



AEROSPACE INFORMATION REPORT

AIR6464™

Issued 2013-06
Reaffirmed 2026-07

EUROCAE/SAE
WG80/AE-7AFC Hydrogen Fuel Cells
Aircraft Fuel Cell Safety Guidelines

RATIONALE

This SAE Aerospace Information Report (AIR) is intended to provide comprehensive reference and background information pertaining to the installation of fuel cells on-board aircraft for the purposes of supplying auxiliary power rather than using separate ground power systems.

AIR646 has been reaffirmed to comply with the SAE Five-Year Review policy.

A reaffirmed status is given to technical reports that have been reviewed by the technical committee and deemed to be current with no need for immediate revision. No changes have been made to this document as a result of this review.

FOREWORD

Aircraft will need to reduce their reliance upon external auxiliary power units and have on board fuel cell powered systems. With the onset of new hydrogen fuel cell systems, new mechanical and electrical system safety design parameters will need to be provided for aircraft developers.

The purpose of this document is to identify the unique safety criteria for the integration of fuel cell systems into aircraft. This document relates to the overall design, construction, operation and safety of fuel cell installations for aircraft including the integration of the fuel systems (and other fuel cell systems containing potentially hazardous fluids as defined in this document) into the aircraft.

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2026 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, or used for text and data mining, AI training, or similar technologies, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 1-877-606-7323 (U.S. and Canada only)
Tel: 1-724-776-4970 (outside U.S. and Canada)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE WEB ADDRESS:

Full document details: SAE AIR6464

For more information on this standard, visit
<https://www.sae.org/standards/content/AIR6464/>

Documents

Standard, visit Sharing Hub

TABLE OF CONTENTS

1.	SCOPE.....	4
1.1	Purpose.....	4
1.2	Field of Application.....	4
2.	REFERENCES.....	4
2.1	Applicable Documents.....	4
2.1.1	SAE Publications.....	4
2.1.2	EASA Publications.....	5
2.1.3	EUROCAE Publications.....	5
2.1.4	FAA Publications.....	5
2.1.5	IEC Publications.....	5
2.1.6	ISO Publications.....	5
2.1.7	RTCA Publications.....	7
2.1.8	Other Publications.....	7
2.2	Related Publications.....	7
2.2.1	SAE Publications.....	7
2.2.2	ANSI Standards.....	8
2.2.3	EASA Publications.....	8
2.2.4	EU Directives.....	8
2.2.5	EUROCAE Publications.....	8
2.2.6	FAA Publications.....	8
2.2.7	IEC Publications.....	9
2.2.8	ISO Publications.....	9
2.2.9	RTCA Publications.....	9
2.2.10	Military Standards.....	9
2.2.11	Other Publications.....	9
3.	DEFINITIONS AND ABBREVIATIONS.....	10
3.1	Balance of Plant.....	12
3.2	Common Mode Failure.....	12
3.3	Compartment.....	12
3.4	Designated Fire Zone.....	12
3.5	Double Barrier.....	12
3.6	Exhaust.....	12
3.7	Exhaust Conditioning.....	12
3.8	External Hydrogen Leakage.....	12
3.8.1	Low Leakage (0 to 25% LFL).....	12
3.8.2	Medium Leakage (25 to 50% LFL).....	13
3.8.3	High Leakage (>50% LFL).....	13
3.9	Fire Zone.....	13
3.10	Fuel Cell Stack (ATA 85-10) from ATA Spec 2200.....	13
3.11	Fuel Cell System (ATA 85) from ATA Spec 2200.....	13
3.12	Fuel Supply.....	13
3.13	Hazardous Area.....	13
3.14	Ignition Sources.....	13
3.15	Normal Discharges.....	13
3.16	Normal Operation.....	13
3.17	Oxidant Supply.....	13
3.18	Point of Release.....	14
3.19	Potentially Unsafe Condition.....	14
3.20	Purges.....	14
3.21	Proton Exchange Membrane Fuel Cell.....	14
3.22	Secondary Fire Load.....	14
3.23	Thermal Management System.....	14
3.24	Uncontrolled Leak.....	14
3.25	Uncontrolled Fire.....	14

