

# Transport Airplane Issues List

Applicable to International Validation\*\* and Domestic Certification Projects

Updated: 10/17/2008

## Airframe Loads

Subject	Description
Automatic speed protection for design 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
Center Landing Gear	Proposed special conditions (in addition to and in lieu of several landing regulations) for airplanes configured with center landing gear
Depressurization into unpressurized areas	Known unsafe condition: depressurization into unpressurized areas. Covered by Amendment 25-72 to § 25.365.
Design Roll Maneuver Requirement for Electronic Flight Controls	The special condition adds a roll check maneuver and defines the design condition in terms of cockpit control displacement instead of aileron deflection. Also applicable to airplanes that use roll spoilers or other non-linear control systems.
Flutter following loss of winglet	A means of compliance to § 25.629 (Aeroelastic stability requirements) that outlines requirement for freedom from flutter following the loss of an least one winglet.
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.
Pilot forces for side stick controls	Proposed Special Conditions (in lieu of § 25.397(c)) (Limit pilot forces and torques). Pilot forces for side stick controls.

## Airframe Structures

Subject	Description
Composite Structure Design & Construction (Materials, Fabrication Methods)	An issue paper documenting a method of compliance with §§ 25.603, 25.605 and 25.613 may be needed on the development of appropriate design values for composite materials that account for variability in constituent element properties, geometry and manufacturing processes.
Crashworthiness of Composite Structure	Special conditions and a means of compliance issue paper may be needed 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.
Damage tolerance for composite bonded joints	An issue paper may be needed to establish an acceptable means of compliance with § 25.571(b) for damage tolerance of composite bonded joints.
Damage Tolerance of Engine Mounts	A means of compliance to § 25.571. Damage tolerance of engine mounts is not "impractical", and is therefore normally needed.
Finite element model validation	A means of compliance to § 25.307 (Proof of structure). Expands upon finite element model validation.

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Fire protection of flight structure (e.g., titanium engine mounts)	A means of compliance to § 25.865 (Fire protection of flight controls, engine mounts, and other flight structure). Outlines specific criteria derived from various advisory material.
Fuel tanks installed in the horizontal stabilizer	Proposed special conditions (in addition to 25.963(d)) for fuel tanks installed in the horizontal stabilizer.
Large Antenna and Radome Installations	A means of compliance with part 25 structural regulations. An issue paper may be needed to address the consequences of loss of an antenna and/or radome.
Pressurization doors not fully closed and locked	A means of compliance to § 25.783(f). Means to prevent initiation of pressurization for doors not fully closed and locked. FAA considers that failure of this means must be extremely improbable.
Resin Transfer Molded (RTM)/Vacuum Assisted Resin Transfer Molded (VARTM) Fittings in Principal Structural Elements or Primary Structure	The strength and reliability of RTM/VARTM fittings can be highly variable. RTM/VARTM fittings have not typically been used in principal structural elements or primary structure.

## Avionics

Subject	Description
Automatic Dependant Surveillance - Broadcast (ADS-B)	New generation of satellite intensive Air Traffic Management (ATM) systems.
Critical Displays and Flight Control in all Attitudes	There have been several instances of display blanking.
Display management and reversion	An issue paper may be needed for displays shared by multiple software level functions.
Electronic Flight Bags (EFB)	For EFB projects with Class 3 hardware or Level C software applications, an issue paper may be needed.
Electronic Flight Instrument System (EFIS)	A G-1 issue paper may be needed for a change from electro-mechanical indicators (round dials) to a digital EFIS.
Enhanced Vision Systems (EVS)	Infrared or other sensor-based vision systems provided on head-up displays need special conditions because they are intended to partially substitute for natural vision assumed by § 25.773.
Future Air Navigation Systems (FANS)	The Transport Standards Staff needs visibility of how FANS new technology is being implemented on transport airplane certification projects.
GBAS (e.g., GPS-LAAS Local Area Augmentation System)	An issue paper may be needed to establish a method of compliance.
GPS/INS integration	An issue paper may be needed for tightly coupled GPS/INS integration.
GRAS (e.g., GPS Regional Area Augmentation System)	An issue paper may be needed to establish a method of compliance.
Head-up Display (HUD)	A means of compliance issue paper may be needed.
Integrated Modular Avionics (IMA) Systems (e.g., EPIC installations)	An issue paper may be needed to establish a method of compliance for highly complex and integrated systems, such as IMA-type architecture.
Required Navigation Performance (RNP)	Sufficient guidance does not exist for Required Navigation Performance < 4 NM.
Runway Awareness Advisory System (RAAS)	Transport Standards Staff desires to be coordinated with on implementations of this new technology.

