

CAAC Special Emphasis Items (SEI) for Small Airplane

First Edition, July 5, 2018

Flight	
Subject	Description
Flight Test Guide	Normally for the Part 23 airplane, the AC 23-8B will be used as test guide, if use other compliance method to show the compliance, Additional interpretative material may be required.
Human Factor	Some significant differences are observed in the way demonstration to regulations is processed. Most of the time an IP need to be issued.
Steep Approach	The regulation dose no cover steep approach landing capability and consequently additional airworthiness requirements are required with provision to enable an airplane to use an approach path angle greater than or equal to 4.54.5° (a gradient of 7.9%). You may need to raise a special condition to support such operations. To establish the means of compliance with structural design requirements for airplanes intended for steep approaches.
EFCS	On fly-by-wire airplanes, the flight controls are implemented according to complex control laws and logics. The handling qualities certification tests usually performed on conventional aircraft to demonstrate compliance with SUBPART B – FLIGHT are not considered sufficient to cover the flight control laws behavior in all foreseeable situations that may be encountered in service. An IP need to be issued to discuss the flight characteristics with EFCS of airplane.
Enhanced Vision System/ Synthetic Vision System	For human factor, an IP was issued to discuss the MOC,
Static Directional, Lateral and longitudinal stability	A special condition & interpretative material may be needed to address flight control systems, which provide neutral stability in the directional, lateral & longitudinal axes.
Flight In Known Icing	An IP may be needed to address detail compliance methods.
Automatic Thrust	An IP may be needed to address detail compliance methods.

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Control System	
Structures	
Subject	Description
Additive Manufacturing	Additive Manufacturing, often referred to as 3-D printing or rapid prototyping, is a new emerging technology to manufacture aeroplane parts and components. The means of compliance needs to be established to develop appropriate design values for additive manufactured parts and components that account for variability in materials, geometry and manufacturing processes.
Composite Structure Design & Construction (Materials, Fabrication Methods)	The mechanical behavior of structure fabricated using composite materials is highly dependent not only the base materials used, but also the fabrication methods used in production. You may need an issue paper to establish a means of compliance with 23.603, 23.605 and 23.613 to develop appropriate design values for composite materials that account for variability in constituent element properties, geometry and manufacturing processes.
Flammable Fluid Fire Protection	A means of compliance may be needed, to provide acceptable compliance guidance for flammable fluid fire Protection 23.863.
Ditching	For structure, to define the planned ditching structural conditions to be considered. For cabin safety, on several programs, a ditching dam has been utilized to allow a floor level exit to qualify as a ditching exit. The dam effectively raises the bottom sill of the door to a level higher than the water level outside. You will likely need an IP to establish an ELOS with 23.807(e) for this installation.
Bird Strike	There is some guidance on several compliance aspects related to bird strike damage. In addition, for windshields, certain items such as the choice of test impact locations and temperature conditions need to be agreed with the Agency. If applicable, A Special Condition is needed to ensure the safety after the aircraft being hit by a UAV.
Large Antenna and	To establish the means of compliance with (mainly) structural requirements related to large antenna

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Radome Installations	and/or radome installations.
Composite Fuselage In-Flight Fire Safety / Flammability	Special condition is required to ensure that composite fuselage construction does not reduce the level of in-flight fire safety when compared with a conventional metallic fuselage. These special conditions include evaluation of a fire propagating along the inside surface of the fuselage and the potential for toxic by-products.
Composite Fuselage Post-Crash Fire Survivability	An IP to establish an equivalent level of safety (ELOS) with 23.853 and is required to show a composite fuselage is as safe for passengers as a similarly sized metallic fuselage during a post-crash fire. The ELOS needs to address flame penetration, smoke and toxic gas emission.
Fire Protection of Flight Structure	You may need an issue paper to establish a means of compliance with 23.865 (Fire protection of flight controls, engine mounts, and other flight structure) for structure composed of materials such as titanium or non-metallic materials.

load	
Subject	Description
Design Dive Speed	To establish the means of compliance for defining the margin between V_c/M_c and V_d/M_d .
Limit Maneuvering Load Factors	To establish the means of compliance when constraints are present which may limit the aircraft stability to attain the maneuvering envelope load factor boundary.
Gust Loads	An IP may be needed to address detail compliance methods for gust loads.
Pitching Maneuvers and Yaw Maneuvers Conditions	To establish the means of compliance for pitching maneuvers and Yaw Maneuvers Conditions.
Ground load	To establish the means of compliance for ground loads during landing and taxi.
Loads Parallel to Hinge Line	To establish the means of compliance for loads parallel to the hinge line on primary control surfaces and other movable surfaces.

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Water Load	To establish the means of compliance for the requirement of water loads.
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Proof of Structure

Subject	Description
Proof of Structure	To establish the need for, and extent of, limit and ultimate load tests to be performed to validate the structural analysis.

Flutter

Subject	Description
Flutter requirement	To establish a means of compliance with the requirement of § 23.629.

Fatigue and Damage Tolerance

Subject	Description
Fatigue and Damage Tolerance	To establish a means of compliance with the fatigue and damage tolerance requirements of 571, 572, 573, 574.
Damage Tolerance for Bonded Joints	To establish a means of compliance with § 23.573(a)(5) for damage tolerance of bonded joints.

Crashworthiness

Subject	Description
Crashworthiness of Composite Structure	To ensure the survivable crashworthiness characteristics (e.g., maintenance of a survivable volume for occupants, maintenance of emergency evacuation paths) for a composite fuselage are equal to or better than those of a similarly sized airplane fabricated from traditionally used metallic materials.
Emergency Landing Conditions	Installation of seats and equipment, and stowage compartments, are contained properly.

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Inflatable Restraints in seats and walls	A special condition is needed for inflatable restraints in seats and walls because the regulations do not contain adequate or appropriate safety standards for inflatable restraints.
Side-Facing Seat	A special condition is needed for single and multiple place side-facing seats on airplanes.

Cabin safety

Subject	Description
Emergency Exit Marker & Locator Signs	Issue paper is needed to establish an equivalent level of safety with 23.811 to allow text-based emergency-exit signs smaller than required in small cabins.

Mechanical system

Subject	Description
Fly-by-wire flight control system	A means of compliance or an ELOS may be needed to ensure fly-by-wire flight control systems are adequately evaluated for the requirement of subpart C /D.

Powerplant

Subject	Description
Uncontained turbine engine rotor failure	In the aircraft design, the influence of the engine rotor failure on the aircraft system and structure should be analyzed according to requirements of AC20-128B. The aircraft system and structure should be properly installation according to the analysis results.
Negative acceleration	The aircraft flight test of negative acceleration should be in accordance with AC23-8B. The flight test results should meet the requirements of 23.943.
Fuel system hot weather operation	The fuel system should show the test of weather operation in accordance with 23.961. The fuel system air lock is not allowed in the test.
Fuel tank tests	The fuel tank test in accordance with 23.965. The fuel leakage is not allowed in the test.
Cooling	The aircraft cooling test should be in accordance with 23.1041, 23.1043, 23.1045, and 23.1047.

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	Overheating of the components and fluids is not allowed in the test.
Induction system icing protection	The induction system icing test should be in accordance with CCAR25 appendix C and 23.1093.Engine surge and stall is not allowed.
Nacelle areas behind firewalls	The installation of components in nacelle areas behind firewalls must meet the requirement of 23.1182.

Electrical Systems	
Subject	Description
HIRF	Special condition may need to address interferences created by High Intensity Radiated Fields.
Systems lightning protection	A compliance method may need to be issued to address compliance with CCAR-23, applicable to preventing catastrophic failures due to the effects of lightning.
Lithium Batteries	Special Conditions are needed to deal with the particular risks associated with this technology, which are not addressed in CCAR-23 requirements.
Solid State Power Contactors	As SSPC technology differs from the classic circuit breaker, a compliance method may need to be issued to address specific risks associated to this technology.
Return Current System in composite aircraft	Composite structure does not distribute electrical currents as a metallic structure does, therefore aircraft with composite fuselage may need a specific network to ensure the classical electrical functions provided by the structure, notably return path for functional electrical currents and fault currents. This design is unconventional and deserves a new certification approach.
PED tolerance demonstration	A means of compliance may be needed to address the electromagnetic interference of PEDs that are planned to be allowed to be used inside the aircraft.
WLAN Installation	A means of compliance may be needed to address electromagnetic interference, system interface and installation of the WLAN system and to address the electromagnetic interference due to the use of PEDs inside the aircraft.
Electrical Load Analysis	The electrical load requirements and power source capacity have been determined using the Electrical Load Analysis Program.

