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Hydraulik – Elektriskt styrda riktningsventiler för hydraulik – Del 1: Provningsmetoder för fyrports riktningsventiler för flödesstyrning (ISO 10770-1:2009, IDT)

Hydraulic fluid power – Electrically modulated hydraulic control valves – Part 1: Test methods for four-port directional flow-control valves (ISO 10770-1:2009, IDT)

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Den internationella standarden ISO 10770-1:2009 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 10770-1:2009.

Denna standard ersätter SS-ISO 10770-1, utgåva 1.

The International Standard ISO 10770-1:2009 has the status of a Swedish Standard. This document contains the official English version of ISO 10770-1:2009.

This standard supersedes the Swedish Standard SS-ISO 10770-1, edition 1.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00.
Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), tel +46 8 555 520 00.
Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

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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 10770-1 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 8, *Product testing*.

This second edition cancels and replaces the first edition (ISO 10770-1:1998), which has been technically revised.

ISO 10770 consists of the following parts, under the general title *Hydraulic fluid power — Electrically modulated hydraulic control valves*:

— *Part 1: Test methods for four-port directional flow-control valves*

— *Part 2: Test methods for three-way directional flow control valves*

— *Part 3: Test methods for pressure control valves*

Introduction

This part of ISO 10770 has been prepared with the intention of improving the uniformity of valve testing and hence the consistency of recorded valve performance data so that these data can be used for system design, regardless of the data source.

Hydraulic fluid power — Electrically modulated hydraulic control valves —

Part 1:
Test methods for four-port directional flow-control valves

1 Scope

This part of ISO 10770 describes methods for determining the performance characteristics of electrically modulated, hydraulic, four-port directional flow-control valves. This type of electrohydraulic valve controls the direction and flow in a hydraulic system.

2 Normative references

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 1219-1, *Fluid power systems and components — Graphic symbols and circuit diagrams — Part 1: Graphic symbols for conventional use and data-processing applications*

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

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

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

ISO 6743-4, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

ISO 9110-1, *Hydraulic fluid power — Measurement techniques — Part 1: General measurement principles*

ISO 10771-1, *Hydraulic fluid power — Fatigue pressure testing of metal pressure-containing envelopes — Part 1: Test methods*

IEC 60617-DB-12M, *Graphical symbols and diagrams*

3 Terms, definitions, symbols and units

3.1 Terms and definitions

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

3.1.1
electrically modulated, hydraulic directional flow-control valve
valve that provides a degree of proportional flow control in response to a continuously variable electrical input signal

NOTE The flow direction can be changed by the input signal.

3.1.2
input signal deadband
portion of input signal that does not produce a controlled flow

3.1.3
threshold
change of input signal required to produce a reversal in continuous control valve output

NOTE The threshold is expressed as a percentage of rated signal.

3.1.4
rated input signal
that signal defined by the manufacturer to achieve rated output

3.2 Symbols and units

For the purposes of this document, the symbols given in Table 1 apply.

NOTE The graphic symbols in this part of ISO 10770 conform to ISO 1219-1 and IEC 60617-DB-12M.

Table 1 — Symbols and units

Parameter	Symbol	Unit
Inductance	L_c	H
Insulation resistance	R_i	Ω
Insulation test current	I_i	A
Insulation test voltage	U_i	V
Resistance	R_c	Ω
Dither amplitude	—	% (of max. input signal)
Dither frequency	—	Hz
Input signal	I, or U	A, or V
Rated input signal	I_n, or U_n	A, or V
Output flow	q	l/min
Rated flow	q_n	l/min
Flow gain	$K_v = (\Delta q/\Delta I)$, or $K_v = (\Delta q/\Delta U)$	l/min/A, or l/min/V
Hysteresis	—	% (of max. output signal)
Internal leakage	q_l	l/min
Supply pressure	p_P	MPa (bar)
Return pressure	p_T	MPa (bar)

Table 1 (*continued*)

Parameter	Symbol	Unit
Load pressure	p_A or p_B	MPa (bar)
Load pressure difference	$p_L = p_A - p_B$, or $p_L = p_B - p_A$	MPa (bar)
Valve pressure drop	$p_V = p_P - p_T - p_L$	MPa (bar)
Rated valve pressure drop	p_n	MPa (bar)
Pressure gain	$K_p = (\Delta p_L / \Delta I)$, or $K_p = (\Delta p_L / \Delta U)$	MPa (bar)/A MPa (bar)/V
Threshold	—	% (of max. input signal)
Amplitude (ratio)	—	dB
Phase lag	—	°
Temperature	—	°C
Frequency	f	Hz
Time	t	s
Time constant	t_c	s
Linearity error	q_{err}	l/min

4 Standard test conditions

Unless otherwise specified, tests shall be carried out using the standard test conditions given in Table 2.

Table 2 — Standard test conditions

Parameter	Condition
Ambient temperature	20 °C ± 5 °C
Fluid cleanliness	Solid contaminant code number shall be stated in accordance with ISO 4406.
Fluid type	Commercially available mineral-based hydraulic fluid (i.e. L - HL in accordance with ISO 6743-4 or other fluid with which the valve is able to operate)
Fluid viscosity	32 cSt ± 8 cSt at valve inlet
Viscosity grade	Grade VG32 or VG46 in accordance with ISO 3448
Pressure drop	Test requirement ± 2,0 %
Return pressure	Shall conform to the manufacturer's recommendations

5 Test installation

A test installation conforming to the requirements of Figure 1 shall be used for testing all valves.

SAFETY PRECAUTIONS — It is essential that consideration be given to the safety of personnel and equipment during the tests.

Figure 1 shows the minimum items required to carry out the tests without any safety devices to protect against damage in the event of component failure. For tests using the test circuit shown in Figure 1, the following apply.

a) Guidance on carrying out the tests is given in Annex A.

b) A separate circuit may be constructed for each type of test. This can improve the accuracy of test results as it eliminates the possibility of leakage through the shut-off valves.

c) Hydraulic performance tests are carried out on a combination of valve and amplifier. Input signals are applied to the amplifier and not directly to the valve. For electrical tests, the signals are applied directly to the valve.