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SBAS (e.g., GPS-WAAS Wide Area Augmentation System)	An issue paper may be needed to establish a method of compliance.
Situation Awareness Displays	Displays presenting advisory information on external situation, but not to be used for pilot action/decision making.
Synthetic Vision Systems	Use of terrain data from a database to display "synthetic vision" information to the pilot. Special conditions and method of compliance issue papers may be needed.
Time of Arrival Control (TOAC)	A means of compliance issue paper is needed for navigation systems intended to provide time of arrival control using an area navigation capability based on Required Navigation Performance.
Unique Flight Deck Failure Modes and Effects	The Common Core System is an Integrated Modular Avionics suite that incorporates many airpalne functions that have historically been supported with federated (i.e., non-integrated) systems. Therefore, many system functions, which have typically been separated with limited interdependence, are now very interrelated and highly integrated. The possibility exists that certain failure modes, which in the federated system may have had limited effect on other systems, may now have a cascading effect on other systems. An issue paper may be needed.
Use of Color for Display of Data Link Weather Information	Inappropriate use of red, yellow/amber, or green may compromise function of alert and limit/exceedence indications.
Vertical Required Navigation Performance (RNP)	An means of compliance issue paper may be needed for approval of Vertical RNP or 'Primary means' baro VNAV.

### **Cabin Safety**

<b>Subject</b>	<b>Description</b>
Child shoulder harnesses for seats	Special conditions are needed
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.
Cooktops	Proposed Special Conditions for cooktops. Cooktops introduce high heat, smoke, and the possibility of fire into the passenger cabin environment. These potential hazards to the airplane and its occupants must be satisfactorily addressed.
Ditching dam	Installation of a portable dam used to cause the water level against a ditched airplane to be higher before water could spill through at exit. An equivalent safety finding may be needed (Ref. 25.807(i))
Emergency Exit Marker & Locator Signs	For small cabins, equivalent safety findings have been granted to allow smaller exit signs than required by § 25.812(b).
Glass in the cabin (partitions, gas plasma monitors, large LCD monitors in seat backs, etc.)	Depending on the extent of use, special conditions or a method of compliance issue paper may be needed.

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Graphical exit signs	An equivalent level of safety finding to allow the use of graphics (symbols) to be used in lieu of the text based exit signs specified in § 25.812(b).
Inflatable Restraints in Seats/Walls	Special conditions are needed.
Inflight Access to Class C Cargo Compartments	A transport airplane manufacturer has requested that inflight access be allowed for a Class C cargo compartment of a model of the manufacturer's airplanes. Special conditions have been issued and will likely be required for similar future requests.
Interior doors	If passenger compartments are separated by interior doors, an exemption is needed if airplane has 25.813(e) at Amendment 25-1 or later in its cert basis. Exemptions have only been granted for airplanes that are privately operated only.
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.
Medical stretchers	An exemption may be needed for airplanes with §§ 25.562 and 25.785 at Amendment 25-64 in their cert basis.
Multiple-Place Side-Facing Seat (Divan)	The only certification method available for this type of seating, for aircraft that include Amendment 25-64 in their certification basis, is through an exemption from the general injury requirements of § 25.785(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
Overhead or under floor crew rest areas	Special conditions are likely to be needed
Security Concerns with Inflight Passenger Access to Class B or C Cargo Compartments	Transport airplanes have been approved with cargo compartments accessible to passengers in flight. Since checked cargo does not have the same screening requirements as carry-on baggage, this raises security concerns, not anticipated in part 25. Special conditions have been issued and may be required for similar future requests.
Single-Place Side-Facing Seat	Proposed Special Conditions that provide testing and human injury for single-occupancy, side-facing seat certifications for aircraft that include Amendment 25-64 in their certification basis.

