BRITISH STANDARD

BS EN
15081:2007

Industrial valves — Mounting kits for part-turn valve actuator attachment

The European Standard EN 15081:2007 has the status of a British Standard

ICS 23.060.99

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 15081:2007.

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Robinetterie industrielle - Kits de montage pour raccordement des actionneurs à fraction de tour

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Foreword

This document (EN 15081:2007) 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of an identical text or by endorsement, at the latest by April 2008, and conflicting national standards shall be withdrawn at the latest by April 2008.

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1 Scope

This European Standard provides requirements for metallic mounting kits for part-turn on-off valves and actuator attachments to enable safe and reliable operation.

It includes all components transmitting torques from actuators to valves with a maximum flange torque up to 16 000 Nm (up to F30 flange type).

It applies to part-turn valves and actuators having attachment flanges and drive components as described in EN ISO 5211.

It includes recommendations and methods for design and environmental corrosion protection.

When reference is made to this European Standard, all the requirements apply, unless otherwise agreed between the purchaser and the manufacturer/supplier, prior to order.

For the scope of this European Standard, the term “Valve” covers valve or shaft extension top-flange.

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 736-1:1995, *Valves — Terminology — Part 1: Definition of types of valves*

EN 736-2:1997, *Valves — Terminology — Part 2: Definition of components of valves*

EN 736-3:1999, *Valves — Terminology — Part 3: Definition of terms*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 736-1:1995, EN 736-2:1997 and EN 736-3:1999 and the following apply.

3.1
mounting kit
kit comprising an intermediate support, coupling and bolting

3.2
intermediate support
mechanical component (bracket, spool, adapter flange) that allows the attachment between a part-turn valve and actuator

3.3
coupling
driven component that allows torque transmission from an actuator driving component to the valve shaft and which includes a position indicator

3.4
axial coupling clearance
clearance to ensure that there is axial movement between the actuator and the valve stem to avoid thrust being applied between the driving and driven components

3.5
part-turn actuator
actuator that transmits torque to the valve for a rotation of one revolution or less and which does not have to be capable of withstanding thrust

3.6
valve top flange
part of the valve which allows the attachment of actuating devices and ancillaries via an intermediate support

3.7
valve shaft
part of the valve transmitting the drive torque to the obturator

3.8
part-turn actuator attachment
attachment interface of the actuator which includes:

— flange necessary to attach the part-turn actuator to the intermediate support;

— driving component of the part-turn actuator necessary to attach it to the coupling or to the driven component of the valve, which may be an integral part or a removable component of the actuator

3.9
maximum actuator output torque
maximum output torque of the actuator available at the maximum motive energy input

3.10
maximum allowable shaft torque (MAST)
maximum torque that can be applied to all the driven components, without damage and/or plastic deformation being sustained by any part

4 Design requirements

4.1 General

Part-turn actuators shall be in accordance with EN ISO 5211.

4.2 Materials

Unless otherwise agreed, mounting kit materials shall be:

— for intermediate supports, of cast iron (CI), carbon steel (CS) or stainless steel (SS);

— for coupling, see performance classes (Table 2);

— for bolting (environmental corrosion categories according to Table 1):

  — categories C2 and C3: stainless steel or a suitably corrosion protected carbon steel;

  — categories C4 and C5-I: stainless steel;

  — other categories: material to be specified by the purchaser.

Special care shall be taken for material selection, in the event of environmental critical conditions.

4.3 Design temperature

The mounting kit shall be designed for operation at an ambient temperature range between – 20 °C and + 60 °C.

4.4 Environmental corrosion protection

Mounting kits shall be protected against corrosion by suitable material selection and/or surface treatment.

The manufacturer's technical documentation shall specify the choice of the materials and/or the type of the surface treatment.

Surface treatment system for carbon or low-alloy steels (e.g. according to EN 10025) shall be chosen according to the classification categories given in Table 1.

Test assessment and test procedures are the responsibility of the manufacturer.

NOTE Table 1 may be used to define the corrosion category and help the mounting kit manufacturers to define the surface treatment for corrosion protection.

Table 1 — 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 or buried in soil:		
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.	
Im 3 (buried in soil)	Buried pipelines	
NOTE This table is taken from EN ISO 12944-2:1998.		

