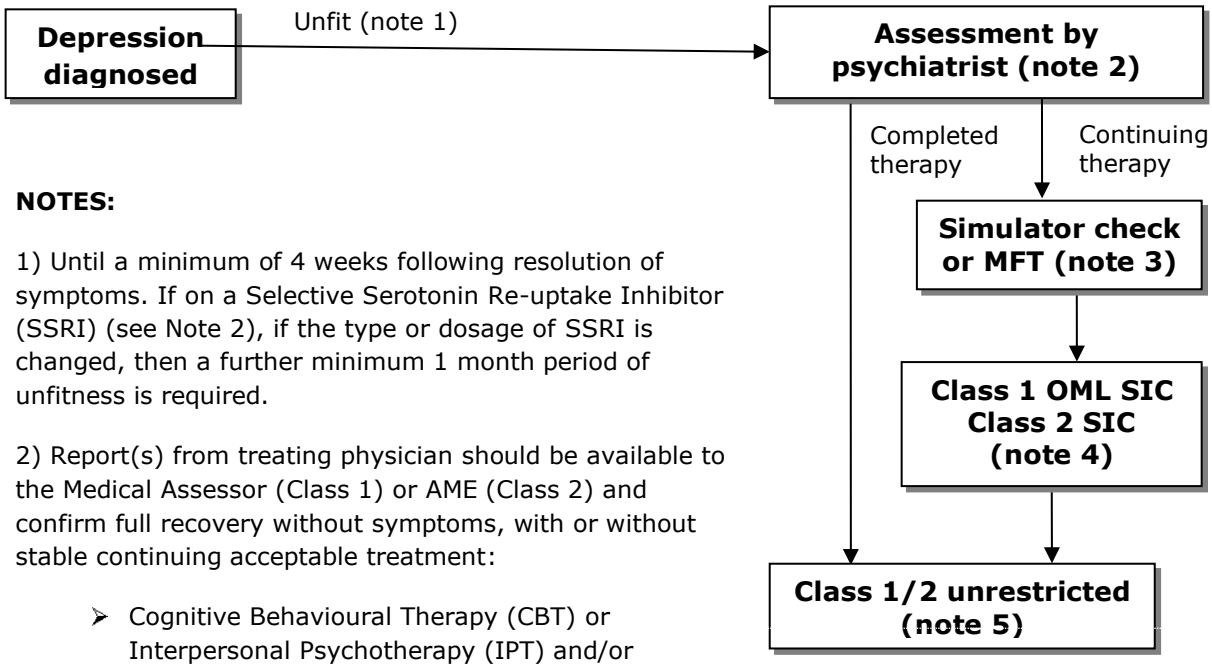
Asperger syndrome

Asperger syndrome is an autistic spectrum disorder characterised by impaired social interaction and restricted, repetitive and stereotyped patterns of behaviour. The DSM-5 diagnostic criteria also include significant impairment in social or occupational functioning. Nevertheless, language skills and cognitive development are not impaired and someone diagnosed with Asperger syndrome may be able to acquire the skills necessary to function safely as a pilot or air traffic controller. Interpersonal difficulties may arise or emerge in the Crew Resource Management environment of the modern professional airline cockpit. It is, of course, essential that an applicant with Asperger syndrome undergoes assessment by a psychologist or psychiatrist with expertise in the condition before embarking on a career in aviation.

Attention Deficit Hyperactivity Disorder

This condition is diagnosed (according to DSM-5) when an individual demonstrates inattention, hyperactivity or impulsiveness sufficient to cause significant impairment in social, school or work functioning
Therefore, anyone applying for pilot licensing who has been diagnosed with this condition must undergo neuropsychological assessment to assess the likelihood of them being able to perform safely as a pilot. An individual with ongoing ADHD will not (by definition) be able to complete pilot training. Medication used for this disorder is normally disqualifying.

Flowchart – Depression certification



NOTES:

1) Until a minimum of 4 weeks following resolution of symptoms. If on a Selective Serotonin Re-uptake Inhibitor (SSRI) (see Note 2), if the type or dosage of SSRI is changed, then a further minimum 1 month period of unfitness is required.

2) Report(s) from treating physician should be available to the Medical Assessor (Class 1) or AME (Class 2) and confirm full recovery without symptoms, with or without stable continuing acceptable treatment:

- Cognitive Behavioural Therapy (CBT) or Interpersonal Psychotherapy (IPT) and/or
- SSRI's: Only CITALOPRAM, SERTRALINE or ESCITALOPRAM are acceptable as maintenance therapy. No other antidepressant medication is permitted.

The pilot should be returned to flying duties is psychiatric assessment is satisfactory and either treatment is complete without recurrence or they remain on maintenance SSRI therapy.

If the type or dosage of the SSRI has been changed, or the condition is not stable, then a further period(s) of unfitness shall be required until both dose and condition are stable. Further report(s) from treating physician may be required. If the SSRI is being discontinued the earliest return to fitness is 4 weeks after ceasing medication.

The Hamilton Depression Scale score should be satisfactory (a score of 7 or less may be acceptable).

Assessment by a CAA-NL accepted psychiatrist may be indicated in Class 1 cases and for all cases (Class 1 and 2) where the pilot is still undergoing therapy and/or taking an acceptable SSRI. Class 2 pilots who have completed therapy will not usually need to be seen by a CAA-NL accepted psychiatrist.

3) Simulator check (Class 1) or Medical Flight Test (MFT) (Class 2 – with a Chief Flying Instructor (CFI) or Flight Instructor Examiner (FIE)) is required.

4) Follow-up to be determined by the Medical Assessor initially every 3 months whilst being treated. 'Buddy reports' may be requested.

5) Follow-up: Class 2 AME (with clinical reports if available). Class 1 to be determined by Medical Assessor. If the type or dosage of the SSRI has been changed, or the condition is not stable, then a further period(s) of unfitness shall be required until both dose and condition are stable. Further report(s) from treating physician may be required. If the SSRI is being discontinued the earliest return to fitness is 4 weeks after ceasing medication.

Class 1 without OML but with SIC is only possible 6 months after cessation of all treatment.

Information – Centrally acting medication

Hypnotics
Temazepam has been used in military and civilian aircrew for the short-term treatment of insomnia associated with circadian rhythm disturbance for many years. Specific treatment should be directed towards other underlying causes of insomnia such as adjustment disorder. *Temazepam* is short acting and hangover effects are uncommon. However, drowsiness or light-headedness the next day, confusion, ataxia and amnesia are possible side-effects so the medication should be started for the first time when it is certain licence privileges will not be exercised the following day. Thereafter, it should be taken no less than 12 hours before exercising licence privileges. Aircrew should not take *Temazepam* continuously for more than one week because of the risk of dependency developing.
Zaleplon is also acceptable for EASA medical certification subject to the same considerations as *Temazepam*.

Zolpidem 5 mg is acceptable. It should be taken no less than 8 hours before exercising licence privilages.

All other hypnotics including *zopiclone* and "over the counter" preparations such as *diphenhydramine* and *promethazine* are disqualifying for EASA medical certification.

Melatonin is a hormone produced nocturnally by the pineal gland. It serves as a circadian time cue promoting sleep. With age, melatonin production declines and the prevalence of sleep disorders, particularly insomnia, increases. Prolonged release melatonin has shown good results in treating insomnia in older adults and the European Medicines Agency has approved *Circadin* 2 mg (prolonged-release *melatonin*) for patients aged 55 or over for the short-term treatment of primary insomnia. *Melatonin* preparations are not always pure pineal extract and may contain herbs such as valerian and chamomile, together with amino acids, calcium and magnesium. These preparations are not acceptable for EASA medical certification.

CNS stimulants
Modafinil is a central nervous system stimulant prescribed for narcolepsy and daytime sleepiness due to obstructive sleep apnoea. Common side-effects (>1:100) include anxiety, depression, dizziness and impaired concentration. Both obstructive sleep apnoea associated with significant daytime drowsiness despite CPAP treatment and narcolepsy are disqualifying and so any applicant taking this medication is unfit for flying duties.

Smoking cessation medication
Nicotine replacement therapy is acceptable.
Varenicline is a selective nicotine receptor partial agonist used for smoking cessation. Common side effects include drowsiness, dizziness and sleep disorder. Less commonly (1:1000 - 1:100) it can cause atrial fibrillation, palpitations, panic attacks, mood swings, incoordination, visual disturbance, myocardial infarction, anxiety, depression, irrational behaviour, psychosis and suicidal ideation. *Varenicline* is not compatible with aeromedical certification.

Bupropion is used for smoking cessation though its mode of action is unknown. Common side effects include anxiety, depression, dizziness and impaired concentration. Less commonly it can cause confusion and visual disturbance. Applicants are 'unfit whilst taking this medication.

Antidepressants
The *SSRIs sertraline, citalopram* and *escitalopram* are the only antidepressants permitted for EASA medical certification – see the Flowchart - Depression certification.

Citalopram and *escitalopram* are associated with dose-dependent QT interval prolongation and should not be used in those with congenital long QT syndrome, known pre-existing QT interval prolongation or in combination with other medicines that prolong the QT interval. ECG measurements should be considered and electrolyte disturbances should be corrected before starting treatment. For *citalopram*, the maximum daily doses are: 40 mg for adults and 20 mg for patients older than 65 years. For *escitalopram*, the maximum daily doses are: 20 mg for adults and 10 mg for patients older than 65 years.

St John's Wort can be purchased without prescription and is used for the treatment of depression though it is not licensed for this purpose. It interacts with other medicines and the quality and quantity of active ingredient in the various preparations available is variable. An applicant or certificate holder on this treatment should be assessed as unfit and follow the Flowchart - Depression certification.

The *SNRI duloxetine* is not permitted as an antidepressant or as medication for neuropathic pain.

The half-life of *amitriptyline* is 18 to 24 hours and active metabolites have a longer half-life. Sedation occurs at all dose levels. It is not compatible with EASA medical certification even at the low doses used for treating neuropathic pain.

Antiepileptics and Medications for Neuropathic Pain
Epilepsy is disqualifying so these drugs are incompatible with EASA medical certification. *Gabapentin, pregabalin* and *carbamazepine* prescribed for neuropathic pain and *valproate* for migraine prophylaxis are disqualifying for EASA medical certification because of the risk of unacceptable side effects.

Antipsychotic drugs
Antipsychotic drugs are not compatible with EASA medical certification because the condition for which they are prescribed is to be disqualifying. However, low dose *sulpiride* (less than 400mg daily) is acceptable for the treatment of Gilles de la Tourette's syndrome (unlicensed indication) provided a clinical report confirms treatment is successful without significant side-effects and a medical flight test gives a satisfactory result. The use of *clonazepam* for treating tics is disqualifying.

Lithium is disqualifying for EASA medical certification because of the risk of unacceptable side effects.

MED.B.065 – Neurology

Guidance material

Cerebral aneurysm, Sub-Arachnoid haemorrhage including coiling

Epilepsy

Clinical EEG abnormalities

Parkinson's disease

Transient Global Amnesia (TGA)

Spinal or peripheral nerve injury

Dementia/Cognitive Impairment

Flowchart – Multiple sclerosis certification

Flowchart – Migraine certification

Information – Certification after cerebrovascular events, stroke and transient ischaemic attack

Information – Carotid or vertebral artery dissection certification

Report specifications – Head injury

Table – Head injury certification

Information - Certification after Meningitis/Encephalitis/Brain abscess

Information - Centrally Acting medication

PLEASE NOTE:
Each of MED.B.065 (b) (1-11) shall undergo further evaluation before a fit assessment can be considered. Applicants for a Class 1 medical certificate shall be referred to the licensing authority. Fitness of Class 2 applicants shall be assessed in consultation with the licensing authority.

Cerebral aneurysm, Sub-Arachnoid haemorrhage including coiling
Three factors influence aeromedical safety:

- Any neurological damage from the bleed or subsequent surgery
- The risk of epilepsy (which may be modified by surgery) and;
- The risk of future bleeding.

A full neurological report must be obtained which gives information about these factors, the presentation, exact diagnosis, surgical treatment and post-operative course. Information on post-operative medication, if any, must be obtained.

Epilepsy
Epileptiform seizures immediately occurring within 24 hours of a head injury may be acceptable, as may drug related or alcohol withdrawal seizures provided that the causation is certain and the predisposing causes have been acceptably managed. Refer to:
Flowchart – Alcohol/substance misuse certification or Table – Head injury certification as appropriate.
Neonatal and febrile convulsions occurring under five years of age are not disqualifying.
A single unprovoked seizure does not constitute epilepsy. About a third of single seizures in adult life recur. Recurrence is more common in the first three months after the first seizure than subsequently – so a significant seizure-free interval reduces the risk.
Two or more unprovoked seizures more than 24 hours apart fulfil the criteria for epilepsy.

Clinical EEG abnormalities
If an EEG has been undertaken for clinical reasons e.g. a single afebrile seizure, a 'provoked' seizure, head injury, post neurosurgery or infection the report should be available for the AME to review.
Rarely, a first degree family history of epilepsy, especially if the mother is affected and if her epilepsy presented in childhood, and the applicant is young, an EEG may be warranted. CAA-NL Medical advice should be sought.

Parkinson's disease
A definitive diagnosis of Parkinson's disease will not permit initial Class 1 or 2 certification. Once the disease becomes clinically evident there is a high incidence of cognitive dysfunction which may progress to dementia. There is also a high incidence of depression. Bradykinesia and tremor may present a flight safety hazard. Additionally the disease process is generally progressive which makes it difficult to predict the cognitive and physical function a few months ahead.
Pilots with a diagnosis of Parkinson's disease will be made unfit pending neurology review. For commercial pilots this must be with a neurologist with a specialist interest in aviation. Most medications used to treat Parkinson's disease are unacceptable for certification due to their side-effects but amantadine and selegiline are acceptable. Return to flying will be with an OML limitation and subject to a satisfactory simulator check. Due to the progressive nature of the disease there must be an adequate process in place for regular clinical and functional review.
Class 2 applicants may regain certification, which may be subject to an OSL, once a satisfactory report is obtained from a consultant neurologist, in consultation with the Medical Assessor.

