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Industrijski ventili - Pogoni - 3. del: Pnevmatični pogoni z delnim zasukom za industrijske ventile - Osnovne zahteve

Industrial valves - Actuators - Part 3: Pneumatic part-turn actuators for industrial valves - Basic requirements

Industriearmaturen - Antriebe - Teil 3: Pneumatische Schwenkantriebe für Industriearmaturen - Grundanforderungen

Robinetterie industrielle - Actionneurs - Partie 3 : Actionneurs pneumatiques à fraction de tour pour robinetterie industrielle - Prescriptions de base

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Industrial valves - Actuators - Part 3: Pneumatic part-turn actuators for industrial valves - Basic requirements

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Foreword

This document (EN 15714-3:2009) 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of an identical text or by endorsement, at the latest by April 2010, and conflicting national standards shall be withdrawn at the latest by April 2010.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 pneumatic 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 pneumatic actuators which are integral parts of control valves.

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 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/Designation

3.1 General

Part-turn valve actuators are classified by 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 4.5.4

3.3 Actuator attachment

As per EN ISO 5211.

3.4 Performance data

3.4.1 Output torques

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

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

3.4.2 Minimum moving pressure

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

3.4.3 Operating time

The actuator manufacturer/supplier shall state the minimum operating time in both directions, without external load, at nominal pressure and without any significant external restriction on supply flow rate and exhaust.

3.4.4 Air volume

The manufacturer/supplier shall state the internal actuator displaced volume (litres) for both directions, including the dead volumes (see Clause 8).

3.4.5 Motive energy

3.4.5.1 Operating medium

The operating medium should be compressed air, unless otherwise specified.

Other compressed gases or pressurised fluids may be used, on agreement between the manufacturer/supplier and purchaser, ensuring they are compatible with internal actuator parts and lubricants.

3.4.5.2 Quality

The operating medium shall have a dew point equal to – 20 °C or, to be at least, 10 °C below the ambient temperature (ISO 8573-1, Class 3). The maximum particle size shall not exceed 40 µm (ISO 8573-1, Class 5).

3.4.5.3 Pressure

The manufacturer/supplier shall indicate the actuator's pressure limits. The maximum allowable pressure shall be at least 0,8 MPa (8 bar), unless otherwise specified. The minimum test pressure for pressurised parts shall be 1,43 times the maximum allowable pressure.

4 Design requirements

4.1 Endurance of part-turn actuators

The actuator shall be designed to have a minimum endurance, without maintenance, in accordance with values given in Table 1. These are based on a load of at least 60 % of the run torque at 0,55 MPa ≅ 5,5 bar supply pressure and in accordance with the test procedure detailed in Annex A.

Table 1 — Minimum number of cycles — Endurance test

Nominal torque [a] Nm	Piston or vane actuator Minimum number of cycles [b]	Maximum stroking time for testing, based on 0-90° s
≤ 125	500 000 [c]	3
≤ 1 000	500 000	5
≤ 2 000	250 000	8
≤ 8 000	100 000	15
≤ 32 000	25 000	20
≤ 63 000	10 000	30
≤ 125 000	5 000	45
≤ 250 000	2 500	60

[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 thermoplastic actuators the minimum number of cycles shall be 250 000.

4.2 Leakage

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

The test pressure shall be at least nominal pressure (0,55 MPa ≅ 5,5 bar).

The minimum duration for the leakage detection test shall be:

a) 15 s for volumes up to and including 2 l;

b) 30 s for volumes up to and including 5 l;

c) 60 s for volumes above 5 l.

4.3 Angle for part-turn actuators

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.

4.4 Environmental conditions

4.4.1 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.

4.4.2 Enclosure protection

The non pressurised enclosure of the actuator shall be IP 6X according to EN 60529 (excluding the exhaust port).

4.4.3 Corrosion protection

Pneumatic 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 2.

Table 2 — Environmental corrosion categories

Corrosion category	Typical environments	
	Exterior	Interior
C2 (low)	Atmospheres with low level of pollution. Mostly rural areas.	Unheated buildings where condensation may occur, e.g. depots, sport halls.
C3 (medium)	Urban and industrial atmospheres, moderate sulphur dioxide pollution. Coastal areas with low salinity.	Production rooms with high humidity and some air pollution, e.g. food-processing plants, laundries, breweries.
C4 (high)	Industrial areas and coastal areas with moderate salinity.	Chemical plants, swimming pools, coastal shipyards.
C5-I (very high — industrial)	Industrial areas with high humidity and aggressive atmosphere.	Buildings or areas with almost permanent condensation and with high pollution.
C5-M (very high — marine)	Coastal and offshore areas with high salinity.	Buildings or areas with almost permanent condensation and with high pollution.
Immersed in water [a]		
Im 1 (Immersed in fresh water)	River installations, hydro-electric power plants.	
Im 2 (Immersed in sea or brackish water)	Harbour areas and offshore structures.	
[a] Pneumatic actuators covered by this European Standard are not designed for permanent immersion unless otherwise specified.		

NOTE 1 Table 2 is taken, for reference purposes only, from EN ISO 12944-2. The actuator corrosion protection may also be achieved by systems/methods which deviate from those specified in EN ISO 12944-5.

NOTE 2 Table 2 may be used to define the corrosion category in order to help the actuator manufacturers to define the surface treatment for corrosion protection. Test assessment and test procedures are the responsibility of the manufacturer.

4.5 Basic design

4.5.1 Safety requirements

Actuators shall be designed taking into account the technical principles and specifications for safety. The design of spring return actuators shall permit the safe assembly/disassembly, when complying with the manufacturer/supplier's instructions.

4.5.2 Part-turn actuator attachment

The attachment for part-turn actuators shall comply with EN ISO 5211.

The output drive of part-turn actuators may be an integral part or a removable component to allow it, when necessary, to be machined to suit the driven component of the valve.

The material of the drive component shall clearly be indicated in the manufacturer's/supplier's documentation.

4.5.3 Pressure connections and pilot valves interface

The actuators shall have two pressure connections, unless otherwise specified.

The position, location, orientation and form of the pressure connections shall be established by the manufacturer.

Connections shall be clearly identified with numbers (2 and 4), in accordance with ISO 5599-2. When pressurised, direction of movement shall be in accordance with Table 3 below, unless otherwise specified.

The dimensions of the pressure connections/interface shall be as specified in Tables 3 and 4 and Figures 1 and 2. The actuator shall be properly marked to indicate the type of thread.

Table 3 — Identification of the part-turn actuator pressure connections

Direction of movement (when viewed from the ancillaries' mounting interface)	Connection 2	Connection 4
	Counter-clockwise	Clockwise

Table 4 — Dimensions of the pressure connections for remotely mounted pilot valves

Air volume [a] V l	**Diameter** [b] **(minimum)** D	**D4** [c] **(minimum)** mm	
		EN ISO 228-1 (G)	**ASME B1.20.1 (NPT)**
$V < 1$	1/8“	8	7
$0,5 < V < 10$	1/4“	12	11
$5 < V < 25$	3/8“	13	11
$10 < V < 50$	1/2“	16	14
$25 < V < 100$	3/4“	17	15
$V > 50$	1“	20	17

[a] Air volume as defined in 3.4.4. The relationship between air volume V and dimensions of connections "2" and "4" are given as guidelines.

[b] According to EN ISO 228-1 (G) or ASME B1.20.1 (NPT).

[c] Min. proof strength of material $R_{p0,2}$ > 150 MPa and 0,8 MPa (8 bar) maximum operating pressure.