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**Automotive parts — Brake hose
assemblies for hydraulic braking
systems used with non-petroleum-
base brake fluid**

ICS 43.040.40 ; 83.140.40

Reference number : JIS D 2601 : 2006 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Society of Automotive Engineers of Japan (JSAE)/ Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS D 2601:1998** is replaced with this Standard.

In the revision at this time, some provisions of **ISO 3996:1995** *Road vehicles—Brake hose assemblies for hydraulic braking systems used with non-petroleum-base brake fluid*, with which **JIS D 2601:1998** was not harmonized, have been adopted based on reviewing.

This revision has been made based on **ISO 3996:1995** *Road vehicles—Brake hose assemblies for hydraulic braking systems used with non-petroleum-base brake fluid* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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the original JIS is to be the final authority.

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Automotive parts—Brake hose assemblies for hydraulic braking systems used with non-petroleum-base brake fluid

Introduction This Japanese Industrial Standard has been prepared based on the third edition of **ISO 3996** *Road vehicles—Brake hose assemblies for hydraulic braking systems used with non-petroleum-base brake fluid* published in 1995. The provisions for marking of ISO certification number and symbol specified in the corresponding International Standard are not adopted because there has been no embodiment.

The portions given sidelines or dotted underlines are the matters not stated in the original International Standard.

1 Scope This Standard specifies the test procedures for, and performance requirements and marking of hydraulic brake hose assemblies to be used in hydraulic braking system of automobiles.

It applies to brake hose assemblies made of a hose fabricated from cord and synthetic elastomers and assembled with metal end fittings for use with non-petroleum-base brake fluids specified in **JIS K 2233**.

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

ISO 3996 : 1995 *Road vehicles—Brake hose assemblies for hydraulic braking systems used with non-petroleum-base brake fluid* (MOD)

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7507 *Vernier, dial and digital callipers*

JIS B 7721 *Verification and calibration of the force measuring system of the tension/compression testing machines*

Remarks : **ISO 7500-1 : 1999** *Metallic materials—Verification of static uniaxial testing machines—Part 1 : Tension/compression testing machines—Verification and calibration of the force measuring system* is equivalent to the said standard.

JIS K 2233 Non-petroleum base motor vehicle brake fluids

Remarks : **ISO 4925 : 1978 Road vehicles—Non-petroleum base brake fluid** is equivalent to the said standard.

JIS Z 2371 Methods of salt spray testing

Remarks : **ISO 9227 : 1990 Corrosion tests in artificial atmospheres—Salt spray tests** is equivalent to the said standard.

ISO 4926 Road vehicles—Hydraulic brake systems—Non-petroleum base reference fluids

3 Definitions For the purpose of this Standard, the following definitions apply.

3.1 brake hose assembly brake hose equipped with end fittings for use in a brake system

3.2 brake hose flexible conduit intended for use in a brake system to transmit and contain the fluid pressure medium used to apply force to the vehicle's brakes

3.3 end fitting coupling designed for permanent attachment to the ends of a brake hose assembly by crimping or swaging

3.4 free length linear length of brake hose exposed between the end fittings of a brake hose assembly while maintained straight

3.5 leaks ; burst loss of test fluid through the brake hose assembly other than by the designed inlet(s) and outlet(s)

3.6 cracking interruption of a surface due to environment and/or stress

3A Classification Brake hose assemblies shall be classified as given in table 1.

Table 1 Classification

Type		Nominal inside diameter mm	Remarks	ISO symbol	Nominal inside diameter (Informative) in
Class 1	A	3.2	Of relatively large expansion	HR	1/8
	B	3.2	Of relatively small expansion	HL	1/8
Class 2	A	4.8	Of relatively large expansion	HR	3/16
	B	4.8	Of relatively small expansion	HL	3/16

4 Construction

4.1 Hose The hose shall consist of an inner elastomeric lining, two or more layers or plies of reinforcing cord and outer cover. A cushion liner between the reinforcing cords

is permitted. The cover shall be a black compound rubber having good weathering resistance, and the inner elastomeric lining shall be of a compound which has a sufficient resistance to non-petroleum-base brake fluids specified in **JIS K 2233**.

4.2 Hose assembly Each hydraulic brake assembly shall have permanently attached end fittings.

5 Performance testing The test schedule shall consist of all the tests listed in table 2. The complete test schedule shall be conducted for each separate brake hose assembly design. Any changes in hose construction or materials, coupling crimp or swage design or end fittings shall be deemed to constitute a change in assembly design. Variations that do not influence the integrity of the hose coupling joint such as variation in thread size, port dimensions, hexagon size and the like shall however not be considered a design change.

When the hose assembly configurations are such that it is impractical to conduct tests such as constriction, whip and tensile, hose assemblies produced from equivalent production type equipment and processes shall be used as substitute brake hose assemblies.

Table 2 Hydraulic brake hose assembly performance tests and quantity of samples required

Number of samples	Qualification test	Subclause
All ⁽¹⁾	Hydrostatic pressure test	6.2
All ⁽²⁾	Constriction test	6.3
4	Volumetric expansion test followed by burst	6.4, 6.5
4	Brake fluid compatibility	6.6
4	Whip test	6.7
4	Tensile strength test	6.8
4	Hot impulse strength test	6.12
2	Ozone resistance test under dynamic conditions	6.11
1	Cold bend test	6.10
1	Salt spray test	6.13
Tests after water absorption		
4	Burst strength test	6.9
4	Whip test	
4	Tensile test	
Total quantity of samples : 36		

Notes (1) "All" means all the total quantity of the samples.

