
**Hydraulic fluid power — Electrically
controlled hydraulic pumps — Test
methods to determine performance
characteristics**

*Transmissions hydrauliques — Pompes hydrauliques à commande
électrique — Méthodes d'essai pour déterminer les caractéristiques de
fonctionnement*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST ISO 17559:2005](https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005)

[https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-
f7face643d66/sist-iso-17559-2005](https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005)



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST ISO 17559:2005](https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005)

<https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005>

© ISO 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

	Page
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols	2
5 Test installation — General requirements	2
5.1 General	2
5.2 General test apparatus	4
6 General test conditions	5
6.1 Test fluid	5
6.2 Ambient conditions	5
6.3 Steady-state conditions	5
7 Tests of steady-state performance characteristics	5
7.1 General	5
7.2 Flow/pressure characteristics	5
7.3 Characteristic test on output pressure against input pressure command signal: test procedure and presentation of test results	7
7.4 Characteristic test of output flow against input flow signal — Test procedure and expression of test results	8
7.5 Repeatability test	9
7.6 Test for change in characteristics against oil temperature	12
8 Tests of dynamic performance characteristics	13
8.1 General	13
8.2 Pressure compensator response and recovery	13
8.3 Test of step response versus output pressure — Test procedure and presentation of test results	14
8.4 Test of step response versus output flow — Test procedure and presentation of test results	15
8.5 Frequency response	16
Annex A (normative) Classes of measurement accuracy	19
Bibliography	20

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17559 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 8, *Product testing*.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST ISO 17559:2005](https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005)

<https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005>

Introduction

This International Standard is intended to unify testing methods of positive-displacement electrically and electronically controlled hydraulic pumps so as to allow comparison of the performance of different components.

Requirements for test installations, procedures and expression of results are described.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST ISO 17559:2005](https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005)

<https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST ISO 17559:2005

<https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005>

Hydraulic fluid power — Electrically controlled hydraulic pumps — Test methods to determine performance characteristics

1 Scope

This International Standard specifies methods for determining the steady-state performance characteristics and dynamic performance characteristics of positive-displacement electrically and electronically controlled hydraulic pumps (hereafter referred to as “pump” or “pumps”), so as to allow comparison of the performance of different components.

Pumps covered by this International Standard have the capacity to affect changes in the output flow or pressure in proportion to the electrical or electronic input signals. These pumps can be of the load-sensing control type, servo-control type, or electrical variable displacement mechanism type, which control output flow and output pressure by feedback using electrical signals.

The accuracy of measurement is divided into three classes, A, B and C, which are explained in Annex A.

2 Normative references [\(standards.iteh.ai\)](http://standards.iteh.ai)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3448, *Industrial liquid lubricants — ISO viscosity classification*

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

ISO 4406, *Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles*

ISO 4409, *Hydraulic fluid power — Positive displacement pumps, motors and integral transmissions — Determination of steady-state performance*

ISO 5598, *Fluid power systems and components — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 and the following apply.

3.1

electrically controlled hydraulic pump

variable displacement pump which is capable of controlling the pressure or flow rate, or the pressure and flow rate corresponding to an input signal

3.2

minimum flow command

minimum input flow command signal needed to maintain the maximum working pressure

3.3 minimum controllable pressure

minimum output pressure when the absolute value of the input pressure command signal is zero and the input flow command signal is maximum (see 7.2.4)

3.4 dead zone

range wherein the output pressure or output flow being controlled by the input signal does not vary when the absolute value of the input signal increases from zero or decreases to zero

3.5 load volume

gross volume of working fluid in the main pipelines from the outlet of the pump to be tested to the inlet of the loading valve

3.6 pressure compensation

condition in which the output flow starts to decrease by the variable displacement control mechanism when the output pressure approaches a set pressure

3.7 deadhead pressure

output pressure without flow

4 Symbols

iTeh STANDARD PREVIEW
(standards.iteh.ai)

4.1 The physical quantity letter symbols and their suffixes used in this International Standard (see Table 1), are fully explained in ISO 4391.