Transient Global Amnesia (TGA)
A diagnosis of TGA should be confirmed by a neurologist.
Initial certification (Class 1 or 2) is not possible.
If investigations (EEG and appropriate scanning) are normal and if there has been no recurrence for 12 months then, for Class 1, a review should be undertaken by a neurologist. If satisfactory a Class 1/OML may be issued.
For a Class 2 revalidation or renewal, recertification with an OSL may be considered.
See also Flowchart – Certification (recurrent) syncope

Spinal or peripheral nerve injury
A pilot who suffers a peripheral nerve injury should be made unfit. Once sufficient time for recovery has passed an assessment of function can be made. Reports on the injury, its treatment and the recovery should be available. For Class 1 applicants a Medical Flight Test should be performed in a relevant simulator or aircraft type with a Type Rated Examiner, to assess the ability of the applicant to perform all the checks, fly the aircraft and perform the emergency drills and evacuation procedures should be obtained. This practical assessment will need to be repeated if there is a change in aircraft type. For Class 2 applicants the AME should assess if recovery is complete. If not, a Medical Flight Test report from a flying instructor should be obtained.

The Medical Flight Test can be found in the Appendix of this document.

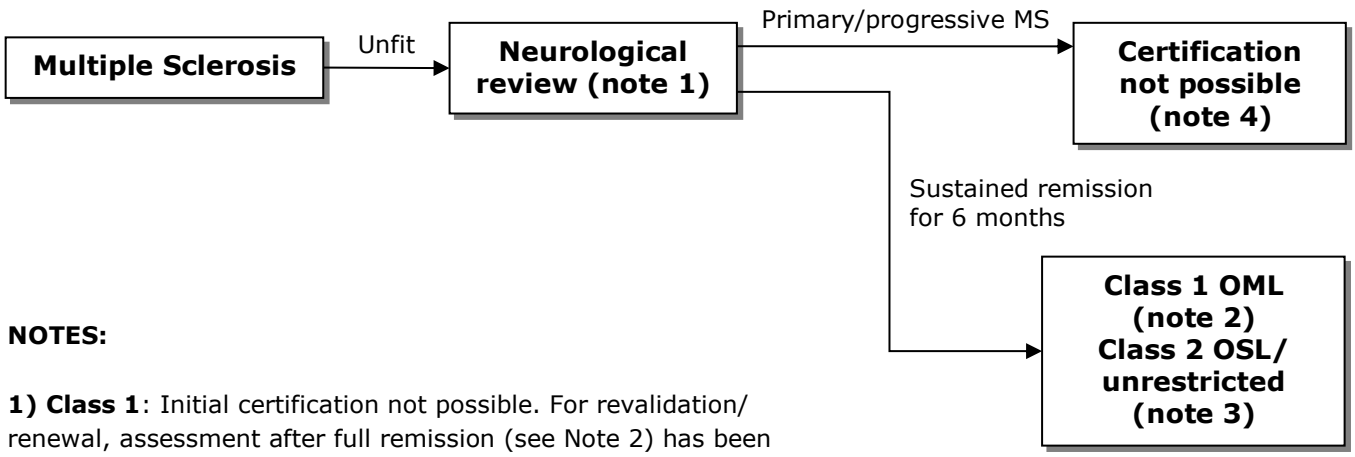
For certification following a permanent spinal injury refer to Information - Certification of Pilots with a musculoskeletal Disability

Additional guidance is available in: MED.B.050 – Musculoskeletal system

Dementia/Cognitive Impairment
Dementia (cognitive and behavioural problems severe enough to impair normal function) is incompatible with any form of certification. Mild cognitive impairment does not interfere with normal daily activities but may represent a significant flight safety risk. It is increasingly common with advancing age and may not be recognised by the pilot. Although there are a number of simple tests of cognition that can be used by the AME these are unlikely to pick up mild cognitive impairment. It is important to have an index of suspicion in elderly pilots and ask about their flying and how well they manage different situations, in particular read-back of information and the acquisition of new skills, for example a different communication layout on a different aircraft. Presentation of a 4-digit number at the start of the medical for recall some time later may be useful. A Medical Flight Test (for Class 2) or referral to the Medical Assessor for a simulator assessment with a Type Rated Examiner (for Class 1) may be required, specifically to test decision-making skills and conditional tasks.

The Medical Flight Test can be found in the Appendix of this document.

Flowchart – Multiple sclerosis certification



NOTES:

1) Class 1: Initial certification not possible. For revalidation/ renewal, assessment after full remission (see Note 2) has been achieved for a minimum of six months by a neurologist. Report from pilot's own neurologist should be made available.

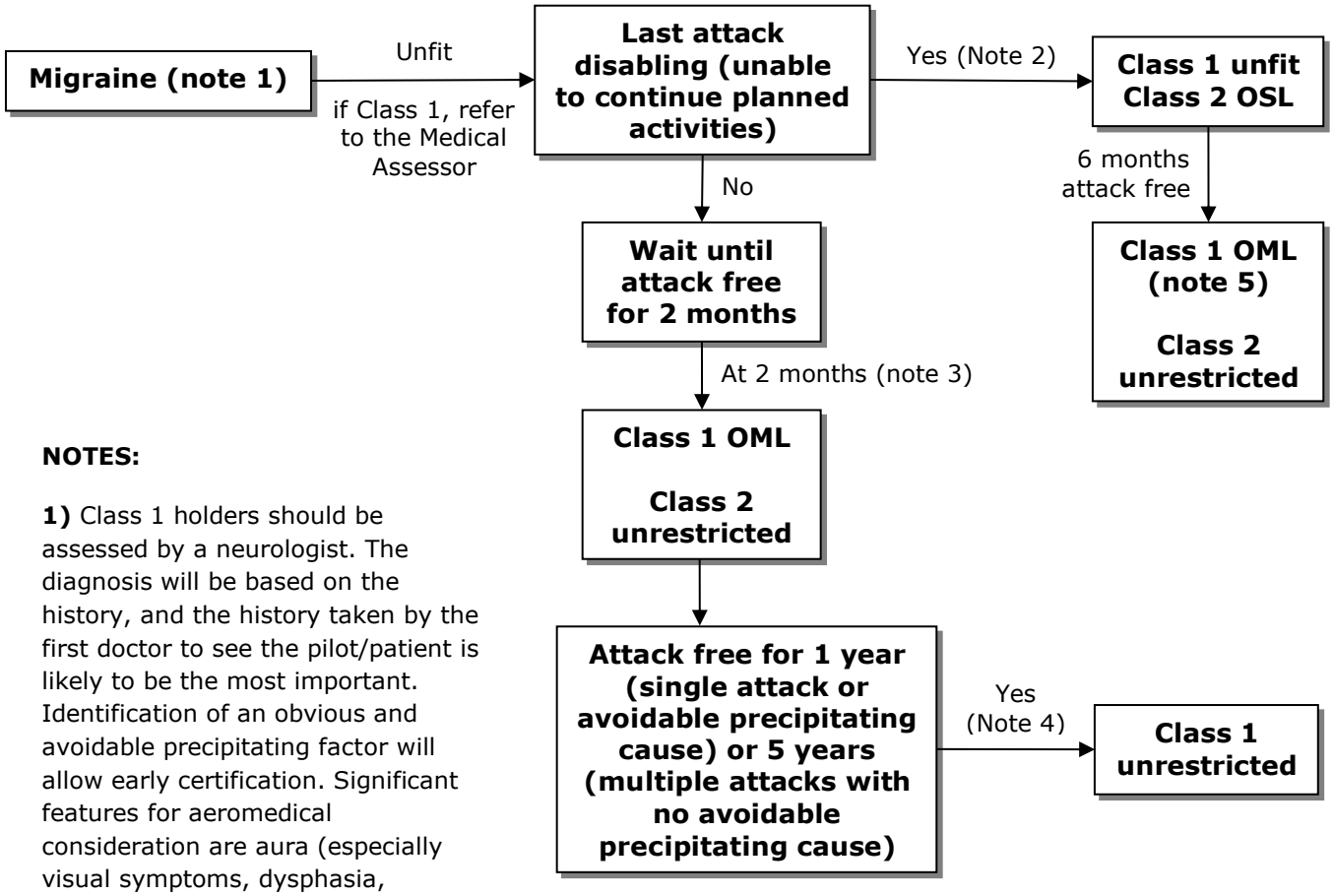
Class 2: Initial certification may be possible with full remission.

2) Class 1: Six monthly review by a neurologist, six monthly simulator check and +/- ophthalmology review as required.

3) Class 2: Annual local neurological review. Unrestricted certification may be possible with full remission (no symptoms). Signs and a score of 2 or less on the Kurtzke Expanded Disability Status Scale for a minimum of 2 years.

4) Subsequent full recovery may permit certification for (Class1/OML, Class 2/OSL) subject to neurological review (Class 1 – Medical Assessor, Class 2 AME).

Flowchart – Migraine certification



NOTES:

1) Class 1 holders should be assessed by a neurologist. The diagnosis will be based on the history, and the history taken by the first doctor to see the pilot/patient is likely to be the most important. Identification of an obvious and avoidable precipitating factor will allow early certification. Significant features for aeromedical consideration are aura (especially visual symptoms, dysphasia, impaired motor function), rapid or unexpected onset, duration of a few hours or longer, the requirement for strong analgesia and the need to "change plans" because of the symptoms.

2) For professional and private pilots already possessing a licence.

3) For professional pilots with a licence and initial applicants for a Class 2 medical certificate.

4) Initial applicants for a Class 1 certificate or professional pilots with a past history of migraine and a Class 1 OML certificate.

5) Removal of OML limitation will normally require at least 10 years attack free.

Migraine Medication

5HT1 agonists, ergot alkaloids and antidepressants are in general not permitted because of their side effect profiles.

In exceptional circumstances low dose propranolol (10mg 3 times daily or 80mg sustained release once daily) may be considered for Class 1, on referral to CAA Medical, or for Class 2 in consultation with CAA Medical. Simple analgesics or non-steroidal anti-inflammatory agents are permitted provided that they adequately control symptoms. As with all medications, an adequate period of grounding must take place so that the effectiveness can be assessed and any side effects will become apparent.

Information – Certification after cerebrovascular events, stroke and transient ischaemic attack

Class 1, Class 2 and LAPL

Applicants for Class 1, Class 2 and certification with a diagnosis of Stroke, Transient Ischaemic Attack (TIA) or Reversible Ischaemic Neurological Deficit (RIND) should be assessed as unfit.
After satisfactory neurological evaluation a fit assessment may be considered for Class 1 by the Medical Assessor and for Class 2/LAPL by the AME in consultation with the Medical Assessor. There should be no residual impairment likely to affect flight safety and no other significant risk factors including:

- Age >70
- Diabetes
- Uncontrolled hypertension
- Coronary artery disease
- Atrial fibrillation
- Heart failure
- Anticoagulation or underlying coagulation defects if associated with an increased risk of spontaneous bleeding or thrombosis

NB Any one of these risk factors will preclude certification

Assessment

- Review of neurological reports including risk factor control must be satisfactory
- Cardiological review to include exercise ECG testing before certification and on an annual basis
- Echocardiogram
- 24hr ECG recording
- Carotid artery imaging – should show no stenotic lesions ≥ 50%
- Thrombophilia screening if indicated
- Visual field mapping should be normal
- A medical flight test is required to assess functional capacity with particular reference to cognitive functions and any physical disability

Recertification

Unfit for a minimum of 6 months after the index event then Class 1 with OML, SIC and Class 2/LAPL with ORL, SIC.

Follow-up

Annual cardiological review is required to include exercise testing, and review and investigation of risk factors. Five years after the event a fit assessment with or without a SIC may be considered.

Information – Carotid or vertebral artery dissection certification

The following co-existing conditions are unacceptable for recertification:

- Smoking
- Uncontrolled hypertension
- Coronary artery disease
- Previous stroke or TIA
- Anticoagulation or underlying coagulation defects
- Autosomal dominant polycystic kidney disease
- Osteogenesis imperfect type I

Assessment

- Review of satisfactory neurological and cardiological reports including risk factor control
- Selective arterial angiogram to exclude arterial disease in the carotid or posterior cerebral circulations
- Exercise stress test
- Coronary angiography, if the cause was likely to have been atheromatous or there are any symptoms suggestive of peripheral vascular, carotid or vertebral artery disease
- Formal visual field mapping, if vertebral artery dissection
- A medical flight test is required to assess function capacity with particular reference to cognitive function and any physical disability.

Recertification

- Unfit Class 1 for 12 months after recovery then long-term OML
- Unfit Class 2 for 6 months after recovery, then OSL for minimum of 6 months, and then consider unrestricted Class 2
- Unfit LAPL until clinical recovery, then OSL/OPL for minimum of 6 months, and then consider unrestricted LAPL.

Follow-up

Annual cardiological review is required to include exercise testing, and review and investigation of risk factors.

