FSG 400-01
AIRCREW VISUAL REQUIREMENTS

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REFERENCES:

A. CFP 154 Medical Standards for the Canadian Forces
B. CFAO 34-44 Periodic Health Examination and Medical Administration – Aircrew
C. AMA Directive 100-01 Medical Standards for CF Aircrew
D. CFHS Instruction 4020-03 Optical Supply and Services: Entitlement to Contact lenses
E. CANFORGEN 69/08 Laser (Eye) Refractive Surgery in CF Aircrew
F. AMA Directive 400-02 Laser Refractive Surgery for CF Aircrew
G. CFHS Instruction 4000-16 Periodic Health Assessment – Aircrew
H. CFHS Instruction 4000-01 Periodic Health Assessments

RECORD OF AMENDMENTS:

Date (DD/MMM/YY)	Reason for Change
29Apr19	**Update to allowable refractive errors for Group A and B aircrew (para 10, table I), and related standards for Laser Refractive Surgery (para 27)**

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GENERAL

1. This guideline represents the concurrent opinion of the Aerospace and Undersea Medical Board (AUMB) including 1 Canadian Air Division Surgeon (1 Cdn Air Div Surg) and the RCAF Surgeon, Medical Advisor to the Chief of the Air Staff. Because of concerns regarding operational effectiveness and flight safety, variation from this guideline should occur only after obtaining appropriate aeromedical advice from the Medical Consult Services (Med C Svcs) at CFEME Toronto. This guideline should be read in conjunction with reference C that further elaborates on diseases of the eye which may be disqualifying for aircrew.

AIRCREW EYE EXAMINATIONS

2. Aircrew eye examinations may be done by an ophthalmologist, an optometrist or a CAF ophthalmic technician.

3. Aircrew eye examinations should include a thorough clinical ophthalmological assessment and must include the following elements, with the results of each clearly documented. DND 2766 – Visual Acuity for Initial Aircrew Form (see Annex B) may be utilized for this purpose.

a. Near and distant visual acuity, corrected and uncorrected;

b. Refraction:

(1) or applicants for all aircrew MOSIDs, a cycloplegic refraction is required on initial eye examination; and

(2) For subsequent examinations after aircrew selection, a manifest refraction may be done in lieu of cycloplegic refraction;

c. Dilated fundoscopy;

d. Ocular muscle balance, measured at 6 m and at 30-50 cm with the individual wearing the correction required for these distances and with measurement in prism diopters of any horizontal and vertical heterophoria using the alternate cover test or Maddox rod;

e. Intraocular pressures with referral to an ophthalmologist for full glaucoma if identified as a glaucoma suspect;

f. Visual fields by confrontation, with formal VF testing if clinically indicated; and

g. Near stereopsis measured in sec/arc.

4. Reports received with incomplete documentation should be returned to the consultant to be fully completed. These requirements are also detailed at Annex A, which may be attached to the request for consultation to the eye specialist.

Initial Aircrew Eye Examination

5. A full eye examination including cycloplegic refraction is required within the 12 months preceding initial medical examination for aircrew.

6. Cycloplegic refraction is required for all initial aircrew to determine the native correction and compute the spherical equivalent.

Periodic Eye Examination

7. For **Group A Aircrew** only, A periodic eye examination will be done:

a. Every 4 years after the initial eye examination to age 40 (every 2 years if the member wears glasses);

b. Every 2 years after age 40; and

c. Annually after age 46.

8. Where visual status changes sufficiently to warrant a V factor change below aircrew MOSID standards, the aircrew member shall be referred to an Ophthalmologist for confirmation. All V factor changes below MOS Standards must be forwarded to 1 Cdn Air Div Surg for recommendations regarding medical employment limitations. 1 Cdn Air Div Surg/ASCS may request consultation advice from CFEME/Medical Consult Services, and/or the Aerospace and Undersea Medical Board, before making a final recommendations, and will then forward its recommendations to D Med Pol in Ottawa

9. **Group B aircrew** require an initial aircrew medical examination for selection and are subsequently examined in accordance with ref H.

