



AEROSPACE RECOMMENDED PRACTICE

ARP4763™

Issued

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Aerospace - General Requirements for Hydraulic Relief Valves

RATIONALE

This document was developed to assist the system designer in specifying the requirements for a hydraulic relief valve that prevents the development of excessive pressure.

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1. SCOPE

This SAE Aerospace Recommended Practice (ARP) is intended as a guide to define the requirements for aerospace hydraulic relief valves, including details pertinent to the design, performance, fabrication, and testing of the relief valves.

NOTE 1: This ARP is for hydraulic system full-flow relief valves; ARP4835 has been developed to specifically cover thermal relief valves.

NOTE 2: This document does not cover the modification of cracking pressure by external input; either hydraulic, electric, or pneumatic.

1.1 Purpose

This document is intended for use in conjunction with the procurement specification to be prepared by the purchaser in which the valve configuration, system fluid and other parameters for the particular application are defined.

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 15091 0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AIR4543	Aerospace Hydraulics and Actuation Lessons Learned
ARP1383	Aerospace - Impulse Testing of Hydraulic Components
ARP4386	Terminology and Definitions for Aerospace Fluid Power, Actuation and Control Technologies
ARP4835	Aerospace Fluid Power-Hydraulic Thermal Expansion Relief Valves
AS478	Identification Marking Methods
AS1241	Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft
AS1300	Port - Ring Locked Fluid Connection Type, Standard Dimensions For
AS4059	Aerospace Fluid Power - Contamination Classification for Hydraulic Fluids
AS4716	Gland Design, O-ring and Other Elastomeric Seals
AS4941	Aerospace - General Requirements for Commercial Aircraft Hydraulic Components
AS5202	Port or Fitting End, Internal Straight Thread, Design Standard
AS5857	Gland Design, O-ring and Other Elastomeric Seals, Static Applications
AS8775	Hydraulic System Components, Aircraft and Missiles, General Specification For

2.1.2 U.S. Military Specifications and Publications

Copies of these documents are available at <http://quicksearch.dla.mil>.

MIL-PRF-83282 Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft

MIL-PRF-87257 Hydraulic Fluid, Fire Resistant, Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile

MIL-STD-130 Identification Marking of U.S. Military Property

2.2 Definitions

Refer to ARP4386 for general hydraulic systems terms that are used in this recommended practice. The following terms used in this document are defined as follows:

RELIEF VALVE: A relief valve is a pressure sensing valve which ports hydraulic fluid from inlet to outlet at a preset pressure that is higher than the normal hydraulic system pressure in order to prevent overpressure of the system.

THERMAL RELIEF VALVE: A relief valve which ports small amounts of hydraulic fluid to return at a preset pressure to prevent overpressure caused by thermal expansion within a sub-circuit isolated from the main system relief valve.

CRACKING PRESSURE: Cracking pressure is the pressure setting at which the relief valve opens and begins to flow a minimal quantity. Typically a flow of 20cc/min would be used to define flow at cracking pressure on a system pressure relief valve. This value should be evaluated and defined in the procurement specification. Since cracking pressure is difficult to quantify, it should not be used as a performance requirement, but for reference only. See Figure 1.

FLOW PRESSURE: Flow pressure is the differential pressure at which a specified flow occurs. See Figure 1.

FULL FLOW PRESSURE: The differential pressure at which the rated flow occurs. See Figure 1.

RATED FLOW: The flow that the relief valve should be designed for. See Figure 1.

RESEAT PRESSURE: Reseat pressure is the pressure that corresponds to the leakage allowed on decreasing pressure after an event has caused the valve to reach or exceed the cracking pressure. See Figure 1.

INTERNAL LEAKAGE: Leakage of fluid from inlet to outlet at a specified pressure.

EXTERNAL LEAKAGE: Leakage external to the pressure vessel.

STATIC LEAKAGE: External fluid leakage with the unit statically pressurized.

