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Replacing GB/T 3765-1983

24° cone connectors - Specification

卡套式管接头技术条件

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24° cone connectors - Specification

1 Scope

This document specifies the material, pressure-temperature requirements, marking methods, connected pipe requirements, wrenching dimensions and tolerances, structure and manufacturing, performance and test requirements, installation instructions, procurement information, marks and other technical requirements for 24° cone connectors.

This Standard applies to hydraulic fluid transmission and general-purpose piping systems with a pipe outer diameter of 4 mm ~ 42 mm and a maximum working pressure of 10MPa to 63MPa.

NOTE 1: In newly designed hydraulic fluid power systems, Type F threaded stud ends shall be used.

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.

GB/T 3, *Run-outs, undercuts and chamfers for general purpose metric screw threads* (GB/T 3-1997, eqv ISO 4755:1983; eqv ISO 3508:1976)

GB/T 193, *General purpose metric screw threads - General plan* (GB/T 193-2003, ISO 261:1998, ISO general purpose metrics screw threads - General plan, MOD)

GB/T197, *General purpose metric screw threads - Tolerances* (GB/T 197-2003, ISO 965-1:1998, ISO general purpose metric screw threads - Tolerances - Part 1: Principles and basic data, MOD)

GB/T 230.1, *Metallic materials - Rockwell hardness test - Part 1: Test method* (GB/T 230.1-2004, ISO 6508-1:1999, MOD)

GB/T 3103.1, *Tolerances for fasteners - Bolts, screws, studs and nuts* (GB/T 3103.1-2002, idt ISO 4759-1:2000)

GB/T 3141, *Industrial liquid lubricants - ISO viscosity classification* (GB/T 3141-1994, eqv ISO 3448:1992)

3.1 connector; fitting

Sealed connection assemblies between pipes, between pipes and other equipment.

3.2 connection body

Parts that connect pipes and equipment through connecting nuts and 24° cones or cone seals.

3.3 stud end thread

External threads connected to threaded ports.

3.4 maximum working pressure

The highest pressure at which a system or system part can operate stably.

4 Materials

4.1 Connection body

The material of the connection body shall be compatible with the transmission medium and ensure an effective connection.

The connection body made of carbon steel shall meet the pressure-temperature requirements specified in Chapter 5. For connection bodies made of other materials such as stainless steel or copper alloy, the pressure-temperature value is specified by the manufacturer.

4.2 Connecting nut

Unless otherwise agreed between the supplier and the purchaser, the connecting nut used in conjunction with the carbon steel joint body shall be made of carbon steel; the connecting nut used in conjunction with the stainless steel joint body shall be made of stainless steel; the connecting nut used in conjunction with the copper alloy joint body shall be made of copper alloy.

4.3 24° cone

24° cone material shall be compatible with the transmission medium. Guarantee a valid connection.

Carbon steel 24° cones are used with carbon steel connection bodies and carbon steel pipes. Stainless steel 24° cones are used with stainless steel connection bodies and stainless-steel pipes. Copper 24° cones are used with copper connection bodies and copper pipes. The combined use of different types of materials shall be determined through negotiation between the supplier and the purchaser.

4.4 O-ring

If not otherwise specified, O-rings for petroleum-based hydraulic fluids and complying with the pressure-temperature requirements of Clause 5 and Table 1 shall be made of nitrile rubber (NBR). Its hardness shall be (90 ± 5) IRHD. Measure according to GB/T 6031. Its appearance quality shall not be lower than the level N requirements of GB/T 3452.2. For O-rings used outside the pressure-temperature range specified in Chapter 5 or in non-petroleum-based hydraulic fluid systems, other durometers or other materials may be used, but the fitting manufacturer shall be consulted.

5 Pressure-temperature requirements

5.1 Carbon steel pipe connectors conforming to the standard for 24° cone connectors shall be able to withstand the working pressure specified in Table 1 and Table 2 when the medium temperature is in the range of -40°C to +120°C. The wall thickness of the 24° cone-seal welded pipe under different working pressures shall meet the requirements in Table 3.

5.2 Unless otherwise specified, connectors with elastomeric seals shall be given a special operating temperature range for use in petroleum-based hydraulic fluid systems. Its operating temperature range may be reduced, or it may not be suitable for other fluids at all. Manufacturers can provide elastic seals that are suitable for different mediums and can meet the temperature range requirements.

5.3 According to different pressure levels and service conditions, the 24° cone connectors are divided into the following three series:

- LL: ultra-light load series;

- L: light load series;

- S: heavy load series.

$^{0}_{-1.0}$ mm.

8.2 The tolerance of the dimension S across the sides of the hexagon shall comply with the requirements for Class B products in GB/T 3103.1. The diagonal dimension of the hexagon shall not be less than 1.092S. The wrenching side length shall not be less than 0.43S. If there is no other provision or mark, the hexagon shall be chamfered by 10°~30°, the diameter of the chamfer shall be equal to the dimension S of the opposite side of the hexagon. The tolerance of the chamfer diameter shall be $^{0}_{-0.4}$ mm.

9 Structure and manufacturing

9.1 Appearance structure

The type and size of 24° cone connectors shall meet the requirements of corresponding standards. Structural dimensions not specified in the standard are to be determined by the manufacturer, but fluid resistance shall be minimized.

9.2 Size

The size specified in the standard refers to the finished product size including the thickness of the coating or surface treatment layer. The tolerance of all unfilled dimensions shall be ±0.4 mm. The circular runout tolerance of the 24° inner cone seat at the 24° cone end to the pitch diameter of the outer thread shall be 0.25 mm. The verticality tolerance of the pitch diameter of the stud end thread to the sealing end face shall be 0.10 mm.

