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Industrial valves — Multi-turn valve actuator attachments

Robinetterie industrielle — Raccordement des actionneurs multitours aux appareils de robinetterie

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 153, *Valves*.

This second edition cancels and replaces the first edition (ISO 5210:1991), which has been technically revised with the following changes:

a) extension of flange sizes;

b) introduction of groups C and D for assemblies capable of transmitting torque, in 7.4 and 7.5;

c) introduction of linear actuator in 7.6.

Introduction

The purpose of this document is to establish certain basic requirements for the attachment of multi-turn actuators, in order to define the interface between actuator and valve.

This document has, in general, to be considered in conjunction with the specific requirements which may be agreed between the parties concerned.

Industrial valves — Multi-turn valve actuator attachments

1 Scope

This document specifies the requirements for the attachment of multi-turn actuators to valves.

Throughout this document, "actuator" may be understood as "actuator and/or gearbox" providing a multi-turn and/or linear output.

It specifies:

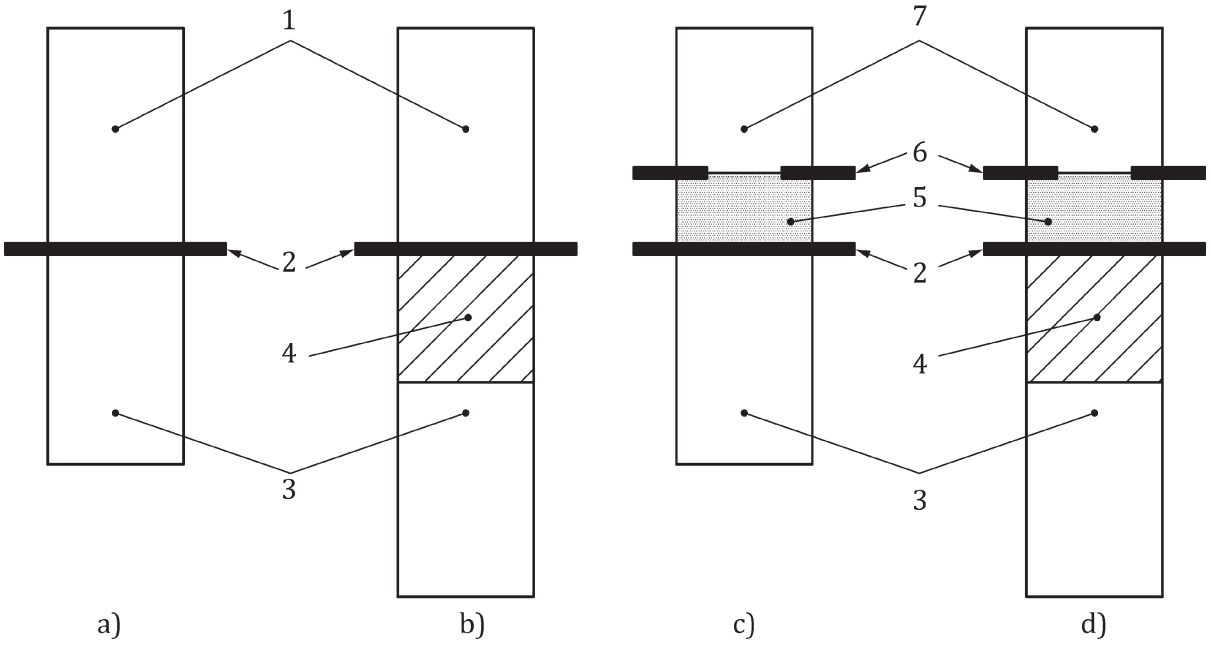
— flange dimensions necessary for the attachment of actuators to industrial valves [see Figure 1 a)] or to intermediate supports [see Figure 1 b)];

— those driving component dimensions of actuators which are necessary to attach them to the driven components;

— reference values for torque and thrust for flanges having the dimensions specified in this document.