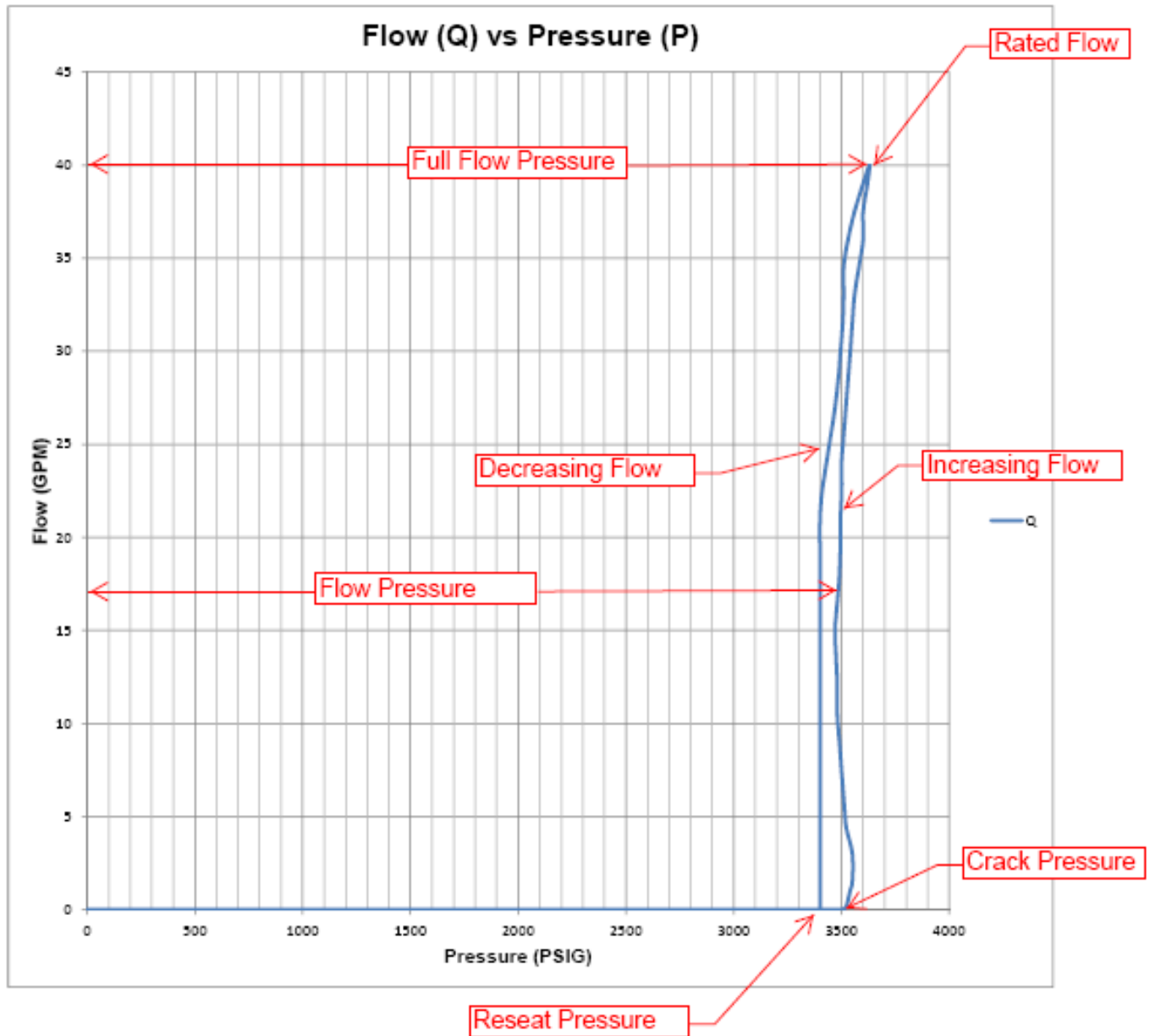


Figure 1 - Flow versus pressure

DESIGN OPERATING PRESSURE (DOP): Design operating pressure is the normal maximum steady state pressure of the relief valve. Excluded are:

- Reasonable tolerances and transient pressure effects such as may arise from acceptable pump ripple, or
- Reactions to system functioning or demands that may affect fatigue

NOTE: This term is used in commercial aircraft and helicopter applications. For military applications, the term "rated pressure" can be substituted.

PROCUREMENT SPECIFICATION: The procurement specification is the document that includes the following:

- Technical Requirements
- Acceptance and Qualification Test Requirements