VISUAL ACUITY STANDARDS

10. Initial Selection: Aircrew candidates must meet visual acuity standards as defined in Table 1 that follows. Near vision is determined using “Times Roman” type and is assessed both at reading distance 30-50 cm and at 100 cm. When two values are shown, such as N5 and N14, the first value refers to the reading distance at 30-50 cm and the second to the 100 cm distance.

Table 1: Visual Acuity Standards for Aircrew.

	V1		PILOT and SAR DES PILOTES / SAR **V2**		OTHER AIRCREW EXCEPT FLIGHT SURGEON /AMTO AUTRE PERSONNEL NAVIGANT **V3**		FLT SURGEON, AMTO MÉDECINS DE L’AIR, OSMA **V4**	
	Better Eye **Meilleur œil**	**Other** **Autre oeil**	**Better Eye** **Meilleur œil**	**Other** **Autre oeil**	**Better Eye** **Meilleur œil**	**Other** **Autre oeil**	**Better Eye** **Meilleur œil**	**Other** **Autre oeil**
Uncorrected Distance **Non corrigée Vision de loin**	6/6	6/9	6/18 or 6/12	6/18 or 6/30	6/60	6/60	N/A S/O	
Corrected Distance **Corrigée Vision de loin**	Not applicable Sans objet		Correctable to 6/6	6/9	Correctable to 6/6	6/9	Correctable to 6/9	6/60
Near at 30cm Uncorrected **VP à 30 cm Non corrigée**	N5	N6	N10 OR N8	N10 N12	N/A S/O	N/A S/O	N/A S/O	N/A S/O
Near at 100cm Uncorrected **VP à 100 cm Non corrigée**	N14	N18	N24 OR N16	N24 N36	N/A S/O	N/A S/O	N/A S/O	N/A S/O
Near Corrected **VP Corrigée**	Not applicable Sans objet		(30cm) N5 (100cm)N14	N6 N18	(30cm) N5 (100cm)N14	N6 N18	(30cm)N6 (100cm)N18	N36 N36

* Table 1 Notes:

a. Spherical equivalent (SE) is determined by algebraically adding half the cylinder part of the correction to the spherical part of the correction, (cylinder/2 + sphere).

b. For Group A aircrew applicants, the spherical equivalent must be less than -8.00 diopters or +3.00 diopters including prior to laser refractive surgery.

c. For Group B aircrew applicants, a refractive error greater than -8.00 diopters if associated with retinal pathology including lattice, or greater than +5.00 diopters SE is disqualifying.

d. Aircrew applicants with a pre-op refractive error greater than -6.00 diopters require a dilated retinal examination to assess for any retinal pathology including lattice. Any retinal pathology requires assessment by an ophthalmologist, and if confirmed, is disqualifying for aircrew.

11. Aircrew must meet criteria for near and distance vision. The final visual category assigned will take into account **both** distance vision and near vision. The worst of the two (distance or near) will take precedence when assigning the final visual category.

OCULAR MUSCLE BALANCE

12. Ocular muscle balance, measured at 6 m and at 30-50 cm with the individual wearing the correction required for these distances with measurement in prism diopters of any horizontal and vertical heterophoria using the alternate cover test or Maddox rod.

13. Diplopia is disqualifying, as is unstable fusion.

14. There must be less than 2 prism diopters of vertical deviation (hyper / hypophoria) at both 30-50 cm and 6 m. Up to 10 diopters of horizontal deviation at both 30-50cm and 6 m (exo/esophoria) is acceptable providing there is no history of diplopia. Borderline cases can be assessed at the Medical Consult Services/ CFEME.

15. AMT, Flight Surgeons and Aeromedical Evacuation (AE) personnel may be considered acceptable with higher amounts of ocular muscle imbalance provided there is stable fusion and there is no history or evidence of diplopia.

