



Circulaire

CIR/FCL 21

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Objet : La qualification d'avions monoteurs et multimoteurs monopilotes. (SPA – SE & ME).

Betreft: De bevoegdverklaring voor eenmotorige en meermotorige éénpiloot vliegtuigen. (SPA – SE & ME)

Réf. :

Arrêté royal du 4 mars 2008 réglementant les licences civiles de pilote d'avions.
Art. 56, 57, 58, 63, 64 et 65, §1.

Ref. :

Koninklijk besluit van 4 maart 2008 tot regeling van de burgerlijke vergunningen van bestuurder van vliegtuigen.
Art. 56, 57, 58, 63, 64 en 65, §1.

JAR-FCL 1.240/ 1.245 / 1.255 / 1.260 / 1.261 / 1.262

App. 1 to JAR-FCL 1.240 & 1.295

App. 3 JAR-FCL 1.240

App. 1 to JAR-FCL 1.261(a)

AMC-FCL 1.261(a)

IEM-FCL 1.240 (b) (2)

JAR-FCL 1.240/ 1.245 / 1.255 / 1.260 / 1.261 / 1.262

App. 1 to JAR-FCL 1.240 & 1.295

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App. 1 to JAR-FCL 1.261(a)

AMC-FCL 1.261(a)

IEM-FCL 1.240 (b) (2)

Le Directeur général a.i.,
De Directeur-generaal a.i.,

L'édition 4 comprend
De 4^{de} uitgave bevat

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FCL 21

Cette circulaire décrit le programme et les procédures de la formation, de l'épreuve d'aptitude et du contrôle de compétence en vue de l'obtention de la qualification de type et de classe d'avions monomoteurs et multimoteurs monopilotes. SPA (SE & ME).

Elle comprend :

- **App. 1 to JAR-FCL 1.240 & 1.295**
Skill test and proficiency check for aeroplane type/class ratings and ATPL.
- **App. 3 to JAR-FCL 1.240**
Contents of the class/type/training/skill test and proficiency check on single-engine and multi-engine single-pilot aeroplanes.
- **App. 1 to JAR-FCL 1.261(a)**
Theoretical knowledge instruction requirements for skill test/proficiency checking for class/type ratings.
- **AMC FCL 1.261(a)**
Syllabus of theoretical knowledge instruction for class/type ratings for single-engine and multi-engine aeroplanes.
- **IEM FCL 1.240 (b)(2)**
Class/type rating/training/skill test and proficiency check form on single-engine and multi-engine single-pilot aeroplanes

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Deze circulaire beschrijft het programma en de procedures die van toepassing zijn voor de opleiding, de vaardigheidstest en de bekwaamheidstest met het oog op het bekomen de klasse- en type- bevoegdverklaring éénmotorige en meermotorige éénpiloot vliegtuigen. SPA (SE & ME).

Zij omvat:

- **App. 1 to JAR-FCL 1.240 & 1.295**
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- **IEM FCL 1.240 (b)(2)**
Class/type rating/training/skill test and proficiency check form on single-engine and multi-engine single-pilot aeroplanes.

Appendix 1 to JAR–FCL 1.240 & 1.295

Skill test and proficiency check for aeroplane type/class ratings and ATPL

(See JAR–FCL 1.240 through 1.262 and 1.295)

(See Appendix 1 to JAR-FCL 1.261(a))

(See AMC FCL 1.261(a))

(See IEM FCL 1.240(1) and (2))

1 The applicant shall have completed the required instruction in accordance with the syllabus (see also Appendix 1 to JAR–FCL 1.261(a) and Appendices 2 & 3 to JAR–FCL 1.240). The administrative arrangements for confirming the applicant's suitability to take the test, including disclosure of the applicant's training record shall be checked by the examiner.

2 Items to be covered in skill tests/proficiency checks are given in the applicable Appendix 2 & 3 to JAR–FCL 1.240. With the approval of the Authority, several different skill test/proficiency check scenarios may be developed containing simulated line operations. The examiner will select one of these scenarios. Flight simulators, if available and other training devices as approved shall be used.

