REPUBLIC OF NAMIBIA

CIVIL AVIATION

DOCUMENT NAM-CATS-21

(CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS AND AIRCRAFT AIRWORTHINESS)

NAMIBIAN CIVIL AVIATION TECHNICAL

STANDARDS RELATING TO CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS AND AIRCRAFT AIRWORTHINESS

INTRODUCTORY NOTES

1. GENERAL

1.1 Section 227 of the Civil Aviation Act, 2016 empowers the Executive Director of Civil Aviation to issue technical standard for civil aviation. Section 227 of the Civil Aviation Act, 2016 further empowers the Executive Director of Civil Aviation to incorporate into a technical standard any international aviation standard or any amendment without publishing the text of such standard or any amendment by mere reference to the title, number and year of issue of such standard or amendment or to any other particulars by which such standard or amendment is sufficiently identified.

1.2 The Executive Director of Civil Aviation has, pursuant to the empowerment mentioned above, issued technical standards relating to Regulation Part 21 (Standards Relating to Certification Procedures for Products and Parts and Aircraft Airworthiness) to be known as Document NAM-CATS-21.

1.3 Document NAM-CATS-21 comprises the standards, rules, requirements, methods, specifications, characteristics and procedures which are applicable in respect of certification procedures and products and parts.

1.4 Where there is any perceived disparity of meaning or inconsistency between these technical standards and the regulations, the provisions of the regulations will take precedence.

1.5 Where there is a difference between a standard or procedure prescribed in ICAO documents and the Civil Aviation Technical Standards (CATS), the CATS standard will prevail.

1.6 The abbreviation CAR is used throughout this document when referring to any civil aviation regulation.

1.7 The abbreviation TS is used throughout this document when referring to any technical standard.

1.8 In this document the words "Executive Director" refers to the chief executive officer of the Authority appointed pursuant to section 34 of the Civil Aviation Act 2016 being the Executive Director of Civil Aviation.

2. AMENDMENTS TO THE TECHNICAL STANDARDS

2.1 The NCAA Airworthiness Division has responsibility for the technical content of this technical standard.

2.2 This technical standard is issued, and may only be amended, under the authority of the Executive Director of Civil Aviation.

2.3 Requests for changes to the content of this technical standard must be forwarded to the Executive Director and may come from:
(a) technical areas within NCAA; or
(b) aviation industry service providers or operators; or
(c) pilots, engineers and maintenance organization staff.

2.4 The need to change the content of this technical standard may arise for any of the following reasons:

(a) to ensure safety;

(b) to ensure standardisation;

(c) to respond to changed NCAA regulations or standards;

(d) to respond to changes initiated by ICAO;

(e) to accommodate proposed initiatives or new technologies.

2.5 The NCAA may approve trials of new procedures or technologies to develop appropriate standards.

3. PURPOSE

Document NAM-CATS-21 contains the standards, rules, requirements, methods, specifications, characteristics and procedures which are applicable in

respect of certification procedures for products and parts and aircraft airworthiness requirements.

Each reference to a technical standard in this document, is a reference to the corresponding regulation in the Namibian Civil Aviation Regulations, 2001 as amended, for example, technical standard 21.02.2 refers to regulation 2 of Subpart 2 of Part 21 of the Regulations.

The abbreviation "CAR" is used throughout this document when referring to any regulation. The abbreviation "CATS" or "TS" refers to any technical standard.

5. SCHEDULES AND NOTES

*Guidelines and recommendations in support of any particular technical standard, are contained in schedules to, and/or notes inserted throughout the technical standard**s.***

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21.01.3 REPORTING OF FAILURES, MALFUNCTIONS AND DEFECTS

1. Occurrences

The occurrences referred to in CAR 21.01.3(1), which must be reported, are the following:

Part 1: List of Aircraft Operations, Maintenance, Repair and Manufacture - Related Occurrences to be Reported

Note 1: Although this Part lists the majority of reportable occurrences, it is not completely comprehensive. Any other occurrences, which are judged by those involved to meet the criteria, should also be reported.

Note 2: This Part does not include accidents.

Note 3: Occurrences to be reported are those where the safety of operation was or could have been endangered or which could have led to an unsafe condition. If in the view of the reporter an occurrence did not endanger the safety of the operation but if repeated in different but likely circumstances would create a hazard, then a report should be made. What is judged to be reportable on one class of product, part or appliance may not be soon another and the absence or presence of a single factor, human or technical, can transform an occurrence into an accident or serious incident.

Note 4: Specific operational approvals, e.g. "RVSM" (reduced vertical separation minima), "ETOPS" (extended range twin operations), "RNAV" (area navigation), or a design or maintenance programme, may have specific reporting requirements for failures or malfunctions associated with that approval or programme.

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1 Aircraft flight operations

1.1 Operation of the aircraft

a) Avoidance manoeuvres:

- risk of collision with another aircraft, terrain or other object or an unsafe situation when avoidance action would have been appropriate;
- an avoidance manoeuvre required to avoid a collision with another aircraft, terrain or other object;
- an avoidance manoeuvre to avoid other unsafe situations.

b) Take-off or landing incidents, including precautionary or forced landings. Incidents such as under-shooting, overrunning or running off the side of runways. Take-offs, rejected take-offs, landings or attempted landings on a closed, occupied or incorrect runway. Runway incursions.

c) Inability to achieve predicted performance during take-off or initial climb.

d) Critically low fuel quantity or inability to transfer fuel or use total quantity of usable fuel.

e) Loss of control (including partial or temporary) regardless of cause.

f) Occurrences close to or above V_1 resulting from or producing a hazardous or potentially hazardous situation (e.g. rejected take-off, tail strike, engine-power loss etc.).

g) Go around producing a hazardous or potentially hazardous situation.

h) Unintentional significant deviation from airspeed, intended track or altitude (more than 300 ft) regardless of cause.

i) Descent below decision height/altitude or minimum descent height/altitude
without the required visual reference.

j) Loss of position awareness relative to actual position or to other aircraft.

k) Breakdown in communication between flight crew "CRM" (crew resource management) or between flight crew and other parties (cabin crew, ATC [air traffic control] engineering).

