

Commercial Aviation Safety Team (CAST) Cargo Fire Protection



FAA William J Hughes Technical Center
Fire Safety Branch

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Working Group. Cologne, Germany

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Federal Aviation
Administration

Mission, Vision, and Goals

The Commercial Aviation Safety Team was founded in 1998 with a goal to reduce the commercial aviation fatality rate in the United States by 80 percent by 2008. By 2008 CAST was able to report that by implementing the most promising safety enhancements, the fatality rate of commercial air travel in the United States was reduced by 83 percent.

Today CAST continues to apply its integrated, data-driven strategy to reduce commercial aviation fatality risk in the United States and promote new government and industry safety initiatives throughout the world.

Vision

Key aviation stakeholders acting cooperatively to lead the world-wide aviation community to the highest levels of global commercial aviation safety by focusing on the right things.

Mission

Enable a continuous improvement framework built on the proactive identification of current and future risks, developing mitigations as needed and monitoring the effectiveness of implemented actions.

Goals

Reduce the U.S. commercial aviation fatality risk by at least 50 percent from 2010 to 2025 and continue to work with our international partners to reduce fatality risk in world-wide commercial aviation.



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Organization and Procedures

Senior-level safety officials from CAST organizations meet regularly. This group, under the direction of a government and industry co-chair, sets overall policy and oversees the activities of the following working groups:

Joint Safety Analysis Teams (JSATs) perform data analyses.

JSATs perform in-depth analysis of a particular accident category. A JSAT examines the sequence of events leading up to each accident studied and then identifies ways to eliminate potential precursors and contributing factors. The intervention strategies are then evaluated for their potential effectiveness.

Joint Safety Implementation Teams (JSITs) develop safety enhancements.

JSITs determine the feasibility of the intervention strategies identified by the JSATs. Each JSIT then develops and recommends a detailed plan of action for industry and government to implement the recommended safety enhancements.

Joint Implementation Measurement Data Analysis Team (JIMDAT) develops a master safety plan, measures effectiveness and identifies future areas of study.

The JIMDAT examines the proposed enhancements and assembles these into an integrated CAST Safety Plan for approval by CAST.

www.cast-safety.org

- **CAST participants have agreed to implement the outcomes of the CAST process on a voluntary basis.**
- **The objective is to improve safety without the need for the traditional rule making processes.**
- **Regulatory guidance material will be needed in some cases.**



Safety Enhancement 126.3

Cargo – Mitigations for Hazardous Material Fires

Safety Enhancement Action:	To reduce the occurrence of accidents and incidents from fires involving high-consequence hazardous materials, develop systems to contain or suppress such fires as a final line of defense for personnel, equipment and cargo. The system should be usable for both ground (e.g., cargo loading/unloading, and ramp movement) and flight operations.	
Implementers: (Select all that apply)	<input checked="" type="checkbox"/> Air Carrier <input checked="" type="checkbox"/> Industry Association <input checked="" type="checkbox"/> CAST <input checked="" type="checkbox"/> JIMDAT <input checked="" type="checkbox"/> Research Organization	<input checked="" type="checkbox"/> Labor Organization <input checked="" type="checkbox"/> Manufacturer <input checked="" type="checkbox"/> Regulator <input type="checkbox"/> Other (specify)
Statement of Work:	Develop and deploy systems that provide a final line of defense against hazardous material fires for personnel, equipment and cargo, usable both on the ground and in flight.	