9.3 Channel tolerance

When the channel of the connection body is processed from both ends, the misalignment deviation of the confluence point shall not be greater than 0.4 mm. The intersection cross-sectional area of the cross channel shall not be lower than the specified minimum channel cross-sectional area.

9.4 Angular tolerance

The angular tolerance of the port axis of elbows, tees and crosses with specifications not greater than 10 mm shall be ±2.5°. The angular tolerance of the port axes of elbows, tees and crosses with specifications greater than 10 mm shall be ±1.5°.

9.5 Thread

9.5.1 Ordinary thread shall comply with the provisions of GB/T 193. The tolerance of external thread shall comply with the provisions of Class 6 g in GB/T 197. The

tolerance of internal thread shall comply with the provisions of Class 6H in GB/T 197. The end face shall be chamfered. Thread finish, shoulder distance and undercut shall comply with the provisions of GB/T 3. After electroplating, the external thread shall be checked and accepted by the Class 6h general regulation.

9.5.2 The 55° non-sealed pipe thread shall comply with the provisions of GB/T 7307. External thread tolerance is Class A. The end faces shall be chamfered.

9.5.3 The 55° sealed pipe thread shall comply with the provisions of GB/T 7306.1 or GB/T 7306.2. The end faces shall be chamfered.

9.5.4 The 60° sealed pipe thread shall meet the requirements of GB/T 12716. The end faces shall be chamfered.

9.6 Manufacturing quality

All connection bodies and fittings shall not have cracks, air holes, burrs, sharp edges, etc. The surface roughness of the O-ring grooves of the 24° inner and outer tapered surfaces of the connection body, combined connection body, adjustable connection body and cone seal body Ra≤3.2μm. The surface of the part that is not machined is allowed to have depressions and indentations not exceeding half of its dimensional tolerance. The roughness of all machined surfaces not marked as required is Ra≤6.3μm. All unmarked edges shall be chamfered with obtuse angles. The chamfer size shall not be greater than 0.15 mm.

9.7 Surface treatment

9.7.1 Unless otherwise agreed between the purchaser and the supplier, the external surfaces and threads of all carbon steel parts shall be coated with the appropriate material. Pass the 72h neutral salt spray test. For salt spray test, red rust spots other than the following areas shall be regarded as unacceptable coating.

-- Surface of the inner wall of the hole;

-- Hexagonal crests, toothed crests, thread crests, etc. that may be damaged during the coating operation of mass production or during delivery and transportation;

-- Areas where folding, flaring, bending or other post-plating forming operations damage the coating;

-- Suspension or fixation during the test (possible salt spray deposits).

9.7.2 The parts to be welded shall be coated with oil film or phosphating or other anti-rust treatment that does not affect welding.

be carried out without additional force.

The manufacturer shall formulate the installation and use instructions for 24° cone connectors, at least providing the following information:

a) Detailed requirements for the material and quality of the connected pipes;

b) Material preparation requirements for connected pipes;

c) Installation instructions, such as installation wrench turns or installation torque;

d) Recommended installation tools.

12 Procurement information

The purchaser shall provide the following information when inquiring and ordering:

a) The name of the connector or connection body and fittings;

b) The material of the connector or connection body and fittings;

c) The material and specification of the connected pipes;

d) The medium of transmission;

e) The work pressure;

f) The medium working temperature range;

g) The ambient temperature range.

13 Marks

Unless otherwise agreed between the supplier and the purchaser, the connection body, 24° cone, cone-sealed welded joint, cone-sealed plug and connection nut shall be permanently marked with the manufacturer's name or trademark or code. The specifications and pressure series shall also be marked for 24° cone, cone-sealed welded pipes, and connecting nuts.

The location of the marking shall not affect the performance and surface protection of the part. Marks shall be clear. The size and method of marks are to be determined by the manufacturer.

B.1.2 Test devices

B.1.2.1 Test block

The test block shall not have plating. The hardness value shall be 35 HRC ~ 45 HRC specified in GB/T 230.1. For test blocks with multiple ports, the center-to-center distance of the test ports shall be at least 1.5 times the diameter of the ports. The distance from the center of the oil port to the edge of the test block shall be at least equal to the diameter of the oil port.

B.1.2.2 Test sealing

Seals used in all tests shall be made of nitrile rubber (NBR), unless tightened or otherwise specified. The hardness shall be (90±5) IRHD. Measure according to GB/T 6031. The size shall meet the relevant requirements. The appearance quality of O-rings shall not be lower than the level N requirements of GB/T 3452.2.

B.1.3 Test procedures

B.1.3.1 Thread lubrication

For carbon steel connectors used in the test, before assembly, all threads and contact surfaces shall be filled with hydraulic oil with a viscosity of VG 32 in accordance with GB/T 3141. Non-carbon steel connectors shall be lubricated according to the manufacturer's recommendations.

B.1.3.2 Assembly moment

For all tests except repeated installation and overtightening tests, the assembly of pipe connections and stud ends shall be tightened with a wrench to the minimum assembly torque or the minimum number of wrench-tightening circles specified in the relevant connector standard after being finger-tight. If there is no standard regulation, it shall be tightened according to the minimum assembly torque or the minimum number of wrench turns provided by the manufacturer. For adjustable stud ends of Type 2 and Type 3 test assemblies, in order to conduct a correct test for the worst case that may occur during actual installation, the column end shall be finger-tightened and then withdrawn one full turn. Then tighten the nut with a wrench according to the above regulations.

B.1.3.3 Test temperature

Unless otherwise specified, the temperature of all test medium shall be between 15°C and 80°C.

B.1.4 Test report

The test results and test conditions shall be filled in according to the test record form in Annex C.

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