NFPA Recommended Standard
NFPA/T3.21.8 R1-2008
3 September 2008

AN INDUSTRY STANDARD FOR FLUID POWER

Pneumatic fluid power — Measurement of response time — Directional control valves

[revision of ANSI/(NFPA)T3.21.8-1990 (R1997)]

This standard is to be used as an alternative to ISO 12238, which is recognized as the preferred method.

Descriptors: fluid power; pneumatic; valve, pneumatic; response time; valve, testing; valve, directional control.

published by
NATIONAL FLUID POWER ASSOCIATION, INC.
3333 N. Mayfair Road / Milwaukee, WI 53222-3219 USA
PHONE: +1 414 778 3344 / FAX: +1 414 778 3361 / E-mail: nfpa@nfpa.com

All standards, recommended practices, information reports, and bibliographies (collectively, “NFPA Documents”) are advisory only. Use thereof by anyone for any purpose is entirely voluntary and in any event without risk of any nature to the National Fluid Power Association (NFPA), its officers, directors or authors of such work. There is no agreement by or between anyone to adhere to any NFPA Document. In formulating and approving NFPA Documents, NFPA and/or its councils and committees will not investigate or consider citations, references or patents which may or may not apply to such subject matter since prospective users of such NFPA Documents alone are responsible for establishing necessary safeguards in connection with utilization of such matters, including technical data, proprietary rights or patentable materials.

The information and data contained in NFPA Documents has been obtained from sources believed to be reliable. However, it should not be assumed that all acceptable or applicable sources of information, procedures, methods or techniques are contained in NFPA Documents, or that additional measures may not be required under certain circumstances or conditions.

NFPA Documents and/or policies and procedures are subject to periodic review and may be changed without notice. NFPA Documents are only current as of their publication date. NFPA Documents, after publication, may be revised or withdrawn at any time and current information on all NFPA Documents may be received by calling or writing NFPA. Additionally, the various codes and regulations referenced in NFPA Documents may be amended from time to time and it should not be assumed that the versions referenced therein are the most current versions of such codes and regulations. Please consult the appropriate regulatory authorities for the most up-to-date versions.

NFPA Documents imply a consensus of those substantially concerned with their scope and provisions and are intended as a guide to aid the manufacturer, the consumer and the general public. The publication of NFPA Documents does not in any respect preclude anyone, whether they have participated in the development of or approved such NFPA Documents or not, from manufacturing, marketing, purchasing, or using of products, processes or procedures not conforming to the NFPA Documents. NFPA Documents do not constitute or indicate a warranty of any sort, express or implied, including but not limited to a warranty or representation as to quality, merchantability or fitness for a particular use or purpose.

Participation by federal agency representative(s) or person(s) affiliated with the industry is not to be interpreted as government or industry endorsement of an NFPA Document(s).

NOTICE

NFPA Documents do not express or imply any judgment, certification or endorsement of or with respect to, the safety, design or performance of any product, component, or its use.

NFPA does not examine, investigate, test, recommend, or certify the design, use or safety of any product or component, even those which may incorporate one or more NFPA Documents. NFPA Documents therefore have no application to and do not express or imply any recommendation, representation or warranty, with respect to the safety, design, use, performance, or functional interchangeability of components or products which incorporate NFPA Documents.

Foreword

This Foreword is not part of NFPA Recommended Standard *Pneumatic fluid power — Measurement of response time — Directional control valves*, NFPA/T3.21.8 R1-2008 [revision of NFPA/T3.21.8-1990 (R1997)].

At its 1 April 2004 meeting, the NFPA Technical Board recommended that NFPA/T3.21.8-1990 (R1997) be revised. At its 19 May 2004 meeting, NFPA/T3.21 appointed Rob Dickman (SMC Corporation of America) as project leader for the revision and asked him to prepare a TSP and first draft.

At the 8 June 2005 meeting, the group approved a motion to submit version 3 of the TSP to the NFPA Technical Board for approval, and to circulate draft no. 1 for general review. At its 11 August 2005 meeting, the NFPA Technical Board approved the TSP. NFPA/T3.21.8 R1-200x was circulated for general review on 8 March 2006. The voting resulted in five approval votes, no disapprovals, two abstentions, and one comment which was satisfactorily resolved.

At the 17 May 2006 joint meeting of NFPA/T3.21 and U.S. TAG to ISO/TC 131/SC 5/Pneumatic, a motion was approved to ask the NFPA Technical Board for permission to circulate the document for final ballot. The NFPA Technical Board gave such approval on 10 August 2006.

The document was circulated for final ballot on 7 August 2007 and closed on 21 September 2007. The NFPA ballot resulted in four approval votes, zero disapprovals and one abstention. No comments were received.

At the 19 September 2007 joint meeting of NFPA/T3.21 and U.S. TAG to ISO/TC 131/SC 5/Pneumatic, a motion was approved to ask the NFPA Technical Board for approval to publish the document. At its 10 January 2008 meeting, the Technical Board approved a motion to publish the document.

Project Group members who developed this standard:

Rob Dickman
Project Chairman
SMC Corporation of America.

James Rosenbury
Section Chairman
Nass Controls LP

Tom Wanke
Technical Auditor
Milwaukee School of Engineering

Carrie Tatman Schwartz
Industry/National Standards Development Manager
National Fluid Power Association

Introduction

In pneumatic fluid power systems, power is transmitted and controlled through a gas under pressure within an enclosed circuit. In some circumstances, the time required to charge or vent a volume of a pneumatic directional control valve is of importance to the fluid power system designer.

Pneumatic fluid power — Measurement of response time — Directional control valves

1 Scope and field of application

This standard is to be used as an alternative to ISO 12238, which is recognized as the preferred method.

This standard is intended:

— to include a standardized procedure for defining, determining and reporting the response time of electrically or pneumatically operated pneumatic directional control valves. The results are applicable only to compressed air at the pressure and temperature at which the test was conducted. Although the method contained can be applied to other gases, pressures or temperatures, these cases are outside the scope of this standard.

— to establish a standard definition of response time.

— to promote improved pneumatic fluid power systems by providing manufacturers and users with a standardized procedure for measurement of the dynamic performance of electrically or pneumatically operated pneumatic directional control valves.

— to establish a standard means of communicating these results.

2 Normative references

ISO 1000 (latest edition), *SI units and recommendations for the use of their multiples and of certain other units*

ISO 1219-1 (latest edition), *Fluid power systems and components — Graphic symbols and circuit diagrams — Part 1: Graphic symbols*

ISO 5598 (latest edition), *Fluid power systems and components — Vocabulary*

ISO 12238 (latest edition), *Pneumatic fluid power – Directional control valves – Measurement of shifting time*

3 Terms and definitions

For the purpose of this standard, the definitions given in ISO 5598 and the following apply.

3.1 response time: Time interval in which the pressure in a test chamber connected to an outlet port of a pneumatic directional control valve changes by 90 % between specified pressure levels in response to a change in the control signal to that valve.

3.2 test chamber: Vessel of measured volume capable of statically containing an imposed pressure.

3.3 output volume: Sum of the downstream volumes under test, composed of the test chamber, its connecting conductors, connectors and the pressure transducer.

NOTE Internal volume of the valve under test is not included.