U.S. Department of Transportation
**Federal Aviation Administration**

# Advisory Circular

Subject: USE OF CHILD RESTRAINT SYSTEMS ON AIRCRAFT

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Initiated by: AFS-200

**1. What is the purpose of this Advisory Circular (AC)?**

This Advisory Circular (AC) provides information and practices regarding the use of Child Restraint Systems (CRS) on aircraft. It is intended to be used as a resource during the development, implementation, and revision of aircraft operator procedures and training programs regarding the use of CRS. This AC is (1) part of several Federal Aviation Administration (FAA) initiatives designed to address safety concerns of the National Transportation Safety Board (NTSB); and (2) part of the FAA's ongoing commitment to educate and inform aircraft operators, crewmembers, and airline passengers regarding the use of CRS on aircraft in order to encourage and increase the use of approved CRS. For more information, see: http://www.faa.gov/passengers/Childtips.cfm.

**2. Does this AC relate to any other FAA guidance?**

This AC provides information and suggested practices regarding the use of CRS on aircraft.

This AC supplements and contains information previously published in:

- AC 91-62A, Use of Child Seats In Aircraft (http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/cabin_safety/regs/ac/)
- FSAT 95-09, Child Restraint (http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/cabin_safety/regs/handbook_and_bulletins/)
- FSAT 97-01, Miscellaneous Cabin Safety Items (Children over 24 months of age) (http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/cabin_safety/regs/handbook_and_bulletins/)
- FSAT 99-03, Types of and Use of Child Restraint on Air Carriers (http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/cabin_safety/regs/handbook_and_bulletins/)

- FAA Order 8400.10, Air Transportation Inspector's Handbook, volume 3, chapter 16, section 6 (http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/cabin_safety/regs/8400)

- FAA-AM-78-12, Child Restraint Systems for Civil Aircraft (http://www.cami.jccbi.gov/aam-400a/Abstracts/1978TechRep.htm)

- FAA-A-94-19, Performance of Child Restraint Devices in Transport Airplane Passenger Seats (http://www.cami.jccbi.gov/aam-400a/Abstracts/1994TechRep.htm)

**3. What FAA regulations does this AC cover?**

14 CFR part 91, section 91.107 and section 91.1035; part 121, section 121.311; part 125, section 125.211; and part 135, section 135.128 (http://www.gpoaccess.gov/ecfr).

**4. Who should read this AC?**

People involved in the development of aircraft operator procedures and training programs, as well as crewmembers and others involved in flight operations under 14 CFR part 121 should be familiar with the contents of this AC. This AC may also be valuable to people associated with operations under part 125, part 135, and part 91.

**5. What is the history of CRS requirements and approval standards?**

**a. Civil Air Regulations Section 40.174.** The permissive language that does not require children under the age of two to be restrained can be found in the 1953 Civil Air Regulations Section 40.174, which stated that "A seat and an individual safety belt are required for each passenger and crewmember excluding infants…"

**b. Federal Motor Vehicle Standard (FMVSS) No. 213.** In 1982, the Department of Transportation (DOT) had two standards for CRS. CRS for use in motor vehicles were required to be certified as complying with the requirements of FMVSS No. 213. CRS for use in aircraft were required to be certified as complying with the requirements of FAA's Technical Standard Order (TSO) C100. In early 1983, the NTSB considered the safety problems posed for young children traveling in motor vehicles and aircraft and urged that a variety of actions be taken to promote increased use of CRS. One of those recommendations was that DOT simplify its two different standards setting forth requirements for CRSs by combining the standards.

The FAA and the National Highway Traffic Safety Administration (NHTSA) agreed upon a single government performance standard that would satisfy both aviation and highway safety requirements for CRS. The agencies proposed that NHTSA would be the sole agency responsible for administering the new FMVSS No. 213, which would be applicable to both CRS designed for use in motor vehicles and CRS designed for use in aircraft (49 CFR section 571.213) (http://www.gpoaccess.gov/ecfr).