l) Heavy landing - a landing deemed to require a "heavy landing check".

m) Exceedance of fuel imbalance limits.

n) Incorrect setting of an "SSR" (secondary surveillance radar) code or of an altimeter subscale.

o) Incorrect programming of, or erroneous entries into, equipment used for navigation or performance calculations, or use of incorrect data.

p) Incorrect receipt or interpretation of radio messages.

q) Fuel system malfunctions or defects, which had an effect on fuel supply and/or distribution.

r) Aircraft unintentionally departing from a paved surface.

s) Collision between an aircraft and any other aircraft, vehicle or other ground object. t) Inadvertent and/or incorrect operation of any controls.

u) Inability to achieve the intended aircraft configuration for any flight phase (e.g. landing gear and gear doors, flaps, stabilizers, slats etc.).

v) A hazard or potential hazard which arises as a consequence of any deliberate simulation of failure conditions for training, system checks or training purposes.

w) Abnormal vibration.

x) Operation of any primary warning system associated with manoeuvring the aircraft e.g. configuration warning, stall warning (stick shaker), over-speed warning etc. unless:
   i) the crew conclusively established that the indication was false and provided that the false warning did not result in difficulty or hazard arising from the crew response to the warning; or
   ii) operated for training or test purposes.

y) "GPWS" (ground proximity warning system)/"TAWS" (terrain awareness and warning system) "warning" when:
   i) the aircraft comes into closer proximity to the ground than had been planned or anticipated; or
   ii) the warning is experienced in instrument meteorological conditions or at night and is established as having been triggered by a high rate of descent (mode 1); or iii) the warning results from failure to select landing gear or landing flaps by the appropriate point on the approach (mode 4); or
   iv) any difficulty or hazard arises or might have arisen as a result of crew response to the "warning" e.g. possible reduced separation from other traffic. This could include warning of any mode or type i.e. genuine, nuisance or false.

z) GPWS/TAWS "alert" when any difficulty or hazard arises or might have arisen as a result of crew response to the "alert".

k) "ACAS" (air collision advisory system)"RA"s (resolution advisories).

l) Jet or prop blast incidents resulting in significant damage or serious injury.

m) Landing at the wrong airfield.

1.2 **Emergencies**

a) Fire, explosion, smoke or toxic or noxious fumes, even though fires were extinguished.

b) The use of any non-standard procedure by the flight or cabin crew to deal with an emergency when:
   i) the procedure exists but is not used;
   ii) the procedure does not exist;
   iii) the procedure exists but is incomplete or inappropriate;
   iv) the procedure is incorrect;
   v) the incorrect procedure is used.

c) Inadequacy of any procedures designed to be used in an emergency, including when being used for maintenance, training or test purposes.

d) An event leading to an emergency evacuation.

e) Loss of pressurisation.

f) The use of any emergency equipment or prescribed emergency procedures in order to deal with a situation.

g) An event leading to the declaration of an emergency ("Mayday" or "PAN").

h) Failure of any emergency system or equipment, including all exit doors and lighting, to perform satisfactorily, including when being used for maintenance, training or test purposes.

i) Events requiring any use of emergency oxygen by any crew member.

1.3 **Crew incapacitation**

a) Incapacitation of any member of the flight crew, including that which occurs prior to departure if it is considered that it could have resulted in incapacitation after take-off.

b) Incapacitation of any member of the cabin crew which renders them unable to perform essential emergency duties.

1.4 **Injury**

Occurrences which have or could have led to significant injury to passengers or crew but which are not considered reportable as an accident.

1.5 **Meteorology**

a) A lightning strike which resulted in damage to the aircraft or loss or malfunction of any essential service.

b) A hail strike which resulted in damage to the aircraft or loss or malfunction of any essential service.

c) Severe turbulence encounter, an encounter resulting in injury to occupants or deemed to require a "turbulence check" of the aircraft.

d) A windshear encounter.

e) Icing encounter resulting in handling difficulties, damage to the aircraft or loss or malfunction of any essential service.

1.6 **Security**

a) Unlawful interference with the aircraft including a bomb threat or hijack.
b) Difficulty in controlling intoxicated, violent or unruly passengers.
c) Discovery of a stowaway.

1.7 **Other occurrences**

a) Repetitive instances of a specific type of occurrence which in isolation would not be considered "reportable" but which due to the frequency with which they arise, form a potential hazard.

b) A bird strike which resulted in damage to the aircraft or loss or malfunction of any essential service.

c) Wake-turbulence encounters.

d) Any other occurrence of any type considered to have endangered or which might have endangered the aircraft or its occupants on board the aircraft or persons on the ground.

2 Aircraft technical

2.1 **Structural**

Not all structural failures need to be reported. Engineering judgment is required to decide whether a failure is serious enough to be reported. The following examples can be taken into consideration:

a) damage to a "PSE" (principal structural element) that has not been designated as damage-tolerant (life-limited element). PSEs are those which contribute significantly to carrying flight, ground, and pressurisation loads, and the failure of which could result in a catastrophic failure of the aircraft;

b) defect or damage exceeding admissible damages to a PSE that has been designated as damage-tolerant;

c) damage to or defect exceeding allowed tolerances of a structural element, the failure of which could reduce the structural stiffness to such an extent that the required flutter, divergence or control reversal margins are no longer achieved;

d) damage to or defect of a structural element, which could result in the liberation of items of mass that may injure occupants of the aircraft;

e) damage to or defect of a structural element, which could jeopardise proper operation of systems. See paragraph 2.2 below;

f) loss of any part of the aircraft structure in flight.