INTRAOCULAR PRESSURE (IOP) / GLAUCOMA

16. Intra-ocular pressures should be measured and recorded in each eye at every aircrew eye examination, both selection and periodic.

17. Glaucoma suspects, identified by any of the following, must be referred to an ophthalmologist for a full glaucoma assessment.

a. An IOP in either eye equal to or greater than 22 mmHg;

b. A difference of 4 mmHg or greater between eyes;

c. Pigmentary dispersion syndrome;

d. Narrow angles;

e. Suspicious optic nerve cupping; or,

f. Visual field defects.

18. An adequate glaucoma assessment should include the following:

a. Visual acuity;

b. Intraocular pressures;

c. Corneal pachymetry

d. Gonioscopy;

e. Dilated optic disc and fundus evaluation with optic nerve imaging (retinal photos) and ocular coherence tomography (OCT) if available;

f. Visual field testing;

g. Treatment recommendations, if indicated; and

h. Follow-up recommendations.

19. Glaucoma, as defined by the following, requires treatment:

a. Glaucomatous change in the optic nerve;

b. Visual field loss characteristic of glaucoma, with or without IOPs greater than 21 mmHg; or,

c. IOP greater than 28mmHg in either eye, even without the presence of optic nerve or visual field changes.

20. Aircrew with treated glaucoma whose intraocular pressures are controlled by topical medications, and who have no significant field loss may be fit for unrestricted flight duties. Aircrew with glaucoma should be assigned a MEL as follows: G3 – Requires medical follow-up less often than six monthly. This requires a CF2033/CF2088 with review through normal channels beginning with ASCS.

FLYING RESTRICTIONS/EXPERIENCED AIRCREW

21. Pilots with V2 or V3 visual category will be assigned the following MEL: **A1 –Must wear corrective lenses while flying**

22. Pilots deteriorating from V1 to V2 may have their visual category changed and the MEL, “A1 – Must wear corrective lenses while flying”, added locally. The change is not required to be seen by 1 CAD Surg/ASCS or D Med Pol.

23. Pilots and Search and Rescue Technicians who become V3 (below standards) will have the appropriate documentation forwarded through 1 CAD Surg/ASCS for recommendations to D Med Pol. Former CF Pilots who, in the past, were routinely made V3/A3 may be re-enrolled as V3/A1 after appropriate ophthalmic assessment

24. All aircrew deteriorating to V4 will be assessed and assigned MELs on a case-by-case basis. Appropriate documentation should be forwarded to 1 Cdn Air Div Surg for recommendations (with consultation to AUMB and CFEME/MCS as appropriate), which will then be forwarded to D Med Pol.

CONTACT LENSES

25. The determination of the A factor of those pilots choosing to fly with contact lenses is the same as for a pilot wearing spectacles (i.e. according to their unaided vision). Pilots who receive contact lenses because of operational roles (Tac Fighter, SAR, TacHel) IAW Ref D will have them supplied by the CAF. Other pilots and aircrew must pay for the lenses. When aircrew wear contact lenses, they must be properly fitted and certified that they were appropriately fitted without problems.

26. Toric lenses are now acceptable for aircrew operating high performance aircraft for corrections up to 2 diopters.

ALTERATION OF CORNEAL REFRACTIVE STATUS

Laser Refractive Surgery

27. a. Conditions of eligibility and details on acceptable procedures for pilot applicants can be found at Refs C and F.

b. Aircrew applicants with a pre-op refractive error greater than -6.00 diopters require a dilated retinal examination by an optometrist or ophthalmologist to assess for any retinal pathology including lattice. Any retinal pathology requires assessment by an ophthalmologist and if confirmed, is disqualifying for aircrew selection.

c. For Group A aircrew, the pre-op spherical equivalent must be less than - 8.00 diopters or +3.00 diopters

d. For Group B aircrew, the pre-op spherical equivalent may exceed -8.00 diopters but there must be no evidence of retinal pathology on careful retinal examination. The maximum pre-op hyperopic limit is +5.00 diopters SE>

28. CAF members considering LASER eye surgery and Flight Surgeons must familiarize themselves with Ref F prior to proceeding with this procedure. It is also important to note that members must get the approval of their CO before undergoing the procedure and that at present laser eye surgery will not be funded by the CAF.