NOTE 1 In this document, the term "valve" may also be understood to include "valve with an intermediate support" [see Figure 1 b)].

NOTE 2 When a combination of a multi-turn actuator and separate multi-turn/linear gearbox is coupled to form an actuator, the multi-turn attachment to the gearbox is in accordance with this document [see Figures 1 c) and 1 d)]. A combination of a multi-turn actuator with integral multi-turn/linear gearbox supplied as an actuator is in accordance with Figures 1 a) and 1 b).



a) Direct interface b) Intermediate support interface c) Direct interface (when combination of a multi-turn actuator and multi-turn/linear gearbox) d) Intermediate support interface (when combination of a multi-turn actuator and a multi-turn/linear gearbox)

Key

1 multi-turn/linear actuator
2 interface (see ISO 5210)
3 valve
4 intermediate support
5 gearbox
6 interface (see ISO 5210)
7 multi-turn actuator

Figure 1 — Interface between multi-turn/linear actuator and valve

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.

ISO 273, *Fasteners — Clearance holes for bolts and screws*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
actuator
any device designed for attachment to a general purpose industrial valve in order to provide for the operation of the valve

Note 1 to entry: The device is designed to operate using motive energy which may be electrical, pneumatic, hydraulic, manual, etc., or a combination of these. Movement is limited by travel, torque and/or thrust.

3.2
multi-turn actuator
actuator which transmits torque to the valve for at least one revolution and may be capable of withstanding thrust

Note 1 to entry: An actuator may be a combination of a multi-turn actuator and multi-turn gearbox.

3.3
linear actuator
actuator which transmits thrust to the valve for a defined linear stroke

Note 1 to entry: An actuator may be a combination of a multi-turn actuator and linear gearbox.

3.4
torque
turning moment transmitted through the mounting flanges and couplings

Note 1 to entry: Torque is expressed in newton-metres.

3.5
thrust
axial force transmitted through the mounting flanges and couplings

Note 1 to entry: Thrust is expressed in kilonewtons.

4 Maximum torques and thrusts

The torque and thrust shall comply with the values listed in Table 1 which represent the maximum torques and thrusts which can be transmitted simultaneously through the mounting flanges and couplings. They are based upon specified criteria.

Table 1 — Maximum torque and thrust values

Flange type	Torque Nm	Thrust kN
F05	20	10
F07	40	20
F10	100	40
F12	250	70
F14	400	100
F16	700	150
F25	1 200	200
F30	2 500	325
F35	5 000	700
F40	10 000	1 100
F48	20 000	2 000
F60	40 000	4 000

The values specified in Table 1 have been defined on the basis of bolts in tension at a stress of 290 MPa and a coefficient of friction of 0,2 between the mounting interface. All variations in these defined parameters lead to variations of the transmittable torque and/or thrust values. See Annex A for an explanation on the calculation method.

The selection of flange size for a particular application should take account of additional torques and/or thrust that may be generated at the valve stem because of sizing, safety factors, inertia or other similar factors. Specifically, the torque and thrust generated at the maximum output torque and/or thrust of the selected actuator shall be calculated and considered in the selection of the flange along with the ability of the valve and actuator to withstand such torque and thrust forces.

5 Flange dimensions

Flanges for actuator attachment shall comply with the dimensions shown in Figure 2 and given in Table 2. The method of attachment shall be by means of studs or through bolting. When through bolting is used, the diameter of the clearance holes shall permit the use of bolts of a size given by the corresponding dimension d_4 in Table 2.

Holes for the studs/bolts shall be positioned off-centre (see Figure 3 and Table 3), shall be equi-spaced and shall conform to the requirements of ISO 273.

The interface on the valve shall have a recess corresponding to the diameter d_2. A spigot on the actuator is optional.