2.2 Systems

The following general criteria applicable to all systems are proposed:

a) loss, significant malfunction or defect of any system, subsystem or set of equipment when standard operating procedures, drills etc. could not be satisfactorily accomplished;

b) inability of the crew to control the system, for example:

i) uncommanded actions,
ii) incorrect and/or incomplete response, including limitation of movement or stiffness,
iii) runaway,
iv) mechanical disconnection or failure;

c) failure or malfunction of the exclusive function(s) of the system (one system could integrate several functions);

d) interference within or between systems;

e) failure or malfunction of the protection device or emergency system associated with the system;

f) loss of redundancy of the system;

g) any occurrence resulting from unforeseen behaviour of a system.

h) for aircraft types with single main systems, subsystems or sets of equipment:

(i) loss, significant malfunction or defect in any main system, subsystem or set of equipment.

i) for aircraft types with multiple independent main systems, subsystems or sets of equipment:

(i) the loss, significant malfunction or defect of more than one main system, subsystem or set of equipment.

j) operation of any primary warning system associated with aircraft systems or equipment unless the crew conclusively established that the indication was false, provided that the false warning did not result in difficulty or hazard arising from the crew response to the warning;

k) leakage of hydraulic fluids, fuel, oil or other fluids which resulted in a fire hazard or possible hazardous contamination of aircraft structure, systems or equipment, or risk to occupants;

l) malfunction or defect of any indication system when this results in the possibility of misleading indications to the crew;

m) any failure, malfunction or defect if it occurs at a critical phase of the flight and is relevant to the system operation;

n) significant shortfall of the actual performances compared to the approved performance which resulted in a hazardous situation (taking into account the accuracy of the performance-calculation method) including braking action, fuel consumption etc.;

o) asymmetry of flight controls; e.g. flaps, slats, spoilers etc.

2.3 **Propulsion (including engines, propellers and rotor systems) and "APUs" (auxiliary power units).**

The Appendix to this Schedule gives a list of examples of reportable occurrences resulting from the application of these general criteria to specific systems.

a) Flameout, shutdown or malfunction of any engine.

b) Over speed or inability to control the speed of any high-speed rotating component (for example: APU, air starter, air cycle machine, air turbine motor, propeller or rotor).

c) Failure or malfunction of any part of an engine or powerplant resulting in any one or more of the following:
   i) non-containment of components/debris;
   ii) uncontrolled internal or external fire, or hot gas breakout;
   iii) thrust in a direction different from that demanded by the pilot;
   iv) revers thrust system failing to operate or operating inadvertently;
   v) inability to control power, thrust or revolutions per minute;
   vi) failure of the engine mount structure;
   vii) partial or complete loss of a major part of the powerplant;
   viii) dense visible fumes or concentrations of toxic products sufficient to incapacitate crew or passengers;
   ix) inability, by use of normal procedures, to shutdown an engine;
   x) inability to restart a serviceable engine.

d) An uncommand thrust/power loss, change or oscillation which is classified as a "LOTC" (loss of thrust or power control):
   i) for a single-engine aircraft; or
   ii) where it is considered excessive for the application; or
   iii) where this could affect more than one engine in a multi-engine aircraft, particularly in the case of a twin-engine aircraft; or
   iv) for a multi-engine aircraft where the same, or similar, engine type is used in an application where the event would be considered hazardous or critical.

e) Any defect in a life-controlled part causing its withdrawal before completion of its full life.

f) Defects of common origin which could cause an in-flight shut-down rate so high that there is the possibility of more than one engine being shut down on the same flight.

g) An engine limiter or control device failing to operate when required or operating inadvertently.

h) Limitations of engine parameters.

i) "FOD" (foreign objects damage).

2.3.1 **Propellers and transmission**

a) Failure or malfunction of any part of a propeller or powerplant resulting in any one or more of the following:

i) an overspeed of the propeller;

ii) the development of excessive drag;

iii) a thrust in the opposite direction to that commanded by the pilot;

iv) a release of the propeller or any major portion of the propeller;

v) a failure that results in excessive imbalance;

vi) the unintended movement of the propeller blades below the established
minimum in-flight low-pitch position;

vii) an inability to feather the propeller;

viii) an inability to change propeller pitch;

ix) an uncommanded change in pitch;

x) an uncontrollable torque or speed fluctuation;

xi) the release of low-energy parts.

Rotors and transmission

b) Damage or defect of main rotor gearbox/attachment which could lead to in-flight separation of the rotor assembly and/or malfunctions of the rotor control.

c) Damage to tail rotor, transmission and equivalent systems.

APUs

d) Shut down or failure when the APU is required to be available by operational requirements, e.g. ETOPS, "MEL" (minimum equipment list).

e) Inability to shut down the APU.
f) Overspeed.
g) Inability to start the APU when needed for operational reasons.

2.4 **Human factors**

Any incident where any feature or inadequacy of the aircraft design could have led to an error of use that could contribute to a hazardous or catastrophic effect.

2.5 **Other occurrences**

a) Any incident where any feature or inadequacy of the aircraft design could have led to an error of use that could contribute to a hazardous or catastrophic effect.

b) An occurrence not normally considered as reportable (e.g., furnishing and cabin equipment, water systems), where the circumstances resulted in endangering the aircraft or its occupants.

c) A fire, explosion, smoke or toxic or noxious fumes.

d) Any other event which could endanger the aircraft, or affect the safety of the occupants of the aircraft, or people or property in the vicinity of the aircraft or on the ground.

e) Failure or defect of passenger address system resulting in loss of, or inaudible, passenger address system.

f) Loss of pilot seat control during flight.

3 Aircraft maintenance and repair

a) Incorrect assembly of parts or components of the aircraft found during an inspection or test procedure not intended for that specific purpose.

b) Hot bleed air leak resulting in structural damage.

c) Any defect in a life-controlled part causing retirement before completion of its full life.

d) Any damage or deterioration (e.g. fractures, cracks, corrosion, delamination, disbonding etc.) resulting from any cause (e.g. as flutter, loss of stiffness or structural failure) to:

i) a primary structure or a "PSE" (principal structure element) (as defined in the manufacturers' Repair Manual) where such damage or deterioration exceeds allowable limits specified in the Repair Manual

and requires a repair or complete or partial replacement;

ii) a secondary structure which consequently has or may have endangered the aircraft;

iii) the engine, propeller or rotorcraft rotor system.

e) Any failure, malfunction or defect of any system or equipment, or damage or deterioration thereof found as a result of compliance with an airworthiness directive or other mandatory instruction issued by a regulatory authority, when:

i) it is detected for the first time by the reporting organisation implementing compliance;

ii) on any subsequent compliance, it exceeds the permissible limits quoted in the instruction and/or published repair/rectification procedures are not available.

f) Failure of any emergency system or equipment, including all exit doors and lighting, to perform satisfactorily, including when being used for maintenance or test purposes.

g) Non-compliance or significant errors in compliance with required maintenance procedures.

h) Products, parts, appliances and materials of unknown or suspect origin.

i) Misleading, incorrect or insufficient maintenance data or procedures that could lead to maintenance errors.

j) Any failure, malfunction or defect of ground equipment used for testing or checking of aircraft systems and equipment when the required routine inspection and test procedures did not clearly identify the problem, where this results in a hazardous situation.

