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**Flexible cellular polymeric materials
— Polyurethane foam for
load-bearing applications excluding
carpet underlay — Specification**

ICS 83.100

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

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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 of 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 6401** : 2006 is replaced with this Standard.

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Flexible cellular polymeric materials — Polyurethane foam for load-bearing applications excluding carpet underlay — Specification

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of **ISO 5999** published in 2007 with some modifications of the technical contents.

The portions with continuous sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with the explanations is given in Annex JB. Annex JA contains matters that are not given in the corresponding International Standard.

1 Scope

This Standard specifies the flexible load-bearing polyurethane foam of polyether type, consisting of a network of cells which are essentially open and interconnecting (hereafter referred to as the “foam”).

This Standard is not applicable to polyurethane foams foamed in place, foams for use in heat-welded systems unless for load-bearing purposes, or foams for carpet backing and underlay or for cushioning for packaging.

Foams are classified into types, classes according to performance during a constant-load pounding test, and grades according to hardness.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 5999 : 2007 *Flexible cellular polymeric materials — Polyurethane foam for load-bearing applications excluding carpet underlay — Specification* (MOD)

The symbols which denote the degree of correspondence in the contents in the corresponding International Standard and **JIS** are IDT (identical), MOD (modified) and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

Warning Persons using this Standard should 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.

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 (in-

cluding amendments) indicated below shall be applied.

JIS K 6400-1 *Flexible cellular polymeric materials — Determination of physical properties — Part 1 : General rules*

JIS K 6400-2 *Flexible cellular polymeric materials — Determination of the physical properties — Part 2 : Hardness (indentation technique) and stress-strain characteristics in compression*

NOTE : Corresponding International Standard : **ISO 2439** : 1997 *Flexible cellular polymeric materials — Determination of hardness (indentation technique)* (MOD)

JIS K 6400-3 *Flexible cellular polymeric materials — Physical properties — Part 3 : Determination of resilience by ball rebound*

NOTE : Corresponding International Standard : **ISO 8307** : 2007 *Flexible cellular polymeric materials — Determination of resilience by ball rebound* (MOD)

JIS K 6400-4 *Flexible cellular polymeric materials — Determination of physical properties — Part 4 : Compression set and fatigue characteristics*

NOTE : Corresponding International Standards : **ISO 1856** : 2000 *Flexible cellular polymeric materials — Determination of compression set* and **ISO 3385** : 1989 *Flexible cellular polymeric materials — Determination of fatigue by constant-load pounding* (Overall evaluation : MOD)

JIS K 6400-5 *Flexible cellular polymeric materials — Determination of physical properties — Part 5 : Tensile strength, elongation at break and tear strength*

NOTE : Corresponding International Standard : **ISO 1798** : 1997 *Flexible cellular polymeric materials — Determination of tensile strength and elongation at break* (MOD)

JIS K 7222 *Cellular plastics and rubbers — Determination of apparent (bulk) density*

ISO 2440 *Flexible and rigid cellular polymeric materials — Accelerated ageing tests*

3 Classification

Foams are classified by the combination of a type, class and grade.

3.1 Types

Types of foams are as follows.

Table 1 Types of foam

Type		Description
Type 1	LB	Block foam, slabstock or contour cut (low resilience)
	MB	Block foam, slabstock or contour cut (conventional)
	HB	Block foam, slabstock or contour cut (high resilience)
Type 2	LM	Moulded (low resilience)
	MM	Moulded (conventional)
	HM	Moulded (high resilience)
Type 3	RE	Reconstituted or bonded

3.2 Classes

Classes of foams are as follows.

- a) Foams, excluding those of Type 2 (MM) and Type 3 (RE) in table 1, are subdivided into five classes as shown in table 2 based on hardness loss ratio measurement described in 6.8.

Table 2 Classes of foam

Class	Type of service	Hardness loss ratio ^{a)} %
X	Exceptionally severe	Less than 12
V	Very severe	12 or over to and excl. 22
S	Severe	22 or over to and excl. 32
A	Average	32 or over to and excl. 39
L	Light	39 or over to and excl. 45
Note ^{a)} The hardness loss ratio is calculated according to 6.8.		

- b) Classes X, V, S, A and L are defined by the indentation hardness loss ratio over the range of hardness index values from 0 N to 650 N, as shown in figures 1 and 2, provided that the requirements for physical properties specified in tables 6 and 7 are met.

NOTE : Class A and Class L materials may not be available at all high hardness levels.

