

# Guide to DRUM

## ➔ Description of Products

Products		Internal Surface Treatment	●Fitting		
Tight Head Steel Drum and Open Head Steel Drum	Universal Drum	Zinc-phosphate coating Iron-phosphate coating	Closure		Gasket
	Internal Surface Coated Drum	Epoxy-phenol resin painted Phenol resin painted	Flange	Electrolytic zinc plated steel	Synthetic rubber
	Galvanized Steel Drum	Zinc-coated	Plug	Electrolytic zinc plated steel	Rubber Polyethylene
Other drums	Composite Drum (Drum with polyethylene inner container)	Polyethylene inner container with external closure Full open type polyethylene inner container	External screw flange	Electrolytic zinc plated steel	
	Thin Gauge Drum		Plug for external screw flange	Electrolytic zinc plated steel	Polyethylene
	Stainless Steel Drum		Closing for Open Head Drum		Gasket
			Bolt type	General contents Dangerous goods	White sponge (natural rubber), etc.
			Lever type	General contents	

## ➔ JIS Standard

Tight head steel drum	JIS Z 1601
Open head steel drum	JIS Z 1600
Closures for steel drum	JIS Z 1604

## ➔ For inquiries, please specify the followings:

- Name of products
- Properties of contents
  - 1) Liquid
  - 2) Specific gravity
  - 3) Corrosiveness, moisture absorption
  - 4) Melting point, Boiling point, Flash point
- Applicable laws and regulations for dangerous goods
  - For domestic use : Fire Service Act, etc.
  - For international use : IMDG code, etc.
- Accommodative parts (Closure, Gasket, Closing ring, etc.)
- Internal/external surface Coating and marking, etc.



# Tight Head Steel Drum

## ➔ Major Application

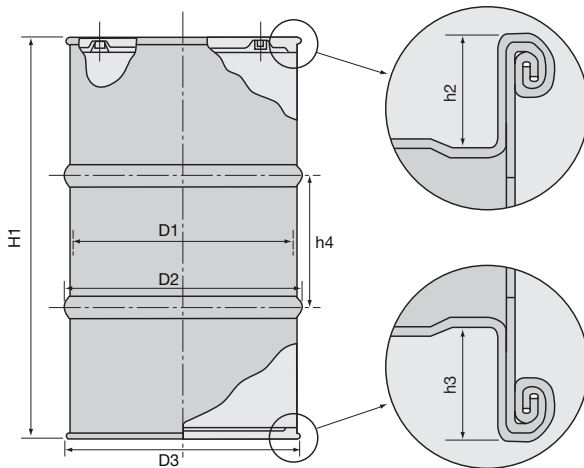
Used for chemical products of general quality, petroleum, gasoline and other liquid oils such as lubricants.

## ➔ Technology

- ① Triple seaming is a sturdy seaming method suited for drums containing dangerous goods.
- ② Internal cleanliness has been enhanced by the application of a full automatic production process and phosphate coating treatment system.

### [Phosphate Coating Treatment]

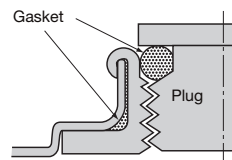
Phosphate coating treatment is applied to both internal and external surfaces of universal steel drums. Two types of phosphate coating treatment, zinc-phosphate coating and iron-phosphate, are available. Their physical properties are shown in the table below. Selection between these two should be made according to the intended use of the drums.