4.0 Ground services and facilities

4.1 "ANS" (Air navigation services)

See Part 2, list of reportable ANS-related occurrences.

4.2 Aerodrome and aerodrome facilities

a) Significant spillage during fuelling operations.
b) Loading of incorrect fuel quantities likely to have a significant effect on aircraft endurance, performance, balance or structural strength.
c) Failure or significant deterioration of aerodrome aircraft operating surfaces.

4.3 Handling of passengers, baggage and cargo

a) Significant contamination of aircraft structure, systems and equipment arising from the carriage of baggage or cargo.

b) Incorrect loading of passengers, baggage or cargo, likely to have a significant effect on aircraft mass and/or balance.

c) Incorrect stowage of baggage or cargo (including hand baggage) likely in any way to endanger the aircraft, its equipment or occupants or to impede emergency evacuation.

d) Inadequate stowage of cargo containers or other substantial items of cargo.

e) Carriage or attempted carriage of dangerous goods in contravention of applicable regulations, including incorrect labelling and packaging of dangerous goods.

4.4 Aircraft ground handling and servicing

Failure, malfunction or defect of ground equipment used for the testing or checking of aircraft systems and equipment when the required routine inspection and test procedures did not clearly identify the problem, where this results in a hazardous situation.

a) Non-compliance or significant errors in compliance with required servicing procedures.
b) Loading of contaminated or incorrect type of fuel or other essential fluids (including oxygen and potable water).
c) Unsatisfactory ground de-icing/anti-icing.

Appendix to Part 1

The following subparagraphs give examples of reportable occurrences resulting from the application of the general criteria to specific systems listed in paragraph 2.2 of Part 1.

1 Air conditioning/ventilation

a) complete loss of avionics cooling;
b) loss of pressurisation.

2 Autoflight system

a) failure of the autoflight system to achieve the intended operation while engaged;
b) significant reported crew difficulty to control the aircraft linked to autoflight system functioning;
c) failure of any autoflight system disconnect device;
d) uncommanded autoflight mode change.

3 Communications

a) failure or defect of passenger address system resulting in loss of or inaudible passenger address;
b) total loss of communication in flight.

4 Electrical system

a) loss of one electrical distribution system (AC/DC);
b) total loss or loss of more than one electrical generation system;
c) failure of the back up (emergency) electrical generation system.

5 Cockpit/Cabin/Cargo

a) pilot seat control loss during flight;
b) failure of any emergency system or equipment, including emergency evacuation signaling system, all exit doors, emergency lighting, etc.;
c) loss of retention capability of the cargo loading system.

6 Fire protection system

a) fire warnings, except those immediately confirmed as false;
b) undetected failure or defect of fire/smoke detection/protection system, which could lead to loss or reduced fire detection/protection;
c) absence of warning in case of actual fire or smoke.

7 Flight controls

a) asymmetry of flaps, slats, spoilers, etc.;
b) limitation of movement, stiffness or poor or delayed response in the operation of primary flight control systems or their associated tab and lock systems;
c) flight control surface runaway;
d) flight control surface vibration felt by the crew;
e) mechanical flight control disconnection or failure;

f) significant interference with normal control of the aircraft or degradation of flying qualities.

8 F u e l system

a) fuel quantity indicating system malfunction resulting in total loss or wrong indication of fuel quantity on board;
b) leakage of fuel which resulted in major loss, fire hazard, significant contamination;
c) malfunction or defects of the fuel jettisoning system which resulted in inadvertent loss of significant quantity, fire hazard, hazardous contamination of aircraft equipment or inability to jettison fuel;
d) fuel system malfunctions or defects which had a significant effect on fuel supply and/or distribution;
e) inability to transfer or use total quantity of usable fuel.

9 Hydraulics

a) loss of one hydraulic system (ETOPS only);
b) failure of the isolation system;
c) loss of more than one hydraulic circuit;
d) failure of the back-up hydraulic system;
e) inadvertent ram air turbine extension.

10 Ice detection/protection system

a) undetected loss or reduced performance of the anti-ice/de-ice system;
b) loss of more than one of the probe-heating systems;
c) inability to obtain symmetrical wing de-icing;
d) abnormal ice accumulation leading to significant effects on performance or handling qualities;
e) crew vision significantly affected.

11 Indicating/warning/recording systems

a) malfunction or defect of any indicating system when the possibility of significant misleading indications to the crew could result in an inappropriate crew action on an essential system;
b) loss of a red warning function on a system;
c) for glass cockpits: loss or malfunction of more than one display unit or computer involved in the display/warning function.

12 Landing gear system/brakes/tyres

a) brake fire;
b) significant loss of braking action;
c) asymmetrical braking action leading to significant path deviation;
d) failure of the landing gear free fall extension system (including during scheduled tests);
e) unwanted landing gear or gear doors extension/retraction;
f) multiple tyre burst.

13 Navigation systems (including precision approach systems) and air data systems

a) total loss or multiple navigation equipment failures
b) total or multiple air data system equipment failures
c) significant misleading indications
d) significant navigation errors attributed to incorrect data or a database coding error
e) unexpected deviations in lateral or vertical path not caused by pilot input
f) problems with ground navigational facilities leading to significant navigation errors not associated with transitions from inertial navigation mode to radio navigation mode.

14 Oxygen for pressurised aircraft

a) loss of oxygen supply in the cockpit
b) loss of oxygen supply to a significant number of passengers (more than 10 %), including when found during maintenance or training or testing.

15 Bleed air system

a) hot bleed air leak resulting in fire warning or structural damage
b) loss of all bleed air systems
c) failure of bleed air leak detection system.

