



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS K 6330-1 : 2003

(JRMA/JSA)

**Testing methods for rubber and
plastics hoses—Part 1 : Methods of
measurement of dimensions for
hoses and hose assemblies**

ICS 23.040.70; 83.140.40

Reference number : JIS K 6330-1 : 2003 (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 The Japan Rubber Manufacturers Association (JRMA)/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 K 6330-1** : 1998 is replaced with this Standard.

In order to conform to the International Standard, this revision has been prepared based on **ISO 4671** : 1999 *Rubber and plastics hoses and hose assemblies—Methods of measurement of dimensions*.

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.

JIS K 6330 consists of the following 10 parts under the general title *Testing methods for rubber and plastics hoses*.

Part 1 : Methods of measurement of dimensions for hoses and hose assemblies

Part 2 : Hydrostatic testing

Part 3 : Determination of suction resistance

Part 4 : Sub-ambient temperature flexibility tests

Part 5 : Determination of electrical resistance

Part 6 : Determination of adhesion between components

Part 7 : Assessment of ozone resistance under static conditions

Part 8 : Hydraulic-pressure impulse test without flexing

Part 9 : Bending properties of hoses and tubing

Part 10 : Determination of transmission of liquids through hose walls

Date of Establishment: 1998-03-20

Date of Revision: 2003-12-20

Date of Public Notice in Official Gazette: 2003-12-22

Investigated by: Japanese Industrial Standards Committee
Standards Board
Technical Committee on Chemical Products

JIS K 6330-1:2003, First English edition published in 2005-03

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Printed in Japan

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Testing methods for rubber and plastics hoses—Part 1 : Methods of measurement of dimensions for hoses and hose assemblies

Introduction This Japanese Industrial Standard has been prepared based on the second edition of **ISO 4671** *Rubber and plastics hoses and hose assemblies—Methods of measurement of dimensions* published in 1999 with modifying some technical contents.

Portions sidelined or underlined with dots are the matters modified from the original International Standard. The list of modification with its explanation is given in annex 2 (informative).

WARNING : Persons using this Japanese Industrial Standard shall be familiar with normal laboratory practice. This Standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

1 Scope This Standard specifies the measuring methods for dimensions in each part of rubber and plastics hoses including hose assemblies (hereafter referred to as “hose”).

The items for measuring dimensions include inside diameter, outside diameter, diameter over reinforcement (applied to hydraulic hose), hose wall thickness, concentricity, thickness of inside and outside layers, inside diameter and length of hose assemblies.

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 4671 : 1999 *Rubber and plastics hoses and hose assemblies—Methods of measurement of dimensions* (MOD)

Information : The measuring instruments used in **JIS** are shown in annex 1.

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of publication is given to these referred standards, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative references without the indication of the year of coming into effect apply only to the most recent edition (including amendments).

JIS B 7502 *Micrometer callipers*

Remarks : **ISO 3611** : 1978 *Micrometer callipers for external measurement* is equivalent to the said standard.

JIS B 7503 *Dial gauges*

JIS B 7507 *Vernier, dial and digital callipers*

Remarks : **ISO 3599** : 1976 *Vernier callipers reading to 0.1 and 0.05 mm* is equivalent to the said standard.

JIS B 7512 *Steel tape measures*

JIS B 7516 *Metal rules*

JIS Z 8401 *Guide to the rounding of numbers*

3 Conditioning Unless otherwise specified, the conditioning for the measurement of hose dimensions shall be as follows.

- a) **Measuring temperature** The measuring temperature shall be 23^{+7}_{-3} °C.
- b) **Sample** The sample shall be taken at least 16 h after manufacture of the hose and conditioned at 23^{+7}_{-3} °C for at least 3 h before measurement. Three hours may be included in 16 h.

4 Inside diameter The measurements for dimensions of inside diameter of the hose shall be carried out on the product or on a sample (minimum length 150 mm) cut from the product. The measurement position shall be the end part of the sample for method A, method C, method E and method F, and the position of at least 25 mm apart from the end for method B, method D and method G.

4.1 Method A The measurements shall be carried out so that a plug gauge or tapered gauge is inserted into the end of the hose. In such a case, the gauge shall be inserted into the hose sample gently without pressure, and special care shall be taken so as not to leave a gap between gauge and inside periphery.

