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BSI Standards Publication

Industrial valves - Actuators

Part 6: Hydraulic linear actuators for industrial valves - Basic requirements

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European foreword

This document (EN 15714-6:2022) 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of an identical text or by endorsement, at the latest by April 2023, and conflicting national standards shall be withdrawn at the latest by April 2023.

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1 Scope

This document specifies basic requirements for piston type hydraulic 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 hydraulic actuators which are integral parts of control valves. Other requirements, or conditions of use, different from those indicated in this document, are expected to be subject to negotiations, 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 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 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

ISO 4401, *Hydraulic fluid power — Four-port directional control valves — Mounting surfaces*

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.

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3.3
thrust

3.3.1
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.

3.3.2
nominal thrust

3.3.2.1
double acting version
minimum guaranteed output thrust of the actuator, at any point of the stroke, with nominal supply pressure

Note 1 to entry: See 4.2.1.

3.3.2.2
single acting version
guaranteed output thrust of the actuator with hydraulic nominal supply at the beginning of the stroke in the direction to compress the spring

Note 1 to entry: See 4.2.2.

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

3.4
single acting version

3.4.1
Fluid Starting Thrust
OST
output thrust, at specified pressure value, at the beginning of the stroke in opposition to the spring

3.4.2
Fluid Ending Thrust
OET
output thrust, at specified pressure value, at the end of the stroke when spring is at its maximum compression

3.4.3
Spring Ending Thrust
SET
output thrust generated by the spring at the end of its stroke with no fluid in the cylinder

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3.4.4
Spring Starting Thrust
SST
output thrust generated by the spring at its maximum compression with no fluid in the cylinder

3.4.5
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 specified by this document: on-off duty and modulating duty.

4.1.2 On-off duty

The actuator is required to 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 is required to 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)

Double acting defines the type of actuator which requires the supply of motive energy to operate in both travel directions.

4.2.2 Single Acting (SA)

Single acting defines the type of actuator which 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 hydraulic fluid.

The fluid used, on agreement between the manufacturer/supplier and purchaser, shall be selected for pressure, compatible with internal actuator parts and shall have lubricant properties.

The flashpoint shall be of not less than 93 °C for pressures below 10 bar and 157 °C for pressures above 10 bar. 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.

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5.2 Quality

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

When necessary the actuator shall be properly flushed to guarantee an internal cleanliness consistent with the above specified contamination level.

5.3 Pressure

5.3.1 General

As a general information the manufacturer/supplier shall indicate, for each actuator model, the pressure limits including at least the maximum allowable pressure and working pressure range for a specific application. Other pressure values shall be available on demand.

5.3.2 Maximum allowable pressure (MAP)

The pressure not to be exceeded for the supply to the hydraulic actuator. Recommended values for maximum allowable pressure are in Table 1.

Table 1 — Pressure level

	MPa	bar	psi
PN 50	5,5	55	800
PN 100	10,3	103	1 500
PN 200	20,7	207	3 000
PN 350	34,5	345	5 000

5.3.3 Design pressure

The design pressure shall be at least 1,1 times the maximum allowable pressure.

5.3.4 Working pressure

The pressure applied to the actuator to guarantee the performances on a specific application.

5.3.5 Structural test pressure

For structural test under pressure, consider a minimum value 1,5 times the design pressure for a minimum holding period 5 min after pressure stabilization.

Structural test under pressure is carried out to validate the capability of the pressure retaining parts of the actuator to withstand the pressure without permanent deformations.

5.3.6 Minimum moving pressure

The minimum moving pressure required, at ambient temperature, to complete the specified stroke without external load, starting from not pressurized conditions shall be made available by the manufacturer/supplier upon request.

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6 Actuator basic performances

6.1 Double acting version

Table 2 — Double acting selection chart

Actuator designation [b]	Inner cylinder diameter mm	Maximum thrust [a] kN for specified maximum allowable pressure bar			
		55	103	207	345
L25D	**25**	2,6	4,9	9,8	16,3
L30D	**30**	3,7	7,0	14,0	23,4
L40D	**40**	6,6	12,4	25,0	41,6
L50D	**50**	10,4	19,4	39,0	65,0
L60D	**60**	14,9	28,0	56,2	93,6
L70D	**70**	20,3	38,1	76,5	127,5
L80D	**80**	26,5	49,7	99,9	166,5
L90D	**90**	33,6	62,9	126,4	210,7
L100D	**100**	41,5	77,7	156,1	260,1
L125D	**125**	64,8	121,3	243,9	406,4
L150D	**150**	106,2	174,7	351,2	585,3
L200D	**200**	165,9	310,6	624,3	—
L250D	**250**	259,2	485,4	—	—
L300D	**300**	373,2	698,9	—	—
L350D	**350**	508,0	—	—	—
L400D	**400**	663,5	—	—	—

[a] Maximum thrust is referred to the net piston size without the effect of stem reduction.

[b] Preferred size of designation (e.g. L25 D stands for the L = linear, 25 = Inner cylinder diameter, D = double acting).

NOTE For further sizing information please see Annex B.

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