BS ISO 7241:2014

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Hydraulic fluid power — Dimensions and requirements of quick-action couplings

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National foreword

This British Standard is the UK implementation of ISO 7241:2014. It supersedes BS 7198-1:1989 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/18/-/4, Connectors and associated components.

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

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INTERNATIONAL STANDARD

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Transmissions hydrauliques — Dimensions et exigences des raccords rapides

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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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The committee responsible for this document is ISO/TC 131, *Fluid power systems*, Subcommittee SC 4, *Connectors and similar products and components*.

This first edition of ISO 7241 cancels and replaces ISO 7241-1:1987, which has been technically revised.

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Quick-action couplings are used to join or separate fluid conductors quickly and without the use of tools or special devices.

When hydraulic quick-action couplings are used on agricultural machinery, the female coupling half is normally assembled on the tractor and the male coupling half is normally assembled on the tractor attachment.

INTERNATIONAL STANDARD **ISO 7241:2014(E)**

Hydraulic fluid power — Dimensions and requirements of quick-action couplings

1 Scope

This International Standard specifies the interface dimensions and basic performance requirements for two series of hydraulic quick-action couplings. Both series are in widespread use and have similar technological advantages. Series A is used predominantly in Europe and is preferred worldwide for agricultural and forestry machinery, and this International Standard also specifies additional requirements for Series A for use in agricultural machinery applications covered in ISO 5675. Series B is used predominantly in North America and in the chemical industry.

2 Normative references

The following documents, in whole or in part, are referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2944, *Fluid power systems and components — Nominal pressures*

ISO 3448, *Industrial liquid lubricants — ISO viscosity classification*

ISO 5598, *Fluid power systems and components — Vocabulary*

ISO 5675, *Agricultural tractors and machinery — General purpose quick-action hydraulic couplers*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

ISO 18869[1)], *Hydraulic fluid power — Test methods for couplings actuated with or without tools*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 and the following apply.

3.1
coupling valve opening force
maximum force required to fully open the hydraulic quick-action coupling valve when the pressure inside the coupling is at zero

3.2
female half
receptacle portion of a quick-action coupling which normally includes the mechanism to lock the two halves of quick-action coupling together

3.3
interface
that portion of a coupling half that establishes and controls interchangeability

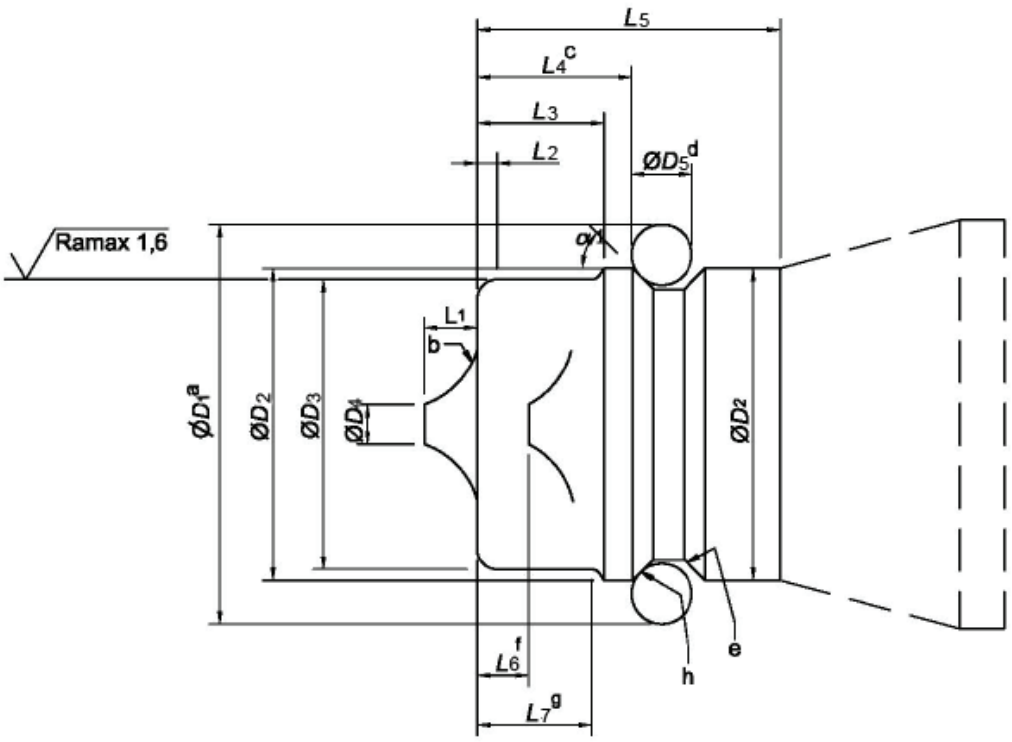
3.4
male half
probe portion of a quick-action coupling which fits and locks into the female half

1) This International Standard is under development.