3.26	Unintended Discharges.....	14
3.27	Ventilation	15
4.	AIRCRAFT EQUIPMENT, TEST REQUIREMENT AND SYSTEM SAFETY GUIDELINES	15
4.1	Generic Fuel Cell System	15
4.1.1	General Considerations	15
4.2	Design for Safety.....	19
4.2.1	Identification, Isolation, and Separation of Hazards	19
4.2.2	Failure Analysis and Risk Assessment.....	19
4.2.3	Pressure Vessels	24
4.2.4	Internal Fuel Cell Leakage Definition.....	24
4.2.5	Flammability Limits for Hydrogen in Air	24
4.3	Fuel Cell System Aircraft Crashworthiness	25
4.4	Fuel System Safety.....	25
4.4.1	General Installation Requirements	25
4.4.2	Fuel Cell System.....	26
4.4.3	Fluid Handling	28
4.4.4	Temperature.....	28
4.4.5	Foreign Objects.....	28
4.4.6	Interface with aircraft structure.....	28
4.4.7	Fail-Safe Shut-off	29
4.4.8	Management of Potentially Unsafe Conditions within Aircraft Compartments	29
4.4.9	Discharges from Pressure Relief Devices	29
4.4.10	Fuelling.....	30
4.4.11	Defueling	30
4.5	Safety Labeling	30
5.	GROUND AND FLIGHT OPERATION AND MAINTENANCE	31
6.	NOTES.....	31
APPENDIX A	LIQUID HYDROGEN STORAGE SAFETY	32
APPENDIX B	FUEL CELL SYSTEM THERMAL MANAGEMENT.....	38
FIGURE 1	EXAMPLE BLOCK DIAGRAM OF A FUEL CELL SYSTEM	15
FIGURE 2	PRESSURE LIMITS OF FLAME PROPAGATION FOR H ₂ -AIR MIXTURES WITH VARIOUS TUBE PARAMETERS (NACA REPORT 1383).....	17
FIGURE 3	IGNITION ENERGIES FOR H ₂ -AIR MIXTURES AT VARIOUS PRESSURES (NACA REPORT 1383).....	18
FIGURE 4	PRESSURE DEPENDENCE ON SPARK IGNITION ENERGY (NACA REPORT 1383)	18
FIGURE 5	TENTATIVE FUNCTIONAL BREAKDOWN OF H ₂ FIRE PROTECTION LEAKAGE MANAGEMENT	20
FIGURE 6	TENTATIVE SAFETY ARCHITECTURE DIAGRAM FOR A FUEL CELL SYSTEM.....	21
FIGURE 7	SYSTEM REACTION AFTER DETECTION (ESCALATION E.G. ACTIVE VENTILATION - TIME V LFL).....	22
FIGURE 8	FAULT TREE FOR MEDIUM LEAKAGE LEADING TO CONCENTRATION ABOVE LFL	23
FIGURE 9	FAULT TREE FOR HIGH LEAKAGE LEADING TO LFL > 100%	23
FIGURE 10	SUMMARY FAULT TREE SCHEMATIC	24
FIGURE 11	EXTERIOR FUEL TYPE LABELS	31
TABLE 1	FLAMMABILITY LIMITS BY HYDROGEN CONCENTRATION (ANSI.AIAA G-095-2004)	25
TABLE 2	PROOF AND BURST	26

1. SCOPE

This document defines the technical guidelines for the safe integration of Proton Exchange Membrane (PEM) Fuel Cell Systems (FCS), fuel (considered to be liquid and compressed hydrogen storage types only), fuel storage, fuel distribution and appropriate electrical systems into the aircraft.

Editorial Note: Today PEM systems and fuel storage represent the most mature FCS technology and currently forms the basis for this standard. Other types of fuel cell systems and fuels (including reforming technologies and electrolyzers), may be covered by a further update to this document.

1.1 Purpose

The purpose of this document is to provide introductory mechanical and electrical system safety guidelines that should be considered when designing fuel cell power systems for use on FAR/CS, Part 25 aircraft applications.