3 (a) For SPA: The applicant shall pass all sections of the skill test/proficiency check. If any item in a section is failed, that section is failed. Failure in more than one section will require the applicant to take the entire test/check again. Any applicant failing only one section shall take the failed section again. Failure in any section of the re-test/re-check including those sections that have been passed at a previous attempt will require the applicant to take the entire test/check again.

(b) For MPA: The applicant shall pass all sections of the skill test/proficiency check. Failure of more than five items will require the applicant to take the entire test/check again. Any applicant failing 5 or less items shall take the failed items again. Failure in any item on the re-test/check including those items that have been passed at a previous attempt will require the applicant to take the entire check/test again.

(c) In case the applicant fails only or does not take Section 6, the type rating will be issued without Cat II or III privileges.

(d) Section 6 is not part of the ATPL skill test.

4. Further training may be required after a failed test/check. Failure to achieve a valid pass in all sections in two attempts shall require further training of at least 2 hours. There is no limit to the number of skill tests/proficiency checks that may be attempted.

CONDUCT OF THE TEST/CHECK – GENERAL

5 The FE will ensure that the test is conducted safely, with respect to the requirements of the Royal Decree of 4 March 2008 and in conformity with the guidelines of CIR/FCL 28.

6 Should an applicant choose not to continue with a test/check for reasons considered inadequate by the examiner, the applicant will be regarded as having failed those items not attempted. If the test/check is terminated for reasons considered adequate by the examiner, only those items not completed shall be tested in a further flight.

7 At the discretion of the examiner any manoeuvre or procedure of the test/check may be repeated once by the applicant. The examiner may stop the test/check at any stage if it is considered that the applicant's competency requires a complete re-test/re-check.

8 Checks and procedures shall be carried out/completed in accordance with the authorised check list for the aeroplane used in the test/check and, if applicable, with the MCC concept. Performance data for take-off, approach and landing shall be calculated by the applicant in compliance with the operations manual or flight manual for the aeroplane used. Decision heights/altitude, minimum descent heights/altitudes and missed approach point shall be determined by the applicant for the ATPL(A) and/or for the type/class rating holder during the proficiency check, as applicable.

SPECIAL REQUIREMENTS FOR THE SKILL TEST/PROFICIENCY CHECK FOR A MULTI-PILOT AEROPLANE AND FOR THE SKILL TEST REQUIRED FOR THE ATPL(A)

9 The test/check for a multi-pilot aeroplane shall be performed in a multi-crew environment. Another applicant or another pilot, may function as second pilot. If an aeroplane, rather than a simulator, is used for the test/check, the second pilot shall be an instructor.

10 An applicant for the initial issue of a multi-pilot aeroplane type rating or ATPL(A) shall be required to operate as 'pilot flying' (PF) during all sections of the test/check (in accordance with Appendix 2 to 1.240 & 1.295). The applicant shall also demonstrate the ability to act as 'pilot not flying' (PNF). The applicant may choose either the left hand or the right hand seat for the test/check.

11 The following matters shall be specifically checked when testing/checking applicants for the ATPL(A) or a type rating for multi-pilot aeroplanes extending to the duties of a pilot-in-command, irrespective of whether the applicant acts as PF or PNF:

- (a) management of crew co-operation;
- (b) maintaining a general survey of the aeroplane operation by appropriate supervision; and
- (c) setting priorities and making decisions in accordance with safety aspects and relevant rules and regulations appropriate to the operational situation, including emergencies.

12 The test/check should be accomplished under IFR and as far as possible in a simulated commercial air transport environment. An essential element is the ability to plan and conduct the flight from routine briefing material.

FLIGHT TEST TOLERANCE

13 The applicant shall demonstrate the ability to:

- (a) operate the aeroplane within its limitations;
- (b) complete all manoeuvres with smoothness and accuracy;
- (c) exercise good judgement and airmanship;
- (d) apply aeronautical knowledge;
- (e) maintain control of the aeroplane at all times in such a manner that the successful outcome of a procedure or manoeuvre is never in doubt;
- (f) understand and apply crew co-ordination and incapacitation procedures, if applicable; and
- (g) communicate effectively with the other crew members, if applicable.