4.5 Mounting kit

4.5.1 Stiffness

The dimensions of the mounting kit given in this European Standard ensure that the maximum flange torque - given in Table 1 of EN ISO 5211 - can be transmitted safely.

For non-vertically mounted actuators, the user may need to design an extra support.

When specified by the purchaser, the mounting kit shall also be designed for external loads (e.g. stepping load, earthquake, wind loading, additional plant induced dynamic loads). In this case, for instance, the thickness as given in Table 3 may be increased.

4.5.2 Intermediate support style

The intermediate support provides two equal or different attachment interfaces (actuator and valve), as per EN ISO 5211.

The most common type is a "rectangular" bracket, as defined in 5.1.

The "rectangular" type is predominantly manufactured from a rectangular or square tube in compliance with EN 10219-2 or EN 10210-2. The "rectangular" type can also be cast, fabricated or machined.

Other commonly used types are the following:

— "adapter flange": generally manufactured as one piece from casting, forging, plate or bar. It shall be provided with a suitable venting device;

— "spool type": generally manufactured from two flanges that correspond to the mating faces of valve and actuator, connected together by a piece of tube. The assembly is welded together to form a spool piece. The "spool" type can also be in one piece: cast, forged or machined. The spool shall be provided with a suitable venting device and/or with a suitable opening to visualise the coupling position.

Other types of intermediate support may be used provided they meet the requirements of this European Standard.

4.6 Coupling

The design of the coupling shall ensure the maximum transmissible torque (as specified in EN ISO 5211), can be delivered to the valve shaft.

The coupling performance class shall be specified by the purchaser in accordance with Table 2.

The design of both coupling ends (driven/driving) shall avoid any contact between moving and fixed parts.

Table 2 — Coupling performance classes

Performance designation	Examples of material types	Minimum yield strength type N/mm^2	Coupling tolerances driven end / driving end	
			Class 1	Class 2
Group A	Austenitic stainless steels, nickel based alloys, carbon steel	200	g9 / H10	g6 / H7
Group B	Duplex steels, martensitic stainless steels	450	g9 / H10	g6 / H7

4.7 Designation

Mounting kits shall be designated as follows:

a) mounting kit style: adaptor flange (AF), bracket (BR), spool (SP) or other (OT) followed by the intermediate support material as per 4.2 (CI, CS or SS);

b) flange designations according to EN ISO 5211 (actuator flange type/valve flange type);

c) coupling drive identification (first for the actuator and second for the valve):

— coupling driven (actuator side) diagonal square “D” designation, as per EN ISO 5211, followed by dimension s_a as per Table 4;

— coupling driving (valve side) designation either to Clause 6 of EN ISO 5211:2001 (additional capital letters with actual dimensions d_7 or s) or to specified / agreed dimensions, followed by actual dimensions l_8 and l_7 in mm (see Figure A.1);

d) environmental corrosion category as per Table 1;

e) performance group/class as per Table 2.

EXAMPLE EN 15081 - BR/CI - F07/F05 - D 14/H 11-11-24 - C3 - B1.

NOTE The designation is not a marking requirement.

4.8 Position indicator

The coupling design shall have a provision for a clear and permanently marked indicator to show whether the valve is open or closed: special attention, during the assembly, should be taken when installing square drive couplings.

4.9 Buried service

When buried service is required, design details and corrosion protection shall be agreed between the purchaser and manufacturer/supplier.

4.10 Safety requirement (mechanical/thermal protection)

The adapter flange or the spool shall have a provision for venting any leakage that may occur through the stem seal of the valve or from the actuator hydraulic/pneumatic supply. This may be obtained either by including a suitable vent or a pressure relief safety valve.

4.11 Orientation

The mounting kit shall be designed to be installed in any mounting position.

4.12 Additional anti-rotation means

When needed to resist torsion, vibration and shock loads, suitable means (e.g. dowel pins) may be used.

4.13 Valve/actuator package maintenance

The maintenance requirements of any valve/actuator package shall always be considered when designing and/or ordering the mounting kit. Special consideration shall be given to the following.

— Access to the fixings that connect the valve and actuator to the mounting kit: the mounting kit should have sufficient clearance to allow the installation and removal of fasteners using standard commercial tooling.

— Access to external valve gland adjustment mechanisms: some part-turn valves require periodic adjustment to prevent fugitive emissions.

— Access to valve lubrication facility: some plug valves require periodic lubrication in order to maintain a consistent torque requirement and prevent seizure.