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Avionics	
Subject	Description
Integrated Modular Avionics(IMA) System	Functions performed by the IMA must be evaluated and approved as part of the aircraft installation.
RVSM	This is unusual for CCAR 23.
Automatic Dependent Surveillance – Broadcast (ADS-B)	General aviation is safer with ADS-B traffic, weather, and flight-information services.
Security Protection of Aircraft Systems and Networks	The Airborne Systems and Networks may introduce the potential for unauthorized electronic access to Aircraft Systems. It may contain security vulnerabilities due to the possible introduction of intentionally forged malware, intentional alteration of critical data, aircraft networks, systems or databases.
Flight Recorders and Data Link Recording	Aircraft equipped with the capability to provide DLS, are not being required to record the DLS messages. A Special Condition and associated interpretative material are proposed to prescribe recording requirements associated with the introduction of data link.
Synthetic Vision	New Technology.

Software and Airborne Electronic Hardware	
Subject	Description
Software	General software guidance, DO-178B/C、 Object Oriented Methods and Languages, Model-Based Development Methods and Tools, etc.
AEH	General Hardware guidance DO-254、 Use of COTS devices in AEH development, Use of COTS Graphical Processor devices in AEH development, etc.
Multi-core Processor	New/Novel Technology:

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Safety	
Subject	Description
Safety Assessment	The CAAC need a correct understanding of the methodology related to the classification of failures at aeroplane safety level. Additional documentation may be requested that describes the methodology used, all considered failure conditions and their justifications.

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Performance & Handling Qualities	
Subject	Description
Handing Qualities Evaluation and control law test strategies for Fly-by-Wire Aircraft	For Fly-by-Wire Aircraft, which equipped with side stick controllers, multi-mode control laws, flight envelope protection functions, auto-trim and/or other active control functions, special conditions or ELOS may be needed to address these characteristics, and the corresponding compliance method for control functions, control laws and handling qualities, including under failure cases, need to be established.
Validation of Engineering simulator	For situation using Engineering Simulator for compliance demonstration, the corresponding validation strategy for the engineering simulator need to be figured out and substantiated to validate the fidelity and representative of the simulator, and to ensure the credibility of the compliance test result.
Unreliable Airspeed	Operation experience shows that, under certain situation of pitot tube clogged due to extreme weather conditions, system failure and etc, which may cause airspeed signal error, mismatch and other airspeed unreliable situation and result in unsafe condition. Corresponding solution or mitigation measures for such unsafe conditions to ensure that the aircraft can continue to fly and land safely.
Return Landing Capability	For aircraft not equipped with fuel jettison system, sufficient return to landing capability need to be assured. Besides the climb performance requirement required in 25.1001, the safety issues of return landing due to the typical condition/failures need to be considered, and issue paper may need to be raised to address the detail requirement and strategy.
Critical icing shape determination	For compliance demonstration of flight in icing conditions, the method to determine the critical icing shape is concerned, including the critical icing condition determination, for flight in icing condition compliance demonstration, ETOPS icing shape.
Landing in Abnormal Configurations	Additional landing distances in abnormal configurations may be required following an in-flight failure. The current landing distance requirement is mainly used with operational factors to cover reasonably expected failure conditions. However, procedures and landing distances provided in many Flight Manuals are not always adequate to cover all the foreseeable failure cases. Concerning should be addressed in abnormal configuration landing, which includes probability of occurrence, landing distance data, operation procedures, runway conditions, etc.

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Autoland Landing Distance	The landing distance obtained using autoland(if applicable) using different autobrake settings should be established and provided in the AFM. Methodology should be established to determine the distance for each approved autobrake setting.
AFM	Including the AFM operation procedure identification, establish and evaluation; Certification of computerized AFM; Establish and verification of CDL.
CDL	The identification, establishment and verification of (Configuration Deviation List) CDL item.

Human Factors	
Subject	Description
Human Factors Certification for Installed Systems and Equipment for use by the flight crew	For the human factors certification, the authority involvement in human factor development/analysis process and human factors evaluation strategy need to be addressed according to design characteristics (novel, complex and integration), which include the human factor evaluation/analysis method, evaluation tools and data collection/analysis method.
Excessive Strength/Force/Friction/Fatigue	An issue paper may be needed to establish a means of compliance for regulations that guard against use of excessive flight crew strength, control force, control friction and fatigue (e.g.25.143(j)(1), 25.147(e), 25.253(c), 25.683(j), 25.735(c)(1) and 25.1329(m)).
Pilot's Non-openable Window	For designs with a pilot's non-openable window, a method of compliance issue paper may be needed for CCAR 25.773(b) (2) (i) requirements.
Touch Screen Interface and Control Device in	Proposed issue paper may be needed to determine an acceptable means of compliance for installing touch screens in the flight deck in lieu of physical controls (e.g., knobs, buttons, and levers). The issue paper would address the affect of touch screen controls on pilot workload, the demand for pilot attention,

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Flight Deck	and the potential for crew error or inadvertent control inputs.
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Loads	
Subject	Description
Automatic speed protection for dive speed	Proposed special conditions or equivalent safety finding (in lieu of 25.335(b)). Allows for consideration of automatic speed protection systems to reduce design dive speed.
Compliance Issues Associated with a High Design Dive Mach Number (Md = 0.99M)	A means of compliance that outlines requirements for airplanes that have Design Dive Mach Number near Mach 1.0.
Loads with abnormal landing gear configuration	Compliance methods of loads with any one or more landing gear legs not extended.
Interaction of Systems and Structures	Proposed Special Conditions for evaluating the interaction of systems and structures for aircraft with automatic flight control systems.
Limit Engine Torque Loads for Sudden Engine Stoppage	Proposed Special Conditions due to the size, configuration, and failure modes of jet engines changing considerably from those envisioned by § 25.361(b) when the engine seizure requirement was first adopted.
Unconventional Landing Gear Arrangements	Proposed special conditions (in addition to and in lieu of several landing regulations) for airplanes configured with unconventional landing gear arrangements.

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Loads condition under deep approach and auto landing	Evaluation may be needed for load condition under deep approach and auto landing.
Rudder reversal loads condition	The structure load of rudder reversal condition should be considered.
Load Condition for Airplanes with an Automatic Braking System	An automatic braking system may apply maximum braking at the main wheels before the nose touches down and thereby cause a high nose gear sink rate and potentially higher gear and airframe loads. An issue paper for developing proposed special conditions may be needed to address the potentially higher structural loads that could result from an automatic braking system.

Aeroelastic stability	
Subject	Description
Failure Criteria Considered Under the Aeroelastic Stability Requirements of 25.629	To demonstrate compliance with the 25.629(d)(9), the applicant usually proposes to use the failure criteria defined by FAA Flight Controls Harmonization Working Group ARAC proposal for 25.671 and 25.1309 in lieu of those in CCAR25.671 and 25.1309 respectively. An issue paper to establish an equivalent safety finding may be needed.
Aeroservoelastic Stability Criteria	An issue paper to establish a means of compliance with 25.629 for airplanes equipped with feedback control systems may be needed. To define gain and phase margin requirements for all normal operations in order to preclude aeroservoelastic instability and provide adequate stability margins for compliance with 25.629
Aeroelastic stability for unbalanced or	For airplanes equipped with control surfaces, including all-movable control surfaces and tabs, that rely on retention of restraint stiffness, damping, or mass balance for flutter and LCO prevention, an issue paper may be needed to establish a means of compliance for freeplay limits, control surface stiffness validation,

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mass balanced control surfaces	and maintenance instructions to ensure that control surface mass balance limits or freeplay limits are not exceeded throughout the life of the airplane.
Aeroelastic stability consideration for under wing turbofan /propeller engine aircraft	An issue paper maybe needed to consider the means of compliance for the aeroelastic stability investigations of any significant elastic, inertial, and aerodynamic forces, including those associated with rotations and displacements in the plane of any turbofan or propeller.

Airframe	
Subject	Description
Special/New material and manufacturing techniques/ processes application	1) the Development of material specification and material design values Metal matrix composite, Polymer matrix composite and new alloys, for Special/New materials; 2) Development of process specification and The demonstration of stability and repeatability for Special/New manufacturing techniques/ Processes (the means of compliance with 25.605). The Special/New Manufacturing techniques/ Processes, such as resin transfer molding, resin film infusion, additive manufacturing and so on.
Design, Construction and demonstration of Additive Manufacturing (Materials, Fabrication Methods, special factors)	Additive Manufacturing creates material and parts at the same time. The controls on raw materials (i.e. metallic powders, wire, resin, etc.), manufacturing process are necessary to make sure the parts are stable and repeatable. It may need an issue paper to establish a means of compliance with §§ 25.603, 25.605 and 25.613 for additive manufactured materials that account for variability in materials, geometry and manufacturing processes. It may need an issue paper for special factors (coordinated with inspection/detection methods) to take account the Unpredictable defects.