**c. United Nations Standards or Approval by a Foreign Government.** On October 15, 1992, the FAA broadened the categories of CRSs that are allowed to be used on aircraft to include CRSs that meet the standards of the United Nations or are approved by a foreign government (57 FR 42662) (http://www.gpoaccess.gov/fr/index.html).

**d. FAA Approval Through Type Certificate (TC), Supplemental Type Certificate (STC) or Technical Standard Order (TSO).** On August 26, 2005, the FAA once again broadened the categories of CRS that are allowed to be used on aircraft to include the use of CRS that are approved by the FAA through TC, STC or TSO (70 FR 50902) (http://www.gpoaccess.gov/fr/index.html).

**6. What are the TC, STC and TSO processes?**

The TC, STC and TSO processes address differences in CRS design and performance as follows:

**a. TC Process.** A TC is an original FAA design approval in which an applicant applies for, and the FAA issues, a TC for a product or a major design change to a product. A product is an aircraft, an aircraft engine, or an aircraft propeller. The TC process is appropriate if a CRS is incorporated into the original aircraft design.

**b. STC Process.** The STC process allows a specific CRS that meets STC testing and evaluation criteria established by the FAA to be used on a specific type of aircraft by a specific aircraft operator.

**(1)** Under the STC process, a CRS manufacturer would approach the FAA to obtain approval, via STC, for CRS to be used on specific aircraft. This allows the FAA to address novel and unusual design features associated with any new type of CRS, when the applicable regulations do not contain adequate and appropriate safety standards for the design features of a CRS that is presented for FAA approval. The STC process is appropriate for a CRS that does not meet FMVSS No. 213.

**(2)** When the FAA considers granting an STC, it publishes the proposed special conditions in the Federal Register for notice and comment. These proposed special conditions contain the additional safety standards the FAA considers necessary to establish a level of safety equivalent to that established by existing regulations, the required performance of the CRS and the capability of the CRS to be installed and used without creating any safety concerns. An example of Special Conditions that were part of an STC the FAA granted to a manufacturer for a CRS (70 FR 18271) may be viewed at: http://www.gpoaccess.gov/fr/index.html.

**c. TSO Process.** A TSO is a minimum performance standard issued by the FAA for specified materials, parts, processes, and appliances used on aircraft. These performance standards must be used for an applicant to receive TSO authorization. TSO C100b Child Restraint System, contains standards for performance testing and evaluation, operating instructions, equipment limitations, installation procedures and limitations, as well as instructions for continuing maintenance of the CRS.

**(1)** Unlike an STC, a TSO authorization or letter of design approval, does not give installation approval. Installation approval must be obtained via an STC, TC, or airframe manufacturer's service bulletin.

**(2)** TSO C100b is a performance standard that is similar to FMVSS No. 213. However, TSO C100b makes the CRS testing more realistic regarding CRS performance in an aviation environment. The TSO process would be appropriate if a CRS is similar in design to a CRS that meets FMVSS No. 213 requirements, and also is designed to meet the specific aviation performance standards contained in TSO C100b (http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/MainFrame?OpenFrameSet).

**7. How do I know if a CRS is approved for use during ground movement, take off and landing?**

Current operating rules in part 91, 121, 125, and 135 require that CRS used on aircraft during ground movement, take off, and landing meet one of the following labeling or marking requirements in subparagraphs a, b or c:

**a.** The CRS must bear two labels, although typically the text for these two required labels is merged onto one label. The labeling must include the text "This child restraint system conforms to all applicable Federal Motor Vehicle Safety Standards" and "THIS RESTRAINT IS CERTIFIED FOR USE IN MOTOR VEHICLES AND AIRCRAFT", in red lettering. The following is an example of this required labeling:


**b**. The CRS must bear either a label showing approval of a foreign government or a label showing that the CRS was manufactured under the standards of the United Nations. The following is an example of the required labeling for a CRS manufactured under the standards of

the United Nations (The “E” is consistently used in the label, but the number to the right of the “E” can change because it is the distinguishing number of the country that has granted approval):


**c.** The CRS must bear a label or markings showing FAA approval through the TC, STC or TSO process.

**(1)** The following is an example of labeling showing FAA approval through STC:


**(2)** A CRS built to the standards of TSO C100b must be permanently and legibly marked with certain required information, which includes the statement “This child restraint system conforms to SAE Aerospace Standard 5276/1.”

