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Laminated thermosetting high-pressure
decorative sheets

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Foreword

This Japanese Industrial Standard has been 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 Plastics Industry Federation (JPIF)/Japan Thermosetting Plastics Industry Association (JTPIA)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS K 6903 : 2008**), which has been technically revised.

However, **JIS K 6903 : 2008** may be applied in the **JIS** mark certification based on the relevant provisions of Article 30, paragraph (1), etc. of the Industrial Standardization Act until 20 February 2023.

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Laminated thermosetting high-pressure decorative sheets

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 4586-3** : 2018, Edition 2, and **ISO 4586-4** : 2018, Edition 2, with some modifications of the technical contents.

The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies requirements for laminated thermosetting high-pressure decorative sheets (hereafter referred to as high-pressure decorative laminates).

This Standard establishes a classification system for high-pressure decorative laminates according to their performance and main applications (material characteristics, for example, postformability or reaction to fire).

This Standard specifies the characteristics requirements for high-pressure decorative laminates classified by this system. Some of these characteristics have more than one test method for checking the conformance, including an alternative test method capable of giving approximately equivalent results, an expensive test method and an exclusive test method in certain countries.

This Standard specifies the required characteristics of commonly used types, and those of other types may be added in accordance with the agreement between the parties concerned with delivery. The specified limit values shall apply to commonly used types; however, higher performance limit values for each classification may be specified in accordance with the agreement between the parties concerned with delivery.

The high-pressure decorative laminates shall be characterized by their decorative surfaces, which are relatively hard and having resistance to wear, scratch, impact, boiling water, domestic stains and moderate heat, and classified as follows :

- ordinary high-pressure decorative laminate of less than 2 mm thickness having a single thin decorative surface to be bonded to substrate;
- compact high-pressure decorative laminate of thickness 2 mm or more having a single or double decorative surface(s).

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

ISO 4586-3 : 2018 *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part*

3 : Classification and specifications for laminates less than 2 mm thick and intended for bonding to supporting substrates

ISO 4586-4 : 2018 *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 4 : Classification and specifications for compact laminates of thickness 2 mm and greater* (Overall evaluation : MOD)

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 21-1**.

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 G 3141 *Cold-reduced carbon steel sheet and strip*

JIS H 4000 *Aluminium and aluminium alloy sheets, strips and plates*

JIS K 6902 *Testing method for laminated thermosetting high-pressure decorative sheets*

NOTE Corresponding International Standard : ISO 4586-2 : 2018 *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2 : Determination of properties*

JIS K 7161-2 *Plastics — Determination of tensile properties — Part 2 : Test conditions for moulding and extrusion plastics*

NOTE Corresponding International Standard : ISO 527-2 : 1993 *Plastics — Determination of tensile properties — Part 2 : Test conditions for moulding and extrusion plastics*

JIS K 7171 *Plastics — Determination of flexural properties*

NOTE Corresponding International Standard: ISO 178 : 2001 *Plastics — Determination of flexural properties*

ISO 1183-1 *Plastics — Methods for determining the density of non-cellular plastics — Part 1 : Immersion method, liquid pycnometer method and titration method*

NOTE **ISO 1183** : 1987 corresponds to **JIS K 7112**.

3 Term and definition

For the purpose of this Standard, the following term and definition apply.

3.1

high-pressure decorative laminate (HPDL, HPL)

sheet consisting of layers of cellulosic fibrous material (normally paper) impregnated with thermosetting resins and bonded together by means of heat and a pressure of at

least 5 MPa, of which one or both outer layer(s) has/have decorative colours and designs

The high-pressure decorative laminates covered in this Standard consist of the core layer impregnated with phenol resin and/or amino group resins and the surface layer or a layer impregnated with amino group resin (mainly melamine resins). The longitudinal direction of a high-pressure decorative laminate is along the paper making direction (the shape forming direction in the paper manufacturing process), and the lateral direction is perpendicular to this direction. When the longitudinal direction is not known, flexural strength tests shall be carried out at various angles. Normally, a test specimen cut in parallel to the longitudinal direction shows the highest strength value. The high-pressure decorative laminates for vehicles (railway rolling stock and the like) consist of the resin impregnated paper and the metallic material (for example, aluminium plate) bonded together under the conditions mentioned above, of which the outer layer on one side has decorative colours or design. For the metallic plate used for this purpose, the plate specified in JIS H 4000 or the steel plate specified in JIS G 3141 shall be used.

NOTE “HPDL” is used as the abbreviation of high-pressure decorative laminates. It is synonymous with and often used interchangeably with “HPL” used in EN 438 (all parts).