## Electrical Systems

Subject	Description
Arc Fault Circuit Breakers	Issues related to nuisance trips and suitability for fuel system protection and flight critical systems.
Cockpit Door Locking Systems (CDLS)	Proposed electromagnetic compatibility criteria for demonstrating compliance with §§ 25.1353(a), 25.1431(a) and 25.1431(c) for a CDLS
Flight Data Recorders (FDR) - Filtering data	Investigations of airplane accidents and incidents have resulted in heightened awareness of the importance of the flight data recorder (FDR) accurately recording the actual sensed value of a parameter.
Fuel Pump Circuit Protection	Installation of Ground Fault Interrupters or other devices to protect fuel pumps from becoming an ignition source.
Lithium Batteries	Lithium batteries have potential failure modes, such as loss of capacity and thermal runaway, which require special conditions.

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Operation without normal electrical power

Proposed Special Condition - Affected airplanes include those with modern electronics in safety critical applications such as displays, engine controls, flight controls, etc.

## Fire Protection

Subject	Description
Cargo Container with Self-Contained Temperature Control System, a.k.a. Active Unit Load Device (AULD)	AULDs are typically not part of the airplane type design and are approved in accordance with FAA Order 8150.4. Areas of concern include the presence of lithium batteries and active thermal control systems that may include a fan which could adversely impact smoke detection, smoke penetration and halon fire extinguishing agent concentration.
Fire Protection of Flight Structure (e.g., titanium engine mounts)	A means of compliance to § 25.865 (Fire protection of flight controls, engine mounts, and other flight structure). Outlines specific criteria derived from various advisory material.
Flammable Fluid Fire Protection	Draft FAA AC provides acceptable compliance guidance for flammable fluid fire protection regulations §§ 25.863 and 25.1187.
Stowage/Baggage Compartment Fire Protection in Remote Areas	Fire protection measures may be needed in certain remote areas that contain combustibles and ignition sources. Special conditions may be needed.
Use of magnesium in the cabin	Magnesium is a flammable metal that has historically not been used in the cabin and is not addressed by the current fire safety regulations. Special conditions may be needed.

## Flight Controls

Subject	Description
Control System Gust Locks - Limit Operation of Aircraft	If a physical block of some kind (e.g. throttle interlock) is not used to limit operation of the airplane, an ESF may be needed.
Electronic Flight Control Systems (EFCS)	Certification issues related to airplanes with EFCS, unconventional flight control laws (fly-by-wire, C*, etc.) and side stick controllers. Special conditions are needed.
Flight Control System Failure Criteria	Equivalent safety to the requirements of § 25.671(c)(2) based on a proposal from the Aviation Rulemaking Advisory Committee (ARAC).

## Flight Test

Subject	Description
A method of compliance with vibration and buffeting requirements for external modifications	An issue paper may be needed. Flight testing is needed up to dive speeds if original compliance finding is invalidated by a change to external lines.
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.
Return landing capability (Fuel jettison)	Describes criteria to be evaluated to determine if a fuel jettison system is needed for an immediate return landing. Tire speed limits and maximum brake energy are of concern.

Steep Approach	An issue paper may be needed to ensure an acceptable means of compliance for airworthiness certification approval of steep approaches (defined as greater than 4.5 degrees) until the revision of 25-7A is issued. Airworthiness certification approval for steep approaches does not constitute operational approval to conduct steep approach operations. Criteria for gaining operational approval for steep approach operations in the U.S. may be provided in an operational suitability issue paper.
Thrust reverser removal	The certification basis for projects in which engine thrust reversers are being removed, or engines with thrust reversers are being replaced by engines without thrust reversers, needs to be evaluated by the Transport Standards Staff. A G-1 issue paper may be needed.