**8. What are the regulatory requirements contained in sections 91.107, 121.311, 125.211, and 135.128, regarding the use of CRS on aircraft?**

**a.** During takeoff, landing, and movement on the surface, each person on board shall occupy an approved seat or berth with a separate safety belt properly secured about him/her. However, a person who has not reached his/her second birthday may be held by an adult who is occupying a seat or berth.

**b.** During takeoff, landing and movement on the surface, a child under the age of two may be held in an adult's lap or be placed in a regular passenger seat and use a standard seatbelt.

**c.** If a child occupies a CRS, a parent/guardian or attendant must accompany the child and the aircraft operator must comply with the requirements that the child is properly secured in the CRS, the CRS is properly secured in a forward-facing seat, the child does not exceed the weight limits of the CRS, and the CRS is approved and has the proper labels or markings.

**d.** No aircraft operator may permit a child to occupy a booster-type, vest-type, harness-type or lap-held CRS during take off, landing and movement on the surface, except when the CRS has been approved by the FAA through TC, STC or TSO. Booster-type, vest-type and harness-type CRS approved by the FAA through TC, STC or TSO may be used during all phases of flight.

**e.** In the case of part 121, part 125 and part 135, no certificate holder may prohibit a child from using an approved CRS when the parent/guardian has purchased a ticket for the child. (Certificate holders are encouraged to allow the use of empty seats to accommodate CRS. However, they are not required to allow unticketed children to occupy empty passenger seats, regardless of whether the child is to be placed in a CRS).

**f.** The regulations allow aircraft operators to provide approved CRS for use.

**g.** The regulations allow aircraft operators to determine the most appropriate forward-facing passenger seat location for CRS based on safe operating practices.

**9. What should an aircraft operator do if a passenger presents a CRS for use, but the labeling has worn off or become unreadable?**

When an approved CRS is labeled or marked by the manufacturer, it certifies that the CRS meets a set of safety standards (FMVSS No. 213, the standards of a foreign government, the standards of the United Nations, or approval by the FAA through TC, STC or TSO). Current operating rules require that CRS used on aircraft during ground movement, take off and landing must bear labels or markings to indicate to the aircraft operator that the CRS has met a set of safety standards. When a parent/guardian presents an approved CRS for use on aircraft with a label that has worn off or become unreadable, the CRS must be furnished with a letter or document from the manufacturer that specifically ties the CRS (through a detailed description or specific make and model number) to approval for use on aircraft.

**10. What are the types of CRS that meet the criteria of FMVSS No. 213, the standards of a foreign government or the standards of the United Nations?**

Although there have been some changes and innovations in the design of CRS, most recently, as a result of FAA approval of CRS through TC, STC or TSO, basic design features for the majority of CRS that are approved for use on aircraft have remained fairly constant. An aircraft operator's personnel, specifically flight attendants, should be aware of the following items pertaining to CRSs that meet the criteria of FMVSS No. 213, the standards of a foreign government or the standards of the United Nations:

**a.** The CRS should have a solid back and seat.

**b**. The CRS should have internal restraint straps installed to securely hold the child in the CRS.

**c.** The CRS should be labeled stating that it has been approved for aviation use.

**Example of a Forward-Facing CRS with Internal Harness**

**Example of an Aft-Facing CRS with Internal Harness**

**11. What types of CRS may be approved by the FAA through TC, STC or TSO?**

Typically, a CRS that is approved by the FAA through the TSO process would be similar in design to a CRS that meets FMVSS No. 213 requirements. However, CRS approved by the FAA through TC or STC may contain novel and unusual design features. In addition, the regulations allow the use of CRSs that are booster-type or vest- and harness-type, if the FAA has approved them through a TC, STC, or TSO (14 CFR section 121.311 (b) (2) (ii) (C) (3) and section 121.311 (b) (2) (ii) (D), http://www.gpoaccess.gov/ecfr). The challenge for crewmembers to properly identify CRS that have been approved for use on their aircraft through TC, STC, or TSO is mitigated by the fact that these CRS must be provided by the aircraft operator. The aircraft operator is also responsible for ensuring that crewmembers have proper training and information regarding the use of CRS approved for use on their aircraft through TC, STC or TSO.