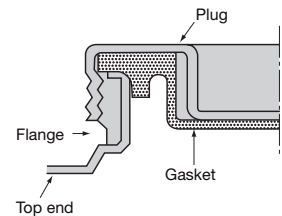
### [Characteristics of Phosphate Coating]

	Zinc-phosphating	Iron-phosphating
Composition of coating layer	$Zn_3(PO_4)_2 \cdot 4H_2O$ $Zn_2Fe(PO_4)_2 \cdot 4H_2O$	$FePO_4 \cdot 2H_2O$ $\gamma-Fe_2O_3$
Structure of coating layer	Crystalline, porous	Non-crystalline
Color tone	Grayish white to gray	Interface color of yellowish gold to purple blue

#### Inner Thread Type Closure



#### Outer Thread Type Closure



### ■ JIS Z 1601

Class	Gauge [mm]	Internal diameter [mm]	External diameter over rolling hoops [mm]	Diameter over bottom chime [mm]	Total drum height [mm]	Depth of top	Clearance from floor [mm]	Distance between beads [mm]	Total Capacity [L]	Mass [kg] (min.)
		D1	D2	D3						
Class H	1.6	566 ±2	585 (max.)	585 (max.)	890 ±5	(a)	4 (min.)	300 ±3	212 (min.)	27.5
Class M	1.2									20.5
Class LM	1.0/1.2									18.0
Class L	1.0									17.0
Class SL	0.9/1.0									15.9

Notes (a) The depth of the top shall be such that the closures and capseals/overseals do not protrude above the chime.



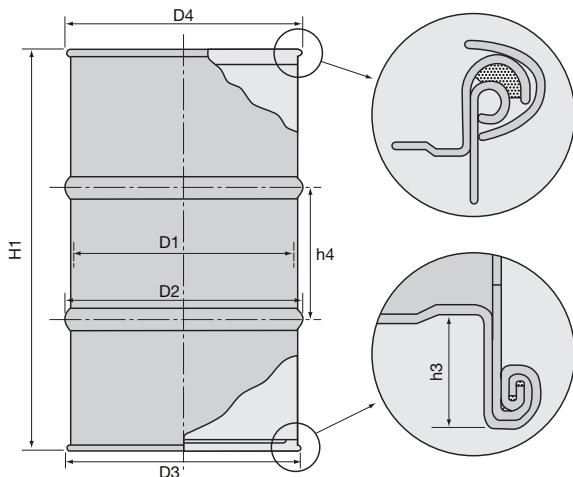
# Open Head Steel Drum

## Major Application

For viscous, powdery and solid materials which tight head drums are not applicable to.

### [Phosphate Coating Treatment]

Phosphate coating treatment is applied to both internal and external surfaces of universal steel drums. Two types of phosphate coating treatment, zinc-phosphate coating and iron-phosphate, are available. Their physical properties are shown in the table below. Selection between these two should be made according to the intended use of the drums.



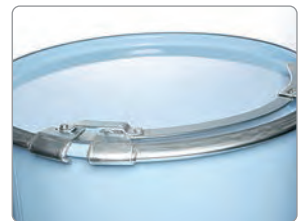
### [Characteristics of Phosphate Coating]

	Zinc-phosphating	Iron-phosphating
Composition of coating layer	$Zn_3(PO_4)_2 \cdot 4H_2O$ $Zn_2Fe(PO_4)_2 \cdot 4H_2O$	$FePO_4 \cdot 2H_2O$ $\gamma-Fe_2O_3$
Structure of coating layer	Crystalline, porous	Non-crystalline
Color tone	Grayish white to gray	Interface color of yellowish gold to purple blue

Bolt Lock Type Closing Ring



Lever Lock Type Closing Ring



### ■ JIS Z 1600

Class	Gauge [mm]	Internal diameter [mm]	External diameter over rolling hoops [mm]	Diameter over bottom chime [mm]	Diameter over closing ring [mm]	Total drum height [mm]	Clearance from floor [mm]	Distance between beads [mm]	Total Capacity [L]	Mass [kg] (min.)
		D1	D2	D3	D4			h4		
Class H	1.6	566 ±2	585 (max.)	585 (max.)	620 (max.)	890 ±5	4 (min.)	300 ±3	208 (min.)	27.0
Class M	1.2									20.0
Class LM	1.0/1.2									17.5

