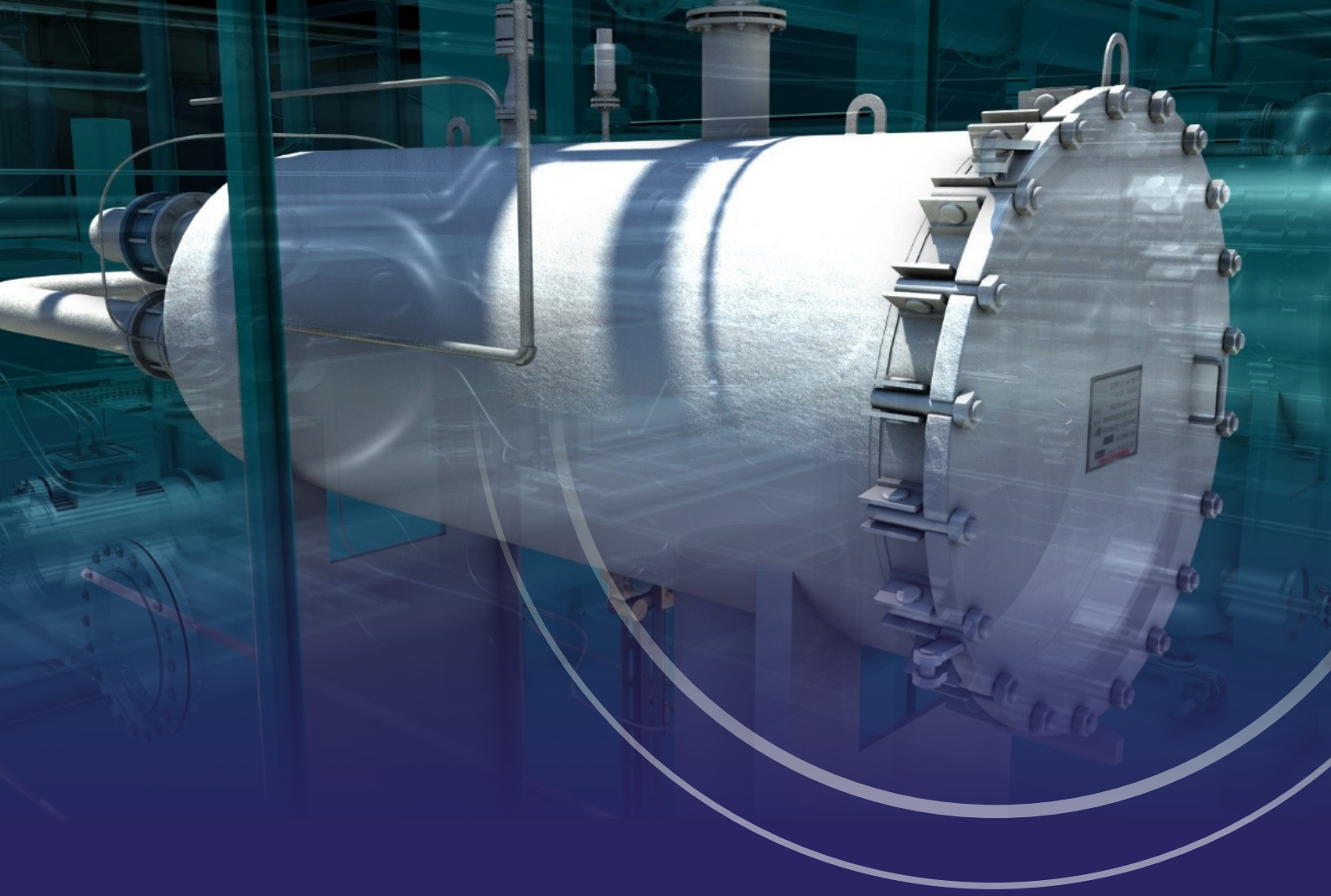

EI 1550

Handbook on equipment used for the maintenance and delivery of clean aviation fuel

Third edition

energy institute

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HANDBOOK ON EQUIPMENT USED FOR THE MAINTENANCE AND DELIVERY OF CLEAN AVIATION FUEL

Third edition

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Foreword

This third edition of this publication was prepared on behalf of the EI Aviation Committee by Phil Rugen (Phil Rugen Consulting) and Martin Hunnybun (EI), with contributions from members of the EI's Aviation Fuel Filtration Committee and filter manufacturer representatives.

