

INTERGOVERNMENTAL STANDARD

GOST 3916.1-96

Plywood with faces in hardwood veneer for general use.

Contents

- [DESCRIPTION - GENERAL USE PLYWOOD](#)
- [CLASSIFICATION AND DIMENSIONS](#)
- [TECHNICAL REQUIREMENTS](#)
- [RULES OF ACCEPTANCE](#)
- [CONTROL METHODS](#)
- [TRANSPORTATION AND STORAGE](#)
- [PRODUCERS GUARANTEE](#)

Table:

[DESCRIPTION AND LIMITATIONS OF PLYWOOD DEFECTS](#)

SPECIFICATIONS

Introduction date: 01-01-1998

1. DESCRIPTION - GENERAL USE PLYWOOD

This standard covers general use plywood with hardwood face veneer.

This standard is not applicable to specialty or decorative plywood.

Minimal requirements relating to the formaldehyde emission of plywood are covered in [4.3](#) and [6.8](#).



3. CLASSIFICATION AND DIMENSIONS

3.1. Plywood is subdivided into grades based on the following: appearance of face veneers, glue bond, the degree of moisture resistance of the bond, and if sanded or not.

3.1.1. The plywood is subdivided into 5 grades, based on the appearance of the face veneers: E (elite), I, II, III and IV. Descriptions of the face grades of the plywood are specified in [Supplement A](#).

3.1.2. The degree of moisture resistance of the plywood bond is specified by the following marks:

- FSF - water proof plywood (WBP)
- FK - water resistant plywood (MR)

3.1.3. The sanding of the plywood is specified as follows:

- Not sanded (NS)
- Sanded one side (S1)
- Sanded two sides (S2)

3.2. Dimensions.

3.2.1. The dimensions and the number of plies in the plywood sheets must correspond to tables 1 and 2.

Table 1. Dimensions (millimeters)

Length(width) of the plywood sheets	Min(Max)Tolerance in mm
1200,1220,1250	+/- 3,0
1500,1525,1800,1830	+/- 4,0
2100,2135,2440,2500	+/- 4,0
2700,2745,3050,3600,3660	+/- 6,0

Note: Production of plywood is allowed in other dimensions corresponding with the terms of a contract.

Table 2. Thickness (millimeters)

Nominal thickness of plywood	Number of plies	Sanded Plywood Tolerance Min/Max(mm)	Sanded Plywood Thickness Variance(mm)	Unsanded Plywood Tolerance Min/Max (mm)	Unsanded Plywood Thickness Variance(mm)
3,0 mm	3-ply	+ 0,3/-0,4		+ 0,4/-0,3	
4,0 mm	3-ply	+ 0,3/-0,5		+ 0,8/-0,4	
6,5 mm	5-ply	+ 0,4/-0,5		+ 0,9/-0,4	1,0
9,0 mm	7-ply	+ 0,4/-0,6		+ 1,0/-0,5	
12,0 mm	9-ply	+ 0,5/-0,7	0,6	+ 1,1/-0,6	
15,0 mm	11-ply	+ 0,6/-0,8		+ 1,2/-0,7	
18,0 mm	13-ply	+ 0,7/-0,9		+ 1,3/-0,8	
21,0 mm	15-ply	+ 0,8/-1,0		+ 1,4/-0,9	1,5
24,0 mm	17-ply	+ 0,9/-1,1		+ 1,5/-1,0	
27,0 mm	19-ply	+ 1,0/-1,2	1,0	+ 1,6/-1,1	2,0

30,0 mm	21-ply	+ 1,1/-1,3		+ 1,7/-1,2
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Note: Production of plywood is allowed in other thickness and construction (number of plies) corresponding with the terms of a contract. The minimum and maximum variances may be determined by the following formula.

Sanded Plywood - maximum/minimum tolerance:

1. Maximum: $\text{Thick} * 0.03 \text{ mm} + 0.2 \text{ mm}$ ($12 \text{ mm} * 0.03 \text{ mm} + 0.2 \text{ mm}$) = 12 mm + 0.5 mm
2. Minimum: $\text{Thick} * 0.03 \text{ mm} + 0.4 \text{ mm}$ ($12 \text{ mm} * 0.03 \text{ mm} + 0.4 \text{ mm}$) = 12 mm - 0.7 mm

Unsanded Plywood - maximum/minimum tolerance:

1. Maximum: $\text{Thick} * 0.03 \text{ mm} + 0.8 \text{ mm}$ ($12 \text{ mm} * 0.03 \text{ mm} + 0.8 \text{ mm}$) = 12 mm + 1.1 mm
2. Minimum: $\text{Thick} * 0.03 \text{ mm} + 0.4 \text{ mm}$ ($12 \text{ mm} * 0.03 \text{ mm} + 0.3 \text{ mm}$) = 12 mm - 0.6 mm