Report specifications – Head injury

History should include the date of the event, post-traumatic amnesia, duration of unconsciousness, any seizure, the presence or absence of skull fracture, and whether any scan or surgical procedure was performed, for example elevating a depressed fracture or removing a blood clot.
There may be associated facial or orbital trauma which may need additional assessment, for example formal visual field testing following orbital injury.
AMEs should consider Eustachian or sinus dysfunction following trauma.
The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**

2. **History**
   - Nature and circumstances surrounding injury
     - Attach personal and witness accounts and paramedic records
   - Duration of loss of consciousness
   - Pre and post traumatic amnesia
   - Other injuries and relevant medical history

3. **Symptoms (post injury period and current)**
   - Any seizures
   - Focal neurological deficits
   - Disorientation or deficits in memory
   - Confusion behaviour alteration disturbance of mood hallucination delusions
   - Generalized intellectual impairment change of personality
   - Coarsening of behaviour e.g. irritability, lack of drive, loss of control aggression

4. **Examination findings**
   - Neurological deficit intellectual impairment or loss of function
   - Compounding factors (e.g. skull fracture, vertigo, headache)
   - Residual impairment

5. **All investigation findings performed (as applicable)**
   - Imaging (CT, MRI)
     - Intracranial haemorrhage
     - Skull fracture
     - Meningeal rupture/penetration of dura
   - Neuropsychological evaluation
   - EEG
   - Other procedures and investigations

6. **Treatment**
   - Past and ongoing treatment must be detailed
   - Current and recent past medications (dose, frequency, start and finish dates)
   - Confirmation of no side effects from medication
   - Surgical reports

Follow up and further investigations/referrals planned or recommended (as applicable)
   - Anticipated follow up/frequency of clinical reviews and investigations
   - Prognosis and risk of recurrence
   - Confirmation of full recovery at date of report

7. **Clinical implications**
   - Any concerns regarding residual impairment, treatment compliance, or risk of sudden incapacity including post-traumatic epilepsy

Table – Head injury certification

Classification*	Criteria**	Aircrew Medical Category	Assessment***
* Any early (<=7 days) seizure must result in a Classification of severe ** The presence of 2 criteria in the most severe category determines the category to be used for certificatory assessment. *** Class 1 cases to be assessed by Medical Assessor apart from minimal (AME), Class 2 cases to be assessed by AME			
Minimal	All must be present • Any concussive or mild head injury symptoms which have recovered within 48 hours • No loss of consciousness (LOC) • No post traumatic amnesia (PTA) • No neurological deficit • No seizure	Class 1 & 2 & LAPL Unfit 7 days	Medical report from attending doctor **OR** AME clinical assessment
Mild	• Any concussive or mild head injury symptoms for greater than 48 hours • Initial Glasgow Coma Score (GCS) 12-15 • LOC less than 30 minutes • PTA less than 30 minutes	Class 1 & 2 & LAPL Unfit for 6 weeks after resolution of any symptoms Class 1 Then OML fur further year	Medical report from attending doctor including investigations **AND** AME clinical assessment after resolution of symptoms
Moderate	• Initial GCS 9-12 • LOC 30 mins to 24 hours • PTA 30 mins to 24 hours • Linear Skull Fracture	Class 1 Unfit for 6 months after resolution of any symptoms. Then OML for 2 years Class 2 Unfit for 3 months after resolution of any symptoms Then OSL for 3 months LAPL Unfit for 3 months after full recovery without symptoms	Medical report from attending specialist including investigations. CT/MRI mandatory before recertification **AND** AME clinical assessment after resolution of symptoms

Classification	Criteria	Aircrew Medical Category	Assessment
Severe	• **Initial GCS less than 9** • LOC more than 24 hours • PTA more than 24 hours • Transient focal neurological deficit • Brain contusion(s) on MRI or • Intracranial haemorrhage on CT/MRI • Complex skull fracture • Any operative intervention • Early seizure*	Class 1 Unfit 2 years after full recovery without symptoms Then Class 1 OML long-term Class 2 Unfit for 1 year after full recovery without symptoms or demonstration of stable, non-disabling symptoms Then OSL for 1 year LAPL Unfit for 6 months after full recovery without symptoms or stable, non-disabling symptoms Then OSL/OPL for 6 months	Class1 applicants must be referred to medical advisor for decision Medical report from attending specialist including investigations. CT/MRI mandatory before recertification Neurocognitive testing must be performed Satisfactory Medical Flight Test / Simulator Proficiency Check Class 2, LAPL Medical report from attending specialist including investigations. CT/MRI mandatory before recertification AME clinical assessment Satisfactory Medical Flight Test
Very severe	• Penetrating brain injury • Significant parenchymal damage i.e brain contusion on CT/MRI (NB multiple unilateral or bilateral increase risk) +/- intracranial haemorrhage on CT/MRI • Enduring neurological deficit • Early* and/or late (>7 days) seizures	Class 1, 2 Unfit long-term LAPL Unfit 1 year after full recovery without symptoms or demonstration of stable, non-disabling symptoms Then OSL/OPL long-term	LAPL Medical report from attending specialist including investigations. CT/MRI mandatory before recertification **AND** satisfactory medical flight test **AND** AME clinical assessment

Information - Certification after Meningitis/Encephalitis/Brain abscess

Once there has been clinical resolution of the infection with no lasting neurological deficit the remaining risk is the development of epilepsy. Aseptic viral meningitis carries no significant risk, bacterial (pyogenic) meningitis a small increase, viral encephalitis a moderate risk and cerebral abscess a high risk.

Condition	**Class 1**	**Class 2**
Aseptic viral meningitis	Unrestricted after 6 months	Unrestricted after 6 months
Bacterial meningitis - Without seizure - With seizure (in acute phase)	Unrestricted after 12 months OML after 2 years & unrestricted after 5 years	Unrestricted after 12 months Unrestricted after 2 years
Viral Encephalitis - Without seizure - With seizure (in acute phase)	OML after 18 months & unrestricted after 5 years OML after 3 years & unrestricted not possible	Unrestricted after 18 months Unrestricted after 3 years
Cerebral abscess	Not possible	Not possible

MED.B.070 – Visual system

Guidance Material

General information

Report specifications - Ophthalmic

Information – Eye conditions certification

Information – Visual fields and binocular vision

Information – Guidance following eye surgery

Information – Retinal arterial disorders certification

Information – Retinal vein occlusion (RVO) certification

Flowchart – Substandard vision in one eye certification

Information – Presbyopia correction guidance

Information – Guidance on spectacle frames and lens choice

Information – Guidance on use of sunglasses by pilots

Information – Guidance on contact lenses

Visual acuity conversion chart

General information

Eye examination
Ophthalmology examination reports and information are included as an attachment to this document.

A routine eye examination that forms part of all revalidation and renewal examinations shall include: history; visual acuity, near and distant vision (uncorrected and with best optical correction if needed), examination of the external eye, anatomy, media, fundoscopy and further examination on clinical indication.

For conditions where deterioration in visual function may pose a significant risk to flight safety, the Medical Assessor will impose a RXO limitation

Comprehensive eye examination
The term 'eye specialist' refers to an ophthalmologist or a vision care specialist qualified in optometry and trained to recognise pathological conditions.

At the initial assessment
All initial applicants who use optical correction should submit the result of a recent spectacle prescription.

Substandard vision
At the initial Class 1 examination, applicants with substandard vision in one eye are unfit.
At revalidation and renewal examinations, Class 1 applicants with acquired substandard vision in one eye shall be referred to the Medical Assessor. Certification with an OML may be possible pending a satisfactory ophthalmological assessment and medical flight test.

Applicants for a Class 2 medical certificate may be assessed as fit in consultation with the Medical Assessor pending a satisfactory ophthalmological evaluation and medical flight test.

See Flowchart – Substandard vision in one eye certification

Eye surgery
See Report specifications – Ophthalmic

See Information – Guidance following eye surgery

Class 1 & 2 - Correcting lenses
See Information – Presbyopia correction guidance

See Information – Guidance on spectacle frames and lens choice

See Information – Guidance on contact lenses

Refractive error and anisometropia
Applicants with refractive errors or anisometropia may be assessed as fit subject to satisfactory ophthalmic evaluation.

Applicants for a Class 1 medical certificate with any of the following medical conditions shall be referred to the medical assessor of the licensing authority and may be assessed as fit subject to a satisfactory ophthalmological evaluation:

(i) myopia exceeding –6.0 dioptres;
(ii) astigmatism exceeding 2.0 dioptres;
(iii) anisometropia exceeding 2.0 dioptres.

Assessment should be conducted by, or under the supervision of, an ophthalmologist and ensure that there is no underlying pathology or other ocular abnormalities.

Assessment shall include:

- Dilated, binocular, indirect ophthalmoscopy in cases of myopia exceeding –6.00 dioptres
- Corneal topography at initial assessment (and at renewal where there is significant change in refraction) in cases of astigmatism exceeding 2.00 dioptres

Applicants for a Class 1 medical certificate with excess hypermetropia exceeding +5.0 dioptres should be assessed by a consultant aviation ophthalmologist and referred to the Medical Assessor. Monocular visual acuities shall be 6/6 or better.

Assessment shall include:

- Intraocular pressures and anterior angle assessment, with gonioscopy where clinically indicated, to assess the risk of closed angle glaucoma attack
- Fusional reserve testing to ensure there are no adverse prism effects from spectacles
- Exclusion of underlying pathology or other ocular abnormalities

Applicants for a Class 1 medical certificate should wear contact lenses if:
(i) hypermetropia exceeds +5.0 dioptres;
(ii) anisometropia exceeds 3.0 dioptres.

For Class 1 applicants, an evaluation by an eye specialist should be undertaken 5-yearly if:
(i) the refractive error is between –3.0 and –6.0 dioptres or +3 and +5 dioptres;
(ii) astigmatism or anisometropia is between 2.0 and 3.0 dioptres.

For Class 1 applicants, an evaluation by an eye specialist should be undertaken 2-yearly if:
(i) the refractive error is greater than –6.0 dioptres or +5.0 dioptres;
(ii) astigmatism or anisometropia exceeds 3.0 dioptres.

Keratoconus
Applicants with a clinical diagnosis of keratoconus may be assessed as fit subject to a satisfactory examination by an ophthalmologist. Such applicants for a Class 1 medical certificate shall be referred to the medical assessor of the licensing authority. A CCL limitation ('Correction by means of Contact Lenses only') should be applied in cases of keratoconus where the visual requirements are met only with contact lenses, rather than spectacles.

Report specifications – Ophthalmic

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnosis (or diagnoses)**

2. **History**
   - Presenting symptoms
   - Nature of condition, circumstances surrounding onset, precipitating factors
   - Other relevant past medical, ocular and family history

3. **Examination and investigation findings**
   - Clinical findings
     - Uncorrected visual acuities (R,L, both) – distant (6 m), intermediate (1 m) and near (30-50 cm)
     - Corrected visual acuities (R,L, both) – distant (6 m), intermediate (1 m) and near (30-50 cm)
     - Refraction
     - General, Face, Adnexal structures e.g. eyelids
     - Pupils
     - Cover test
     - Eye movements
     - Convergence and accommodation
     - Stereopsis and fusion
     - Field of binocular single vision
     - Hess test
     - Where relevant, full orthoptic report
     - Visual fields
       1. For monitoring glaucoma, central static fields ideally Humphrey 24-2
       2. For monitoring neuro-ophthalmological conditions, Humphrey peripheral or neurological programmes, or Goldmann kinetic perimetry
       3. For function, monocular and binocular Estermann programme or Humphrey machine
   - Results of investigations such as CT or MRI scanning
   - Results of blood tests
   - Results of any other relevant tests

4. **Treatment, including surgery**
   - A. Ocular and other current and recent past medications (name, dose, start and finish dates, frequency)
   - B. Surgery
     - Date of surgery
     - Make and model of any implant
     - Post op medication
     - Post op result (e.g. refraction, eye position) measured at least twice separated by one month to establish early stability

5. **Follow up and prognosis**
   - Anticipated follow up/frequency of clinical reviews and investigations
   - Anticipated stability at 1, 5, 10 years

6. **Clinical implications**
   - Effect on function
   - Any concerns regarding disease progression, treatment compliance, sudden change in vision or risk of sudden incapacity

Information for specific conditions

Ocular Hypertension, Glaucoma and Pigment Dispersion Syndrome

- Visual fields
- Optic disc assessment
- Intra ocular pressures
- Anterior angle assessment

Keratoconus

- Specify treatment (spectacles, contact lens supervision, cross linking, corneal transplant)
- Corneal topographies (colour copy)

Vascular Conditions (Artery or vein occlusions, Amaurosis Fugax)

- Esterman visual fields – right, left and binocular field results required
- Intra ocular pressures
- Cardiovascular review include
  - FBC, erythrocyte sedimentation rate, Trombophilia screen (where relevant)
  - Temporal artery biopsy, carotid Doppler, echocardiogram

Phorias and Tropias

- Orthoptic report required

Eye Surgery Reports (from ophthalmic surgeon who carried out surgery)

- Date of surgery
- Intra or post-operative complications
- Comment on relevant clinical findings
  - Ocular discomfort or diplopia
  - Corneal haze or other median opacities
  - Symptoms of glare, photophobia or other dysphotopic symptoms
  - Night vision issues

Cataract Surgery

- Type of surgery (phacoemulsification or extracapsular)
- Post capsular thickening and YAG laser treatment (if applicable)
- Type of intraocular lens implant used
- Mesopic Contrast Sensitivity
- Glare sensitivity
- Halos

Refractive Surgery and Collagen Cross Linking

- Type of surgery (LASIK, LASEK, PRK, Collagen Cross Linking, other)
- Pre-operative refractions
- Post-operative refractions
- Months 2 and 3 following LASIK
- Months 3 and 6 following LASEK
- Glare sensitivity
- Corneal topographies (Collagen Cross Linking)
- Mesopic Contrast Sensitivity

Retinal Detachment / Par Planus Vitrectomy – Laser Retinopexy

- Type of surgery (gas or silicone oil)
- Residual field defect
- Risk of recurrence

Follow-up reports, to include visual field test results are required for many eye conditions in order to maintain medical certification in the aviation environment.

Information – Eye conditions certification

Conjunctivitis
Cases should be assessed individually. Viral conjunctivitis is associated with sore throat and lymphadenopathy and is infectious. Conjunctivitis often requires topical medication (e.g. antibiotic drops) and can impact on certification when purulent secretions are copious or when drop administration is very frequent. Please note that topical eye ointments may cause reduced vision for a period after application.

Minor eyelid infections
Minor eyelid infections such as blepharitis, chalazion (stye) or hordeolum do not normally impact on certification unless causing discomfort or a reduction in vision due to ptosis or induced astigmatism. Topical medications should not have an impact on certification unless it results in a reduction of vision or discomfort. Note that some topical eye ointments may cause reduced vision immediately after insertion and so they should not be used just before or during flight.

Keratitis / Anterior Uveitis
Should be declared unfit on diagnosis. Recertification is considered once the condition resolved and the applicant is off medication (or low dose topical therapy). A consultant report is required regarding diagnosis and follow-up. Class 1 holders may be required to undertake an assessment with a consultant aviation ophthalmology adviser, particularly if residual scarring is present. Recurrent anterior uveitis should be investigated for systemic inflammatory conditions (such as ankylosing spondylitis).

