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IS : 3071 - 1981  
(Reaffirmed 1987)

*Indian Standard*  
SPECIFICATION FOR  
WOODEN CRATES

( *First Revision* )

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BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# *Indian Standard*

## SPECIFICATION FOR WOODEN CRATES

### *( First Revision )*

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*( Continued on page 2 )*

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# *Indian Standard*

## SPECIFICATION FOR WOODEN CRATES

### *( First Revision )*

#### 0. FOREWORD

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 30 December 1981, after the draft finalized by the Wood and Wood Products Containers Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

**0.2** A wooden crate is a framework used as a container in the transportation of articles which do not require the complete protection afforded by a wooden case.

The method of construction of crates is dependent upon the nature of contents to be transported, its weight, shape and liability to damage. This wide range of factors makes it very difficult to specify definite styles as has been done for wooden packing cases ( *see* IS : 1503-1979\* ). However, since large quantities of wooden crates of various sizes and designs are in use for packing a wide variety of articles, an attempt has been made to lay down the requirements of the framework of wooden crates in relation to the weight of contents packed and the type of load.

By using wooden crates, a considerable saving both in the volume of timber used and the gross weight of the pack is effected, provided the crate is properly designed and constructed. The strength and rigidity of a crate are influenced by the three-way corner ( locked corner ) and diagonal braces.

**0.3** This standard, first published in 1965, has been revised to cover wooden crates for carrying articles up to 500 kg net mass. With the publication of IS : 6662-1980†, the information regarding the species of timbers suitable for the manufacture of crates, earlier covered in this specification, has been referred to IS : 6662-1980†. Also, with the increase in net contents mass, the sizes of the members of the crates have been given for 6 classes instead of 5. Provision has also been made for the handling of crates by forklift

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\*Specification for wooden packing cases ( *second revision* ).

†Specification for timber species suitable for wooden packaging ( *first revision* ).

trucks and strengthening by iron hoops to ensure better performance of the crates in transit.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

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## 1. SCOPE

**1.1** This standard covers the requirements of wooden crates intended for packaging of articles weighing not more than 500 kg which do not require the complete protection as provided by a wooden packing case.

## 2. TERMINOLOGY

**2.0** For the purpose of this standard, the definitions given in IS : 707-1976† and IS : 6703-1972‡ and the following shall apply.

**2.1 Edge-Members** — Those parts of the framework forming the edges of the crate are shown as 'a' members in Fig. 1.

### 2.2 Objectionable Knots

- a) A live knot in a frame member shall be considered objectionable, if its diameter along the major axis exceeds one-third the width of the frame member, provided such knots do not reach the edge of the member and are not so numerous or grouped or located as to affect unduly the strength of the frame members, or are situated within 25 mm from a place through which a nail may be driven.
- b) A dead knot in a frame member shall be considered objectionable, if its diameter along the major axis exceeds 12 mm in the case of an unplugged knot or 25 mm in the case of a glued and plugged knot, provided such knots do not reach the edge of the member and are not so numerous or grouped or located as to affect unduly the strength of the frame members, or are situated within 25 mm from a place through which a nail may be driven.

**2.3 Surrounding Battens** — Surrounding battens are the girth or body battens fixed to the crate and are shown as 'd' members in Fig. 1.

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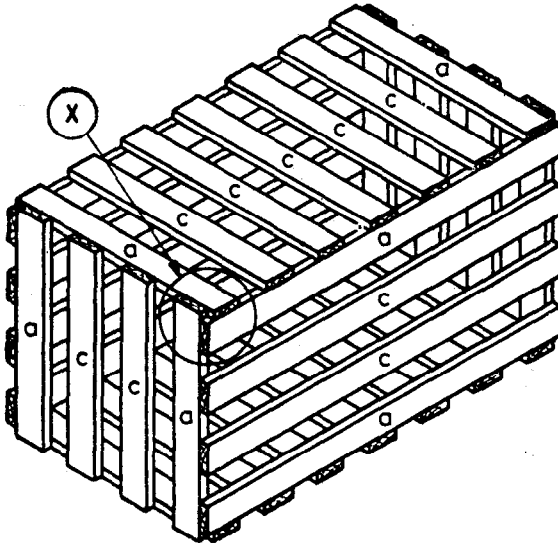
\*Rules for rounding off numerical values (*revised*).

†Glossary of terms applicable to timber technology and utilization (*second revision*).