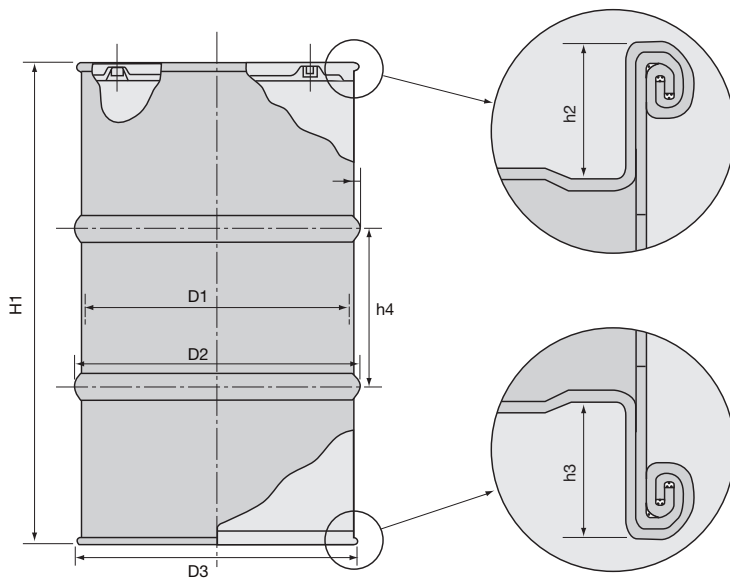


# Internal Surface Coated Drum (Tight Head Type)

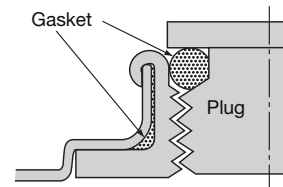
High-quality finished drums coated on internal surfaces with synthetic resin paint and baked to improve their chemical resistance. Suitable for containing corrosive chemical products, or those that have to be kept from direct contact with steel. Open head drums are for medium- or high-viscosity substances, powder and so forth.

## ➔ Major Application

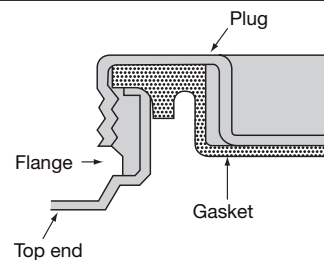
Used for corrosive chemicals, fine chemicals and other chemicals which have to be kept from direct contact with steel.



### Inner Thread Type Closure



### External Thread Type Closure

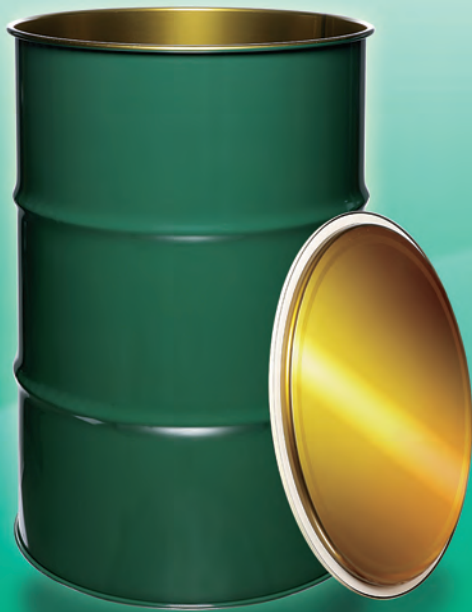


#### ■ JIS Z 1601

Class	Gauge [mm]	Internal diameter [mm]	External diameter over rolling hoops [mm]	Diameter over bottom chime [mm]	Total drum height [mm]	Depth of top	Clearance from floor [mm]	Distance between beads [mm]	Total Capacity [L]	Mass [kg] (min.)
		D1	D2	D3		H1		h2		
Class H	1.6	566 ±2	585 (max.)	585 (max.)	890 ±5	(a)	4 (min.)	300 ±3	212 (min.)	27.5
Class M	1.2									20.5
Class LM	1.0/1.2									18.0
Class L	1.0									17.0

Notes (a) The depth of the top small be such that the closures and capseals/overseals do not protrude above the chime.