Posterior Uveitis
This is associated with underlying disease (inflammatory bowel disease, sarcoidosis, etc). Certificate holders should be assessed as unfit on diagnosis and a formal consultant ophthalmologist report is required (see CAA-NL's guidance on ophthalmic reports) and should include the results of all systemic investigations. A return to fit status should be considered bearing in mind visual function, medication and identification and control of any underlying cause.

Trauma
Eye injuries requiring ophthalmological assessment should be reported to the AME (Class 2) or Medical Assessor (Class 1). The pilot may be made unfit whilst recovering, depending on the individual case. Class 1 holders may be required to undertake assessment with a consultant aviation ophthalmology adviser. Pilots with minor corneal abrasions should not fly with any discomfort or disturbance to vision, with or without treatment.

Pupil Abnormalities
The pilot should be made unfit if there is recent onset and should be referred for further assessment by an ophthalmologist. Recertification is dependent on need for other investigations related to any underlying cause identified, and no symptoms (photophobia/difficulties with night vision).

Cataract
Pilots can be certificated provided the vision standards are met and there are no symptoms of glare, haloes etc. The pilot will be certificated as unfit if symptomatic or below vision standards with best correction. Certification can be reconsidered following successful cataract surgery with an intraocular lens implant (see Information – Guidance following eye surgery).

Retinal Detachment
Pilot will be unfit on diagnosis of retinal detachment. Consultant ophthalmologist reports will be required. Recertification can be considered following successful treatment. Recertification following surgery can be assessed individually. Note retinal tears treated successfully with laser can be reconsidered for certification once confirmation that no further treatment is required. Visual fields are required and should be normal (see Information – Visual fields and binocular vision). In complex cases including visual field loss, certification can be considered, following assessment by a consultant aviation ophthalmology adviser, for Class 1 with OML provided binocular visual field normal. Cases with significant field loss should follow the Flowchart - Substandard vision in one eye certification.

Central Serous Retinopathy
Pilot is made unfit on diagnosis. Recertification can be considered when the condition is resolved or when no further improvement to vision is expected and provided that the visual standards are met. Pilot must be asymptomatic and adapted to any vision loss. In cases of significant visual acuity loss, certification can be considered using the substandard vision in one eye guidance.

Acquired Disorders of the Macula
Retinal drusen should be monitored. In case of any distortion (metamorphopsia)of central vision or reduction of visual acuity below standards, the pilot should be made unfit. Ophthalmological reports are required. Recertification on individual basis but the pilot must be asymptomatic and adapted to any vision loss. In cases of significant visual acuity loss, certification can be considered using the substandard vision in one eye guidance.

Optic Disc Drusen
Certificated as fit provided visual fields and visual acuity are acceptable. Requires submission of periodic (normally annual) field tests for ongoing certification.

Glaucoma
Initial diagnosis should be reported by the pilot to their AME who should then manage/advise the pilot appropriately. Class 1 cases should be referred onward to the Medical Assessor and Class 2 cases managed by the AME in consultation with the Medical Assessor. Routine follow up reports including visual field results will be required. If there is significant loss of field in one eye, certification can be considered using the substandard vision in one eye guidance provided the binocular visual field is normal. In cases of glaucoma in both eyes, binocular visual fields shall be normal. Pilots undergoing glaucoma surgery will be made unfit. Recertification is on an individual assessment basis. Selective laser trabeculoplasty can, if successful, be recertificated subject to a satisfactory specialist report. Assessment by a consultant aviation ophthalmology adviser may be required for Class 1 pilots following surgery for glaucoma, where pilots have significant visual field loss or aggressive glaucoma.

Information – Visual fields and binocular vision

Visual Fields

EASA MED.B.070 (e) states that "Applicants for a Class 1 medical certificate shall be assessed as unfit, where they do not have normal binocular function and that medical condition is likely to jeopardise the safe exercise of the privileges of the license, taking account of any appropriate corrective measures where relevant". For the purpose of clarity the CAA-NL defines "normal fields of vision" as follows:

Monocularly, on Esterman field testing, there should be no more than two confluent missed spots within 20 degrees vertically from the primary position and 30 degrees horizontally from the primary position.

Where the monocular Esterman field is abnormal in either or both eyes, a binocular Esterman test should be carried out. Visual field defects in either or both eyes may be acceptable where they compensate for one another such that the Esterman binocular field is satisfactory.

A satisfactory binocular Esterman field is one in which there are no more than 4 missed spots, of which not more than 2 shall be contiguous in the visual field defined horizontally by 60 degrees either side of the primary position and vertically by 20 degrees above the primary position and 30 degrees below the primary position.

Visual fields should be carried out on Humphrey or Octopus field analysers. Goldman kinetic fields may be requested by the Medical Assessor when clarification is required on static field abnormalities and may form an acceptable alternative in situations where individuals cannot cope with automated perimetry.

Binocular Vision

There are three grades of binocular vision in the Worth's Classification: simultaneous macular perception (Grade 1), fusion (Grade 2) and stereopsis (Grade 3). For the purposes of aeromedical certification, **'normal binocular function'** includes all of these. This would include situations in which individuals have well-adapted heterotropia, are not at risk of diplopia, and/or have adopted a suppression scotoma when both eyes are open.

Information – Guidance following eye surgery

Refractive, cataract, glaucoma and retinal surgery, and collagen cross linking.

Refractive surgery

Prerequisites

- For Radial Keratotomy (RK), stability of refraction must be demonstrated before recertification. Each treated eye should show less than 0.75 dioptres diurnal variation.

- Applicants should have refraction and slit lamp examination. There should be no post- operative complications (e.g. corneal scarring) that might impact on flight safety.

- Glare sensitivity and mesopic contrast sensitivity should be satisfactory. Class 1 applicants should be formally tested at an AeMC, and have no dysphotopsia symptoms such as glare, halos (rings of light) or starbursts (streaking of point lights). In cases of doubt referral to a consultant aviation ophthalmologist should be considered. For Class 2, formal testing is not required but symptom inquiry should be carried out and there should be no dysphotopsia symptoms such as glare, halos or starbursts.

- A report must be provided from the centre that carried out the surgery and this should conform to the CAA's guidance on ophthalmic reports. Details must include dates and type of surgery performed, pre-operative refraction, and details of any complications (or a statement that no complications have occurred).

Revalidation Periods
All pilots must be assessed as unfit at the time of surgery. Assessment for restoration of fitness status should be carried out one week after the satisfactory cessation of post-operative medication when no longer necessary. Further reviews will be required if stability of refraction is in doubt or there are adverse effects. Guidance on the most common procedures is given below. Further guidance on other procedures should be sought from the AME or CAA Medical Assessor before the applicant is listed for surgery.

Photo Refractive Keratectomy (PRK)
Class 1 applicants or holders should undergo formal testing as above at an AeMC at 6 months and have an ophthalmological review with a consultant ophthalmologist. This should confirm a satisfactory surgical result and freedom from adverse side-effects. Restoration of fitness status before 6 months (but not less than three months) may sometimes be possible if only a low level of refractive error has been treated and early stability of refraction is demonstrated.
Class 2 applicants do not require formal testing for dysphotopsia but should confirm absence of glare, halos and starburst. Review can be with a local consultant ophthalmologist.

Laser Assisted in-Situ Epithelial Keratomileusis (LASEK)
As for PRK for all Classes.
Laser Assisted In-situ Keratomileusis (LASIK)
Class 1: refraction should be assessed at 4 and 6 weeks at an AeMC and an ophthalmological review undertaken with a consultant ophthalmologist at the 6 week point before recertification can be considered.
Class 2 – refraction should be assessed at 4 and 6 weeks with confirmation of absence of dysphotopsia symptoms and local consultant ophthalmological review at the 6 week point before recertification can be considered.

Clear Lens Exchange
Policy as for cataract surgery; please see below.

Conductive Keratoplasty
As for LASIK, but no return to fit status of any Class until 3 months. Due to the higher incidence of refraction regression following this procedure, ongoing 3 monthly refractions will be required until stability is confirmed.

Cataract Surgery
For Class 1, intraocular lens implants must be monofocal and should not impair colour vision and night vision.
For Class 2 and LAPL, multifocal lens implants may be acceptable subject to a satisfactory ophthalmological evaluation including confirmation of normal contrast sensitivity, night vision/night vision adaptation, and the absence of glare and halo's.

Multifocal implants may be offered by the pilot's surgeon before cataract surgery as an alternative to traditional monofocal lens implants. The CAA does not recommend or approve a particular intraocular lens (IOL) for certification.
A review[1] of randomised controlled trials studying multifocal versus monofocal intraocular lenses after cataract extraction was published by the Cochrane Collaboration in 2016. It reported that distant visual acuity was similar in the multifocal and monofocal groups but people with multifocal lenses achieved better near vision overall and were less dependent on spectacles. Adverse subjective visual phenomena, particularly halos, were common and troublesome in people receiving multifocal IOLs.
There was some evidence that contrast sensitivity may be lower in people receiving multifocal IOLs. There were no significant differences between IOLs with respect to objective glare.
The information in this review indicates that monofocal IOLs are likely to be less problematic than multi-focal IOLs for the issue of an aeromedical certificate. However, the decision to proceed with a multifocal implant should be made by the applicant and their surgeon, considering the potential impact on the applicant's occupation. Applicants should be aware of the possible adverse effects from any type of lens as aeromedical certification may not be possible if they occur.

Micro monovision* after both laser refractive surgery and intraocular lens implantation may be permitted subject to freedom from adverse effects and glasses being available which reverse the micromonovision* and restore both eyes in full focus at distant, intermediate and near.

*In traditional monovision, one eye was set for distant vision and the other for near using surgical strategies that created a large difference (typically 2- 3.5 dioptres) between the eyes. Micro-monovision aims to establish a reduced interocular dioptric power difference, typically of the order of 0.75D and not greater than 2D, such that a large intermediate zone of binocularity is achieved.

Fitness Assessment
Intraocular surgery will generally result in an unfit assessment for at least 6 weeks. Fitness can be reassessed following complete recovery from surgery. Assessment should include a comprehensive eye examination to include assessment of contrast and glare sensitivities and mesopic contrast sensitivity. For Class 1 applicants, this should be conducted with the vision specialist at an Aeromedical Centre or an ophthalmologist. Class 2 applicants may undertake this with their local vision specialist. A report from this assessment should be provided to the applicant's AME along with a detailed report from the specialist who performed the procedure following the template for ophthalmic medical reports (see Report specifications – Ophthalmic). This report should include the date of surgery, the type of implant used and confirmation that the pilot has fully recovered from surgery and that there are no post-operative complications.

[1] de Silva SR, Evans JR, Kirthi V, Ziaei M, Leyland M. Multifocal versus monofocal intraocular lenses after cataract extraction. Cochrane Database Syst Rev. 2016 Dec 12;12(12):CD003169. doi: 10.1002/14651858.CD003169.pub4. PMID: 27943250; PMCID: PMC6463930.

Glaucoma Surgery
A report shall be provided from the consultant ophthalmologist who performed the procedure and should include full details of the treatment carried out, current management, postoperative distant and near visual acuities, and up to date visual field results (please refer to separate guidance material on visual fields).
For Class 1 an assessment by a consultant aviation ophthalmologist may be required.

Procedure	Likely time before reassessment for certification
Trabeculectomy or treatment with external glaucoma devices**	3 months
Stenting	6 weeks
Selective laser or argon laser trabeculoplasty	1 week
Other procedures	Assessment once recovery made

** Glaucoma drainage devices create alternate channels to drain the aqueous humour from the anterior chamber through a long tube to a reservoir placed at the equator of the globe. Glaucoma drainage devices are being used more frequently but usually indicate that the glaucoma being treated is particularly severe and has not responded to medication, laser or traditional trabeculectomy surgery OR that the patient has an atypical form of glaucoma such as neovascular glaucoma, where it may be used as the primary procedure.

Retinal surgery
A report should be obtained from the consultant ophthalmologist who performed the procedure based on a review at 3 months. This should include full details of the procedure, and in particular whether any medical gases were used; post-operative recovery should be complete and current visual acuities and Esterman visual field analysis should be provided. The report should either confirm absence of post-operative ocular motility problems (except with vitrectomy) or incorporate an orthoptic report and/ or strabismology report. For Class 1, an assessment by a consultant aviation ophthalmologist may be required before recertification can be considered.

Collagen Cross Linking
Due to the risk of corneal haze following this procedure, assessment for dysphotopsia is required (see refractive surgery guidance).

Class 1 - Refraction at 2 months and then further refraction and full dysphotopsia testing and consultant aviation ophthalmological review at 3 months.

Class 2 - Refraction at 2 months and then review by a local consultant ophthalmologist at 3 months to include refraction and confirmation of absence of dysphotopsia symptoms.

Information – Retinal arterial disorders certification

(includes: retinal artery occlusion, ischaemic optic neuropathy and amaurosis fugax)

Pilots with arterial vascular disease affecting the eye should be made unfit. The subsequent aeromedical fitness assessment needs to take into account the both the effect on visual functions and the cardiovascular incapacitation risk.

Arterial vascular disease affecting the eye reduces visual acuity and field of vision in the affected eye, sometimes permanently.

It is important to identify disease due to emboli from the left side heart and carotids, as this carries a higher cardiovascular risk. Infective endocarditis and the systemic vasculitides, including giant cell (temporal) arteritis and thrombophilia must all be excluded, as these conditions have their own treatment protocols and aeromedical implications.

Arterial vascular disease affecting the eye is usually associated with an increased cardiovascular mortality. Cardiovascular risk factors must be identified and managed before recertification.

Class 1 & 2 certification

Assessment of visual function

A report must be obtained from the treating consultant ophthalmologist, to include:

- Visual acuity in each eye separately
- Visual field results in each eye separately and together

If the pilot develops substandard vision in one eye following a vascular event then they should be assessed in accordance with the Flowchart - Substandard vision in one eye certification.

