



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS K 6249 : 2003
(JRMA/JSA)

**Testing methods for uncured and
cured silicone rubber**

ICS 71.100.55

Reference number : JIS K 6249 : 2003 (E)

PROTECTED BY COPYRIGHT

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)/the 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 6249 : 1997** is replaced with this Standard.

Date of Establishment: 1997-12-20

Date of Revision: 2003-05-20

Date of Public Notice in Official Gazette: 2003-05-20

Investigated by: Japanese Industrial Standards Committee

Standards Board

Technical Committee on Chemical Products

JIS K 6249:2003, First English edition published in 2003-11

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.

© JSA 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	1
3 Definitions	2
4 Kind of tests	3
4.1 Uncured silicone rubber	3
4.2 Cured silicone rubber	3
5 Symbols of units	3
6 General condition of test	3
6.1 Standard condition of laboratory	3
6.2 Conditioning of test piece	3
6.3 Rounding-off of numerical value	3
7 Viscosity test	4
7.1 Purpose	4
7.2 Kind of test	4
7.3 Rotational viscosity method	4
7.4 Apparent viscosity method	4
8 Plasticity test	4
8.1 Purpose	4
8.2 Test device	5
8.3 Test piece	5
8.4 Test method	5
8.5 Summarizing method of test results	5
8.6 Record	6
9 Curing property test	6
9.1 Purpose	6
9.2 Test method	6

9.3	Summarizing method of test results	6
9.4	Record	7
10	Tack free test	7
10.1	Purpose	7
10.2	Kind of test	7
10.3	Finger touch method	7
10.4	Pencil method	8
11	Linear shrinkage rate test	8
11.1	Purpose	8
11.2	Kind of test	8
11.3	Sheet method	8
11.4	Disk method	10
12	Density test	11
12.1	Purpose	11
12.2	Test method	11
12.3	Summarizing method of test results	11
12.4	Record	11
13	Hardness test	11
13.1	Purpose	11
13.2	Test method	11
13.3	Test device	12
13.4	Summarizing method of test results	12
13.5	Record	12
14	Penetration test	12
14.1	Purpose	12
14.2	Test method	12
14.3	Summarizing method of test results	12
14.4	Record	12
15	Tensile test	12
15.1	Purpose	12

15.2	Test piece	12
15.3	Test method	12
15.4	Summarizing method of test results	12
15.5	Record	13
16	Tear test	13
16.1	Purpose	13
16.2	Test piece	13
16.3	Test method	13
16.4	Summarizing method of test results	13
16.5	Record	13
17	Permanent set test	13
17.1	Purpose	13
17.2	Kind of test	13
17.3	Tensile permanent set test	14
17.4	Compression permanent set test	14
18	Heat resistance test	14
18.1	Purpose	14
18.2	Test method	15
18.3	Summarizing method of test results	15
18.4	Record	15
19	Immersion test	15
19.1	Purpose	15
19.2	Test method	15
19.3	Summarizing method of test results	15
19.4	Record	15
20	Tensile shearing adhesive strength test	15
20.1	Purpose	15
20.2	Test method	15
20.3	Summarizing method of test results	16
20.4	Record	16

21	Volume resistivity test	16
21.1	Purpose	16
21.2	Test device	16
21.3	Kind of test	17
21.4	Test piece	17
21.5	Normal state test.....	17
21.6	Immersion test	18
22	Dielectric breakdown test	18
22.1	Purpose	18
22.2	Test device	18
22.3	Kind of test	18
22.4	Test piece	18
22.5	Normal state test.....	19
22.6	Immersion test	20
23	Dielectric loss tangent and specific inductive capacity test.....	20
23.1	Purpose	20
23.2	Test device	20
23.3	Kind of test	20
23.4	Test piece	20
23.5	Normal state test.....	21
23.6	Immersion test	21

Testing methods for uncured and cured silicone rubber

Introduction Silicone rubber has the characteristics which are not found in other organic rubber. Therefore, **JIS K 6249** has been established in 1997 as the test methods for the evaluation of the characteristics. This time, this Standard has been revised as the second edition.

Warning : Persons using this 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 Japanese Industrial Standard specifies the test methods for millable type of silicone rubber compound (hereafter referred to as “millable type of silicone rubber”) and liquid silicone rubber compound (hereafter referred to as “liquid silicone rubber”).