※Refer to "Type and Features of Internal Surface Coating Paint"

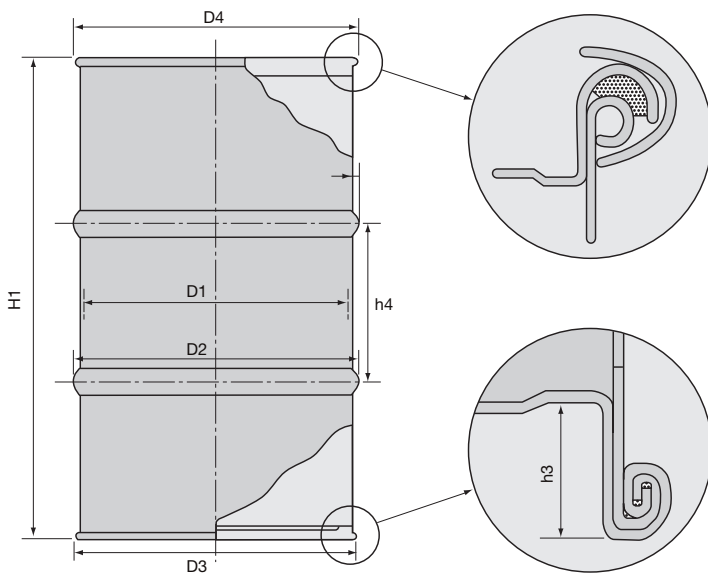


# Internal Surface Coated Drum (Open Head Type)

High-quality finished drums coated on internal surfaces with synthetic resin paint and baked to improve their chemical resistance. Suitable for containing corrosive chemical products, or those that have to be kept from direct contact with steel. Open head drums are for medium- or high-viscosity substances, powder and so forth.

## ➔ Major Application

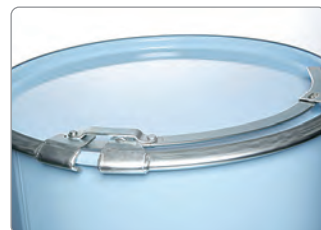
Used for viscous, powdery and solid materials where a tight head drum is not applicable. Used for corrosive chemicals, fine chemicals and other chemicals which have to be kept from direct contact with steel.



Bolt Lock Type Closing Ring



Lever Lock Type Closing Ring



### ■ JIS Z 1600

Class	Gauge [mm]	Internal diameter [mm]	External diameter over rolling hoops [mm]	Diameter over bottom chime [mm]	Diameter over closing ring [mm]	Total drum height [mm]	Clearance from floor [mm]	Distance between beads [mm]	Total Capacity [L]	Mass [kg] (min.)
		D1	D2	D3	D4					
Class H	1.6	566 ±2	585 (max.)	585 (max.)	620 (max.)	890 ±5	4 (min.)	300 ±3	208 (min.)	27.0
Class M	1.2									20.0
Class LM	1.0/1.2									17.5

※Refer to "Type and Features of Internal Surface Coating Paint"



# Steel Drum with Polyethylene Inner Container (Composite Drum)

Composite Drum has a chemical-resistant polyethylene inner container (lining) and is available in tight head or open head types.

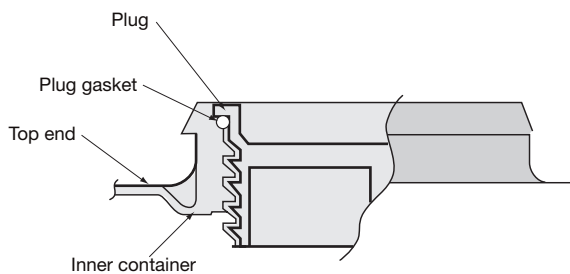
## ➔ Major Application

Used for highly acidic, corrosive substances, particularly for acetic acid and agricultural chemicals.