— Actuator and accessories arrangement in relation to valve/pipeline flanges: the kit should be of sufficient height to allow suitable access for assembly, valve adjustment, and valve/pipeline insulation/lagging.

5 Dimensions

5.1 Bracket

The bracket consists of two mounting faces which can be either identical or different. In the latter case, the largest flange type dictates the height (H), width (W) and thickness (T), as per Figure 1 and Table 3.

When specified, the valve side of the bracket shall be profiled to clear the packing gland.

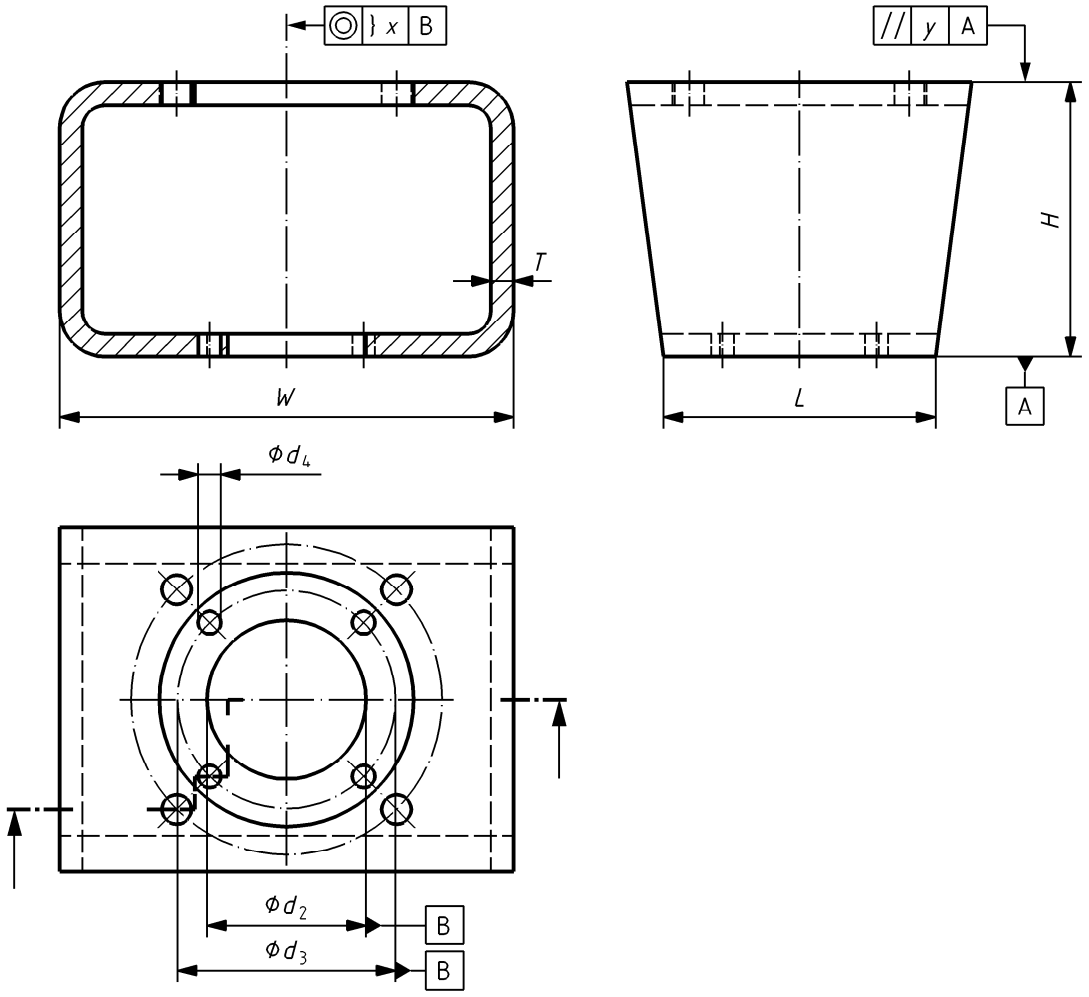


Figure 1 — Bracket dimensions

Table 3 — Bracket dimensions (in mm)