4 Dimensional requirements

4.1 Dimensional requirements for Series A hydraulic quick-action couplings are shown in Figure 1 and given in Table 1.

Surface roughness values in micrometres



Key

a Dimension D_1 is the gauge diameter.

b The shape of the valve is optional, and dimension D_4 is used unless the valve has a spherical form.

c Dimension L_4 is measured to the ball.

d Dimension D_5 is the diameter of the gauge ball.

e The shape of the groove that receives the bearings in the coupled position is left to the manufacturer.

f Maximum valve travel against stop.

g Minimum length of diameter D_3.

h Minimum hardness shall be 86HR 15N at ball contact point, in accordance with ISO 6508-1.

Figure 1 — Dimensional requirements for Series A couplings

Table 1 — Dimensional requirements for Series A couplings

Dimensions in millimetres

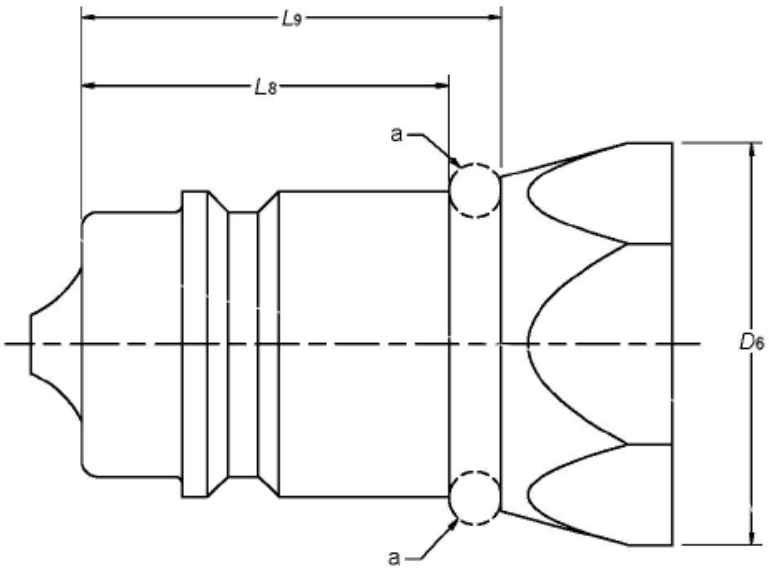
Size[a]	D_1	D_2	D_3	D_4[b] min.	D_5 ±0,002 5	L_1 max.	L_2[c]	L_3	L_4	L_5 min.	L_6 max.	L_7 min.	α_1
6,3	18,7	12,9 13	11,73 11,86	1,9	3,968	2,8	0,7 1,5	5,5 5,7	6,6 6,8	14,5	0,5	3,7	44° 46°
10	24,1	18,3 18,4	17,2 17,3	3	3,968	3,8	0,7 1,5	8,8 9	9,8 10	18	0,5	7	
12,5	30,3	23,66 23,74	20,48 20,56	4,5	4,762	4	0,7 1,5	9,2 9,4	11,6 11,8	24	0,5	8	
20	37,1	30,4 30,5	29 29,1	5,4	4,762	7,2	1 2,5	15,9 16,1	17,5 17,7	27,5	0,6	13,7	
25	43,0	36,5 36,6	34,21 34,34	7,8	4,762	8,5	1,5 3	19,7 20	22,8 23	34	0,7	16,3	
31,5	56,0	47,7 47,8	44,9 45	8,9	6	11	2 4,5	24,9 25,1	28,4 28,6	43	0,7	24	
40	68,5	57,5 57,6	54,9 55	9,9	8	13	3 6	30,6 30,8	33,7 33,9	51	0,8	29,6	
50	83,7	69,9 70	65 65,1	9,9	10	16,6	3 7	35 35,2	39,6 39,8	61	0,8	34	

[a] The size designation corresponds to the nominal size of the hose recommended for use with the coupling; see ISO 4397.