4 Classification

4.1 General

The high-pressure decorative laminates shall be classified by the type and performance as shown in Table 3 or by the application and grade as shown in Table 4.

4.2 Classification of high-pressure decorative laminates by type and performance

4.2.1 Classification of high-pressure decorative laminates by type

Types of high-pressure decorative laminates shall be as follows.

- a) **Type S** Standard grade decorative laminates.
- b) **Type P** Postforming decorative laminates, similar to type S but can also be formed at elevated temperature.
- c) **Type F** Decorative laminates with improved fire retardance, similar to Type S or P but also meeting special requirements of specified fire tests which may vary according to the application (e.g. construction, marine, transport) and the country of use (see 5.1).

4.2.2 Classification of high-pressure decorative laminates by performance

4.2.2.1 Classification by performance

Classification by performance is shown by the first, second and third index numbers indicating the surface wear resistance, impact resistance and scratch resistance, respectively.

Table 1 shows classification by performance.

Table 1 Classification by performance

Resistance to surface wear	First index number — Resistance to surface wear		
	2	3	4
Initial point (revs)	≥50	≥150	≥350
Wear value (revs)	≥150	≥300	≥1 000
Impact resistance	Second index number — Impact resistance		
	2	3	4
Small diameter ball (N)	≥15	≥20	≥25
Scratch resistance (Rating)	Third index number — Scratch resistance		
	2	3	4
Index number 2 applies to vertical general purpose, index number 3, to horizontal general purpose, and index number 4, to horizontal heavy duty purpose. Index number 1 represents a lower quality level that does not apply to HPL.			

4.2.2.2 Classification by application and grade

This classification, for example “HGS”, is shown by the first alphabetical letter indicating the application out of three options, the second alphabetical letter indicating the grade out of two options, and the third alphabetical letter indicating the type of the high-pressure decorative laminate (see the type classification in 4.2.1) out of three options, as given in Table 2.

Table 2 Classification by application and grade

First letter indicating the application	Second letter indicating the grade	Third letter indicating the type of high-pressure decorative laminate
H (Horizontal)	G (General purpose)	S (Standard grade)
V (Vertical)	D (Heavy duty)	P (Postforming grade)
C (Compact)		F (Flame-retardant grade)

Table 3 compares the alternative classification systems and shows how different HPL products relate to some typical applications. The list of typical applications shown for each category is for guidance only and is not intended to be comprehensive.

Table 3 Classification of high-pressure decorative laminates by type and performance

Performance category	HPDL type	Classification of high-pressure decorative laminates by performance				Typical applications
		Classification by performance			Classification by application and grade	
		Resistance to surface wear	Impact resistance	Scratch resistance		
Compact high-pressure decorative laminates	S or F	— ^{a)}	— ^{a)}	— ^{a)}	CGS (Compact General purpose Standard) CGF (Compact General purpose Flame-retardant)	Doors, partitions, walls, laboratory chairs, components in construction, marine and transport industries
Very high resistance to surface wear, high resistance to impact, and very high resistance to scratch	S, F or P	4	4	4	HDS (Horizontal Heavy duty Standard) HDF (Horizontal Heavy duty Flame-retardant) HDP (Horizontal Heavy duty Postforming)	Counter tops, institutional applications (prisons, military, barracks, etc.)
High resistance to surface wear, high resistance to impact, and high resistance to scratch	S, F or P	3	3	3	HGS (Horizontal General purpose Standard) HGF (Horizontal General purpose Flame-retardant) HGP (Horizontal General purpose Postforming)	Kitchen and office work surfaces, restaurant and hotel tables, doors and wall coverings in public areas, interior walls of public transport vehicles, etc.
Medium resistance to surface wear, medium resistance to impact and medium resistance to scratch	S, F or P	2	2	2	VGS (Vertical General purpose Standard) VGF (Vertical General purpose Flame-retardant) VGP (Vertical General purpose Postforming)	Front panels for kitchen, office and bathroom furniture, wall coverings, shelves, etc.
Combinations of wear, impact and scratch resistance index numbers other than those shown in Table 3 are possible and can be specified using the numerical classification system. In such cases properties other than wear resistance, impact resistance and scratch resistance shall meet the requirements specified for type VG in Table 6.						
NOTE Symbols of classification by application and grade: C : Compact, H : Horizontal, V : Vertical, G : General purpose, D : Heavy duty, S : Standard, F : Flame-retardant, P : Postforming						
Note ^{a)} Classification by performance does not apply to compact high-pressure decorative laminates.						