3.2.2. Plywood panels must be cut at a right angle. Deviation must not exceed 2 mm per 1 lineal meter.

3.2.3. Deviation from square edges can not exceed 2mm per 1 lineal meter.

3.3. Making if plywood must include:

- Name of product
- Woos species of the face and core veneers
- Glue Bond marks
- Veneer grades for face and core
- Formaldehyde emission classification
- Type of surface treatment
- Dimensions
- Applicable GOST standard

Below is an example of markings in plywood. Birch plywood with core plies of birch veneer, water resistant, with a combination of face and core veneers I/III, with an emission class of E1, sanded in both sides, in 2440 mm long, 1220 mm wide and 9 mm thick is marked:

Birch plywood/birch, FK, I/III, E1, S2, 2440*1220*9 GOST 3916.1-96



4. TECHNICAL REQUIREMENTS

4.1. Characteristics

4.1.1. To produce face veneers for plywood, the following species can be used for

the face veneer: birch, alder, maple, elm, beech, asp, poplar, lime. For core veneers, in addition to the ones just mentioned, the following can be used: pine, spruce, fir, larch and cedar.

The timber used to make veneers for plywood determines the species of the plywood.

The plywood can be made of one or more than one species of wood, therefore it is either "homogeneous" or "combined".

If the number of veneer plies is even, the direction of fibers (grain) of the two middle plies must be parallel.

Veneers, located symmetrically within the thickness of plywood, must be the same species and thickness.

The thickness of the veneer used for the faces must not exceed 3,5 mm. And for the thickness of core veneers must not exceed 4 mm.

4.1.2. Wood and manufacturing defects exceeding limits stated in [Table 3](#), are not allowed in face veneers.

4.1.3. Wood and manufacturing defects, exceeding the limits stated in [Table 3](#), are allowed in core veneers, as long as they do not influence its integrity and dimensions. The requirements for quality and dimensions are specified in this standard.

4.1.4. The maximum amount of wood and manufacturing defects allowed in face veneers is indicated in Table 4.

4.1.5. The combination of face veneer grades is indicated in GOST 30427.

4.1.6. The face veneer of E grade can consist of 2 components with one splice joint in the middle of the panel. This applies only to widths up to 1525 mm.

If the width is over 1525 mm, the face veneer of E grade can consist of 3 components of equal width. The face veneer of I and II grades can be made from an unlimited number of veneer components.

For grades E, I, II veneer joints must be parallel to plywood edges. Veneers must be matched for color.

4.1.7. Plugs must be even with the surface, firmly bonded, must match the color of the face of the panel. The grain must also be parallel to the direction of the wood fibers (grain) on face veneer. For grades I and II the plugs must match the color of the wood.

Putty fills or repairs must match the color of the wood of a given grade. In addition, they must provide easy gluing, retain its color during plywood treatment and not crack while bending.

4.2. Strength and mechanical indices are stated in [Table 5](#).

4.3. Formaldehyde content in plywood, depending in emission class, must meet the limits stated in [Table 6](#).

4.4. The plywood is measured in either square meters or cubic meters. The volume of one panel is determined with a precision of up to 0.00001 m³. The volume of a few panels is determined with the precision of up to 0.5 m³. The squareness of a panel is measured with the precision of up to 0.01 m². The squareness of a few panels is measured with a precision of up to 0.5 m².

4.5. The marking is stamped with indelible paint on the back side of every panel stating plywood grade and inspector's number.

Marks of bundles or crates of plywood contain:

- Name of the country plywood-producer
- Name of mill-producer or its trade mark
- Conventional plywood marking
- Number of panels in the bundle
- National mark of conformity for certified production
- Transportation marking is in accordance with GOST 14192.

4.6. Packaging.

4.6.1. Plywood must be packed in bundles weighting no more than 1500 kgs. It has to be separated according to species, glue bond, grades, glue emission classes, types of surface treatments and dimensions.

If parties mutually agree and in accordance with a sales contract, plywood can be packed in bundles or other weights.

4.6.2. If plywood is to be shipped to regions in the Extreme North or other difficult-to-reach regions, it has to be packed according to 4.6.1. and GOST 15848.



5. RULES OF ACCEPTANCE

5.1. Plywood is accepted in lots.

A lot consists of plywood of one species, one glue bond, one sort, one glue emission class one type of surface treatment and panel dimensions.

There should be one document for each lot, specifying quality and containing:

- Name of the country-producer
- Name of the mill-producer and (or) its trade mark
- Conventional plywood marking
- Volume or square meters of panels in lot
- Stamp of technical control
- National mark of conformity for a certified production

5.2. Quality and dimensions of panels are subject to random inspection. If specified in a sales contract (agreement), specific lots may be subject to full inspection.

In a random inspection, sheets are selected indiscriminately in accordance with GOST 18324 and confirming the quantities, mentioned in [Table 7](#).

5.3. Shear, tensile and static bending strengths are checked for plywood of every species, glue bond and number of plies at least once month. In accordance with sales contracts (agreements), it is permitted to select 0.1 % of sheets in every lot, but not less than one sheet.