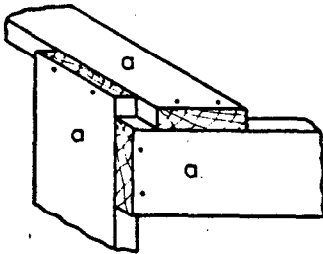
‡Glossary of wooden packaging terms.



**2.4 Three-Way Corner** — A corner formed by 3 edge members so arranged that each member is nailed into the side grain of another member and has the third member nailed to it in the same way. All nails are thus driven into the side grain of the timber ( see Fig. 1A, 1B, 1C and 1D ).



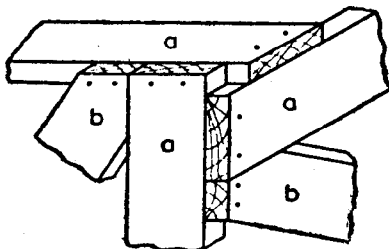
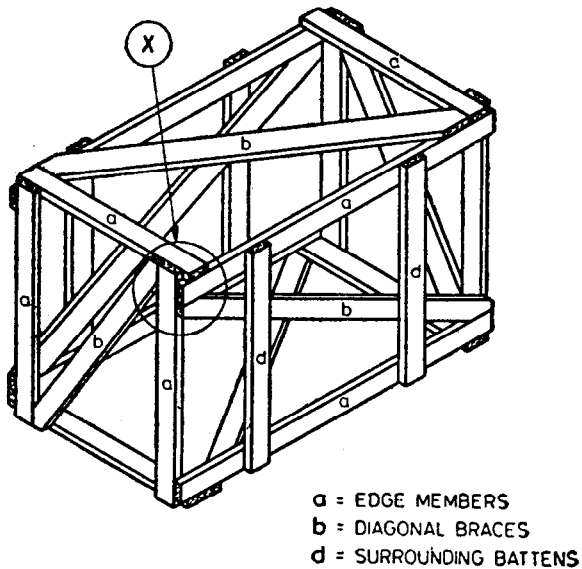
a = EDGE MEMBERS  
c = STRUTS



ENLARGED DETAIL AT X  
(THREE WAY CORNER)

1A Style 1

FIG. 1 TYPICAL WOODEN CRATE CONSTRUCTION (Contd.)



ENLARGED DETAIL AT X  
(THREE-WAY CORNER)

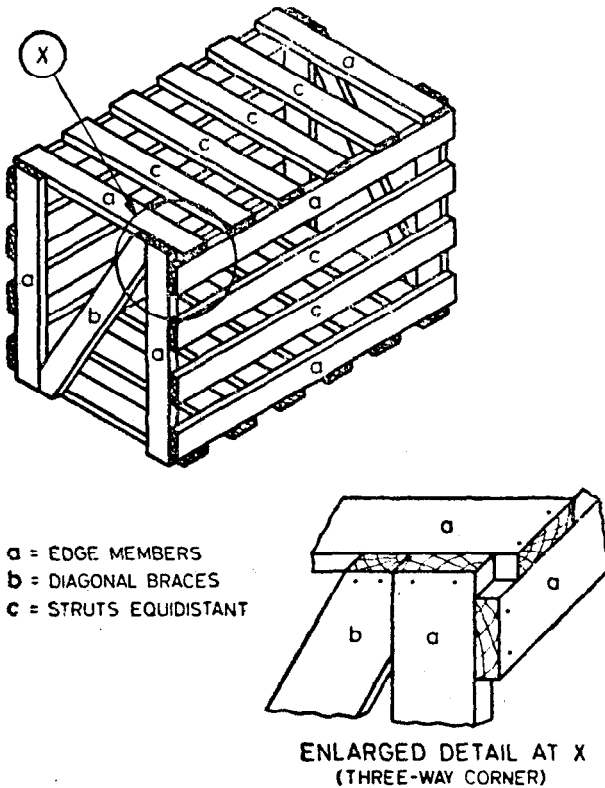
1B Style 2

FIG. 1 TYPICAL WOODEN CRATE CONSTRUCTION (Contd.)

### 3. MATERIALS

**3.1 Timber** — Any of the timber species given under Group I, II or III of IS : 6662-1980\* shall be used for the manufacture of crates. Any other suitable timber not included in Group I, II or III of IS : 6662-1980\* may also be used with the prior approval of the purchaser.

\*Specification for timber species suitable for wooden packaging (first revision).