Part 2: List of Air Navigation Services - Related Occurrences to be Reported

Note 1: Although this Part lists the majority of reportable occurrences, it cannot be completely comprehensive. Any other occurrences, which are judged by those involved to meet the criteria, should also be reported.

Note 2: This Part does not include accidents and serious incidents.

Note 3: This Part includes "ANS" (air navigation service) occurrences which pose an actual or potential threat to flight safety, or can compromise the provision of safe ANS services.

Note 4: The contents of this Part shall not preclude the reporting of any occurrence, situation or condition which, if repeated in different but likely circumstances or allowed to continue uncorrected, could create a hazard to aircraft safety.

1.1 **Near collision incidents** (encompassing specific situations where one aircraft and another aircraft/the ground/a vehicle/person or object are perceived to be too close to each other):

a) separation minima infringement;
b) inadequate separation;
c) "near-CFIT" (near-controlled flight into terrain);
d) runway incursion where avoiding action was necessary.

1.2 **Potential for collision or near collision** (encompassing specific situations having the potential to be an accident or a near collision, if another aircraft is in the vicinity):

a) runway incursion where no avoiding action is necessary;
b) runway excursion;
c) aircraft deviation from ATC clearance;
d) aircraft deviation from applicable "ATM" (air traffic management) regulation:
   i) aircraft deviation from applicable published ATM procedures;
   ii) unauthorised penetration of airspace;
   iii) deviation from aircraft ATM-related equipment carriage and operations, as mandated by applicable regulation(s).

1.3 **ATM-specific occurrences** (encompassing those situations where the ability to provide safe ATM services is affected, including situations where, by chance, the safe operation of aircraft has not been jeopardised). This shall include the following occurrences:

a) inability to provide ATM services:
   i) inability to provide air traffic services;
   ii) inability to provide airspace management services;
   iii) inability to provide air traffic flow management services;
b) failure of Communication function;
c) failure of Surveillance function;
d) failure of Data Processing and Distribution function;
e) failure of Navigation function;
f) ATM system security.

1.4 **"ATC" (air traffic control) Navigation and Communications** - significant malfunction or deterioration of service.

1.5 **An aircraft was or could have been endangered by impairment of any member of ground staff** (e.g. ATC, "AD" (aircraft dispatchers), Maintenance, etc.).

1.6 **ATC overload.**

1.7 **Failure or unplanned shutdown of a major operational ATC computer system,**
requiring reversion to manual back-up and resulting in disruption to the normal flow of air traffic.

Appendix to Part 2

The following subparagraphs give examples of reportable ATM occurrences resulting from the application of the general criteria listed in paragraph 1.3 of Part 2.

1 Provision of significantly incorrect, inadequate or misleading information from any ground sources, e.g. ATC, "ATIS" (automatic terminal information service), meteorological services, navigation databases, maps, charts, manuals, etc.

2 Provision of less than prescribed terrain clearance.
3 Provision of incorrect pressure reference data (i.e. altimeter setting).
4 Incorrect transmission, receipt or interpretation of significant messages when this results in a hazardous situation.
5 Separation minima infringement.
6 Unauthorised penetration of airspace.
7 Unlawful radio communication transmission.
8 Failure of ANS ground or satellite facilities.
9 Major ATC/ATM failure or significant deterioration of aerodrome infrastructure.
10 Aerodrome movement areas obstructed by aircraft, vehicles, animals or foreign objects, resulting in a hazardous or potentially hazardous situation.
11 Errors or inadequacies in marking of obstructions or hazards on aerodrome movement areas resulting in a hazardous situation.
12 Failure, significant malfunction or unavailability of airfield lighting.

2. Exceptions

The provisions of CAR 21.01.3 do not apply to the following:

(1) Failures, malfunctions or defects which the holder of a type certificate, production certificate, supplemental type certificate, NAM-PMA or NAM-TSO authorisation –

(a) determines were caused by improper maintenance, or improper usage;
(b) knows were reported to the Executive Director by another person; or
(c) has already reported in terms of requirements set out in the Act or regulations made under the Act.

(2) Failures, malfunctions or defects in products, parts or appliances manufactured by a foreign manufacturer under a type acceptance certificate issued in terms of Part 21.

21.02.3 AIRWORTHINESS DESIGN STANDARDS

1. Gliders, power-assisted gliders, and touring gliders

(1) Gliders, power-assisted gliders, and touring gliders must be designed to and comply with the following standards for the issuing of a type certificate:

(a) European Aviation Safety Agency (EASA) CS 22 or equivalent standards applicable in another ICAO member state: Sailplanes and powered sailplanes.

(2) Gliders, power-assisted gliders, and touring gliders imported from a foreign country and assembled here must meet the above requirements or similar requirements prescribed by an appropriate authority and have been certified and released for export by an appropriate authority as such to qualify for the issuing of a type acceptance certificate.

2. Very light aeroplanes (VLA)

(1) Very Light Aeroplanes must be designed to and comply with the following standards for the issuing of a type certificate:

(a) Joint Airworthiness Requirements – Very light aeroplanes.

(2) VLA's imported from a foreign country and assembled in Namibia must meet the above requirements or its equivalent and have been certified and released for export by an appropriate authority as such to qualify for the issuing of a certificate of airworthiness.

3. Aeroplanes: Normal, utility, acrobatic and commuter category

(1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) airworthiness requirements as stated in FAR Part 23 (as amended on the date of application for certification).

(2) Aeroplanes imported from a foreign country and assembled here must meet at least FAR Part 23 or equivalent and have been certified by an appropriate authority and release for export as such.

(3) Designs to requirements other than FAR Part 23 may be accepted by the Director, if considered practical as regards language, standard, etc., to qualify for the issuing of a certificate of airworthiness.

4. Aeroplanes: Transport category

(1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) airworthiness requirements as stated in FAR Part 25 (as amended on the date of application for certification).

(2) Aeroplanes imported from a foreign country must meet at least the FARs as stated at the time of original certification by an appropriate authority and have been certified by an appropriate authority and released for export as such. Designs to requirements other than the FARs may be accepted by the Executive Director, if considered practical as regards language, standard, etc., to qualify for the issuing of a type acceptance certificate.