[b] Use dimension D_4 unless the valve has a spherical form; spherical form is not preferred.

[c] Radius or chamfer length. Radius with chamfer is optional.

4.2 Additional dimensional requirements for Series A hydraulic quick-action couplings used in agricultural applications are shown in Figure 2 and given in Table 2.



Key

[a] Shape of neck between L_8 and L_9 is optional but shall be circular to accommodate dust sealing.

Figure 2 — Additional dimensional requirements for Series A couplings used in agricultural applications

Table 2 — Additional dimensional requirements for Series A couplings used in agricultural applications

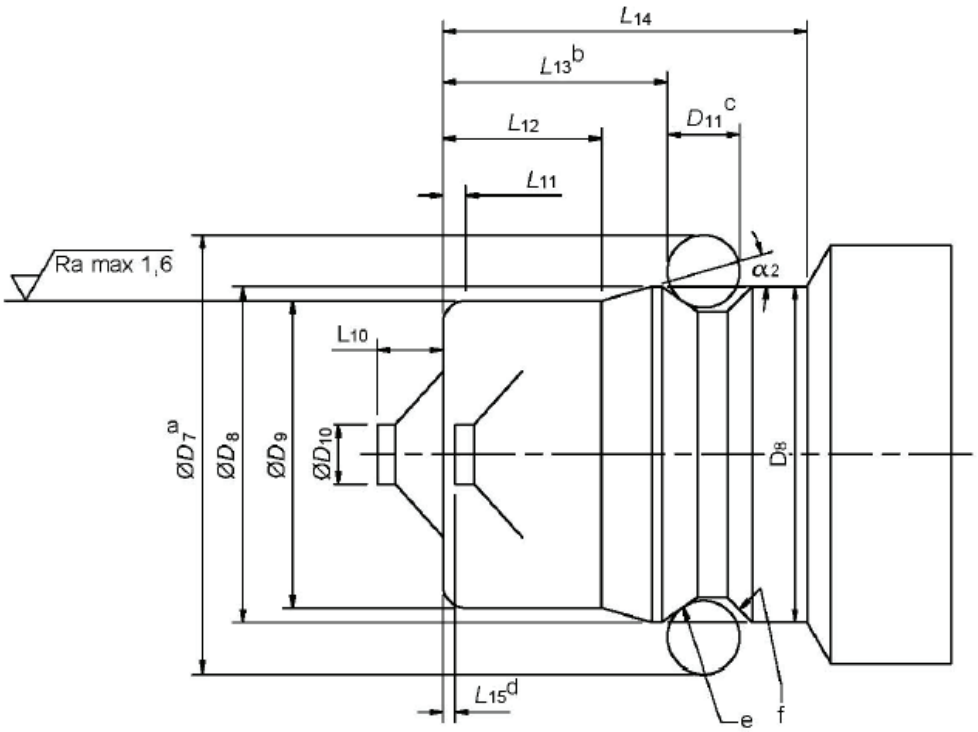
Dimensions in millimetres

Size[a]	D_6 max.	L_8 min.	L_9 min.
12,5	31	28,5	32,7
20	38	27,5	—

[a] The size designation corresponds to the nominal size of the hose recommended for use with the coupling; see ISO 4397.

4.3 Dimensional requirements for Series B hydraulic quick-action couplings are shown in Figures 3 and 4, and given in Tables 3 and 4.

Surface roughness values in micrometres



Key

a Dimension D_7 is the gauge diameter.

b Dimension L_{13} is measured to the ball.

c Diameter D_{11} is the diameter of the gauge ball.

d Valve is flush to minus from end of coupling when against stop.

e Minimum hardness shall be 86HR 15N at ball contact point, in accordance with ISO 6508-1.

f The shape of the groove that receives the bearings in the coupled position is left to the manufacturer.