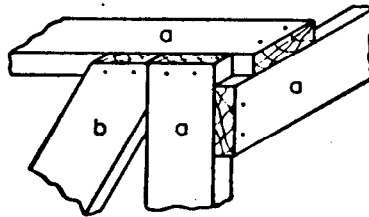
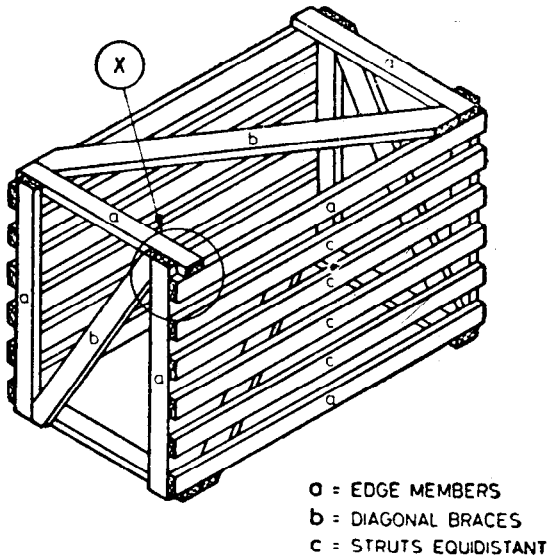


1C Style 3

FIG. 1 TYPICAL WOODEN CRATE CONSTRUCTION (Contd.)

**3.1.1** The timber shall be seasoned to a moisture content not exceeding 18 percent and the inclination of the grain shall not exceed 1 in 10. The timber shall be free from centre hearth (pith), insect attack, any kind of decay (rot), objectionable knots, warping, splits and any other defect which will reduce the strength or usefulness of the crate. Pinholes (dead infestation) shall be permissible provided they are not of powder post beetles and are scattered (not concentrated).

**3.1.2** As far as possible, only one species of timber shall be used in the manufacture of any one crate. However, when different species are required to be used, they shall be selected from the same group, but coniferous and non-coniferous timber shall not be mixed in any one crate.



ENLARGED DETAIL AT X  
(THREE-WAY CORNER)

1D Style 4

FIG. 1 TYPICAL WOODEN CRATE CONSTRUCTION (Contd.)

3.2 Nails — Plain head nails conforming to IS : 723-1972\* shall be used.

#### 4. CLASSES OF CRATES

4.1 Classes — Crates shall be classified into 6 classes according to the size of frame members as given in Table 1.

4.1.1 Struts shall be spaced at distances not more than the width of the struts.

\*Specification for steel countersunk head wire nails (first revision).

**TABLE 1 SIZE OF FRAME MEMBERS FOR DIFFERENT CLASSES OF CRATES**  
( Clause 4.1 )

MEMBERS	SIZE IN mm FOR CRATE OF CLASS						
	A	B	C	D	E	F	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Edge members	a } b } d }	50×16	75×16	75×16	75×20	115×25	140×40
Diagonal braces							
Surrounding member							
Struts	c	50×16	75×16	110×16	115×20	140×25	165×40

4.2 The choice of a suitable class of crate depends on several factors, for example, weight and nature of contents, type of load, means of handling, modes of transportation, etc, but generally the weight of contents and type of load ( see Appendix A ) are the governing factors. A general guide to the different classes of crates to be used according to the weight of contents, type of load and group of timber is given in Table 2.

**TABLE 2 MASS OF CONTENTS, CLASS OF CRATE AND GROUP OF TIMBER**

MASS OF CONTENTS kg	CLASS OF CRATES FOR TYPE OF LOAD		GROUP OF TIMBER
	Easy Load and Average Load	Difficult Load	
(1)	(2)	(3)	(4)
Up to 50	A	B	III
51 to 100	B	C	III
101 to 150	C	D	II
151 to 250	D	E	I
251 to 500	F	F	I

## 5. CONSTRUCTION

5.1 The size of frame members shall be as given in 4.1.

5.2 The grain of timber shall be in the direction of the longest dimension.

5.3 The edge members shall be of sufficient strength and size ( see 4.1 ) to permit adequate fastening of various parts and to support the loads and shocks encountered in storage or transit.

**5.4** Surrounding battens shall be placed at equal distances from the ends. No surrounding battens shall normally be used for crates below 60 cm in length, but at the option of the purchaser these may be specified according to considerations of anticipated hazards in the journey.

**5.5** The frame members meeting at a corner shall be of the same thickness.

**5.6** Diagonal bracing has considerable effect in making a crate rigid. No diagonal brace shall normally be used for crates of size less than 65 × 45 × 45 cm and for weight of contents less than 50 kg but at the option of the purchaser, these may be specified according to considerations of anticipated hazards in transit and handling. More information on bracing is given in Appendix B.

