EI 1584 Four-inch hydrant system components and arrangements. Equipment Qualification & Approval.

Gammon Technical Symposium
Dallas
February 2025

Nic Mason
EI Equipment Sub-Committee Chairman,
Technical Director Q8 Aviation

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Nic Mason

Technical Director of Q8 Aviation which is owned by Kuwait Petroleum Corporation, one of the largest producers of crude and a major manufacturer of jet fuel. We currently supply jet fuel every day to over 70 international and regional airports, including Europe's 10 busiest airports.

Chair of Energy Institute Equipment Sub-Committee (ESC) for more than 20 years.

ESC maintains specifications for aircraft fuelling equipment and materials such as hydrant pit valves & couplers, aircraft fuelling hose and lining materials.

Senior JIG Inspector and also a Director of JIG.

Brief History of EI 1584

Some aviation gasoline hydrants were developed in the 1940s and 50s however with the introduction of large jet-engined aircraft in the 1960s which required larger fuel uplifts in a short period of time Jet Fuel hydrants developed quickly around the world.

Initially there were no internationally recognised specifications for hydrant pit valves. Eventually both the American Petroleum Institute (API) and Institute of Petroleum (IP) published requirements as follows:

API 1584

- Four-Inch Hydrant System Components and Arrangements
  - API 1584 1st edition – 1975
  - Key features:
    - 4” 150lb inlet flange
    - 12” high
    - 4 inch API outlet adaptor
  - API 1584 2nd edition – 1994
    - No significant changes

American Petroleum Institute

IP hydrant pit valve specification

- **Aviation hydrant pit systems recommended arrangements**
  - IP specifications had no numbering system, only titles
  - IP standard for aviation hydrant pit systems "Recommended Arrangements for New Facilities" - 1st edition April 1980
  - 6 inch 300lb inlet flange
  - 4 inch API outlet adaptor
  - 16-18 inches high
  - Shall have an independent means to shut-off hydrant pit valve (lanyard)
  - Resulted in manually operated pilot controls

API/IP 1584

- API and IP merge aviation specifications
  - API/IP 1584 – 1999
  - Still 2nd edition from 1994

American Petroleum Institute

IP THE INSTITUTE OF PETROLEUM

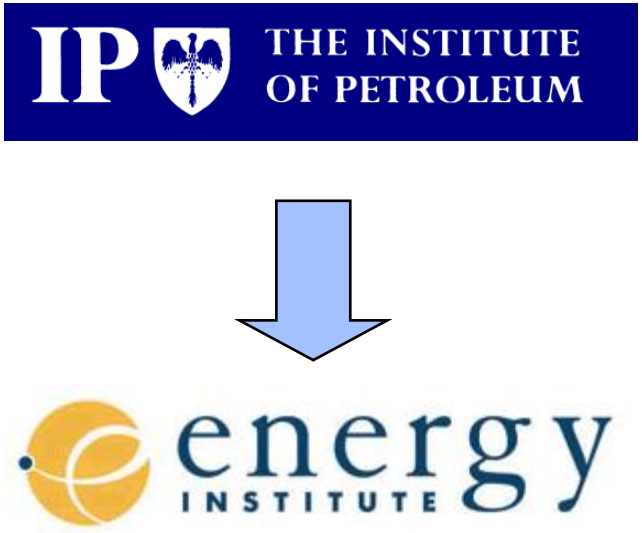
API/IP 1584

- API and IP merge aviation specifications
  - Key requirements
  - either 12” or 16” high
  - previously API 12” high valve
  - previously IP 16” to 18” high valve
  - ability to replace API adaptor or pilot assembly with hydrant pressure applied
  - includes air, dual (air/lanyard) and manual pilot controls

API/IP 1584

- API and IP merge aviation specifications
  - API/IP 1584 – 3rd edition 2001
  - Introduces steady load and pit coupler impact load (knock-off) test
  - Coupler designed to break away in the event of an incident
  - pit valve 4” API outlet required to close if coupler breaks away under full flow conditions

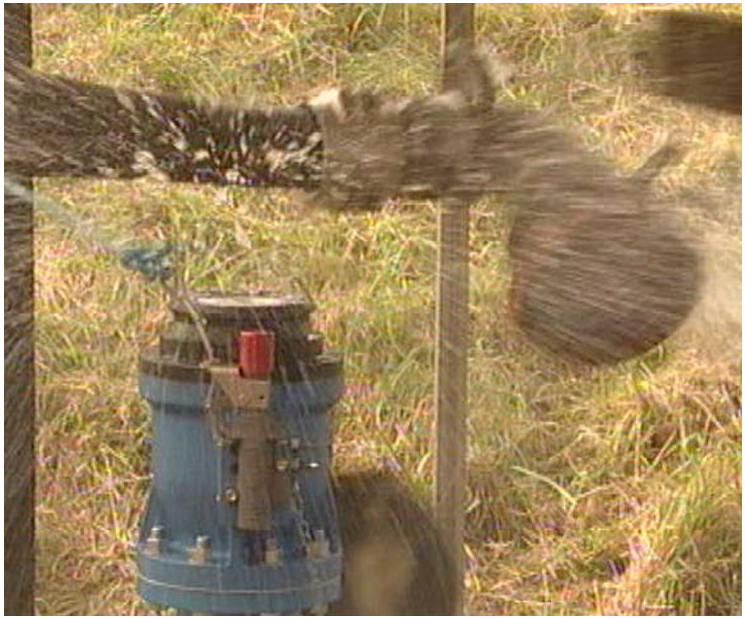
- **Institute of Petroleum changes name to Energy Institute**
  - **1999 - American API 1584 hydrant pit valve specification, merged with UK IP specification becoming API/IP 1584**
  - **2003 - IP Institute of Petroleum became EI Energy Institute, specification renamed API/EI 1584**
  - **2010 - API withdrew aviation specifications, specification became EI 1584**



Summary of API/EI 1584 3rd Edition

API / EI 1584 Third Edition was published in 2001 and included the requirement that in the event of an impact, hydrant pit couplers would break away cleanly from the pit valve with no pressurised release of fuel.

