UIC CODE 435-2

11th edition, March 2014

Translation

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Standard of quality for EUR flat pallets made of wood measuring 800 mm x 1 200 mm (EUR-1)

Norme de qualité pour une palette plate EUR en bois de dimensions 800 mm x 1 200 mm (EUR-1)
Gütenorm für einen EUR-Ladungsträger aus Holz mit den Abmessungen 800 mm x 1 200 mm (EUR-1)

INTERNATIONAL UNION
OF RAILWAYS

Leaflet to be classified in volumes:

II - Transport of goods

IV - Management

Application :

With effect from 1 March 2014
All members of the International Union of Railway, technical amendments, printing and factual errors notwithstanding

Record of updates

1st edition, January 1960	First issue and 1 amendment
7th edition, July 1994	Including 2 amendments
8th edition, May 2005	Overhaul of leaflet
9th edition, February 2009	Update of the leaflet with new title
10th edition, April 2010	Changes to points 1.4.5 and 1.7.1 in addition to Appendix M due, inter alia, to the decision of UIC WG "Questions on palletising" to introduce the mandatory implementation of the ISPM 15 standard.
11th edition, March 2014	Uptade of the leaflet. Implementation of the one-brand concept.

The person responsible for this leaflet is indicated in the UIC Code

Contents

Summary

This leaflet applies to the production, testing and marking of recyclable and repairable EUR pallets (EUR pallets) made of wood with the dimensions 800 mm x 1 200 mm EUR-1.

1 - Technical construction

1.1 - Dimensions

The production tolerances take the natural properties of the material wood into account, which shrinks when it dries out.

The dimensions with the permissible tolerances can be seen from Appendix A - page 12, drawing.

In case of deviating wood moisture of the elements, the shrinkage values in Table 3 - page 45 are relevant.

1.2 - Load bearing capacity

The EUR-1 pallet is recommended for the following loads when stacked on a shelf or on the fork of a forklift truck:

- 1 500 kg, if the load is evenly distributed on the pallet surface,

In a stack, the additional load of the lowest EUR-1 pallet is

- maximum 4 000 kg, if it lies on an even, horizontal and rigid surface and the load lies horizontally and covers the ground completely.

1.3 - Construction

1.3.1 - Approved fasteners

For the construction, only approved fasteners may be used, which correspond to the conditions in Appendix E - page 33 and which guarantee a stability of the EUR pallets in accordance with point 1.3.4 - page 3.

They must be tested and applied for and registered with a UIC RU (see List of abbreviations - page 58) in accordance with Appendix N - page 54 / a pallet organisation in accordance with Appendix L - page 52.

The acceptance of the tested fasteners, approved by an RU in accordance with Appendix L by a pallet organisation, by other railway companies is permissible.

1.3.2 - Construction process

All fasteners must be attached so that none of the fasteners protrudes laterally from a board or a block. They must be seated so deep in the wood that their heads do not protrude from the surface of the board but that they do also not lie lower than 3 mm below the surface (in case of minimum height of the pallet).

The fasteners shown in the parts list of Appendix A must be set into each block - both from the top as well as from the bottom side of the pallet, for example - so that they do not lie in one and the same grain of the block and have the greatest possible distance from each other.

In doing so, a minimum distance of 20 mm from the corners of the blocks and of the boards as well as from production-specific cavities must be adhered to. The lead boards and the central deck board, if necessary, must be connected with each stringer board with at least one fastener. Fasteners which penetrate the bottom of the stringer boards must be clinched.

1.3.3 - Other construction methods

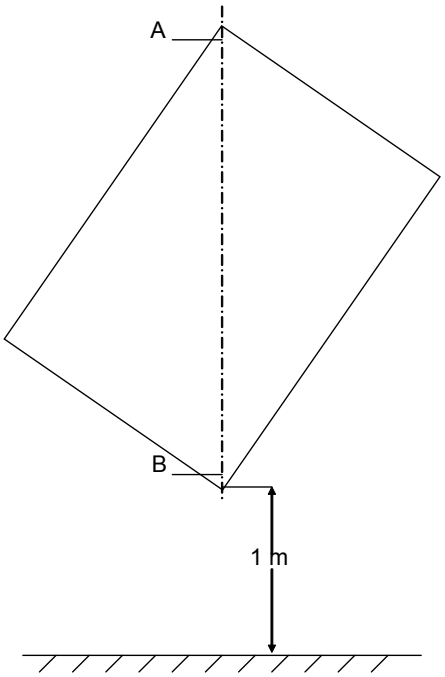
Other types of construction, such as gluing, screwing or riveting, must be applied for and approved by the managing UIC RU (see List of abbreviations - page 58).

1.3.4 - Stability test of the EUR pallet

The stability of the EUR pallet must be tested by the approving UIC RU in accordance with Appendix N - page 54 / by the pallet organisation in accordance with Appendix L - page 52. This test must be carried out with every manufacturer (see Glossary - page 59) at the start of production and when the production method is changed, or when the approving UIC RU / the pallet organisation consider it necessary. For the stability test, the wood moisture must be 20 % ± 2 % in case of natural wood. The corner drop test mentioned below must be passed.

1.3.5 - Corner drop test

- Two points A and B must be marked on the deck surface of the pallet on the diagonal, with a distance of approximately 40 mm from the corners of the EUR pallet.
- The EUR pallet must be suspended so that the diagonal is perpendicular to the measuring points.
- The EUR pallet must drop freely from a height of 1 m with the corner onto a flat, hard, firm and horizontal floor.
- The tests must be performed with 3 EUR pallets and a **test report** must be prepared.
- The distance of the measuring points A and B must be measured prior to the first and after the sixth drop.
- Damages of the EUR pallet are not permissible, with the exception of local damages having a distance of up to 50 mm from the point of impact.
- After 6 drops of each EUR pallet onto the same corner, the reduction of the distance between the measuring points must not exceed 3 % of the original distance.



1.4 - Treatment of the wood and the pallet

1.4.1 - General condition

The EUR pallet must be free from impurities (e.g. sawdust, sawmill waste, paint, oil, etc.).

1.4.2 - Boards

All boards must be in one piece.

On the loading and bottom surface of the pallet, the boards must be rough (not planed).

1.4.3 - Blocks

The blocks may consist of:

- one piece of wood,
- wood-chip material (moulded wood-chip block).

In case of blocks made of one piece of wood, with the exception of the 145 x 145 mm blocks, the grain must run parallel to the 1 200 mm side of the EUR pallets.

For the construction with moulded wood-chip blocks, only blocks made of wood-chip material may be used which fulfil the requirements of Appendix C - page 15 and which guarantee the stability of the EUR pallet in accordance with point 1.3.4 - page 3.

They must be **tested** and approved by the approving UIC RU in accordance with Appendix N - page 54 / by the pallet organisation in accordance with Appendix L - page 52.

1.4.4 - Bevelled edges

The upper edges of the floorboards and the four corner edges of the EUR pallet must have the bevelled edges shown in and intended by the drawing of Appendix A - page 12. Shreds of wood are not permitted.

1.4.5 - Treatment

The wood must be free of any trace of wood preservatives and blue stain inhibitors. The allowed wood preservatives against mould and wood blueing are included in Appendix M - page 53.

From 1.1.2010 the phytosanitary treatment of wood for EUR pallets in accordance with the current ISPM 15 standard (IPPC) is mandatory. This is to be achieved by means of heat treatment of the wood or pallet. It is the responsibility of the relevant national authorities to ensure that this standard is adhered to.

1.5 - Wood types and wood materials

The allowed wood types are included in Appendix D - page 32.

Other types of wood may only be allowed if they have at least the same mechanical properties as the wood types given in Appendix D.

1.6 - Wood quality

1.6.1 - General regulations

The following is not permissible:

- Rotting (mould, fungus, dry rot),
- the inclusion of bark and,
- active insect infestation.

1.6.2 - Moisture content

The wood moisture may not exceed 22 % of the weight of the dry wood (dry weight).

1.6.3 - Wanes

If oak is used, wanes are not permissible. In case of other woods, wanes are permissible on two edges of each part provided that they do not have any bark, that they are on the top and do not exceed 15 mm measured diagonally. They are not permissible for stringer boards, bottom centre boards and on the outer edges of the deck and bottom lead boards.

1.6.4 - Knots

Knots with a diameter of up to 10 mm are not taken into account. Sound knots are permissible. Knots are considered as sound if there are grown together with at least 3/4 of their circumference on one side.

On each length of a board corresponding to the width of a board, the diameter of a knot must not exceed the board width by:

- 1/4 in case of stringer boards,
- 1/3 in case of other boards,

or the total sum of the diameters of several knots:

- 1/3 in case of stringer boards and,
- 1/2 in case of other boards.

In case of the blocks, the diameter of a knot must not exceed 1/4 of the block height on the visible side.

1.6.5 - Cracks

Only dry surface cracks are permissible in the blocks. Only one continuous crack, which must not be longer than the width of the board and which is not traceable to construction, is permissible per board.

1.6.6 - Discolouration

Blueing and slight discolouration corresponding to the time of the year are permissible.

Discolouration due to poor drying and storage conditions is not permissible.

1.6.7 - Resin galls

They are neither permissible on the top of the deck boards nor on the underside of the floorboards.

In other places, surface resin balls up to a length of 50 mm are permissible.

1.6.8 - Lie of the wood grain

In relation to the associated longitudinal edge, the slant of the grain must not exceed:

- 5 % in the boards and
- 20 % in the blocks.

1.6.9 - Insect damage tunnels

In case of non-active insect infestation, tunnels (e.g. black boreholes) with a diameter of up to 3 mm are sporadically permissible.

1.6.10 - Sap wood

Healthy sap wood is permissible in case of:

- deciduous wood, if it neither exceeds 1/4 of the board width nor 1/2 of the board thickness and
- in case of pine woods.

1.6.11 - Medullary canal

A cut-in medullary canal is permissible for the blocks.

Enclosed medullary canals are generally permissible in case of pine wood; in case of other woods only in a maximum of three of the nine blocks of the EUR pallet.

1.7 - Marking

1.7.1 - Marking of EUR pallets

EUR-1 flat pallets (see Glossary - page 59) must have the following symbols on the blocks of the 1200 mm side:

- **on the left-hand corner block:** the UIC symbol in accordance with Appendix B - page 14 in a font size of at least 40 mm,
- **on the centre block:** due to the mandatory phytosanitary heat treatment, the symbols assigned by the relevant authority for said treatment are to appear on both centre blocks on the 1 200 mm side with, one line below, the production code and production year in a legible font size of at least 10 mm and the symbol of the RU in a font of at least 15 mm,
- **on the right-hand corner block:** the protected EUR symbol in accordance with Appendix I - page 42.

The manufacturer code 000-0-00 gives

- the approving manufacturer in the first group (digits/letters) and
- the last digit of the year plus the month of manufacture in the second group.

The characters must be burnt in completely. In addition, stamping and simultaneous colouring are permissible. The stamp must be at least 0,3 mm, the colour must be brown to black, water-insoluble, light-resistant and non-toxic (water-based).

1.7.2 - Withdrawal of a symbol

In particular, the unlawful use and imitation of the protected EUR symbol in accordance with Appendix I, as well as of the UIC symbol in accordance with Appendix B and of the UIC RU symbol in accordance with Appendix N - page 54 shall be the subject of legal action by the UIC RU/pallet organisation.

The approving UIC RU has to ensure that all the necessary conditions of pursuit are given.

Should a UIC RU not fulfil its obligations from the regulations of this leaflet, its authority to confer the protected (EUR) symbol will be withdrawn.

This will not affect the assertion of any claims for damages and enrichment.

1.7.3 - Unlawful use of symbols

In case of unlawful use of the symbols, the pallets must not be brought into circulation as EUR pallets.

The markings (see Glossary) must be **permanently** obliterated with water-insoluble black paint.

If permitted by national law, destruction of the pallets is **mandatory**.

1.7.4 - Additional markings

From 1.1.2010, a control staple on the centre block is mandatory for all new EUR pallets. This documents that quality inspection has been correctly undertaken in accordance with this leaflet.

Any other possible markings must first be approved by the UIC "Palletisation issues" WG.

1.8 - Quality control

The approving UIC RU in accordance with Appendix N - page 54 / pallet organisation in accordance with Appendix L - page 52 must check the quality of the finished EUR pallets by batch in accordance with a random test schedule in accordance with Appendix J - page 43 cont. at the manufacturer's site/ the principal (quality check - see Glossary - page 59).

The measuring equipment required for this must be made available by the manufacturer, the UIC RU/ the pallet organisation.

The measuring equipment for checking the dimensions must have a measurement accuracy of 0,1 mm and must be calibrated on a yearly basis. The measuring range of the measuring equipment must be adjusted so that the required dimensions and tolerances can be checked, depending on the wood moisture.

The measuring equipment for determining the moisture must also be calibrated once a year and must dispose of a temperature setting device.

If no EUR pallets are presented for quality control (no production), it must be checked at least once a year whether the conditions for production as provided by this leaflet are still given or whether the approval (see Glossary) must be withdrawn.

1.8.1 - Self-monitoring

If the manufacturer has manufactured 30 000 EUR flat pallets (EUR-1/-2/-3/-6) in accordance with the required conditions within six months and disposes of a self-monitoring system which has been approved by the competent UIC RU in accordance with Appendix N or the pallet organisation in accordance with Appendix L, the approving UIC RU / pallet organisation must check its proper

manufacturing procedure once a month by carrying out unannounced inspections for monitoring the production in accordance with the following production figures.

Monthly production figure in pieces	Number of unannounced inspections
< 10 000	1x
> 10 000 < 50 000	2x
> 50 000 < 100 000	3x
> 100 000	4x

In case of granted self-monitoring, the manufacturer must record the test results by means of a defect collection sheet in the scope of an independent quality control (SQK), (see Glossary - page 59), comparable to Appendix J - page 43.

A pallet must be taken as random sample from the running production and tested at least once every 20 minutes. Evidence of the test results must be produced directly on-site by the manufacturer in the scope of his independent quality control (SQK).

1.8.2 - Imported EUR pallets

The UIC RU in whose area the imported EUR pallets are brought into circulation first is allowed to check these pallets in accordance with the sample test plan in Appendix J.