The following is an example of a CRS that has been approved by the FAA through STC:

**Example of CRS Approved through STC**

**12. What CRS are not approved for use during ground movement, take off, and landing?**

In 1994, the FAA issued a study entitled "The Performance of Child Restraint Devices in Transport Airplane Seats." The research for the study conducted by the FAA Civil Aerospace Medical Institute (CAMI) involved dynamic impact tests with a variety of CRS installed in transport category aircraft passenger seats. The results of this study were used as the basis for prohibiting the use of the following devices during ground movement, take off and landing. Except for CRS approved by the FAA through TC, STC or TSO, the following CRS continue to be prohibited for use during ground movement, take off and landing:

- Lap-held child restraint (commonly referred to as a belly belt)
- Vest- and harness-type devices that attach the child to the parent, the parent's restraint system, or to the aircraft seatbelt

- Booster-type child restraints (even though they may bear appropriate labels showing that they meet applicable United Nations standards or are approved by a foreign government)

The CAMI study revealed:

**a. Belly belts.** These devices attach the child to the accompanying adult. The child is restrained by an abdominal belt attached to the adult's seatbelt. During dynamic testing, the forward flailing of the adult and the child resulted in severe body impacts against the forward seat. The child Anthropomorphic Test Dummy (ATD) moved forward to impact the forward row seat back, followed by the adult ATD torso striking the child ATD. Then, the adult ATD torso continued to move forward after contact with the child ATD, crushing the child ATD against the seat back.

**b. Harness Restraints.** The devices that were tested consisted of a torso harness for the child ATD placed in its own seat with the airplane seatbelt routed through a loop of webbing attached to the back of the harness. During dynamic testing, the devices allowed excessive forward body excursion, resulting in the test dummy sliding off the front of the seat with a high likelihood of the child's entire body impacting the seat back of the seat directly in front of it. Then, elasticity in the webbing of the harness and seatbelts pulled the ATD rearward and this rebound acceleration presented further risk of injury.

**c. Booster Seats.** A key concern for backless booster seats used in airplane seats is the combined effect of seat back breakover and impact of an adult seated behind the child. Booster seats may expose the child occupant to potential abdominal injury due to the combined effects of these forces.

> **NOTE: Dynamic video of the FAA Office of Aerospace Medicine Report "The Performance of Child Restraint Devices in Transport Airplane Passenger Seats" may be viewed at: http://www.faa.gov/education_research/research/med_humanfacs/aeromedical/ biodynamics/index.cfm**

**13. How does the FAA define a "booster seat"?**

**a.** The FAA defines these seats as those that are a raised platform base on which the child sits. A front shield, over which the lap belts are routed, covers the abdominal area of the child. Booster seats do not have a back or side shell. There are no integral belts to restrain the child. The use of such automotive booster seats is prohibited by the FAA's operating rules during ground movement, take off and landing. A child large enough for a booster seat can also be properly restrained in the normal passenger seat lap belts.

**Example of a Backless Booster Seat**

**b.** Some manufacturers choose to market and label their approved CRS with backs as "booster seats". These "booster seats" do not meet the FAA definition of a booster seat. However, these booster seats fall into two categories, those with internal restraints and those without internal restraints. As per FMVSS No. 213, the manufacturer's labeling will specify that a CRS without internal restraints is not certified for use in aircraft. However, with internal restraints, solid backs and the proper labeling, these CRS marketed as "booster seats" will be labeled as certified for use in motor vehicles and aircraft and may be used for all phases of flight.

**c**. For example, the CRS in the first image would be approved for use during all phases of flight and the CRS in the second image would not be approved for use during all phases of flight. Although both CRS meet the automotive performance standards in FMVSS No. 213, the CRS in the second image (with internal harness system removed) would not meet the additional test criteria established in FMVSS No. 213 that a CRS must meet to also be approved for use on aircraft (49 CFR section 571.213, http://www.gpoaccess.gov/ecfr).

