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AN INDUSTRY STANDARD FOR FLUID POWER

**Hydraulic fluid power – Valves –
Method for determining
the internal leakage characteristics**

Descriptors: fluid power; fluid power valve; valve leakage; valve port

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Foreword

This Foreword is not part of National Fluid Power Association Recommended Standard *Hydraulic fluid power — Valves — Method for determining the internal leakage characteristics*, NFPA/T3.5.15M-1986.

Control devices have always been an integral part of fluid power systems. The growth of the fluid power industry has precipitated many ways of defining and describing the control characteristics of fluid power valves.

As the result of the greatly expanded use of fluid power valves, it became apparent that there was a need for standard methods of testing and rating control devices which were accepted by the fluid power industry. In recognition of the need for standard test methods, the NFPA authorized Project T3.5.15M.

In December 1971, at the request of NFPA, Mr. G.E. Maroney of Oklahoma State University attended the NFPA meeting chaired by Mr. N. Mills (Sperry Vickers). Mr. Maroney reported on the valve investigations being conducted at OSU for the U.S. Army's Mobile Equipment Research and Development Command in consultation with a broadly based advisory group made up of valve users and manufacturers. Consistent with the Army's goal toward increased reliance on voluntary industrial standards, the results of the valve investigations were offered to NFPA for use in the development of voluntary industrial standards. The offer was accepted.

NFPA Draft No. 1 was prepared by OSU for review by the NFPA Hydraulic Valve Section. The Section reviewed Draft No. 1 at their 7-8 December 1971 meeting. Comments made at that meeting were incorporated into the draft by Earl Maroney and Draft No. 2 was developed. The Section reached consensus on the draft on 22 March 1972 and a Section Review Draft was prepared on 26 June 1972. The General Review Draft was prepared on 27 July 1972.

Due to the time involved in resolving comments, the Hydraulic Valve Section agreed to submit this proposal for a Second General Review. NFPA Headquarters Staff prepared a Second General Review Draft on 2 March 1979.

Technical comments of the Second General Review Draft were discussed and incorporated into the document at the 17 April 1980 Section Meeting. It was decided that the document be retyped and sent to the project group members for final review.

The document was reviewed by the project group and changes incorporated into the document. Headquarters prepared the Third General Draft on 16 October 1981. The Third General Review closed with negative comments. These comments were reviewed at the 16 March 1983 Project Group meeting and resolved.

At the 5 October 1983 Hydraulic Valve Section meeting the committee moved that the document be submitted to the Technical Board for approval to Ballot. The Technical Board granted approval to Ballot on 9 February 1984 and NFPA's Technical Staff prepared the document for Ballot on 22 March 1985.

Five negative ballots were received on the Ballot Draft. The negative ballots were resolved when the project group made editorial corrections to the document.

The Technical Board unanimously granted final approval on 8 May 1986 and recommended to the Board of Directors that the document be approved as an NFPA Recommended Standard and that after approval the document be submitted to B93 for promulgation as an ANSI standard.

The NFPA Board of Directors supported the Technical Board recommendation and granted final approval on 4 June 1986.

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Hydraulic fluid power — Valves — Method for determining the internal leakage characteristics

0 Introduction

In hydraulic fluid power systems, power is transmitted and controlled thru a liquid under pressure within an enclosed circuit. A hydraulic valve is often required to limit the flow thru a fluid conduit. A leakage characteristic of a fluid power valve defines how well the valve limits the flow into one of its work ports for a given valve control position. For example, the ability of a directional control valve to restrict cylinder travel when the work ports are considered blocked is often used to evaluate valves for a given application.

1 Scope and field of application

This Standard specifies procedures for the determination of leakage characteristics of any fluid power valve, and is intended to provide a uniform laboratory procedure for obtaining and reporting the fluid flow across a valve element which is considered blocked.

2 References

ANSI/B93.2, *Fluid power systems and products — Glossary.*

NFPAT2.10.1M, *Metric Units for Fluid Power Applications.*

ANSI/Y32.10, *Graphic Symbols for Fluid Power Diagrams.*

ISO 1219, *Graphical symbols for hydraulic and pneumatic equipment and accessories for fluid power transmission.*

ANSI/Y14.17, *Fluid Power Diagrams.*

3 Terms and definitions

For definitions of other terms used see ANSI/B93.2.

3.1 test pressures: The pressures specified at which leakage will be determined.

3.2 test port: The valve port for which leakage characteristics are desired or determined.

4 Units of measurement

4.1 The International System of Units (SI) is used in accordance with NFPAT2.10.1M.

4.2 Approximate conversion to Customary US units are shown in parentheses after their metric counterparts and are made in accordance with NFPAT2.10.1M.

5 Graphic symbols

Graphic symbols are used in accordance with ANSI/Y32.10.

6 Letter symbols

The following letter symbols are used in this standard:

T_1 is the time at which leakage measurements are started after pressurizing the subject port;

T_2 is the time at which leakage measurements are terminated after pressurizing the subject port.