(2) Four brake hose assemblies may be used as the samples if assemblies have to be cut to conduct constriction tests.

6 Tests

6.1 Test conditions The hose assemblies for the performance tests shall be new and unused. They shall be at least 24 h old.

For the last 4 h prior to testing, they shall be maintained at a temperature of 15 °C to 32 °C.

Prior to installation of the hose assembly for a whip test or cold bend test, all external appendages such as mounting brackets, spring guards and metal collars shall be removed, or long tubes shortened, or both.

Unless otherwise specified, the temperature of the test room shall be between 15 °C and 32 °C for all test.

If the hose assemblies for the performance test have been maintained or tested in a room at any temperature outside the range of 15 °C to 32 °C, it shall be noted in the test report.

6.2 Hydrostatic pressure test Subject the hose assembly to a hydrostatic pressure test, using inert gas, air, water or brake fluid conforming to **JIS K 2233** as the pressure medium. At this time, for detecting the abnormality of the hose assembly, detection of lowered pressure or visual checking for visible abnormalities such as blisters shall be conducted. For tests where the hose assembly is checked for lowered pressure, the test pressure shall be 10.3 MPa to 14.5 MPa for inert gas and air, and 20.7 MPa to 24.8 MPa for water and brake fluid. Hold the pressure for between 10 s and 25 s.

WARNING : Special care shall be taken when gas or air is used, as under the pressure specified, gas and air are explosive if a failure should occur in the hose assembly.

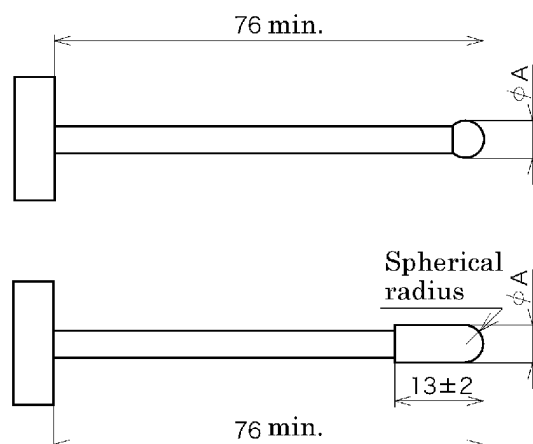
For tests where the hose assembly is visually checked for visible abnormalities, the test pressure shall be 29.4 MPa to 34.3 MPa for water and brake fluid, and shall be applied for 2 min to 3 min. Hose assemblies showing abnormalities such as leaks under this test shall be rejected and destroyed.

6.3 Constriction test

6.3.1 Requirements For the constriction test, the inside diameter of end fitting of the hose assembly shall generally be measured with either of the gauge plugs shown in figure 1. Which of the gauge plugs to apply shall be decided at the discretion of the tester.

The inside diameter shall not be less than diameter A min. given in figure 1.

Unit : mm



Nominal inside diameter	Gauge diameter A (min.)
3.2	2.03
4.8	3.05

Figure 1 Gauge plugs for testing constriction of hose bore

6.3.2 Procedure The hose assemblies shall be submitted to the following procedure.

6.3.2.1 Hold the hose assembly vertically at the fitting and insert the A diameter portion of the gauge plug into the end of the fitting for the full length of the probe. Repeat at the other end of the hose assembly.

6.3.2.2 For hose assemblies impossible to insert the gauge at the fitting externally, insert a special elongated gauge plug that meets the requirements other than the length of figure 1, passing through the hose, into the opposite side. If the gauge plug becomes misaligned at the entrance to the second fitting, it may be necessary to align the hose to allow the gauge plug to pass through.

6.3.2.3 For hose assemblies which cannot be entered with the gauge plug at either of the fittings on both ends, cut these hose assemblies $50 \text{ mm} \pm 2 \text{ mm}$ from the end of the fitting and then insert the gauge plug from the hose cut side.

6.4 Expansion test

6.4.1 Requirement The maximum expansion of any hose assembly tested according to 6.4.4 shall not exceed the values in table 3.

Table 3 Maximum expansion

Nominal inside diameter	Test pressure			
	6.9 MPa		10.3 MPa	
	Of relatively large expansion (A) cm ³ /m	Of relatively small expansion (B) cm ³ /m	Of relatively large expansion (A) cm ³ /m	Of relatively small expansion (B) cm ³ /m
mm				
3.2	2.17	1.08	2.59	1.38
4.8	2.82	1.81	3.35	2.36

6.4.2 Apparatus The apparatus shall basically consist of the following elements (see figure 2).

- Source for required fluid pressures
- Test fluid consisting of brake fluid, or water without any additives and free of air or gas bubbles
- Water pressure gauges
- Fittings in which the hose assembly may be mounted vertically for application of pressure under controlled conditions
- Graduated burette with 0.05 cm³ increments for measuring the volume of liquid corresponding to the expansion of the hose under pressure
- Plumbing hardware as required

All piping and connections shall be smooth-bore without recesses or offsets, so that all air may be freely removed from the system before running each test. Valves shall withstand the pressures involved without leakage.