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

- JIS C 2320 *Electrical insulating oils*
- JIS K 2220 *Lubricating grease*
- JIS K 6200 *Rubber—Vocabulary*
- JIS K 6250 *Rubber—General rules of physical testing methods*
- JIS K 6251 *Tensile testing methods for vulcanized rubber*
- JIS K 6252 *Rubber, vulcanized or thermoplastics—Determination of tear strength*
- JIS K 6253 *Hardness testing methods for rubber, vulcanized or thermoplastic*
- JIS K 6257 *Accelerated aging test methods for vulcanized rubber*
- JIS K 6258 *Testing methods of the effect of liquids for vulcanized rubber*
- JIS K 6262 *Permanent set testing methods for rubber, vulcanized or thermoplastic*
- JIS K 6268 *Rubber, vulcanized—Determination of density*
- JIS K 6271 *Rubber, vulcanized or thermoplastics—Determination of volume and surface resistivity*
- JIS K 6300-2 *Rubber, unvulcanized—Physical property—Part 2 : Determination of cure characteristics with oscillating curemeters*
- JIS K 6850 *Adhesives—Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies*
- JIS K 7117-1 *Plastics—Resins in the liquid state or as emulsions or dispersions—Determination of apparent viscosity by the Brookfield Test method*

- JIS Z 8202-0 *Quantities and units—Part 0 : General principles*
 JIS Z 8202-1 *Quantities and units—Part 1 : Space and time*
 JIS Z 8202-2 *Quantities and units—Part 2 : Periodic and related phenomena*
 JIS Z 8202-3 *Quantities and units—Part 3 : Mechanics*
 JIS Z 8202-4 *Quantities and units—Part 4 : Heat*
 JIS Z 8202-5 *Quantities and units—Part 5 : Electricity and magnetism*
 JIS Z 8203 *SI units and recommendations for the use of their multiples and of certain other units*
 JIS Z 8401 *Guide to the rounding of numbers*
 ISO 7323 *Rubber, raw and unvulcanized compounded—Determination of plasticity number and recovery number—Parallel plate method*

3 Definitions For the purposes of this Standard, the definitions given in **JIS K 6200**, and the following definitions apply.

- a) **millable type of silicone rubber** The generic term of silicone rubber in the silicone rubber compound of which the state prior to be cured is similar to the uncured compound rubber of natural or general synthetic rubber and can be plasticized or mixed in a mixing roll machine or a closed type mixer.
- b) **liquid silicone rubber** The generic term of silicone rubber in the silicone rubber compound of which the state prior to be cured is liquid or paste.
- c) **viscosity** The value on viscosity of liquid silicone rubber which is obtained by measuring with using of rotary viscometer or apparent viscosity tester.
- d) **plasticity** The value on plasticity of uncured millable type of silicone rubber which is obtained by measuring with using of parallel plate plastometer.
- e) **cure** The chemical reaction by which silicone rubber forms a crosslinkage structure by heat, moisture, etc. Generally this is a synonym of vulcanization.
- f) **curing property** The curing speed or degree of cure which is obtained by measuring with using of oscillating type curemeter.
- g) **tack free time** The time for which moisture-cure type liquid silicone rubber becomes not sticky with finger or pencil in curing process.
- h) **linear shrinkage rate** The value of change rate which is obtained by measuring of dimension change on moulded silicone rubber to the dimension of mould at being cured so as to form square or circular shape in mould.
- i) **penetration** The value which is obtained by measuring of the penetrated depth of specified cone for specified time. This value represents the softness of cured silicone rubber in gel state.
- j) **tensile shearing adhesive strength** After silicone rubber being adhered and cured between the adherends, the maximum shearing load is obtained by tensile tester till the break of shearing. This value is obtained by dividing the maximum shearing load by shearing area.

4 Kind of tests The kind of tests shall be as shown in the following.

4.1 Uncured silicone rubber

- a) Viscosity test
- b) Plasticity test
- c) Curing property test
- d) Tack free test
- e) Linear shrinkage rate test

4.2 Cured silicone rubber

- a) Density test
- b) Hardness test
- c) Penetration test
- d) Tensile test
- e) Tear test
- f) Permanent set test
- g) Heat resistance test
- h) Immersion test
- i) Tensile shearing adhesive strength test
- j) Volume resistivity test
- k) Dielectric breakdown test
- l) Dielectric loss tangent and specific inductive capacity test

5 Symbols of units The symbols of units shall be in accordance with **JIS Z 8202-0, JIS Z 8202-1, JIS Z 8202-2, JIS Z 8202-3, JIS Z 8202-4, JIS Z 8202-5** and **JIS Z 8203**.

6 General condition of test

6.1 Standard condition of laboratory The standard condition of laboratory should be $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ of temperature and $(50 \pm 5)\%$ of relative humidity according to **5.1** and **6.1** of **JIS K 6250**.

6.2 Conditioning of test piece The conditioning of test piece shall be in accordance with **8.3** of **JIS K 6250**, and the uncured silicone rubber, however, shall be placed in **5.1** of **JIS K 6250** for at least 3 h prior to test.

6.3 Rounding-off of numerical value The measured value or obtained value according to respective tests shall be in accordance with **JIS Z 8401**.