Units are given in Table 1 and Annex A.
<https://standards.iteh.ai/catalog/standards/sist/ed72fe7f-2b90-48e3-8f8e-f7face643d66/sist-iso-17559-2005>

4.2 Graphical symbols used in Figures 1 and 2, showing test circuit diagrams, conform to ISO 1219-1 and ISO 1219-2.

Table 1 — Symbols and units

Quantity	Symbol	Dimension ^a	SI unit
Power	<i>P</i>	M L ² T ⁻³	W
Pressure, differential pressure	<i>p, Δp</i>	M L ⁻¹ T ⁻²	MPa
Flow rate	<i>q</i>	L ³ T ⁻¹	dm ³ /min
Rotational speed	<i>n</i>	T ⁻¹	min ⁻¹

^a M = mass, L = length, T = time.

5 Test installation — General requirements

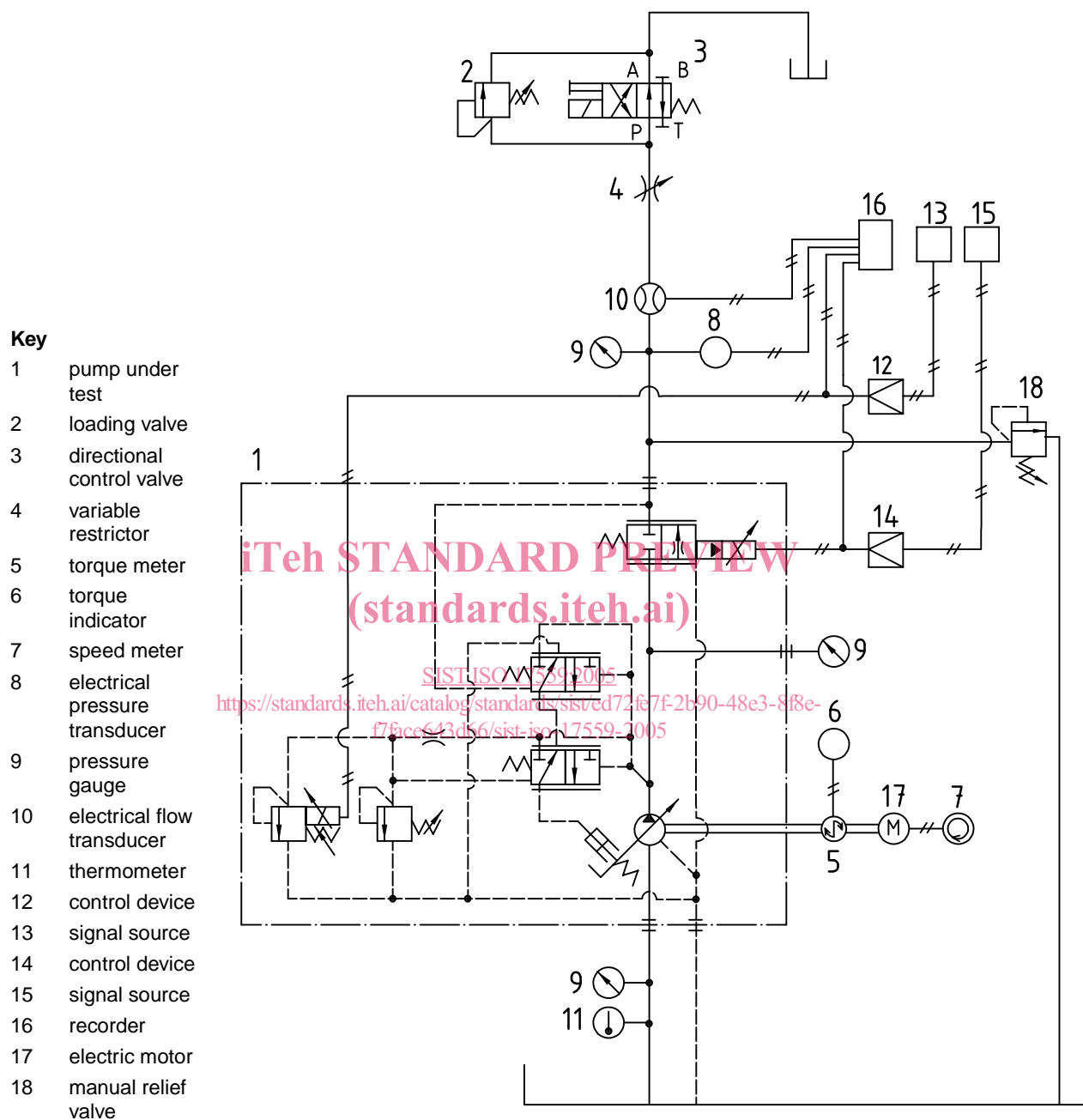
5.1 General