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Finite Element Model Validation	It may need an issue paper to establish a means of compliance when a finite element model is used to show compliance with § 25.305 (Strength and Deformation) and § 25.307 (Proof of structure).
Establishing a Limit of Validity	Special Condition may need for establishing of LOV for metallic airframe. The means of compliance for SC will be the focus of attention.
Primary Composite Structures	1) Static and damage tolerance of composite structure: building block method; taking account of defects, damages, environment, thermal stress, material and process vibration, stress concentration, out ply loads, etc. 2) Special conditions and equivalence safety of findings relate to composite application, such as Crashworthiness, fire safety, tire debris impacting, etc. And the means of compliance for these SC and ELOS.
Rapid Decompression	The means of compliance to take account the Rapid Decompression Issues such as windshield loss, fuselage hole, decompress to un-pressed component.
Fire Protection of Flight Structure (e.g., Composite lower wing panel, Titanium Engine Mounts)	For structures composed of materials such as polymer matrix composite and titanium, the strength may reduce when structures were exposed to in flight heat and fire, especially the engine fire. It may need an issue paper to establish the means of compliance with 25.865 and 25.867
Structure integrity after tyre and wheel failures.	Consideration for structure after wheel and tyre failure including tyre debris, wheel flange debris, flailing tyre strip and tyre burst pressure.

Cabin safety	
Subject	Description

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Graphical/ symbolic exit signs	It may need an issue paper to establish an equivalent level of safety with §§ 25.811(g) and 25.812(b) to allow the use of specific graphics/symbols in lieu of the text-based exit signs specified in § 25.812(b).
Occupant Protection with Dual Head-up Display (HUD) Installation	Installation of HUD over both pilots may result in a single incident affecting both pilots and affect continued safe flight and landing. You may need an issue paper to establish the means of compliance with § 25.785 for the occupant injury requirements.
Large surface area seat panels	For airplanes with 20 or more passenger seats, seats with large surface area composite or plastic panels may need special conditions to address heat release and smoke emission fire.
Composite fuselage in-flight fire safety/flammability	Special conditions may be needed to ensure that composite fuselage construction does not reduce the level of in-flight fire safety when compared with a conventional metallic fuselage. This includes the effects of a fire propagating along the inside surface of the fuselage and the potential for toxic by-products.
Composite fuselage post-crash fire survivability	An issue paper may be needed to ensure that a composite fuselage will provide an equivalent level of safety for passengers as a similarly sized metallic fuselage during a post-crash fire. Issues that need to be addressed are flame penetration, smoke and toxic gas emission.
Full Side-Facing and Oblique Seats	You need special conditions for single and multiple place side-facing seats, and oblique seats to establish a dynamic test method and occupant injury criterion.
Use of magnesium in the cabin and flight deck (including magnesium seats)	You may need special conditions where a design uses magnesium in the cabin or flight deck because magnesium is a flammable metal that has historically not been used in the cabin and has been limited in the flight deck. Flammable metals are not addressed by the current fire safety regulations.

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Composite seats	An issue paper is needed to establish what should be addressed beyond traditional aluminum alloy seats, i.e. environment and material variability, damage threat assessment, residual strength test criteria. etc.
Inflatable Restraints in Seats/Walls (i.e. airbag)	You need special conditions for inflatable restraints in seats and walls because the regulations do not contain adequate or appropriate safety standards for inflatable restraints. The special conditions address the safety performance of the system and the system's integrity against inadvertent activation.
Medical stretchers	An exemption may be needed pertaining to CCAR 25.562 and 25.785.
Interior doors	If passenger compartments are separated by interior doors, an exemption is needed pertaining to CCAR 25.813(e). Exemptions would only be granted for airplanes that are privately operated only.

Electronic and Electrical system	
Subject	Description
The qualification of the EWIS components	The qualification requirements of EWIS components, include standard parts and customized parts, need to be specified
The separation of the aircraft wiring	The separation criteria need to be specified for the aircraft wiring and approve that the separation criteria and the mitigation design meet the 25.1707.

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Safety analysis of EWIS with the 25.1709	The safety evaluation process of EWIS need to be established by the 25.1709.And define the method and process to calculate EWIS component failure rate, analyses particular risk (single wire chafing or arcing event) for EWIS system.
Systems and functions: EWIS	The EWIS compliance demonstration for those requirements (such as 25.773, 25.1331, 25.1360, 25.1362) referred by 25.1705.
Optical fiber	A method of compliance issue paper may be needed to define the compliance method of the function, performance and installation of the optical fiber
Safety analysis of SSPC technology and SSPC command architecture.	A method of compliance issue paper may be needed to address §§ 25.1309, 25.1357(d), (e) and (g) because of concerns with the safety analysis of SSPC function, performance, installation and SSPC command architecture.
Arc Fault Circuit Breakers	A method of compliance issue paper may be needed to address §§ 25.901(c), 25.981(a) and (b), 25.1309 and 25.1357 because of concerns with nuisance trips and suitability for fuel system protection and flight critical systems.
Cockpit Door Locking Systems (CDLS)	A means of compliance issue paper may be needed to address §§ 25.1353(a), 25.1431(a) and 25.1431(c) because of concerns with electromagnetic compatibility of CDLS.
Exterior Lighting Chromaticity	Equivalent level of safety finding may be needed to approve the color of exterior position lights which do not meet the chromaticity coordinates specified in § 25.1397.
LED Landing and Taxi Light Night	An issue paper to establish a mean of compliance with § 25.1383(a) (2) and (3) may be needed to address unique aspects of LED landing and taxi light installation, ICAs and performance at night.

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Performance	
Lithium Batteries	Special conditions and means of compliance issue papers are needed for lithium battery installations except for those with less than 2 wathours of energy that are not required for safe operation of the airplane and meet UL 1642, UL 2054 or International Electro technical Commission 62133.
Current Return Network	A method of compliance issue paper may need to be defined.
Operation Without Normal Electrical Power	A special condition may be needed to address § 25.1351(d) because the greater use of modern electronics in safety critical applications such as displays, engine controls, flight controls, etc.
Air data system and inertial system voting architecture	An issue paper is needed to address that the instrument system with a voting architecture has the equivalent level of safety to the required independent architecture in 25.1333(a).
Supercooled large drops, ice crystal and mixed phase icing requirements for air data probe.	A issue paper may be needed to address the new icing condition requirement including supercooled large drops, ice crystal and mixed phase icing
Airborne satellite navigation system using constellations other than GPS.	New requirements and means of compliance is needed for airborne satellite navigation system using GLONASS, GALILEO, COMPASS. A special condition may be needed.

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Required Time of Arrival (RTA) or Time of Arrival Control (TOAC)	An issue paper may be needed for navigation systems intended to provide time of arrival control.
Barometric Vertical Navigation	Means of compliance for Baro-VNAV systems incorporating automated temperature compensation for all segments in the approach procedure
Vertical Required Navigation Performance (RNP)	An issue paper may be needed to establish an acceptable means of compliance for Vertical RNP.
Radio Frequency Identification Tags (RFID)	RFID systems that have more than minor safety effects, or RFID systems which do not plan to use AC 20-162, or that utilize ACTIVE RFID, will require a means of compliance issue paper.
Use of Portable Electronic Devices (PEDs) to Control Installed Airplane Systems in the Cabin	A means of compliance issue paper may be needed when applicants propose to control certain aircraft systems using Portable Electronic Devices.
Performance-Based Communications and Surveillance.	A means of compliance issue paper may be needed when demonstrating compliance to Performance-Based Communications and Surveillance requirements.

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HUD 、 EVS/EFVS and SVS	A special condition and a means of compliance issue papers may be needed for these systems.
Airborne Cyber-Security	A special condition and a means of compliance issue papers may be needed for these system. New Technologies: Compliance means and evaluation methods for airborne Cyber-Security. And the monitor of continued airworthiness.
Integral Modular Avionics	A means of compliance issue papers may be needed for the IMA system.
Process assurance of the highly integrated complex system/aircraft integration	A means of compliance issue papers may be needed for the process assurance of the highly integrated complex system/aircraft integration
Metric Altitude Indication	The implementation of the Metric Altitude Indication function need to be verified.
Quick Access Recorder	The implementation of the Quick Access Recorder function need to be verified.

