ITAKA

Collaborative Project

FP7 – 308807

D3.7 Procedures and guidelines for Health & Safety

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Project title:	Initiative Towards sustAinable Kerosene for Aviation
Deliverable nature:	Report (R)
Dissemination level: (Confidentiality)	Restricted to group (RE)
Start date of the project	1st November 2012
Duration	36 months
Contractual delivery date:	M43
Actual delivery date:	August 2016
Status:	*Submitted*
Contractual:	*Yes*
Version:	*1.0*
Total number of pages:	12
WP number:	3
Leader of WP:	SkyNRG
Lead Beneficiary of deliverable:	SkyNRG (11)
Comments:	
Keywords:	Health, Safety, Fuel quality, Fuel handling

This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 308807

Executive summary

Safety is key in aviation. There are many procedures and standards that have to be met by the aviation fuel in itself as well as by the operations involved in handling the fuel. Most of these are laid down in the well-known fuel quality standards (ASTM, DefStan) and the (airport) operations standards (JIG/EI/ATA).

Since bio jet fuel in the end is similar to conventional jet fuel, except that the source is different, the same standards apply when it comes to (health &) safety.

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Abbreviations

A4A = Airlines for America

API = American Petroleum Institute

ASTM = American Society for Testing and Materials

Defstan = Defence Standard

EI = Energy Institute

IATA = International Air Transport Association

ICAO = International Civil Aviation Organization

JIG = Joint Inspection Group

SAE = Society of Automative Engineers

Definitions

ASTM: originally known as the American Society for Testing and Materials, this international standards organization develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services. ASTM International works with aircraft and engine manufacturers, government authorities and fuel suppliers to set the standards for aviation fuels such as the required characteristics for jet fuel.

Defstan 91-91: The fuel quality standard for conventional Jet A1, developed by the UK Ministry of Defence. The conventional jet fuel quality standard that is used within Europe.

1 Introduction

Safety is key in aviation. There are many procedures and standards that have to be met by the aviation fuel in itself as well as by the operations involved in handling the fuel. Most of these are laid down in the well-known fuel quality standards (ASTM, DefStan) and the (airport) operations standards (JIG/EI/ATA).

This report provides information on the fuel quality and fuel handling standards for (bio) jet fuel.

2 Procedures & Guidelines for Health & Safety

Aviation fuel and aviation fuel handling have to meet various requirements. Most of these requirements are laid down in standards and specifications that are made by organizations like ASTM, EI, JIG, A4A, etc. Compared to other fuel products, the specifications for jet fuel and jet fuel handling are much more controlled since a small deviation in property of the product can affect engine performance and thereby the safety of a flight. Therefore, control systems are in place that monitor fuel quality and fuel handling throughout the chain.

The most common standards (for Europe/US) in which **aviation fuel quality requirements** are laid down are:

- ASTM D1655: Standard Specification for Aviation Turbine Fuels
- ASTM D7566: Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons
- DEFSTAN 91-91: Turbine Fuel, Aviation Kerosine Type, Jet A1

The most common standards (for Europe/US) in which **aviation fuel handling requirements** are laid down are:

- JIG Sections 1 to 4 Guidelines for Aviation Fuel Quality Control and Operating:
- EI 1530 Quality assurance requirements for the manufacture, storage and distribution of aviation fuels to airport
- IATA Fuel Quality Pool: Control of Fuel Quality & Fueling Safety Standards Procedures for Joint Into-Plane Fueling Services
- ICAO Doc 9977, AN/489: Manual on Civil Aviation Jet Fuel Supply
- API 1543 Documentation, Monitoring and Laboratory Testing of Aviation Fuel During Shipment from Refinery to Airport
- API 1540: Design, construction, operation and maintenance of aviation
- fuelling facilities (Model code of safe practice Part 7)
- EI/HM 50: Guideline for the cleaning of tanks and lines for marine tank vessels carrying petroleum and refined products.
- A4A ATA 103: Standards for Jet Fuel Quality Control at Airports
- API 1595: Design, Construction, Operation, Maintenance, and Inspection of Aviation Pre-Airfield Storage Terminals
- SAE Aerospace SAE- AS 6401 Storage, Handling and Distribution of Jet Fuels at Airports

MSDS

In addition to the above, manufacturers and distributors of jet fuel (and actually of any hazardous fuel or chemical product) are required to issue a Material Safety Data Sheet (MSDS) with the shipment of the product.

A Material Safety Data Sheet (MSDS) gives detailed information about the nature of a chemical, such as physical and chemical properties, health, safety, fire, and environmental hazards of a chemical product. It classifies a product into a hazardous category, it describes how to handle the product in a safe way and what to do in case there might be a spill.

- Chemical Identity: Name of the product.
- Manufacturer's Information (Name, address, etcetera)
- Hazardous Ingredients/Identity Information: List of hazardous chemicals.
- Physical/Chemical Characteristics, like Boiling point, vapor pressure and density, melting point, evaporation rate, etc.
- Fire and Explosion Hazard Data: Flash point, flammability limits, ways to extinguish, special firefighting procedures, unusual fire and explosion hazards.
- Reactivity Data: How certain materials react with others when mixed or stored together.
- Health Hazard Data: Health effects (acute= immediate; chronic= long-term), ways the hazard can enter the body (lungs, skin or mouth), symptoms of exposure, emergency and first aid procedures.
- Precautions of Safe Handling and Use: What to do in case of a spill or leak, how to dispose of waste safely, how to handle and store materials in a safe manner.
- Control Measures: Eg. Ventilation (local, general, etc.), type of respirator/filter to use, protective gloves, clothing and equipment, etc.

3. Procedures & Guidelines for Health & Safety – Bio jet

Neat bio jet has to be certified to ASTM D7566 before being blended into a biojet blend. Once blended biojet fuel is certified it can be considered similar to conventional jet fuel.

From a Health & Safety perspective Bio jet can be handled in the same way as conventional jet fuel (there are no additional health & safety related procedures known for bio jet fuel). Throughout the supply chain the same jet fuel handling standards apply.

Biojet and biojet blends do have their own MSDS sheets. When comparing the MSDS of biojet blend and conventional jet fuel one will notice that there no differences with respect to hazardous category, precautions, chemical characteristics, etc.

Conclusions

Safety is key in aviation. There are many procedures and standards that have to be met by the aviation fuel in itself as well as by the operations involved in handling the fuel. Most of these are laid down in the well-known fuel quality standards (ASTM, DefStan) and the (airport) operations standards (JIG/EI/ATA).

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