SLOVENSKI STANDARD
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Industrijski ventili - Pogoni - 5. del: Pnevmatični linearni pogoni za industrijske ventile - Osnovne zahteve

Industrial valves - Actuators - Part 5: Pneumatic linear actuators for industrial valves - Basic requirements

Industriearmaturen - Antriebe - Teil 5: Pneumatische Antriebe – Grundanforderungen

Robinetterie industrielle - Actionneurs - Partie 5 : Actionneurs linéaires pneumatiques - Prescriptions de base

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Industrial valves - Actuators - Part 5: Pneumatic linear actuators for industrial valves - Basic requirements

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 15714-5:2022) 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of an identical text or by endorsement, at the latest by November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

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1 Scope

This document provides basic requirements for piston type pneumatic linear actuators for industrial valve, both double acting and single acting, used for on-off and modulating control duties.

It includes criteria, method and guidelines for design, qualification, corrosion protection, control and testing.

It does not apply to diaphragm actuators and to pneumatic actuators which are integral parts of control valves.

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 ISO 286-2, *Geometrical product specifications (GPS) - ISO code system for tolerances on linear sizes - Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts (ISO 286-2)*

EN ISO 5210:2017, *Industrial valves - Multi-turn valve actuator attachments (ISO 5210:2017)*

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

EN 15714-1, *Industrial valves - Actuators - Part 1: Terminology and definitions*

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

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

ISO 8573-1:2010, *Compressed air — Part 1: Contaminants and purity classes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15714-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
stroke
single and complete movement from one end of travel to the other

3.2
end stop
mechanical part, designed to stop the actuator drive train at an end position

Note 1 to entry: End stop can be fixed or adjustable.

3.3
output thrust
minimum guaranteed output thrust capability of the actuator, in both directions, at specified supply pressures conditions as provided by the manufacturer/supplier

Note 1 to entry: Where the output thrust varies with the stroke, in a linear or nonlinear relationship with pressure, tabulated data and/or thrust versus stroke diagram shall be provided at significant pressure values for each direction of movement.

3.3.1
rated thrust
characterizing figure, indicated by the actuator manufacturer/supplier, used to define the maximum actuator operating thrust

Note 1 to entry: The rated thrust corresponds to the maximum thrust value developed by the actuator when powered with maximum allowable pressure.

3.3.2
nominal thrust
3.3.2.1
double acting version (4.2.1)
minimum guaranteed output thrust of the actuator, at any point of the stroke, with nominal supply pressure 0,55 MPa (5,5 bar)

3.3.2.2
single acting version (4.2.2)
guaranteed output thrust of the actuator with pneumatic nominal supply 0,55 MPa (5,5 bar) at the beginning of the stroke in the direction to compress the spring

3.3.3
start thrust
actuator output thrust at the beginning of the stroke in the direction of movement

3.3.4
maximum operating thrust
MOT
for double acting version, output thrust of the actuator when the pressure of the power supply corresponds to the maximum allowable pressure; for single acting version the maximum output thrust between the thrust at the beginning of the stroke when the pressure of the power supply corresponds to the maximum allowable pressure and the thrust generated by the spring at the end of specified compression stroke

Note 1 to entry: The maximum thrust value shall be indicated by the manufacturer/supplier; the value shall be not lower than 1,45 times the nominal thrust.

3.4
single acting version
3.4.1
air starting thrust
AST
output thrust, at defined pressure value, at the beginning of the stroke in opposition to the spring

3.4.2
air ending thrust
AET
output thrust, at defined pressure value, at the end of the stroke when spring is at its maximum compression

3.4.3
air running thrust
ART
any output thrust value between AST and AET at defined pressure value

3.4.4
spring ending thrust
SET
output thrust generated by the spring at the end of its stroke with no air in the cylinder

3.4.5
spring starting thrust
SST
output thrust generated by the spring at its maximum compression with no air in the cylinder

3.4.6
spring running thrust
SRT
any output thrust value between SST and SET

4 Classification/designation

4.1 Duty classification

4.1.1 General

According to their intended function, two versions of linear valve actuators are defined by this document: on-off duty and modulating duty.