Assessment of cardiovascular risk

All pilots must undergo a cardiovascular review with a consultant cardiologist and submit a report to their AME (or if Class 1 to the Medical Assessor if referred by their AME) to include:

- FBC and erythrocyte sedimentation rate
- Results of temporal artery biopsy if performed
- Carotid Doppler scan and echocardiogram
- Confirmation that blood pressure is stable (ideally with a 24-hour blood pressure recording)
- Assessment and appropriate management of other cardiovascular risk factors
- Exercise ECG, symptom limited and performed in accordance with the Bruce protocol
- Thrombophilia screen

Aeromedical disposal

Class 1

If both ophthalmic and cardiological assessments are satisfactory, the pilot can be assessed by the Medical Assessor as fit with an OML applied to the certificate. Abnormal findings may require further investigation/assessment.

Class 2

If ophthalmic and cardiological assessments are satisfactory, an unrestricted fit assessment can be made. When there are field defects and/or cardiovascular risks, an OSL may need to be applied to the certificate. in consultation with the Medical Assessor.

Information – Retinal vein occlusion (RVO) certification

Pilots with RVO should be declared as unfit. The subsequent aeromedical fitness assessment needs to take into account both the effect on visual function and the cardiovascular incapacitation risk.

RVO reduces visual acuity and field of vision in the affected eye, sometimes permanently. It is usually associated with an increased cardiovascular mortality. High blood pressure is a cardinal risk factor for RVO and satisfactory blood pressure control is therefore essential before recertification.

Class 1 & 2 certification

Assessment of visual function

A report must be obtained from the treating ophthalmologist, to include:

- Visual acuity in each eye separately
- Visual field results in each eye separately and together
- Evidence that intraocular pressure is stable

If the pilot develops substandard vision in one eye following a vascular event then they should be assessed in accordance with the Flowchart - Substandard vision in one eye certification.

Assessment of cardiovascular risk

All pilots must undergo a cardiovascular review with a consultant cardiologist to include:

- Confirmation that blood pressure is stable (ideally with a 24-hour blood pressure recording)
- Assessment and appropriate management of other cardiovascular risk factors
- Exercise ECG, symptom limited and performed in accordance with the Bruce protocol

Aeromedical disposal

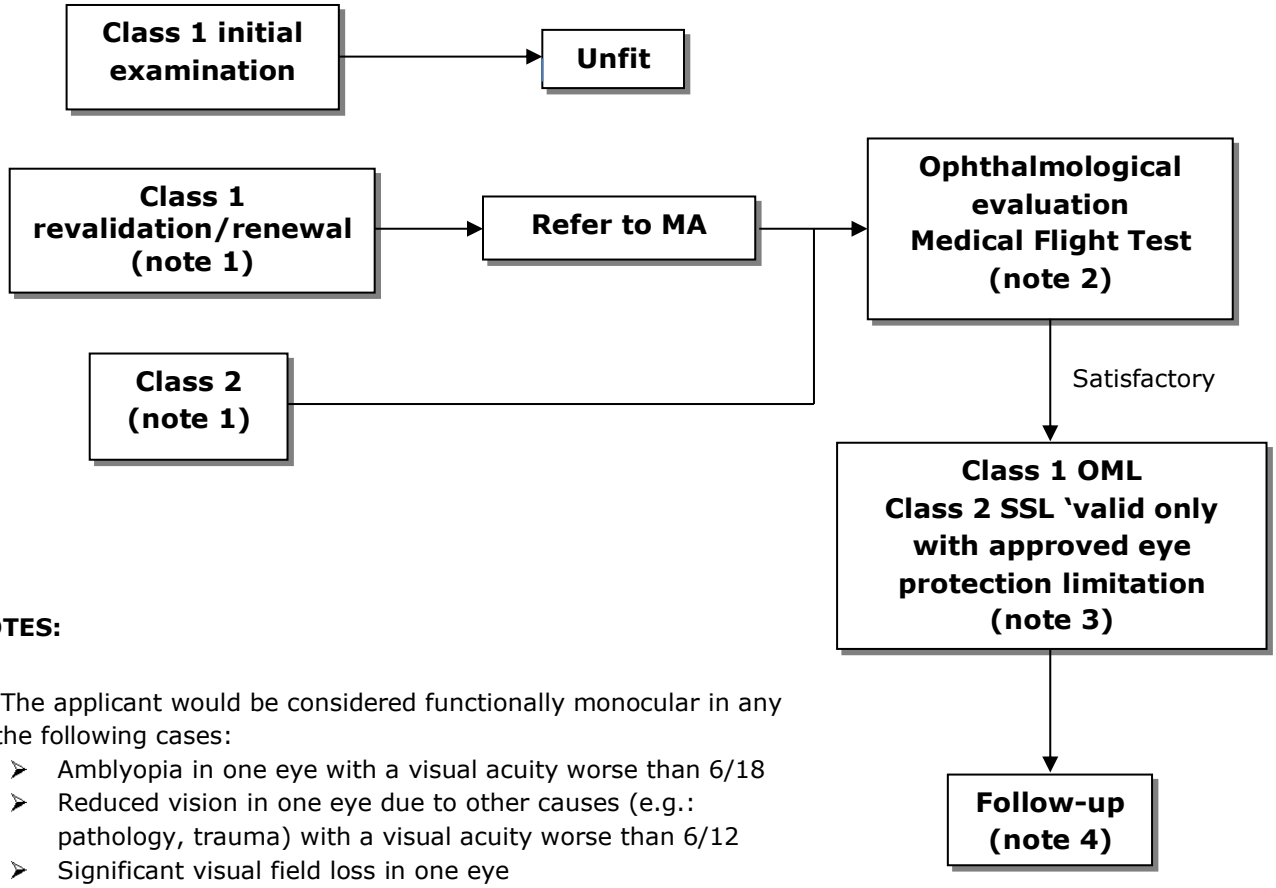
Class 1

If both ophthalmic and cardiological assessments are satisfactory, the pilot can be assessed by the Medical Assessor as fit with an OML applied to the certificate. Abnormal findings may require further investigation/assessment.

Class 2

If ophthalmic and cardiological assessments are satisfactory, an unrestricted fit assessment can be made. When there are field defects and/or cardiovascular risks, an OSL may need to be applied to the certificate. This can be done by an AeMC or AME in consultation with the Medical Assessor.

Flowchart – Substandard vision in one eye certification



NOTES:

1) The applicant would be considered functionally monocular in any of the following cases:

- Amblyopia in one eye with a visual acuity worse than 6/18
- Reduced vision in one eye due to other causes (e.g.: pathology, trauma) with a visual acuity worse than 6/12
- Significant visual field loss in one eye

2) Ophthalmological evaluation should establish

- Acceptable visual field(s)
- Distant visual acuity in the unaffected eye of 6/6 (1,0) corrected or uncorrected
- Intermediate visual acuity of N14 and N5 for near in the unaffected eye
- Acceptable underlying pathology and no significant pathology in the unaffected eye

In the case of monocularity, a period of adaption time must have passed from the known point of visual loss during which the applicant should be assessed as unfit

3) SSL valid only with approved eye protection: Protective goggles must be carried and used in any flying with a risk to eyesight including negative/zero G manoeuvres and flight in open cockpits.

4) Periodical ophthalmological evaluation as determined by the Medical Assessor. Any further deterioration in visual acuities requires repeat MFT.

Information – Presbyopia correction guidance

Pilots have to change their gaze frequently between objects at near, intermediate and far distances. With age, the ability of the eye to focus on near tasks decreases. This is known as presbyopia and the individual requires a prescription for near tasks. If a distance prescription is also required, some form of optical correction is needed which incorporates focus for both distance and near (and also intermediate) vision. In pilots the ideal presbyopic correction sometimes incorporates a distance prescription as well (even if the distance prescription is zero) so that one pair of spectacles covers all visual tasks. An intermediate zone for screen or instrument panel vision will usually also be required.

Spectacles
All types of correction (bifocal, progressive or trifocal) are acceptable provided they are well tolerated. Bifocals will offer distance and near correction with the near portion being a distinct segment within the lower part of the lens. There are different bifocal types: D-segment are the most prevalent and these are acceptable. Executive bifocals (where the reading portion covers the whole width of the lens) are less ideal, and are not recommended for helicopter pilots. are not recommended for pilots as the lower half of the distance visual field is blurred by the reading segment. This is particularly important in helicopter pilots and with NVG use.

Progressive lenses (or varifocals) change in prescription gradually from the distance part of the lens at the top, to the near portion of the lens towards the bottom. These lenses will also have an area of intermediate focus in-between the distance and near portions. The other type of lens available with an intermediate prescription is a trifocal lens. These are usually similar in appearance to bifocals but with an extra segment on top of the near portion. Occasionally the intermediate portion is incorporated into the top of the lens, with the reading portion at the bottom of the lens and the distance area in the centre. This may be useful for viewing overhead panels.

Contact Lenses
See Information – Guidance on contact lenses.

Information – Guidance on spectacle frames and lens choice

The following is intended to offer guidance on the type of spectacle frame and lenses recommended for use in the aviation environment.

Frame choice

All frames should be well fitting and comfortable. The choice of frame should minimise any effects on peripheral vision. The eye size should not be too small and a frame with a reasonably thin front (e.g. metal) and sides should be used. However, for those pilots that may have to use emergency oxygen, such as commercial jet airline pilots, the sides of the spectacles need to be strong enough to be placed under the oxygen mask straps.

For presbyopic pilots/ATCO's with good uncorrected distance vision, reading glasses should be in a ½ eye (look-over) style of frame. A full frame reading correction is unacceptable.

Lens Choice

The vast majority of spectacle lenses prescribed are made from a plastic material. These have a weight and a safety advantage over glass lenses. A hard coating is always recommended. Anti-reflection coatings reduce the intensity of reflections from the lens surfaces and allow a higher percentage of light to pass through the lens. These are compatible with aviation use.

High index lenses are recommended for stronger spectacle prescriptions.

For further information on bifocal and varifocal lenses, please see Information – Presbyopia correction guidance.

For information on sunglasses, please see the Information - Guidance on use of sunglasses by pilots. Note that all pilots requiring corrective lenses must have at least one pair of untinted spectacles available whilst exercising the privileges of their licence.

Information -Guidance on use of sunglasses by pilots

Sunglasses are an important piece of protective equipment in the cockpit environment. The following offers guidance to pilots purchasing sunglasses.

The tint should be neutral in colour. In practice, grey or brown are acceptable. The tint should be no darker than 80% absorption. A graduated tint (darkest at the top of the lens and lightening towards the bottom) may be useful.

Photochromic lenses react with UV radiation by darkening. As the cockpit windshield is designed to block the transmission of UV light, these lenses will not work as effectively in the cockpit environment. The use of these sunglasses is therefore discouraged.

Polarised lenses reduce the amount of light passing through the lens by selective filtering of certain electromagnetic spectral planes. These lenses can cause distortion patterns from certain laminated cockpit windshields. They can also alter cloud appearance and reduce ground reflections useful for VFR pilots. The use of these sunglasses is therefore discouraged.

All frames should be well fitting and be large enough to allow sufficient protection from oblique sunlight. All pilots requiring a spectacle prescription must have one clear ~~pair~~ spare set of correcting lenses. Sunglasses are not acceptable as a spare set. The wearing of plano sunglasses on top of prescription glasses is not acceptable.

Information – Guidance on contact lenses

EU implementing rules require that:

- If contact lenses are worn when exercising the privileges of the applicable licence(s), they shall be for distant vision, monofocal, non-tinted and well-tolerated.
- Applicants with a large refractive error shall use contact lenses or high-index spectacle lenses.
- Orthokeratological lenses shall not be used.

Contact lenses should be worn where:

- hypermetropia (long sight) exceeds +5.00 dioptres or
- anisometropia (difference in prescription between the 2 eyes) exceeds 3.00 dioptres.

Contact lenses have an optical advantage over glasses. The change of image size is minimised compared to glasses. Ring scotomas (area of visual field missed) caused by spectacle frame and lenses are eliminated as are peripheral aberrations induced by a spectacle lens.

However, a pilot wishing to use contact lenses for flying will need to ensure that the lenses can be comfortably worn on the ground before using them in the cockpit. As a guide, a minimum wearing time of 8 hours a day for 5 days a week consistently for at least one month is acceptable. It is important that the wearing times do not impact on the pilot's visual acuity, comfort or eye health. All contact lens wearing pilots are expected to attend for regular check-ups as advised by their contact lens practitioners.

It should be noted that some successful contact lens wearers are not able to use their lenses in flight. This may be due to dehydration of the lens, altering lens parameters or other factors.

All contact lens materials (gas permeable, soft, soft disposable, hard) are acceptable for aviation use provided they are well tolerated. Optimum correction must be achieved. The correction of astigmatism should always be considered for soft contact lens wearers (toric lenses). Silicon hydrogels (a type of soft disposable contact lens material) should be considered for aviation use due to their low water content and high oxygen transmission.

All contact lenses must be for distance only correction.

The following types of contact lens correction are not acceptable:

Monovision
This is where the dominant eye is fully corrected for distance and the non-dominant eye is corrected for near. The distance visual acuity in the 'reading eye' will often fall below the appropriate acuity standard. It can interfere with depth perception and does not give optimum distance vision.

Multifocal (bifocal / varifocal)
Unlike spectacle lenses where the user can use eye movements to view through a different portion of the lens and consequently a different focal length, a contact lens will move with eye movement. This means that a different optical system must be applied to enable the viewing of more than one focal length. There are several designs of multifocal contact lenses, however they will tend to have a poorer optical quality and cause potential loss of visual acuity and contrast sensitivity. Some designs are also problematic in bright light conditions. Multifocal contact lenses are not acceptable for aviation use.

Cosmetic coloured lenses
These have either a tint or an iris pattern to change the apparent colour of the user's eyes. More recent designs include themed images such as slit pupil 'cat's eyes'. Coloured lenses are not compatible with aviation use due to potential visual disturbances in lower light levels where the pupil widens beyond the central clear zone of the lens. Some lenses also have a high risk of inducing corneal hypoxia in flight due to poor oxygen transmissibility.