In case of negative results, the markings must be obliterated and the approving UIC RU must be notified of it.

The approving UIC RU **must** then take the respective measures.

2 - Approval of EUR pallet manufacturers

2.1 - Approving RU

In principle, any RU, which is a member of the UIC, has the right to approve a manufacturer for the production of EUR pallets within its area.

The approving UIC RU is entitled to charge a pallet organisation with this task in accordance with Appendix L - page 52.

If Appendix K - page 49 is adhered to, manufacturers outside its area can also be approved. For doing this, the company can also charge a pallet organisation in accordance with Appendix L with this.

In principle, approving a pallet organisation from abroad must be **applied for and approved** by the managing UIC RU.

2.2 - Approval

Approval will only be granted if:

- the technical production conditions have been fulfilled,
- the manufacturer has committed himself in writing to keep to the construction regulations and to accept the conditions with regard to checking and quality control and,
- if it has been proven by checking a sample batch of 100 EUR pallets against a defect collection sheet (see Appendix J - page 43), that the conditions of the leaflet have been adhered to.

Approval shall be given by granting the express authorisation and obligation to use the EUR protected symbol in accordance with Appendix I - page 42, the UIC symbol in accordance with Appendix B - page 14 and the symbol of the UIC RU in accordance with Appendix N - page 54, and by allocating the manufacturer code.

In case of previous withdrawal of approval, approval may only be granted again after a **waiting period of 6 months**.

2.3 - Withdrawal of approval

The approval must be withdrawn in case of:

- **non-compliance** with the conditions of this leaflet,
- unlawful use of the UIC symbol in accordance with Appendix B, of the EUR symbol in accordance with Appendix I, or of the UIC RU symbol in accordance with Appendix N,
- cessation of production or,
- declaration of insolvency or,
- winding up of the company or,
- upon request of the trade mark owner.

The **cancellation of the approval** results in a ban on use and the withdrawal or the destruction of the marking stamp by the UIC RU.

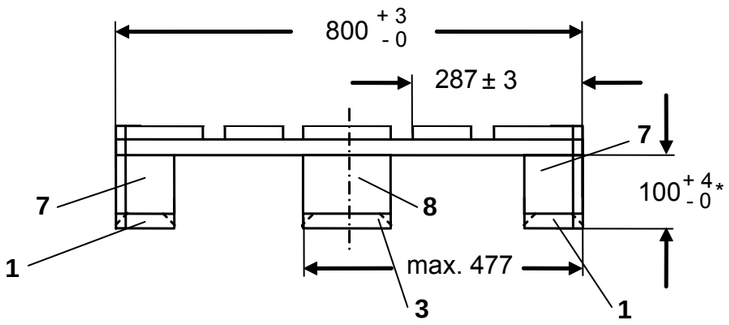
The **cancellation of the approval of foreign companies** must be notified to the managing UIC.

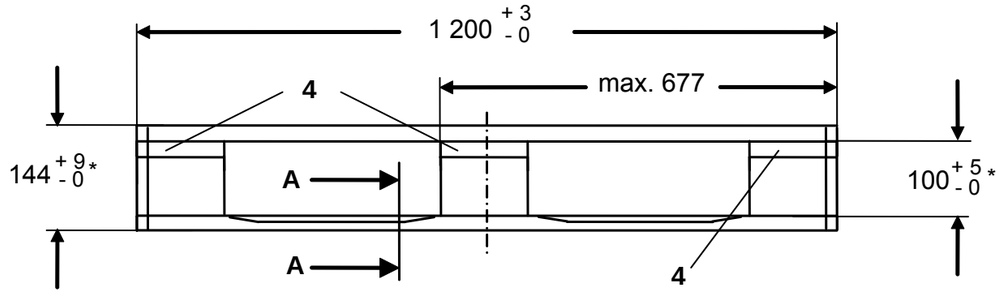
Appendix A - Drawing EUR-1

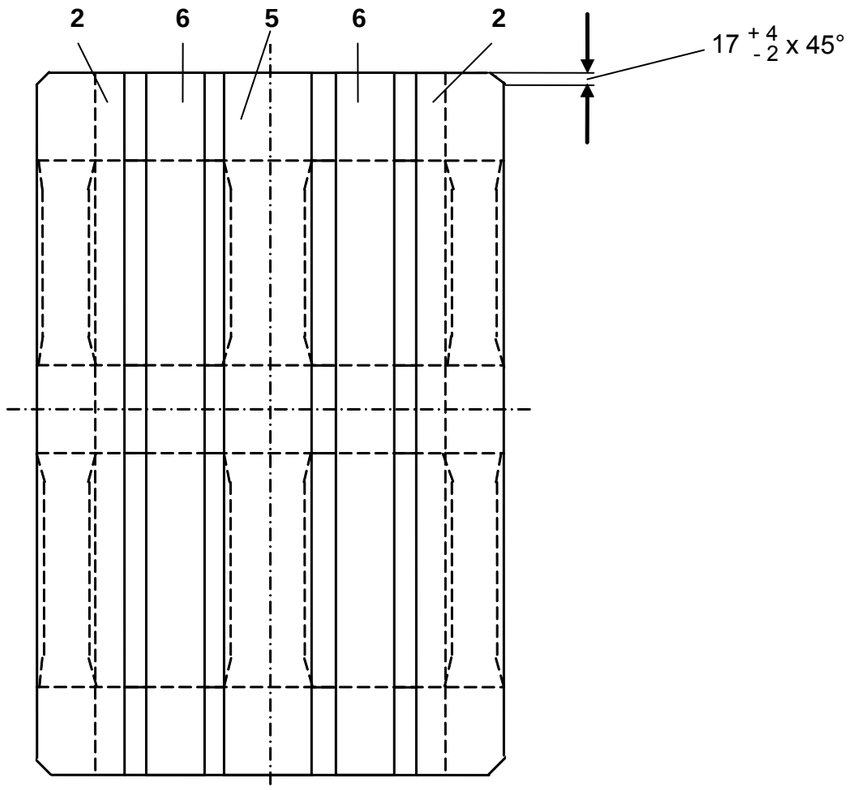
A.1 - Drawing EUR-1

EUR wooden flat pallet 800 mm x 1 200 mm

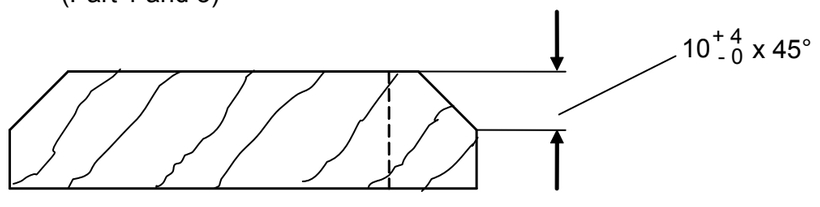
Positioning the fastening elements in accordance with *UIC Leaflet 435-2*. The components must be selected with permissible tolerances so that the pallet covers the base completely!







Cross section **A - A**
(Part 1 and 3)



* Dimensions for

entry height central skid	100^{+4}_{-1}
height of the central skid	100^{+3}_{-1}
pallet height/central skid	144^{+8}_{-1}

Fig. 1 - Drawing EUR-1

A.2 - Parts list EUR-1

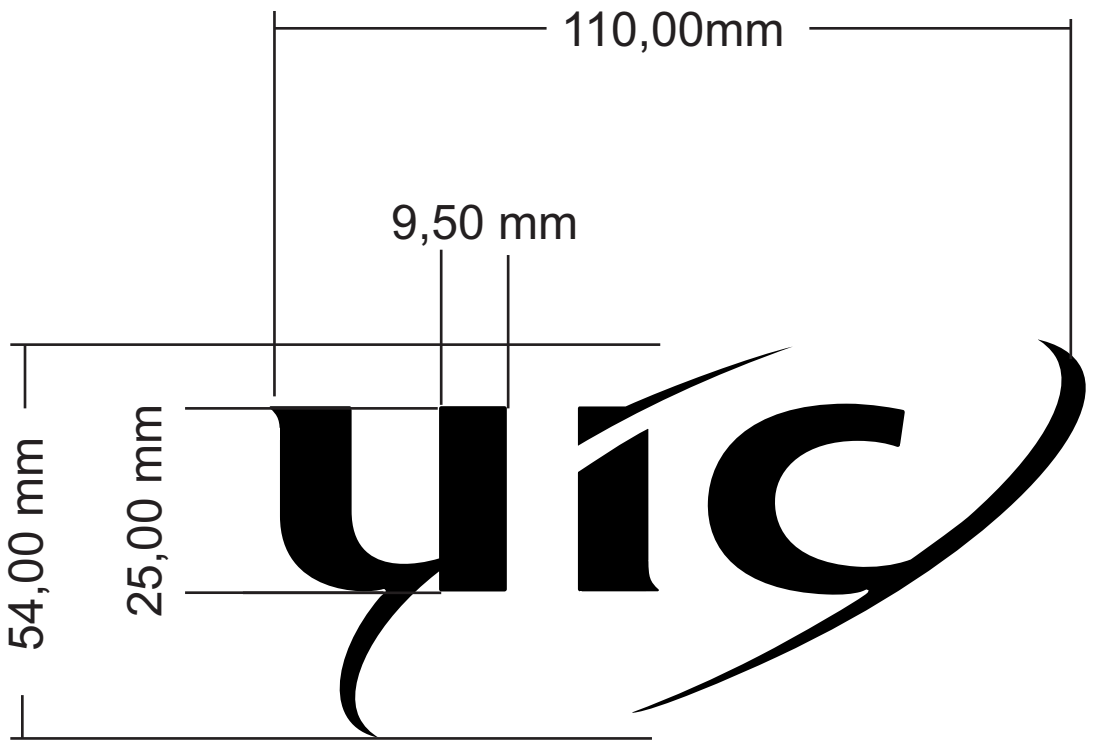
EUR wooden flat pallet 800 mm x 1 200 mm

Part Serial no.	No. of pieces	Parts designation	Nominal dimensions (mm) L / W / H	Tolerances (mm) L	W	H	Material Tensile strength fastening element (N / mm²)	Restriction of the applicaton	Connection of:
1	2	Outer floorboard	1200 x 100 x 22	+3/-0	+3/-3	+2/-0	(see Appendix E - page 33)	(see Appendix E)	
2	2	Outer deckboard	1200 x 145 x 22	+3/-0	+5/-3	+2/-0			
3	1	Centre floorboard	1200 x 145 x 22	+3/-0	+5/-3	+2/-0			
4	3	Stringer board	800 x 145 x 22	+3/-0	+5/-3	+3/-0			
5	1	Inner deckboard	1200 x 145 x 22	+3/-0	+5/-3	+2/-0			
6	2	Inner top deck board	1200 x 100 x 22	+3/-0	+3/-3	+2/-0			
7	6	Block	145 x 100 x 78	+5/-3	+3/-3	+2/-0			
8	3	Block	145 x 145 x 78	+5/-3	+5/-3	+1/-1			
9	27	Angular ring shrank nail***	4,2 x 70	see *UIC Leaflet 435-2*			Pcs. / min. 650	Blocks made of ** coniferous wood, hardwood, formed chipboard	connection 6 x 3 fastening elements part no. 1 with part no. 7
10	27	Anti gap screw nail***	5,2 x 70				Pcs. / min. 650	Blocks made of hardwood	connection 3 x 3 fastening elements part no. 3 with part no. 8
11	24	Angular ring shrank nail***	4,2 x 38	see *UIC Leaflet 435-2*			Pcs. / min. 600	Stringer board made of hardwood	connection 6 x 3 fastening elements Part no. 6 with part no. 4 and connection 6 x 1 fastening elements part no. 2 with part no. 4
12	24	Anchor nail */***	2,8 x 56				Pcs. / min. 800	Fix rivet bar	
13	24	Machine nail***	2,5 x 60				Pcs. / min. 800	Movable rivet bar	
14	24	Clamp***	2,2 x 14 x 53				Pcs. / min. 760		
15	27	Angular ring shrank nail***	4,2 x 90	see *UIC Leaflet 435-2*			Pcs. / min.700	Blocks made of ** coniferous wood, hardwood and formed	connection 6 x 3 fastening elements Part no.2 with part no. 4 and part no. 7 connection 3 x 3 fastening elements Part no. 5 with part no. 4 and part no. 8
16	27	Anti gap screw nail***	5,2 x 90				Pcs. / min. 700	Blocks made of hard wood	

* Angular ring shrank nail with cut head.
** NH = coniferous wood / LH = hardwood / FSPH = Formed chipboard.
***Other fastening elements example (see Appendix E).

The total number (78 pieces) of nails to be used per pallet has to be specified depending on the manufacturer in accordance with the lines of the running numbers 9 to 16 of the column "number of pieces".
Example: 27 nails (Serial no. 9) + 24 nails (Serial no. 11) + 27 nails (Serial no. 15) = 78 nails (total number).

Appendix B - UIC symbol



The UIC symbols are registered at the Office for Harmonisation in the Internal Market (OHIM - see List of abbreviations - page 58) in Alicante under numbers 7007495, 011388196 and 011647534 for classes 6, 20, 39 and 42.

Appendix C - Permissible blocks made of wood-chip material (moulded wood-chip blocks)

C.1 - General

Only glues and additives which can permanently guarantee the strength of the material may be used as bonding agents. If glues/additives can cause a hazard when used or disposed of, this **must** be indicated by the glue/additive manufacturer on a data sheet.

The blocks must not be coated or sealed in any manner. Documentary evidence of the glue currently used in the most recent batch must be provided both on initial approval and for every repeat approval.

Hollow spaces caused by production (extrusion process) are permissible up to the maximum size given in the drawing (see point C.11 - page 31), and must be positioned centrally (± 5 mm from the block's centre line). Authorised blocks are to be given a manufacturer-specific marking (manufacturer/ month/year, in the same way as for the pallet). This manufacturer-specific marking is to be applied to the side of the block such that the blocks' origin can be immediately ascertained when installed. The blocks may not therefore be marked on the vertical-facing surfaces (see point C.11).

C.2 - Initial approval

The block manufacturer applies to UIC for approval for each block type and production plant.