ETOPS	
Subject	Description

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<p>Icing Environment Exposure and Ice Shape for a Maximum Length ETOPS Diversion</p>	<p>Exposure to icing conditions during an ETOPS mission results in accretion of ice on unprotected surfaces of the airplane. The ice accretion produces ice shapes that increase drag and reduce lift, which affect airplane performance and handling qualities. For example, the drag increases fuel consumption and reduces maximum cruise altitude capability, while the lift loss increases stall speeds. To show that the airplane can safely operate in icing conditions that may be experienced during an ETOPS diversion, airplane performance and handling qualities must be evaluated using ice shapes based on a maximum length ETOPS diversion. Additionally, the increase in fuel consumption due to the ice accretions is used to determine the critical fuel reserves required to dispatch the airplane. The applicant and authority must agree on the icing environmental conditions, icing exposure, and resulting ice shapes that may result from a maximum length ETOPS diversion.</p>
<p>Analysis Methods for Determination of ETOPS Diversion Capability</p>	<p>For ETOPS design approval, special conditions may be proposed for such an approval that will include provisions for ETOPS approval based on the airplane and aircrew capability to safely perform diversions when engine failure or other emergencies occur. The applicant must propose and accepted by the authority on the methods to identify the design and human factors elements critical to the safety of a diversion and to determine any limitations on allowable diversion time based on those elements.</p>
<p>Aircraft System Functions Required for a Maximum Time ETOPS Diversion</p>	<p>For aircraft ETOPS design approval, a list of minimum system functions required for a maximum time of ETOPS diversion should be established and accepted by authority.</p>

Powerplant	
Subject	Description

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Flight Critical Thrust Reverser	An issue paper may be needed to identify the guidance needed for the Controllability requirements of § 25.933(a) (1)(ii).
Backing Using Reverse Thrust	An issue paper may be needed if an applicant requests type design approval to use reverse power or thrust from the airplanes engines to move the airplane backwards.
In flight All-Engine Restart	An issue paper may be needed to address engine restart following loss of all engine power. This issue applies to all airplanes powered by high bypass engines, engines with free power turbines, or with limited restart capability.
Uncontrollable High Thrust (UHT)	A means of compliance with 25.901(c) as it relates to failures that prevent the flightcrew from controlling thrust through the normal means when actual thrust is higher than commanded (i.e., uncontrollable high thrust). When the applicant has done everything practical within the scope of the project to assure a compliant design, but still cannot demonstrate full compliance, granting a petition for exemption may be in the public interest.
ATTCS	A special condition may be needed for the type design using ATTCS for go around.
Engine Icing Protection	A means of compliance issue paper may be needed to show compliance to § 25.1093(b). This issue paper clarifies the need for protection of the engine during icing conditions at all engine power settings should be addressed, including in-flight idle conditions, and the regulatory need for consideration of the airframe as part of the engine inlet.
Ice Crystal Icing Condition	An issue paper may be needed to develop a means of compliance with § 25.1093(b) to describe that flight testing may be needed to sufficiently validate an analytical compliance demonstration to in-flight ICI conditions.
Potential Engine Damage from Airframe Ice Outside of Icing	An issue paper may be needed to address potential ingestion of wing ice that may form during non-icing conditions (e.g., cold-soaked fuel in wing tanks), shed and cause an all engine failure. This issue is applicable to all aft fuselage mounted engine installations.

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Conditions	
Digital Display of Engine Parameters	An equivalent level of safety finding may be needed if any required engine parameters specified in 25.1305 and 25.1549 are displayed in a digital-only format.
Green Arc Indications	An equivalent safety finding for compliance with 25.1549(b) is necessary if engine parameters do not indicate the normal operating range with green arcs or green lines.
Warning Means for Engine Oil Filter Contamination	An issue paper may be necessary if the provisions of 25.1019(a) and 25.1305(c) (7) are not wholly met by the same single filtering device. This may require an equivalent level of safety finding.
Warning Means for Engine Fuel Filter Contamination	An equivalent level of safety issue paper may be needed to address 25.997 and 25.1305(c)(6) if the fuel filter required by 25.997 is not installed in the location specified in 25.997; A means of compliance issue paper may be needed to address 25.1305(c)(6) and 25.1309(c) if more than one fuel filter is used and/or if other fuel system components (e.g., fuel-oil heat exchanger) are installed upstream of the main fuel filter to ensure the flight crew receives appropriate alerting of possible fuel contamination.(25.997、 25.1305(c)(6) and 25.1309(c))
Fire Detection for tailpipe	You may need a ELOS for 25.1203 if there is no fire detection device in the area of tailpipe.
Shutoff means in designated fire zone	A means of compliance may be needed for the Shutoff means in designated fire zone.
Pylon and Struts Fire Protection	The equivalent level of safety (ELOS) may be proposed to show the compliance with 25.1182(a) for flammable fluid-carrying components in pylon and struts.
Uncontained rotor failure of Engine and APU	Methodology to deal with engine and APU rotor burst issue and need to know assumptions, including any risk factors (conditional probabilities) indicating a probability of catastrophe smaller than 1.0, that will be used in the uncontained rotor failure risk analysis.
Integrated control of single lever of	No single provision about this and a SC must be needed, referred terms are 25.1143, 25.1149, 25.1153, 25.1155, etc., for the design Features of Integrated control of single lever of engine and propeller based

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engine propeller	and	on FADEC, etc.
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Fuel System		
Subject	Description	
Fuel Feed System Icing Threat	Icing accumulation on the inner wall of the fuel feeding system and then instantaneously release to the downstream within the fuel may cause a restriction of the fuel feeding function, affecting the aircraft flight safely and landing. A means of compliance issue paper may be needed to address this subject (fuel feed system icing threat) for the aircraft models with the same unsafe design. (25.951(c) and 25.952(a)).	
Fuel Tank Structural Lightning Protection	Fuel tank structure(including metal and composite materials) design features based on “state-of-the-art” often impractical to be directly showed compliance with the lightning protection requirements of 25.981(a)(3), therefore, a special conditions, or exemptions may be needed to address this subject. (25.981(a)(3))	
Fuel Tank Flammability Reduction Rule	Appendix N to CCAR25 defines the detailed parameters should be used when conducting fuel tank flammability exposure analysis. An ELOS issue paper may be needed to address the deviations from the parameters defined in appendix N to CCAR25. (25.981(b), Appendix M, Appendix N, 26.33, 26.35, 26.37, and 26.39)	
Composite Wing Fuel Tank Structure Post Crash Fire Survivability	Composite fuel tank structure is a novel and unique design feature, and is not as fire resistant as Aluminum and may result in hot spots that cause ignition sources in fuel tanks. That is to say, composite structure may not match the existing level of safety that Aluminum structure exhibits during a post-crash fire. (25.867, 5.963, and 25.1193)	
Expansion Space for Composite Fuel Tanks	Composite material thermal expansion characteristics may result in less tank volume increase with temperature increase than traditional aluminum fuel tanks. Additional fuel tank expansion space may be needed for composite fuel tanks. A means of compliance IP may be needed to address 25.969 for composite fuel tanks. (25.969)	

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Electrostatic Charge during fueling of Composite Fuel Tanks	Composite materials may have a low electrical conductivity than Aluminum materials. Therefore, isolated parts is often easier to collect electrostatic charge, and it may need longer time to relax for the electrostatic charge accumulated during fueling. Additional means may be needed to keep the accumulated charge on the fuel surface at a safe level to prevent an ignition source in the fuel tank, which may often need a means of compliance issue paper to address fuel tank ignition prevention from electrostatic charge in compliance with 25.981. (25.981(a)(d))
Secondary Fuel Vapor Barrier for Composite Fuel Tank Structure	25.967(e) requires fuel tanks to be isolated from the personnel compartments by a fume proof and fuel proof enclosure. Secondary fuel barrier coatings used on traditional aluminum tank construction are not often compatible for use with fuel tanks made of composites, which may need a means of compliance issue paper to address. (25.967(e))
Fuel System/ Cockpit Interface Safety Analysis	A means of compliance issue paper may be needed to address considerations for safety analysis of fuel system in relation to cockpit interface issues. (25.901, 25.903, 25.955, 25.1305, 25.1337, 25.1501, 25.1523)
Fuel Tank Ignition Prevention and Electrical System Changes	A means of compliance issue paper may be needed to address the applicability of CCAR 25.981-R4, because fuel tank changes (such as electrical system changes) can create fuel tank ignition sources. (25.981(a)(d))
Fuel Temperature Indication	A means of compliance issue paper may be needed to address § 25.1521(c) (2) if fuel temperature indication is not provided. (25.1521(c)(2), and 25.1501(b))
Fuel Shutoff Valve	An ELOS issue paper may be needed to address the compliance with 25.1141 if the position of the fuel shutoff valve is not adequately indicated. (25.1141)
Fuel Pump Circuit Protection	Fuel pump circuit failure may result in ignition sources within fuel tanks, and usual protection design features are installation of Ground Fault Interrupters or other protection devices. A means of compliance may be needed to address this issue. (25.901, 25.981, 25.951, 25.952, 25.955, 25.961, 25.1301, 25.1309, 25.1316, 25.1351, 25.1353, 25.1357, 25.1363, 25.1581, 25.1529, and 25.1585)
Fuel Tank Vent Fire Protection	An issue paper may be needed to document the equivalent means to prevent fuel tank explosion if fuel tank vent lines do not include flame arresters; An issue paper may be needed to establish performance