**5.7** For crates weighing 100 kg and above, suitable provisions shall be made in the bottom battens for handling with forklift trucks.

**5.8** Where manual handling of the crates is anticipated, the crates shall be strengthened by iron hoops to ensure stability of the crate members.

**5.9** The size of nails used in making the crates shall depend on the thickness of frame members and shall be as given in Table 3.

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**TALBE 3 SIZE OF NAILS AND THICKNESS OF FRAME MEMBERS**

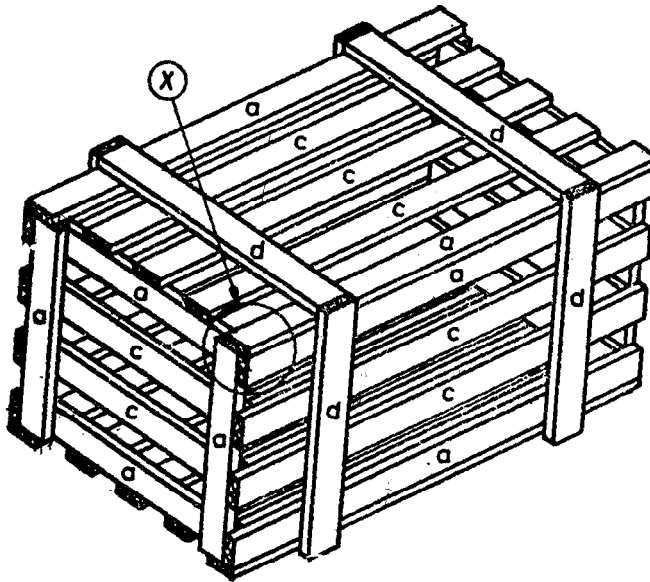
THICKNESS OF FRAME MEMBER ( mm )	NAIL	
	Length ( mm )	Diameter ( mm )
16	50	2.80
20	60	2.80
25	70	3.15
40	115	3.50

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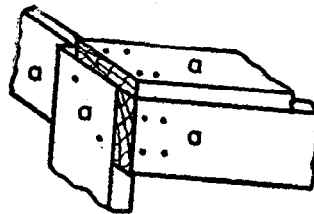
**5.9.1** No framework member shall have less than 2 nails in each end. Nails shall be driven without splitting the frame member and weakening the joint, and shall generally be placed at a distance of about 20 mm from the edge. Where the thickness of frame members permits, the nails may be driven in staggered rows to make a stronger joint.

**5.9.2** Where two diagonal braces cross each other, they shall be fastened together with not less than two nails driven through the faces of the members. Each diagonal brace shall be nailed to each member it crosses with no fewer than 2 nails.

**5.10** Different styles of crate construction are given in Fig. 1A to Fig. 1F.



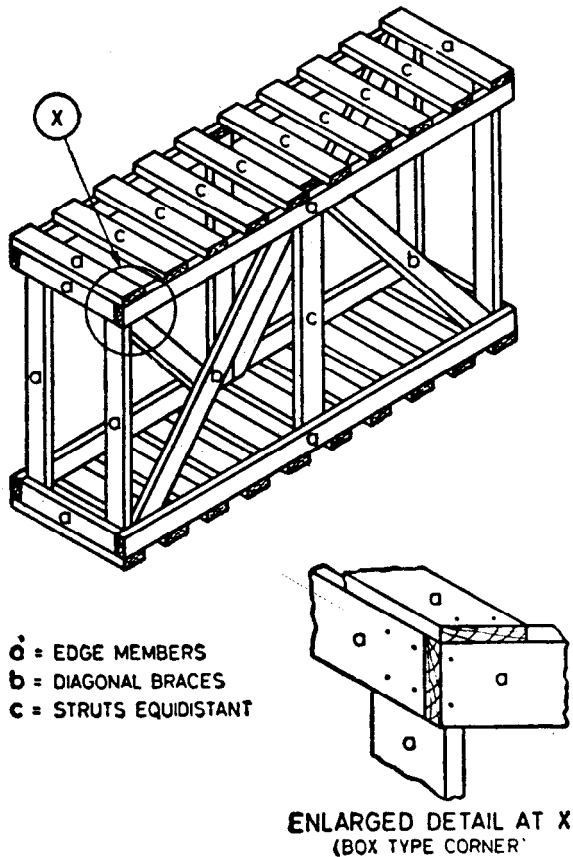
a = EDGE MEMBERS  
c = STRUTS EQUIDISTANT  
d = SURROUNDING MEMBERS



ENLARGED DETAIL AT X  
(BOX TYPE CORNER)

1E Style 5

FIG. 1 TYPICAL WOODEN CRATE CONSTRUCTION (Contd.)