For the gauge, the plug gauge as shown in **a)** of figure 1 of which the diameter becomes bigger every 0.25 mm and the tapered gauge as shown in **b)** of figure 1 of which the diameter becomes bigger every 0.1 mm, may be used.

Further, this measuring method shall be appropriate to the hose of under 150 nominal diameter or the collapsible type hose (the hose of which the sectional shape is changeable by dead load or slight force) for all sizes.

Unit: mm

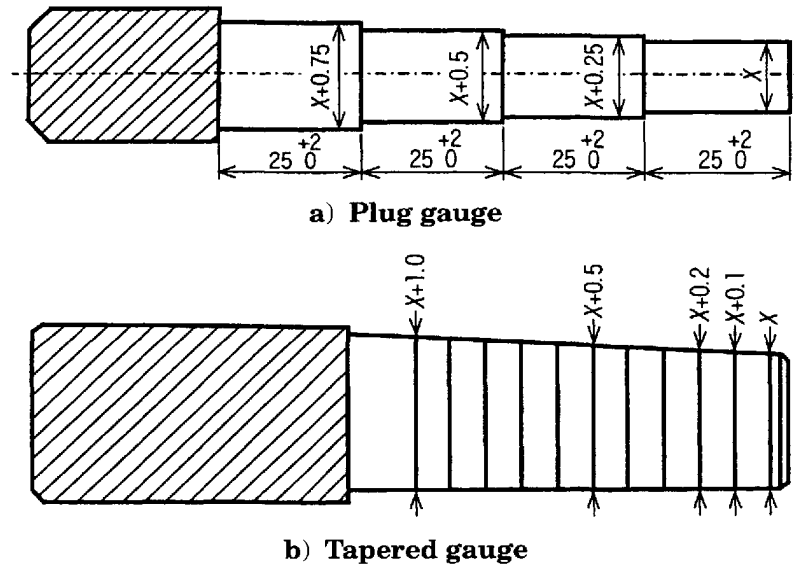


Figure 1 An example of gauge for measuring inside diameter of hose

4.2 Method B For nominal inside diameter less than 63, where greater accuracy is required, for example for wire reinforced hydraulic hoses, an expanding ball or telescoping gauge of external micrometer callipers specified in **JIS B 7502** shall be used for measuring.

4.3 Method C The end of the hose shall be measured in two directions of approximately right angles to each other using the internal jaws of sliding vernier callipers specified in **JIS B 7507**. In such a case, care shall be taken so as not to distort the hose. The average value shall be obtained from the measured values.

Further, this measuring method should be applied to the hoses not more than 100 of nominal diameter. When greater accuracy is required even for nominal diameter over 100, the measurements may be carried out with using of callipers of suitable size.

4.4 Method D The measurements shall be carried out in two directions of approximately right angles to each other using a suitable size of internal calliper dial gauge with rounded feet designed for use in bores made of elastomeric material (see **JIS B 7503**). The average value shall be obtained from the measured values.

4.5 Method E The measurements shall be carried out in two directions approximately right angles to each other with metal rules specified in **JIS B 7516**. The average value shall be obtained from the measured values.

Further, this measuring method should be applied to the hoses over 100 of nominal diameter where greater accuracy is not required.

4.6 Method F Hoses shall be vertically cut to the axis direction and the cross section shall be measured using an optical magnifier with a scale graduated in 0.1 mm divisions. The measurements shall be carried out in two directions of approximately

right angles to each other and the average value shall be obtained from the measured values.

Further, this measuring method may be applied to the hoses of which the cross section has not been distorted by cutting operation.

4.7 Method G The inside periphery of the hose shall be measured with steel tape measures specified in **JIS B 7512** and the value obtained by dividing the inside periphery of the hose by the circular constant (π) shall be the inside diameter. Tape measures graduated by π , also, may be used.

Further, this measuring method should be applied to the hoses over 300 of nominal diameter where greater accuracy is not required.

5 Outside diameter The measurements for dimensions of outside diameter of the hose shall be carried out on the product or a sample (minimum length 150 mm) cut from the product. The measurement position shall be the end part of the sample for method D and the position of at least 25 mm apart from the end for method A, method B and method C.