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(Flame Arresters)	standards for systems with flame arresters if flame arresters are installed on the fuel tank vent lines outlet.
Return Landing Capability (Fuel Jettison)	An issue paper may be needed to establish the evaluation criteria whether a fuel jettison system is needed for an immediate return landing. (25.733, 25.735, 25.1001(a), 25.1301, 25.1309(a))
Auxiliary fuel tank installations	A means of compliance issue paper may be needed to address the installation of auxiliary fuel tank located aft and adjacent to the passenger compartment and cargo compartment, including a fuel tank in horizontal stabilizer. (25.25, 25.365, 25.561, 25.571, 25.609, 25.613(c), 25.903(d), 25.981, 25.1185, 25.951, 25.953, 25.955, 25.957, 25.961, 25.963, 25.965, 25.1301, 25.1309)

APU	
Subject	Description
Toxic Gas from Composite APU Tail Cone	This composite compartment material may produce toxic gas on the cool side (external) when exposed to a flame within the APU compartment. The toxic gas may enter to the cockpit and cabin through APU bleed air. This issue need to be evaluated.

Aircraft Fire Safety	
Subject	Description
Fire Protection of Flight Structure (i.e. Titanium engine mount)	An issue paper may be proposed to establish a means of compliance with §25.865 for structure composed of materials such as titanium or non-metallic materials.
Flammable Fluid Fire Protection	A means of compliance may be needed, using draft FAA AC 25.863-1 provides acceptable compliance guidance for flammable fluid fire protection regulations §§25.863, 25.1187 and other relevant regulations.
Fire Protection in 2D nacelle zone	The means of compliance with 25.867 request a clarification of the requirement stating “within one nacelle diameter of the nacelle centerline”.
Halon-Replacement Fire	An issue paper may be needed for New type Halon-Replacement fire Extinguishing Agent to comply with the requirement of 25.1197.

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Extinguishing Agent	
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ECS	
Subject	Description
Acceptable Low Temperature Physiological Environment During Failure Conditions	A means of compliance issue paper may be issued to clarify acceptable low temperature physiological limits during failure conditions.
Acceptable High Temperature Physiological Environment During Failure Conditions	An equivalent safety finding may be needed for any airplane that exceeds the limits of 25.831(g) (CCAR-25-R3 and above)
High Altitude Decompression	An exemption is needed for any airplane that exceed the limits of 25.841(a)(2) (CCAR-25-R3 and above)

Flight Controls	
Subject	Description
Control System Gust Locks - Limit Operation of Aircraft	If a physical device of some kind (e.g. throttle interlock) is not used to limit operation of the airplane (e.g. taking off with gust limitation device engaged), an equivalent safety finding may be needed.

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Electronic Flight Control Systems	There are certification issues related to airplanes with electronic flight control systems. The subject also covers side stick controllers, electronic flight control system failures and mode annunciation. Special conditions may be needed.
Flight Control in All Attitudes	An issue paper may be needed to address continued functionality of flight control systems in conditions of unusual attitudes and rapid maneuvers.
Flight Control Surface position Awareness	Special Conditions for airplanes equipped with Electronic Flight Control Systems are needed to provide a means of conveying control surface position awareness to the flight crew to preclude inadvertently reaching a control surface limit.
Flight Control System Failure Criteria	An issue Paper may be needed to establish an equivalent level of safety with 25.671(c)(2) to use the Aviation Rulemaking Advisory Committee's (ARAC) proposal which includes 10^{-3} criteria, etc.
Command Signal Integrity	An issue paper may be needed to address command and control signals remain unaltered from internal or external interference. Electronic flight control systems may be affected by electromagnetic and computer induced spurious signals.

Icing	
Subject	Description
Pilot's non openable window	A means of compliance issue paper may be issued to clarify the requirements for non-openable window for the first pilot.

Landing gear extension and retraction system	
Subject	Description
The availability of Emergency extension function	particular attention from CAAC during the validation of Emergency extension function: the latent failure of the system and the consequent CCMR (if have)

Weight on Wheel

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Subject	Description
The criticality of the system producing the Weight on wheel	Weight on wheel signal is typically fed to a large number of systems. As a consequence, the criticality of the system producing the Weight on wheel shall be carefully assess.

Wheel brake	
Subject	Description
Braking Antiskid	Particular attention from CAAC during the validation of the Braking Antiskid system: How the tuning and verification of the Antiskid system have been performed to account for all relevant parameters?
Respecting Brake Energy Qualification Limits	Particular attention from CAAC: Part of TSO is an “Accelerate Stop Test”, which establish the Kinetic Energy (KE) absorption capability of the brake assembly. The TSO tests prove the KE absorption capability of the brake with that brake at a pre-determined (threshold) start temperature. It is assumed that if the brake were to be used in-service with an initial temperature higher than the threshold temperature then its KE absorption capability would be reduced. As this capability of the brakes is finite, appropriate limitations must be specified in the Airplane Flight Manual (AFM) to ensure operations are permitted only within the demonstrated capability of the brakes.

Tyre	
Subject	Description
Tyre speed selection	Particular attention from CAAC during the validation: Determination of Tyre Speed Rating and How to address no exceedance of the Speed Rating.

Oxygen	
Subject	Description
Oxygen Equipment Qualification above	A means of compliance issue paper may be issued to clarify the requirements for oxygen equipment above 40.000ft

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40.000ft	
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Water and waste system	
Subject	Description
Water and waste water system leakage prevention and ice hazards	An issue paper may be needed to define a means of compliance for water and waste intended to drain outboard or leakage and the possible ice hazard as a result.

System and Equipment General	
Subject	Description
Clarification of Use of ARAC Recommended 25.1309 and AC 25.1309-Arsenal	An issue paper may be needed to document an equivalent safety finding with 25.1301 and 25.1309 to use the ARAC recommended AC 25.1309-Arsenal and to clarify certain aspects of the AC.
Development Assurance Process Based on SAE ARP 4754A	An issue paper may be needed if applicant chooses to use ARP 4754A as a guideline or show their processes as an equivalent outcome that meets the objectives of ARP 4754A.

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Flight	
Subject	Description
Flight Test Guide	Normally for the Part 27 Aircraft, the AC 27-1 will be used as test guide, if use other compliance method to show the compliance, Additional interpretative material may be required.
General Handling Qualities (Subpart B)	General Handling qualities should be concerned, especially for the projects involving significant external modification to the basic airframe (FLIR, etc.)
Category-A (Subpart B)	Category-A characteristics and performance should be concerned, especially for the Evaluation of T/O and Landing procedures, Engine failure, etc.
Human Factor	Some significant differences are observed in the way demonstration to regulations is processed. Most of the time a IP need to be issued.
AFCS / Autopilot	The characteristics and performance of AFCS should be concerned, especially for the mode changing.
Variable Rotor Speed(NR) Flight, Transmission and Powerplant Aspect	The helicopter design incorporates a variable rotor speed (Nr) law for different operational conditions. This variable Nr function aims at achieving better noise and helicopter performance, and presents new challenges in various certification disciplines, namely flight, structure, transmission, powerplant and noise. It need an IP to discuss aspect of certification of disciplines relevant to the variable Nr system.
Static Directional, Lateral and longitudinal stability.	A special condition & interpretative material may be needed to address flight control systems, which provide neutral stability in the directional, lateral & longitudinal axes.
Emergency Procedure, HYD Failure, Tail Rotor Failure	IPs may be needed to address detail compliance methods. 27.695 Power boost & power-operated control system. Encourage dual Hydraulic system in case of single system need Dry Boost testing. Verify by flt test single system hydraulic off still able to land safely.
Flight In Known	An IP may be needed to address detail compliance methods.

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Icing	
Optional Equipment: Engine Air Intake Particle Separator, Cargo Hook, Hoist, Ditching configuration, Night Vision Goggle operation, Synthetic Vision system	IPs may be needed to address detail compliance methods.