The sampling of the block batch must be carried out directly on-site during ongoing production by a UIC-approved inspection body as per the terms of point C.6 - page 22. The sampling shall take place in accordance with point C.8 - page 28. The inspection body is responsible for the sampling, the tests to be performed in accordance with this appendix, and verification of the manufacturer's self-monitoring (inspection as per point C.10 - page 30). For approval tests, the date of sampling may be agreed between the block manufacturer and the inspection body.

Exception:

- The inspection body approved as per the terms of point C.6 may commission a suitably-qualified outside testing body to perform either the heavy metal analysis or the formaldehyde test.

After sampling, the block batch must be stored for at least 10 days at 20 °C (± 2 °C) and an air humidity of 65 % (± 5 %).

Deviations from the European testing standards mentioned below are only permitted in the ways described.

Exception:

- Deviations from the test standard are authorised during the chemical heavy metal analysis to the extent that the material being tested demands such deviations.

C.2.1 - Boiling test

At least 5 blocks per block size are to be tested.

After carrying out the following test, the material bond must be maintained and the surfaces must not be cracked through; chippings must not come loose spontaneously. For example, if the material bond for one or more blocks has disintegrated during the boiling process, the block size in question is considered to have failed this test.

- storage of 2 hours in water (at 100 °C) at ambient pressure and
- drying of 2 hours at 65 °C (± 3 °C).

C.2.2 - Density test

Number of blocks for density and swelling test:

At least 10 blocks per block size are to be tested.

Each block must show a raw density of 600 kg/m^3 up to max. 750 kg/m^3.

The test must be carried out in accordance with *EN 323* (see Bibliography - page 60).

Permitted deviations from standardised procedures:

- (determination of raw density in accordance with *EN 323*)

4.3 "Weighing scales":

- Determine mass of block to an accuracy of 0,1 g.

5.2 "Dimensions":

- Test raw density on whole wood-chip block.

6.1 "Weighing":

- Weigh to an accuracy of 0,1 g.

6.2 "Determination of dimensions":

- The principal dimensions used in the sample (length, width, height) and their diagonals shall be measured to an accuracy of 0,01 mm. For samples with hollow spaces caused by production, the diameter of the hollow space and its position shall also be measured to determine any eccentricity (± 5 mm from block centre line)
  Indicate raw density precise to 1 kg/m³.

General:

- This test is simultaneously to ascertain whether or not the permitted UIC limit dimensions are complied with. If not, this must be indicated in the test report.
- The lower permitted limit value is 600 kg/m³.

- The block size in question shall be considered to have failed the density test even if only one value in a test batch underruns the lower limit of 600 kg/m³, or exceeds the upper limit of 750 kg/m^3.

C.2.3 - Swelling test

The blocks tested are those which have already undergone the density test. The blocks are to be positioned with the cut surfaces/pressure-bearing surfaces pointing upwards towards the surface of the water. The blocks must be immersed throughout the swelling test. After 24 hours immersed in water at 20 °C, the swelling measured on 10 test specimens per block size may measure up to 2 % in length and width. None of the blocks may exceed the maximum height values given in the following table during the swelling test. If one does, the block size in question is considered to have failed the swelling test.

Block type	**Maximum height of tested product after swelling (in mm)**
Dimensions (in mm)	
160 x 95 x 95	100
95 x 95 x 95	100
145 x 145 x 78	83
145 x 100 x 78	83
78 x 78 x 78	83

The test shall take place in accordance with *EN 317* (see Bibliography - page 60).

Deviations from the standardised procedure described in *EN 317*:

4.1 "Micrometer":

- Measurement shall take place using linear measuring sensors with the relevant accuracy.

4.2 "Water bath":

- The water bath to be used for the immersion in water shall be thermostatically controlled.

5.2 "Dimensions":

- The thickness swelling shall be verified across the whole of the wood-chip block, albeit at various locations thereon and in three axial directions as per the measuring points described in point C.7 - page 22.

6.2 "Immersion":

- The water temperature shall be 20 °C ± 2 °C throughout the duration of testing. The immersion shall last for 24 hours.

7.2 "Expression of results - for a board":

- The swelling in thickness of a wood-chip block is the arithmetic mean of all the results for all the measuring points on each block, for each axial direction.

C.2.4 - Transverse tensile strength test *(EN 1087-1)*

Block type	Number of blocks/test specimens
Dimensions (in mm)	
160 x 95 x 95	5/10
95 x 95 x 95	5/10
145 x 145 x 78	5/10
145 x 100 x 78	5/10
78 x 78 x 78	10/10

The test shall be performed in accordance with *EN 1087-1* (see Bibliography - page 60). Any deviations (e.g. batch arrangement) are to be documented.

For the transverse tensile test, the blanks of which the samples used for the test are made must be separated from the respective blocks so that during the test the tensile force acts transversely to the direction of pressure. The mean of the transverse tensile strength values determined for each block size and 80 % of all the individual transverse tensile values for each block size must achieve a value of at least 0,25 N/mm². The block size in question shall be considered to have failed this test if any one of these criteria is not met.

For elementary diagrams and an idea of the batch arrangement for the transverse tensile test (see point C.7 - page 22).

Further deviations from the standardised procedure described in *EN 1087-1*:

- determination of the transverse tensile strength after boiling as per *EN 1087-1*

Addition to 5.3 "Climate control":

- The test specimens used to determine the transverse tensile strength are to be prepared from batches which have been stored for at least 10 days at 20 °C ± 2 °C and air humidity of 65 % ± 5 % prior to testing.

C.2.5 - Nail removal test

Block type	Number of blocks
Dimensions (in mm)	
160 x 95 x 95	10
95 x 95 x 95	10
145 x 145 x 78	10
145 x 100 x 78	10
78 x 78 x 78	10

Only one nail, measuring minimum 68 mm in length in accordance with Appendix E - page 33 and manufactured by an approved manufacturer of securing parts, may be used for the test specimens. Should the approval of the relevant nail type have expired in the meantime, nails of this type can (with UIC authorisation) continue to be used for testing purposes only, until any stocks of them held by the UIC-approved testing body have been used up.

The mean nail removal force determined for each block size and for 80 % of all the individual nail removal forces must achieve a value of 5,5 kN minimum. The block size in question shall be considered to have failed this test if any one of these criteria is not met. The requisite test specimens are to be manufactured by the testing body (see point E.4 - page 38), in accordance with point 1.3.2 - page 2 (Construction process) of this leaflet.

In addition, only the bond between the block and the floorboard in accordance with Appendix H - page 41 may be tested. Floorboards made of wear-resistant hardwoods (oak / beech / red ironwood) are permitted. Pre-drilling of nail holes in hardwood boards for repeated use is permitted.

The speed at which the force is to be applied is approx. 10 mm per minute.

For blocks for EUR-2-pallets measuring 160 x 95 x 95 mm, it is permitted to shorten the 160 mm to a more suitable length if the test machine's tensioning device is not designed for lengths of 160 mm.

C.2.6 - Heavy metal analysis

Block type	Number of blocks
Dimensions (in mm)	
160 x 95 x 95	4
95 x 95 x 95	5
145 x 145 x 78	4
145 x 100 x 78	5
78 x 78 x 78	10

Directive 94/62/EC (see Bibliography - page 60) is to be taken as a basis. The wood-chip material for each block size is to be analysed for the presence of the heavy metals cadmium, lead, mercury and chromium. The procedure adopted is to be based on that of *EN ISO 11885* (see Bibliography - page 60).

The total heavy metal content for each block size may not exceed a value of 100 ppm. If one block type exceeds the total limit, this block type shall be considered to have failed this test.

C.2.7 - Formaldehyde test

Block type	Number of test specimens
Dimensions (in mm)	
160 x 95 x 95	4
95 x 95 x 95	5,5 (one block to be halved and the cut surface to be sealed (e.g. with self-adhesive aluminium sheet))
145 x 145 x 78	3,5 (one block to be halved and the cut surface to be sealed (e.g. with self-adhesive aluminium sheet))
145 x 100 x 78	4,5 (one block to be halved and the cut surface to be sealed (e.g. with self-adhesive aluminium sheet))
78 x 78 x 78	8

The test procedure to be applied is the test chamber method as per *EN 717 - Part 1* (see Bibliography - page 60).

Deviations from the standard procedure as per *EN 717 - Part 1*:

- A loading value of approx. 0,3 m²/m³ is to be applied.

The formaldehyde emission must not exceed 0,1 ppm or 0,124 mg/m³. If one block type exceeds the emission limit, this block type shall be considered to have failed this test.

C.2.8 - Granting of approval

The results of the test are to be included in a test report giving the following information:

- Place of production, designation and dimensions of the block, results of the boiling, density, swelling, transverse tensile, nail removal, heavy metal and formaldehyde tests (the last two can be shown separately).
  The testing body shall report directly to the block manufacturer, which shall then immediately inform UIC of the test results in writing.

Only if all the requirements of points C.2.1 - page 16 to C.2.7 - page 20 have been fulfilled and a report prepared in accordance with point C.2.8 - page 20 can UIC grant approval for the block.

Approved blocks are to be given a manufacturer-specific marking.

C.3 - Repeat test

The repeat test must be carried out quarterly by analogy to points C.2.1 - page 16 to C.2.6 - page 19.

The block batch samples as per point C.8 - page 28 must be taken from regular production, directly on-site and without prior notification, by the quality inspection body approved by UIC in line with point C.6.

The quality inspection body shall perform the sampling within a quarter such that all the tests can be concluded within this same quarter. In exceptional cases, testing may exceed the quarter. If a block manufacturer only allows a sample to be taken towards the end of a quarter and as a consequence the tests cannot be concluded within the same quarter, UIC is to be informed of this by the quality inspection body.

Alongside the sampling, there shall also be an inspection of the manufacturer's day-to-day self-monitoring (inspection as per point C.10 - page 30).

The quality inspection body shall report directly to the block manufacturer, which for its part shall then immediately inform UIC of the test results in writing. If the test results are negative, the tests failed are to be repeated. The manufacturer shall commission the same inspection body to perform the repeat tests. The inspection body shall send someone to take the sample unannounced within the same quarter in order to take the requisite number of blocks from regular production. Due to the 10-day storage period, it is permitted for the repeat tests to be conducted using blocks from one quarter and concluded during the following quarter. Following conclusion of the repeat tests, the quality inspection body shall report directly to the block manufacturer, which for its part shall then immediately inform UIC of the test results in writing.

Point C.2.7 - page 20 is to be repeated once a year and as an exception may be used for the initial approval, using the extraction procedure (perforator method) (*EN 120* - see bibliography - page 60). For the formaldehyde content test, a perforator value of 7,5 mg HCHO/100 g ATRO mass must not be exceeded.

The manufacturer shall inform UIC unbidden of any change to the production procedure or material composition, in particular the glue used.

C.4 - Withdrawal of approval

The approval must be withdrawn in case of:

- **non-adherence** to the aforementioned conditions of this leaflet,
- cessation of production for more than 12 months or,
- declaration of insolvency or,
- winding-up of the company or,
- upon the trade mark owner’s request.

C.5 - Marking

The trademarks mandatory on EUR pallets may not be used without the authorisation of UIC.

C.6 - Approved test bodies

A test body is a body:

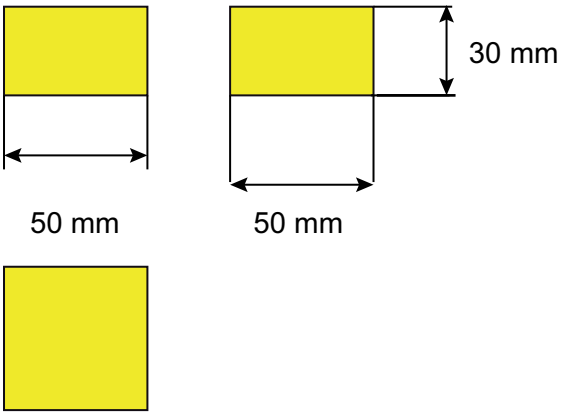
- to which UIC can entrust the task of testing wood-chip blocks and which possesses an authority acknowledged by the UIC WG in the field of wood-chip block testing.

A list of approved test bodies can be downloaded from the UIC website at:
http://www.uic.org/Activities/Topics/Freight/Leaflets.

