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(R2004)
Third edition
17 April 1997

Hydraulic fluid power – Positive displacement pumps, motors, and integral transmissions – Method of testing and presenting basic performance data

(Revision of ANSI/(NFPA)T3.9.17 R1-1990)

A NATIONAL INDUSTRY STANDARD FOR FLUID POWER

Approved by Committee ASC B93,
accredited by the American National Standards Institute (ANSI)

Descriptors: hydraulic fluid power, hydraulic equipment, hydraulic transmission, pumps, positive displacement pumps, hydraulic motors, tests, performance tests

Developed and published by

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Any part of this standard may be quoted. Credit lines should read: Extracted from the national industry standard ***Hydraulic fluid power – Positive displacement pumps, motors, and integral transmissions – Method of testing and presenting basic performance data*, ANSI/(NFPA)T3.9.17 R2-1997 (R2004).**

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Foreword

This Foreword is not part of American National Standard *Hydraulic fluid power — Positive displacement pumps, motors and integral transmissions — Method of testing and presenting basic performance data* (Revision of ANSI/(NFPA)T3.9.17 R1-1990), ANSI/(NFPA)T3.9.17 R2-1997.

At the T3.9 meeting on 18 August 1992 it was decided to form a project group to harmonize T3.9.17 R1 with ISO 4409. ISO 4409 includes pumps, motors and transmissions. T3.9.17 R1 deals with pumps only but has inlet requirements better identified. John Jones (Parker Hannifin Corp.) agreed to serve as project chairman.

The TSP was approved by the Technical Board on 21 January 1993. At the 16 November 1993 T3.9 meeting Project Chairman Jones distributed Draft No. 1 and ISO 4409 for comments. At the 24 May 1994 T3.9 meeting it was recommended that the document out for General Review after the comments were incorporated into the document.

Project Chairman Jones sent the revised document to Headquarters and the document was sent out for General Review on 1 November 1994. The General Review closed with comments from two companies. After the General Review closed comments were also received from two additional companies.

At the 23 May 1995 T3.9 meeting, Project Chairman Jones stepped down as Project Chairman. Richard Klimaszewski (Denison Hydraulics) agreed to serve as Project Chairman. At the 19 September 1995 Project Group meeting the document was revised. At the 13 February 1996 meeting of T3.9 additional changes were made to the document and it was decided to send the document to the Technical Board for approval to Ballot.

In May of 1996 letters were sent out to the commentators from the General Review. All comments were signed off on by the end of June 1996. On 26 June 1996 and on 6 August 1996 letters from Project Chairman Klimaszewski were sent to Headquarters with changes to the document.

The document was granted approval to Ballot at the 15 August 1996 Technical Board meeting. The document was sent out for Ballot on 27 August 1996. Balloting closed with no negative votes.

The document was granted final approval at the 5 December 1996 Technical Board meeting.

Project Group Members who developed this standard:

Richard Klimaszewski
Section Chairman and
Project Chairman
Denison Hydraulics

John Jones**
Past Project Chairman
Parker Hannifin Corp.

Gary Smith
Past Section Chairman
Robert Bosch Fluid Power

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* Retired

** Company affiliation has changed

On 17 December 1996 ANSI/(NFPA)T3.9.17 R2 was submitted to ANSI Committee B93 for Ballot. Balloting closed with no negative ballots. This document was granted final approval on 17 April 1997.

The membership roster of Standards Committee B93 at the time of Ballot:

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Jack Walrad
Tom Wanke
James C. White
Frank Yeaple

*Retired

/jmf

On 29 June 2004, ANSI/(NFPA)T3.9.17 R2-1997 was submitted to ANSI Committee B93 for ballot to reaffirm the document. Balloting closed on 13 August 2004 with no negative votes.

ANSI/(NFPA)T3.9.17 R2-1997 (R2005) was approved by ANSI's Board of Standards Review on 15 December 2004.

The membership roster of Standards Committee B93 at the time of ballot:

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Scott Cedarquist

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/jw

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Pumps are components which convert rotary mechanical power into hydraulic fluid power. Motors are components which convert hydraulic fluid power into rotary mechanical power. Integral transmissions (hydraulic drive units) are a combination of one or more hydraulic pumps and motors and appropriate controls forming a component.

With very few exceptions, all hydraulic fluid power pumps and motors are of the positive displacement type, i.e. they have internal sealing means which make them capable of maintaining a relatively constant ratio between rotational speed and fluid flow over wide pressure ranges. They generally use gears, vanes or pistons. Nonpositive displacement components, such as centrifugal or turbine types, are seldom associated with hydraulic fluid power systems.

Pumps and motors are available either as “fixed” or ”variable” displacement types. Fixed displacement units have preselected internal geometries which maintain a relatively constant volume of liquid passing through the component per revolution of the components shaft. Variable displacement components have means for changing the internal geometries so that the volume of liquid passing through the component per revolution of the components shaft can be changed.

Hydraulic fluid power — Positive displacement pumps, motors, and integral transmissions — Method of testing and presenting basic performance data

1 Scope

This standard specifies methods for determining the performance and efficiency of hydraulic fluid power positive displacement pumps, motors and integral transmissions. It applies to components having continuously rotating shafts.

This standard describes requirements for test installations, test procedures (under steady-state conditions) and the presentation of test results.

Annex A gives guidance as to the use of practical units for the expression of results.

Annex B contains information on errors and classes of measurement accuracy. The measurement accuracy is divided into three classes: A, B and C.

Annex C provides a pretest checklist of those items on which agreement is recommended between the parties concerned.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. NFPA maintains registers of currently valid NFPA/ANSI standards.

ISO 31-0:1992, *Quantities and units — Part 0: General principles.*

ISO 31-1:1992, *Quantities and units — Part 1: Space and time.*

ISO 31-2:1992, *Quantities and units — Part 2: Periodic and* related phenomena.

ISO 31-3:1992, *Quantities and units — Part 3: Mechanics.*

ISO 31-11:1992: *Quantities and units — Part 11: Mathematical* signs and symbols for use in the physical sciences and technology.

ISO 1219-1:1991, *Fluid power systems and components — Graphic* symbols.

ISO 4391:1983, *Hydraulic fluid power — Pumps, motors and integral* transmissions — Parameter definitions and letter symbols.

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

IEC Publication 34-2, *Rotating electrical machines — Part* 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles).

IEC Publication 51, *Recommendation for direct acting indicating* electrical measuring instruments and their accessories.