



AEROSPACE RECOMMENDED PRACTICE

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SAFETY LAP BELTS (FOR CIVIL TRANSPORT AIRCRAFT)

1. PURPOSE - The purpose of this recommended practice is to provide recommendations which will lead to the standardization of safety lap belts in all civil transport aircraft, thereby providing maximum safety. The purpose is not to specify the design methods or specific mechanism to be used in accomplishing the objective of this document.
2. INTRODUCTION - The safety belt (as herein defined and sometimes referred to as the seat belt) comprises all components of the restraining device, exclusive of the seat or berth structure.
 - 2.1 Safety belts are provided for the protection of human occupants of aircraft during routine take-offs and landings, turbulent flight, emergency conditions (such as intentional ditchings and crash-landings), and unexpected crash conditions.
 - 2.2 A safety belt's prime function is to retain the occupant within — and close to — his seat or berth, without in itself endangering the occupant during or immediately after an incident.
 - 2.3 To encourage maximum use during routine flight the seat belt should provide adequate comfort and ease of adjustment.
3. DETAILED RECOMMENDATIONS - The following detail criteria are recommended:
 - 3.1 Requirements of the current FAA Technical Standard Order for safety belts should be considered as minimum requirements only.
 - 3.2 The strength relationship between the belt, seat and seat attachment should be such that the belt-seat strength will exceed the strength of the seat-floor attachment.
 - 3.3 Elongation of any portion of the safety belt (other than that associated with a device designed for energy absorption) due to crash loading should be held to a minimum so that the deceleration of the seat and occupant are approximately equal.
 - 3.4 The attachments of the safety belt should permit alignment of the belt with the fixed anchorages in such a manner that excessive stress levels will not be created in the attachments and anchorages during decelerative loads imposed by the occupant.
 - 3.5 The material composing that portion of the safety belt in contact with the occupant's body should be pliable (with the exception of the buckle hardware), should have no sharp, cutting edges, and should be approximately two inches in width.
 - 3.6 The buckle (locking-unlocking device) should be minimal in size, light-weight, easily operable by the user in the most unfavorable position of his body with respect to the seat, and should have no sharp cutting edges or protuberances which might be injurious to the occupant.
 - 3.7 The design of the safety belt and buckle should be such that its locking, unlocking and adjustment operations will be OBVIOUS without the need for printed instructions.
 - 3.8 To prevent "snap" loads being imposed on the occupant's body and the safety belt and anchorages, the safety belt should be designed in such a manner as to encourage its use in snug but comfortable contact with the occupant's body.

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- 3.9 The safety belt should be incapable of being inadvertently used in a partially locked (unsafe) condition.
- 3.10 Release (unlocking) of the safety belt should be easily accomplished regardless of the occupant's body attitude (hanging inverted or on side, etc.) and should involve a single motion.
- 3.11 Release of (newly-designed) safety belts should be possible by use of either hand of the wearer without the necessity of using more than one finger and/or thumb, after limit loading while a 250 pound occupant is hanging inverted in the belt.
- 3.12 Release of the safety belt should result in immediate separation (or opening) of the belt without requiring further action by the occupant.
- 3.13 The design of the safety belt should minimize the possibility of inadvertent release through accidental contact with the user's body, apparel, or any component of the seat.
- 3.14 The safety belt should not open inadvertently due to acceleration imposed on the belt itself, such as that resulting from acceleration of loose belt ends.
- 3.15 Automatic unlocking (release) of the safety belt while the occupant is undergoing deceleration and/or hanging inverted in the belt should not be acceptable.
- 3.16 The safety belt and fittings should be designed in such a way that the possibility of improper installation by production and maintenance personnel is reduced to a minimum.
- 4. SAFETY LAP BELT RETRACTORS - The following additional detail criteria are recommended for belts with retractors. (Mechanical devices for retracting the seat belt webbing may be of an inertia locking type):
 - 4.1 The retracting device should be an integral part of the safety belt assembly and should not impair the safety, comfort, or convenience of the seated passenger.
 - 4.2 The retracting device should not reduce the ultimate strength or degree of restraint provided by the safety belt alone.
 - 4.3 The retractable safety belt should be simple to use and capable of operation by the average airline passenger without special or verbal instructions.
 - 4.4 Normal operation and use of the safety belt buckle should not be affected adversely by operation of the retractor. (See paragraphs 3.10 and 3.12).
 - 4.5 Release (unlocking) of the buckle should not be adversely affected by the retracting feature and should operate in the conventional and customary manner. (See paragraphs 3.10 and 3.12).
 - 4.6 The retracting device should be self-operating and should lock automatically after the buckle has been fastened and should provide positive restraint as required in paragraph 3, et seq., Detailed Recommendations.
 - 4.7 The retracting device should lock in all positions, regardless of adjustment of the belt, in increments not to exceed 1/2 inch. After retraction it should retain its position. Not more than 1/2 inch of belt extension should occur with application of ultimate load.
 - 4.8 The retracting device should provide for locking to any desired safety belt tension for planned emergency situations.
 - 4.9 After locking of the buckle and retraction of excess slack, the retractor should not loosen, nor creep to excessive tightness; it should normalize at a safe and comfortable tension.
 - 4.10 The retracting device should incorporate fail-safe principles which provide positive locking in the event of failure within the unit.