Structures	
Subject	Description
Additive Manufacturing	Additive Manufacturing, often referred to as 3-D printing or rapid prototyping, is a new emerging technology to manufacture rotorcraft parts and components. The means of compliance needs to be established to develop appropriate design values for additive manufactured parts and components that account for variability in materials, geometry and manufacturing processes.
Composite Structure Design & Construction (Materials, Fabrication Methods)	The mechanical behavior of structure fabricated using composite materials is highly dependent not only the base materials used, but also the fabrication methods used in production. You may need an issue paper to establish a means of compliance with 27.603, 27.605 and 27.613 to develop appropriate design values for composite materials that account for variability in constituent element properties, geometry and manufacturing processes.
Child Shoulder Harnesses for Seats	Special conditions are issued for child shoulder harnesses for seats. The airworthiness regulations do not contain adequate or appropriate safety standards for safety restraint devices such as a shoulder harness designed for use by small children.

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Human External Cargo (HEC) (§27.865)	There is confusion as to what constitutes “HEC”. The current guidance needs to be revised to provide clear guidance. There are differences between CAAC and FAA operational requirements which also lead to confusion during validation.
Combi	Rotorcraft that includes a passenger and cargo configuration. A special condition is required due to the lack of regulations for combi configurations
Ditching Structural Conditions	For structure, to define the planned ditching structural conditions to be considered. A means of compliance may be needed.
Flammable Fluid Fire Protection	A means of compliance may be needed, to provide acceptable compliance guidance for flammable fluid fire Protection 27.863.
Large Antenna and Radome Installations	To establish the means of compliance with (mainly) structural requirements related to large antenna and/or radome installations.
Composite Fuselage In-Flight Fire Safety/Flammability	Special condition is required to ensure that composite fuselage construction does not reduce the level of in-flight fire safety when compared with a conventional metallic fuselage. These special conditions include evaluation of a fire propagating along the inside surface of the fuselage and the potential for toxic by-products.
Composite Fuselage Crash Survivability Post-Fire	An IP to establish an equivalent level of safety (ELOS) with 27.853 and is required to show a composite fuselage is as safe for passengers as a similarly sized metallic fuselage during a post-crash fire. The ELOS needs to address flame penetration, smoke and toxic gas emission.
Fire Protection of Flight Structure	You may need an issue paper to establish a means of compliance with 27.865 (Fire protection of flight controls, engine mounts, and other flight structure) for structure composed of materials such as titanium or non-metallic materials.

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load	
Subject	Description
Limit Maneuvering Load Factors	To establish the means of compliance when constraints are present which may limit the aircraft stability to attain the maneuvering envelope load factor boundary.
Gust Loads	An IP may be needed to address detail compliance methods for gust loads.
Yaw Maneuvers Conditions	To establish the means of compliance for Yaw Maneuvers Conditions loads.
Ground load	To establish the means of compliance for ground loads during landing and taxi.
Loads Parallel to Hinge Line	To establish the means of compliance for loads parallel to the hinge line on primary control surfaces and other movable surfaces.
Water Load	To establish the means of compliance for the requirement of water loads.

Proof of Structure	
Subject	Description
Proof of Structure	To establish the need for, and extent of, limit and ultimate load tests to be performed to validate the structural analysis.

Flutter	
Subject	Description
Flutter requirement	To establish a means of compliance with the requirement of § 27.629.

Fatigue and Damage Tolerance	
Subject	Description
Fatigue and Damage Tolerance	To establish a means of compliance with the fatigue and damage tolerance requirements of 27.571, 27.573.

Crashworthiness	
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Subject	Description
Crashworthiness of Composite Structure	To ensure the survivable crashworthiness characteristics (e.g., maintenance of a survivable volume for occupants, maintenance of emergency evacuation paths) for a composite fuselage are equal to or better than those of a similarly sized aircraft fabricated from traditionally used metallic materials.
Emergency Landing Conditions	Installation of seats and equipment, and stowage compartments, are contained properly.
Inflatable Restraints in seats and walls	A special condition is needed for inflatable restraints in seats and walls because the regulations do not contain adequate or appropriate safety standards for inflatable restraints.
Side-Facing Seat	A special condition is needed for single and multiple place side-facing seats on aircrafts.

Mechanical system

Subject	Description
Fly-by-wire flight control system	A means of compliance or an ELOS may be needed to ensure fly-by-wire flight control systems are adequately evaluated for the requirement of subpart C /D.

Cabin safety

Subject	Description
Emergency Exit Marker & Locator Signs	You may need an issue paper to establish an equivalent level of safety with 27.811 to allow text-based emergency-exit signs smaller than required in small cabins.

Powerplant

Subject	Description
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Uncontained turbine engine rotor failure	In the aircraft design, the influence of the engine rotor failure on the aircraft system and structure should be analyzed according to requirements of AC20-128B. The aircraft system and structure should be properly installation according to the analysis results.
Lubrication system failure.	When running the lubrication system failure test, the operation time should start when the rotor drive system completely loses the oil. The running time is not less than 15 minutes.
Fuel system crash resistance	The Fuel system crash resistance test should be in accordance with 27.952. After the test, there must be no leakage.
Fuel tank tests	The fuel tank test should be in accordance with 27.965. The fuel leakage is not allowed in the test.
Cooling	The aircraft cooling test should be in accordance with 27.1041, 27.1043, 27.1045, 27.1047, and 27.1049. Overheating of the components and fluids is not allowed in the test.
Induction system icing protection	The induction system icing test should be in accordance with CCAR29 appendix C and 27.1093. Engine surge and stall is not allowed.

Electrical Systems	
Subject	Description
HIRF	HIRF requirements have been introduced in CCAR-27, A means of compliance may be needed.
Systems lightning protection	A means of compliance may be needed to address the Systems lightning protection.
Lithium Batteries	Special Conditions are needed to deal with the particular risks associated with this technology, which are not addressed in CCAR-27 requirements.
Solid State Power Contractors	As SSPC technology differs from the classic circuit breaker, a compliance method may need to be issued to address specific risks associated to this technology.
PED tolerance demonstration	A means of compliance may be needed to address the electromagnetic interference of PEDs that are planned to be allowed to be used inside the aircraft.
WLAN Installation	A means of compliance may be needed to address electromagnetic interference, system interface and installation of the WLAN system and to address the electromagnetic interference due to the use of PEDs inside the aircraft.

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Electrical Load Analysis	The electrical load requirements and power source capacity have been determined using the Electrical Load Analysis Program.
Arc Fault Circuit Breakers	Arc Fault Circuit Breakers are a technology still on development, which differs from the classic circuit breakers, a MoC CRI may need to be issued to address specific risks associated to this technology.

Avionics	
Subject	Description
Integrated Modular Avionics(IMA) System	Functions performed by the IMA must be evaluated and approved as part of the aircraft installation.
Automatic Dependent Surveillance – Broadcast (ADS-B)	General aviation is safer with ADS-B traffic, weather, and flight-information services.
Security Protection of Aircraft Systems and Networks	The Airborne Systems and Networks may introduce the potential for unauthorized electronic access to Aircraft Systems. It may contain security vulnerabilities due to the possible introduction of intentionally forged malware, intentional alteration of critical data, aircraft networks, systems or databases.
Flight Recorders and Data Link Recording	Aircraft equipped with the capability to provide DLS, are not being required to record the DLS messages. A Special Condition and associated interpretative material are proposed to prescribe recording requirements associated with the introduction of data link.
Synthetic Vision	New Technology.

Software and Airborne Electronics Hardware	
Subject	Description
Software	General software guidance, DO-178B/C、 Object Oriented Methods and Languages、 Model-Based Development Methods and Tools, etc.
AEH	General Hardware guidance DO-254、 Use of COTS devices in AEH development、 Use of COTS

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	Graphical Processor devices in AEH development, etc.
Multi-Core Processors	New Technology.

System Safety	
Subject	Description
Safety Assessment	The CAAC need a correct understanding of the methodology related to the classification of failures at aeroplane safety level. Additional documentation may be requested that describes the methodology used, all considered failure conditions and their justifications.

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Flight	
Subject	Description
Flight Test Guide	Normally for the Part 29 Aircraft, the AC29-2 will be used as test guide, if use other compliance method to show the compliance, Additional interpretative material may be required.
General Handling Qualities (Subpart B)	General Handling qualities should be concerned, especially for the projects involving significant external modification to the basic airframe (FLIR, Night-sun, etc.)
Category-A (Subpart B)	Evaluation of T/O and Landing procedures, including abuse testing; Engine failure below/at/above DP; Assessment of displays & required equipment to execute maneuver (RADALT, lights, etc.); Evaluation of "Training Mode" & displays, if applicable.; Verification of RFMS WAT performance information; Evaluation of elevated heliport procedures, if approval is requested.
Human Factor	Some significant differences are observed in the way demonstration to regulations is processed. Most of the time a IP need to be issued.
AFCS / Autopilot	The characteristics and performance of AFCS should be concerned, especially for the mode changing.
Variable Rotor Speed(NR) Flight, Transmission and Powerplant Aspect	The helicopter design incorporates a variable rotor speed (Nr) law for different operational conditions. This variable Nr function aims at achieving better noise and helicopter performance, and presents new challenges in various certification disciplines, namely flight, structure, transmission, powerplant and noise. It need an IP to discuss aspect of certification of disciplines relevant to the variable Nr system.
Static Directional, Lateral and longitudinal stability.	A special condition & interpretative material may be needed to address flight control systems, which provide neutral stability in the directional, lateral & longitudinal axes.
Emergency Procedure HYD Failure	IPs may be needed to address detail compliance methods.