1.2 Field of Application

This document covers primarily fuel cell systems in the various intended applications for FAR/CS, Part 25 large aircraft and the installations should comply with all appropriate regulatory requirements.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AIR64	Electrical and Electronic Equipment Cooling in Commercial Transports
AIR825	Oxygen Equipment for Aircraft
AIR1168	Aircraft Fuel Weight Penalty Due to Air Conditioning
AIR1277	Cooling of Military Avionic Equipment
AIR1811	Liquid Cooling Systems
ARP1870	Aerospace Systems Electrical Bonding and Grounding for Electromagnetic Compatibility and Safety
ARP4752	Aerospace - Design and Installation of Commercial Transport Aircraft Hydraulic Systems
ARP4754	Guidelines for Development of Civil Aircraft and Systems
ARP4761	Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment

2.1.2 EASA Publications

Available from European Aviation Safety Agency, Otto Platz 1, Postfach 101253, D-50452, Cologne, Germany, www.easa.eu.int.

AMC 25.1309 System Design and Analysis

AMC 25.1435 Hydraulic Systems - Design, Test, Analysis and Certification

AMC 25.1453 Protection of Oxygen Equipment from Rupture

CS 25.1309 Equipment, Systems and Installations

CS 25.1435 Hydraulic Systems

CS 25.1453 Protection of Oxygen Equipment from Rupture

2.1.3 EUROCAE Publications

Available from EUROCAE, 102 rue Etienne Dolet 92240, Malakoff, France.

ED-14 Environmental Conditions for Airborne Equipment

2.1.4 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

14 CFR 25.1309 Equipment, Systems and Installations

14 CFR 25.1435 Hydraulic Systems

14 CFR 25.1453 Protection of Oxygen Equipment from Rupture

2.1.5 IEC Publications

Available from International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41-22-919-02-11, www.iec.ch.

IEC 60079 Electrical Apparatus for Explosive Gas Atmospheres

IEC 61882 Hazard and Operability Studies - (HAZOP studies) - Application Guide

IEC 62282-2 Fuel Cell Technologies - Part 2: Fuel Cell Modules

2.1.6 ISO Publications

Available from International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland, Tel: +41-22-749-01-11, www.iso.org.

ISO 3864 Graphical Symbols - Safety Colours and Safety Signs

ISO 11114-1 Transportable Gas Cylinders - Compatibility of Cylinder and Valve Materials with Gas Contents - Part 1: Metallic Materials

ISO 11114-2	Transportable Gas Cylinders - Compatibility of Cylinder and Valve Materials with Gas Contents - Part 2: Non-Metallic Materials
ISO 11114-3	Transportable Gas Cylinders - Compatibility of Cylinder and Valve Materials with Gas Contents - Part 3: Autogenous Ignition Test in Oxygen Atmosphere
ISO 11114-4	Transportable Gas Cylinders - Compatibility of Cylinder and Valve Materials with Gas Contents - Part 4: Test Methods for Selecting Metallic Materials Resistant to Hydrogen Embrittlement
ISO 11119	Gas Cylinders of Composite Construction - Specification and Test Methods
ISO 13984	Liquid Hydrogen - Land Vehicle Fuelling System Interface
ISO 13985	Liquid Hydrogen - Land Vehicle Fuel Tanks
ISO/TS 14687 Part 2	Hydrogen Fuel - Product Specification - Part 2: Proton Exchange Membrane (PEM) Fuel Cell Applications for Road Vehicles (Type II (Grade D) Fuel Quality)
ISO 15869	Gaseous Hydrogen and Hydrogen Blends - Land Vehicle Fuel Tanks
ISO/TR 15916	Basic Considerations for the Safety of Hydrogen Systems
ISO 21010	Cryogenic Vessels - Gas/Materials Compatibility
ISO 21011	Cryogenic Vessels - Valves for Cryogenic Service
ISO 21012	Cryogenic Vessels - Hoses
ISO 21013-1	Cryogenic Vessels - Pressure-Relief Accessories for Cryogenic Service - Part 1: Reclosable Pressure-Relief Valves
ISO 21013-2	Cryogenic Vessels - Pressure-Relief Accessories for Cryogenic Service - Part 2: Non-Reclosable Pressure-Relief Devices
ISO 21013-3	Cryogenic Vessels - Pressure-Relief Accessories for Cryogenic Service - Part 3: Sizing and Capacity Determination
ISO 21014	Cryogenic Vessels - Cryogenic Insulation Performance
ISO 21028-1	Cryogenic Vessels - Toughness Requirements for Materials at Cryogenic Temperature - Part 1: Temperatures below -80 °C
ISO 21028-2	Cryogenic Vessels - Toughness Requirements for Materials at Cryogenic Temperature - Part 2: Temperatures between -80 °C and -20 °C
ISO 21029-1	Cryogenic Vessels - Transportable Vacuum Insulated Vessels of not more than 1000 Litres Volume - Part 1: Design, Fabrication, Inspection and Tests
ISO 21029-2	Cryogenic Vessels - Transportable Vacuum Insulated Vessels of not more than 1000 Litres Volume - Part 2: Operational Requirements
ISO 23208	Cryogenic Vessels - Cleanliness for Cryogenic Service
ISO 24490	Cryogenic Vessels - Pumps for Cryogenic Service (if the System is Equipped with one)