14 The following limits are for general guidance. The examiner shall make allowance for turbulent conditions and the handling qualities and performance of the type of aeroplane used.

Height

Generally	±100 feet
Starting a go-around at decision height	+ 50 feet/-0 feet
Minimum descent height/ altitude	+ 50 feet/-0 feet

Tracking

on radio aids	± 5°
Precision approach	half scale deflection, azimuth and glide path

Heading

all engines operating	± 5°
with simulated engine failure	± 10°

Speed

all engines operating
with simulated engine failure

± 5 knots
+10 knots/ -5 knots

CONTENT OF THE SKILL TEST/PROFICIENCY CHECK

15 (a) The skill test and proficiency check contents and sections are set out in Appendix 2 to JAR-FCL 1.240 for multi-pilot aeroplanes and at Appendix 3 to JAR-FCL 1.240 for single-pilot aeroplanes. The application and report form as set out in IEM FCL 1.240 (b)(1) will be used.

(b) When the type rating course includes less than 2 hours flight training on the aeroplane, the skill test may be flight simulator only and may be completed before the flight training on the aeroplane. In that case, a certificate of completion of the type rating course including the flight training on the aeroplane shall be forwarded to the Authority before the new type rating is entered in the applicant's licence.

Appendix 3 to JAR-FCL 1.240

Contents of the class/type rating/training/skill test and proficiency check on single-engine and multi-engine single-pilot aeroplanes

(See JAR-FCL 1.240 through 1.262 and 1.295)

1 The following symbols mean:

- P = Trained as Pilot-in-Command for the issue of the class/type rating as applicable.
- X = Flight simulators shall be used for this exercise, if available, otherwise an aeroplane shall be used if appropriate for the manoeuvre or procedure.

2 The practical training shall be conducted at least at the training equipment level shown as (P), or may be conducted on any higher level of equipment shown by the arrow (---->)

The following abbreviations are used to indicate the training equipment used:

- A = Aeroplane
- FS = Flight Simulator
- FTD = Flight Training Device (including FNPT II for ME class rating)

3 The starred (*) items of section 3B and, for multi engine Section 6, shall be flown solely by reference to instruments if revalidation/renewal of an instrument rating is included in the skill test or proficiency check. If the starred (*) items are not flown solely by reference to instruments during the skill test or proficiency check, the type/class rating will be restricted to VFR only.

4 Section 3A shall be completed to revalidate a type or multi-engine class rating, VFR only, where the required experience of 10 route sectors within the previous 12 months has not been completed. Section 3A is not required if section 3B is completed.

5 Where the letter 'M' appears in the skill test/proficiency check column this will indicate the mandatory exercise or a choice where more than one exercise appears.

6 When a proficiency check on a single-pilot aeroplane is performed in a multi-pilot operation in accordance with JAR-OPS, the type/class rating will be restricted to multi-pilot.

7 A flight simulator or FNPT II shall be used for practical training for type or multi-engine class ratings if the simulator or FNPT II forms part of an approved type or class rating course. The following considerations will apply to the approval of the course:

- (a) the qualification of the flight simulator or FNPT II as set out in JAR-STD;
- (b) the qualifications of the instructors and examiner;
- (c) the amount of flight simulator or FNPT II training provided on the course; and
- (d) the qualifications and previous experience of the pilot under training.

Manoeuvres/Procedures	PRACTICAL TRAINING				TYPE/CLASS RATING SKILL TEST/ PROF CHECK	
	FTD	FS	A	Instructors initials when training completed	Chkd in FS A	Examiners initials when test completed
SECTION 1						
1 Departure						
1.1 Pre-flight including: Documentation Mass and Balance Weather briefing						
1.2 Pre-start checks External/internal			P		M	
1.3 Engine starting: Normal Malfunctions	P---->	---->	---->		M	
1.4 Taxiing		P---->	---->		M	
1.5 Pre-departure checks: Engine run-up (if applicable)	P---->	---->	---->		M	
1.6 Take-off procedure: Normal with Flight Manual flap settings Crosswind (if conditions available)		P---->	---->			
1.7 Climbing: V _x /V _y Turns onto headings Level off		P---->	---->		M	
1.8 ATC liaison – Compliance, R/T procedure						
SECTION 2						
2 Airwork (VFR)						
2.1 Straight and level flight at various airspeeds including flight at critically low airspeed with and without flaps (including approach to V _{MCA} when applicable)		P---->	---->			
2.2 Steep turns (360° left and right at 45° bank)		P---->	---->		M	
2.3 Stalls and recovery: i. clean stall ii. Approach to stall in descending turn with bank with approach configuration and power iii. Approach to stall in landing configuration and power iv. Approach to stall, climbing turn with take-off flap and climb power (single engine aeroplane only)		P---->	---->		M	
2.4 Handling using autopilot and flight director (may be conducted in Section 3) if		P---->	---->		M	