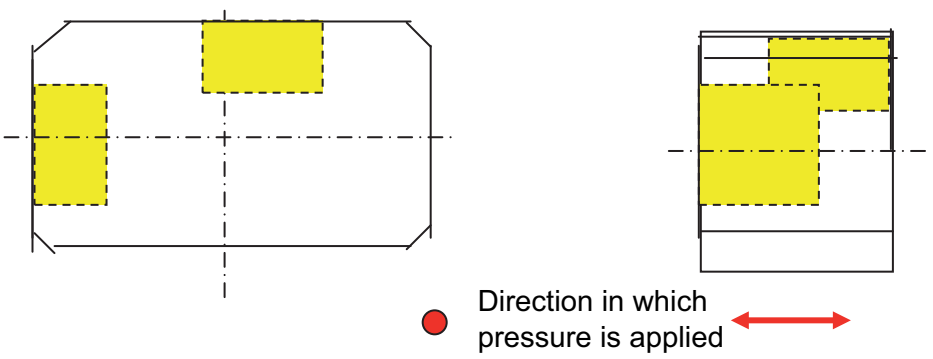
C.7 - Production of test specimens for the transverse tensile test

The position of the test specimens in the blocks is to be taken from the drawings hereafter:

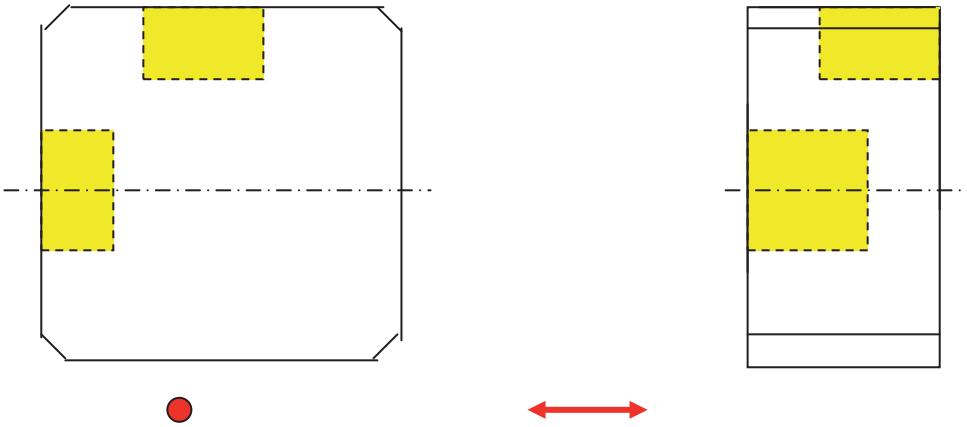
Test specimens:



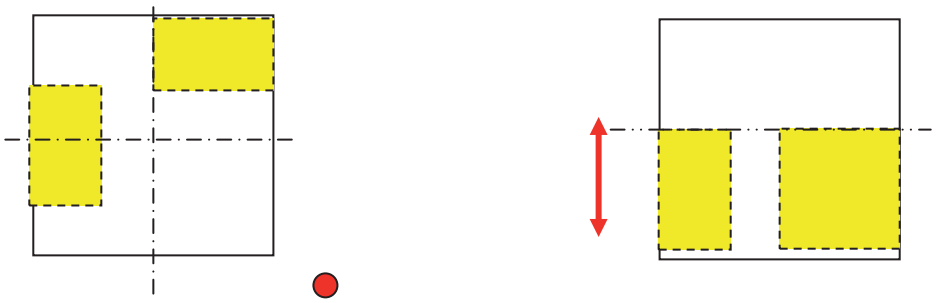
Block size 145 x 100 x 78 mm



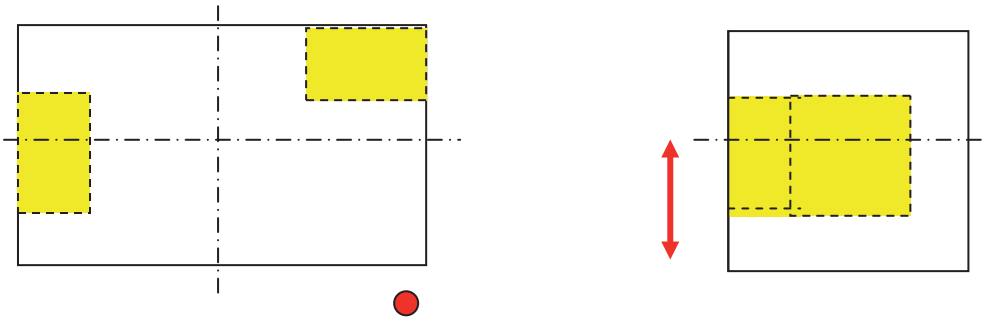
Block size 145 x 145 x 78 mm



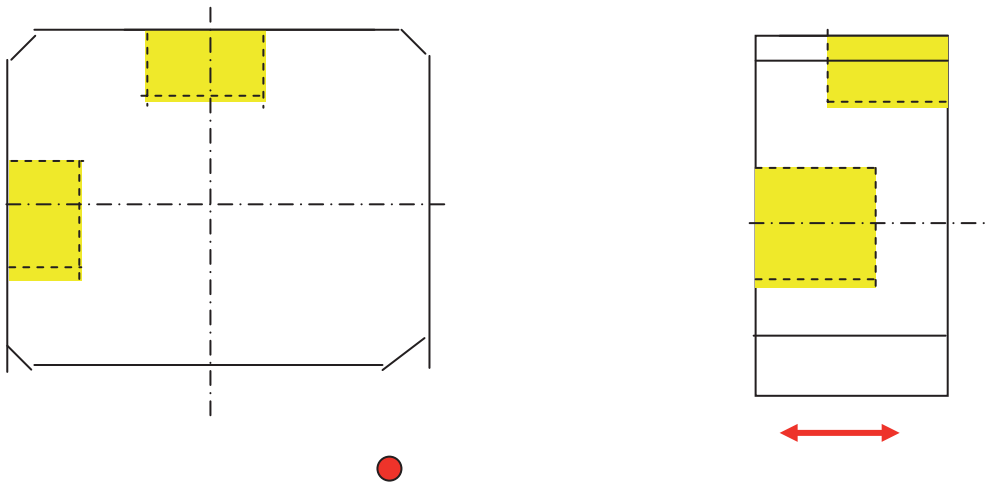
Block size 95 x 95 x 95 mm



Block size 160 x 95 x 95 mm

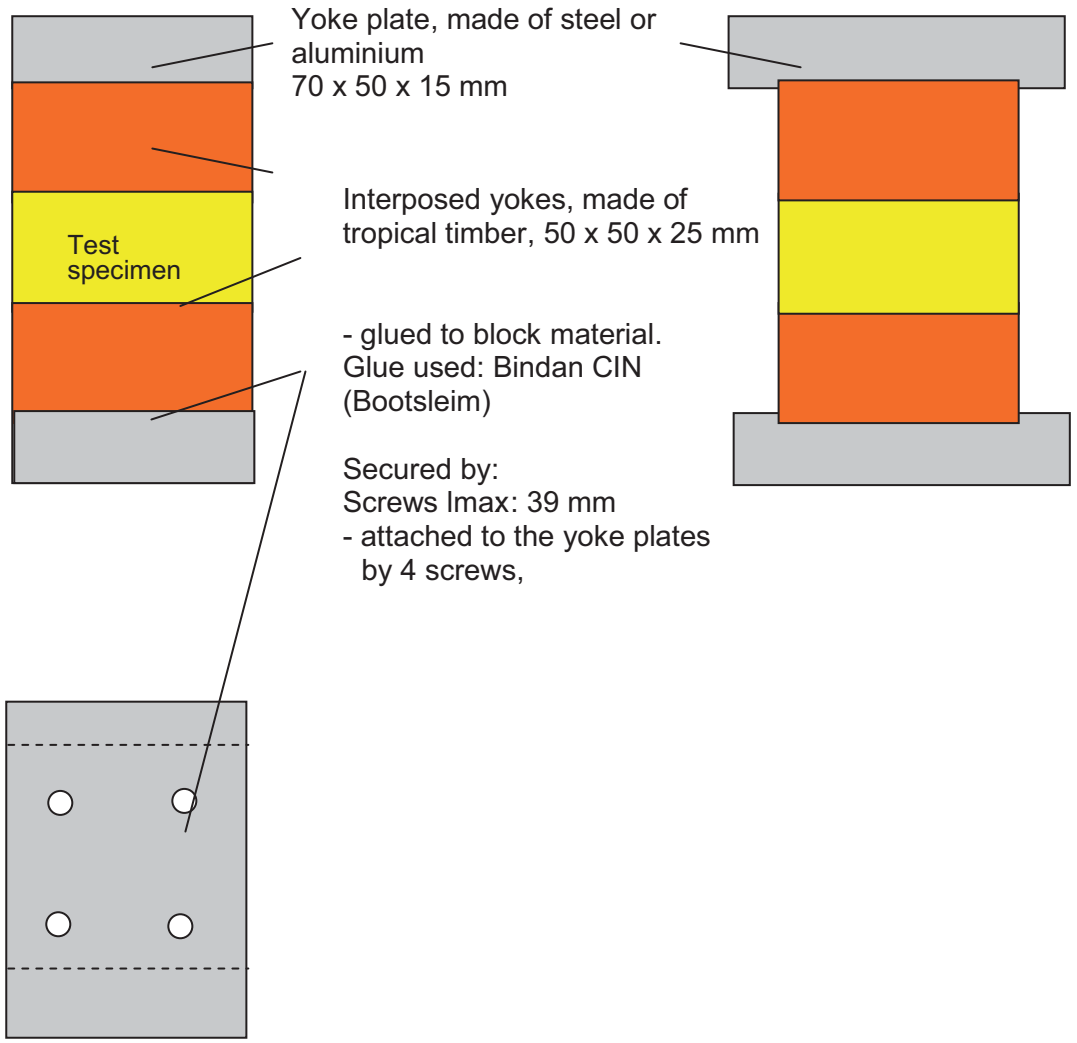


Block size 145 x 145 x 78 mm



Block size 78 x 78 x 78 mm

Schematic example of arrangements for a tensile test:

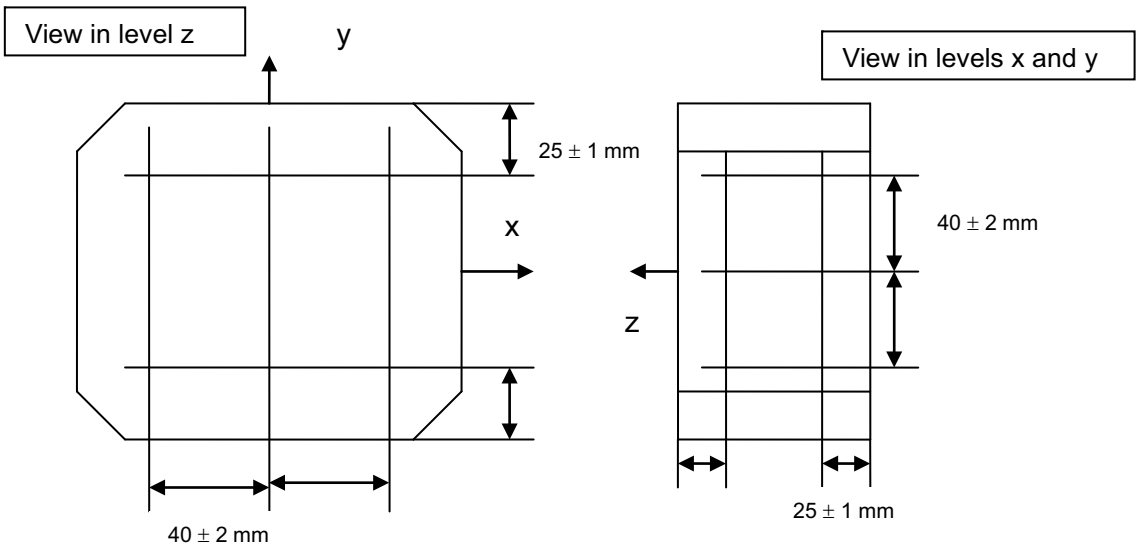


For the test:

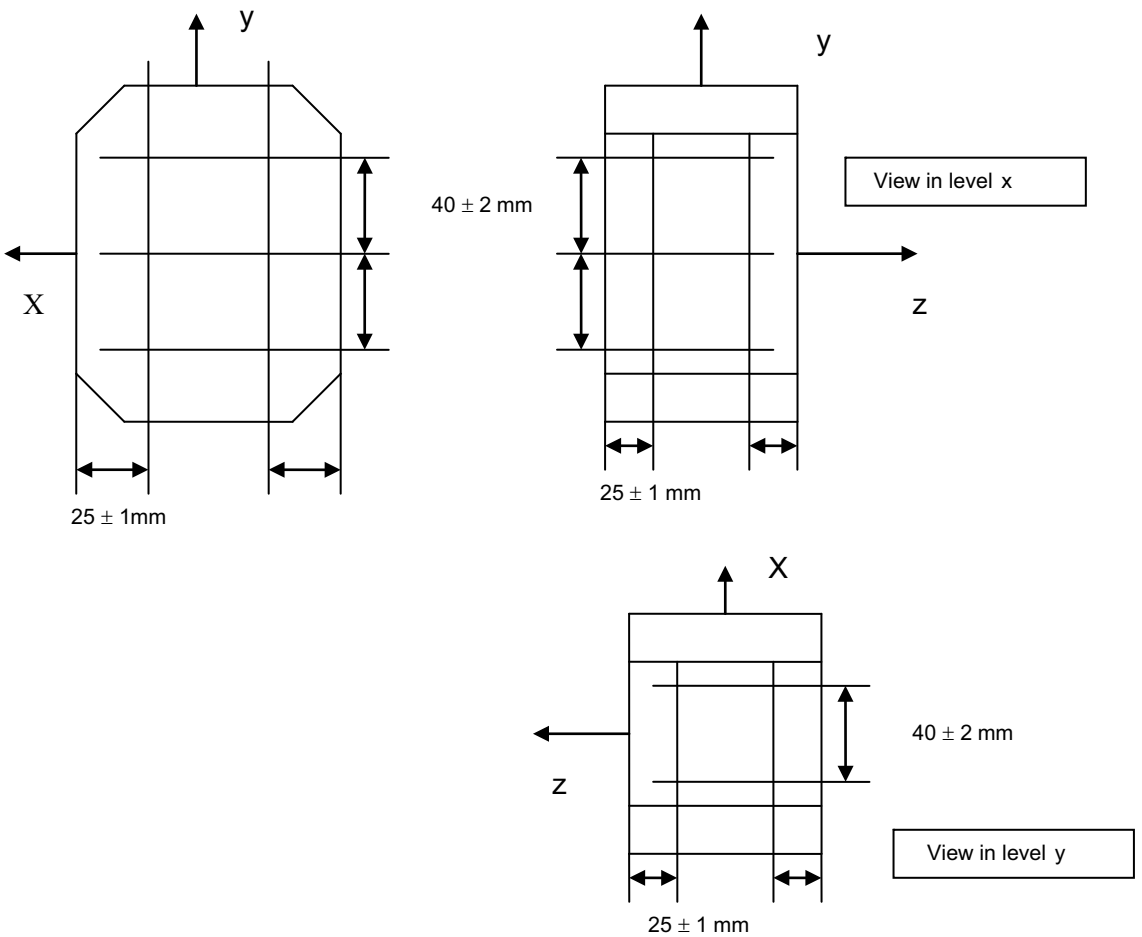
The samples are to be boiled for 2 hours, then cooled in a water bath at room temperature for at least 1 hour. After cooling-off, the tensile test is to take place immediately while the samples are still wet. To avoid lateral forces, the traction device is to be gimbal-mounted on both sides. The speed at which the force is to be applied shall be approx. 10 mm per minute.