**Example of a CRS with Internal Restraint Marketed as a Booster Seat**
**(Approved for use in aircraft during all phases of flight)**

**Example of a CRS without Internal Restraint Marketed as a Booster Seat**
**(Not approved for use in aircraft during all phases of flight)**

**14. What if someone wants to use a type of non-approved CRS on an aircraft such as a cloth baby carrier or a vest/harness device that attaches the child to the parent during flight?**

The regulations that are contained in section 121.311 prohibit the use of certain types of CRS during ground movement, takeoff, and landing. However, during the cruise portion of the flight, there is no regulatory prohibition regarding the use of any type of child restraint, including those that are prohibited from use during ground movement, takeoff, and landing.

Also, there is no regulatory requirement that an aircraft operator permit the use of "non-approved" CRS during the cruise portion of the flight. If an aircraft operator decides to implement a policy to prohibit the use of non-approved CRS inflight, they have the operational flexibility to do so.

**15. Where should CRS be placed on the aircraft?**

CRS must be installed in forward-facing aircraft seats, in accordance with instructions on the label. This includes placing the CRS in the appropriate forward or aft-facing direction as indicated on the label for the size of the child. A window seat is the preferred location; however, other locations may be acceptable, provided the CRS does not block the egress of any passenger, including the child's parent or guardian, to the aisle used to evacuate the aircraft.

The regulations allow aircraft operators to determine the most appropriate passenger seat location for CRS based on safe operating practices. In making this determination, an aircraft operator may consider the following:

**a. Aisle Seats.** CRS should not be placed in an aisle seat because this placement has the highest risk of slowing down the passenger flow rate during an evacuation. For example, a parent or guardian traveling with the child in a CRS may step out into the aisle to release the child from the CRS or the CRS may impede flight attendants who may need to climb over the top of aisle seats to get past passengers in the aisle to reach an emergency exit.

**b. Rows Forward and Aft of Emergency Exit Rows.** Each aircraft operator's specific evacuation procedures should be taken under consideration during the development of procedures regarding placement of CRS on aircraft.

**(1)** In an evacuation, space would have to be rapidly cleared forward or aft of the exit row so that no one would be hurt or trapped if the exit hatch was thrown in this area. A delay may be encountered as a parent/guardian removes a child from a CRS. If the aircraft operator's crewmember evacuation procedures or instructions to passengers demonstrate the removal and placement of type III exit hatches in the row forward or aft of the emergency exit row, the aircraft operator should restrict the placement of CRS accordingly.

**(2)** Installation of a CRS in the row forward of an exit would keep a seatback from breaking over. Aircraft seats are not required to break over, but if an aircraft operator operates

aircraft with this feature and evacuation procedures include breaking over seatbacks forward of an exit to create assist space for a crewmember or to create a wider evacuation path for passengers, the aircraft operator should restrict the placement of CRS accordingly.

**16. What if someone is traveling with more than one child?**

In the event that a parent/guardian is traveling with more than one child in CRSs or is traveling with several small children, only one of whom is occupying a CRS, good judgment should be used regarding placement of the CRSs. At a minimum:

- The CRS should be placed so that it does not block any passenger's (including the parent/guardian's) egress to the aisle used to evacuate the aircraft

- The CRS should be placed so that the parent/guardian can reach the child in the CRS to release and evacuate with the child, should an emergency evacuation be necessary

As long as these conditions are met, this may result in the CRS being placed in a seat other than a window seat.

**17. Who is responsible for ensuring the proper use of CRS ?**

If the approved CRS is supplied by the parent or guardian, typically they will check to ensure that the CRS is approved, the child is the right size and weight for the CRS, and the CRS is properly installed in a forward-facing passenger seat. However, aircraft operators still have the overall responsibility to ensure that that CRS is properly secured to a forward-facing seat, the child is properly secured in the CRS and does not exceed the weight limit for the CRS, and that the CRS bears the appropriate labels or markings (14 CFR section 121.311 (b) (2) (iii), http://www.gpoaccess.gov/ecfr).