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Tail Rotor Failure	
Flight In Known Icing	An IP may be needed to address detail compliance methods.
Optional Equipment: Engine Air Intake Particle Separator, Cargo Hook, Hoist, Ditching configuration, Night Vision Goggle operation, Synthetic Vision system.	IPs may be needed to address detail compliance methods.

Structures	
Subject	Description
Additive Manufacturing	Additive Manufacturing, often referred to as 3-D printing or rapid prototyping, is a new emerging technology to manufacture rotorcraft parts and components. The means of compliance needs to be established to develop appropriate design values for additive manufactured parts and components that account for variability in materials, geometry and manufacturing processes.
Composite Structure Design & Construction (Materials, Fabrication Methods)	The mechanical behavior of structure fabricated using composite materials is highly dependent not only the base materials used, but also the fabrication methods used in production. You may need an issue paper to establish a means of compliance with 29.603, 29.605 and 29.613 to develop appropriate design values for composite materials that account for variability in constituent element properties, geometry and manufacturing processes.
Child Shoulder Harnesses for Seats	Special conditions are issued for child shoulder harnesses for seats. The airworthiness regulations do not contain adequate or appropriate safety standards for safety restraint devices such as a shoulder harness designed for use by small children.

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Human External Cargo (HEC) (§29.865)	There is confusion as to what constitutes “HEC”. The current guidance needs to be revised to provide clear guidance. There are differences between CAAC and FAA operational requirements which also lead to confusion during validation.
Passenger Emergency Exits (§29.807(c)(1))	Repetitive ELOS. Requires exits on top, bottom or ends of fuselage. Typically rotorcraft does not have these and compliance is shown by demonstrating egress outside exits while fuselage is on its side.
Combi	Rotorcraft that includes a passenger and cargo configuration. A special condition is required due to the lack of regulations for combi configurations
Ditching Structural Conditions	For structure, to define the planned ditching structural conditions to be considered. A means of compliance may be needed.
Flammable Fluid Fire Protection	A means of compliance may be needed, to provide acceptable compliance guidance for flammable fluid fire Protection 29.863.
Bird Strike	There is some guidance on several compliance aspects related to bird strike damage. In addition, for windshields, certain items such as the choice of test impact locations and temperature conditions need to be agreed with the Agency.
Large Antenna and Radome Installations	To establish the means of compliance with (mainly) structural requirements related to large antenna and/or radome installations.
Composite Fuselage In-Flight Fire Safety/Flammability	Special condition is required to ensure that composite fuselage construction does not reduce the level of in-flight fire safety when compared with a conventional metallic fuselage. These special conditions include evaluation of a fire propagating along the inside surface of the fuselage and the potential for toxic by-products.

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Composite Fuselage Crash Survivability	Post-Fire	An IP to establish an equivalent level of safety (ELOS) with 29.853 and is required to show a composite fuselage is as safe for passengers as a similarly sized metallic fuselage during a post-crash fire. The ELOS needs to address flame penetration, smoke and toxic gas emission.
Fire Protection of Flight Structure		You may need an issue paper to establish a means of compliance with 29.865 (Fire protection of flight controls, engine mounts, and other flight structure) for structure composed of materials such as titanium or non-metallic materials.

load		
Subject		Description
Limit Maneuvering Load Factors		To establish the means of compliance when constraints are present which may limit the aircraft stability to attain the maneuvering envelope load factor boundary.
Gust Loads		To establish the means of compliance for gust loads.
Yaw Maneuvers Conditions		To establish the means of compliance for Yaw Maneuvers Conditions loads.
Ground load		To establish the means of compliance for ground loads during landing and taxi.
Loads Parallel to Hinge Line		To establish the means of compliance for loads parallel to the hinge line on primary control surfaces and other movable surfaces.
Water Load		To establish the means of compliance for the requirement of water loads.

Proof of Structure		
Subject		Description
Proof of Structure		To establish the need for, and extent of, limit and ultimate load tests to be performed to validate the structural analysis.

Flutter		
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Subject	Description
Flutter requirement	To establish a means of compliance with the requirement of § 29.629.

Fatigue and Damage Tolerance	
Subject	Description
Fatigue and Damage Tolerance	To establish a means of compliance with the fatigue and damage tolerance requirements of 29.571, 29.573.

Crashworthiness	
Subject	Description
Crashworthiness of Composite Structure	To ensure the survivable crashworthiness characteristics (e.g., maintenance of a survivable volume for occupants, maintenance of emergency evacuation paths) for a composite fuselage are equal to or better than those of a similarly sized aircraft fabricated from traditionally used metallic materials.
Emergency Landing Conditions	Installation of seats and equipment, and stowage compartments, are contained properly.
Inflatable Restraints in seats and walls	A special condition is needed for inflatable restraints in seats and walls because the regulations do not contain adequate or appropriate safety standards for inflatable restraints.
Side-Facing Seat	A special condition is needed for single and multiple place side-facing seats on aircrafts.

Mechanical system	
Subject	Description
Fly-by-wire flight control system	A means of compliance or an ELOS may be needed to ensure fly-by-wire flight control systems are adequately evaluated for the requirement of subpart C /D.

Cabin safety	
Subject	Description
Emergency Exit	You may need an issue paper to establish an equivalent level of safety with 29.811 to allow text-based

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Marker & Locator Signs	emergency-exit signs smaller than required in small cabins.
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Powerplant	
Subject	Description
Uncontained turbine engine rotor failure	In the aircraft design, the influence of the engine rotor failure on the aircraft system and structure should be analyzed according to requirements of AC20-128B. The aircraft system and structure should be properly installation according to the analysis results.
Lubrication system failure.	When running the lubrication system failure test, the operation time should start when the rotor drive system completely loses the oil. The running time is not less than 30 minutes.
Fuel system crash resistance	The Fuel system crash resistance test should be in accordance with 29.952. After the test, there must be no leakage.
Fuel tank tests	The fuel tank test should be in accordance with 29.965. The fuel leakage is not allowed in the test.
Cooling	The aircraft cooling test should be in accordance with 29.1041, 29.1043, 29.1045, 29.1047, and 29.1049. Overheating of the components and fluids is not allowed in the test.
Induction system icing protection	The induction system icing test should be in accordance with CCAR29 appendix C and 29.1093. Engine surge and stall is not allowed.

Electrical Systems	
Subject	Description
HIRF	HIRF requirements have been introduced in CCAR-29, A means of compliance may be needed.
Systems lightning protection	A means of compliance may be needed to address the Systems lightning protection.
Lithium Batteries	Special Conditions are needed to deal with the particular risks associated with this technology, which are not addressed in CCAR-29 requirements.
Solid State Power Contractors	As SSPC technology differs from the classic circuit breaker, a compliance method may need to be issued to address specific risks associated to this technology.

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PED tolerance demonstration	A means of compliance may be needed to address the electromagnetic interference of PEDs that are planned to be allowed to be used inside the aircraft.
WLAN Installation	A means of compliance may be needed to address electromagnetic interference, system interface and installation of the WLAN system and to address the electromagnetic interference due to the use of PEDs inside the aircraft.
Electrical Load Analysis	The electrical load requirements and power source capacity have been determined using the Electrical Load Analysis Program.
Arc Fault Circuit Breakers	Arc Fault Circuit Breakers are a technology still on development, which differs from the classic circuit breakers, a MoC CRI may need to be issued to address specific risks associated to this technology.

Avionics	
Subject	Description
Integrated Modular Avionics(IMA) System	Functions performed by the IMA must be evaluated and approved as part of the aircraft installation.
Automatic Dependent Surveillance - Broadcast (ADS-B)	General aviation is safer with ADS-B traffic, weather, and flight-information services.
Security Protection of Aircraft Systems and Networks	The Airborne Systems and Networks may introduce the potential for unauthorized electronic access to Aircraft Systems. It may contain security vulnerabilities due to the possible introduction of intentionally forged malware, intentional alteration of critical data, aircraft networks, systems or databases.
Flight Recorders and Data Link Recording	Aircraft equipped with the capability to provide DLS, are not being required to record the DLS messages. A Special Condition and associated interpretative material are proposed to prescribe recording requirements associated with the introduction of data link.
Synthetic Vision	New Technology.