Safety Enhancement SE 223

Cargo – Hazardous Material Fires – Prevention and Mitigation

Safety Enhancement Action:	Air carriers, aircraft manufacturers, lithium battery manufacturers, and shippers of hazardous materials develop and implement means to prevent fires involving hazardous materials from occurring on board aircraft, or to prevent any fires that do occur from endangering the aircraft or its occupants.	
Implementers: (Select all that apply)	<input checked="" type="checkbox"/> Air Carrier <input type="checkbox"/> Industry Association <input type="checkbox"/> Commercial Aviation Safety Team (CAST) <input type="checkbox"/> Joint Implementation Measurement and Data Analysis Team (JIMDAT)	<input type="checkbox"/> Research Organization <input type="checkbox"/> Labor Organization <input type="checkbox"/> Manufacturer <input checked="" type="checkbox"/> Regulator <input checked="" type="checkbox"/> Other (specify) <u>Industry Standards Committee</u>
Statement of Work:	<p>To reduce the occurrence of accidents and incidents due to cargo fires involving hazardous materials, including lithium batteries, the aviation community (government, industry, and academia) should develop and implement the following:</p> <ol style="list-style-type: none"> 1. A procedural method to identify and provide information to the flightcrew about the presence of lithium batteries, including those categorized under International Civil Aviation Organization (ICAO) Dangerous Goods Section II*, tendered for transport by aircraft. Note: Most hazardous materials with a comparable fire risk (especially hazardous materials that can both ignite and fuel a fire) are already required to be declared to the operator and made known to the flightcrew. 2. Systematic, performance-based fire mitigation standards for hazardous materials at the packaging level. 3. Systematic, performance-based fire mitigation standards for hazardous materials at the cargo container level. 4. Procedures that prevent the cumulative hazard of multiple dangerous goods shipments on the aircraft to exceed the capability of aircraft fire protection systems and operator equipment. <p><i>*Section II covers non-declared shipment of lithium cells/batteries, up to either eight cells < 20 Watt-hours or up to two batteries < 100 Watt-hours</i></p>	



Safety Enhancement SE 224 (R&D)
Cargo – Hazardous Material Fires – Enhanced Fire Detection Systems

Safety Enhancement Action:	Aviation community (government and industry) performs research, development, and certification of technologies that enhance flightcrew awareness of smoke, fire, fumes, and/or other fire effects within the cargo compartments.	
Implementers: (Select all that apply)	<input type="checkbox"/> Air Carrier <input type="checkbox"/> Industry Association <input type="checkbox"/> Commercial Aviation Safety Team (CAST) <input type="checkbox"/> Joint Implementation Measurement and Data Analysis Team (JIMDAT)	<input checked="" type="checkbox"/> Research Organization <input type="checkbox"/> Labor Organization <input type="checkbox"/> Manufacturer <input checked="" type="checkbox"/> Regulator <input checked="" type="checkbox"/> Other (specify) <u>Standards Committee</u>
Statement of Work:	<p>To increase the time available for the flightcrew and/or fire mitigation systems to respond to a cargo fire involving hazardous materials, including lithium batteries, the aviation community (including manufacturers, operators, and regulatory agencies) should research, develop, and implement the following detection strategies:</p> <ol style="list-style-type: none"> 1. Published standards and regulatory guidance regarding detection of smoke, fire, fumes, and other detrimental effects of a fire. 2. Fire detection systems that work in accordance with these published standards, including detection systems within unit load devices (ULD) or other containers as well as aircraft-based detection systems with capabilities exceeding those currently required by Title 14, Code of Federal Regulations (14 CFR) part 25. These detection systems should alert the flightcrew of the status and location of the fire within the cargo compartment. 3. Published research results for optimization of multi-criteria fire detection systems on aircraft that can detect fires (including lithium battery fires) in a more timely manner that is less prone to false alarms. 	



Safety Enhancement SE 225 (R&D)
Cargo – Hazardous Material Fires – Containment and Suppression

Safety Enhancement Action:	Air carriers, aircraft manufacturers, lithium battery manufacturers, shippers of hazardous materials, manufacturers of unit load devices (ULD), and manufacturers of packaging for hazardous materials conduct research and develop systems for mitigating the effects of a fire involving hazardous materials through improved containment and/or suppression.	
Implementers: (Select all that apply)	<input type="checkbox"/> Air Carrier <input type="checkbox"/> Industry Association <input type="checkbox"/> Commercial Aviation Safety Team (CAST) <input type="checkbox"/> Joint Implementation Measurement and Data Analysis Team (JIMDAT)	<input checked="" type="checkbox"/> Research Organization <input type="checkbox"/> Labor Organization <input type="checkbox"/> Manufacturer <input checked="" type="checkbox"/> Regulator <input type="checkbox"/> Other (specify) _____
Statement of Work:	The aviation community should conduct research and develop standards for containment and/or suppression solutions that mitigate hazardous material fires (including but not limited to lithium batteries) for at least 6 hours. These systems could be aircraft-based, or installed within the cargo container, or in the hazardous material's packaging.	