4.1.2 On-off duty

The actuator shall drive the valve through its entire travel from the fully open position to the fully closed position or vice-versa.

4.1.3 Modulating duty

The actuator shall continuously drive the valve to any position between fully open and fully closed or vice-versa.

4.2 Action

4.2.1 Double acting (DA)

A double acting actuator requires the supply of motive energy to operate in both travel directions.

4.2.2 Single acting (SA)

A single acting actuator requires external power to operate the valve in one direction only, the return stroke being powered by an alternative form of stored energy (fail-safe actuators).

For the purpose of this document, the stored energy shall be supplied by a mechanical spring.

5 Motive energy

5.1 Operating medium

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

Other compressed gases may be used, on agreement between the manufacturer/supplier and purchaser, ensuring they are compatible with all the parts which they are in contact with, including the lubricants.

5.2 Quality

Humidity of the operating medium shall be Class 2 according to ISO 8573-1:2010, Table 2.

For ambient temperature conditions different from the standard stated at 7.6.1, the dew point shall be at least 10 °C below the minimum operating ambient temperature.

It is recommended that the content of particles per cubic meter in the operating medium shall not exceed Class 5 according to ISO 8573-1:2010, Table 1; particles up to a maximum 40 µm size are acceptable in the operating medium provided that a right analysis of the behaviour of the ancillaries (8.1), when mounted on the actuator, is done.

5.3 Pressure

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

Unless otherwise specified the following values shall be considered within the scope of this document:

a) nominal supply pressure: 0,55 MPa (5,5 bar);

b) maximum allowable pressure shall be at least 0,8 MPa (8 bar);

c) design pressure for pressurized parts at least 1,1 times the maximum allowable pressure;

d) the minimum test pressure for pressurized parts shall be 1,50 times the design pressure.

For sizing of the double acting actuator at different pressures with different loads, Figure B.1 can be used as a guidance.

6 Actuator performance data

6.1 Minimum moving pressure

For double acting actuators, the minimum moving pressure, at no load condition and ambient temperature, shall be made available by the manufacturer/supplier upon request.

For single acting actuators, the minimum starting and release pressure in contrast to the spring at the beginning and ending of the nominal stroke, at no load condition and ambient temperature, shall be made available by manufacturer/supplier upon request.

6.2 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.

6.3 Displacement volume

Internal actuator displaced volumes for each direction, including the dead volumes, for the maximum stroke without any external limitation.

Displacement volume should be expressed in litres.

6.4 Dimensions and performances for double acting version

Dimension of cylinders and performances data of double acting actuator shall be in accordance with Table 1.

Table 1 — Dimensions and data of double acting actuator

Standard nominal diameter of cylinder [a] mm	Minimum nominal thrust [b] kN	Rated thrust [c] "X" kN	Flange type EN ISO 5210 [d]	Nominal thrust based on EN ISO 5210 kN	Minimum stroke mm
80	2,6	4,0	F05	≤ 10	20
100	4,1	6,0	F05	≤ 10	20
125	6,3	10,0	F05	≤ 10	20
160	10,4	16,0	F07	≤ 20	40
200	16,2	24,0	F10	≤ 40	60
250	25,4	37,0	F10	≤ 40	60
300	37,3	55,0	F12	≤ 70	60
400	66,4	97,0	F14	≤ 100	80
500	103,7	150,0	F16	≤ 150	100
600	149,3	218,0	F30	≤ 325	140
700	203,2	296,0	F30	≤ 350	140
900	335,9	489,0	F35	≤ 700	160
1 100	501,8	730,0	F35	≤ 700	160

[a] Intermediate diameters are permissible and may be used upon agreement between purchaser and manufacturer/supplier.

[b] Minimum nominal thrust is based on nominal pressure 0,55 MPa (5,5 bar) and includes friction factor. Different operating pressure sizing can be referred to as in Clause B.3 (Figure B.1).

[c] Maximum operating thrust (MOT) at maximum allowable pressure 0,80 MPa (8,0 bar); different rated thrust can be defined at higher maximum allowable pressure upon agreement between purchaser and manufacturer/supplier.

[d] Different flange type may be used upon agreement between purchaser and manufacturer/supplier.