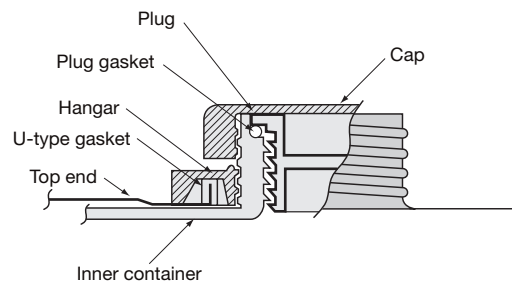
## ➔ Technology

- ① Inner container is blow-molded and maintains high internal cleanliness.
- ② Two types of closure system are available: Inserted Flange Type (ICI Closure Type) and Hanger Fastening Type (Screw Fastening Type)

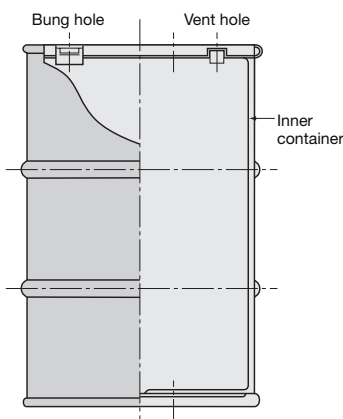
ICI Closure Type



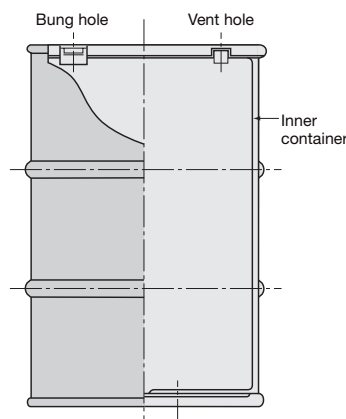
Screw Fastening Type



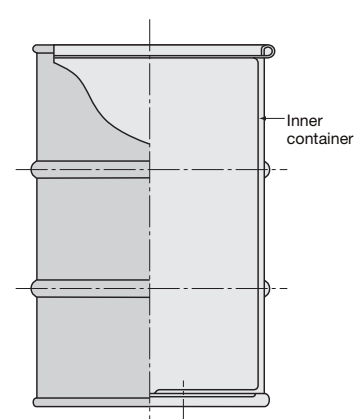
Tight Head Type



Open Head Type with external closures



Full Open Type





# Galvanized Steel Drums

Highly corrosion-resistant drums available in both tight head and open head.

## ➔ Major Application

Used for phenols, perfumes, varnishes and other materials that should not be directly in contact with steel.

## ➔ Technology

High-quality galvanized steel sheet manufactured by Nippon Steel Corporation is used.

### [Phenol-corrosion Test Result]

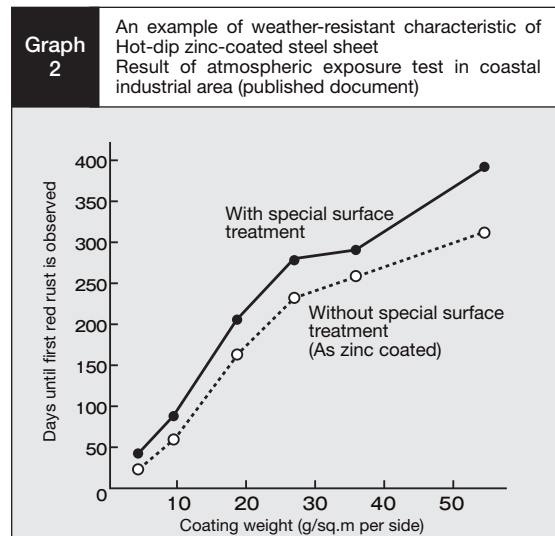
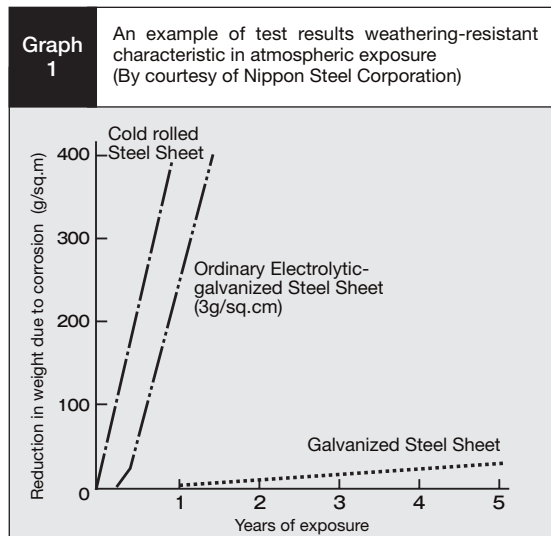
Results of immersion test (40°C, 40 days)