Orthokeratology (or Ortho K) lenses
These are 'reverse geometry' lenses designed to remould the front corneal surface. They are often worn at night and removed during the day. Any change to the corneal shape (and hence improvement to unaided vision) tends to be lost during the day and wearers of these lenses are unable to have optimum vision throughout the day. For this reason, this type of lens is not acceptable for aviation use.

X-chrom or Chromagen lenses
These are coloured lenses which are occasionally worn by people with colour vision deficiencies to aid them in a particular area where they may confuse certain colours. The lenses do not correct a colour vision deficiency but merely move the colour confusion to a different area of the colour spectrum. Due to the significant interference and loss of colour discrimination induced, these are not acceptable for aviation use.

Visual acuity conversion chart

Distance Visual Acuity Conversion Chart

UK	Decimal	5m	US
6/3	2.0	5/3	20/10
6/4	1.5		20/13
6/5	1.2		20/17
6/6	1.0	5/5	20/20
6/9	0.7	5/7.5	20/30
6/12	0.5	5/10	20/40
6/18	0.3	5/15	20/60
6/24	0.25	5/20	20/80
6/36	0.2	5/30	20/120
6/60	0.1	5/50	20/200

Near Visual Acuity Conversion Chart

UK (at 40 cm)	US (at 40 cm)	Distance equivalent
N4.5	20/20	6/6
N5	20/30	6/9
N6	20/40	6/12
N8		
N10	20/60	6/18
N12	20/80	6/24
N14	20/100	6/30
N18		
N24	20/200	6/60
N36		
N48		

Intermediate Visual Acuity Conversion Chart

UK (at 100 cm)	US (at 100 cm)	Distance equivalent
N8	20/20	6/6
N10	20/25	4/7.5
N12	20/30	6/9
N14	20/40	6/12
N18	20/60	6/18
N24	20/80	6/24
N36		
N48	20/200	6/60

Note: the near vision conversions are approximated to the nearest N equivalent

MED.B.075 – Colour vision

Guidance material

Ishihara test to be conducted as per manufacturer's instructions: test distance 75 cm with plane of plates at right angles to line of vision under daylight or daylight simulated light (usually colour temperature around 6500K) allowing 3 seconds per plate for response. The plates should be presented to the applicant in a random order. Ishihara plates should be updated periodically or if showing any signs of fading.

Anomaloscopy (Nagel or equivalent) may be considered provided the full protocol used for testing is enclosed with the result. This test is only considered passed if the colour match shows normal trichromacy, i.e. a matching midpoint of 38-42 scale units and the matching range is 4 scale units or less. Tests that have not been performed in the ~~UK~~ Netherlands must have been conducted by an Aeromedical Centre in another EASA member state. Applicants failing the Anomaloscope test may undergo the CAD test.

Colour Assessment and Diagnosis (CAD) test is also accepted if there are any errors on the first 15 plates. Part MED.A.010 defines colour safe as 'the ability of an applicant to readily distinguish the colours used in air navigation and to correctly identify aviation coloured lights'.
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.

If the Medical Assessor is to consider the result of a lantern test, the report should include clear detail of the protocol used, responses made and documentation of the calibration/maintenance of the equipment.

MED.B.80 – Otorhinolaryngology

Guidance material

Information - Hearing Loss

Information - Ear and Labyrinth Conditions

Report specifications – Otorhinolaryngology

Information - Hearing Loss

Applicants who fail the conversational test at 2 metres are required to provide specialist medical reports detailing the cause of hearing loss and the results of pure tone audiometry. Functional testing in flight may be necessary.

Initial applicants for Class 2 with a hearing loss of more than 35 dB at any of the frequencies 500 Hz, 1000 Hz or 2000 Hz, or more than 50 dB at 3000 Hz, in either ear separately should have an assessment carried out by a consultant ENT specialist to identify or exclude underlying pathology, assess stability of hearing loss and establish suitability for a hearing aid. The application should then be referred to the Medical Assessor.

A newly diagnosed hearing loss at an initial medical, with no evidence of stability, may require a number of months to elapse and then repeat audiometry to be undertaken before certification can be considered.

Speech discrimination test or functional hearing test
This test should be based on the following ICAO guidance:
Hearing loss greater than the requirements may be acceptable provided that there is normal hearing performance against a background noise that reproduces or simulates the masking properties of the flight deck noise in the cockpit upon speech and beacon signals.

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. The frequency composition of the background noise is defined only to the extent that the frequency range 600 to 4800 Hz (speech frequency range) is adequately represented. In the speech material for discrimination testing, both aviation-relevant phrases and phonetically balanced words are normally used. Alternatively, a practical hearing test conducted in communication environment representative of the one for which the certificate holder's licence and ratings are valid may be used. The functional hearing assessment/speech discrimination test can be found in the Appendix of this document.

Hearing Aids
In an applicant who already holds a medical certificate, any type of hearing aid is acceptable for recertification, e.g. bone-anchored or intra-aural. Following insertion of the hearing aid, a functional hearing assessment must be performed and if satisfactory a return to certification is possible. A multi-pilot restriction may be required for existing Class 1 pilots.

Consideration should also be given to carrying spare aids and batteries where appropriate.
For removable hearing aids, audiometry, if required, should be undertaken both with and without hearing aids.

Note: For many pilots increasing the volume of the head set may be preferable and enhance hearing more than wearing hearing aids. In increasing the volume, pilots should be aware of the risks to their residual hearing from noise exposure and seek advice from their AME or company occupational physician.

Profound Hearing Loss
Applicants who are or become completely deaf will not be able to gain or renew/revalidate a Class 1 medical certificate.

Class 2/LAPL applicants may be considered for certification with special restriction of 'SSL' – 'no flights to or from airfields where ATC is provided by radio and remain outside controlled airspace'.

Information - Ear and Labyrinth Conditions

A fit assessment can be considered after full recovery from a condition affecting the ear following provision of a satisfactory GP or specialist report. Complex conditions and Class 1 certificate holders will require an ENT specialist assessment.
If there is incomplete recovery from the condition, evidence that the condition has stabilised for an appropriate period of time is required. The audiogram standards must be met or a satisfactory functional hearing assessment is required.

Perforation
Recertification is possible after a minimum period of six weeks following a single dry perforation of non-infectious origin. A specialist report is required confirming complete healing and the pilot must be pain free. A satisfactory audiogram is required for Class 1 or Class 2 Instrument Rating (IR) recertification.

Stapedectomy
To ensure full healing, recertification is only allowed a minimum of three months after surgery, subject to a satisfactory specialist report confirming no complications, the absence of dizziness, spontaneous or positional nystagmus and a satisfactory hearing result.

Grommet insertion
This is acceptable for certification at both initial and revalidation/renewal.

Acoustic Neuroma
On diagnosis, the applicant should be made unfit. If clinical management is a 'watch and wait' policy, the applicant can be recertificated to Class 1 OML/unrestricted Class 2. Follow-up MRI reports should be forwarded to the Medical Assessor.
An applicant with symptoms, or if a decision is made to treat, should be made unfit pending full recovery from symptoms or treatment.

Following surgery, recertification depends on surgical approach, extent of removal and post op symptoms. If brain has been retracted during operation the risk of seizure should be considered. Normally, following full recovery, a fit Class 1 OML or unrestricted Class 2 assessment is appropriate. Can consider unrestricted Class 1 at 12 months post-operatively if the imaging shows complete resection of the tumour and there are no seizures or balance disturbance.

Following radiotherapy, certification is possible as Class 1 OML/unrestricted Class 2 on recovery (minimum 4 weeks following completion of treatment). Unrestricted certification can be considered 1 year after the completion date of radiotherapy, subject to imaging showing complete resection of the tumour and there being no seizures or balance disturbance.

Benign Positional Vertigo/Labyrinthitis
In view of the recurrence risk of this condition and the sudden incapacitating nature of the symptoms, the earliest a pilot can be considered for recertification is after they have been symptom-free and off any treatment for at least 4 weeks. Class 1 holders require an OML for a minimum period of 3 months from recertification.
The use of any medication to treat vestibular symptoms, e.g. Betahistine is not acceptable for medical certification.

Meniere's Disease
A diagnosis of Meniere's Disease, untreated or treated is not acceptable for Class 1 or 2 medical initial or recertification.

Report specifications – Otorhinolaryngology

The following subheadings are for guidance purposes only and should not be taken as an exhaustive list.

1. **Diagnoses**
2. **History**
   - Presenting symptoms and date of onset
     - Otologic (e.g. deafness, tinnitus, vertigo, otalgia, discharge, fever, barotraumas)
     - Nasal (e.g. obstruction, discharge)
     - Throat/larynx
   - Mechanism of injury or trauma
   - Circumstances surrounding onset, precipitating factors
   - Past history and family history of ENT disorders
   - Effect on daily activities/duties of working role, including altitude pressure changes and balance/orientation

3. **Examination findings relevant to condition**
   - Eustachian tubes (Valsalva manoeuvre)
   - Tympanic membrane integrity (perforations)
   - Hearing function Weber and Rinne tests
   - Vestibular function
   - Oropharynx

4. **Findings of investigations performed (as applicable)**
   - Pure tone audiometry – required for all cases of hypoacusis
     - Up to date audiogram required post treatment when symptoms are fully resolved
     - Tympanometry
   - Imaging reports (CT, MRI)
   - Histology reports
   - Other procedures and investigations

5. **Treatment**
   - Past, recent and ongoing treatment must be detailed
   - Current and recent past medications (dose, frequency, start and finish dates)
   - Confirmation of no side effects from medication
   - Surgical reports

6. **Follow up and further investigations/referrals planned or recommended (as applicable)**
   - Anticipated follow up/frequency of clinical reviews and investigations
   - Prognosis and risk of recurrence
   - Confirmation of full recovery at date of report

7. **Clinical implications**
   - Any concerns regarding disease progression, treatment compliance or risk of sudden incapacity, difficulties with environmental pressure change or balance/orientation

MED.B.085 – Dermatology

Guidance material

Information – Dermatological conditions certification

Isotretinoin policy – Guidance on assessment following completion of treatment

Information – Dermatological conditions certification

Acne, Eczema, Psoriasis, Photosensitivity, Bullous eruptions

As long as these conditions are under sufficiently good control so that there is:

- No significant irritation or distraction;
- No possibility of a sudden flare-up with significant symptoms;
- Acceptable treatment (see below),

then certification can be maintained.

Otherwise the pilot will need to be declared 'unfit' and a report sought from a consultant dermatologist. Class 2 OSL may be considered in some cases. In all cases where doubt exists or control is sub-optimal an opinion should be sought from a consultant dermatologist.

Many topical treatments are acceptable after refraining from flying whilst symptoms are brought under control and ensuring that there are no side effects from the treatment. A few topical treatments can themselves cause irritation/pruritis or even drowsiness. Long-term low dose erythromycin or tetracycline treatment for acne is acceptable following 2 days of refraining from flying after initially starting treatment whilst ensuring that no side-effects occur.

Guidance on cytotoxic or immunosuppressant drugs can be found in Medication used in GI conditions. See also Isotretinoin policy – Guidance on assessment following completion of treatment.

Care must be taken to ensure that associated conditions e.g., arthropathy with psoriasis, are considered.

Skin infections

Provided that the infection is not of risk to others, that there is no significant irritation or distraction, and that the infection is limited to the skin and not systemic, there is no restriction to certification. Acute infections, where the immediate course is uncertain, require a period off flying until resolved. Topical antibiotics, antifungals or antiviral treatments are acceptable after refraining from flying whilst symptoms are brought under control and ensuring that there are no side effects from the treatment.

The only systemic antifungal that is permitted is Terbinafine for fungal infection of the nails. Flying is not permitted within two weeks of the start of treatment and liver function tests need to be monitored throughout treatment.

Skin malignancy

Squamous cell carcinoma, Bowen's disease and Paget's disease of the nipple are disqualifying before treatment. Unrestricted certification for Class 1 and Class 2 is possible for localised disease after complete excision, provided confirmation of this is obtained from the relevant specialist and adequate follow-up is in place.

Basal cell carcinoma, keratoacanthoma, actinic keratosis must be treated as soon as possible after diagnosis. Immediate grounding is not necessary, however specialist reports should be obtained following treatment. Unrestricted certification for Class 1 and Class 2 is acceptable following full excision or satisfactory alternative treatment.

See also Information – Primary cutaneous melanoma.

Isotretinoin policy - Guidance on assessment following completion of treatment

Background
Isotretinoin is a very effective therapy for severe and persistent acne. It is not recommended for pilots, because of the possibility of mood changes and depression, and the association with photophobia and night blindness (nyctalopia) while on treatment. Additionally, dark adaptation may be affected permanently in some individuals. Animal models show that the effects of isotretinoin on retinal function reverse rapidly within several days after cessation of high dose treatment.

Guidelines
Medical certification (Class 1 and 2) is not possible whilst taking isotretinoin.

- Existing certificate holders: shall be made unfit until off treatment for 2 weeks or more followed by a fit assessment by the AME – see below.
- Initial applicants: defer initial medical until has been off treatment for 2 weeks or more followed by a fit assessment by the AME – see below.

Fitness assessment
For all those with a history of isotretinoin use, a detailed history must be taken to include questions about low mood and night vision e.g. night driving.
In the last two weeks…

- Do you have difficulty adapting from brightly lit rooms to dark places?
- Do you suffer eye-strain at sudden bright lights?
- Do you have any difficulty seeing the stars on a clear night?
- Do you have stress, anxiety or fear of driving in the evening or at night?
- Do you have difficulty seeing colours at night?

Psychological questions are recommended and include:
For most of the last 2 weeks….

- Have you been feeling unusually sad or fed up?
- Have you lost interest in things that used to interest you, or gave you pleasure?

More extensive screening using a validated questionnaire may be helpful. For example the PHQ-9 test for depression.