2.1.7 RTCA Publications

Available from Radio Technical Commission for Aeronautics Inc., 1828 L Street, NW, Suite 805, Washington, DC 20036, Tel: 202-833-9339, www.rtca.org.

DO-160 Environmental Conditions for Airborne Equipment

2.1.8 Other Publications

ASTM D1193 Standard Specification for Reagent Water

DOT-CFFC Basic Requirements for Fully Wrapped Carbon-Fiber Reinforced Aluminum Lined Cylinders (Dedicated to Type 3 Pressure Vessel with Aluminum Liner).

EN 12245 Transportable Gas Cylinders - Fully Wrapped Composite Cylinder

EN 13463 Non-Electrical Equipment for use in Potentially Explosive Atmospheres

NASA/TM-2003-212059 NASA Hydrogen Hazards Analysis on Components and Systems

Flammability Limits and Laminar Speed of Hydrogen-Air Mixtures at Sub-Atmospheric Pressures. M. Kuznetsov, S. Kobeltl, J. Grune', T. Jordan'; Pro-Science GmbH, Germany; Institute for Energy and Nuclear Energy, Karlsruhe Institute of Technology

NFPA 2 Hydrogen Technologies Code

NACA Report 1383 Survey of Hydrogen Combustion Properties

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Aerospace Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AIR825/12 Oxygen System Integration and Performance Precautions

AIR5128 Electrical Bonding of Aircraft Fuel Systems

ARP5412 Aircraft Lightning Environment and Related Test Waveforms

ARP5414 Aircraft Lightning Zone

ARP5416 Aircraft Lightning Test Methods

ARP5577 Aircraft Lightning Direct Effects Certification

AIR5744 Composite Fuel Tanks, Fuel systems Design Considerations

2.2.2 ANSI Standards

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI/IEEE C62.41 Surge Voltages in Low-Voltage AC Power Circuits

ANSI/IEEE C62.45 Equipment Connected to Low-Voltage AC Power Circuits, Guide on Surge Testing for ANSI Z21.83 - Standard for Stationary Fuel Cell Power Plants

ANSI/AIAA G-095-2004 Guide to Safety of Hydrogen and Hydrogen Systems

2.2.3 EASA Publications

Available from European Aviation Safety Agency, Otto Platz 1, Postfach 101253, D-50452, Cologne, Germany, www.easa.eu.int.

CS 25.561 General

CS 25.981 Fuel Tank Ignition Prevention

2.2.4 EU Directives

Available from the European Union at <http://www.europa.eu.int/eur-lex/en/index.html>

AGARD The Challenge of the Environment, Volume 2

2.2.5 EUROCAE Publications

Available from EUROCAE, 102 rue Etienne Dolet 92240, Malakoff, France.