Figure 3 — Dimensional requirements for Series B couplings — Sizes 5 to 25

Table 3 — Dimensional requirements for Series B couplings — Sizes 5 to 25

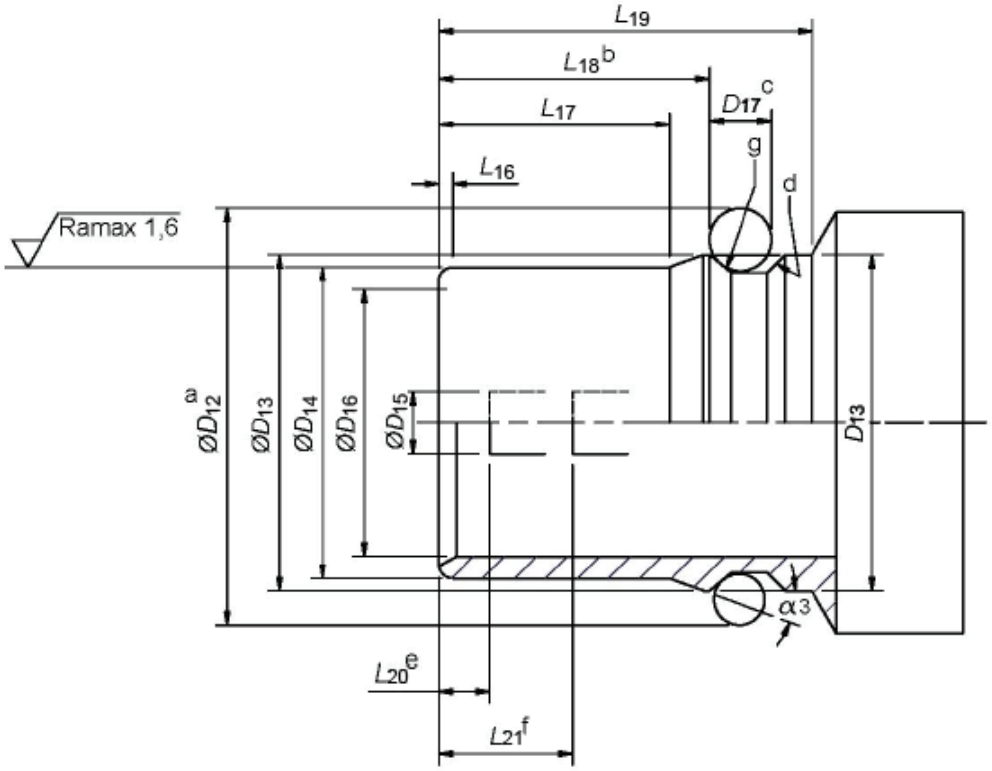
Dimensions in millimetres

Size[a]	**Gauge diameter D_7**	D_8	D_9	D_{10} min.	D_{11} ±0,002 5	L_{10} max.	L_{11}[b]	L_{12} min.	L_{13}	L_{14} min.	L_{15} max.	α_2 max.
5	16,69	12,09 12,19	10,8 10,9	2,16	3,175	2,79	0,64 1,32	7,87	11,28 11,48	18,92	0,5	16°
6,3	21,21	15,6 15,7	14,1 14,2	2,54	3,967	4,06	1,07 1,73	9,65	13,41 13,61	22,1	0,5	
10	26,87	20,04 20,14	19 19,1	3,05	4,763	4,83	1,07 1,73	12,45	15,52 15,72	24,89	0,5	
12,5	33,45	25,65 25,76	23,44 23,55	4,57	5,555	5,08	1,07 1,73	12,19	17,17 17,37	27,94	0,5	
20	41,66	32,66 32,77	31,34 31,45	5,08	6,35	7,37	1,45 2,51	18,8	22,86 23,06	35,56	0,6	
25	49,38	40,46 40,56	37,69 37,8	6,1	6,35	8,64	1,45 2,51	20,57	27,36 27,56	40,39	0,7	

[a] The size designation corresponds to the nominal size of the hose recommended for use with the coupling; see ISO 4397.

[b] Radius or chamfer length. Radius with chamfer is optional.

Surface roughness values in micrometres



Key

a Dimension D_{12} is the gauge diameter.

b Dimension L_{18} is measured to the ball.

c Diameter D_{17} is the diameter of the gauge ball.

d The shape of the groove that receives the bearings in the coupled position is left to the manufacturer.

e Valve closed.

f Valve open against stop.

g Minimum hardness shall be 86HR 15N at ball contact point, in accordance with ISO 6508-1.