Measuring points for swelling test (z direction = direction in which pressure applied)

Block size 145 x 145 x 78 [mm]

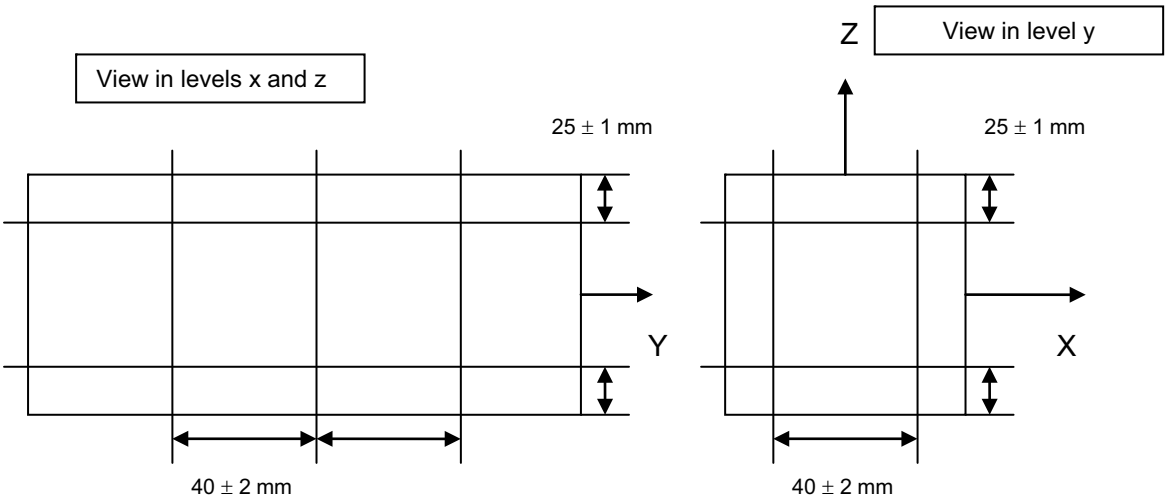


Block size 145 x 100 x 78 [mm]

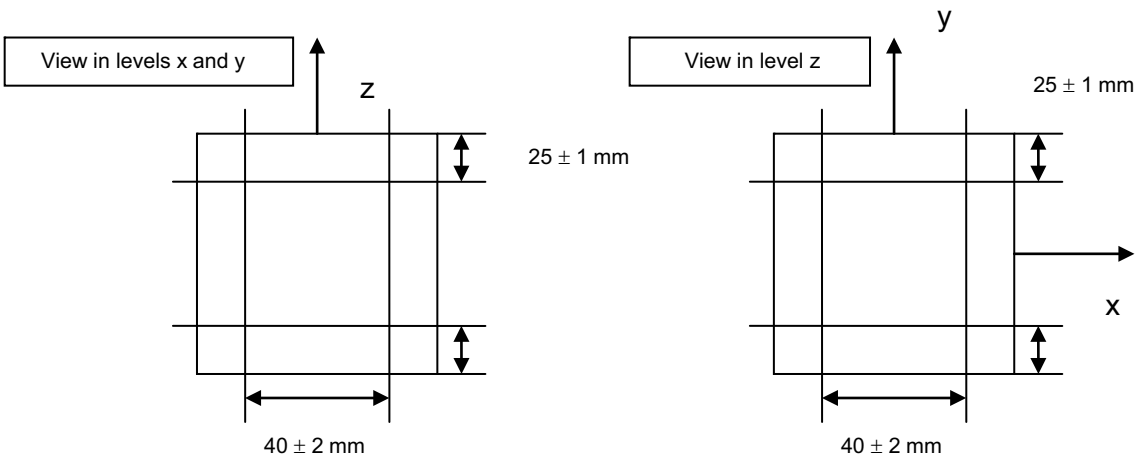


Measuring points for swelling test (z direction = direction in which pressure applied)

Block size 160 x 95 x 95 [mm]

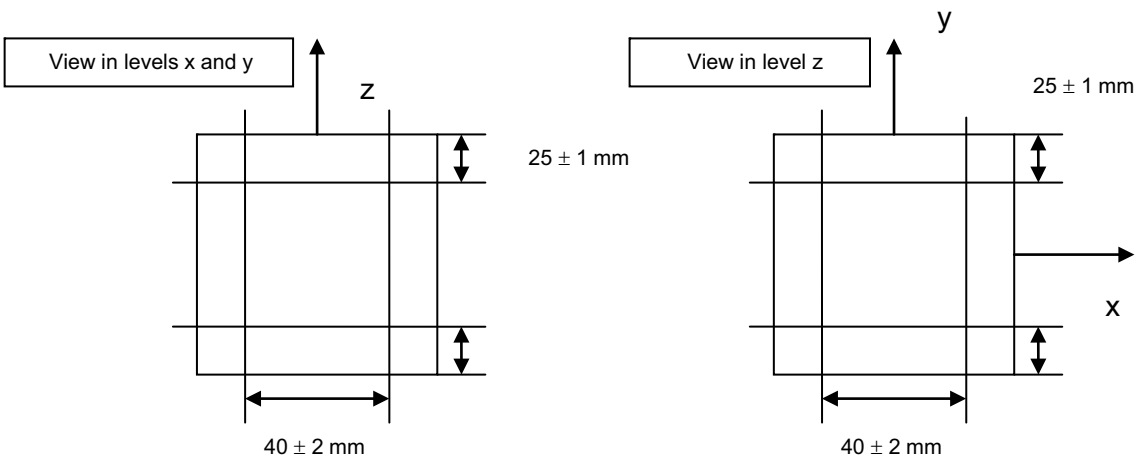


Block size 95 x 95 x 95 [mm]



Measuring points for swelling test (z direction = direction in which pressure applied)

Block size 78 x 78 x 78 [mm]



C.8 - Taking samples of wood-chip blocks

The test body shall provide the sample-taker. The wood-chip blocks are to be taken from regular production by the sample-taker. Where there are several production lines, the sample must take blocks from all the lines/presses (for each block type).

The sample-taker shall give each block sample the prescribed unique marking numbers and a continuous numbering. The marking must be made such that it remains permanently visible using a percussion hammer or waterproof paint.

In cases where the manufacturer has to send the full sample to the test body, the sample-taker shall additionally mark each block taken for the sample using his/her own percussion hammer or waterproof paint.

Samples taken for approval tests may be announced in advance. Samples taken for quarterly repeat tests are not to be announced in advance. It is critical that samples be taken from regular production. Samples must not be taken from stored blocks.

The sampling is to be documented in writing (for an example see point C.9 - page 29).

C.9 - Example of pre-printed sampling documentation

Sampling of wood-chip blocks for EUR flat wooden pallets: Date:

Wood-chip blocks sampled from company:

Factory:
Address:
Postcode:
Person responsible:

Sample-taker:
Test series: (e.g. 1st quarter 2013)

Number of samples (dimensions):

Marking/unique marking number:
(for each sample!)

Continuous numbering:

Percussion hammer mark:

Samples dispatched:

- Transported to test body by sample-taker
- Sent to test body by manufacturer

Test body:
Address:
Postcode:

Place and date sample taken:

Manufacturer's signature:

Sample-taker's signature:

A copy of the sampling documentation was given to the manufacturer.

C.10 - Verification of self-monitoring by wood-chip block manufacturer (inspection)

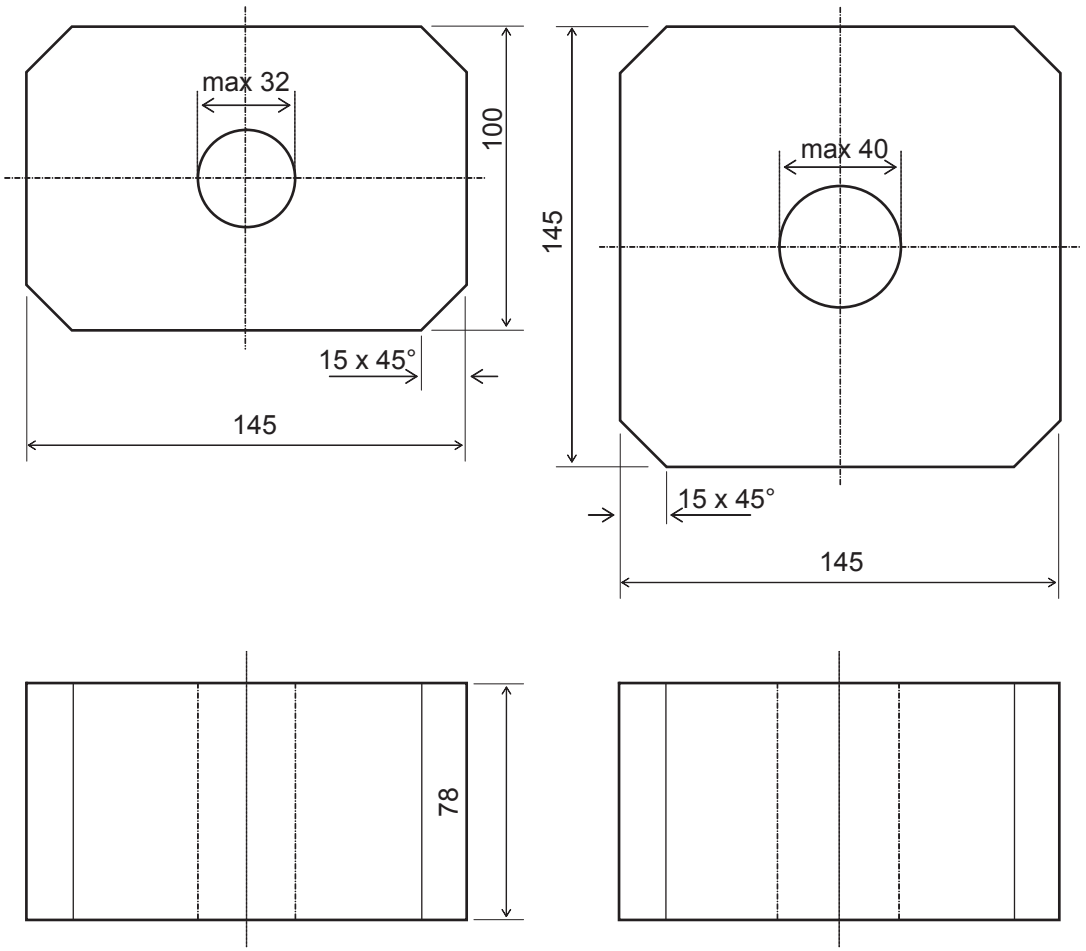
Every time samples are taken for the repeat tests, the sample-taker shall also inspect the manufacturer's own self-monitoring. To this end, the manufacturer's monitoring documents will need to be viewed. The manufacturer must verify daily the dimensions and density of at least 10 blocks from each system/assembly line producing EUR blocks, and the swelling of another 10 for each gluing system. In addition, for each system/assembly line producing EUR blocks, 5 blocks of each size produced shall be subject to a weekly boiling test.

If continuous self-monitoring is temporarily impossible, e.g. due to production down-time, the reasons are to be justified to the sample-taker.

The sample-taker is also to check whether the blocks produced bear a manufacturer-specific marking. If they do not, UIC is to be informed immediately.

If the aforementioned rules are not adhered to, or if there are unjustified irregularities, the test body is to inform UIC immediately.

C.11 - Drawing of blocks made of wood-chip material (moulded wood-chip block)



Material: Wood material with a density of at least 600 kg/m^3 to maximum 750 kg/m^3

Tolerances for block size 145 x 145 x 78 mm: 145^{+5}_{-3} mm; 78 ± 1 mm

Tolerances for block size 145 x 100 x 78 mm: 145^{+5}_{-3} mm; $100 \pm$;78^{+2}_{-0} mm

The manufacturer-specific marking is not permitted on the cut surfaces or the pressure-bearing surfaces pointing upwards. For blocks of size 145 x 100 x 78 [mm] (EUR-1) and 160 x 95 x 95 (EUR-2), such markings are only permitted on one of the narrow sides (EUR-1:100 x 78 [mm], EUR-2: 95 x 95 [mm])

Appendix D - Permissible wood types and wood materials

D.1 - Wood types

Coniferous wood[a]	Deciduous wood	
	Softwood	**Hard wood**
Fir	Alder	Oak
Spruce	Birch	Ash
Pine	Poplar [1]	Beech
Larch	Aspen [a]	Elm
Hemlock fir		Acacia
		Maple
		Plane
		Horse Chestnut

1. Not permissible for part 4 (stringer board).

The pallet manufacturer may use other wood types only if he can prove that these wood types have at least the same mechanical properties as the above-mentioned wood types and if these have been **applied for with and approved** by the managing UIC RU.

D.2 - Wood materials

Wood-chip materials are only permissible for blocks.

Appendix E - Permissible fasteners

E.1 - Initial approval

The manufacturer of the fasteners applies to UIC for approval of each fastener and place of production.

The manufacturer of the fasteners provides a UIC-approved test body (as per point E.2 - page 35) with samples (10 specimens for each type of fastener), drawings thereof, and a test certificate proving the wire's tensile strength.

By way of pre-testing, the approved test body checks that the 10 sample fasteners and the drawings thereof are UIC-compliant and, if the manufacturer has not provided a test certificate proving the wire's tensile strength, either carries out wire tensile tests in accordance with *EN 10002-1* (see Bibliography - page 60) or commissions them. The head diameter, maximum shaft diameter and length of the fastenings are to be measured. Proof of the results is to be given in a separate report which documents the pre-testing.

For any deviations from the test standards mentioned hereafter, an application is to be submitted to UIC, which must authorise any such deviations.

If the manufacture of already-approved fasteners is relocated to a different site, UIC shall be informed of this by the manufacturer. In such cases, UIC may require that the initial approval tests be repeated for the fastenings concerned.

E.1.1 - Extraction test/main test

If all the minimum UIC requirements as per point E.3 - page 36 are met, the manufacturer of the fastener shall provide the approved test body with approx. 100 samples of each type of fastener and samples of wire of the required final diameter (5 of each type of fastener of approx. 30 cm in length) from regular production. The test body approved in accordance with point E.2 shall then produce 20 test specimens for each type of fastener in accordance with Appendix H, using the sample fasteners provided. The test specimens are to be using extruded pressboard blocks produced by approved manufacturers (dimensions 145 x 145 x 78 [mm]). The blocks may not contain any matured timber. The wood-chip blocks are to be stored at 20 °C (± 2°) and an air humidity of 65 % (± 5 %). The block density must be between 620 and 650 kg/m^3. The density values shall form part of the associated report.