ED-12 Software Considerations in Airborne Systems and Equipment Certification

ED-80 Design Assurance Guidance for Airborne Electronic Hardware

2.2.6 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

AC 20-136A Advisory Circular, Protection of Aircraft Electrical / Electronic Systems Against the Indirect Effects of Lightning

AC 25.981-1C Advisory Circular, Fuel Tank Ignition Source Prevention Guidelines

AC 25.981-2A Advisory Circular, Fuel Tank Flammability

FAR 25.561 General

FAR 25.981 Fuel Tank Ignition Prevention

2.2.7 IEC Publications

Available from International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41-22-919-02-11, www.iec.ch.

IEC 61508-2, 2000	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems - Part 2: Requirements for Electrical/Electronic/Programmable Electronic Safety-Related Systems
IEC 61508-4, 1998 & Corrigendum: 04-1999	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems - Part 4: Definitions and Abbreviations
IEC 61508-5, 1998 & Corrigendum: 04-1999	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems - Part 5: Examples of Methods for the Determination of Safety Integrity Levels
IEC 61508-6, 2000	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems - Part 6: Guidelines on the Application of IEC 61508-2 and IEC 61508-3
IEC 61508-7, 2000	Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems - Part 7: Overview of Techniques and Measures
IEC 62282-1	Fuel Cell Technologies Part 1 Terminology
IEC 62282-2	Fuel Cell Technologies Part 2 Fuel Cell Technologies

2.2.8 ISO Publications

Available from International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland, Tel: +41-22-749-01-11, www.iso.org.

ISO/PAS 15594:2004 Airport Hydrogen Fuelling Facility

2.2.9 RTCA Publications

Available from Radio Technical Commission for Aeronautics Inc., 1828 L Street, NW, Suite 805, Washington, DC 20036, Tel: 202-833-9339, www.rtca.org.

DO-178B Software Considerations in Airborne Systems and Equipment Certification

DO-254 Design Assurance Guidance for Airborne Electronic Hardware

2.2.10 Military Standards

Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6396, <http://quicksearch.dla.mil/>.

MIL-STD-1472F Human Engineering

2.2.11 Other Publications

CSA Component Acceptance Service No. 33

FCC Rules and Regulations Parts 15 and 18

3. DEFINITIONS AND ABBREVIATIONS

AC	Alternating Current
AC	Advisory Circular
A/C	Aircraft
AIAA	American Institute of Aeronautics and Astronautics
AIR	Aerospace Information Report
ANSI	American National Standards Institute
AMC	Acceptable Means of Compliance
ASTM	American Society for Testing and Materials
ARP	Aerospace Recommended Practice
ATA	Air Transport Association
BLEVE	Boiling Liquid Expanding Vapour Explosion
BPCU	Bus Power Control Unit
BOV	Boil Off Valve
CFFC	Carbon Fiber Full Composite
CS	Certification Specification
DOD	Department of Defence
DOP	Design Operating Pressure
DOT	Department of Transportation
ECS	Environmental Control System
ENMF	Electrical Network Management Function
EUROCAE	European Organization for Civil Aviation Equipment
FAR	Federal Aviation Regulation
FCA	Fuel Cell Aircraft
FCS	Fuel Cell Stack
FCS	Fuel Cell System
FHA	Functional Hazard Assessment
FMES	Failure Mode Effects Summary

FTA	Fault Tree Analysis
GH ₂	Gaseous Hydrogen
GHe	Gaseous Helium
HAZOP	Hazard and Operability
H ₂ O	Water
HCFC	Hydro-Chlorofluorocarbons
HPZ	High Pressure Zone
He	Helium
IEC	International Electro-technical Commission
IEEE	Institute of Electrical and Electronic Engineers
ISO	International Organization for Standardization
LEL	Lower Explosive Limit
LFL	Lower Flammability Limit
LH ₂	Liquid Hydrogen
LHSS	Liquid Hydrogen Storage System
LN ₂	Liquid Nitrogen
LOX	Liquid Oxygen
LPZ	Low Pressure Zone
LRU	Material Safety Data Sheet
NFPA	National Fire Protection Association
MAWP	Maximum Allowable Working Pressure
MIE	Minimal Ignition Energy
NASA	National Aeronautics and Space Administration
RTCA	Radio Technical Commission for Aeronautics
PEM	Proton Exchange Membrane
PAO	Polyalphaolefin
PRD	Pressure Relief Device
SOV	Shut Off Valve

SOV	Shut Off Valve
SRV	Safety Relief Valve
SSA	System Safety Assessment
TAO	Thermo Acoustic Oscillators
TMS	Thermal Management System
UFL	Upper Flammability Limit

Standard terminology for the Fuel Cell Aircraft (FCA) is provided below.

