INTERNATIONAL STANDARD

ISO 11926-2

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Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing —

Part 2:
Heavy-duty (S series) stud ends

Raccordements pour applications générales et transmissions hydrauliques et pneumatiques — Orifices et éléments mâles à filetage ISO 725 et joint torique —

Partie 2: Éléments mâles de série lourde (série S)

Reference number
ISO 11926-2:1995(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 11926-2 was prepared jointly by Technical Committees ISO/TC 131, *Fluid power systems*, Subcommittee SC 4, *Connectors and similar products and components* and ISO/TC 5, *Ferrous metal pipes and metallic fittings*.

ISO 11926 consists of the following parts, under the general title *Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing*:

— *Part 1: Ports with O-ring seal in truncated housing*

— *Part 2: Heavy-duty (S series) stud ends*

— *Part 3: Light-duty (L series) stud ends*

Annex A forms an integral part of this part of ISO 11926. Annex B is for information only.

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Introduction

In fluid power systems, power is transmitted and controlled through a fluid (liquid or gas) under pressure within an enclosed circuit. In general applications, a fluid may be conveyed under pressure.

Components are connected through their threaded ports by stud ends on fluid conductor fittings to tubes and pipes or to hose fittings and hoses.

Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing —

Part 2:
Heavy-duty (S series) stud ends

1 Scope

This part of ISO 11926 specifies dimensions, performance requirements and test procedures for adjustable and non-adjustable heavy-duty (S series) stud ends complying with ISO 725 and for their related O-rings, for general use and fluid power applications. It also specifies the designation of these stud ends.

Stud ends in accordance with this part of ISO 11926 may be used at working pressures up to 63 MPa (630 bar[1]) for non-adjustable stud ends, and 40 MPa (400 bar) for adjustable stud ends. The permissible working pressure depends upon the stud end size, materials, design, working conditions, application, etc.

For threaded ports and stud ends specified in new designs in hydraulic fluid power applications, only ISO 6149 is to be used. Threaded ports and stud ends in accordance with ISO 1179, ISO 9974 and ISO 11926 are not to be used for new designs in hydraulic fluid power applications.

Conformance to the dimensional information in this part of ISO 11926 does not guarantee rated performance. Each manufacturer should perform testing according to the specification contained in this part of ISO 11926 to assure that components comply with the performance ratings.

NOTE 1 Significant testing over 40 years has confirmed the performance requirements of ports complying with ISO 11926-1 and of stud ends complying with this part of ISO 11926; the latter are identical to those complying with SAE J 1453.

1) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 11926. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11926 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 48:1994, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD).*

ISO 725:1978, *ISO inch screw threads — Basic dimensions.*

ISO 3448:1992, *Industrial liquid lubricants — ISO viscosity classification.*

ISO 3601-3:1987, *Fluid systems — Sealing devices — O-rings — Part 3: Quality acceptance criteria.*

ISO 4759-1:1978, *Tolerances for fasteners — Part 1: Bolts, screws and nuts with thread diameters be-*

tween 1,6 (inclusive) and 150 mm (inclusive) and product grades A, B and C.

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

ISO 5864:1993, *ISO inch screw threads — Allowances and tolerances.*

ISO 6508:1986, *Metallic materials — Hardness test — Rockwell test (scales A - B - C - D - E - F - G - H - K).*

ISO 6803:1994, *Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing.*

ISO 11926-1:1995, *Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing — Part 1: Ports with O-ring seal in truncated housing.*

3 Definitions

For the purposes of this part of ISO 11926, the definitions given in ISO 5598 and the following definitions apply.

3.1 adjustable stud end: Stud end connector that allows for fitting orientation through final tightening of the locknut to complete the connection. This type of stud end is typically used on shaped fittings (e.g. tees, crosses and elbows).

3.2 non-adjustable stud end: Stud end connector that does not require specific orientation before final tightening of the connection because it is only used on straight fittings.

4 Dimensions

Heavy-duty (S series) stud ends shall conform to the dimensions shown in figures 1 and 2 and given in table 1. Hex tolerances across flats shall be in accordance with ISO 4759-1, product grade C.

5 Requirements

5.1 Working pressure

Heavy-duty (S series) stud ends made of low carbon steel shall be designed for use at the working pressures given in table 2.