		PRACTICAL TRAINING			TYPE/CLASS RATING SKILL TEST/ PROF CHECK		
Manoeuvres/Procedures					Instructors initials when training completed	Chkd in FS A	Examiners initials when test completed
		FTD	FS	A			
applicable							
2.5	ATC liaison – Compliance, R/T procedure						
SECTION 3A							
3A	En route procedures VFR (see Appendix 3 to JAR-FCL 1.240 note 3 and 4)						
3A.1	Flight plan, dead reckoning and map reading						
3A.2	Maintenance of altitude, heading and speed						
3A.3	Orientation, timing and revision of ETAs						
3A.4	Use of radio navigation aids (if applicable)						
3A.5	Flight management (flight log, routine checks including fuel, systems and icing)						
3A.6	ATC liaison – Compliance, R/T procedure						
SECTION 3B							
3B	Instrument flight						
3B.1*	Departure IFR		P---->	---->		M	
3B.2*	En route IFR		P---->	---->		M	
3B.3*	Holding procedures		P---->	---->		M	
3B.4*	ILS to DH/A of 200' (60 m) or to procedure minima (autopilot may be used to glideslope intercept)		P---->	---->		M	
3B.5*	Non-precision approach to MDH/A and MAP		P---->	---->		M	
3B.6*	Flight exercises including simulated failure of the compass and attitude indicator: Rate 1 turns Recoveries from unusual attitudes	P---->	---->	---->		M	
3B.7*	Failure of localiser or glideslope	P---->	---->	---->			
3B.8*	ATC liaison – Compliance, R/T procedure						
SECTION 4							
4	Arrival and landings		P---->	---->		M	

Manoeuvres/Procedures	PRACTICAL TRAINING				TYPE/CLASS RATING SKILL TEST/ PROF CHECK	
	FTD	FS	A	Instructors initials when training completed	Chkd in FS A	Examiners initials when test completed
4.1 Aerodrome arrival procedure						
4.2 Normal landing		P---->	---->		M	
4.3 Flapless landing		P---->	---->		M	
4.4 Crosswind landing (if suitable conditions)		P---->	---->			
4.5 Approach and landing with idle power from up to 2000' above the runway (single engine aeroplane only)		P---->	---->			
4.6 Go-around from minimum height		P---->	---->		M	
4.7 Night go-around and landing (if applicable)	P---->	---->	---->			
4.8 ATC liaison – Compliance, R/T procedure						
SECTION 5						
5 Abnormal and emergency procedures (This Section may be combined with Sections 1 through 4)						
5.1 Rejected take-off at a reasonable speed		P---->	---->		M	
5.2 Simulated engine failure after take-off (single engine aeroplanes only)			P		M	
5.3 Simulated forced landing without power (single engine aeroplanes only)			P		M	
5.4 Simulated emergencies: i. Fire or smoke in flight ii. Systems malfunctions as appropriate	P---->	---->	---->			
5.5 Engine shutdown and restart (ME skill test only)	P---->	---->	---->			
5.6 ATC liaison – Compliance, R/T procedure						
SECTION 6						
6 Simulated asymmetric flight 6.1* (This Section may be combined with Sections 1 through 5) Simulated engine failure during take-off (at a safe altitude unless carried out in FS or FNPT II)	P---->	---->	--- >X		M	
6.2* Asymmetric approach and go-around	P---->	---->	---->		M	
6.3* Asymmetric approach and full stop landing	P---->	---->	---->		M	