1F Style 6

FIG. 1 TYPICAL WOODEN CRATE CONSTRUCTION

**5.11** The shooks, if manufactured from non-coniferous timbers, shall be treated by dipping for 5 minutes in 10 percent solution of copper naphthenate in white spirit.

NOTE — The use of any other suitable wood preservative shall also be permissible with the prior approval, in writing, of the purchaser.

## 6. WORKMANSHIP AND FINISH

**6.1** The frame members shall be of even thickness, rectangular section, trimmed square at the ends and reasonably smooth.



**6.2** The nails shall be well clinched and the clinching shall be done along the grain of the timber.

## **7. DELIVERY**

**7.1** Unless otherwise specified, the crates shall be supplied in shooks, firmly bundled together.

## **8. MARKING**

**8.1** Unless otherwise specified, each bundle of shooks shall be legibly and indelibly marked or stencilled with the following information:

- a) Manufacturer's name or trade-mark, if any;
- b) Year of manufacture; and
- c) Class and size.

**8.1.1** The crates may also be marked with the ISI Certification Mark.

**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI-marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

# **A P P E N D I X A**

( *Clause 4.2* )

## **TYPES OF LOADS**

### **A-1. FACTORS**

**A-1.1** The prime factor influencing proper wooden container design is the physical attributes of the load. This includes the weight, size, fragility, shape and capacity for supporting the container. For the purpose of classifying the contents which can be packed in wooden containers, 3 types of load categories have been defined. These are Easy Load, Average Load and Difficult Load.

**IS : 3071 - 1981**

## **A-2. EASY LOAD**

**A-2.1** Easy load consists of contents having low or moderate density and filling the inside of the container completely. The contents also consist of articles of sufficient strength to withstand the forces encountered in handling and transportation, and are of such shape as to fully contact all faces of the shipping container. Such items as boxed articles, chests or kits of tools, and wooden cabinets are examples of this type of load.

## **A-3. AVERAGE LOAD**

**A-3.1** Average load consists of items which are moderately dense and which require a reasonable amount of protection. Items of this type may either be packed directly into the outer container or in an intermediate package which aids in supporting the faces of the outer container. The items themselves or their packages must provide a moderate amount of support for all faces of the shipping container in order to be classified as an average load. In this group fall items in metal cans, bottles individually cushioned, hardware and numerous other items which are first packed in individual cartons.

## **A-4. DIFFICULT LOAD**

**A-4.1** Difficult load consists of items which are highly concentrated or require a high degree of protection. Items in this category furnish no support to the cases of the shipping container but rather, in many instances, tend to apply concentrated forces to the container's surfaces. Bolts, nuts, and other dense items which are free to shift or move about as well as delicate instruments, machined parts, valves and fittings, machine assemblies and accessories which have to be held in place by bracing and bolting. heavy wrenches which exert highly concentrated forces on two opposite faces of the container, and others which do not completely fill the shipping container fall into this class.

# **A P P E N D I X B**

*( Clause 5.6 )*

## **STRENGTH OF A WOODEN CRATE**

### **B-1. CRITERION FOR STRENGTH**

**B-1.1** This pertains to the strength of a wooden crate, meaning thereby the following:

- a) Capacity to carry a certain weight,

- b) Constructional stability, and
- c) Rigidity against distortion.

## **B-2. SIZE**

**B-2.1** The sizes of frame members usually can be related to the weight of contents, that is, for heavier loads, the frame members are thicker and/or wider.

## **B-3. CONSTRUCTIONAL STABILITY**

**B-3.1** Constructional stability is usually achieved by the design of the corners. In the three-way corner, each edge member is fastened by nails in both the directions. In the box type corner, 2 edge members are nailed with their wide faces, while the other 2 are nailed to the side grain of the first 2. The addition of the intermediate strut members does add a little to the stability of the crate.

## **B-4. RIGIDITY**

**B-4.1** The rigidity of a crate usually depends on the diagonal bracings. A crate having only edge members with no intermediate struts and diagonal braces on all 6 faces produces maximum rigidity. Diagonal braces on a pair of opposite faces produce rigidity in the direction of the faces, and on 2 pairs of opposite faces in 2 directions.

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