For test specimens with a block-floorboard bond, floorboards made of wear-resistant hardwoods (oak / beech / red ironwood) are permitted for testing purposes.

For test specimens with a block-stringer board-deck board bond, deck boards made of wear-resistant hardwoods (oak / beech / red ironwood) are permitted for testing purposes.

Pre-drilling of nail holes in the aforementioned hardwood boards for repeated use is permitted.

For test specimens with a stringer board-deck board bond, the stringer boards must be made of spruce.

The boards used with the test specimens may not exceed a residual moisture content of 20 ± 2 %.

It is to be ensured that fasteners are inserted into the test specimens vertically and in accordance with the prescribed UIC nail pattern (see point 1.3.2 - page 2 - Construction procedure) using appropriate equipment as per point E.4 - page 38.

The extraction force values are to be determined in accordance with Appendix G - page 40. In this context, the extraction values given in the appendix are to be achieved as a minimum. The speed at which the force is to be applied is approx. 10 mm per minute.

E.1.2 - Bending test/main test

The bending test as per *EN/ISO 12777-1* (see Bibliography - page 60) is to determine 10 bending moment values with the wire samples of the required final diameter.

E.1.3 - Granting of approval

The test results must be included in a test report, which must contain the following information:

- the designation and the dimensions of the shaft/milling (pre-test and main test reports),
- whether the minimum requirements as per point E.3 - page 36 are fulfilled, (main test report)
- whether the wood's moisture content is UIC-compliant (main test report),
- the individual values of the extraction forces measured per test specimen (main test report),
- the average values of the extraction forces (without minimum/maximum values) (main test report),
- the results of the bending test (main test report),
- whether the wire's tensile strength is UIC-compliant (pre-test report).

UIC can only grant approval for the fasteners and, if relevant, prescribe a head marking for the approved fastener if all the requirements of points E.1 - page 33 to E.1.2 - page 34 are met and if the reports are provided as per point E.1.3.

The test body shall report directly to the fastener manufacturer, which for its part shall inform UIC immediately of the test results.

E.1.4 - Repeat tests

The repeat tests are to be conducted in the same way as for points E.1 to E.1.2, at the latest 12 months after the granting of initial approval or 12 months after the preceding set of repeat tests. For the main test, 8 test specimens per fastener type are to be produced as per Appendix H - page 41. Pre-testing is to be conducted on the same scale as for the initial approval tests.

The specimen fastener samples (50 per fastener type), and the wire samples of the required final diameter (5 of each type of fastener of approx. 30 cm in length) are to be taken from regular production directly in-situ by a UIC-approved test body.

The result of the bending test may deviate from the mean results achieved in initial testing by maximum 10 %. If no report on the initial tests is available for the test body to consult, the bending moment values recorded during the first set of repeat tests shall be considered the basis for future repeat tests.

The test body shall report directly to the fastener manufacturer, which for its part shall inform UIC immediately of the test results.

If the test results are negative, the necessary repeat tests must be conducted by the test body and the manufacturer of the fasteners within 8 weeks of the test results being announced by the test body. The manufacturer must commission the same test body to perform these repeat tests. The 8-week deadline shall be counted from the date of issue of the main test report.

No retrospective modification of the nominal dimensions of approved fasteners is permitted.

E.1.5 - Withdrawal of approval

Approval shall be withdrawn if:

- The aforementioned conditions are not met,
- Production ceases for more than 12 months,
- The manufacturer declares insolvency,
- The company is wound up,
- The trade mark owner requests it.

E.1.6 - Ongoing verifications

Compliance with the shaft design/creasing/thread (e.g. sharp edges) and the planned usage for the wood type must be checked during quality control inspections in accordance with Appendix J - page 43 and any deviation recorded under "Non-permissible fasteners".

In case of deviations, and if UIC considers it necessary, the tests must be repeated in accordance with points E.1 - page 33 to E.2 - page 35.

E.2 - Approved test bodies

A test body is a body:

- to which UIC can entrust the task of testing fasteners and which possesses an authority acknowledged by the UIC WG in the field of fastener testing.

A list of approved test bodies can be downloaded from the UIC website at:
http:// www.uic.org/Activities/Topics/Freight/Leaflets

E.3 - Minimum requirements for EUR pallet fasteners

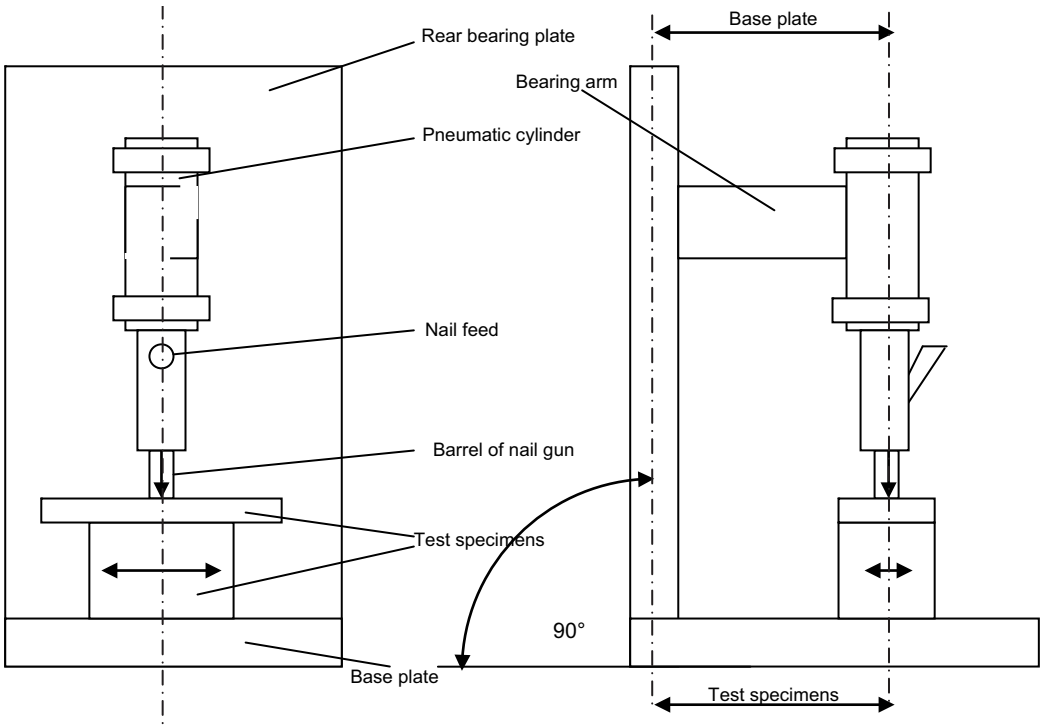
	Dimensions / designs	EUR 1, 2, 3, 6
Bonds	**Block, stringer board, deck board**	
	Length min. (mm)	88
	Head size min. (mm)(mm²)	8,4/55
	Ratio head to shaft Ø	≥ 2:1
	Shaft design**	A, B, C
	Tensile strength**** min. (N/mm²)	700
	Point design***	E, F
Bonds	**Block / floorboard**	
	Length min.* (mm)	68
	Head size min. (mm)(mm²)	8,4/55
	Ratio head to shaft Ø	≥ 2:1
	Shaft design **	A, B, C
	Tensile strength **** min. (N/mm²)	650
	Point design ***	E, F
Bonds	**Stringer board / deck board**	
	Fasteners which are clinched on the underside of the stringer boards	
(1)	Length min. (mm)	53
	Head size min. (mm)(mm²)	5,5/24
	Ratio head to shaft Ø	≥ 2:1
	Shaft design **	A, B, C, D
	Tensile strength **** min. (N/mm²)	800
	Point design ***	E, G
	Fasteners which do not protrude through the stringer board (preferably if stringer board is made of hardwood)	
(2)	Length min./max. (mm)	36/41
	Head size min. (mm)(mm²)	5,5/24
	Ratio head to shaft Ø	≥ 2:1
	Shaft design **	A, B, C
	Tensile strength **** min. (N/mm²)	600
	Point design ***	E

(3)	**Fasteners and clips which are clinched on the underside of the stringer boards**	
	Length min. (mm)	53
	Width/inner min. (mm)	14
	Wire Ø min. (mm)	2,2
	Shaft design **	A, B, C D
	Tensile strength **** min. (N/mm²)	760
	Point design	E

- * For lengths of less than 88 mm, the head must have a circular marking with a diameter of 2,7 mm ± 0,5 and a depth of 0,3 mm.
- A manufacturer-specific head marking is permitted for fasteners
- Shaft design**: A = turned, B = grooved, C = notched or similar, D = smooth
- Point design*** E = diamond point, F = chisel point, G = cut (slanting) point
- Tensile strength**** = wire with the required final diameter of the smooth nail shaft

E.4 - Schematic construction of a nailing machine for the vertical insertion of fasteners into test specimens

Schematic diagram



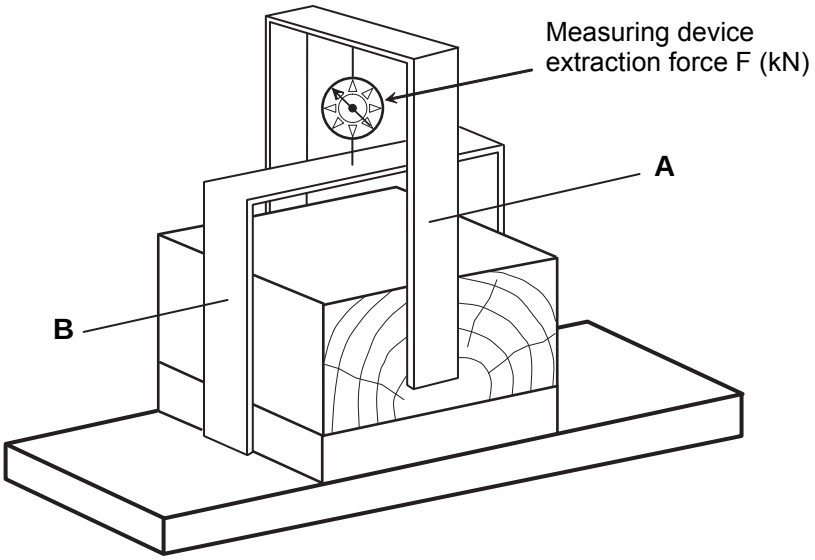
Requirements:

- The barrel of the nail gun must be positioned vertically to the base plate (A = B)
- The test specimens must be displaceable on the base plate in directions X and Y.
- Optionally, marks may be used for easier positioning of the nails.
- The fasteners being tested must be applied vertically to the test specimens using an air-operated nailing machine.
- 3 fasteners of the relevant type are to be prepared for each test specimen.

Appendix F - (Reserved)

Appendix G - Test set-up for determining the extraction forces

G.1 - Elementary diagram



G.2 - Test set-up

The test set-up consists of two brackets:

- bracket A holds the block,
- bracket B presses on the board.

The extraction force F is generated and measured between both brackets.

The extraction force must be applied without pushing, slowly and evenly.

The device must work with a measurement accuracy of at least 4 %.

The average of the measured extraction forces and 75 % of all measured individual extraction forces must achieve at least the following values for the test pieces:

- bond: block - stringer board - deck board	6,0 kN
- bond: block floorboard	5,5 kN
- bond: stringer board - deck board	2,5 kN for fastenings with a minimum length of 36 mm
- bond: stringer board - deck board	3,0 kN for fastenings with a minimum length of 53 mm

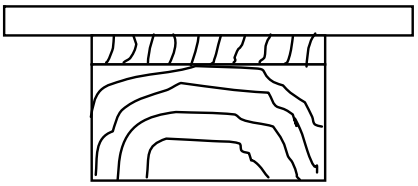
Appendix H - Test specimens for determining the extraction forces

The wood parts must not show any knots or cracks.

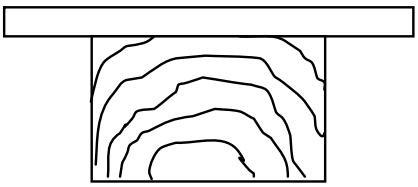
At the time of the test, the moisture content must not exceed 22 % of the dry wood (dry weight).

The fasteners must fulfil the minimum requirements of Appendix E - page 33 cont.