## Fuel System

Subject	Description
Alternative Fuel Tank Structural Lightning Protection	Composite materials are not as thermally or electrically conductive as conventional aluminum wing tank structure. This novel design feature and the difficulty in detecting failures of structural elements makes compliance with § 25.981(a)(3) uniquely challenging and potentially impractical.
Composite wing and fuel tank structure post crash fire survivability	Composite material may not be as fire resistant as aluminum. Since the existing level of safety that aluminum structure exhibits during a post crash fire may not be matched by composite structure, a special condition may be needed.
Fuel filter bypass indication	Provides a method of compliance with § 25.1305(c)(6) to provide indication of impending fuel filter bypass and associated flight manual procedures.
Fuel shutoff valves	Proposed equivalent level of safety to requirements for fuel shutoff.
Fuel system/cockpit interface safety analysis	Provides considerations for safety analysis of the fuel system in relation to cockpit interface issues.
Fuel tank expansion space for composite wing	Composite wing materials may allow large changes in fuel temperature. Additional fuel tank expansion space may be needed. A means of compliance issue paper may be needed.
Fuel Tank Inerting	Special conditions are needed for flammability reduction systems.
Fuel Tank Related Projects	Any modifications to fuel systems may necessitate an upgrade to the certification basis
Fuel temperature indication	Provides an acceptable method of compliance with 25.1521(c)(2)
Lack of Fuel Tank Vent Fire Protection	Notifies applicant of proposed requirement for flame arrestors in fuel tank vent lines.
Secondary fuel vapor barrier for composite structure	Compliance with § 25.967 (e) requires that fuel tanks be isolated from the personnel compartments by a fume proof and fuel proof enclosure. A means of compliance issue paper may be needed.

## Human Factors

Subject	Description
Control labeling	Use of "point and click" interface complicates control labeling issues. A means of compliance issue paper for § 25.1555(a) may be needed.
Hydrophobic Windshield Coating in Lieu of Wipers	25.773(b)(1) only requires testing at high speeds & precipitation rates, but coatings are least effective at low speeds & precipitation rates. Special conditions are needed if there are no wipers.

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Pilot's Non-openable Window	Method of compliance for § 25.773(b)(2).
Voice Checklist	An issue paper may be necessary for designs not previously approved, or for any design intended for non-normal checklists.

### Icing

Subject	Description
Engine Icing Protection	Provides a means of compliance with §25.1093(b) for protection of the engine during icing conditions with engine power at in flight idle conditions and regulatory need for consideration of the airframe as part of the engine inlet.
Icing Protection - Electro-impulse Deice System	Means of compliance for an electro-impulse deice system. Ref: §§ 25.571, 25.1353, 25.1419, 25.1581 and 25.1585.
Icing protection for supercooled large droplets (SLD)	Part 25, Appendix C is not adequate to address freezing drizzle and freezing rain conditions e.g., SLD. An issue paper may be needed for airplanes with unpowered roll control and pneumatic deicing boots.
Primary Inflight Ice Detection	A proposed means of compliance with §§ 25.1419, 25.1301, 25.1309 and 25.1322 for ice detection systems.