Flange type	Profile						$\varnothing d_2$	$\varnothing d_3$	$\varnothing d_4$	Tolerance	
	Height		Width	Length		Thickness					
	H	Tolerance	W	L	Tolerance	T				x	y
F 03	50	50 - 1	80	40	40 + 1	4	$25^{+0,15}_{+0,05}$	36	5,5	0,1	0,1
F 04	50	50 - 1	80	45	45 + 1	4	$30^{+0,15}_{+0,05}$	42	5,5	0,1	0,1
F 05	60	60 - 1	100	50	50 + 1	5	$35^{+0,15}_{+0,05}$	50	6,5	0,1	0,1
F 07	60	60 - 1	100	70	70 + 2	5	$55^{+0,15}_{+0,05}$	70	9	0,1	0,1
F 10	80	80 - 1	120	95	95 + 2	5	$70^{+0,20}_{+0,05}$	102	11	0,2	0,2
F 12	80	80 - 1	160	115	115 + 2	6	$85^{+0,20}_{+0,05}$	125	13	0,2	0,2
F 14	80	80 - 1	160	135	135 + 2	6	$100^{+0,20}_{+0,05}$	140	17	0,2	0,2
F 16	100	100 - 2	200	160	160 + 2	6	$130^{+0,20}_{+0,05}$	165	21	0,4	0,4
F 25	200	200 - 2	400	270	270 + 3	10	$200^{+0,25}_{+0,05}$	254	17	0,4	0,4
F 30	200	200 - 2	400	320	320 + 5	10	$230^{+0,25}_{+0,05}$	298	21	0,4	0,4

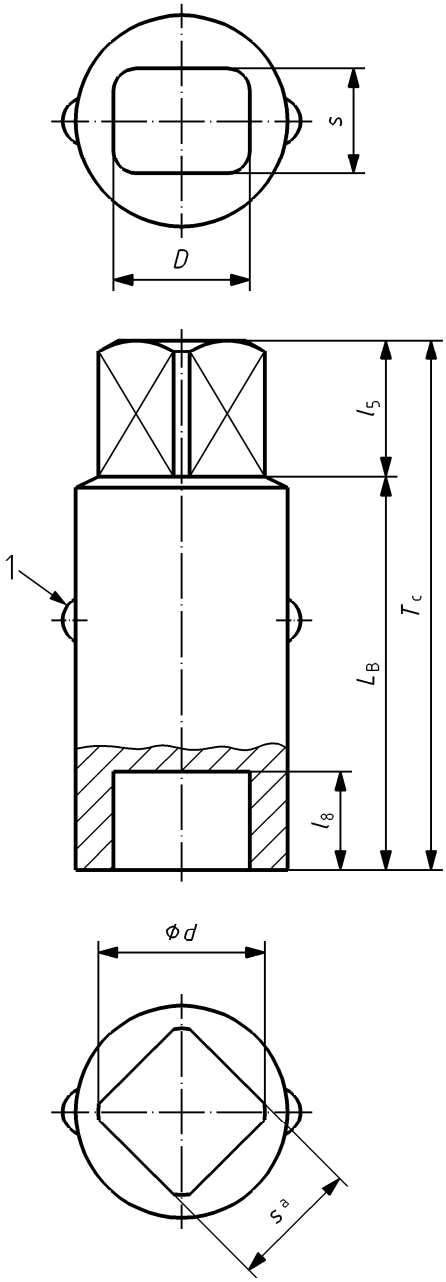
5.2 Valve top flange

The valve top flange dimensions shall be in accordance with EN ISO 5211. Additionally - for centering purposes - the valve top flange shall include an integral or additional spigot with a diameter and height corresponding to those dimensions given in EN ISO 5211.

The design of the top flange may include either tapped or through holes and proper care shall be paid to ensure adequate engagement.

5.3 Coupling

The driven end of the coupling shall be the diagonal square type as per EN ISO 5211 (designation "D").



Key

1 Position indicator

NOTE The dimensions s, D and l_8 of the flat-head drive coupling shown are given for example only. Other drive types may be used.

Figure 2 — Coupling dimensions

Table 4 — Dimensions (in mm) of the driven part of the coupling (actuator side)

Flange type	F03	F04	F05	F07	F10	F12	F14	F16	F25	F30
s_a	9	11	14	17	22	27	36	46	55	75
D	12	14	18	22	28	36	48	60	72	98
l_5	10	12	16	19	24	29	38	48	57	77
NOTE The relevant coupling tolerances are as per Table 2.										