Specimen	Change in specimen		Change in experiment liquid
	Outlook	Reductions in weight	
<b>Galvanized</b>	No change	-0.5%	No change
<b>Iron-phosphate</b>	Decoloured	-63.6%	Change to reddish brown
<b>Zinc-phosphate</b>	No change	-11.6%	Change to reddish brown

### [Characteristics of Zinc Coating]

An example of test results of the weathering-resistant characteristics in atmospheric exposure is shown in Graph 1 below. Under normal atmospheric conditions, the rust prevention capability of galvanized steel sheet is 5 to 30 times higher than that of ordinary steel sheets.

Graph 2 shows the effect of special surface treatment of conventional galvanized steel sheets in the improvement of corrosion-resistance.





# Thin Gauge Drum

## New bead type drum

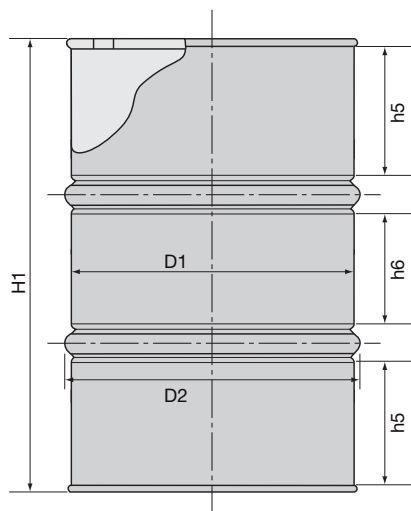
Light weight drum with waves on body secures similar strength against decompression to conventional type.

### ➔ Major Application

Suitable for export, one way use.  
(Approved to UN X-class)

**LMD**

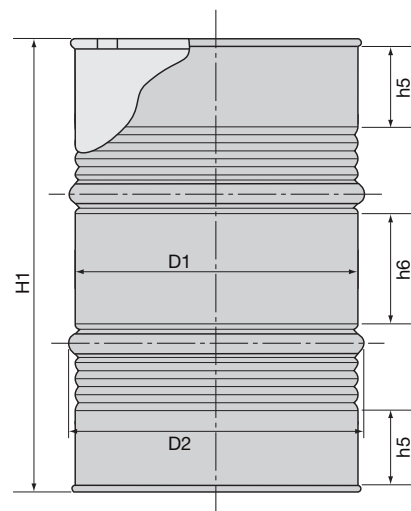
(Top end & Bottom end 1.2mm / Body 1.0mm)



W-hoops

**SL**

(Top end & Bottom end 1.0mm / Body 0.9mm)



W-hoops + Corrugation

Class	Gauge [mm] Body / Top end & Bottom end	Internal diameter [mm]	External diameter over rolling hoops [mm]	Total drum height [mm]	Total Capacity [L]	Mass [kg] (min.)
		D1	D2			
LMD	1.0 / 1.2	566 ±2	585 (max.)	890 ±5	212 (min.)	18.0
SL	0.9 / 1.0					15.9

### Reference data

[mm]	
h5	h6
247 ±2	220 ±2
165 ±3	220 ±2



# Type and Features of Internal Surface Coating Paint

## 1. Properties and Features of Internal Surface Coating Paint

Properties and features of representative internal coating paint are shown below. For further information on this and other types of paints available to our customers, please contact our sales divisions.