### Mechanical Systems

Subject	Description
Cabin Outflow Valve	Proposed Equivalent Safety Finding for cabin outflow valve and safety valve functions combined in a single valve. Ref: § 25.841
Cabin Pressurization - High Altitude Airports	Proposed Equivalent Safety Finding: Cabin Pressurization-High Altitude Takeoff and Landing Operations.
Cabin Temperature-Humidity Limits	An equivalent safety finding is needed for any airplane that exceeds the limits of § 25.831(g) at Amdt 25-87.
Command Signal Integrity	Means of compliance to ensure fly-by-wire flight control systems are adequately evaluated
High Altitude Decompression	Compliance with cabin altitude limits (ref § 25.841(a)(2) & (3)) affected by decompression requirements of Amendment 25-87. An exemption is needed for any airplane that will exceed the limits of § 25.841.
Liquid Oxygen Systems	Proposed special condition for design and installation criteria for a liquid oxygen system. Ref: §§ 25.831, 25.1309, 25.1441, 25.1451 and 25.1453.
Oxygen Equipment for Airplanes Operating Above 40,000 Feet	Means of compliance is affected by decompression requirements of Amendment 25-87. An Issue paper may be needed.
Potable and Waste Water Systems	System design to minimize the possibility of leaks and resulting formation of ice that can pose a hazard to the airplane, its occupants, and/or persons and property on the ground.
Protective Breathing & Oxygen Systems	Incorporation of features to ensure that an inoperative crew oxygen system is annunciated to the flight crew is needed. Two incidents of false indication of sufficient oxygen supply have recently occurred.
Yaw Oscillations	Means of compliance to ensure rudder control system has acceptable handling qualities and no hazardous characteristics

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## Noise

Subject	Description
Noise Control Act of 1972	Applied to all new TC projects. An issue paper may be needed to addresses compliance with Noise Control Act of 1972 and FAA Order 1050.1D, which are in addition to Part 36 noise requirements.
Part 36 noise requirements for foreign certified aircraft	An issue paper may be needed to address compliance with Part 36 noise requirements for validation projects from certain countries.

## Other

Subject	Description
Automatic Takeoff Thrust Compensation System (ATTCS)	Proposed Special Condition for performance credit for ATTCS during Go-Around. (In addition, an equivalent level of safety in lieu of providing the required means for the flight crew to deactivate the automatic function of the ATTCS system may be needed.)
Class E cargo compartments	If supernumeraries (including animal handlers) are to be carried, an exemption is needed.

## Propulsion

Subject	Description
APU certification requirements	Proposed equivalent level of safety to adopt the draft FAR 25 new Appendix K requirements rather than comply with the current FAR 25 applicable airworthiness requirements for APU.
APU Indications	An issue paper may be needed to document an equivalent safety finding with § 25.1305 for APU indications
APU inlet fire protection	In lieu of specific compliance with § 25.1103(e), a control system may provide an equivalent level of safety.
APU rotor containment	An issue paper may be needed on a means of compliance with § 25.903 for APU's meeting the rotor containment provisions of TSO C77a (blade containment only).
APU rotor integrity	An issue paper may be needed to document a means of compliance with § 25.903 for APU's meeting the rotor integrity provisions of TSO C77a.
Auxiliary fuel tank installations	Applicable to auxiliary fuel tank located aft and adjacent to the passenger compartment and cargo compartment.
AVM (airborne vibration monitoring) indication	An issue paper may be needed if an AVM indication system is not provided.
AVM (airborne vibration monitoring) qualifications	An issue paper may be needed to document a means of compliance with AVM indicators qualification requirements.
Backing using reverse thrust (powerback)	Provides considerations for certification of thrust reversers for power backing.
Digital display of engine rotor speed N2	An issue paper may be needed on display of digital only N2 rotor speed.
Engine and APU fire protection	Method of compliance with § 25.1193 for fireproof engine and APU enclosures.
Engine fire detectors in tailpipe	An equivalent safety finding with § 25.1203 may be needed if there are no fire detectors in the engine tailpipe.