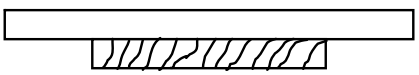
Connection block, stringer board, deck board



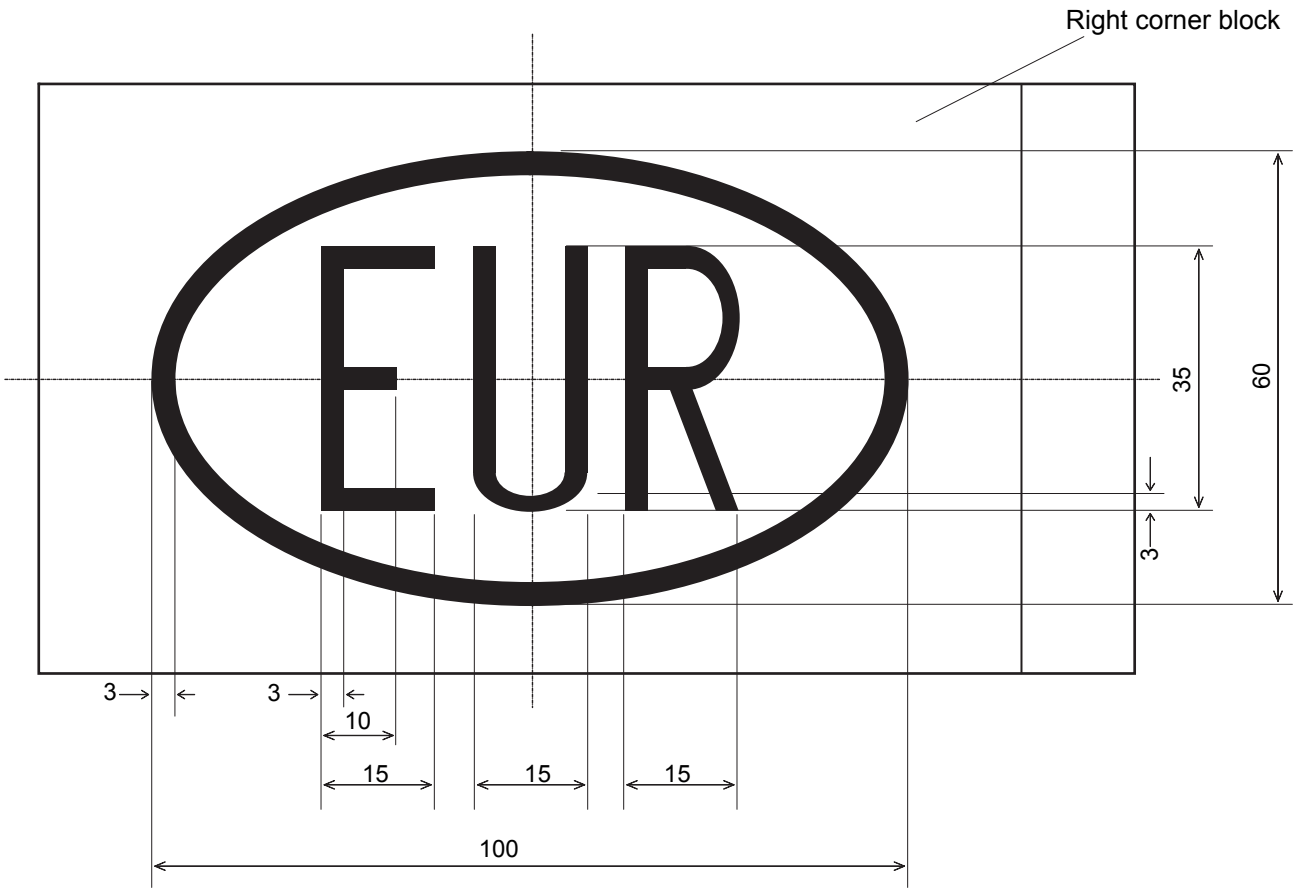
Bond: block, floorboard



Bond: stringer board, deck board



Appendix I - Standard symbol for marking a European flat wood pallet with four entries



Authorisation to use branding plates or stamps with this symbol may only be given to approved EUR pallet manufacturers by an authorised UIC RU as per the terms of Appendix N - page 54 or by a pallet organisation as per the terms of Appendix L - page 52.

The EUR symbol is registered as a figurative mark at the World Intellectual Property Organisation (WIPO - see List of abbreviations - page 58) in Geneva under number 430 337 and at the OHIM (Office for Harmonisation) in Alicante as a Community Trade Mark under number 004848206.

Appendix J - Quality test, sampling test plan, shrinkage values, defect collection sheet and measurement of the wood moisture

J.1 - Quality test

J.1.1 - The quality test of a submitted batch requires the testing of a statistically selected random sample by means of qualitative characteristics in a sampling test plan. This serves to assess the total number of a certain quantity of EUR pallets (batch) presented for checking due to the precise checking of a specific part of these EUR pallets (random test).

Testing in accordance with a sampling test plan may only be carried out if even manufacturing quality is guaranteed. The quality test must be carried out in accordance with Appendix O - page 55 cont.

J.1.2 - The number of the random sample (n) depends on the size of the batch (N) in accordance with the sampling test plan in Table 1 - page 44. If the batch size (N) exceeds 10 000 EUR pallets, several batches should be formed.

J.1.3 - The EUR pallets which should be supplied for the random test must be taken at random from the entire batch by the tester prior to commencement of the test. The manufacturer must ensure access to the entire test batch.

J.1.4 - The test of the random sample is carried out in accordance with the conditions of this leaflet by means of visual check, as well as by measuring the main dimensions and the supplementary dimensions and measuring the wood moisture. Not the defective EUR pallets but all defective test elements (components with the same dimensions) are counted in the random test. For doing this, each defect is noted in a defect collection sheet as in Appendix J - page 43. If one defect is the reason for one or several supplementary defects in accordance with the sampling plan of Appendix J, only the highest defect is registered. At the end of the test, the defects are summarized, separated according to critical major and minor defects.

J.1.4.1 - Critical defects are defects which impair the safety or which exclude the use of the EUR pallet.

J.1.4.2 - Main defects are defects which considerably shorten the useful life of the EUR pallet or which seriously reduce its usability.

J.1.4.3 - Minor defects are defects which only slightly affect the usability of the EUR pallet.

J.1.5 - The criteria for the sampling plan of Table 2 - page 44 are relevant for the assessment of the whole batch.

If the maximum number of defects given in the sampling plan in Table 2 is not exceeded for the relevant samples, the whole batch will be considered as accepted.

If only one of the maximum numbers of defects is exceeded, the whole batch must be rejected as not conforming to the conditions. The markings must be removed from the rejected pallets (see, however, the procedure in point J.1.6 - page 44).

J.1.6 - The sampling method may be repeated with the consent of the tester, if the manufacturer sorts the defective pallets of the whole batch out prior to repeating the method. The pallets sorted out must be presented to the tester after repair or after removal of the markings, together with the new batch.

In accordance with the conditions of the points J.1.1 to J.1.5 - page 43, the new batch must be tested again.

J.2 - Sampling plan

Table 1 : Size of the random sample

Batch size (N)	Random sample (n)
N ≤ 150	8
151 ≥ N ≤ 280	13
281 ≥ N ≤ 500	20
501 ≥ N ≤ 1 200	32
1 201 ≥ N ≤ 3 200	50
3 201 ≥ N ≤ 10 000	80

Table 2 : Assessment of the whole batch

Random samples (n)	Maximum number of defects		
	Critical	Major defects	Minor defects
8	0	5	10
13	0	7	14
20	0	10	21
32	0	14	30
50	0	21	44
80	0	30	70

J.3 - Shrinkage values

The average shrinkage or swelling transversely (radially and tangentially) to the direction of the grain of the wood is approx. 1 % when the wood moisture content changes (this only applies up to a wood moisture of 30 %).

- for oak, spruce, pine, fir 0,24 % and
- for beech 0,32 %

Table 3 : Minimum dimensions related to the measured wood moisture, reference moisture 22 %

Dimension	**22** $^{+2}_{-0}$		**78** $^{+2}_{-0}$		**78** $^{+1}_{-1}$		**100** $^{+3}_{-3}$		**145** $^{+5}_{-3}$	
Shrinkage %	0,24	0,32	0,24	0,32	0,24	0,32	0,24	0,32	0,24	0,32
Wood moisture %										
30	22,4	22,6	79,5	80,0	78,5	79,0	98,9	99,5	144,7	145,6
29	22,4	22,5	79,3	79,7	78,3	78,7	98,6	99,2	144,4	145,2
28	22,3	22,4	79,1	79,5	78,1	78,5	98,4	98,9	144,0	144,7
27	22,3	22,4	78,9	79,2	77,9	78,2	98,2	98,6	143,7	144,3
26	22,2	22,3	78,7	79,0	77,7	78,0	97,9	98,3	143,4	143,8
25	22,2	22,2	78,6	78,7	77,6	77,7	97,7	97,9	143,0	143,4
24	22,1	22,1	78,4	78,5	77,4	77,5	97,5	97,6	142,7	142,9
23	22,1	22,1	78,2	78,2	77,2	77,3	97,2	97,3	142,3	142,5
22	**22,0**	**22,0**	**78,0**	**78,0**	**77,0**	**77,0**	**97,0**	**97,0**	**142,0**	**142,0**
21	21,9	21,9	77,8	77,8	76,8	76,8	96,8	96,7	141,7	141,5
20	21,9	21,9	77,6	77,5	76,6	76,5	96,5	96,4	141,3	141,1
19	21,8	21,8	77,4	77,3	76,5	76,3	96,3	96,1	141,0	140,6
18	21,8	21,7	77,3	77,0	76,3	76,0	96,1	95,8	140,6	140,2
17	21,7	21,6	77,1	76,8	76,1	75,8	95,8	95,4	140,3	139,7
16	21,7	21,6	76,9	76,5	75,9	75,5	95,6	95,1	140,0	139,3
15	21,6	21,5	76,7	76,3	75,7	75,3	95,4	94,8	139,6	138,8
14	21,6	21,4	76,5	76,0	75,5	75,0	95,1	94,5	139,3	138,4
13	21,5	21,4	76,3	75,8	75,3	74,8	94,9	94,2	138,9	137,9
12	21,5	21,3	76,1	75,5	75,2	74,5	94,7	93,9	138,6	137,5

If these minimum dimensions are not achieved, this is considered as defect.

J.4 - Defect collection sheet EUR-1

(see page 47)

Defect collection sheet EUR-1 (*UIC Leaflet 435-2, 9. edition*) **Company:**
Marking of the random sample: **Order: No.of**
Block marking: **specimens:**
Marking fastening elements **Batch size:**
Colour of the clamp, manufacturer of the clamp

batch size N	1 - 150	151 - 280	281 - 500	501 - 1 200	1 201 - 3 200	3 201 - 10 000
random samples n	8	13	20	32	50	80
critical defects	0	0	0	0	0	0
major defects	5	7	10	14	21	30
minor defects	10	14	21	30	44	70

critical defects defect designation	**UIC No. 435-2**	**Defect characteristics more/ less than (mm)**	**Number of critical defects**			**Sum**
main dimension length	App. A	1 200 + 8/- 5				
main dimension width	App. A	800 + 8/- 5				
thickness of the stringer board [1]	App. A	22 + 3/- 0				
non-permissible wood types, knots, wanes ingrown barks and decay in stringer boards	App. D Pt 1.6.1, 1.6.3, 1.6.4	x				
non-permissible moulded wood-chip blocks	App. C	x				
non-permissible wood preservatives	App. M	x				
wood preservatives	Pt 1.4.5	x				
single knots in stringer board	Pt 1.6.4	> 1/4 b				
sum of knots in stringer board	Pt 1.6.4	> 1/3 b				
non-permissible fastener	App. E	yes				
critical defects			Sum of defects			

major/minor defects - defect designation		**Defect characteristics major defect/minor defect more/less (mm)**		**Number of major defect**	**Sum**	**Minor defect**	**Sum**
Main dimension length	App. A	1 200 + 3/ - 0					
Main dimension width	App. A	800 + 3/- 0					
Entry height of the outer skid	App. A	100 + 5/ - 0					
Distance inner deckboard	App. A		287 + 3/ - 3				
Distance centre block / centre	App. A	max. 477					
Distance central block/stringer central board	App. A	max. 677					
Board length deck/floorboard	App. A		< 1 200				
Board length stringer board	App. A		< 800				
Board width stringer board [1]	App. A	145 + 5/ - 3					
Board width [1]	App. A		145 + 5/ - 3				
Board width [1]	App. A		100 + 3/ - 3				
Board thickness [1]	App. A	22 + 2/ - 0					
Block length	App. A		145 + 5/ - 3				
Block width [1]	App. A		145 + 5/ - 3				
Block width [1]	App. A		100 + 3/ - 3				
Decay, ingrown barks, insect infestation	Pt 1.6.1						
Wood moisture content	Pt 1.6.2	> 26 %	> 22 %				
Wanes	Pt 1.6.3		> 15 mm				
Non-permissible knots	Pt 1.6.4	yes					
Single knots	Pt 1.6.4	> 1/2 b	> 1/3 b				
Sum of knots	Pt 1.6.4	> 2/3 b	> 1/2 b				
Cracks	Pt 1.6.5		x				
Assembly cracks	Pt 1.6.5	yes					
Discolourations	Pt 1.6.6		yes				
Resin galls	Pt 1.6.7		> 50 mm				
Course of the wood grains	Pt 1.6.8		5 %, 20 %				
Insect holes	Pt 1.6.9		yes				
Sapwood	Pt 1.6.10		yes				
Medullary canals	Pt 1.6.11		yes				
Treatment of the boards	Pt 1.4.2		x				
Treatment of the blocks	Pt 1.4.3		x				
Bevelled edges	Pt 1.4.4	x					
Protruding fastening elements	Pt 1.3.2		yes				
Missing or crooked fastening elements	Pt 1.3.2	x					
Distance of the fastening elements (nailing pattern)	Pt 1.3.2	x					
Marking incomplete (per pallet more than one UIC symbol, more than one EUR symbol)	Pt 1.7	x					
Sum of defects:			Major defect			Minor defect.	
Conditions complied with: yes/no	**If the conditions are not complied with, the batch is blocked and marked with the mallet**						

1) See Appendix J.2 shrinkage values

Place: Date: Tester:

J.5 - Measuring the wood moisture EUR-1

EUR wooden flat pallet 800 mm x 1 200 mm

Appendix to the defect collection sheet_____ To order: _____
Exhibitor/Manufacturer:_____
Company symbol:_____Random sample:_____ No. of pieces: _____

Pallet no.	100th block*	145th block*	100th deckboard*	100th floorboard*	stringer board*	145th deckboard	145th floorboard
1	□						
3			□				
5					□		
7						□	
9		□					
11				□			
13					□		
15							□
17	□						
19			□				
21					□		
23						□	
25		□					
27				□			
29					□		
31							□
33	□						
35			□				
37					□		
39						□	
41		□					
43				□			
45					□		
47							□
49	□						
51			□				
53					□		
55						□	
57		□					
59				□			
61					□		
63							□
65	□						
67			□				
69					□		
71						□	
73		□					
75				□			
77					□		
79							□

* Components with the same dimensions must be measured in turn !
Date:_____ Tester:_____

Appendix K - Approval of EUR pallet manufacturers in the area of another RU

K.1 - General

K.1.1 - If the production site of a EUR pallet manufacturer is located in the area of a RU which is not a member of UIC, each UIC RU may grant approval for production of EUR pallets in accordance with the conditions of this Appendix.

K.1.2 - If the production site of a EUR pallet manufacturer is located in the area of a RU which is a member of UIC, any UIC RU may grant approval for the production of EUR pallets in accordance with the conditions of this Appendix. In this case, however, the UIC RU, in whose area the manufacturer is located, must be notified of.