5. Rotorcraft: Normal category (maximum certificated mass 2 700 kg or less)

(1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) airworthiness requirements as stated in FAR Part 27 (as amended on the date of application for certification).

(2) Rotorcraft imported from a foreign country must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and release for export as such. Designs to requirements other than the FARs may be accepted by the Executive Director, if considered practical as regards language, standard, etc., to qualify for the issuing of a certificate of airworthiness.

6. Rotorcraft: Transport category

(1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) airworthiness requirements as stated in FAR Part 29 (as amended on the date of application for certification).

(2) Rotorcraft imported from a foreign country must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and release for export as such. Designs to requirements other than the FARs may be accepted by the Executive Director, if considered practical as regards language, standard, etc., to qualify for the issuing of a certificate of airworthiness.

7. Manned free balloons

(1) Manned free balloons must be designed to and comply with the following standards:

Federal Aviation Administration FAR Part 31: Airworthiness Standards: Manned free balloons, for the issuing of a type certificate.

(2) Manned free balloons imported from a foreign country must meet the above or its equivalent and have been certified and released for export by an appropriate authority as such to qualify for the issuing of a certificate of airworthiness.

8. Non-rigid airships

(1) Non-rigid airships must be designed to and comply with the following standards:

(a) FAR 21 – Design Handbook:

(b) British Civil Airworthiness Requirements: Section Q, Non-rigid airships (Gust requirements), for the issuing of a type certificate.

(2) Non-rigid airships imported from a foreign country must meet the above standard or its equivalent and have been certified and released for export by an appropriate authority as such as to qualify for the issuing of a certificate of airworthiness.

9. Rigid airships

(Reserved.)

10. Remotely piloted aircraft

(Reserved.)

11. Engines

(1) Compliance for type certification must be shown with the Joint Airworthiness Requirements as stated in Part 33 (as amended on the date of application for certification).

(2) Engines imported from a foreign country and assembled in Namibia must meet at least the JARs as stated above or equivalent and have been certified by an appropriate authority and released as such. Engines manufactured to requirements other than the JARs may be accepted by the Executive Director, if considered practical as regards language, standard, etc.

12. Propellers

(1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) Airworthiness Requirements as stated in FAR Part 35 (as amended on the date of application for certification).

(2) Propellers imported from a foreign country and assembled in Namibia must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and released as such. Propellers manufactured to requirements other than the FARs may be accepted by the Executive Director, if considered practical as regards language, standard, etc.

13. Avionics

(1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) Airworthiness Requirements as stated in FAR Part 21 (as amended on the date of application for certification).

(2) Avionics imported from a foreign country must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and released as such. Avionics manufactured to requirements other than the FARs may be accepted by the Executive Director, if considered practical as regards language, standard, etc.

(3) Radio equipment to be installed in an aircraft must be of a type approved by the Executive Director as per document RAD/GEN 1.

(4) JAR – all weather operation.

14. Equipment

(1) Any other component, instrument, appliance, material, etc. installed or intended to be installed or used in or on an aircraft is considered as equipment. Note that Unit Load Devices (ULD) are included in this group.

(2) Compliance must be shown with FAA standards and test procedures as stated in FAR Part 21 (as amended on the date of application for certification).

(3) Equipment imported from a foreign country and assembled in Namibia must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and released as such. Equipment manufactured to requirements other than the FARs may be accepted by the Executive Director if considered practical as regards language, standard, etc.

15 (1) a set of airworthiness design standards that the Executive Director determines—

(a) comply with ICAO Annex 8; and

(b) provide an equivalent level of safety to those airworthiness design standards specified in paragraph 1 – 14 above.

21.04.4 DATA REQUIREMENTS

Document LS/15 applies until this section has been reviewed.

1. Standards for flight manual

(1.1) The airworthiness design standard for a standard category or a restricted category aircraft must include a flight manual that contains—

(1) the operating limitations and information required to be provided by the applicable airworthiness design standard, in the form of a manual, markings, or placards; and

(2) for an aeroplane and rotorcraft, the maximum ambient atmospheric temperatures for which engine cooling was demonstrated, in the performance information section of the flight manual; and

(3) the information required under regulation 34 and 36 in the form of a certificate or a page in the flight manual.

(1.2) The standard category aircraft noise standards are—

(1) the standards specified in the applicable chapter of ICAO Annex 16 Volume I except that —

(i) after 30 June 2003 every subsonic turbo-jet and turbo-fan powered aeroplanes must comply with the standards specified in Chapter 3 of Annex 16 Volume I; and

(ii) if a higher standard has been specified in the aircraft type certificate, noise certificate or equivalent document, then that standard applies; or

(2) a set of equivalent airworthiness design standards acceptable to the Executive Director.

(1.3) The standard category aircraft engine emission standards are—

(1) the standards specified in the applicable chapter of ICAO Annex 16 Volume II; or

(2) a set of equivalent airworthiness design standards acceptable to the Executive Director.

21.06.2 PRODUCTION INSPECTION SYSTEM

1. Procedures for making determinations

The procedures for making determinations referred to in CAR 21.06.2(2), must provide a means for determining at least the following:

(1) Incoming materials, and bought or subcontracted parts, used in the finished product must be specified in the type design data, or must be suitable equivalents.

(2) Incoming materials, and bought or subcontracted parts, must be properly identified if their physical or chemical properties cannot be readily and accurately determined.

(3) Materials subject to damage and deterioration must be suitably stored and adequately protected.

(4) Processes affecting the quality and safety of the finished product must be accomplished in accordance with acceptable industry specifications.

(5) Parts and components in process must be inspected for conformity with the type design data at points in production where accurate determinations can be made.

(6) Current design drawings must be readily available to manufacturing and inspection personnel, and used when necessary.

(7) Design changes, including material substitutions, must be controlled and approved before being incorporated in the finished product.

(8) Rejected materials and parts must be segregated and identified in a manner that precludes installation in the finished product.