5.4 Spools and adapter flanges

The height of the spool shall have the same dimension as the rectangular bracket.

The height of the adapter flange shall be specified by the valve or actuator manufacturer.

6 Marking

6.1 General

Each mounting kit shall bear the permanent indications as stated in 6.2 and 6.3.

6.2 Mandatory information

— Bracket: flange sizes to EN ISO 5211 (e.g. F05/F05, F07/F05, etc.).

— Coupling: for the driven end, “D” drive dimension to EN ISO 5211 followed by the driving end dimensions and performance group/class (Table 2) identifications (e.g. D14/H11-B1).

6.3 Optional information

— Manufacturer/supplier’s identification (name and/or logo and/or trade mark).

— Reference to this European Standard.

7 Documentation

7.1 Language

The language of the relevant documentation shall be agreed between the manufacturer/supplier and the purchaser.

7.2 Product documentation

The following documentation shall be provided by the manufacturer/supplier:

— mounting kit installation, commissioning instructions and weight indication;

— storage instructions;

— drawing with itemized components and recommended spare parts list.

Annex A
(normative)

Coupling axial clearance

Axial clearance, between the coupling and the valve and actuator, is required to permit secure assembly without end loading of the valve stem or actuator drive.

The critical axial dimensions of a typical assembly are shown in Figure A.1. The coupling shall provide appropriate drive engagement, for both the driven and driving ends, to ensure that it transmits the rated torque. These considerations are reflected in dimensions l_5 and l_8. Adequate axial clearance may be achieved by the dimension C_c in the two positions indicated in Figure A.1.

The critical axial dimensions of a typical coupling are shown in Figure 2 and may be established, in terms of the dimensions shown in Figure A.1, as follows:

$$L_B = H + h_4 - l_7 + l_8 - C_c \quad \text{(A.1)}$$

$$T_C = L_B + l_5 \quad \text{(A.2)}$$

The values of the minimum design coupling axial clearance, based on nominal dimensions, are given in Table A.1.

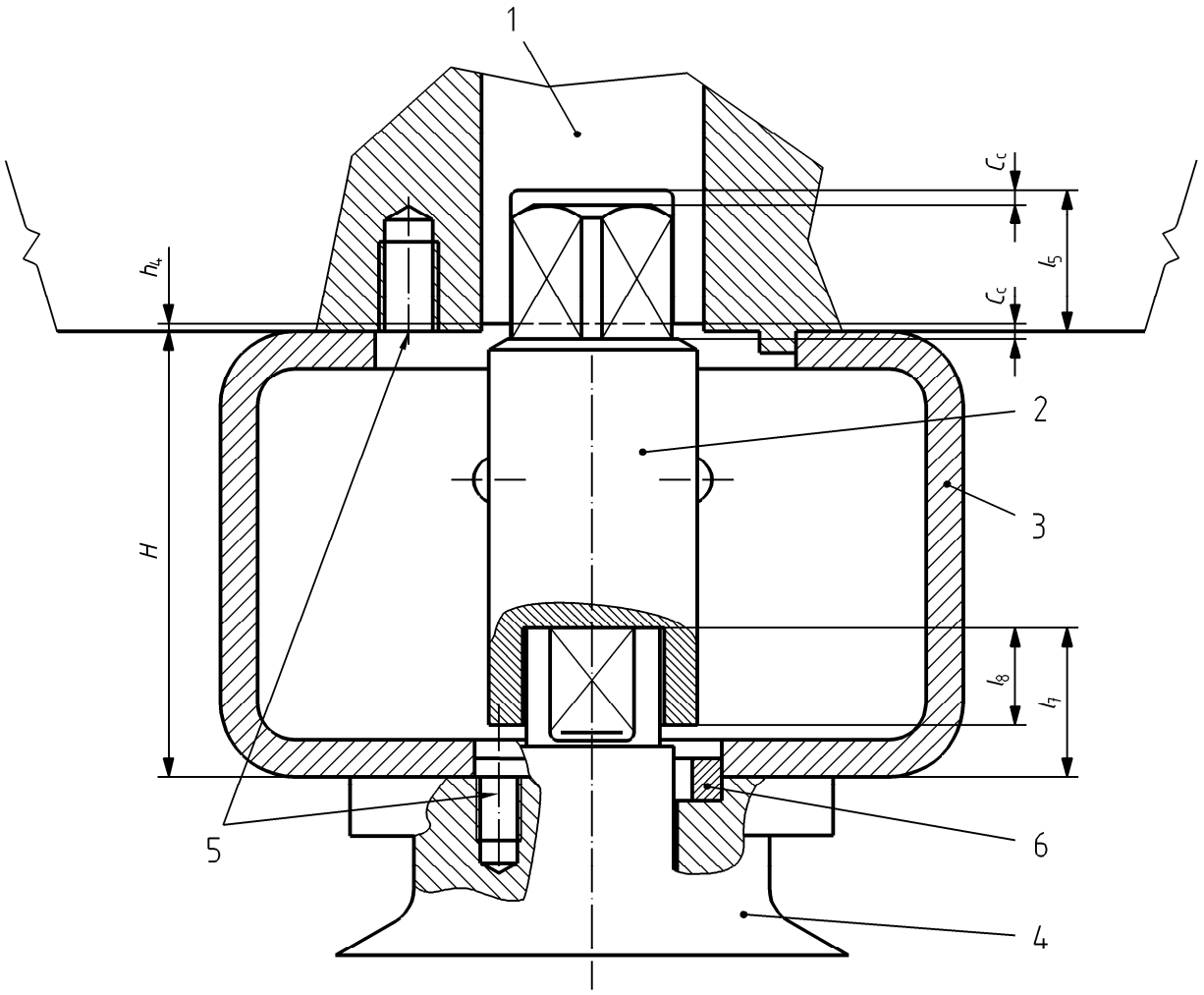
Dimension l_7 shall be the maximum value under all foreseeable and/or critical working conditions. Valve conditions may change due to valve gland or seat wear and consideration should be given to any resultant changes in coupling axial clearance.