5.1.1 Unless otherwise specified, install the pump with the output shaft horizontal and the drain port facing upwards.

5.1.2 Use a hydraulic test circuit conforming to Figure 1 for test pumps having a pressure control valve to control the pressure in the pressure-compensation state and a flow control valve to control the output flow.

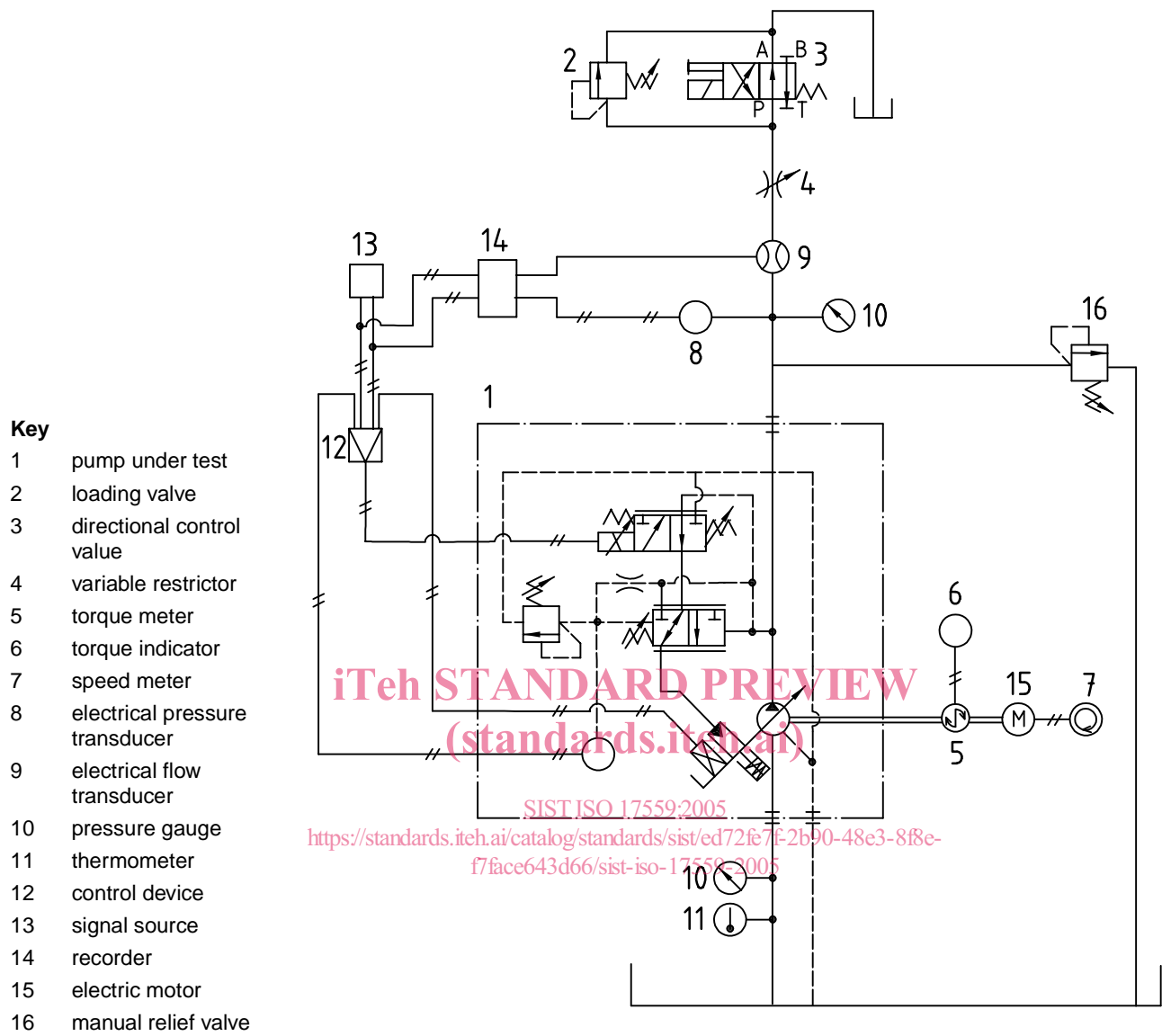
5.1.3 Use a hydraulic test circuit conforming to Figure 2 for test pumps that utilize electrical input signals to control the pressure in the pressure-compensation state and either the position or angle of the mechanism to vary the displacement of the pump.