This significantly reduces the risk of a pressurised fuel geyser in the event of damage to the pit coupler / valve connection during an aircraft refuelling.



Summary of EI 1584 4rd Edition May 2017

Providing greater emphasis on the need for universal interchangeability between hydrant pit valve and hydrant pit coupler combinations between any manufacturers.

Includes the requirement for the hydrant pit valve manufacturer to provide detailed instructions for the mounting of the valve arrangement to hydrant riser flanges.

Specifying the maximum permissible wear measured across any point on the diameter of the hydrant pit valve adaptor ring and the distance from the top seal face of the adaptor ring to the underside of the 45° angled face that a pit valve wear gauge shall be able to access.

An expansion of the requirements for product quality assurance, inspection, acceptance and shipping.

Proposed changes EI 1584 5th Edition

Terminology simplification – refers to either a basic hydrant coupler or a pressure regulating coupler.

References to coupler lift assist devices (CLADS)

Include fuel control pressure for hydrant pit valves

Hydrant pit valve pilot device override primary intended as a diagnostic when determining “hot hydrant valve” cause. Not recommended for isolation for maintenance purposes.

Removal of hydrant pit valve reverse flow option.

Removal, of option for a secondary breakaway feature on the hydrant pit valve – now obsolete with breakaway pit couplers.

Added a sense port option on hydrant pit valves for potential future condition monitoring devices – for example “Pit Sentry”.

Proposed changes EI 1584 5th Edition

Breakaway testing clarified and harmonised with requirements for CLADS – so now includes attached section of intake hose along with a castor dolly.

Push as well as pull permitted for steady load test.

Impact load test contact point with hydrant pit coupler better defined.

Some figures detailing obsolete options such as connections for regulating hydrant pit valves removed.

Publication of EI 1584 Fifth Edition expected later in 2025

Qualification & Approval of Equipment

The terms *qualified* and *approved* are often used interchangeably to describe the status of aviation fuelling equipment or materials.

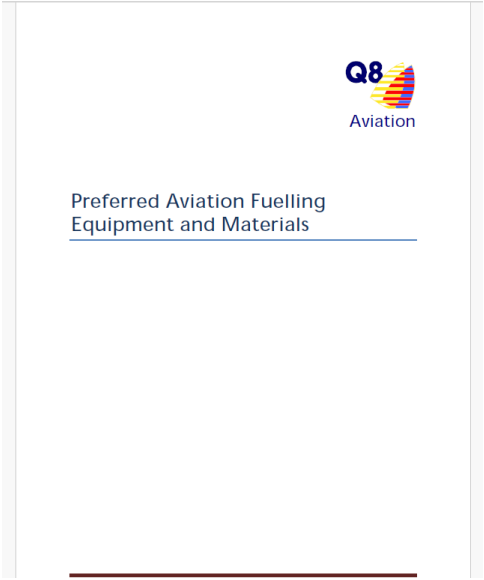
Qualified means that the equipment or material has been tested in accordance with a published specification and meets all the requirements.

Examples of aviation fuelling equipment material and equipment specifications include:

- EI 1581 6th Specification and laboratory qualification procedures for aviation fuel filter/water separators
- SAE AS 5877 Detailed Specification for Aircraft Pressure Refuelling Nozzles

Approved means that the equipment or material has been qualified in accordance with a published specification and has also been subjected to a formal review that typically includes a field test evaluation. Approval can only be granted by users of the equipment or material.

Published Approvals Examples



Modification of Equipment

Any modification to aircraft fuelling equipment needs careful consideration particularly with safety critical systems such as pressure control.

No modifications shall be made to pressure control equipment by any third parties unless approved by the relevant component OEM. Note that this may require requalification to associated standards such as SAE AS 5877 for underwing pressure fuelling nozzles or EI 1584 for hydrant pit couplers with a pressure control function.

Any modification to a pressure control system in addition to the OEM approval shall be subject to a detailed Management of Change review process, which includes any interface with any other vehicle components or functions, such as electrical circuitry or the deadman as well as materials compatibility.

Modification of Equipment

Once an Original Equipment Manufacturer has successfully qualified an article to a specification then no further changes should be made to the design or materials of construction without the agreement and confirmation of the publisher of the specification.

Some minor changes may not require any action however more significant changes may require a partial or even a full requalification.

Use of unqualified equipment may have some contractual implications particularly in the case of any damage or harm attributed to its use.

Replacement Parts

Only genuine replacement parts from the original equipment manufacturer (OEM) should be used in aviation fuelling equipment that has been qualified to a specification. These parts are identical to those used for the equipment qualification which includes compatibility and fuel contamination testing.

Non-OEM replacement parts will not have undergone compatibility and fuel contamination testing and may be of an inferior quality. This can result in malfunction of the equipment.

Beware also of counterfeit replacement parts that may be provided in branded packaging – only purchase replacement parts from the OEM or one of their authorised distributors.

Any questions?