This publication describes how to maintain aviation fuel cleanliness from the point of fuel manufacture to into-plane delivery. It has been prepared in order to communicate key information on the laboratory testing/qualification, application and use of aviation fuel filtration systems, quantitative electronic sensors and qualitative bulk water detectors, either individually or in combination. It includes operational experiences from users, findings from industry research and explanations of laboratory qualification test requirements included in EI specifications.

It has been extensively updated to reflect the industry transition away from the use of filter monitors that contained super-absorbent polymer, which have been widely deployed for aircraft fuelling for several decades (for further information see Annex H). It describes new EI specifications for developing technologies, including those intended to retrofit in existing filter monitor vessels, quantitative electronic water sensors (EI 1598) and qualitative bulk water detectors (EI 1592). At the time of publication, some technologies are yet to be used in service and have yet to be recognised by any of the industry operating standards.

This third edition provides seven new chapters/annexes, covering:

- water barrier filters (EI 1588),
- dirt defence filters (EI 1599),
- quantitative electronic sensors for particulate matter and/or free water detection for into-plane applications (EI 1598),
- qualitative bulk water detectors (EI 1592),
- retrofitting dirt defence filter elements or water barrier filter elements into filter monitor vessels for into-plane use,
- FWS sump water management systems, and
- single stage coalescers/hay packs.

In addition, significant updates have been included in the chapters covering:

- laboratory testing requirements (to reflect EI 1588, EI 1589, EI 1592, EI 1598, EI 1599 and recent work on electrostatic charge measurement),
- filter/water separators (to reflect EI 1581 6th edition),
- filter vessels (to reflect EI 1596 3rd edition),
- quality assurance of filter element and vessel manufacture, and
- application of fuel cleanliness components in aviation fuel handling systems (to incorporate water barrier filters and dirt defence filters).

Other amendments have been made throughout the document to ensure that the information provided remains up to date and continues to reflect good practice.

This publication is intended for a wide range of industry practitioners including those who design aviation fuel handling systems, specify and/or purchase equipment/components for use in such systems, manufacturers and users of equipment/components, operators of pipelines, operators of refineries, operators of terminals (intermediate and pre-airport) and those who own or operate aviation fuel supply facilities at airports.

Reference has been made throughout this document to the requirements of operating standards, particularly ATA 103, JIG 1 and JIG 2. Readers should be aware of other operating standards that may also be followed, and recognised by ICAO Doc. 9977.

This publication should not be considered as a replacement for the recommendations of aviation fuel cleanliness component manufacturers, which should be followed. Neither does it absolve the manufacturers of such components of their responsibility to clearly communicate to users of their products, their correct operation and any application/ operational limitations that may exist.

This publication also addresses key aspects of operational requirements for filtration systems. It is assumed that all users of this publication are either fully trained or under the supervision of a responsible trained person who is familiar with all normal engineering safety practice, and that all such precautions are observed. Users of this publication are responsible for ensuring compliance with the requirements of locally prevailing health and safety regulations.

This publication uses the Systemé International d'Unités (International System of Units, or SI), with the exception of pressure which is given in psi. In this system, the decimal point is a comma (,). In writing numbers of greater than three digits, thousands are demarcated by the use of a space, rather than a comma. US Customary Units are also given in parentheses after the SI unit.

Suggested revisions are invited and should be submitted to the Technical Department, Energy Institute, 61 New Cavendish Street, London, W1G 7AR,
e: technical@energyinst.org.

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Sid Barber (CanadianNorth); Jack Buffin (US Navy); Edward W. English II (Fuel Quality Services, Inc); Kyriakos Gennadis (ofc Aviation Fuel Services S.A.); Richmond Hannah (Aviation Refuelling Compliance Solutions); John Pherrin (CLA-VAL Company); Pierre Poitras (CSA); Jorge Prats (REPSOL); Olaf Randzio (Hydranten-Betriebs OHG); Mark Rumizen (Federal Aviation Administration); Melanie Thom (Baere Aerospace).