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Software and Airborne Electronics Hardware	
Subject	Description
Software	General software guidance, DO-178B/C, Object Oriented Methods and Languages, Model-Based Development Methods and Tools, etc.
AEH	General Hardware guidance DO-254, Use of COTS devices in AEH development, Use of COTS Graphical Processor devices in AEH development, etc.
Multi-Core Processors	New Technology.

System Safety	
Subject	Description
Safety Assessment	The CAAC need a correct understanding of the methodology related to the classification of failures at aeroplane safety level. Additional documentation may be requested that describes the methodology used, all considered failure conditions and their justifications.

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Engine structural strength	
Subject	Description
Design Approval of Critical and Life-Limited Aircraft Turbine Engine Parts	For design approval of redesigned critical and life-limited aircraft Turbine Engine Parts, FAA should establish uniform approach to approve, since the failure of safety critical parts could lead to hazardous engine effects.
Durability Substantiation of Reciprocating Engine Redesigned Parts	For redesigned parts of Reciprocating Engine, applicants must conduct extent effort to show the compliance to 33.19.
Ultrasonic billet inspection for Titanium material (33.15).	To avoid Titanium fan disk failure that attributed to the presence of a hard alpha material anomaly, need to conduct specific ultrasonic billet inspection for Titanium material.
Design Approval Procedures for Critical Engine and Propeller Parts.	For design approval procedures for critical Engine and propeller parts, applicants must complete a safety assessment and to consider the development of a Continuous Operational Safety (COS) plan for all engine and propeller proposed redesigned parts.
Microstructure examination of reciprocating engine forged steel alloy crankshafts in support of 33.15 compliance.	Microstructure examination of reciprocating engine forged steel alloy crankshafts after Charpy impact test, to determine the suitability and durability of the crankshaft, because reciprocating engine forged steel alloy crankshafts can develop subsurface micro-cracks when honeycomb, a low toughness dimpled feature, develops during manufacture.
Component Contractor Generated Composite Design Values for Composite Structure	Structural properties that are determined from test data at the laminate or lamina level on a probability basis. The amount of data required to derive these values is governed by the statistical significance (or basis) needed.
Use of structure dynamic analysis methods for blade	Use two-dimensional and three-dimensional finite element models of the engine and installation to help in determining loads and performing structural dynamic analyses on engine rotating

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containment and rotor unbalance tests.	components, static structure, mounts, and other components, to simulate the effects of blade loss on the engine during a blade out test or on an aircraft installation.
Continued Airworthiness Assessment Methodology for Turbine Engine Rotating Life-Limited Parts Life Shortfall	The scenario and method to establish a new life limit by continued airworthiness assessment methodology for turbine engine rotating life-limited parts.
Clarification for 14 CFR Part 33.83 Vibration Test	The applicants must conduct the engine surveys by the means of an engine test, and the applicants may use an "appropriate combination of experience, analysis, and component test" in support of conducting the engine test.
Clarification guidance on implementation of Overtemperature Test	For over temperature test, FAA should establish the basis for uniformity of implementation of that rule in that the overtemperature test condition should be based on the engine's maximum rating steady-state operating temperature limit, not the transient limit.
Design approval for Reciprocating Engine Critical, Highly Stressed or Complex Parts or Components.	FAA should establishes a standardized method to evaluate applications for reciprocating engine critical, highly stressed or complex parts, including, but not limited to crankshafts and cylinder heads.
Engine Overtemperature Test; Governing Temperature Location.	Governing temperature location in over temperature test could strongly influence the test result, turbine inlet should be chosen as the Governing temperature location.
Repair and Alteration of Rotating Turbine Engine-Life-Limited Parts, § 33.3	FAA establish repair and alteration of rotating turbine engine-life-limited parts requirements.

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Usage based lifing methodology of life limited parts, 33.70	UBL method is a complex lifing method and less conservative than conventional safe-life lifing methodology, which introduces new issues that do not exist in conventional life calculation methods. Need continues concern.
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Aerodynamic performance	
Subject	Description
5-second acceleration for high bypass turbofan engines	high bypass turbofan engines have demonstrated difficulty in meeting the 5-second acceleration requirement of 33.73(b)
Rotor Lock	Rotor lock may have catastrophic consequences for an airplane. Applicants for engine type certificates should, therefore, determine the potential for rotor lock in turbofan, turbojet and turboprop engines and its impact on engine restart capability.
Impact of Tailored Schedules for power or thrust response	Tailored control system schedules can result in critical conditions where power or thrust response is negatively affected which impacts compliance to § 33.73(b).
Bird ingestion in climb condition	According FAA Engine & propeller Issue List, bird ingestion in climb condition is Generic VI. An issue paper is needed to establish a means of compliance with 33.76 to address the threat from bird ingestion in the climb phase of flight If the most critical condition, in particular airspeed, occurs at an altitude more than 1,500 feet above ground level, the issue paper would require showing how to determine that the engine is sufficiently robust against core bird ingestion during the climb phase of flight
Inlet probe icing	According FAA Engine & propeller Issue List, inlet system icing is Generic VI. An issue paper is needed to establish a means of compliance with 33.68 to address the threat from ice adversely affecting engine inlet probe signals or engine damage from probe ice buildup and release into the engine. Testing the inlet probes in an ice crystal environment in accordance with Appendix D to part 33, Amendment, 33-34 could be required

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Fuel system	
Subject	Description
Fuel System Icing Threats	Events of engine malfunction under transient fuel icing conditions, including one multi-engine event, have occurred on a number of different engine types and aircraft installations. This fuel icing mechanism was not anticipated in previous engine certification programmes, and is not addressed by conventional contaminated fuel certification testing, which simulates evenly distributed ice in fuel at a defined maximum concentration. The potential for transient fuel icing threat should therefore be addressed when complying with regulation requirements.

Control system	
Subject	Description
Safety Impact of the Susceptibility to Atmospheric Neutrons	Due to the decreasing size of integrated circuit components, flight at increasing altitudes for better efficiency, and more common flight over the earth's poles, the susceptibility of the electronics used in aircraft engine to the effects of atmospheric neutrons has increased over time. Atmospheric neutrons could change the state of the EEC system's digital memory or other digital circuitry. Memory or logic upsets that are not detected and corrected or mitigated could result in a malfunction of the system. The safety impact of the susceptibility to atmospheric neutrons should therefore be addressed when complying with regulation requirements.

Engine control system	
Subject	Description
Distributed control system(DCS) Development	For the introduction of DCS, the failure mode, fault detection, signal conditioning and monitoring segregation, fault accommodation logic and synchronization will differ a lot and will impact the safety of the control system.
Control system dual core processor	Control system dual core processor failure mode and defect have uncertainty, the uncertainty will impact Control system operation safety. Dual core processor failure compliance on system level has evolve.

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system safety analysis for engine	
Subject	Description
system safety	The applicant must analyze the engine, including the control system, to assess the likely consequences of all failures that can reasonably be expected to occur.

Failure analysis for piston engine	
Subject	Description
Failure analysis method and application	A Failure analysis of the Engine, including the control system for a typical installation must be made to establish that no single Fault, or double Fault if one of the Faults may be present and undetected during pre-flight checks, could lead to unsafe Engine conditions beyond the normal control of the flight crew.

SW and HW	
Subject	Description
Tool qualification	Software develop new tech, what is the Certification Criteria, Compliance activities.

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Engine structural strength	
Subject	Description
Design Approval Procedures for Critical Engine and Propeller Parts.	For design approval procedures for critical Engine and propeller parts, applicants must complete a safety assessment and to consider the development of a Continuous Operational Safety (COS) plan for all engine and propeller proposed redesigned parts.
Centrifugal test	Demonstrate the propeller withstand the centrifugal load without evidence of failure, malfunction, or permanent deformation. The environmental degradation should be taken into consideration for this test.
Bird impact	Demonstrate the propeller can withstand the impact of a 4-pound bird without causing a major or hazardous propeller effect.

system safety	
Subject	Description
System safety analysis	Safety analysis for propeller to assess the likely consequences of all failures that can reasonably be expected to occur.
System safety analysis	System safety analysis method; the combination of the certification and product development; the applicability of the industry standards (ARP4761 and ARP 4754A); equivalent method for the compliance method for the system safety analysis. Different OEMs have different principle and logic to conduct the safety analysis. Some OEM did not follow the industry standards such as ARP4761 and ARP 4754A. Additionally, it is necessary to make safety analysis and certification for the new technology, new design and modification.
Lighting strike	Certification Criteria for direct effect lighting test

SW and HW	
Subject	Description
Tool qualification	Software develop new tech, what is the Certification Criteria, Compliance activities.