5.2 Performance

Heavy-duty (S series) stud ends made of low carbon steel shall meet at least the burst and impulse pressures given in table 2, when tested in accordance with clause 7.

5.3 Flatness and fit of adjustable stud end washers

The washer shall be clinched to the stud end with a tight slip fit to an interference fit. The slip fit shall be tight enough so that the washer cannot be shaken loose to cause it to drop from its uppermost position by its own weight. The locknut torque needed to move the washer at the maximum washer interference fit shall not exceed the torques given in table 3.

Any washer surface that is out of flatness shall be uniform (i.e. not wavy) and concave with respect to the stud end and shall conform to the allowances given in table 3.

6 O-rings

O-rings for use with heavy-duty (S series) stud ends complying with this part of ISO 11926 shall conform to the dimensions shown in figure 3 and given in table 4.

7 Test methods

Parts used for the cyclic endurance or burst test shall not be tested further, used or returned to stock.

7.1 Burst pressure test

7.1.1 Principle

Test three samples to confirm that heavy-duty (S series) stud ends meet or exceed a ratio of 4:1 between the burst and working pressures.

7.1.2 Materials

7.1.2.1 Test block and stud ends

Test blocks shall be unplated and hardened to 50 HRC to 55 HRC (see ISO 6508). Stud ends shall be made from low carbon steel and shall be plated.

7.1.2.2 Test O-rings

Unless otherwise specified, O-rings shall be made from nitrile (NBR) rubber with a hardness of (90 ± 0,5) IRHD when measured in accordance with

ISO 48. O-rings shall conform to the dimensions given in table 4 and shall meet or exceed the quality requirement grade N of ISO 3601-3.

7.1.3 Procedure

7.1.3.1 Thread lubrication

For testing only, threads and contact surfaces shall be lubricated with hydraulic oil with a viscosity of VG 32 in accordance with ISO 3448 prior to the application of torque.

7.1.3.2 Stud end torque

Test stud ends after application of the torques given in table 5. Apply adjustable stud end locknut torques after the stud end has been backed out one full turn from finger-tight position, to test correctly the worst possible actual assembly conditions.

7.1.3.3 Pressure rise rate

During the burst test, the rate of pressure rise shall not exceed 138 MPa/min (1 380 bar/min).

7.1.4 Test report

Test results and conditions shall be reported on the test data form given in annex A.

7.2 Cyclic endurance (impulse) test

7.2.1 Principle

Test six samples at their respective impulse pressures.

7.2.2 Materials

Use the same materials as those given in 7.1.2.

7.2.3 Procedure

7.2.3.1 Thread lubrication

Apply lubricant as specified in 7.1.3.1.

7.2.3.2 Stud end torques

Apply torque as specified in 7.1.3.2.

7.2.3.3 Cycle and pressure rise rate

The cycle rate shall be uniform between 0,5 Hz and 1,3 Hz and shall conform to the wave pattern shown in ISO 6803, except that the pressure rise rate shall be adjusted accordingly.

7.2.4 Requirements

The six samples tested shall pass a cyclic endurance test of 1 000 000 cycles.

7.2.5 Test report

Test results and conditions shall be reported on the test data form given in annex A.

8 Designation of stud ends

Heavy-duty (S series) stud ends shall be designated by

a) "Stud end";

b) reference to this part of ISO 11926, i.e. ISO 11926-2;

c) thread size (d_1) and number of threads per inch (n), separated by a hyphen, without indicating the fine thread series (UNF) or the constant-pitch series (UN) and the thread class symbol (2A).