Intra-Corneal Rings and Radial Keratectomy (RK)

29. Inter-corneal rings and RK surgery still remain disqualifying for all aircrew MOSIDs.

Orthokeratology (Corneal Refractive Therapy)

30. Orthokeratology treatments are unacceptable and will be disqualifying until the practice has been stopped for a period of six-months.

Keratoplasty (Corneal Transplant)

31. A history of lamellar or penetrating keratoplasty is disqualifying.

PROGRESSIVE LENSES AND POLARIZED LENSES

32. Progressive lenses are not authorised for pilot (00183). Bifocals and trifocals are acceptable. Other aircrew may use progressive lenses. Polarized lenses are not allowed for any aircrew.

INTRAOCULAR LENS IMPLANTS

33. Intraocular lens implants are acceptable for unrestricted flying duties following cataract surgery provided there are no complications, and all visual standards are met. “Blue Blocker” IOLs are not acceptable for pilot and are not recommended for other aircrew. Consultation with CFEME/Medical Consult Services is advised for clarification of aeromedically acceptable IOLs.

34. Beyond the obvious importance of visual function in air operations, such function represents the single-most frequent cause for aircrew candidate unsuitability. It follows that Flight Surgeons must have a thorough knowledge of aircrew visual requirements and should ensure that visual examinations are carried out completely, accurately and at the required intervals.

SUMMARY

35. Beyond the obvious importance of visual function in air operations, such function represents the single-most frequent cause for aircrew candidate unsuitability. It follows that Flight Surgeons must have a thorough knowledge of aircrew visual requirements and should ensure that visual examinations are carried out completely, accurately and at the required intervals.

36. Where doubt exists as to the implications of visual function to the suitability of an aircrew candidate or in experienced aircrew, such cases should be discussed with or referred to the Medical Consult Services/CFEME or the 1 Cdn Air Div Surgeon, respectively

ANNEX A - REQUIREMENTS FOR AIRCREW EYE EXAMINATIONS

37. Canadian Forces aircrew are required to have full eye examinations at selection and then every four years after selection. Near and distance visual acuity testing is included with each annual aircrew medical examination. Aircrew eye examinations may be done by an ophthalmologist, an optometrist, or a Canadian Forces Ophthalmic Technician. The following elements are required for Canadian Forces aircrew eye examinations. Incomplete examinations will be returned to the examining health care specialist for completion.

a. A thorough clinical ophthalmological assessment;

b. Near and distant visual acuity, uncorrected and corrected;

c. Refraction:

(1) For all aircrew applicants, a cycloplegic refraction is required on initial eye examination.

(2) For subsequent examinations after aircrew selection, a manifest refraction may be done in lieu of cycloplegic.

d. Ocular muscle balance, measured at 6 m and at 30-50 cm with the individual wearing the correction required for these distances using the cover and alternate cover tests, with measurement in prism diopters.

e. Dilated fundoscopy;

f. Intraocular pressures; and

g. Visual fields.

ANNEX B DND 2776 – Visual Acuity for Initial Aircrew Form

National Defence / Défense nationale

PROTECTED B (When completed)
PROTÉGÉ B (Une fois rempli)

Visual Acuity for Initial "Aircrew"
Acuité visuelle initiale pour "personnel navigant"

Facility providing care - Établissement médical

Surname - Nom	Given name - Prénom	SN - NM

DOB - DDN *(yyaa-mm-dj)*	Component - Force	Element - Élément
	☐ REG - RÉG ☐ RES - RÉS	☐ Air

