

# UIC Code

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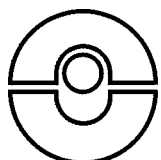
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4th edition, June 2001

*Translation*

**Technical specification for the supply of  
plywood panels, glued together and  
protected by phenolic resin, for the walls of  
covered wagons**

*Spécification technique pour la fourniture de panneaux contreplaqués en bois collés et protégés aux résines phénoliques pour parois de wagons couverts  
Technische Lieferbedingungen für phenolharzverleimte und -geschützte Sperrholzplatten für die Wände von gedeckten Güterwagen*



*Union Internationale des Chemins de fer  
Internationaler Eisenbahnverband  
International Union of Railways*

**UIC**

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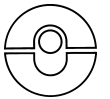
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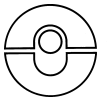
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## Summary

The present leaflet defines the technical specification for the supply of plywood panels glued together and protected by phenolic resin, for the walls of covered wagons.



# 1 - General

## 1.1 - Scope

This specification concerns the supply of plywood panels for the side and end walls of covered wagons, and consisting of a number of plies glued together using phenolic resins, the surfaces of which are protected by a coat of phenolic resin applied directly to the panel or to a foundation, in accordance with the regulations laid down by the purchasing Railway.

## 1.2 - Designation

The panels are specified by their dimensions expressed in millimetres and taken in the following order:

- size in the direction of the surface grain;
- size across the surface grain;
- thickness.

The above dimensions are separated by multiplication sign x.

Example: A panel 838 mm wide, 1 500 mm long and 25 mm thick, with the surface grain running along the width, would be indicated as follows:

Plywood panel 838 x 1 500 x 25.



## 2 - Required characteristics

### 2.1 - Species and quality of timber

The veneers used shall be preferably of beech (*Fagus sylvatica* and *Fagus ferruginea*).

Other types can however be used by agreement with the purchasing Railway, and provided that the panels comply with the other regulations contained in this specification.

The veneers must be of sound timber entirely.

Exotic timber must be free from sap.

### 2.2 - Geometrical characteristics

1. *Thickness of the plies*: The thickness of the plies must not exceed:

- 2 mm (surface) and 2,5 mm (inner plies) in the case of panels 15 mm thick;
- 2 mm (surface) and 3 mm (inner plies) in the case of panels 25 mm thick.

Slightly thicker plies may, however, be used with the agreement of the purchasing Railway.

2. *Shape and dimensions of the panels*: The shape and dimensions of the panels must agree with those indicated on the diagram or on the order.

Except when otherwise indicated on the order or on the diagram, the edges must be straight and square with the surfaces.

The thickness of the panel is fixed at:

- 15 mm in the case of side panels, upper end panels and door panels;
- 25 mm in the case of lower end panels.

3. *Tolerances on the dimensions*: On the thickness:  $\pm 1$  mm.

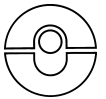
Greater tolerances may be applied by agreement with the purchasing Railway. In this event, the thickness variation between any two points on the same panel must not exceed 1 millimetre.

On the length and width: as shown in the diagrams.

4. *Flatness*: The panels must be free from warps, twists and hollows. A slight twist or warp of a maximum of:

- 2% of the diagonal length of a panel 25 mm thick,
- 4% of the diagonal length of a panel 15 mm thick,

may, however be allowed.



## 2.3 - Physical characteristics

1. *Appearance:* The surfaces must be smooth, of uniform shade, and free from cracks or other noticeable defects.

The machined surfaces and edges must be clean-cut and seamless. It will be permissible, however, for there to be an open visible joint on the edge at intervals at the most every 300 mm, provided that it affects only the inner plies and that the gap is not greater than a millimetre.

2. *Protective paper:* in the event of a protective paper being applied to the surfaces, this shall be impregnated with phenolic resin weighing at least 210 g/m<sup>2</sup> (including 60 g/m<sup>2</sup> of resin), of uniform appearance and shade throughout.

This shade, which shall be fixed by the purchasing Railway both for the upper and lower faces, shall be specified by referring to a shade sample.

The direction of the paper must be at right-angles to the grain of the wood of the external face which it covers.