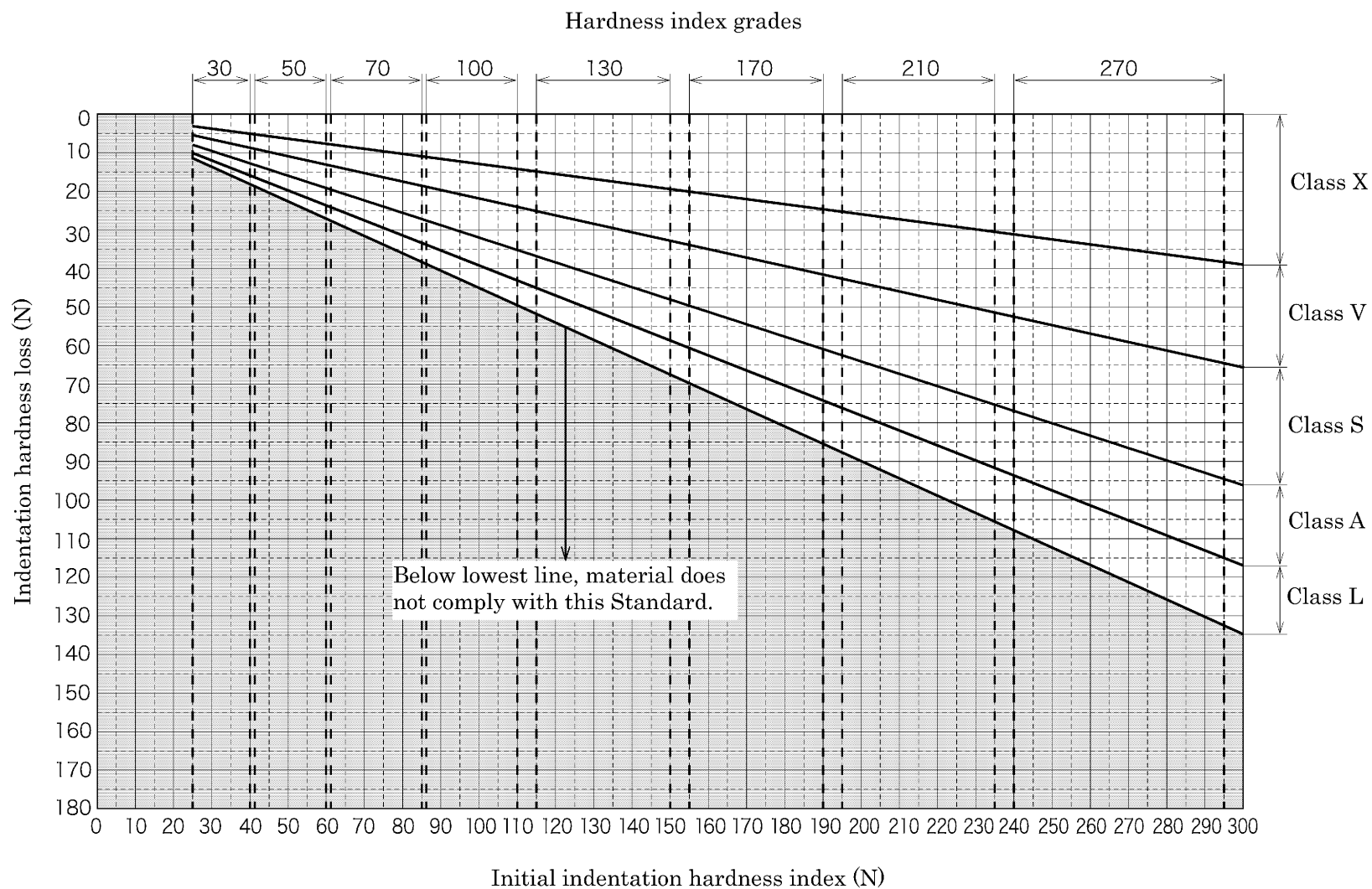


Figure 1 Classes according to initial indentation hardness index and indentation hardness loss (low hardness values)