If review is satisfactory, Class 1 certification can be considered through referral to the Medical Assessor and Class 2 certification can be considered in consultation with the Medical Assessor.
If there are any concerns about night vision, then further assessment will be necessary prior to making a certificatory decision. This should involve appropriate examination, such as electrophysiological testing and dark adaptometry, to determine whether there is any detrimental impact on night vision. If the pilot is found to have a demonstrable nyctalopia, a medical flight or simulator test may be required, depending on the degree of severity. For pilots with demonstrated nyctalopia enough to cause concerns for night flying, a VCL limitation will be required.

MED.B.090 – Oncology

Guidance material

Chemotherapy

Radiotherapy

Surgery

Metastatic disease

Report specifications - Oncology

Flowchart – Anthracycline treatment certification

Information – Oncology charts for certification assessments

- Colorectal cancer
- Breast cancer
- Primary cutaneous melanoma
- Germ cell tumour of the testis
- Renal cell carcinoma
- Non-small cell lung cancer
- Prostate cancer

On reporting a diagnosis of malignancy, applicants should be assessed as unfit.
Recertification can be considered following receipt of a satisfactory specialist report.

Note 1: All Class 1 applicants shall be referred to the Medical Assessor.
Note 2: Class 2 applicants shall be discussed with the Medical Assessor.

Information and guidance on oncology certification is also available in Ernsting's Textbook of Aviation Medicine 5th Edition, Chapter 28, Malignant Disease.

For recertification:

- Treatment completed
- Full recovery
- No symptoms that could affect flight safety
- No complications, or if any, appropriate investigation and specialist referral may be required

Chemotherapy

- Recertification a minimum of 6 weeks after the last dose of chemotherapy, subject to satisfactory blood tests results (HT, urea and electrolytes, liver function tests, relevant tumour markers as a minimum).
- Complications from treatment need full recovery. If unresolved, appropriate specialist assessment may be required, e.g. neuropathy may require a specialist neurology assessment.
- Class 1 pilots who have had anthracycline (e.g. doxorubicin, adriamycin, daunorubicin) require cardiological assessment: See Flowchart – Anthracycline treatment certification

Radiotherapy

- Recertification a minimum of 4 weeks after the last dose of radiotherapy.
- Complications from treatment need full recovery. If unresolved, appropriate specialist assessment may be required, e.g. radiation pneumonitis/pulmonary fibrosis requires a specialist respiratory assessment.

Surgery

As a guide, minimum post-operative grounding periods:

- Minor – 1 week (e.g. skin lesion)
- Intermediate – 6 weeks (e.g. prostatectomy (TURP))
- Major – 3 months (e.g. hemicolectomy)

Metastatic disease

Metastatic disease is generally disqualifying for Class 1 and Class 2 certification.
In exceptional cases, recertification may be considered by the Medical Assessor.

Incapacitation risks are based on:

- Risk of a recurrence
- Site of the recurrence
- Risk of a recurrence at that site leading to an incapacitation.

Oncology certification charts exist for these tumour types:

- Colorectal cancer
- Breast cancer
- Malignant melanoma
- Testicular germ cell tumour
- Renal cell carcinoma
- Non-small cell lung cancer
- Prostate cancer

See also Information – Certification after treatment for malignancy of the immune system

Report specifications – Oncology

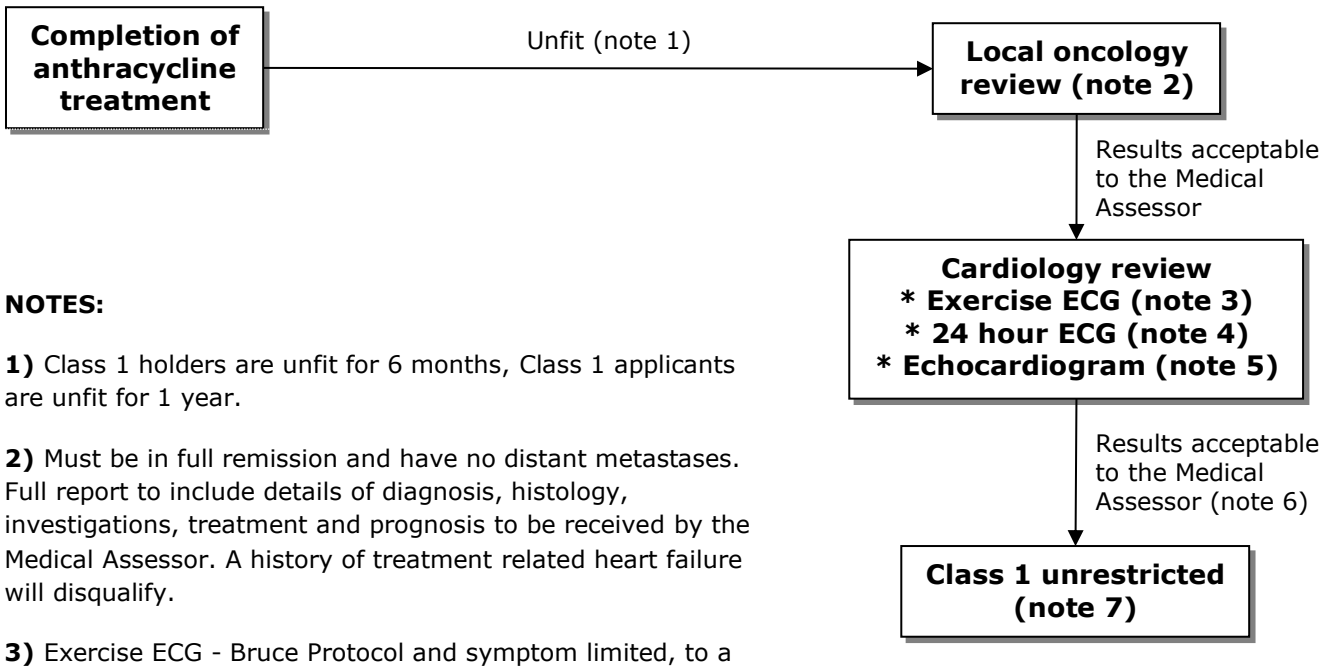
To return to flying:

1. There must be no evidence of residual malignant disease after treatment.
2. Adequate time must have elapsed appropriate for a full recovery, at least 6 weeks following chemotherapy and 4 weeks following radiotherapy.
3. There must be no evidence of complications from treatment likely to interfere with flight safety.
4. The risk of in-flight incapacitation must be no greater than:
   - 1% per annum (Class 1 OML, Class 2 unrestricted)
   - 5% per annum (Class 2 OSL)

A medical report may be provided to the Medical Assessor (Class 1) or AME (Class 2) with the following information:

1	History	Presentation and course of illness including dates	
2	Diagnosis		
3	Results of radiological investigations	CT/MRI scan, ultrasound, bone scan, chest x-ray, other	
4	Blood test results	Haematology (FBC, liver function tests, etc), tumour markers	
5	Grade of tumour	Including copies of histology reports	
6	Stage of tumour	TNM or other staging	
7	Site of any distant disease		
8	Types and dates of treatment	i. Surgery ii. Chemotherapy (curative / adjuvant / palliative) (specify if anthracylines) iii. Radiotherapy (curative / adjuvant / palliative) iv. Hormone therapy	
9	Complications from treatment	Investigations or referral to other specialists	
10	Follow-up plan	Frequency of clinical radiological imaging and tumour markers	
11	Ongoing treatment	All ongoing treatment should be specified	
12	Prognostic factors	Adverse or good	
13	Prognosis	Event free survival Disease free survival Overall survival	1 year, 5 years and 10 years
14	Risk of possible future recurrence / metastasis	i. What are the most likely sites of recurrence / metastases? ii. What is the risk of cerebral metastasis? iii. What are the likely clinical presentations of recurrences / metastases? iv. Could these symptoms be incapacitating? v. Could a recurrence / metastasis be detected before symptoms develop by increasing the frequency or types of surveillance (radiological imaging / blood tests)?	
15	References to medical literature	Provide and relevant references in medical literature, especially for are malignancies.	

Flowchart – Anthracycline treatment certification



NOTES:

1) Class 1 holders are unfit for 6 months, Class 1 applicants are unfit for 1 year.

2) Must be in full remission and have no distant metastases. Full report to include details of diagnosis, histology, investigations, treatment and prognosis to be received by the Medical Assessor. A history of treatment related heart failure will disqualify.

3) Exercise ECG - Bruce Protocol and symptom limited, to a minimum of 9 minutes.

4) 24 hr ECG - No significant rhythm or conduction disturbance. Short burst of SVT may be acceptable. VT will require further investigation.

5) Echocardiogram - Structurally normal heart and normal LV and RV function.

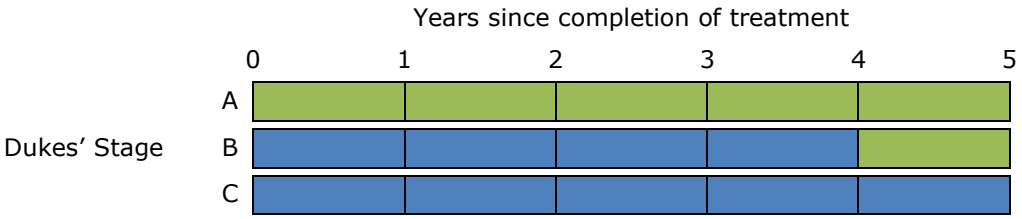
6) The cardiology report will be reviewed by the Medical Assessor. It may be necessary to see the investigations, in which case the actual tracings/films/videos will be requested.

7) Initially, annual cardiology review with echocardiogram, 24-hour and exercise ECG. Subsequently, reduced follow-up requirements may be acceptable at the Medical Assessor's discretion.

Information – Oncology charts for certification assessments

Note: All Class 1 holders should be referred to the Medical Assessor.

Colorectal cancer

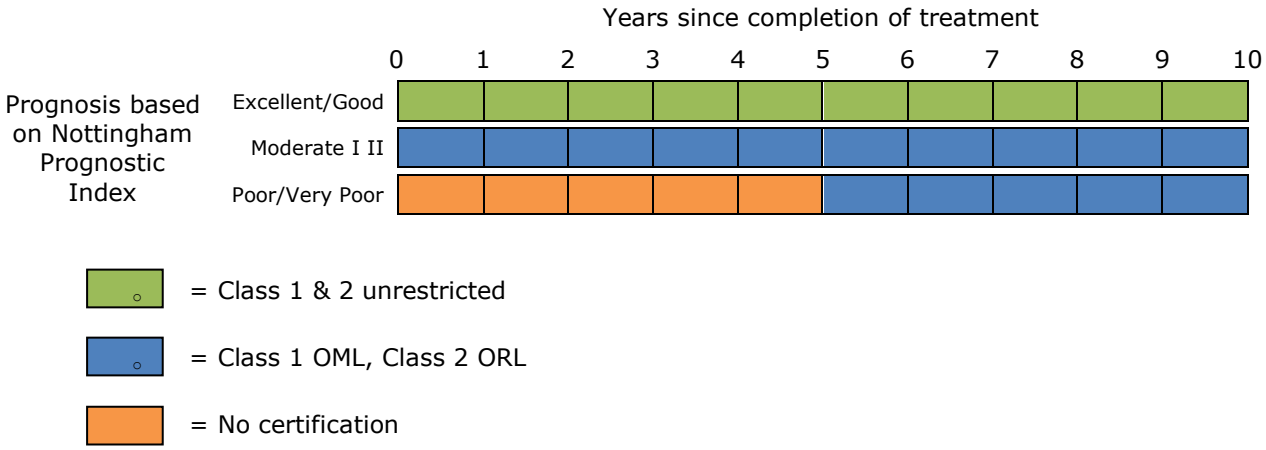


- Dukes' Stage A = T_{1-2}
- Dukes' Stage B = T_{3-4}

= Class 1 & 2 unrestricted

= Class 1 OML, Class 2 ORL

Breast cancer



10 year survival for breast cancer using the Nottingham Prognostic Index (NPI)

Prognosis	NPI	10 year survival
Excellent	2.08 - 2,4	96%
Good	2.42 ≤ 3,4	93%
Moderate I	3,42 ≤ 4,4	81%
Moderate II	4,42 ≤ 5,4	74%
Poor	5,42 ≤ 6,4	50%
Very Poor	6,5 – 6,8	38%

The most significant indicators of prognosis are tumour grade, stage as indicated by histological lymph node involvement and tumour size. The Nottingham Prognostic Index (NPI) (Haybittle, 1982) uses these factors to predict outcome on an individual basis by applying the formula:

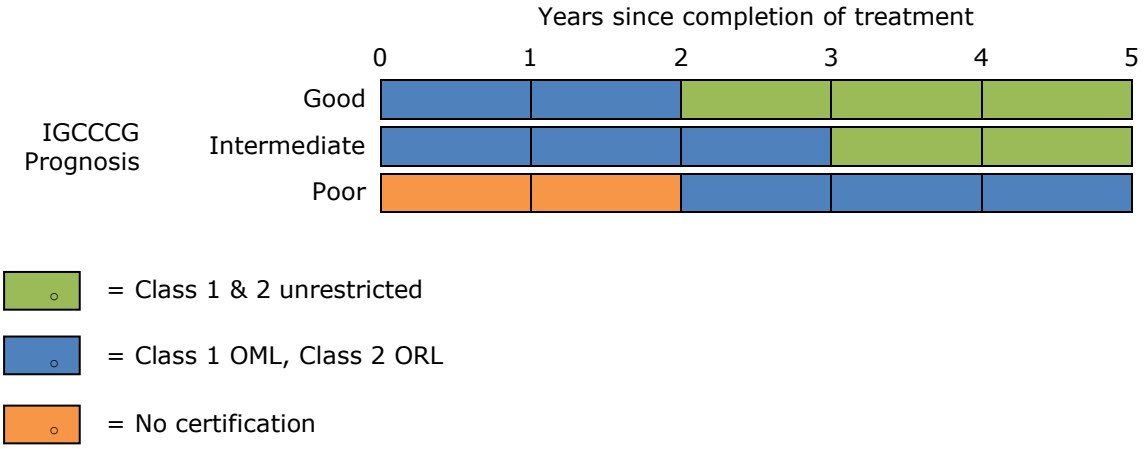
NPI = 0,2 × size (in cm) + Stage (I-III) + Grade (1-3; good, moderate, poor)