It may also be necessary to provide clearance between the coupling and bracket/spool mounting flanges or any protrusions such as bolt heads, centering spigots or valve gland components.

Care should be taken to ensure that adequate drive engagements are provided when the coupling travels to either extreme of the axial clearance.

Table A.1 — Minimum coupling axial clearance

Flange type in accordance with EN ISO 5211	Minimum coupling axial clearance C_c mm
F 03 to F 07	1
F 10 to F 12	1,5
F 14 to F 16	2
F 25 to F 30	3



Key

1 Actuator
2 Coupling (adaptor)
3 Bracket
4 Valve
5 Mounting bolt
6 Spigot (integral or additional)
H Nominal rectangular bracket or spool height (see Figure 1 and Table 3)
h_4 Actuator drive clearance (as per EN ISO 5211)
l_5 Actuator drive depth
l_7 Shaft height from valve top flange
l_8 Coupling driving end engagement length
C_c Minimum coupling clearance (see Table A.1)

Figure A.1 — Mounting kit assembly

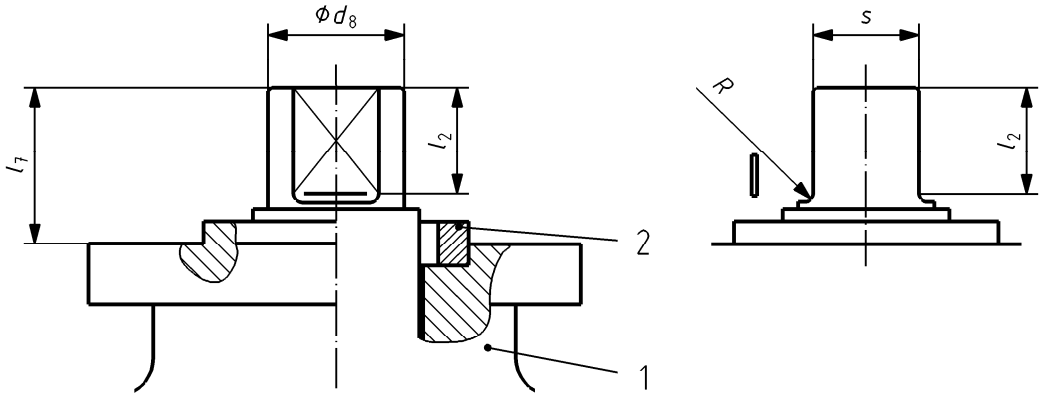
Annex B
(informative)

Proposed stem details for ball and butterfly valves

B.1 General

This annex has been developed to propose to the European Valve Industry the gradual implementation of new standard dimensions for the driven end of ball and butterfly valve shafts, with the ultimate aim of product optimisation and increased interchangeability levels.