Manoeuvres/Procedures	PRACTICAL TRAINING				TYPE/CLASS RATING SKILL TEST/ PROF CHECK	
	FTD	FS	A	Instructors initials when training completed	Chkd in FS A	Examiners initials when test completed
6.4 ATC liaison – Compliance, R/T procedure						

IEM FCL 1.240(b)(2)

Class/type rating/training/skill test and proficiency check form on single-engine and multi-engine single-pilot aeroplanes

See JAR-FCL 1.240

APPLICATION AND REPORT FORM

Applicant's last name:		First name:	
Type of licence:		Number:	State:
Type of aeroplane:	Registration:	Signature of applicant:	

I hereby certify proper completion of the theoretical and practical instruction in accordance with the requirements:

1	Single-engine / multi-engine / single-pilot Aeroplanes		
Type rating:	+	Skill test:	+
Class rating:	+	Proficiency check:	+
Training record:	+		

2	Flight training:		
Flight time:	Take-offs:	Landings:	
Training aerodromes (take-offs, approaches and landings):			
Location and date:		Signature of TRI/CRI*:	
Type and No of licence:		Name in capital letters:	

3	Skill test		
Aerodrome:	Take-off time:	Landing time:	
Skill test/Proficiency Check Remark: if the applicant failed the examiner shall indicate the reasons why	<i>Passed</i>	<i>Failed</i>	SIM/Aircraft Reg:
Location and date:		Type and number of licence:	
Signature of authorised examiner*:		Name in capital letters:	

* delete as necessary

In case of revalidation

Rating:	was valid till		revalidated till	
	date		date	

Appendix 1 to JAR–FCL 1.261(a)

Theoretical knowledge instruction requirements for skill test/proficiency checking for class/type ratings

(See JAR–FCL 1.261(a))

(See AMC FCL 1.261(a))

1 The theoretical knowledge instruction shall be conducted by an authorised instructor holding the appropriate type/class rating or any instructor having appropriate experience in aviation and knowledge of the aircraft concerned, e.g. flight engineer, maintenance engineer, flight operations officer.

2 The theoretical knowledge instruction shall cover the syllabus in AMC FCL 1.261(a), as appropriate to the aeroplane class/type concerned. Depending on the equipment and systems installed, the instruction shall include but is not limited to the following content:

(a) Aeroplane structure and equipment, normal operation of systems and malfunctions

- Dimensions
- Engine including auxiliary power unit
- Fuel system
- Pressurisation and air-conditioning
- Ice protection, windshield wipers and rain repellent
- Hydraulic systems
- Landing gear
- Flight controls, lift devices
- Electrical power supply
- Flight instruments, communication, radar and navigation equipment
- Cockpit, cabin and cargo compartment
- Emergency equipment

(b) Limitations

- General limitations
- Engine limitations
- System limitations
- Minimum equipment list

(c) Performance, flight planning and monitoring

- Performance
- Flight planning
- Flight monitoring

(d) Load, balance and servicing

- Load and balance
- Servicing on ground

(e) Emergency procedures

(f) Special requirements for extension of a type rating for instrument approaches down to a decision height of less than 200 ft (60 m)

- Airborne equipment, procedures and limitations

(g) Special requirements for “glass cockpit” aeroplanes

- Electronic flight instrument systems (e.g. EFIS, EICAS)

(h) Flight Management systems (FMS)

3 For the initial issue of type ratings for multi-pilot aeroplanes the written or computer based examination shall at least comprise one hundred multi-choice questions distributed appropriately across the main subjects of the syllabus. The pass mark shall be 75% in each of the main subjects of the syllabus.

4 For the initial issue of type and class ratings for single-pilot multi-engine aeroplanes the number of multi-choice questions in the written or computer based examination shall depend on the complexity of the aeroplane. The pass mark shall be 75%.

5 For single-engine single-pilot aeroplanes the examiner may conduct the theoretical knowledge part of the skill test and proficiency check orally and shall determine whether or not a satisfactory level of knowledge has been achieved.