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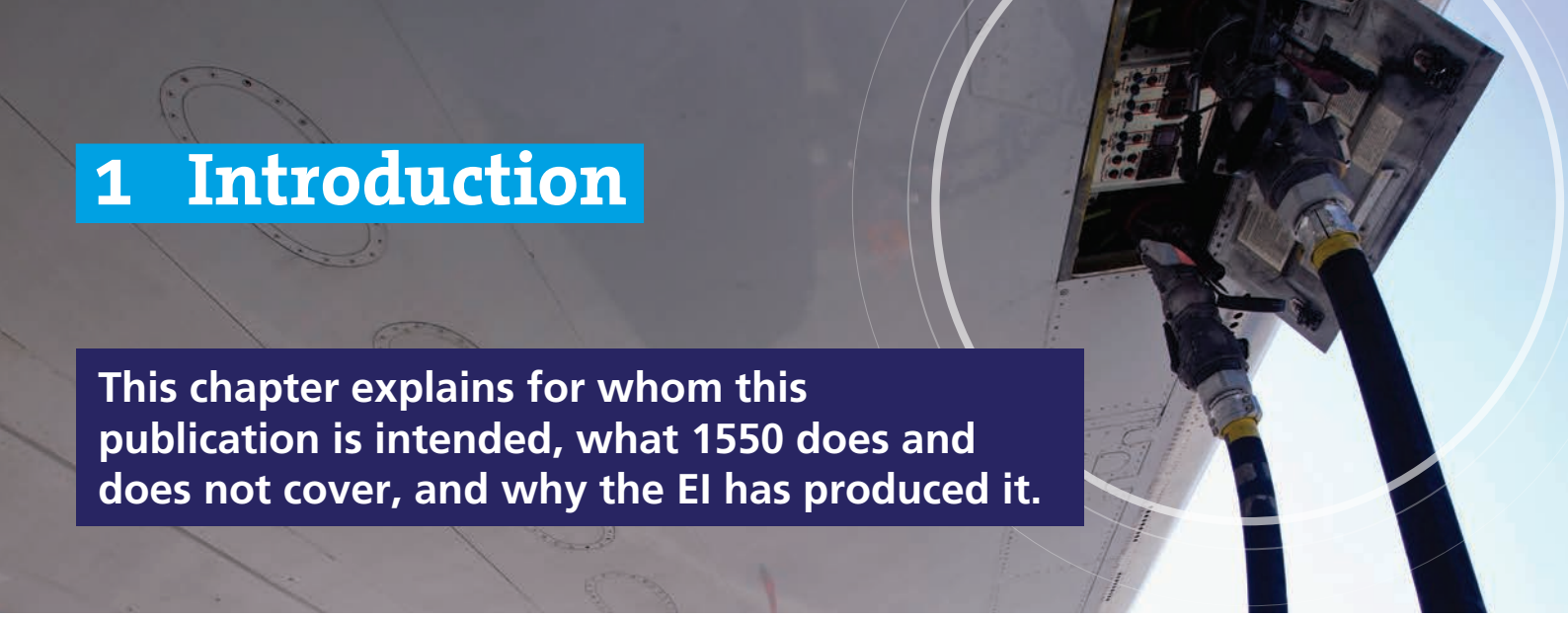
Goussett (SEA); Richmond Hannah (Aviation Refuelling Compliance Solutions); Dennis Hughes (ParkerVelcon), Martin Hunnybun (EI), Jimmy Kmetz (OCV Control Valves), Charlie Laudage (Allied New York Services, Inc.), Ken McCarley (P66); Ron McDowell (Facet), John Pherrin (CLA-VAL Company), Phil Rugen (Phil Rugen Consulting), Philipp Somogyi (FAUDI Aviation), Phillip Tran (Parker Hannifin), Paul Wells (ExxonMobil Research & Engineering) and Marcus Wildschütz (Faudi Aviation). A significant contribution to this publication has been made by Kyriakos Gennadis and the teams at OFC Aviation Fuel Services S.A. and SAFCO at Athens International Airport, who worked with Thanasis Anagnostopoulos (Ace Photography & Videography[1]) to provide a large number of photographs which have been included to illustrate examples of best practice.

Coordination and editing was undertaken by Martin Hunnybun (EI). Typesetting was undertaken by Jack Keaney (EI) and Lydia Malley (EI).

1 www.acephotography.gr

1 Introduction



This chapter explains for whom this publication is intended, what 1550 does and does not cover, and why the EI has produced it.

Who is 1550 for?