EXAMPLE

Stud end ISO 11926-2 - 1/2 - 20

9 Identification statement (Reference to this part of ISO 11926)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 11926:

"Heavy-duty (S series) stud ends conform to ISO 11926-2:1995, *Connections for general use and fluid power — Ports and stud ends with ISO 725 threads and O-ring sealing — Part 2: Heavy-duty (S series) stud ends.*"

Dimensions in millimetres,
surface roughness in micrometres

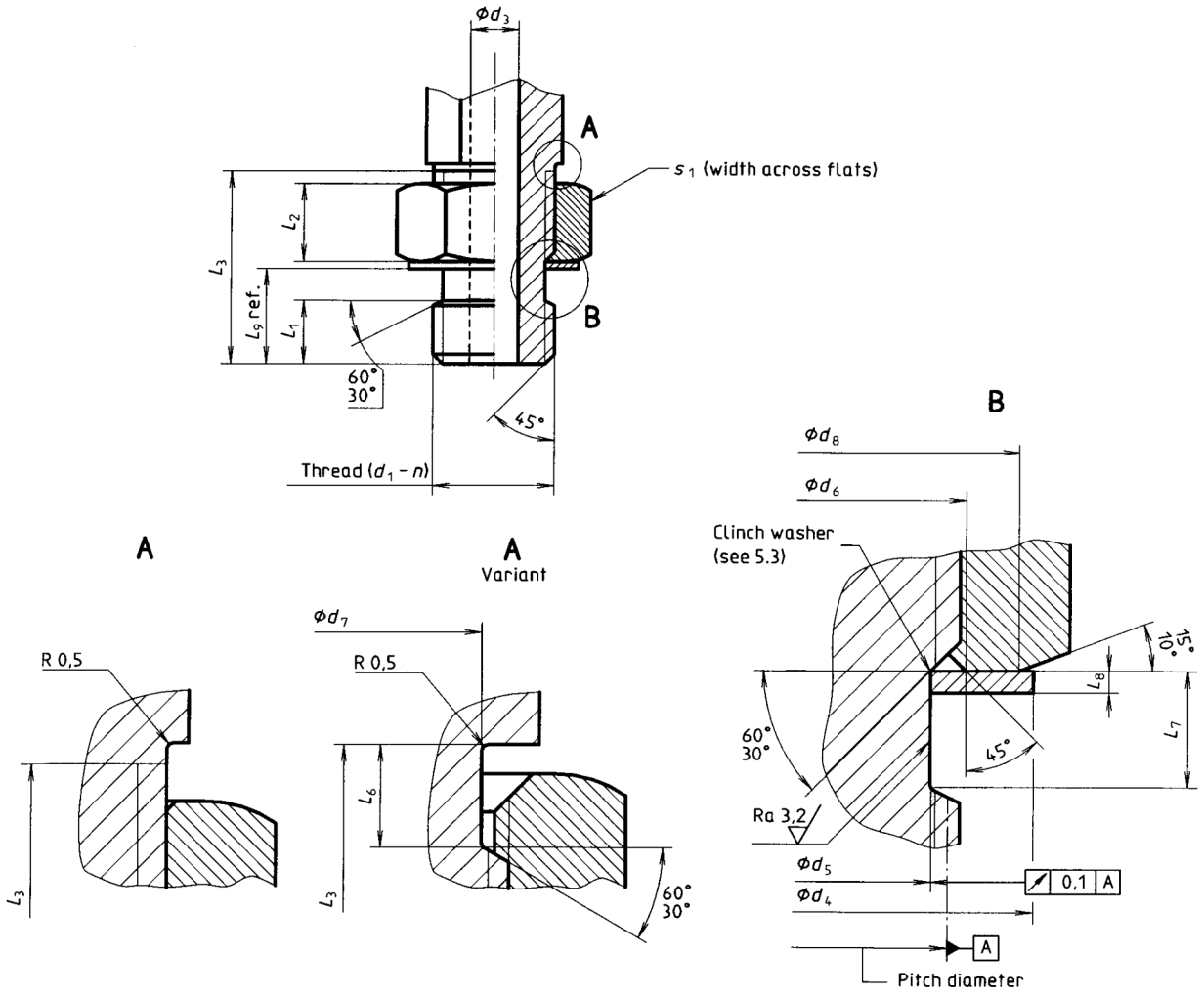


Figure 1 — Adjustable heavy-duty (S series) stud end

Dimensions in millimetres,
surface roughness in micrometres

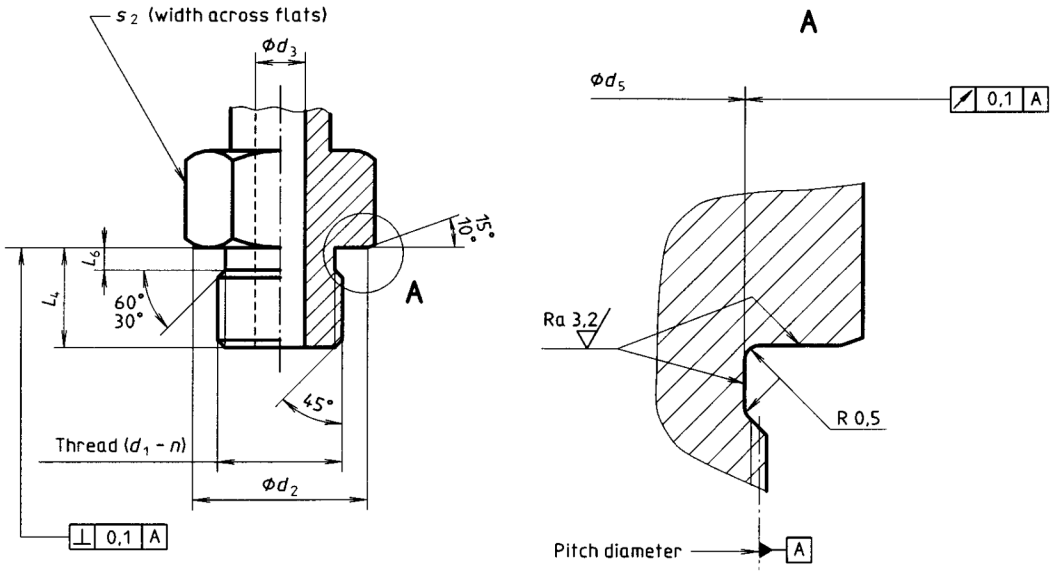


Figure 2 — Non-adjustable heavy-duty (S series) stud end

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Table 1 — Dimensions of heavy duty (S series) stud ends

Dimensions in millimetres

Thread[1] $(d_1 - n)$	d_2 ± 0,2	d_3 nom.	d_3 tol.	d_4 ± 0,4	d_5 $^{+0,05}_{-0,08}$	d_6 ± 0,2	d_7 $^{0}_{-0,3}$	d_8 ± 0,2	L_1 ± 0,2	L_2 ± 0,2	L_3 min.	L_4 ± 0,2	L_6 ± 0,15	L_7 ± 0,1	L_8 ± 0,08	L_9 ref.	s_1	s_2 min.
3/8-24 UNF-2A	11,8	3,2	$^{+0,18}_{0}$	14,6	7,95	9,9	8	13,8	7	7,2	18,8	9,5	1,75	3,4	0,8	9,6	14	12