Figure 4 — Dimensional requirements for Series B couplings — Sizes 40 and 50

Table 4 — Dimensional requirements for Series B couplings — Sizes 40 and 50

Dimensions in millimetres

Size[a]	**Gauge diameter D_{12}**	**D_{13}**	**D_{14}**	**D_{15}** min.	**D_{16}**	**L_{16}**[b]	**L_{17}** min.	**L_{18}**	**L_{19}** min.	**L_{20}** max.	**L_{21}**	**D_{17}** ±0,002 5	**α_3** max.
40	59,13	47,96 48,06	44,4 44,5	8,89	38,05 38,15	1,4 2,54	32,56	38,91 39,17	53,34	10	26,36 26,87	7,938	21°
50	85,6	66,55 66,68	63,14 63,27	10,16	53 53,16	1,4 2,54	38,1	45,16 45,42	65,02	15	32 32,51	12,7	

a The size designation corresponds to the nominal size of the hose recommended for use with the coupling; see ISO 4397.

b Radius or chamfer length. Radius with chamfer is optional.

5 Performance requirements

5.1 The performance values specified in this International Standard apply to standard couplings made from carbon steel. The use of any combination of other materials and related performance values shall be agreed between the customer and manufacturer.

5.2 Series A and B hydraulic quick-action couplings shall meet or exceed the maximum working pressure and minimum burst pressure ratings given in Tables 5 and 6. See Clause 6 and Table 7 for additional requirements for Series A quick-action couplings for use in agricultural machinery applications.

Table 5 — Performance requirements for Series A couplings

Characteristic	Performance requirements by coupling size[a]							
	6,3	10	12,5	20	25	31,5	40	50
Maximum rated pressure in accordance with ISO 2944	31,5 MPa (315 bar[b])	31,5 MPa (315 bar)	25 MPa (250 bar)	25 MPa (250 bar)	20 MPa (200 bar)	20 MPa (200 bar)	16 MPa (160 bar)	10 MPa (100 bar)
Minimum burst pressure	126 MPa (1 260 bar)	126 MPa (1 260 bar)	100 MPa (1 000 bar)	100 MPa (1 000 bar)	80 MPa (800 bar)	80 MPa (800 bar)	64 MPa (640 bar)	40 MPa (400 bar)
Rated flow	3 l/min	23 l/min	45 l/min	106 l/min	189 l/min	288 l/min	379 l/min	757 l/min
Maximum pressure drop at rated flow	130 kPa (1,3 bar)	180 kPa (1,8 bar)	200 kPa (2 bar)	200 kPa (2 bar)	250 kPa (2,5 bar)	200 kPa (2 bar)	200 kPa (2 bar)	200 kPa (2 bar)
Rated surge flow	9 l/min	69 l/min	135 l/min	300 l/min	567 l/min	864 l/min	1 137 l/min	2 271 l/min
Maximum fluid loss per disconnect	1 ml	2 ml	2,5 ml	9 ml	25 ml	60 ml	90 ml	150 ml

[a] The size designation corresponds to the nominal size of the hose recommended for use with the coupling; see ISO 4397.

[b] 1 bar = 10^5 Pa = 0,1 MPa = 100 kPa; 1 Pa = 1 N/m^2.

Table 6 — Performance requirements for Series B couplings

Characteristic	Performance requirements by coupling size[a]							
	5	6,3	10	12,5	20	25	40	50
Maximum rated pressure in accordance with ISO 2944	25 MPa (250 bar)	25 MPa (250 bar)	25 MPa (250 bar)	25 MPa (250 bar)	16 MPa (160 bar)	10 MPa (100 bar)	6,3 MPa (63 bar)	5 MPa (50 bar)
Minimum burst pressure	100 MPa (1 000 bar)	100 MPa (1 000 bar)	100 MPa (1 000 bar)	100 MPa (1 000 bar)	64 MPa (640 bar)	40 MPa (400 bar)	25 MPa (250 bar)	20 MPa (200 bar)
Rated flow	3 l/min	12 l/min	23 l/min	45 l/min	106 l/min	189 l/min	375 l/min	560 l/min
Maximum pressure drop at rated flow	100 kPa (1 bar)	100 kPa (1 bar)	130 kPa (1,3 bar)	130 kPa (1,3 bar)	130 kPa (1,3 bar)	150 kPa (1,5 bar)	180 kPa (1,8 bar)	200 kPa (2 bar)
Rated surge flow	9 l/min	36 l/min	69 l/min	135 l/min	300 l/min	567 l/min	1 125 l/min	1 680 l/min
Maximum fluid loss per disconnect	1 ml	2 ml	2,5 ml	5 ml	10 ml	25 ml	100 ml	200 ml

[a] The size designation corresponds to the nominal size of the hose recommended for use with the coupling; see ISO 4397.