K.2 - Pre-conditions for granting approval

K.2.1 - Applying for approval requires an application with the following information:

- Company name of the applicant (see Glossary - page 59),
- Company name of the manufacturer with information about the production site,
- planned start of production,
- planned quantity of production,
- suggested quality inspection body and,
- approval already obtained.

K.2.2 - Furthermore, the applicant must submit a statement in which he assures that **no approval has been withdrawn from him** during the last 12 months and that he accepts the conditions under point K.3 - page 50 of this Appendix as binding.

K.3 - Conditions for granting the symbol

UIC symbol in accordance with Appendix B - page 14, symbol of a UIC RU in accordance with Appendix N - page 54 and EUR symbol for manufacturing EUR pallets

Granting is only possible upon application. The application must be addressed to the UIC RU/the pallet organisation the use of whose symbol is being applied for.

In case of approval, both the applicant and the manufacturer acquire exclusivity rights, since it is not possible for:

- several applicants with the same UIC RU symbol/pallet organisation symbol to be approved for one manufacturer, or for,

- approval to be granted by several UIC RUs/pallet organisations for one manufacturer.

The RU/pallet organisation shall determine a quality-testing organisation either based in the country of production or another recognised body, which is prepared to undertake ongoing inspections and quality control following approval and the granting of symbol user rights, in accordance with the provisions of the UIC Code.

Carrying out ongoing inspections to check quality means, in accordance with point 1.8 - page 8 of this leaflet, batch inspections and unannounced works inspections to be carried out at the place of production. The costs incurred in the course of inspection and quality control (as well as of nail and block approvals) must be borne by the manufacturer.

The applicant shall undertake to answer for damages incurred abroad by the manufacturer, including, as necessary, damage due to misuse of the protected symbols (symbol of the UIC RU, UIC symbol, and EUR symbol).

The applicant also agrees to the withdrawal of approval in case of violation of these conditions or of the UIC codices.

The applicant and the manufacturer oblige to file a new application for **any further production site or EUR pallet type**.

The applicant and the manufacturer engage to exclusively use marking equipment (stamps, branding plates) which will be let by the trade mark owner or a third party appointed by him and to give these trade marks back to the owner in case of withdrawal and/or cessation of production. The marking equipment remains the property of the trade mark owner. The manufacturer and the applicant only acquire rights to use the symbol.

The applicant engages to bear all costs and expenses arising in connection with the approval inspection (especially travel/flight costs, costs for board and lodging, processing fees, also in case of a failed attempt and in case of necessary repeat inspections). The costs and expenses must either be reimbursed after submission of the invoice or paid in the form of lump sum rates, fixed by each UIC RU. Advanced payment can be arranged.

The applicant must ensure submission of the inspection batch and arrange the works inspection with the manufacturer and the tester.

The manufacturer must dispose of all measuring equipment which is necessary for the quality inspection. It must be made available to the quality inspector.

K.4 - Approval process

K.4.1 - Every UIC RU receiving a corresponding application:

- verifies whether all formal requirements have been fulfilled,
- notifies the UIC RU in whose area approval is intended and,
- notifies Rail Cargo Austria as the managing RU and owner of the (EUR) symbol.

K.4.2 - In case of granting the symbol, this UIC RU undertakes:

- to only grant approval if the applicant has fulfilled all the requirements, especially if the adherence to the UIC codes is guaranteed,
- to carry out the quality inspections or having the quality inspections carried out for the presented batches, as agreed under point 1.8 - page 8,
- to withdraw the rights to use the symbol if the conditions are violated,
- to apply **a waiting period of 6 months before allowing fresh applications** in case of previous withdrawal and,
- to grant approval **only upon agreement with** the managing UIC RU in case of repeated withdrawal.

Appendix L - Pallet organisation for the quality-control of EUR flat pallets as a part of reusable transport packaging

A pallet organisation recognised by the UIC WG is an organisation with legal personality to which UIC RUs can entrust the tasks described in *UIC Leaflet 435, point 1.8* (see Bibliography - page 60).

The UIC "Palletisation Issues" WG confers recognised and approved status following internal consideration of the application. The organisation must fulfil all the criteria listed hereafter for it to be commissioned to execute the tasks comprehensively and lawfully:

1. Organisation with legal personality working in the sector(s) of quality-control and/or management and use of reusable flat pallets;

2. In order to exclude any conflict of interest, the commissioned organisation must demonstrate and guarantee its independence vis-à-vis interest groups of manufacturers, repairers, traders, users, and other parties involved with reusable flat pallets;

3. Proof that the organisation possesses a Quality Management-System certified against *DIN EN ISO 9001-2008* (see Bibliography - page 60) as a minimum;

4. Proof that the organisation possesses a registered and protected trade mark allowing it to be unambiguously identified on the market;

5. Ability and willingness to pursue trade mark violations in and out of court with sole responsibility in a quality-control context;

6. Where the organisation has additional lines of work, there must be a demonstrable separation of powers within the organisational structure between quality-control and other business areas;

7. Demonstration of the organisation's own ability to physically monitor manufacturers, repairers, and future licence-holders in the context of quality-control/testing, or proof that the organisation has commissioned a certified, internationally-active inspection body to perform the specified task.

Pallet organisations can apply informally for approval from the managing RU. A pallet organisation approved as per Appendix L - page 52 requires a valid contract with a UIC member RU in order to begin work.

A list of approved pallet organisations can be downloaded from the UIC website at:
http:/www.uic.org/Activities/Topics/Freight/Leaflets

Appendix M - Approved wood preservatives

Approved wood preservatives can be used against mould and blueing.

A wood preservative must be **applied for and approved** by the UIC.

The application for approval of a wood preservative may be requested from the managing UIC RU.

The use of non-approved wood preservatives or wood protectors may lead to immediate withdrawal of approval.

The list of approved wood preservative products can be found on the UIC website under:
http://www.uic.org/Activities/Topics/Freight/Leaflets

Appendix N - UIC RU symbol

The currently valid UIC RU symbols can be obtained from the managing UIC RU.

Authorisation to use branding plates or stamps with these symbols may **only** be given to **approved EUR pallet manufacturers** by a UIC RU as per the terms of Appendix N - page 54 or by a pallet organisation as per the terms of Appendix L - page 52.

Appendix O - Description of the inspection process - general

Batch inspection

1. **Stock inspection of the stored EUR pallets:**
   Note: tour of the storage areas.
   Important: the inspection batch must be accessible (batch inspection).

2. **Measuring equipment/check gauges:** (inspection - manufacturer)
   Visual check for damages and re-measurement.
   Note: measurement equipment / check gauges must be calibrated.

3. **Quantity of the inspection batch:**
   Establish the quantity of the inspection batch and determine the respective number of random sample(s).
   Important: mark the random samples.

4. **Arranging the EUR pallets in inspection position**

5. **Measuring the wood moisture:**
   (see point J.5 - page 48).
   Note: the measurement is important in order to assess the minimum dimensions in relation to the wood moisture.

6. **Dimensional check**
   Carrying out the dimensional check in accordance with Table 4 - page 56.

7. **Visual check:**
   Carrying out visual check of the material, the construction, for processing defects and marking in accordance with Table 5 - page 57.

   In addition in case of self-monitoring

   Checking the whole pallet stock:

   Checking the raw material of the manufacturer:
   Note: wood and fasteners must be checked directly at the manufacturing plant and in the warehouse or the storage space.

   Checking the production of the manufacturer:
   Note: Is faulty wood sorted out at the machine? Checking of the function of the production monitoring plant and of the condition of the production plants.

   Random sampling in accordance with the daily production at the time of visits and comparison to the recordings of the manufacturer (at least 13 pallets).

8. **Reporting (test result):**
   The designation of the used fasteners and block brandings must be noted in the test report.
   The test report must be compared to the records of the manufacturer.

   General

   In case of negative test result, proceed in accordance with point 1.8 - page 8.

Table 4 : Measurement per pallet

			Description					Dimensions - Tolerances						
	Pos.	Gauge	mm	Serial no.		Measurement	Defect per pallet	Critical defect	Major defect	Minor defect	target	Minor defect	Major defect	Critical defect
1	1	1500	length of the pallet		top	1	max 1 defect	< 795	< 800		800 - 803		> 803	> 808
					bottom	2								
2			length of the stringer board	4	145 x 800	1	1 defect			< 800	min. 800			
3			distance of the centre block /bottom centre board		to right	1	max 1 defect				max. 477		> 477	
					top left	2								
4	2		width of the pallet		top	1	max 1 defect	< 1195	< 1200		1200 - 1203		> 1203	> 1208
					bottom	2								
5			length of the board	1 / 6*	100 x 1200	1	1 defect			< 1200	min. 1200			
6			length of the board	2 / 3 / 5*	145 x 1200	1	1 defect			< 1200	min. 1200			
7			distance of the centre block /stringer centre board		top right	1	max 1 defect				max. 677		> 677	
					top left	2								
8		300	distance of inner deckboard		top right	1	max 1 defect			< 284	284 - 290	> 290		
					top left	2								
9			width of the stringer board	4	board left	1	max 1 defect		< 142		142 - 150		> 150	
					board centre	2								
					board right	3								
10			length of the block	8*	145 x 145	1	1 defect			< 142	142 - 150	> 150		
11			length of the block	7*	145 x 100	1	1 defect			< 142	142 - 150	> 150		
12			thickness of the stringer board	4	board left	1	max 1 defect	< 22			22 - 25			> 25
					board centre	2								
					board right	3								
13			thickness of the board	2 / 3 / 5*	145 x 1200	1	1 defect		< 22		22 - 24		> 24	
14			thickness of the board	1 / 6*	100 x 1200	1	1 defect		< 22		22 - 24		> 24	
15			width of the board	2 / 3 / 5*	145 x 1200	1	1 defect			< 142	142 - 150	> 150		
16			width of the board	1 / 6*	100 x 1200	1	1 defect			< 97	97 - 103	> 103		
17			width of the block	8*	145 x 145	1	1 defect			< 142	142 - 150	> 150		
18			width of the block	7*	100 x 145	1	1 defect			< 97	97 - 103	> 103		
19			entry height of the outer skid		right	1	max 1 defect		< 100		100 - 105		> 105	
					left	2								

* the components must be measured in turn!

Pos. 1: pallet stands vertically on the narrow longitudinal side (800 mm).

Pos. 2: pallet stands vertically on the narrow broadside (1200 mm).

Table 5 : Visual check per pallet

	Description	Minor defect	Major defect	Critical defect
1	non-permissible wood types, knots, wanes ingrown barks and decay in stringer boards			Critical defect
2	non-permissible moulded wood-chip blocks			Critical defect
3	non-permissible wood preservatives			Critical defect
4	wood preservatives			Critical defect
5	single knots in stringer boards			> 1/4 b
6	sum of the knots in the stringer board			> 1/3 b
7	non-permissible fastening elements			Critical defect
8	decay, ingrown barks, insect infestation		Major defect	
9	wanes	> 15 mm		
10	non-permissible knots		Major defect	
11	single knots	> 1/3 b	> 1/2 b	
12	sum of the knots	> 1/2 b	> 2/3 b	
13	cracks	Minor defect		
14	assembly cracks		Major defect	
15	discolorations	Minor defect		
16	resin galls	> 50 mm		
17	course of the wood grain	5 %, 20 %		
18	insect holes	Minor defect		
19	sapwood	Minor defect		
20	medullary canal	Minor defect		
21	treatment of the boards	Minor defect		
22	treatment of the blocks	Minor defect		
23	bevelled edges		Major defect	
24	protruding fastening elements	Minor defect		
25	missing or crooked fastening elements		Major defect	
26	distance of the fastening elements (nailing pattern)		Major defect	
27	marking incomplete		Major defect	

List of abbreviations

Alicante (OHIM)	Office for Harmonization in the Internal Market
UIC	International Union of Railways
UIC RU	Railway Undertaking which is a member of UIC
WIPO	World Intellectual Property Organisation 34, Chemin des colombettes CH-1211 Geneva

Glossary

Applicant	The applicant is a natural or legal person applying for approval at a UIC RU or a pallet organisation.
Approval	Approval includes the right and the obligation to apply the symbols stated in point 1.7.1 to EUR pallets, which have been manufactured in accordance with the conditions of this leaflet.
EUR flat pallet	A EUR flat pallet is a re-usable and repairable EUR pallet made of wood, which is manufactured, quality checked and marked in accordance with the conditions of this leaflet.
Managing RU	The RU which occupies the chair of the UIC "Palletisation issues" working group (currently Rail Cargo Austria).
Manufacturer	The manufacturer is a natural or legal person manufacturing pallets in accordance with this leaflet.
Markings	The main markings for a EUR pallet are: - the protected EUR symbol in accordance with Appendix I, - the protected symbol of the approving UIC RU in accordance with Appendix N and the UIC symbol in accordance with Appendix B on the left hand corner block, and - the manufacturer code in accordance with point 1.7.1 on the centre block. Additional symbols certify the quality check carried out.
Quality control	Quality control means all activities which are necessary in order to guarantee a uniform quality.

Bibliography

1. European Standards

European Committee for Standardization (CEN)
EN 120:1992: Wood-base panels. Determination of formaldehyde content. Extraction method called the perforator method, 1992

EN 317:1993: Particleboards and fibreboards - determination of swelling in thickness after immersion in water, 1993

EN 323:1993: Wood-based panels - determination of density, 1993

EN 717-1:2004: Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method, 2004

EN 1087-1:1995: Particleboards - Determination of moisture resistance - Part 1: Boil test, 1995

EN 10002-1:2001: Metallic materials - Tensile testing - Part 1: Method of testing at ambient temperature, 2001

EN 11885:2007: Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES), 2007

EN 12777-1:1996: Methods of test for pallet joints. Part 1 : determination of bending resistance of pallet nails, other dowel-type fasteners and staples, 1996

2. International Standards

International Organization for Standardization (ISO)
EN ISO 9001:2008: Quality management systems - Requirements, 2008

3. Miscellanous

European Union (UE)
Directive 94/62/EC: European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste, 1994

Warning

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