3. *Static bending strength:*

Thickness of panel	Minimum strength	
	individual	mean
mm	daN	daN
15	90	100
25	225	250

4. *Resistance to boiling water:* The panels must be capable of bearing, without modification of the ply assembly, the effect of boiling water under the conditions laid down in Point 4.5 - page 8.
5. *Uninflammability and flame-retardent properties:* When presented, the panels must be non-inflammable and flame-retardent. They must comply with the regulations fixed for these characteristics by the national standards of the purchasing Railway, or, failing these, by the order or its appended documents.

## 2.4 - Marks

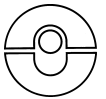
The panels must bear the following distinctive indelible marks:

- the manufacturer's identification number allocated by the purchasing Railway,
- the date of manufacture.

These distinctive marks shall be placed on the lower face, in the above order, in two diagonally-opposed corners.

Upon special request from the purchasing Railway, instructions relating to the treatment of the panels (Nailing prohibited) shall be placed durably on the lower face. The dimensions and position of the marking shall be given in the respective order documents.





## 3 - Manufacture

### 3.1 - Make-up of the panels

1. *Inner plies:* The inner plies shall be obtained by side butt-jointing and glueing of basic veneers, each at least 200 mm wide. End butt-jointing, separated joints, or lap joints, shall be prohibited.

The plies shall be assembled so that the structure of the panel be symmetrical in relation to the median plane parallel to the surfaces. In general, the plies shall be arranged with the grain crossing at 90°. It is, however, permissible for a maximum of two adjacent plies to have their grain running in the same direction.

2. *Surfaces:* The surfaces may be cut in one piece from a single veneer, or obtained by side butt-jointing and glueing of basic veneers at least 300 mm in width. End butt-jointing, separated joints, or lap joints shall be prohibited.

The constituent veneers of the surface plies shall be arranged in such a way that the grain:

- on the one hand, crosses at right-angles that of the adjacent inner plies;
- on the other hand, and except when otherwise indicated on the order, runs parallel with the smaller edge of the panel.

3. *Glueing together:* The glueing together of the plies shall be obtained by hot polymerisation under pressure, on a hot-plate press, with a glue having a base of pure phenolic resin or of any other product acceptable to the purchasing Railway. The greatest care should be taken with this operation.

**NB :** The purchasing Railway may demand samples of this glue with the timber preserving product, for chemical analysis.

4. *Timber preservation:* If the panels are not preserved prior to glueing, they shall be preserved by means of a fungicide and insecticide product incorporated in the glue and agreed by the purchasing Railway.

The glueing must not be affected by the timber preserving product.

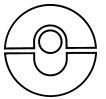
5. *Protection:* In the event of the surfaces being covered by a protective paper, the latter shall be made adhesive by hot polymerisation of the impregnated resin.

After checking the panels, the machined surfaces and edges shall be protected, with a view to storage, by a coat of varnish of a type acceptable to the purchasing Railway.

### 3.2 - Possible modifications

Any repair carried out without the preliminary approval of the purchasing Railway or with the object of concealing a defect, is strictly prohibited and may result in the rejection of the whole supply.

The repair of the protective covering is not normally permissible. If, however, such a repair proved necessary, it should be submitted for prior agreement to the purchasing Railway, and be carried out in accordance with the latter's instructions.



## 4 - Acceptance conditions

### 4.1 - Submission for acceptance

The panels shall be submitted with rough-sawn edges except when otherwise stipulated on the order, in batches consisting of panels of the same surface dimensions and thickness.

### 4.2 - Nature and proportion of the checks and tests

For each batch submitted, the following checks and tests shall be carried out:

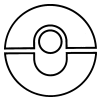
- at the manufacturer's factory	}	check of check of the dimensions static bending test	}	the appearance the structure the flatness
- at the laboratory of the purchasing Railway	}	test of resistance to boiling water test of unflammability and flame-retardant properties		

The proportions of the tests shall be as follows:

Size of batch (number of panels N)	Proportion
N ≤ 100	2
100 < N ≤ 200	3
200 < N ≤ 400	4
400 < N ≤ 800	5
800 < N ≤ 1600	6
1600 < N ≤ 3200	7
3200 < N	8

} series of static bending tests and resistance to boiling water, per batch

The proportion of tests for unflammability and flame-retardant properties shall be that indicated by the national standards of the purchasing Railway, or, failing these, by the order or its appended documents.