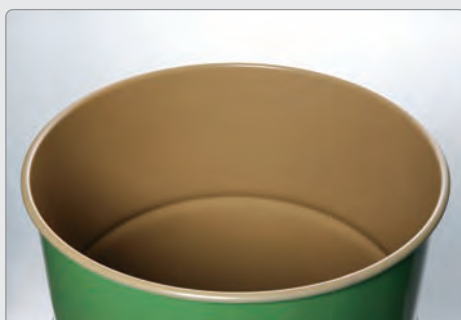
Type	Epoxy-phenolic	Phenolic
Code name	NSP	4A
Coating thickness	10~30 $\mu$ m	6~12 $\mu$ m
Color tone	Yellowish gray	Transparent brown
Features	This type of coating has excellent adhesion to metals and is highly flexible as well as durable against weak alkaline substances. Since internal odor is hardly present, this type of coating is suitable for containing foods and perfume too.	This type of coating provides low penetration characteristic and is durable against organic solvents or weak acids with a drawback of low flexibility. Due care, however, should be taken for alkaline or water solution type contents.

## 2. Internal Coating Quality

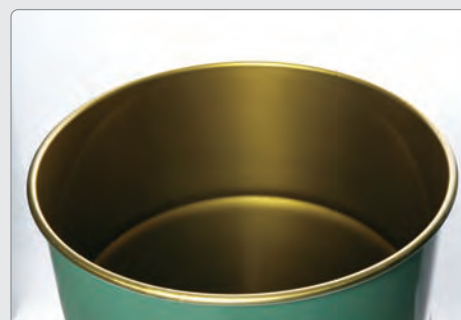
The following table shows examples of results of standard specimen tests made to evaluate the internal coating quality. Values shown in the table, however, are the test results for each corresponding test, and not the specification value of our products. Such test results may vary depending upon the process of surface pretreatment. For further information, please contact our sales divisions.

Test Item	Test Method	Unit	Epoxy-phenolic	Phenolic
			NSP	4A
<b>Erichsen Test</b>	As per JISK5600	mm	3~8	1~4
<b>Du Pont Impact Test</b>		500g, 1/4"	Not less than 50	Not less than 5
<b>Cross Cut Test</b>			100/100	100/100
<b>Scratch Hardness (Pencil method) Test</b>			6~8H	9H
<b>MEK Rubbing Test</b>	As per Company's Standard		OK at 60 strokes	OK at 3000 strokes
<b>Immersion Test</b>			No abnormalities were observed after 2 months under 40 degrees C.	Paint film swelling was observed after 2 months under 40 degrees C.