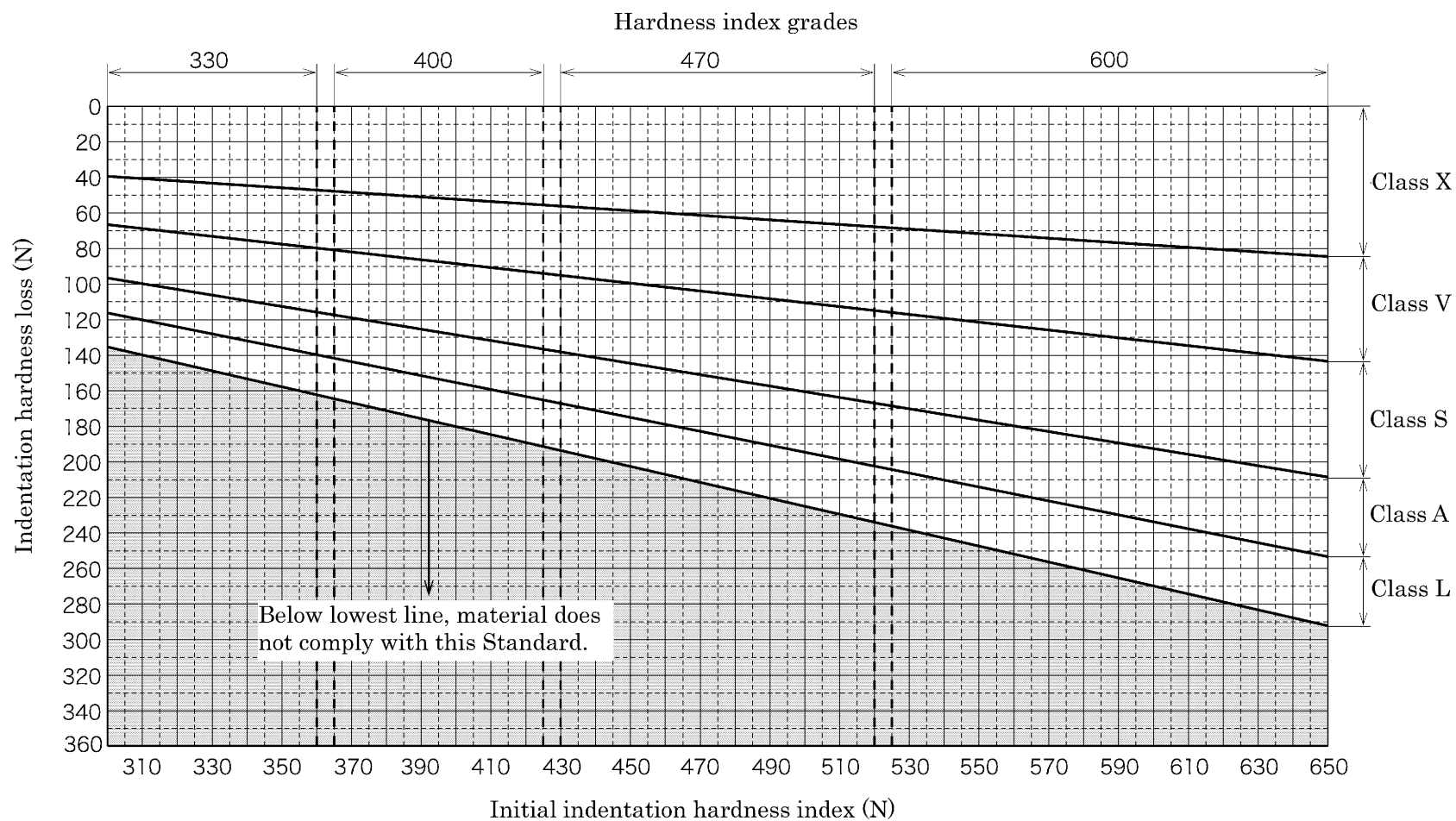


Figure 2 Classes according to initial indentation hardness index and indentation hardness loss (high hardness values)

- c) Type 3 (RE) foam, because of low hardness loss ratio combined with poorer compression set, tensile strength and elongation at break properties, is specified separately in table 8. It is generally used as thin, firm padding or to provide reinforcement for the other foams, in positions associated with small deformation.
- d) As an example, as shown in figures 1 and 2, a material of initial hardness indentation index 140 N, with an indentation hardness loss less than 17 N is a class X material, with a hardness loss 17 N or over to and excluding 31 N is a class V material, with a hardness loss 31 N or over to and excluding 45 N is a class S material, with a hardness loss 45 N or over to and excluding 55 N is a class A material, and with a hardness loss 55 N or over to and excluding 63 N is a class L material, provided, in all cases, that the other property levels are achieved. Any material having an initial indentation hardness index of 140 N and a hardness loss 63 N or greater does not comply with the requirements of this Standard.

3.3 Grades

Foams are further graded by hardness at 40 % constant-load compression, as determined by the method described in 6.5, in accordance with table 3.

Table 3 Grading by hardness at 40 % constant-load compression

Grade	Hardness at 40 % compression N
30	25 to 40
50	41 to 60
70	61 to 85
100	86 to 110
130	115 to 150
170	155 to 190
210	195 to 235
270	240 to 295
330	300 to 360
400	365 to 425
470	430 to 520
600	525 to 650

- a) It may not be possible to manufacture foam falling into all these grades in each of the material classes. To control the hardness of foam to within the grades in table 3, selection of material may be necessary, since the typical variation of the hardness of foam within and between production runs can be of the order of $\pm 16\%$.
- b) If the hardness value of a material extends over the boundary between two grades, both of the two grades may be indicated with a slash in between. For example, in the case of a material with the hardness value extending over the boundary between Grade 100 and Grade 130, the grade may be indicated as 100/130.)