### 4.3 - Method of selection and preparation of test-pieces

The test-pieces for each series of tests shall be taken in accordance with the methods laid down in the following table, from a panel selected at random from the batch, and shall be tested as they are.

Nature of test	Characteristics of test pieces		Number of test-pieces to be selected	Method of selection
	Shape	Dimensions (mm)		
Static bending test	Rectangular	270 x 15 x 15 (panel, 15 mm thick) or 450 x 25 x 25 (panel, 25 mm thick)	6	Sawn from a position at least 50 mm from the edge of the panel, the longitudinal axis of the rectangular test-pieces running in the same direction as the grain of the surfaces.
Test of resistance to boiling water	Square	50 x 50 x e <sup>a</sup>	2	
Test of unflammability and flame-retardent properties	When submitted, the panels must comply with the regulations of the national standards of the purchasing Railway, or failing these, those of the order, or its appended documents.			

a. e= Panel thickness

### 4.4 - Static bending test

*Test-piece:* See point 4.3 - page 7.

*Method of testing:* The six test-pieces selected are tested individually, by applying the load,

- to the upper face of the panel, in the case of half of them,
- to the under face of the panel, in the case of the remainder.

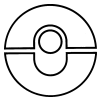
Each test-piece is placed on two parallel and level supports, and deformed until breaking occurs, by applying a gradually increasing load over its whole width and equidistant from the supports.

The distance between the supports shall be fixed at:

- 225 mm for test-pieces with a thickness of 15 mm;
- 375 mm for test-pieces with a thickness of 25 mm.

The bending strength of the test-piece is the maximum load shown on the indicator of the testing machine.

*Results to be obtained:* See Point 2.3, Paragraph 3 - page 4.



## 4.5 - Resistance to boiling water

*Test-piece:* See Point 4.3 - page 7.

*Method of testing:* The two test-pieces are submitted to the following cycle of tests:

- immersion, for four hours, in boiling water;
- drying in an oven at a temperature of  $65 \pm 3^{\circ}\text{C}$  for twenty hours;
- further immersion, for four hours, in boiling water;
- cooling in water at normal temperature.

*Result to be obtained:* The constituent plies of the panel should not come apart at any point.

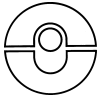
## 4.6 - Test of unflammability and flame-retardent properties

The test of unflammability and flame-retardent properties is carried out in compliance with the national standards of the purchasing Railway, or, failing these, with the regulations of the order or its appended documents.

## 4.7 - Interpretation of the checks and tests

Any characteristic which does not conform to the requirements may result in the rejection of the batch concerned.

If the purchasing Railway agrees to proceed with extra tests, the number of panels to be subjected to these tests shall be decided by special agreement between the supplier and the Railway.



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## 5 - Guarantee

The panels shall be guaranteed by the supplier for a period of two years following their delivery, against any defect due to manufacture and not detected at the time of acceptance in the factory or to unsatisfactory packing.

Panels which, during the guarantee period, reveal defects rendering them unfit for service or which are likely to reduce their service life, shall be rejected.

The rejected parts shall be made available to the supplier for replacement or reimbursement.



# Bibliography

## 1. Minutes of meetings

### International Union of Railways

*"5th Committee -J.Q. - Preparation of specifications and dimensional standards for panels in compressed and plasticised wood for wagon sides", May 1962*

*"Sub-Committee for Specifications. - Finalising of technical specifications relating to pallets, plywood or layered panels, brake hoses, springs, coupling screws and running gear", January 1973*

*"Sub-Committee for Specifications. - Finalising of technical specifications: a) ..... b) Harmonisation of guarantee clauses", January 1975*

*"Sub-Committee for Specifications. - Question 5/SA/FIC : Revision of Leaflet 844-3 "Plywood panels, glued together and protected by phenolic resin, for the walls of covered wagons", January 1980*