7/16-20 UNF-2A	13,8	4,5	$^{+0,18}_{0}$	16,5	9,25	11,5	9,3	16,8	8,2	8	20,5	11	2,05	4,1	0,9	11	17	14
1/2-20 UNF-2A	16,8	6	$^{+0,18}_{0}$	18,3	10,85	13	10,9	16,8	8,2	8	22,4	11	2,05	4,1	0,9	11	17	17
9/16-18 UNF-2A	16,8	7,5	$^{+0,22}_{0}$	20,2	12,24	14,6	12,3	18,8	9	8,5	22,4	12	2,05	4,1	0,9	12,2	19	17
3/4-16 UNF-2A	21,8	10	$^{+0,22}_{0}$	25,7	16,76	19,4	16,8	23,8	10	10,3	26,1	14	2,25	4,9	1	13,9	24	22
7/8-14 UNF-2A	26,8	12,5	$^{+0,27}_{0}$	29,3	19,63	22,6	19,7	26,8	11,8	11,5	30,2	16	2,85	5,7	1,25	16,3	27	27
1 1/16-12 UN-2A	31,8	15,5	$^{+0,27}_{0}$	36,7	24	27,3	24	35,8	13,8	12,8	33,8	18,5	3,35	6	1,25	18,6	36	32
1 3/16-12 UN-2A	35,8	18	$^{+0,27}_{0}$	40,4	27,18	30,5	27,2	40,8	13,8	12,8	33,8	18,5	3,35	6	1,25	18,6	41	36
1 5/16-12 UN-2A	40,8	21,5	$^{+0,33}_{0}$	44	30,35	33,7	30,4	40,8	13,8	13,6	34,6	18,5	3,35	6	1,25	18,6	41	41
1 5/8-12 UN-2A	49,8	27,5	$^{+0,33}_{0}$	55	38,28	41,6	38,3	48,8	13,8	13,6	34,6	18,5	3,35	6	1,25	18,6	50	50
1 7/8-12 UN-2A	54,8	33,5	$^{+0,39}_{0}$	62,3	44,6	48	44,6	54,8	13,8	13,6	34,6	18,5	3,35	6	1,25	18,6	55	55

1) See ISO 725 for basic dimensions, and ISO 5864 for the tolerance class (2A).