This publication provides information for:

- Anyone seeking information on the maintenance of aviation fuel cleanliness.
- Designers of aviation fuel handling systems (including aviation filtration systems and other fuel cleanliness monitoring/control equipment).
- Those responsible for specifying and purchasing equipment/components for use in aviation fuel handling systems.
- Manufacturers of equipment/components (including vehicles) typically used in aviation fuel handling systems.
- Refinery operators.
- Pipeline operators.
- Pre-airport/pre-airfield and intermediate depot/terminal operators.
- Operators of aviation fuel supply facilities at airports/airfields.
- Equipment/component operators/users.
- Those responsible for purchasing aviation fuel.
- Those who have read EI/JIG 1530 or EI 1560 and would like more information on fuel cleanliness.
- Other standards developing organisations that may wish to reference EI fuel cleanliness component specifications.

Equipment/component users at airports are typically major international oil companies, national oil companies, independent into-plane agents, airlines, or in some cases, airports.

EI/JIG Standard 1530 *Quality assurance requirements for the manufacture, storage and distribution of aviation fuels to airports.*

EI 1560 *Recommended practice for the operation, inspection, maintenance and commissioning of aviation fuel hydrant systems and hydrant system extensions.*

What does 1550 cover?

This publication provides information on:

- Maintaining aviation fuel cleanliness from batch release/point of fuel certification to into-plane delivery for civilian (mainly commercial) applications.
- The design, installation and operation of fuel cleanliness components (filtration/water removal systems, quantitative electronic sensors and qualitative bulk water detectors) used in aviation fuel handling systems to ensure fuel cleanliness.
- Operational characteristics of different system components as applied in the aviation fuel handling system. This includes discussion of known limitations in the use of particular types of components.
- Key issues to be considered in the selection and use of combinations of various fuel cleanliness components/quality assurance procedures to achieve the required fuel cleanliness.
- Other standards or publications that should be consulted for additional in-depth information.

For definitions of **batch** and **into-plane** see Chapter 2.

commercial

In this sense refers to the supply of aviation fuel to a company that typically operates a fleet of aircraft for the transport of paying passengers or freight, such as major international airlines. Civilian (civil) refers to any operation that is non-military.

Why the need for 1550?

EI specifications for fuel cleanliness components are primarily written for use by manufacturers in their design and laboratory qualification of a specific model. EI 1550 is primarily intended for equipment/component users.

This publication has been prepared to:

- Communicate key information on the above topics to assist all those listed above.
- Provide information based on operational experiences that may benefit the industry and provide specific references to other publications where appropriate.
- Disseminate key findings from relevant industry research to users of equipment/components who may not be directly involved in all research activities.
- Provide information that may assist in the optimisation of aviation fuel handling system components in terms of safety and efficiency.
- Highlight the benefits of using combinations of components.
- Incorporate developments in good practice and EI specifications that have occurred since the publication of the second edition of EI 1550 in 2014.

What 1550 does not cover

Note 1:

Further advice should be sought from manufacturers and suppliers of fuel handling equipment for specific military applications.

1550 does not specifically address military applications. However, much of the information may be applicable[NOTE 1].

- 1550 has been developed in conjunction with technical specialists involved primarily in the supply of jet fuel to commercial aircraft. The information may therefore have limited application to maintaining cleanliness of aviation gasoline fuels (which may form a large part of the 'general aviation' market), to very small airfield installations, or those on board ships or on offshore platforms. It is hoped that a future edition of 1550 will cover some of the more specific requirements for those applications. (Note some aviation gasoline points are included in Chapter 3 *Fuel cleanliness* and Chapter 19 *Application of fuel cleanliness components in aviation fuel handling systems*.)
- 1550 should not be considered an operations manual. All operators of aviation fuel handling systems and equipment/components should have their own detailed operating procedures.
- 1550 does not include detailed information or operational recommendations from equipment/component manufacturers. Such information should always be provided by manufacturers, and followed by users.
- 1550 does not provide general fuel handling design and operational recommendations that do not specifically relate to fuel cleanliness, see *Where can I find further information?*
- 1550 does not provide specific information on cleanliness control at refineries. For further information see EI/JIG 1530.

Where can further information be found?

If what you are looking for is not outlined here, you might not find it in 1550. Other sources of related information are included in Annex T (see also inside back cover).