The proposed heights l_7 are based on EN ISO 5211, l_5 dimensions and clearances are in line with values indicated in Table A.1.



Key

1 Valve

2 Spigot (integral or additional)

Figure B.1 — Example of flat head shaft

B.2 Proposed stem details for ball valves

Table B.1 — Drive by flat head

d_8	s	Valve top flange according to EN ISO 5211	l_2 (min)	l_7	
				Nominal	Tolerance
10	7	F03, F04, F05	8	18	0 / to 1,0
12	8	F03, F04, F05	9	22	0 / to 1,0
14	9,5	F04, F05, F07	10,5	27	0 / to 1,0
18	12	F05, F07, F10	13	33	0 / to 1,0
22	15	F07, F10, F12	16	34	0 / to 1,0
28	19	F10, F12, F14	21	45	0 / to 2,0
36	24	F12, F14, F16	26	56	0 / to 2,0
48 [a]	32	F14, F16, F25	34	69	0 / to 2,0

[a] Larger stems are normally of key drive design and therefore not considered applicable in this proposal.

B.3 Proposed stem details for butterfly valves

Table B.2 — Drive by flat head

d_8	s	Valve top flange according to EN ISO 5211	l_2 (min)	l_7	
				Nominal	Tolerance
12	9	F03, F04, F05	14	15	0 / to 1,0
14	11	F04, F05, F07	17	18	0 / to 1,0
18	14	F05, F07, F10	21	24	0 / to 1,0
22	17	F07, F10, F12	26	29	0 / to 1,0
25	19	F10, F12	29	32,5	0 / to 1,0
28	22	F10, F12, F14	33	37,5	0 / to 2,0
36	27	F12, F14, F16	41	46,5	0 / to 2,0
48	36	F14, F16, F25	54	62	0 / to 2,0
60	46	F16, F25, F30	69	80	0 / to 2,0
72	55	F25, F30	83	96	0 / to 2,0
98	75	F30	113	132	0 / to 2,0

Table B.3 — Drive by square head

d_8	s	Valve top flange according to EN ISO 5211	l_7	
			Nominal	Tolerance
12	9	F03, F04, F05	9	0 / to 1,0
14	11	F04, F05, F07	11	0 / to 1,0
18	14	F05, F07, F10	15	0 / to 1,0
22	17	F07, F10, F12	18	0 / to 1,0
25	19	F10, F12	20	0 / to 1,0
28	22	F10, F12, F14	22,5	0 / to 2,0
36	27	F12, F14, F16	27,5	0 / to 2,0
48	36	F14, F16, F25	36	0 / to 2,0
60	46	F16, F25, F30	46	0 / to 2,0
72	55	F25, F30	54	0 / to 2,0
98	75	F30	74	0 / to 2,0

Table B.4 — Drive by key (single)

d_7	Valve top flange according to EN ISO 5211	l_7	
		Nominal	Tolerance
12	F05	29	0 / to 1,0
14	F05, F07	29	0 / to 1,0
18	F05, F07, F10	29	0 / to 1,0
22	F05, F07, F10, F12	34	0 / to 1,0
28	F07, F10, F12, F14	43,5	0 / to 2,0
36	F10, F12, F14	53,5	0 / to 2,0
48	F12, F14, F16, F25	63	0 / to 2,0
60	F14, F16, F25, F30	78	0 / to 2,0
72	F16, F25, F30	107	0 / to 2,0
98	F25, F30	127	0 / to 2,0

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[2] EN ISO 4628-2, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering (ISO 4628-2:2003)*

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[4] EN ISO 12944-2, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 2: Classification of environments (ISO 12944-2:1998)*

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

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

[7] EN 10025 (all parts), *Hot-rolled products of structural steels*

[8] EN 10028 (all parts), *Flat products made of steels for pressure purposes*

[9] EN 10210-2, *Hot finished structural hollow sections of non-alloy and fine grain steels — Part 2: Tolerances, dimensions and sectional properties*

[10] EN 10219-2, *Cold formed welded structural hollow sections of non-alloy and fine grain steels — Part 2: Tolerances, dimensions and sectional properties*

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