Table 2 — Pressures for heavy-duty (S series) stud ends

Thread	Stud end style											
	Non-adjustable						Adjustable					
	Working pressure		Test pressure				Working pressure		Test pressure			
			Burst		Impulse[1]				Burst		Impulse[1]	
	MPa	(bar)	MPa	(bar)	MPa	(bar)	MPa	(bar)	MPa	(bar)	MPa	(bar)
3/8-24 UNF-2A	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
7/16-20 UNF-2A	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
1/2-20 UNF-2A	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
9/16-18 UNF-2A	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
3/4-16 UNF-2A	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
7/8-14 UNF-2A	63	(630)	252	(2 520)	83,8	(838)	40	(400)	160	(1 600)	53,2	(532)
1 1/16-12 UN-2A	40	(400)	160	(1 600)	53,2	(532)	40	(400)	160	(1 600)	53,2	(532)
1 3/16-12 UN-2A	40	(400)	160	(1 600)	53,2	(532)	40	(400)	160	(1 600)	53,2	(532)
1 5/16-12 UN-2A	40	(400)	160	(1 600)	53,2	(532)	31,5	(315)	126	(1 260)	41,9	(419)
1 5/8-12 UN-2A	25	(250)	100	(1 000)	33,2	(332)	25	(250)	100	(1 000)	33,2	(332)
1 7/8-12 UN-2A	25	(250)	100	(1 000)	33,2	(332)	20	(200)	80	(800)	26,6	(266)

NOTE — These pressures were established using fittings made of low carbon steel when tested in accordance with clause 7.

1) Cyclic endurance test pressure.

Table 3 — Adjustable stud end washer torque and flatness allowances

Thread	Maximum nut torque required to move washer	Maximum washer flatness allowance
	N·m	mm
3/8-24 UNF-2A	3	0,25
7/16-20 UNF-2A	4	0,25
1/2-20 UNF-2A	5	0,25
9/16-18 UNF-2A	7	0,25
3/4-16 UNF-2A	10	0,25
7/8-14 UNF-2A	12	0,25
1 1/16-12 UN-2A	15	0,4
1 3/16-12 UN-2A	18	0,4
1 5/16-12 UN-2A	20	0,4
1 5/8-12 UN-2A	25	0,5
1 7/8-12 UN-2A	30	0,5

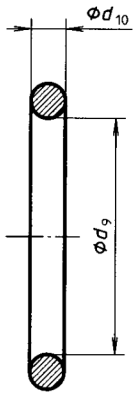


Figure 3 — O-ring

Table 4 — Dimensions of O-rings

Dimensions in millimetres

Thread	Inside diameter d_9		Section d_{10}	
	nom.	tol.	nom.	tol.
3/8-24 UNF-2A	7,65	± 0,13	1,63	± 0,08
7/16-20 UNF-2A	9,17	± 0,13	1,83	± 0,08
1/2-20 UNF-2A	10,52	± 0,13	1,83	± 0,08
9/16-18 UNF-2A	11,89	± 0,13	1,98	± 0,08
3/4-16 UNF-2A	16,36	± 0,13	2,21	± 0,08
7/8-14 UNF-2A	19,18	± 0,13	2,46	± 0,08
1 1/16-12 UN-2A	23,47	± 0,15	2,95	± 0,1
1 3/16-12 UN-2A	26,62	± 0,15	2,95	± 0,1
1 5/16-12 UN-2A	29,74	± 0,15	2,95	± 0,1
1 5/8-12 UN-2A	37,47	± 0,25	3	± 0,1
1 7/8-12 UN-2A	43,69	± 0,25	3	± 0,1