Safety Enhancement SE 226

Cargo – Hazardous Material Fires – Enhanced Protection of Occupants and Aircraft

Safety Enhancement Action:	Air carriers provide additional training and equip their fleets (as feasible) with systems to enhance the protection of occupants and aircraft and increase the flightcrew’s ability to continue safe flight and landing in response to an onboard fire involving hazardous materials, including lithium batteries.	
Implementers: (Select all that apply)	<input type="checkbox"/> Air Carrier <input type="checkbox"/> Industry Association <input type="checkbox"/> Commercial Aviation Safety Team (CAST) <input type="checkbox"/> Joint Implementation Measurement and Data Analysis Team (JIMDAT)	<input type="checkbox"/> Research Organization <input type="checkbox"/> Labor Organization <input type="checkbox"/> Manufacturer <input type="checkbox"/> Regulator <input type="checkbox"/> Other (specify) _____
Statement of Work:	To improve the outcome of accidents and incidents due to cargo fires involving hazardous materials, including lithium batteries, and to enhance the protection of occupants and aircraft, air carriers should implement the following, as feasible: <ol style="list-style-type: none"> 1. Installation of crew smoke mask/oxygen systems employing a single full face mask that can accommodate glasses and is equipped with state-of-the art communications technologies 2. Installation of systems to maintain pilots’ view of necessary flight information and, where possible, visual references outside the aircraft in dense continuous smoke conditions. 3. Installation of a system to upload emergency route information to aircraft using Controller Pilot Data Link Communications (CPDLC). 	



Safety Enhancement SE 127R3.2 Remaining Risk – Cargo – Fire Management

Safety Enhancement Action:	Regulators will determine existing fire suppression and containment capabilities and revise standards to reduce accidents and incidents from cargo fires. Manufacturers will develop new fire systems for operator implementation.		
Implementers: (Select all that apply)	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Air Carrier <input type="checkbox"/> Industry Association <input type="checkbox"/> CAST <input type="checkbox"/> JIMDAT <input type="checkbox"/> Research Organization </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Labor Organization <input checked="" type="checkbox"/> Manufacturer <input checked="" type="checkbox"/> Regulator <input type="checkbox"/> Other (specify) _____ </td> </tr> </table>	<input type="checkbox"/> Air Carrier <input type="checkbox"/> Industry Association <input type="checkbox"/> CAST <input type="checkbox"/> JIMDAT <input type="checkbox"/> Research Organization	<input type="checkbox"/> Labor Organization <input checked="" type="checkbox"/> Manufacturer <input checked="" type="checkbox"/> Regulator <input type="checkbox"/> Other (specify) _____
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Statement of Work:	<p>To reduce the occurrence of accidents and incidents from cargo fires, improved fire containment/suppression systems in Class B, E or F cargo areas should be developed. These systems could include:</p> <ol style="list-style-type: none"> 1) Improved unit load device (ULD) containers capable of internally containing or suppressing a fire; 2) Fire containment covers (FCCs) or bags/blankets that would be used to cover palletized, netted cargo or ULD containers; or 3) Fire suppression systems external to the pallets / ULDs. <p>These improved containment/suppression systems should be implemented when available.</p>		



CAST Risk Reduction

- **CAST recently reported that the efforts to meet risk reduction goals for the cargo area were projected to meet only 50% of the target.**
- **The focus areas for improvement in the cargo area are:**
 - Weight & Balance (FAA Flight Standards & Industry)
 - Fire Protection (FAA Aircraft Certification & SAE)
 - Fire Resistant Containers (FRC) & Fire Containment Covers (FCC) as risk mitigations
 - FCC implementation issues
 - Encouraging completion of FRC standard



CAST Request

- **CAST requested that development of mitigations in the areas of Weight and Balance and Fire Protection be focused on and completed as soon as possible.**
- **FAA has requested SAE submit implementation data on FCCs and FRCs for CAST's risk reduction evaluation.**
- **FAA has also urged SAE to focus on the completion of the standard for the FRC using a Class A fire.**
- **CAST has approved, but not dispositioned several SE's to conduct R & D on systems for mitigating the effects of a fire involving hazardous materials through improved containment and/or suppression.**