5.1.4 For applications where the pump will be part of a closed-loop control system it may be necessary to perform a frequency response test. Subclause 8.5 describes a pump test method. The need for the test should be agreed between the customer and manufacturer.



NOTE Details of the pump control valves are for illustration only.

Figure 1 — Pump with pressure-compensation control valve and flow control valve to control output flow



NOTE Details of the pump control valves are for illustration only.

Figure 2 — Pump with electrical input signals to control pressure-compensation and either the position or angle of the mechanism to vary displacement

5.2 General test apparatus

5.2.1 Set up a test rig conforming to 5.1.1 to 5.1.3 and Figures 1 and 2 as applicable.

5.2.2 Maintain the loading valve and variable restrictor in the test circuit at no loading and no restriction except for the conditions specified in the test procedure. If the loading valve is operated, open the variable restrictor completely and adjust the directional control valve so that the P port is closed. If the variable restrictor is operated, adjust the directional control valve so that the P port opens to the A port.

5.2.3 Set the manual relief valve integrated with the pump for safety purposes to limit the maximum steady-state pressure to no less than 125 % of the maximum working pressure setting.

6 General test conditions

6.1 Test fluid

6.1.1 The hydraulic fluid type and viscosity shall conform to ISO VG 32 or ISO VG 46 according to ISO 3448.

6.1.2 Maintain the fluid temperature at the pump inlet in the range of 45 °C to 55 °C.

6.1.3 Maintain the fluid contamination class within 19/16 or less according to ISO 4406.

Conditions other than those indicated in this subclause should be agreed between the supplier and purchaser.

6.2 Ambient conditions

The ambient temperature and any variation from still air conditions shall be recorded.

6.3 Steady-state conditions

Take each set of measurements only when the values of the controlled parameters are within the limits given in Table 2.

Table 2 — Limits of permissible variation in the values of controlled parameters

Controlled parameter	Limits of permissible variation in the values of controlled parameters for class of measurement accuracy ^a		
	A	B	C
Temperature, °C	± 0,5	± 1	± 2
Rotational speed, %	± 0,5	± 1	± 2
Input signal, %	± 0,5	± 1,5	± 2,5

^a See Annex A.

7 Tests of steady-state performance characteristics

7.1 General

7.1.1 The test circuit and measuring circuit shall conform to Figures 1 or 2 as applicable.

NOTE In addition to the internal control pressure supply as shown in Figure 2, it is possible to use an external control pressure supply.

7.1.2 Adjust the electric motor to the specified rotational speed.

7.1.3 The steady-state performance shall be determined in accordance with ISO 4409.

7.1.4 For pumps in accordance with Figure 2, the swivel angle or stroke in percent of the maximum value may be used as an alternative to the output flow.

7.2 Flow/pressure characteristics

7.2.1 Use the pump having pressure control and flow control functions.