6 For proficiency checks multi-pilot and single-pilot multi-engine aeroplanes theoretical knowledge shall be verified by a multi-choice questionnaire or other suitable methods.

AMC FCL 1.261(a)

Syllabus of theoretical knowledge instruction for class/type ratings for single-engine and multi-engine aeroplanes

See JAR-FCL 1.261(a)

See Appendix 1 to JAR-FCL 1.261(a)

DETAILED LISTING

- 1 Aeroplane structure and equipment, normal operation of systems and malfunctions
 - 1.1 Dimensions
 - minimum required runway width for 180° turn
 - 1.2 Engine including auxiliary power unit
 - 1.2.1 type of engine/engines
 - 1.2.2 in general, function of the following systems or components:
 - engine
 - auxiliary power unit
 - oil system
 - fuel system
 - ignition system
 - starting system
 - fire warning and extinguishing system
 - generators and generator drives
 - power indication
 - reverse thrust
 - water injection
 - on piston or turbine-propeller engines additionally:
 - propeller system
 - feathering system
 - 1.2.3 engine controls (including starter), engine instruments and indications in the cockpit, their function, interrelation and interpretation
 - 1.2.4 engine operation, including APU, during engine start, start and engine malfunctions, procedures for normal operation in the correct sequence
 - 1.3 Fuel system
 - 1.3.1 location of the fuel tanks, fuel pumps, fuel lines to the engines, tank capacities, valves and measuring
 - 1.3.2 location of the following systems:
 - filtering
 - heating
 - fuelling and defuelling
 - dumping
 - venting
 - 1.3.3 in the cockpit
 - the monitors and indicators of the fuel system,
 - quantity and flow indication, interpretation
 - 1.3.4 procedures
 - fuel procedures distribution into the various tanks
 - fuel supply, temperature control and fuel dumping

- 1.4 Pressurisation and air conditioning
 - 1.4.1 components of the system and protection devices
 - 1.4.2 cockpit monitors and indicators
interpretation with regard to the operational condition
 - 1.4.3 normal operation of the system during start, cruise, approach and landing, air conditioning airflow and temperature control
- 1.5 Ice and rain protection, windshield wipers and rain repellent
 - 1.5.1 ice protected components of the aeroplane including engines, heat sources, controls and indications
 - 1.5.2 operation of the anti-icing/de-icing system during take-off, climb, cruise and descent, conditions requiring the use of the protection systems
 - 1.5.3 controls and indications of the windshield wipers and rain repellent systems operation
- 1.6 Hydraulic system
 - 1.6.1 components of the hydraulic system(s), quantities and system pressure, hydraulically actuated components associated to the respective hydraulic system
 - 1.6.2 controls, monitors and indicators in the cockpit, function and interrelation and interpretation of indications
- 1.7 Landing gear
 - 1.7.1 main components of the
 - main landing gear
 - nose gear
 - gear steering
 - wheel brake system, including anti-skid
 - 1.7.2 gear retraction and extension (including changes in trim and drag caused by gear operation)
 - 1.7.3 required tyre pressure, or location of the relevant placard
 - 1.7.4 controls and indicators including warning indicators in the cockpit in relation to the retraction/extension condition of the landing gear and brakes
 - 1.7.5 components of the emergency extension system
- 1.8 Flight controls and high lift devices
 - 1.8.1
 - aileron system
 - elevator system
 - rudder system
 - trim system
 - spoiler system
 - lift devices
 - stall warning system
 - take-off configuration warning system
 - 1.8.2 flight control system from the cockpit controls to the flight control/surfaces
 - 1.8.3 controls, monitors and indicators including warning indicators of the systems mentioned under 1.8.1, interrelation and dependencies
- 1.9 Electrical power supply
 - 1.9.1 number, power, voltage, frequency and location of the main power system (AC or DC), auxiliary power system location and external power system
 - 1.9.2 location of the controls, monitors and indicators in the cockpit
 - 1.9.3 flight instruments, communication and navigation systems, main and back-up power sources
 - 1.9.4 location of vital circuit breakers