- Stage I = No lymph node involvement
- Stage II = Lower axillary or internal mammary nodes positive
- Stage III = Apex or both axillary and mammary nodes positive

Primary cutaneous melanoma

Pathological stage	Clinical stage	Tumour thickness	Nodes	Metastases
I	T1	≤ 1 mm	No	No
	T2	1 – 2 mm	No	No
II	T3	2 – 4 mm	No	No
	T4	> 4 mm	No	No
III	N1	Any	1	No
	N2	Any	2 – 3	No
	N3	Any	4+	No
IV	M	Any	Yes / No	Yes

Germ cell tumour of the testis



International Germ Cell Cancer Collaborative Group (IGCCCG) Prognosis

Good prognosis = All seminoma except non-pulmonary metastases

NSGCT: AFP < 1.000 ng/mL
hCG < 5.000 IU/L
LDH < 1,5 × normal

Intermediate prognosis = Seminoma with non-pulmonary metastases

NSGCT: AFP < 10.000 ng/mL
hCG < 50.000 IU/L
LDH up to 10 × normal

Poor prognosis = NSGCT

NSGCT: AFP > 10.000 ng/mL
hCG > 50.000 IU/L
LDH more than 10 × normal

AFP = alphafoetoprotein in ng/ml
hCG = human chorionic gonadotrophin in iu/l
LDH = lactate dehydrogenase
NSGCT = non-seminomatous germ-cell tumours

Renal cell carcinoma

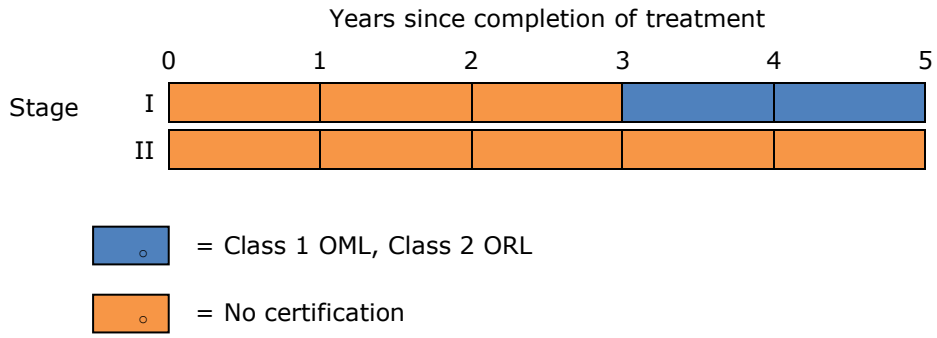
UCLA integrated staging system N_0M_0 renal cell carcinoma

Risk Factor	T Stage	Grade	Performance Status	5 year survival
Low	1	1 – 2	0	93%
Intermediate	1, 2 or 3	Any	Any	71%
High	4 or 3	Any	1+	50%

Performance Status is determined according to the Eastern Co-operative Oncology Group criteria.

(UCLA = University of California Los Angeles)

Non-small cell lung cancer



Prostate cancer

Note: All Class 1 holders should be referred to the Medical Assessor.

A. On reporting a diagnosis of prostate cancer the pilot should be assessed as unfit pending receipt of satisfactory reports.

B. A specialist report is required to include:

1. Grade (Gleason score)
2. Stage
3. Any extra-capsular spread
4. Any distance spread
5. Pre and post treatment PSA
6. Imaging results: MRI, bone scan
7. Treatment, including dates
8. Prognosis
9. Follow-up plan: clinical reviews / PSA tests / imaging

C. Requirements for recertification:

1. No metastases. (Note: exceptionally, Class 2 with OSL may be possible; such cases should be referred to the Medical Assessor)
2. Satisfactory treatment response, demonstrated by decrease in PSA level, if elevated. (Note: 15% of prostate cancer is associated with normal PSA levels)
3. Full recovery from treatment.
4. No symptoms / complications that could affect flying. If any complications, appropriate investigations and specialist referral is required.
5. Time to recertification depends on treatment received (see table below).

D. Time to recertification after common treatments:

Treatment	**Prostatectomy** (TURP / Radical)	**Radiotherapy** (External)	**Brachy-therapy** (Internal)	**Hormone therapy ***	**'Watchful waiting' / Active surveillance**
Requirements	Minimum of 6 weeks after prostatectomy	Minimum of 4 weeks after last dose radiotherapy	Minimum of 6 weeks after insertion	Minimum of 4 weeks on maintenance dose, stable and without side-effects.	Minimum of 3 monthly specialist reviews with PSA tests. Follow-up reports must be submitted to the: Medical Assessor for Class 1 and AME for Class 2
Certification	Class 1 unrestricted (high grade or extra-capsular spread may require an OML) Class 2 unrestricted				Class 1 OML Class 2 unrestricted
Follow-up requirements after recertification					AME will require follow up reports after each clinical review, or at least annually. A recurrence of symptoms, or rise in PSA suggestive of a recurrence, should entail unfitness.

* Acceptable treatments: anti-androgens, e.g. bicalutamide, LHRH agonists, e.g. goserelin.

Note: Other treatments (such as but not limited to chemotherapy, cryotherapy, steroids and High Intensity Focused Ultrasound) should be referred to the Medical Assessor.

Appendix – Medical Flight Tests

MFT – Physical ability

MFT – Cognitive function assessment/Performance-affecting medication

MFT – Substandard vision in one eye

MFT – Functional hearing assessment/Speech discrimination test

Human Environment and Transport Inspectorate
Ministry of Infrastructure and Water Management

THE NETHERLANDS CIVIL AVIATION AUTHORITY

MEDICAL FLIGHT TEST REPORT

Physical ability

1) Applicant's personal details

Full name: _____

Licence no.: _____

Date of birth: _____/ _____/ _____ (dd/mm/yyyy)

2) Purpose of test

To assess safe handling and fitness to operate all aircraft controls

a) In normal flight conditions (pre-flight checks, preparation for flight, taxi, take off, landing, normal flight manoeuvres and operation of all switches, levers and other operational procedures in the cockpit)

b) In the event of an emergency (such as but not limited to: engine failures, brake faults requiring full manual braking, rejected take off following engine failure)

c) In demonstrating safe evacuation of the aircraft

(NOTE: Separate reports may be required for different Classes and types)

(NOTE: Test may be conducted on a suitable and CAA-NL approved FSTD)

3) Declaration

Declaration: *I understand the purpose of the medical flight test (see section 2)*

Signature of applicant: _____ Date: _____/_____/_____

4) Medical flight test report (to be completed by the instructor/examiner)

Aircraft Type and registration: _____/_____

FSTD type and simulator company: _____

Modifications to aircraft/simulator if any: _____

Artificial aids used by the applicant if any: _____

Date of test: ____/____/____ Place of test: _____

Please comment on the following:

1) Can the applicant reach and safely handle all aircraft and ancillary controls in the Aircraft/Simulator during the different phases of flight? Yes ☐ No ☐ N/A ☐

2) Does the applicant have sufficient range of movement, strength, dexterity and agility for all operational procedures during routine flight conditions and in the event of an emergency? Yes ☐ No ☐ N/A ☐

3) Can the applicant safely evacuate the aircraft? Yes ☐ No ☐ N/A ☐

4) In your opinion, is the applicant's physical limitation or body mass compatible with the safe exercise of the licence privileges? Yes ☐ No ☐ N/A ☐

Comments on the applicant's ability to compensate for their physical limitation

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_____

_____

_____

_____

Instructor/Examiner's Name: _____ Licence Number: _____

Position Held: _____

Signed: _____ Date: ____/ ____/ ____

Human Environment and Transport Inspectorate
Ministry of Infrastructure and Water Management

THE NETHERLANDS CIVIL AVIATION AUTHORITY

MEDICAL FLIGHT TEST REPORT

Cognitive function assessment/Performance-affecting medication

1) Applicant's personal details

Full name: _____

Licence no.:_____

Date of birth:_____ /_____ / _____ (dd/mm/yyyy)

2) Purpose of test

Following assessment, the applicant has demonstrated satisfactory clinical recovery from their medical condition. The applicant is taking acceptable prescribed medication that has a low risk of side effects that might include effects on flying/operational performance. The final stage of assessment before certificate issue is to demonstrate that there is no decrement in expected performance during a license proficiency check or skills test. The examiner should therefore confirm that there are no problems with relevant tasks such as communication (both in the cockpit and with ATC), concentration on task, memory recall for essential items, ability to react appropriately to emergencies, flight plan changes, good airmanship/behaviour and other general flying skills.

(NOTE: Test may be conducted on a suitable and CAA-NL approved FSTD)

3) Declaration

Declaration: *I understand the purpose of the medical flight test (see section 2)*

Signature of applicant:_____ Date:_____/_____/_____

4) Medical flight test report

Aircraft Type and registration: _____/_____

FSTD type and simulator company: _____

Date of test: _____/_____/_____ Place of test: _____

Please comment on the following:

1) Completion of flightplanning / paperwork, reading weather reports, NOTAM's, maps etc. Yes ☐ No ☐ N/A ☐

2) Pre-flight checks and reading of cockpit instruments Yes ☐ No ☐ N/A ☐

3) Taxiing – speed, safe clearance from other aircraft/objects Yes ☐ No ☐ N/A ☐

4) Take off and climb-out- judgement of distances/height Yes ☐ No ☐ N/A ☐

5) Look-out – Appropriate visual scan and identification of other aircraft and ground features Yes ☐ No ☐ N/A ☐

6) In-flight reading of instruments, flight plans/logs and maps Yes ☐ No ☐ N/A ☐

7) Approach and landing – judgement of distances/height Yes ☐ No ☐ N/A ☐

Comments on the applicant's ability for adequate cognitive performance

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_____

Instructor/Examiner's Name: _____ Licence Number: _____

Position Held: _____

Signed: _____ Date: _____/ _____/ _____

Human Environment and Transport Inspectorate
Ministry of Infrastructure and Water Management

THE NETHERLANDS CIVIL AVIATION AUTHORITY

MEDICAL FLIGHT TEST REPORT

Substandard vision in one eye

1) Applicant's personal details

Full name: _____

License no.:_____

Date of birth:_____ /_____ / _____ (dd/mm/yyyy)

2) Purpose of test

The purpose of this medical flight test is to assess the applicant's ability to compensate for their reduced vision. It should normally be performed in conjunction with a licence skills/proficiency test where all aspects of the flying task are tested.

Once content that the applicant has demonstrated a satisfactory safe standard, the examiner should complete and sign this medical flight test report, to confirm that they consider the student has reached as satisfactory standard for solo flying. Training/flight operations can then proceed as normal.

3) Declaration

Declaration: *I understand the purpose of the medical flight test (see section 2)*

Signature of applicant:_____ Date:_____/_____/_____

4) Medical flight test report

Aircraft Type and registration: _____/_____

Date of test: _____/_____/_____ Place of test: _____

Please comment on the following:

1) Completion of flightplanning / paperwork, reading weather reports, NOTAM's, maps etc. Yes ☐ No ☐ N/A☐

2) Pre-flight checks and reading of cockpit instruments Yes ☐ No ☐ N/A☐

3) Taxiing – speed, safe clearance from other aircraft/objects Yes ☐ No ☐ N/A☐

4) Take off and climb-out- judgement of distances/height Yes ☐ No ☐ N/A☐

5) Look-out – Appropriate visual scan and identification of other Aircraft and ground features Yes ☐ No ☐ N/A☐

6) In-flight reading of instruments, flight plans/logs and maps Yes ☐ No ☐ N/A☐

7) Approach and landing – judgement of distances/height Yes ☐ No ☐ N/A☐

Comments on the applicant's ability to compensate for their reduced vision

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_____

_____

_____

_____

Instructor/Examiner's Name: _____ Licence Number: _____

Position Held: _____

Signed: _____ Date: _____/ _____/ _____

Human Environment and Transport Inspectorate
Ministry of Infrastructure and Water Management

THE NETHERLANDS CIVIL AVIATION AUTHORITY

MEDICAL FLIGHT TEST REPORT

Functional hearing assessment/Speech discrimination test

1) Applicant's personal details

Full name: _____

License no.: _____

Date of birth: _____/ _____/ _____ (dd/mm/yyyy)

2) Purpose of test

Based on EASA guidance, hearing loss greater than the requirements may be acceptable provided that there is normal hearing performance against a background noise that reproduces or simulates the masking properties of the flight deck noise in the cockpit upon speech and beacon signals. This test should be conducted where background noise is representative of the noise in the cockpit of the type of aircraft for which the pilot's licence and ratings are valid. Both aviation-relevant phrases and phonetically balanced words should be used in the speech material for discrimination testing.

3) Declaration

Declaration: *I understand the purpose of the medical flight test (see section 2)*

Signature of applicant: _____ Date: _____/_____/_____

4) Medical flight test report

Aircraft Type and registration: _____/_____

Date of test: _____/_____/_____ Place of test: _____

lease comment on the following:

1) Can the applicant hear adequately in the Aircraft/Simulator during all phases of flight? Yes ☐ No ☐ N/A ☐

2). Does the applicant's hearing loss interfere with the ability to Communicate with ATC and/or other flight crew members during all phases of flight? Yes ☐ No ☐ N/A ☐

3). Can the applicant accurately identify non-routine R/T phraseology? Yes ☐ No ☐ N/A ☐

4). Can the applicant identify accurately the identification signals of Navigation Beacons? Yes ☐ No ☐ N/A ☐

5). In your opinion, does the applicant's hearing loss interfere with flight safety? Yes ☐ No ☐ N/A ☐

Comments on the applicant's ability to compensate for their hearing loss

_____

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Instructor/Examiner's Name: _____ Licence Number: _____

Position Held: _____

Signed: _____ Date: _____/ _____/ _____

Colofon

Published by: Dutch Civil Aviation Authority
Aeromedical section

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