Table 5 — Torques for stud end qualification test

Thread	Torque N·m $^{+10}_{0}$ %
3/8-24 UNF-2A	10
7/16-20 UNF-2A	20
1/2-20 UNF-2A	25
9/16-18 UNF-2A	35
3/4-16 UNF-2A	70
7/8-14 UNF-2A	100
1 1/16-12 UN-2A	170
1 3/16-12 UN-2A	215
1 5/16-12 UN-2A	270
1 5/8-12 UN-2A	285
1 7/8-12 UN-2A	370

NOTE — These torque values are for testing only. Assembly tightening torque depends on many factors, including lubrication, coating and surface finish. The manufacturer shall be consulted.

Annex A
(normative)

Test data form for ISO 11926-1 ports and ISO 11926-2 stud ends

Stud end specifications:

Manufacturer: ..... Test facility: .....

Stud end type: ..... Size: .....

Minimum material tensile strength: ..... MPa

Stud end working pressure (table 2): ..... MPa

Stud end impulse test pressure (table 2): ..... MPa

Stud end burst test pressure (table 2): ..... MPa

Qualification test assembly torque (table 3): ..... N·m

Burst test results (at least three samples burst tested)

	Sample No.	Pressure at failure	Torque	Hardness	Type of failure
1	.....	..... MPa	..... N·m	.....	.....
2	.....	..... MPa	..... N·m	.....	.....
3	.....	..... MPa	..... N·m	.....	.....

Cyclic endurance test results (at least six samples impulse tested)

	Sample No.	Cycles at failure	Torque	Hardness	Type of failure
1	.....	.....	..... N·m	.....	.....
2	.....	.....	..... N·m	.....	.....
3	.....	.....	..... N·m	.....	.....
4	.....	.....	..... N·m	.....	.....
5	.....	.....	..... N·m	.....	.....
6	.....	.....	..... N·m	.....	.....

Conclusions: .....

Dimensions/List any exceptions: .....

Name (printed or typed) and signature of person certifying report:

..... Date: .....

Annex B
(informative)

Bibliography

[1] ISO 263:1973, *ISO inch screw threads — General plan and selection for screws, bolts and nuts — Diameter range 0.06 to 6 in.*

[2] ISO 1101:1983, *Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings.*

[3] ISO 1179-1:—[2], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 1: Threaded ports.*

[4] ISO 1179-2:—[2], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 2: Heavy-duty (S series) and light-duty (L series) stud ends with elastomeric sealing (type E).*

[5] ISO 1179-3:—[2], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 3: Light-duty (L series) stud ends with sealing by O-ring with retaining ring (types G and H).*

[6] ISO 1179-4:—[2], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 4: Stud ends for general use only with metal-to-metal sealing (type B).*

[7] ISO 1302:1992, *Technical drawings — Method of indicating surface texture.*

[8] ISO 6149-1:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 1: Ports with O-ring seal in truncated housing.*

[9] ISO 6149-2:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 2: Heavy-duty (S series) stud ends — Dimensions, design, test methods and requirements.*

[10] ISO 6149-3:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 3: Light-duty (L series) stud ends — Dimensions, design, test methods and requirements.*

[11] ISO 6410-1:1993, *Technical drawings — Screw threads and threaded parts — Part 1: General conventions.*

[12] ISO 9974-1:—[2], *Connections for general use and fluid power — Ports and stud ends with ISO 261 threads with elastomeric or metal-to-metal sealing — Part 1: Threaded ports.*

[13] ISO 9974-2:—[2], *Connections for general use and fluid power — Ports and stud ends with ISO 261 threads with elastomeric or metal-to-metal sealing — Part 2: Stud ends with elastomeric sealing (type E).*

[14] ISO 9974-3:—[2], *Connections for general use and fluid power — Ports and stud ends with ISO 261 threads with elastomeric or metal-to-metal sealing — Part 3: Stud ends with metal-to-metal sealing (type B).*

2) To be published.

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Descriptors: hydraulic fluid power, pneumatic fluid power, fluid circuits, components, fittings, connecting joints, O-ring unions, threaded parts, heavy duty series, stud ends, specifications, dimensions, performance, tests, identification methods.

Price based on 11 pages