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Engine fire zone hydraulic system shutoff valve	A method of compliance for hydraulic system shutoff valve.
Engine ingestion of airframe shed ice	Defines need to address potential ingestion of wing ice that may form during non-icing conditions that sheds and caused all engine failure. It is applicable to all aft fuselage mounted engine installations.
Engine shared electronic displays	Defines considerations for shared electronic displays.
Engine strut fire protection - hydraulic components	An equivalent safety finding with 25.1182(a) for fire resistant flammable fluid carrying lines (hydraulic systems components) in engine pod attaching structure may be needed.
Fire Extinguishing Plumbing and Wiring Connections	All fire extinguishing connections should be designed to preclude cross connection. An issue paper may be needed to document a known unsafe condition.
Flight Critical Thrust Reverser	An issue paper may be needed to define a means of compliance, or an equivalent level of safety based on reliability, with the controllability requirements of § 25.933.
Fuel tank in horizontal stabilizer	Defines considerations for location of fuel tankage within the horizontal stabilizer.
Inflight All-Engine Restart	An issue paper may be needed to documents a potential unsafe condition for engine restart following loss of all engine power. Applies to all airplanes powered by high bypass engines, engines with free power turbines, or with limited restart capability.
Reverse thrust and propeller pitch settings below the flight regime	25.1155 requires a positive means to prevent inadvertent reverse or propeller beta operation for reversing systems intended for ground use. Accidents have shown that this requirement does not provide protection from intentional operation in the beta mode.
Reverser controls without interlock	Provides considerations for finding of no unsafe condition due to lack of tactile feedback that reverser is not deployed via the cockpit reverser controls.
Toxic gas from composite APU tailcone	Defines considerations for toxic gas produced by composite structures. Applicable to airplanes with composite ducting or structures in fire zones.
Uncontained Engine and Tire Failure - Debris Penetration of Fuel Tank Composite Structure	The ability of composite construction to resist penetration hazards has not been established.
Uncontrollable High Thrust (UHT)	Engine controls may have single catastrophic failures (ref 25.901(c))
Warning means for engine oil filter contamination	An issue paper may be needed to document a proposed equivalent level of safety to the requirements for indication of impending oil filter bypass.

## Security

Subject	Description
Airplane Security	Any new airplane security measure
Counter Man Portable Air Defense System (Counter MANPADS)	High visibility issue. Appropriate limitations/conditions need to be included in the STC.
Secondary flight deck door (AKA Secondary door)	An issue paper delineating the part 25 regulations that are met by a door installed between the flight deck door and the passenger cabin. Airlines may install such a door in order to gain approval to modify procedures currently in place addressing § 121.587(b).

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## Software

Subject	Description
Aircraft system and network security	If access by external sources are granted to aircraft databuses/servers, an issue paper and/or special condition may be needed..
Assurance of Simple and Complex Electronic Hardware	FAA AC 20-152 recognizes RTCA DO-254 for "complex custom micro coded components". However, there are additional issues that need discussion and agreement on an acceptable means of compliance for both simple and complex custom hardware.
Database and Data Structure Assurance	An issue paper may be needed if any airplane systems will use NAV databases, airport map databases, terrain and obstacle databases or data structures for configuration settings, options, activation/deactivation of functions, etc.
Disabling Deactivated Functions	A means of compliance issue paper may be needed when disabling software embedded functions.
General Software Guidance	An issue paper may be needed to establish a method of compliance with §§ 25.1301 and 25.1309 for most software development programs. (Ref. DO-178B)
Management of Open Problem Reports	A means of compliance issue paper will likely be needed if an applicant intends to defer problem reports beyond initial certification.
Software Maturity Prior to Flight Test	An issue paper may be needed to establish minimum criteria prior to TIA
Software Reuse	A means of compliance issue paper may be needed if software used in a previously certified system will be used in another system.
Use of Alternative Methods for Verification or Measuring Software Structural Coverage (e.g., Assembly Branch Coverage (ABC) instead of Modified Condition Decision Coverage (MCDC))	A method of compliance issue paper may be needed if object code structural coverage will be used instead of MCDC at source code level.
Use of Commercial Off-The-Shelf (COTS) Software	An issue paper may be needed if COTS software is used.
Use of Object Oriented Methods or C++ Programming Language	A mean of compliance issue paper may be needed if OO languages such as C++ are intended to be used.
Use of Off-Shore Software Suppliers	Undue burden, delegation, data retention issues.

## Systems and Equipment

Subject	Description
Radio Frequency Identification Tags (RFID)	A means of compliance issue paper may be needed for projects involving RFID Tag installations
Wireless Equipment	An issue paper may be needed to address EMI and other concerns with wireless equipment.