Uncorrected vision - Vision sans lunettes

Right - Droit 6/ _____ Left - Gauche 6/ _____

		Sphere Sphère	CYL	AXIS Axe	Add Ajouter	Vision Metric Vision métrique
Present glases / Lunettes portées	Right - Droit					
	Left - Gauche					
Manifest refreaction / Réfraction manifeste	Right - Droit					
	Left - Gauche					
Cycloplegic Refraction / Réfraction cycloplegique	Right - Droit					
	Left - Gauche					

Muscle balance / Équilibre musculaire — 1/3 M _____ 6 M _____ (In prism diopter) (prisme diopter)

Normal			Abnormal - Anormal
	External - Externe	1	
	Cornea - Cornée	2	
	ANT chamber - Chambre ANT	3	
	Lens - Cristallin	4	
	Iris	5	
	Pupil - Pupille	6	
	Disc - Papille	7	
	Macula	8	
	Vessels - Vaisseaux	9	
	Retina - Rétine	10	
	Media - Milieux	11	
	Field - Champ	12	
	EOM - Movements oculaires	13	
	Convergence	14	
	Accommodation	15	

	Right - Droit	Left - Gauche	Time - Heure
Interocular pressure - Tension oculaire			
Pachymetry (If available) / Pachymétrie (si disponible)			

Near stereopsis vision (In sec/arc) / Vision stéréoscopique de près (en sec/arc) _____

At distance (If available) / À distance (si disponible) _____

- Please note that an accurate reporting of the following items is very important to us in relation to an applicant's occupational fitness.
- Veuillez prendre note que l'enregistrement pour nous en ce qui concerne l'aptitude du travail d'un (e) postulant(e).

a. The uncorrected visual acuity at distance and near - L'acuité visuelle non-corrigée à distance et de près

b. The best corrected vision at distance and near using spectacles (not contact lenses) - La meilleure vision à distance et de près avec des lunettes (pas des lentilles cornéennes).

c. Near vision at 30-50 cm and 100 cm preferably N, not Jaeger or metreprint sizes - La vision de près à 30-50 cm et 100 cm préférablement en N, non Jaeger ou format metreprint.

d. Cycloplegic refraction is required for all applicants - Une réfraction cycloplégique est obligatoire.

e. Stereopsis at near (seconds of arc) and distance if available - Vision stéréoscopique de près (en sec/arc)et à distance si disponible.

f. Muscle balance: Use alternate cover test to measure horizontal and vertical alignment in prism diopters at distance and near with appropriate glasses
Équilibre musculaire : Utilisez test couver en alternance pour mesurer l'alignement horizontal et vertical en prism diopter à distance et de près avec verres appropriés.

g. Intraocular pressure is required for all applicants - Tension oculaire requise pour tous les postulants

h. Dilated fundoscopy is required. Record the presence of lattice or other peripheral retinal changes. - Un examen do fond d'oeil avec dilatation des pupilles est requis. Noté la presence de lattice ou autre changement retinien périféral.

Near vision - Vision de près (N)
Distances

		30-50 cm	100 cm
Uncorrected / Non - corrigée	Right Droit		
	Left Gauche		
Corrected / Corrigée	Right Droit		
	Left Gauche		

Comments: Please comment on any abnormalities and previous laser eye surgery including pre-operative refraction if known.
Commentaires : S.v.p. commenter tous résultats anormaux et les antécédents de chirurgie oculaire au laser incluant la réfraction pré-opérative si connue.

Date *(yyaa-mm-dj)*		Signature and stamp - Signature et estampe	Telephone number / Numéro de téléphone
	☐ Ophthalmologist - Ophthalmologiste ☐ Optometrist - Optométriste ☐ Ophtal-Tech - Tech-Ophtal		

****** Note: All fees for reports are the responsibility of the applicant.** ****** Note : L'obtention de ce rapport et aux frais du/de la postulant(e).**

DND 2776 (02-2014)

Design: Forms Management 613-995-9944
Conception : Gestion des formulaires 613-947-8944

PROTECTED B (When completed)
PROTÉGÉ B (Une fois rempli)

Canada