Further, in the case of fluted or corrugated type of external layer, the maximum outside diameter (peak part) shall be measured.

5.1 Method A The measurements shall be made at two directions approximately right angles to each other with sliding vernier callipers specified in **JIS B 7507** or external micrometer callipers specified in **JIS B 7502**. In such a case, care shall be taken to avoid distorting the hose. When greater accuracy is required, a mandrel of outside diameter equal to the hose inside diameter shall be inserted in the inside of the hose to avoid distorting. The average value shall be obtained from the measured values.

Further, this measuring method should be applied to the hose of outside diameter not more than 100 mm.

5.2 Method B The outside diameter of the hose shall be measured with tape measures graduated by π .

Further, this measuring method should be applied to the hose of outside diameter over 20 mm.

5.3 Method C The outside diameter of the hose shall be directly measured or may be obtained by dividing the outside periphery which is measured with a tape measure by the circular constant (π).

Further, this measuring method should be applied to the hose of outside diameter over 100 mm.

5.4 Method D The hose shall be vertically cut to the axis direction and the cross section shall be measured with an optical magnifier with a scale in 0.1 mm divisions. The measurements shall be made in two directions of approximately right angles to each other and the average value shall be obtained from the measured values.

Further, this measuring method may be applied to the hoses of which the cross section has not been distorted by cutting operation.

6 Diameter over reinforcement The measurements of diameter over reinforcement shall be carried out in accordance with method A of 5.1 or method B of 5.2 after completely removing the outside cover layer.

Further, this measuring method shall be applied to hydraulic hoses in connection with the fitting of couplings and shall be carried out on a sample cut from the hose.

7 Hose wall thickness The measurements of dimension for hose wall thickness may be obtained by calculation to divide the difference between outside and inside diameters by two. The direct measurements shall be in accordance with the following method. The measuring position shall be the end part of the sample for method A and method D, and the position of 15 mm apart from the end for method B and method C.

7.1 Method A The measurements shall be carried out with a sliding vernier calipers specified in JIS B 7507. In such a case, care shall be taken so as to minimize the error due to curvatures.

7.2 Method B The measurements shall be carried out with a micrometer with a rounded anvil contacting the inside of the hose or a dial gauge using an arrangement similar to that shown in figure 2.

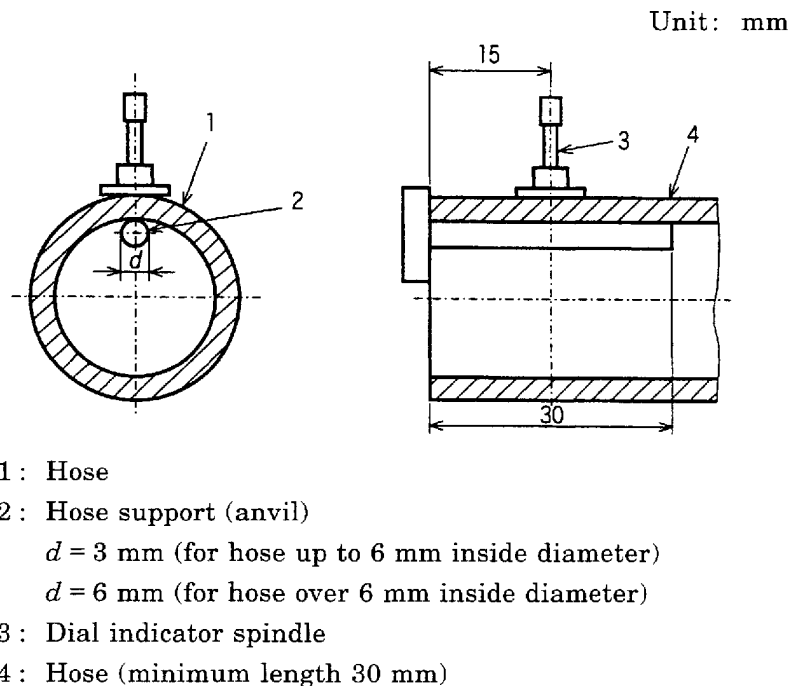


Figure 2 Arrangement for the measurement of hose wall thickness using a dial gauge

7.3 Method C The measurements shall be carried out with a thickness calliper dial gauge with rounded feet designed for use with elastomeric materials.