The minimum values for dimension h_2 shown in Table 2 apply to flanges having material of proof stress $R_e \geq 200$ MPa. The minimum values for dimension h_2 applied to flanges having materials of proof stress $R_e \leq 200$ MPa shall be agreed between manufacturer and purchaser. The minimum values for dimension h_3 shall be at least $1 \times d_4$.

Dimension d_1 has been based on providing sufficient landing for the nuts and bolt heads where applicable. Such landing is defined as a radius from the bolt hole centre with the dimension $(d_1 - d_3) / 2$, and is a minimum. The flange shape of both valve and actuator outside these areas of landing is left to the option of the manufacturer.

The dimensions and bolting material are based on bolts in tension at a maximum stress of 290 MPa. On agreement, between the manufacturer/supplier and purchaser, bolting material with different tensile strength can be used, with no dimensional changes but with potential variation of the transmittable torque and thrust value.

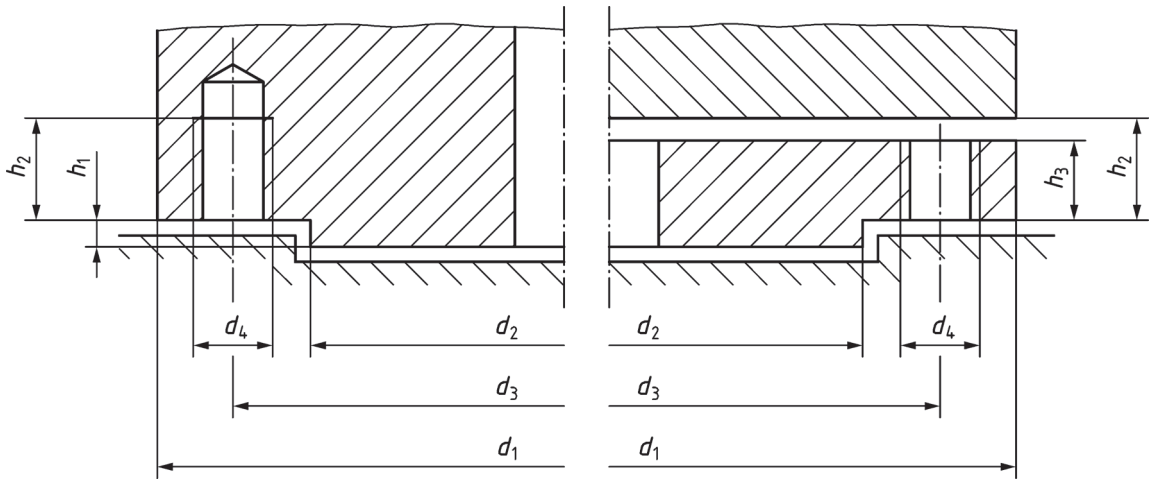


Figure 2 — Flange dimensions

Table 2 — Flange dimensions

Dimensions in millimetres

Flange type	Dimensions							Number of studs or bolts
	d_1 min.	d_2 [a]	d_3	d_4	h_1 max.	h_2 min.	h_3 min.	n
F05	Ø65	Ø35	Ø50	M6	3	9	6	4
F07	Ø90	Ø55	Ø70	M8	3	12	8	4
F10	Ø125	Ø70	Ø102	M10	3	15	10	4
F12	Ø150	Ø85	Ø125	M12	3	18	12	4
F14	Ø175	Ø100	Ø140	M16	4	24	16	4
F16	Ø210	Ø130	Ø165	M20	5	30	20	4
F25	Ø300	Ø200	Ø254	M16	5	24	16	8
F30	Ø350	Ø230	Ø298	M20	5	30	20	8
F35	Ø415	Ø260	Ø356	M30	5	45	30	8
F40	Ø475	Ø300	Ø406	M36	8	54	36	8
F48	Ø560	Ø370	Ø483	M36	8	54	36	12
F60	Ø686	Ø470	Ø603	M36	8	54	36	20

[a] d_2 shall be manufactured within the diameter tolerance f8.