5.3 The maximum rated pressure shall be verified by cyclic endurance (impulse) testing in the coupled and uncoupled conditions conducted in accordance with ISO 18869 for 100 000 cycles.

5.4 The minimum burst pressure shall be verified by burst pressure testing conducted in accordance with ISO 18869 in the coupled and uncoupled conditions.

5.5 The maximum pressure drop at rated flow shall be verified by pressure drop testing conducted in accordance with ISO 18869.

5.6 The rated surge flow rate shall be verified by either long duration surge flow testing or short duration surge flow testing conducted in accordance with ISO 18869.

5.7 The maximum fluid loss per disconnect shall be verified by testing conducted in accordance with ISO 18869.

6 Additional requirements for Series A quick-action couplings for use in agricultural machinery applications

6.1 General

Size 12,5 and 20 Series A quick-action couplings designated for use on agricultural machinery shall fulfil the additional requirements specified in this clause, unless otherwise agreed between the customer and manufacturer. Any other performance requirements shall be in accordance with ISO 5675.

6.2 Connecting and disconnecting

Female and male coupling halves shall fulfil the following requirements.

a) The connecting force measured in accordance to ISO 18869 shall not exceed 200 N with the male coupling half pressurized to 16 MPa (160 bar) and the female coupling half pressurized to 0,25 MPa (2,5 bar) for size 12,5 and 0,10 MPa (1,0 bar) for size 20.

b) The disconnecting force shall not exceed 1,7 kN for size 12,5 and 2,5 kN for size 20 when subjected to an internal pressure of 17,5 MPa (175 bar). The disconnecting force shall be measured in accordance with ISO 18869.

A special female coupling capable of connecting and disconnecting under pressure is required to meet these requirements.

6.3 Fluid loss

Fluid loss on disconnecting the coupling under pressure shall not exceed the values given in Table 7 when determined in accordance with ISO 18869.

Table 7 — Maximum fluid loss allowed on disconnecting under pressure

	Size 12,5	Size 20
Disconnecting at 0,1 MPa (1 bar)	2,5 ml	4,0 ml
Disconnecting at 17,5 MPa (175 bar)	9,0 ml	12,5 ml

6.4 Valve performance

6.4.1 The force required to fully open the valve in the male part of the coupling when there is no internal pressure in the male part shall not exceed 45 N for size 12,5 and 70 N for size 20.

6.4.2 The coupling shall not check off (i.e. the valve shall not close) when hydraulic fluid with a viscosity of ISO VG 32, in accordance with ISO 3448, flows from the male part to the female part at a flow rate of 190 l/min for size 12,5 and 250 l/min for size 20.

7 Workmanship

The couplings shall be free from defects such as cracks and porosity and shall be deburred. Sharp edges on the outside shall be removed. All machined surfaces shall have a material removal rate surface roughness value of MRR Ramax 3,2 µm, except where otherwise specified in the figures. The finishing of the sealing area in contact with ports and stud ends shall conform to the respective connector standards.

8 Designation

Hydraulic quick-action couplings conforming to this International Standard shall be designated as follows:

a) the word “Coupling”;

b) a reference to this International Standard (i.e. ISO 7241), followed by a spaced hyphen;

c) the series designation (A or B), followed by a spaced hyphen;

d) the size;

e) the designation AG (for agricultural service), if needed.

EXAMPLE A Series A hydraulic quick-action coupling of size 12,5 is designated as follows:

Coupling ISO 7241 - A - 12,5

9 Marking

Couplings conforming to this International Standard shall be permanently marked at a minimum with the manufacturer’s name, logo, or product identification.

10 **Identification statement** (reference to this International Standard)

Use the following statement in test reports, catalogues, and sales literature when electing to comply with this International Standard:

“Hydraulic quick-action coupling dimensions and requirements conform to ISO 7241, *Hydraulic fluid power — Dimensions and requirements of quick-action couplings.*”

Bibliography

[1] ISO 4397, *Fluid power connectors and associated components — Nominal outside diameters of tubes and nominal hose sizes*

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