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Industrial valves - Actuators - Part 4: Hydraulic part-turn actuators for industrial valves - Basic requirements

Industriearmaturen - Antriebe - Teil 4: Hydraulische Schwenkantriebe für Industriearmaturen - Grundanforderungen

Robinetterie industrielle - Actionneurs - Partie 4 : Actionneurs hydrauliques à fraction de tour pour robinetterie industrielle - Prescriptions de base

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 15714-4:2009) has been prepared by Technical Committee CEN/TC 69 “Industrial valves”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2010, and conflicting national standards shall be withdrawn at the latest by April 2010.

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1 Scope

This document provides basic requirements for hydraulic part-turn valve actuators, both double acting and single acting, used for on-off and modulating control duties. It includes guidelines, recommendations and methods for enclosure and corrosion protection, control and testing.

It does not apply, to hydraulic actuators that are integral parts of control valves or to electro-hydraulic actuators.

Other requirements or conditions of use different from those indicated in this document should be subject to negotiations between the purchaser and the manufacturer/supplier prior to order.

The terms and definitions applicable to this European Standard are given in EN 15714-1.

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.

EN 12570, *Industrial valves — Method for sizing the operating element*

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 5211, *Industrial valves — Part-turn valve actuator attachments (ISO 5211:2001)*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227:2006)*

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

ISO 5599-2, *Pneumatic fluid power — Five-port directional control valves — Part 2: Mounting interface surfaces with optional electrical connector*

ASME B1.20.1:1983, *Pipe Threads, General Purpose (Inch)*

3 Classification and designation

3.1 General

Hydraulic part-turn actuators are designated by function, action and interface as detailed below.

3.2 Action

a) Double Acting (DA)

b) Single Acting (SA) with spring action to move clock-wise (CW) or counter clock-wise (CCW), as per 4.10.4

3.3 Valve actuator attachment

As per EN ISO 5211.

3.4 Motive energy

3.4.1 Operating medium

The operating medium shall be hydraulic fluid.

The fluid may be used, on agreement between the manufacturer/supplier and purchaser, ensuring it is designed for both pressure and compatible with internal actuator parts and lubricants.

The flashpoint shall be of not less than 93 °C for pressures below 1 MPa and 157 °C for pressures above 1 MPa.

The chemical and physical properties of the hydraulic fluid shall be suitable for use with the materials used in the design of the actuator and its accessories.

The hydraulic fluid shall be suitable for operation of the hydraulic system through the entire temperature range to which it may be subjected in service.

3.4.2 Quality

The operating medium shall have a contamination level specified to ISO 4406 class 18/16/13 as a maximum.

3.4.3 Pressure

The manufacturer/supplier shall indicate the actuator's operating pressure limits.

The minimum design pressure for pressure retaining parts shall be 1,1 times the maximum allowable pressure selected from the values defined in 4.3.1. The test pressure condition shall be considered in the design of the actuator for pressure containing parts, see 4.10.5.

Working pressure in accordance to manufacturer/supplier indication (as per 4.3.1).

The test pressure applied to the pressure retaining parts shall be a minimum of 1,43 times the design pressure for steel enclosures and a minimum of twice the maximum working pressure for cast steel and spheroidal cast iron enclosures

Hydrostatic testing shall be carried out at testing pressure.

4 Design requirements

4.1 General

The following data shall be provided by the manufacturer/supplier to enable correct actuator selection and performance evaluation.

4.2 Output torques (performance test)

The guaranteed minimum, output torque capability of the actuator, in both directions, at specified operating pressures shall be provided by the manufacturer/supplier.

Where the output torque varies with the rotation, in a non-linear relationship, tabulated data and/or torque curves shall be provided.

4.3 Pressure ratings and endurance

4.3.1 Pressure ratings

Actuators shall be designed to operate with one of the following maximum allowable pressures.

Table 1 — Maximum allowable pressure

Maximum allowable pressure		
MPa	bar	psi
5,5	55	800
10,3	103	1 500
20,7	207	3 000
34,5	345	5 000

4.3.2 Endurance

The actuator shall be designed to have a minimum endurance, without maintenance, in accordance with values given in Table 2. These are based of at least 60 % of the run torque at a rated working pressure supplied by the operating medium defined in 3.4.1 (Motive Energy) and in accordance with the test procedure detailed in Annex A.

Table 2 — Minimum number of cycles — Endurance test

Rated torque [a] Nm	Piston or vane actuator Minimum number of cycles [b c]	Maximum stroking time for testing, based on 0-90° s
≤ 125	50 000	10
≤ 1 000	50 000	20
≤ 2 000	25 000	30
≤ 8 000	10 000	45
≤ 32 000	2 500	60
≤ 63 000	2 500	90
≤ 125 000	2 500	120
≤ 250 000	2 500	150

[a] Based on EN ISO 5211.

[b] One cycle consists of nominal 90° angular travel in both directions (i.e. 90° to open + 90° to close).

For angular travel other than 90°, the endurance shall be agreed between the purchaser and the manufacturer/supplier.

[c] For severe control service duty these values shall be agreed between manufacturer/supplier and purchaser.

4.4 Minimum moving pressure

The actuator minimum moving pressure, at ambient temperature, shall be made available, by the manufacturer/supplier upon request.

4.5 Leakage

The actuator shall be pressure tested in two stages by applying pressures of 15 to 25 % and a minimum of 143 % of the maximum allowable pressure of the actuator.

The actuator shall have no visible external leakage as detailed in Table 8 for the duration of the production test.

The test media shall be specified by the manufacturer.

The test media always shall be compatible with the operation media of the supplied actuator.

The minimum test duration for each test pressure shall be 3 minutes. The test period shall not begin until the test pressure has been reached and has stabilised. The tests gauge pressure reading and time at the beginning and the end of each pressure holding period shall be recorded.

4.6 Moving time

The actuator manufacturer/supplier shall state the moving time in both directions, without external load and without valve at working pressure and without any significant external restriction on supply flow, unless otherwise specified.

4.7 Angle

Part-turn actuators without adjustable end-stops shall be designed for an output movement of 90° (- 0°, + 2°) as standard.

For part-turn actuators with adjustable end-stops and a standard nominal output movement of 90°, the adjustment range shall be stated by the manufacturer/supplier and shall be, at least, ± 3°.

Other angles are subject to agreement between the manufacturer/supplier and purchaser.

4.8 Fluid displacement volume

The manufacturer/supplier shall indicate the internal actuator displaced volume (litres) for both directions, including the dead volumes.

4.9 Environmental conditions

4.9.1 Ambient temperature

The actuator shall be designed for operation at an ambient temperature range between – 20 °C and + 60 °C, unless otherwise agreed between the manufacturer/supplier and purchaser.

4.9.2 Enclosure protection

The non pressurised enclosure of the actuator shall be at least IP 65, according to EN 60529.

4.9.3 Corrosion protection

Hydraulic actuators shall be protected against external corrosion by proper material selection and/or surface treatment. The actuator manufacturer's technical documentation shall specify the corrosion protection category according to Table 3.