3.1 Balance of Plant

The assembly of equipment used in the control of the reactants supporting the operation of the fuel cell stack. The equipment may consist of valves, sensors, pumps, compressors, humidification devices and water.

3.2 Common Mode Failure

The result of a failure event which, because of dependencies, causes multiple failures within a system, resulting in the system failing to perform its intended function.

3.3 Compartment

A space that is enclosed (by barriers) except for openings necessary for interconnection, controls, fuel supply and ventilation.

3.4 Designated Fire Zone

A region in the aircraft which is designed to cope with a fire likely to occur (e.g., by means of fire resistant/proof materials and fire detection).

3.5 Double Barrier

Double barrier is a system of two independent barriers, each of which is capable of acting as the sole partition between energised and accessible parts in the event of failure of the other partition.

3.6 Exhaust

Fluids and gases leaving the fuel cell system during normal operation through the exhaust.

3.7 Exhaust Conditioning

The conditioning of exhaust products, such as the collection of fluids or dehumidification of gases.

3.8 External Hydrogen Leakage

The following leakage levels are defined in relation to the Lower Flammability Limit (LFL) of hydrogen (H_2):

3.8.1 Low Leakage (0 to 25% LFL)

Low leakage is defined as an amount of leaking fuel which leads to a fuel concentration in a fuel/air mixture below 25% of the LFL (1% volumetric H_2 concentration). Refer to ANSI/AIAA G-095-2004.

3.8.2 Medium Leakage (25 to 50% LFL)

Medium leakage is defined as an amount of leaking fuel which leads to a fuel concentration in a fuel/air mixture between 25% and 50% of the LFL (1 to 2% volumetric H₂ concentration).

3.8.3 High Leakage (>50% LFL)

High leakage is defined as an amount of leaking fuel which leads to a fuel concentration above 50% of the LFL (>2% volumetric H₂ concentration).

3.9 Fire Zone

A potential flammable fluid leakage zone that contains a nominal ignition source.

3.10 Fuel Cell Stack (ATA 85-10) from ATA Spec 2200

That portion of the fuel cell system achieving electrochemical conversion of fuel and oxidant into electrical energy, thermal energy and exhaust gas. This includes the fuel cell housing, fittings, wiring and all devices allowing the connection to other subsystems.

3.11 Fuel Cell System (ATA 85) from ATA Spec 2200

Those units and components using an electrochemical conversion process to produce electricity from a fuel (on the anode side) and an oxidant (on the cathode side). This includes reactants and reaction products, supply/exhaust devices, fuel cell stacks, electric power output devices, cooling or/and heating devices and a centralized control and monitoring subsystem.

3.12 Fuel Supply

Liquid or compressed hydrogen gas.

3.13 Hazardous Area

Defined as an area or space in which a hazardous condition, such as an explosive gas atmosphere, may be present in such quantities as to require precautions for the construction, installation and use of apparatus, in order to comply with the intended applications for civil aircraft. Refer to IEC 60079 Standards family.

3.14 Ignition Sources

Any process or event that is capable of causing a fire or an explosion. Open flames, sparks, static electricity and hot surfaces are possible ignition sources.

3.15 Normal Discharges

Discharges expected during normal operation and not associated with failure conditions.

3.16 Normal Operation

All transient and steady state operating conditions according to the inflight envelope of the aircraft which occurs during start, intended operation and shut down which does not involve a component or system failure.

3.17 Oxidant Supply

The supply of an oxidizing agent; a substance that oxidizes another substance.