**18. What are some effective practices that an aircraft operator may consider in its program?**

Effective practices can include:

- The aircraft operator's training program and crewmember operating manuals should contain information, policy and procedures regarding the use of CRS

- The CRS should be secured to a regular passenger seat at all times or, if not in use, stowed as carry-on baggage

- The child should always be properly secured in the CRS whenever other passengers are required to have their seatbelts fastened

**19. What is the FAA's intent regarding the age of an "adult" as found in Section 121.311?**

The word “adult” as it appears in Section 121.311 is used in the ordinary sense of the word to denote a person 18 years of age or older.
(http://www.faa.gov/safety/programs_initiatives/aircraft_aviation/cabin_safety/regs/legal/)

**20. What are some considerations regarding the use of an approved CRS by a child with disabilities?**

The majority of individuals who use CRS on aircraft are young children who typically weigh 40 pounds or less. However, there are some people who, because of physical challenges, need the support and security that a restraint system provides in order to travel safely on aircraft. Aircraft operators should ensure that flight attendants are aware that older children (who have not reached their eighteenth birthday) may use a properly approved CRS that is appropriate for that child’s size and weight. In this case, the aircraft operator may not prohibit the use of the CRS. There are several companies that manufacture CRS approved for use on aircraft that are specifically designed for larger children who are physically challenged.

**21. What are some considerations regarding the use of a non-approved CRS by a child, or a non-approved restraint system by an adult with disabilities?**

In the case of a person who, because of physical challenges, needs the support and security that a non-approved CRS or restraint system provides in order to travel safely on aircraft, the individual, his or her guardian, or the aircraft operator (on the individual’s behalf) may request an exemption to certain operating rules that address the use of CRS on aircraft. Upon application, the FAA will determine whether the exemption request will be granted in order to allow the use of any non-approved restraint systems during all phases of flight. While not required, it has certainly been found to be an effective practice for the individual or the parent/guardian to have a copy of the grant of exemption available for aircraft operator review when using a non-approved CRS or restraint system on aircraft. See paragraph 21 for information on requesting an exemption.

**22. How is a petition for exemption submitted?**

To find out how to submit a petition for exemption, visit www.faa.gov/avr/arm/index.cfm. Exemption information is also available for review on the DOT Docket Management System website. To review previously granted exemptions regarding the use of restraint systems, visit http://dms.dot.gov/. To view previously granted exemptions regarding the use of specialized restraint for adults, type “12485” or “9364” in the blank “Docket Search” field. To view previously granted exemptions regarding the use of non-approved restraint for children, type “17184”, “29824” or “28630” in the blank “Docket Search” field.

**23. What can be done to improve emergency evacuation capabilities when a child is using a CRS?**

To improve emergency evacuation capabilities, the CRS should remain attached to the passenger seat during an emergency evacuation, and only the child should be removed from the aircraft.

Researchers from the FAA Civil Aerospace Medical Institute (CAMI), AAM-600, have completed two studies designed to determine the most favorable methods for the emergency evacuation of infants from aircraft. A subject index of all CAMI publications can be found at: http://www.cami.jccbi.gov/aam-400a/Subjects/subject_index.htm. The full reports may be found at http://www.cami.jccbi.gov/aam-400a/Abstracts/Tech_Rep.htm.

**a.** The purpose of the first study, DOT/FAA/AM-01/18, was to determine the most favorable methods for the evacuation of infants via an inflatable emergency evacuation slide. The results of this study strongly suggest that jumping onto the slide should be the favored boarding maneuver, as opposed to sitting down and sliding which slows the progress of the evacuation. The carrying position that provides the most protection for the child would include cradling the child's head and neck with the hand (for a vertical position) or in the arm (for horizontal positions), keeping the child's arms, legs and feet enfolded as much as possible by the adult's arms.

**b.** The purpose of the second study, DOT/FAA/AM-05/02, was to determine the most favorable methods for evacuation of infants through a Type III overwing exit. The results of this study suggest that carrying the infant vertically should be the favored egress maneuver through the Type III exit, as opposed to carrying the child horizontally or passing the child to another passenger on the outside of the Type III exit.

/s/
James Ballough
Director, Flight Standards Service