(9) Materials and parts that are withheld because of departures from design data or specifications, and that are to be considered for installation in the finished product, must be processed through the Materials Review Board. Those materials and parts determined by the Board to be serviceable must be properly identified and reinspected if rework of repair is necessary. Materials and parts rejected by the Board must be marked and disposed of to ensure that they are not incorporated in the final product.

2. Materials Review Board

(1) The Materials Review Board referred to in CAR 21.06.2(3), must include representatives from the inspection and engineering departments of the manufacturing organisation.

(2) All records of Materials Review Board action must be maintained by the manufacturing organisation for a period of two years.

(3) All inspection records must be maintained, identified with the completed product where practicable, and retained by the manufacturing organisation for a period of at least two years.

21.06.4 TESTS FOR AIRCRAFT ENGINES

21.06.3TESTS FOR AIRCRAFT

1. Production flight test procedure

The production flight test procedure referred to in CAR 21.06.3, must include the following:

(1) An operational check of the trim, controllability, or other flight characteristics to establish that the production aircraft has the same range and degree of control as the prototype aircraft.

(2) An operational check of each part or system operated by the flight crew while in flight to establish that, during flight, instrument readings are within normal range.

(3) A determination that all instruments are properly marked, and that all placards and required flight manuals are installed after flight test.

(4) A check of the operational characteristics of the aircraft on the ground.

(5) A check on any other items peculiar to the aircraft being tested that can best be done during the ground or flight operation of the aircraft.

21.06.4 TESTS FOR AIRCRAFT ENGINES

1. Test run

(1) The test run referred to in CAR 21.06.4, must include the following:

(a) Break-in runs that include a determination of fuel and oil consumption and a determination of power characteristics at the rated maximum continuous power or thrust and, if applicable, at rated take-off power or thrust;

(b) at least five hours of operation at rated maximum continuous power or thrust. For engines having a rated take-off power or thrust higher than rated maximum continuous power or thrust,

the five-hour run must include 30 minutes at rated take-off power or thrust.

(2) The test run may be made with the engine appropriately mounted and using current types of power and thrust measuring equipment.

21.11.2 APPLICATION FOR EXPORT AIRWORTHINESS APPROVAL

1. Mass and balance report

(1) The mass and balance report referred to in CAR 21.11.2(3)(b)(ii)(bb), must include at least the following information:
- (a) Aircraft nationality and registration letters, make, model and serial number;
- (b) the date on which the mass was determined and centre of gravity computed;
- (c) the datum point used; and
- (d) the necessary calculations.

(2) A specimen mass and balance report is contained in FAA Advisory Circular AC 43.13-1A.

SCHEDULES

Schedule 1: Microlight minimum speed

Any aeroplane qualifies as a microlight when its maximum gross mass, useful load and minimum speed complies with the requirements as stated below.

1. A one or two seat aeroplane whose minimum speed at gross mass is less than 65 km/h (or 35.1 knots or 40.39 mph) and having a maximum gross mass of:

   – 300 kg for a landplane, single-seater

   – 350 kg for an amphibian, or a pure seaplane, single-seater

   – 450 kg for a landplane, two-seater

   – 500 kg for an amphibian or a pure seaplane, two-seater.

2. The minimum speed will be calculated by taking into account the wing area, the possible presence of high-lift devices and the gross weight, according to the provisions of paragraph 6.

3. The aeroplane may also qualify as a microlight by a flight demonstration of minimum level speed at gross weight (in this case, it must fly over a 500 m

course). The measured speed will be the average of the timed speed in both directions. The component of the wind perpendicular to the course must not exceed 10 km/h. The measured speed will be corrected for air density (15 C, 1013.2 mb, Om).

4. The useful weight to be considered must be at least equal to 90 kg per seat and

– a full charge of fuel or 15 kg, whichever is less, for a single-seater, or

– a full charge of fuel or 22 kg, whichever is less, for a two-seater.

The useful weight as defined in the present paragraph will be called “nominal FAI useful weight”.

5. If the real useful weight of an aeroplane is less than the nominal FAI useful weight, the aeroplane may qualify as a microlight if its minimum speed is less than the following:

Min speed limit –

$$\sqrt{\frac{empty\,weight + real\,useful\,weight}{empty + nominal\,FAI\,useful\,weight}} \times 65\ km/h$$

(weights in kg).

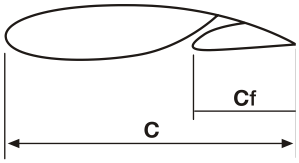
6. CALCULATED MINIMUM SPEED

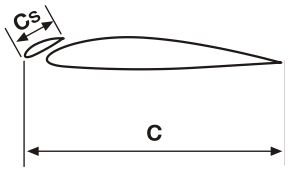
Min speed =

$$\sqrt{\frac{207.6 \times gross\,weight}{C_L \times S}}\ (km)$$

(weights in kg – area in m²).

7. CALCULATION FOR CL FOR COMBINATIONS OF HIGH-LIFT DEVICES





FLAP

To be considered, flap chord should be such that

$$0.05 \le \frac{Cf}{C} \le 0.025$$

SLAT

To be considered, slat chord Cs should be such that

$$0.04 \le \frac{Cs}{C} \le 0.15$$

of considered

30° max for a normal flap

20° max if flap is also used for roll control (“flaperon”)

Lifting surface	CL	Maximum value
Airfoil alone	1.45	1.45
Airfoil + plain flap	$1.45+0.0875\frac{Cf}{C}\times o_f$	2.10
Airfoil + split flap	$1.45+0.1125\frac{Cf}{C}\times o_f$	2.29
Airfoil + slotted flap	$1.45+1000\frac{Cf}{C}\times o_f$	2.20
Slat + airfoil	1.95	1.95
Slat + airfoil + plain flap	$1.45+0.1063\frac{Cf}{C}\times o_f$	2.75
Slat + airfoil + split flap	$1.45+0875\frac{Cf}{C}\times o_f$	2.61
Slat + airfoil + slotted flap	$1.45+0.1250\frac{Cf}{C}\times o_f$	2.89

8. DETERMINATION OF CL × S

8.1 Aeroplanes with no aerodynamic devices for pitch control (this includes weight-shift aeroplanes)

S = horizontal projection of all lifting surfaces (m^2)

CL = 1.45.