- 1.9.5 generator operation and monitoring procedures of the electrical power supply
 - 1.10 Flight instruments, communication, radar and navigation equipment, autoflight and flight recorder
 - 1.10.1 visible antennae
 - 1.10.2 controls and instruments of the following equipment in the cockpit during normal operation:
 - flight instruments
 - flight management systems
 - radar equipment, including radio altimeter
 - communication and navigation systems
 - autopilot
 - flight recorder, voice recorder
 - ground proximity warning system
 - collision avoidance system
 - warning systems
 - 1.11 Cockpit, cabin and cargo compartment
 - 1.11.1 operation of the exterior, cockpit, cabin and cargo compartment lighting and the emergency lighting
 - 1.11.2 operation of the cabin and cargo doors, stairs, windows and emergency exits
 - 1.11.3 main components of the oxygen system and their location, oxygen masks and operation of the oxygen systems for the crew and passengers, required amount of oxygen by means of a table or diagram
 - 1.12 Emergency equipment operation and correct application of the following emergency equipment in the aeroplane:
 - portable fire extinguisher
 - first aid kits
 - portable oxygen equipment
 - emergency ropes
 - life vest
 - life rafts
 - emergency transmitters
 - crash axes
 - megaphones
 - emergency signals
 - 1.13 Pneumatic system
 - 1.13.1 components of the pneumatic system, pressure source, actuated components
 - 1.13.2 controls, monitors and indicators in the cockpit, function of the system
 - 1.13.3 vacuum system
- ## 2 LIMITATIONS
- 2.1 General Limitations
 - 2.1.1. certification of the aeroplane, category of operation, noise certification and maximum and minimum performance data for all flight profiles, conditions and a/c systems,
 - maximum tail and crosswind-components at take-off and landing,
 - maximum speeds for flap extension V_{fo}
 - at various flap settings V_{fe}
 - for landing gear operation V_{lo} , M_{lo}
 - for extended landing gear V_{le} , M_{le}
 - for maximum rudder deflection V_a , M_a
 - for tyres
 - one propeller feathered

- 2.1.2 – minimum control speed air V_{mca}
- minimum control speed ground V_{mcg}
- stall speed under various conditions V_{so}, V_{s1}
- maximum speed V_{ne}, M_{ne}
- maximum speed for normal operation V_{mo}, M_{mo}
- altitude and temperature limitations
- stick shaker activation
- 2.1.3 – maximum airport pressure altitude, runway slope
- maximum taxi mass
- maximum take-off mass
- maximum lift off mass
- maximum landing mass
- zero fuel mass
- maximum dumping speed $V_{dco}, M_{dco}, V_{dce}, M_{dce}$
- maximum load factor during operation
- certificated range of centre of gravity
- 2.2 Engine Limitations
 - 2.2.1 Operating data of the engines
 - time limits and maximum temperatures
 - minimum RPMs and temperatures
 - torque
 - maximum power for take-off and go-around with respect to pressure altitude/flight altitude and temperature
 - piston engines: certified range of mixture
 - minimum and maximum oil temperature and pressure
 - maximum starter time and required cooling
 - time between two start attempts for engines and auxiliary power unit
 - for propeller: maximum RPM of propeller triggering of automatic feathering device.
 - 2.2.2 Certified oil grades
- 2.3 Systems limitations
 - 2.3.1 Operating data of the following systems:
 - pressurisation, air conditioning maximum pressures
 - electrical power supply, maximum load of main power system (AC or DC)
 - maximum time of power supply by battery in case of emergency
 - mach trim system and yaw damper speed limits
 - auto pilot limitations of various modes
 - ice protection
 - speed and temperature limits of window heat
 - temperature limits of engine and wing anti-ice
 - 2.3.2 Fuel system
 - Certified fuel specifications, minimum and maximum pressures and temperature of the fuel
- 2.4 Minimum equipment list
- 3 PERFORMANCE, FLIGHT PLANNING
 - 3.1 Performance

Performance calculation concerning speeds, gradients, masses in all conditions for take off, en route, approach and landing according to the documentation available, e.g. for take-off $V_1, V_{mbe}, V_r, V_{lof}, V_2$, take-off distance, maximum take-off mass and the required stop distance with respect to the following factors:

 - accelerate/stop distance
 - take-off run and distance available (TORA, TODA)
 - ground temperature, pressure altitude, slope, wind

- maximum load and maximum mass (e.g. ZFM)
- minimum climb gradient after engine failure
- influence of snow, slush, moisture and standing water on the runway
- possible single and/or dual engine failure during cruise flight
- use of anti-icing systems
- failure of water injection system and/or antiskid system
- speeds at reduced thrust, V_1 , V_{1red} , V_{mbe} , V_{mu} , V_r , V_{lof} , V_2
- safe approach speed V_{ref} , with respect to V_{mca} and turbulent conditions
- effects of excessive approach speed and abnormal glideslope with respect to the landing distance
- minimum climb gradient during approach and landing
- limiting values for a go around with minimum fuel
- maximum allowable landing mass and the landing distance for the destination and alternate aerodrome with respect to the following factors:
 - available landing distance
 - ground temperature, pressure altitude, runway slope and wind
 - fuel consumption to destination or alternate aerodrome
 - influence of moisture on the runway, snow, slush and standing water
 - failure of the water injection system and/or the anti skid system
 - influence of thrust reverser and spoilers

3.2 Flight planning

Flight planning for normal and abnormal conditions

- optimum/maximum flight level
- minimum required flight altitude
- drift down procedure after an engine failure during cruise flight
- power setting of the engines during climb, cruise and holding under various circumstances, as well as the most economic cruising flight level
- calculation of a short range/long range flight plan
- optimum and maximum flight level and power setting of the engines after engine failure

4 LOAD AND BALANCE AND SERVICING

4.1 Load and Balance

- load and trim sheet with respect to the maximum masses for take-off and landing
- centre of gravity limits

4.1.1 influence of fuel consumption on the centre of gravity

4.1.2 lashing points, load clamping, maximum ground load

4.2 Servicing

Servicing connections for:

- fuel
- oil
- water
- hydraulic
- oxygen
- nitrogen
- conditioned air
- electric power
- start air
- toilet and safety regulations

5 EMERGENCY PROCEDURES

5.1 Recognition of the situation as well as immediate memory actions in correct sequence and for those conditions recognised as emergencies by the manufacturer and certification authority:

- engine failure during take off before and after V_1 , as well as inflight

- malfunctions of the propeller system
- engine overheat, engine fire on ground and inflight
- wheel well fire
- electrical smoke and/or fire
- rapid decompression and emergency descent
- air-conditioning overheat, anti ice system overheat
- fuel pump failure
- fuel freezing/overheat
- electric power failure
- equipment cooling failure
- flight instrument failure
- partial or total hydraulic failure
- failures at the lift devices and flight controls including boosters
- cargo compartment smoke and/or fire

5.2 Actions according to the approved abnormal and emergency checklist

- engine restart inflight
- landing gear emergency extension
- application of the emergency brake system
- emergency extension of lift devices
- fuel dumping
- emergency descent

6 SPECIAL REQUIREMENTS FOR EXTENSION OF A TYPE RATING FOR INSTRUMENT APPROACHES DOWN TO DECISION HEIGHTS OF LESS THAN 200 FT (60 M)

6.1 Airborne and ground equipment

- technical requirements
- operational requirements
- operational reliability
- fail operational
- fail-passive
- equipment reliability
- operating procedures
- preparatory measures
- operational downgrading
- communications

6.2 Procedures and Limitations

- operational procedures
- crew co-ordination

7 SPECIAL REQUIREMENTS FOR 'GLASS COCKPIT' AEROPLANES WITH ELECTRONIC FLIGHT INSTRUMENT SYSTEMS (EFIS)

7.1 Additional learning objectives

7.1.1 general rules of aeroplanes computer hardware and software design

7.1.2 logic of all crew information and alerting systems and their limitations

7.1.3 interaction of the different aeroplane computer systems, their limitations, the possibilities of computer fault recognition and the actions to be performed on computer failures

7.1.4 normal procedures including all crew co-ordination duties

7.1.5 aeroplane operation with different computer degradations (basic flying)

8 FLIGHT MANAGEMENT SYSTEMS