



NFPA Recommended Standard  
**NFPA/T3.5.30-2008**  
14 August 2008

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AN INDUSTRY STANDARD FOR FLUID POWER

**Hydraulic fluid power –  
Solenoid operated directional control valves –  
Measurement of response time**

Descriptors: hydraulic fluid power measurement response time solenoid directional control valves

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## Foreword

This foreword is not part of National Fluid Power Association Recommended Standard *Hydraulic fluid power – Solenoid operated directional control valves – Measurement of response time*, NFPA/T3.5.30-2008.

At the 28 September 1976 Hydraulic valve section meeting (NFPA/T3.5), a project group was appointed to prepare a hydraulic valve response test Title, Scope and Purpose (TSP) for submission to the NFPA Technical Board.

The NFPA Technical Board approved the project TSP at the 10 November 1976 meeting. This activity was assigned project number NFPA/T3.5.30.

After several discussions by the members of the project group, the scope was revised on 9 May 1979 to limit the type of valve to hydraulic directional valves and to expand the scope to include electrically, hydraulically or pneumatically operated hydraulic directional valves. The Technical Board approved the revised TSP on 16 November 1979.

A working draft of NFPA/T3.5.30 was written 26 October 1981, based on NFPA/T3.21.8, Pneumatic valve response test document.

At the 5 October 1983 project group meeting, members agreed to limit the scope to electrically operated valves to reduce the complexity of the document. Draft no. 1, dated 19 September 1984, included this limitation along with other changes.

Draft no. 2, dated 5 March 1986, refined the previous draft with several editorial changes.

On 30 September 1986, project group members agreed to submit the document for general review with minor editorial changes. On 1 October 1986, NFPA/T3.5 members approved general review circulation.

Draft no. 3, dated 8 January 1987, included the 30 September 1986 changes and was submitted to NFPA Headquarters on 19 January 1987. Headquarters prepared the document for general review on 14 August 1987.

The first general review netted negative comments from 11 members. Several changes were made to the document to accommodate the negative responses.

At the 8 April 1992 Hydraulic valve section meeting, the document was approved for a second general review. The second general review document was submitted to NFPA Headquarters on 29 July 1992. Headquarters prepared the document for second general review on 25 August 1992.

At the 21 May 1997 project group meeting, the document was circulated and reviewed. Comments were discussed.

On 23 January 1998, Draft no. 4 was distributed for comments to be discussed at the 11 February 1998 project group meeting.

At the 11 February 1998 group project meeting, members agreed that the document was to be revised and draft no. 5 was reviewed at the 20 May 1998 project group meeting.

On 31 August 1998, Project Chair Cooper developed draft no. 6.

Corrections were made and draft no. 7 was distributed at the 10 February 1999 project group meeting, for review and recommendation for a fourth general review.

On 10 February 1999, project group members met and discussed whether response testing should be under a dynamic condition (full flow across spool) or under static flow condition (load valve closed; single flow path). The document was revised to show pressure transducer on the inlet or service port, as appropriate for the spool type being tested. Mr. Cooper made corrections to the document for distribution of draft no. 8 at the next meeting.

At the 19 May 1999 project group meeting, members reviewed draft no. 8 and made additional changes. A motion was made to circulate the fourth general review. Comments were discussed at the September 1999 meeting.

On 22 September 1999, project group members met, discussed comments received from the 4 August 1999 fourth general review and made changes to the document. Members continued to discuss the 4 August 1999 fourth general review comments at the February 2000 meeting.

On 9 February 2000, project group members continued discussion of the fourth general review comments. NFPA/T3.5 members agreed to circulate the document for fifth general review.

The document was circulated for fifth general review on 26 April 2000, and comments were incorporated into the document. At the 19 September 2001 project group meeting, a motion was approved to circulate the document for sixth general review.

The document was circulated for sixth general review on 10 December 2001 and closed on 10 January 2002. Comments were successfully resolved and the resulting changes were incorporated into the final ballot draft. At the 8 June 2005 joint meeting of NFPA/T3.5 and U.S. TAG to ISO/TC 131/SC 5/WG 2, a motion was approved to circulate the document for final ballot. The NFPA Technical Board gave its permission to circulate the document for final ballot on 12 April 2007.

The document was circulated for final ballot on 6 July 2007 and closed on 6 August 2007. The voting resulted in nine approval votes and no disapprovals or abstentions. The comments were satisfactorily resolved and permission to publish NFPA/T3.5.30-200x was granted by the NFPA Technical Board on 14 August 2008.

Project group members who developed this standard:

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/cts

## **Introduction**

In hydraulic power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Hydraulic valves can be used to control the direction of the working fluid through the circuit. For some applications, the time required to change the direction of the fluid by energizing or de-energizing the solenoid valve is important to the fluid power system designer.

# Hydraulic fluid power – Solenoid operated directional control valves – Measurement of response time

## 1 Scope

1.1 This standard includes a standardized procedure for defining, measuring and reporting the response time of hydraulic solenoid operated directional control valves with minimum influence from the system. Valves included are electrically controlled, either directly or with a direct-mounted pilot valve, excluding servo and proportional valves.

1.2 This standard is intended to:

- a) establish a standard definition of response time;
- b) provide a uniform basis to manufacturers and users of hydraulic fluid power systems for measuring and comparing the response time of hydraulic fluid power solenoid operated directional valves;
- c) establish a standard means for presenting the results of response time measurements.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this NFPA document. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this NFPA document are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referenced applies. NFPA maintains registers of currently valid NFPA and ANSI/(NFPA) Standards. Standards development organization contact information and links can be found on the NFPA website ([www.nfpa.com](http://www.nfpa.com)).

ANSI/(NFPA)T2.12.1 (*latest edition*), *Hydraulic fluid power – Systems and products – Method of measuring average steady-state pressure (to be used in conjunction with ANSI/(NFPA)T2.12.10)*.

ANSI/(NFPA)T2.12.10 (*latest edition*), *Recommended practice – Hydraulic fluid power – Systems and products – Testing general measurement principles and tolerances (to be used in conjunction with ANSI/(NFPA)T2.12.1)*.

IEEE/ASTM SI 10 (*latest edition*), *Standard for Use of the International System of Units (SI): The Modern Metric System*.

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 3448 (*latest edition*), *Industrial liquid lubricants – ISO viscosity classification*.

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