8.2 Other aeroplanes (including canard, tandem, flying wings, “classical”, ...)

– All calculations are done on the horizontal projections of all lifting surfaces, (lift being positive or negative). The global projection will be divided into elements (S1, S2, ... Sn) according to the presence or not of high-lift devices (see example). CL for all possible combinations are defined in paragraph 7.

– The surface affected by a high-lift device is the lifting surface directly comprised within the span of this high-lift device.

– Moving surfaces used for pitch control will not be considered as high-lift devices.

– Relative chord of flaps (Cf/C) will not be considered higher than 0.25.

– Deflection of flaps (of) will not be considered more than 30.

– In case of flaperons (flaps used for roll control), only symmetrical deflection up to 20 will be considered.

– CL x s = 0.80 (CL1 x S1 + CL2 x S2 + ... + CLn x SN).

8.3 About the wing area

There are so many different and interesting ways to design a flying machine that it is almost impossible to define a special rule for each.

It should be noted that some parts of the total wing area produce no additional lift but add manoeuvrability and stability.

This is the reason for the 0.80 factor in the formula for DL x s.

9. EXAMPLES

9.1 Trike (weight shift), single-seater wing area 10 m²

empty weight, equipped 110 kg

fuel tank 25 litres

gross weight 200 kg

(a) Minimum speed limit (see paragraph 5)

$$\sqrt{\frac{110+90}{110+105}} \times 65 + 0.964 \times 65 = 62.7\ km/h$$

(b) Calculated minimum speed (see paragraph 6)

$$V_{mini} = \sqrt{\frac{207.6 \times 200}{11.45 \times 10}} = 53.5\ km/h$$

accepted as microlight

9.2 Classical aircraft, two-seater, no high-lift devices

wing area 12,2 m²

empty weight, equipped 250 kg

fuel tank 28 litres

declared gross weight 360 kg

minimum speed 65 km/h (calculated)

(a) Minimum speed limit

$$\sqrt{\frac{250+110}{250+200}} \times 65 + 0.964 \times 65 = 58.14\ km/h$$

(b) Calculated minimum speed

$$V_{mini} = \sqrt{\frac{207.6 \times 360}{11.45 \times 12.2}} = 65\ km/h$$

NOT accepted as microlight

This aircraft is a “false” two-seater, as the declared gross weight will obviously be exceeded in flight. Any attempt of exaggerated empty weight versus gross weight will be discouraged by the provisions of paragraphs 5 and 6.

9.3 Classical aircraft, single-seater

wing area (total) 9,26 m²

empty weight, equipped 160 kg

fuel tank 30 litres

useful weight 105 kg

gross weight 265 kg

(a) Minimum speed limit

$$\frac{160\times105}{160+105}\times65=65\,km/h$$

(b) Calculated minimum speed (see illustration)

	Si area	CLi	DLi × Si
S1 : wing + slat	3.40	1.95	6.630
S2 : wing + slat + plain flap (*)	1.20	2.75	3.300
S3 : wing + plain flap (*)	2.80	2.1	5.880
S4 : wing into fuselage	0.6	1.45	0.870
S5 : tailplane	1.26	1.45	1.827
	9.26		

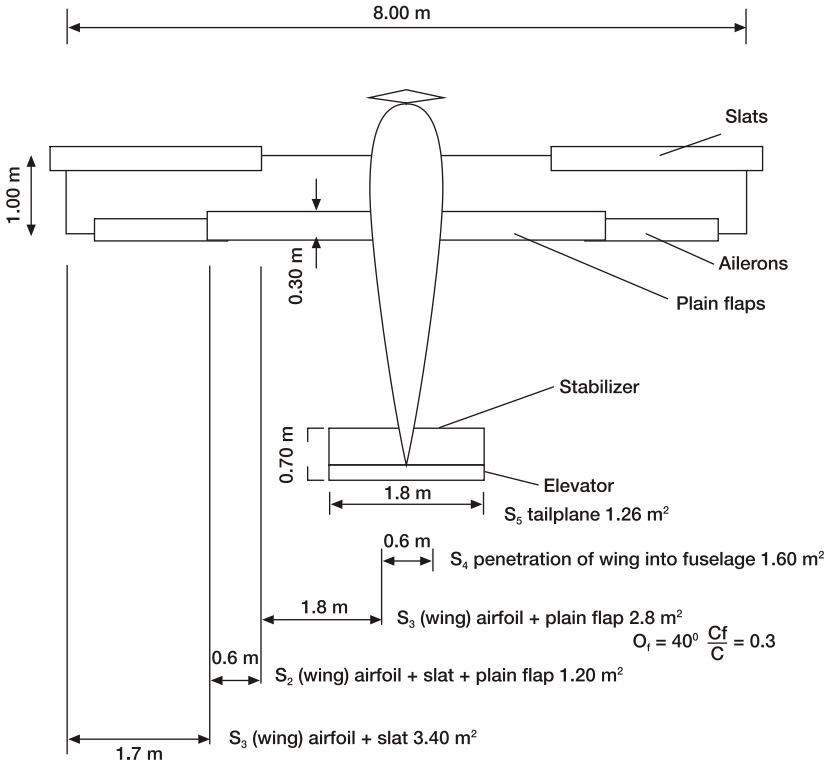
(*) $\frac{Cf}{C}$ = 0.30 (0.25 considered)

Of = 40° (30° considered)

CL × S = 0.80 (6.63 + 3.39 + 5.88 + 0.87 + 1.827) = 14.806 m²

$$V_{mini}=\sqrt{\frac{207.6\times265}{14.806}}=61\,km/h$$

accepted as microlight.


8.00 m
Slats
1.00 m
0.30 m
Ailerons
Plain flaps
Stabilizer
0.70 m
Elevator
1.8 m
S5 tailplane 1.26 m2
0.6 m
S4 penetration of wing into fuselage 1.60 m2
1.8 m
S3 (wing) airfoil + plain flap 2.8 m2
Of = 40° Cf/C = 0.3
0.6 m
S2 (wing) airfoil + slat + plain flap 1.20 m2
S3 (wing) airfoil + slat 3.40 m2
1.7 m