Epoxy-phenolic



Phenolic

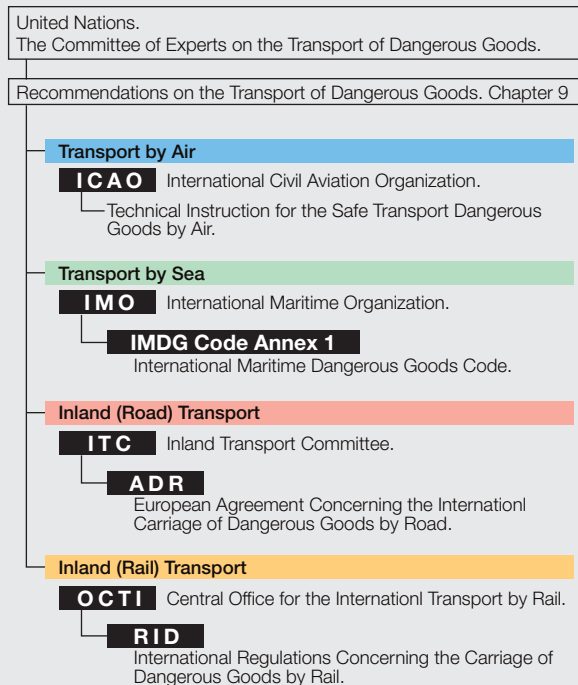


# Dangerous Goods Container

## Dangerous Goods Container

Recommendations on the Transport of Dangerous Goods (UN Recommendations Chapter 9) were issued by the United Nations, the Committee of Experts on the Transport of Dangerous Goods, to secure the safe transport of dangerous goods in packages where they are packed in containers for transport. Based on these recommendations, the IMDG Code was formulated to specify containers suitable for the international sea transportation on dangerous goods. These container specifications are also adopted in Japanese laws and therefore must be applied to dangerous goods containers for international transport. Similar container specifications have been also adopted for domestic transport of dangerous goods.

## International System of Laws and Regulations for the Transport of Dangerous Goods



## Japanese Legal System for the Transport of Dangerous Goods

Type of Transport	Competent Authorities	Laws and Regulations
Air Transport	Ministry of Land, Infrastructure and Transport Civil Aviation Bureau	1. Air Navigation Law Enforcement Regulations 2. Notification for determining the criteria for the transport of explosive, etc., by air
Sea Transport	Ministry of Land, Infrastructure and Transport Maritime Technology and Safety Bureau	1. Dangerous Goods Ship Transport and Storage Regulations 2. Criteria for the transport of dangerous goods by sea
Land Transport and storage	Ministry of Home Affairs Fire and Disaster Management Agency	1. Regulations concerning the control of dangerous substances 2. Notification for determining the details of technical criteria for the control of dangerous substances
	Ministry of Health, Labour and welfare Pharmaceutical Affairs Bureau	1. Ordinance for designating poisonous and deleterious substances 2. Poisonous and Deleterious Substances Control Law Enforcement Regulations

## Containers and Packagings

The type of containers and packagings are drum, wooden barrel, box, jerrican, bag and composite containers. The necessary performance items required for containers alone are specified as control items, and although there is a simple construction specification, there are no shape or dimensional specifications. Three different performance specifications have been set up, and the proper selection must be made according to the class of dangerous goods to be transported. Since the class of container and the type container and packagings are specified for each type of goods, reference to the IMDG Code is requested for sea transport, and to the Dangerous Goods Regulations in Fire Service Law for domestic transport.

- 1) High level dangerous goods·····Packing Group I
- 2) Medium level dangerous goods·····Packing Group II
- 3) Low level dangerous goods·····Packing Group III

All containers and packagings for dangerous goods must be tested for performance, and required markings must be put on containers and packagings that have passed the test.

### UN Recommendations

Inspection organization	The Ship Equipment Inspection Society of Japan*1	
Type of steel drum	Marking	
Tight head drum for liquids	UN 1A1 / X1.8 / 300 / YR*2 / J / ND*3	
Open head drum for solids	UN 1A2 / Y280 / S / YR*2 / J / ND*3	
Open head drum for liquids	UN 1A2 / Y / 100 / YR*2 / J / ND*3	
Composite drum	Universal closure type	UN 6HA1 / Y1.5 / 150 / YR*2 / J / ND*3
	ICI closure type	UN 6HA1 / X1.2 / 250 / YR*2 / J / ND*3

### Fire Defense Agency Specification

Voluntary		
Drum Manufacturers' Association		
Tight head drum	Open head drum	
Liquid	Solid	Liquid
L-X JSDA ND*3	S-Y JSDA ND*3	L-Y JSDA ND*3

\*1 Approved by Ministry of Land, Infrastructure and Transport

\*2 YR: last two numbers of AD

\*3 Initial of manufacturer