5.4. Formaldehyde emission is checked every 30 days for FSF plywood mark and every 15 days for FK plywood mark. In accordance with terms of sales contract, a check may be done every 7 days.

5.5. A lot is considered to meet the requirement of the current standard and is accepted, if in the random inspection the following is confirmed:

- number of plywood sheets which are not meeting the requirements of the current standard due to dimensions, out of square, linear edges, wood and manufacturing defects is LESS or EQUAL to the accepted amount, which is stated in Table 7.
- all sheets of plywood must have no bubbles, no delamination and no trace of bark
- formaldehyde emission corresponds to the norms defined in [Table 6](#)



6. CONTROL METHODS

6.1. Selection of samples for strength and mechanical tests are done in accordance with GOST 9620. Selection of samples for formaldehyde emission tests are done in accordance with GOST 27678.

6.2. The length and width is measured at two points in the same panel, which are parallel to the edges and are located at least 100 mm from the edges. The measurements are done with a metal tape, which has an index error of 1 mm or less in accordance with GOST 7502. Measurements have to be taken twice and the

actual length (width) of the sheet would be their average.

6.3. Thickness is measured at a distance of at least 100 mm from the edges.

Thickness also has to be measured at the middle of each side of the panel with a caliper as per GOST 11358, or with a micrometer with a scale division of at least 0.1 mm in accordance with GOST 6507.

Measurements of thickness have to be taken 4 times and the actual thickness would be an average of those 4 measurements.

The difference in thickness in one panel of plywood is determined as a difference between the maximum and minimum thickness from these 4 measurements.

6.4. Moisture content is determined in accordance with GOST 9621.

6.5. Shear strength along the glue line is determined in accordance with GOST 9624.

6.6. Static bending strength is determined in accordance with GOST 9625

6.7. Tensile strength is determined in accordance with GOST 9662

6.8. Formaldehyde emission is determined in accordance with GOST 27678

6.9. Roughness of the surface is determined in accordance with GOST 15612

6.10. Wood and manufacturing defects are measured in accordance with GOST 30427

6.11. Deviation from linear edges of plywood panel is determined by measurements of the maximum gap between the panel edge and metallic square edge in accordance with GOST 8925 and within an index error of 0,2 mm.

6.12. Measurements for squareness are determined in accordance with GOST 30427.



7. TRANSPORTATION AND STORAGE

7.1. Plywood is transported in covered vehicles, in accordance with the transportation consignment rules for each given vehicle.

7.2. Transportation and storage of plywood, which is to be shipped to the Extreme North or difficult-to-access regions are done in accordance with GOST 15846.

7.3. Plywood is stored in horizontally stacked bundles, on pallets or on wooden pallets. The temperature of closed premises, in which the plywood is stored, should be between -40°C to +50°C. The humidity should not exceed 80%



8. PRODUCERS GUARANTEE

Producers guarantee that the plywood conforms with the current GOST, as well as with transportation and storage conditions.

FK plywood has a guarantee of 3 years and FSF plywood has a guarantee of 5 years from the day it was shipped.

TABLE 3. DESCRIPTION AND LIMITATIONS OF PLYWOOD DEFECTS

Description of defects as per GOST 30427	<i>E grade</i> plywood face veneers	<i>I grade</i> plywood face veneers	<i>II grade</i> plywood face veneers	<i>II grade</i> plywood face veneers	<i>IV grade</i> plywood face veneers
1.Pin knots	Not allowed	Max 3 per M2 allowed	Allowed	Allowed	Allowed
2.Sound lights and/or dark knots	Not allowed	Up to 5 per M2 max, 15mm diam. cracks no more than 0,5mm wide	Up to 10 per M2 max, 25mm diam. cracks no more than 1mm wide	Allow cracks not more than 1,5mm wide	Allow cracks not more than 1,5mm wide
3.Loose knots or with/without knot holes, worn holes in cluster or scattered	Not allowed	Up to 3 with max 6mm diam.	Up to 6 with max 6mm diam.	Up to 6 with max 6mm diam.	No limits with max 40 mm diam.
4.Tight cracks/splits	Not allowed	Up to 2 per 1M of plywood, max 200mm long	Up to 2 per 1M of plywood, max 200mm long	Allowed	Allowed
5.Wide cracks/splits	Not allowed	Not allowed	Up to 2 per 1M of plywood filled with putty max 200mm long	Up to 2 per 1M of plywood filled with putty max 600mm long and 5 mm wide	Allowed with limitations
6.Light Mold	Not allowed	Allowed	Allowed	Allowed	Allowed
7.Dark mold	Not allowed	Not allowed	General number allowed as per item 2 of present table	General number allowed as per item 2 of present table	Allowed
8.Deviation in	Allowed very	Allowed	Allowed	Allowed	Allowed

wood structure	insignificant, incidental disposition				
9.Light color variation	Not allowed	Allowed, no more than 5% of the sheet surface	Allowed	Allowed	Allowed
10.Strong color variation	Not allowed	Not allowed	Not allowed	Not allowed	Allowed
11.Decay	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
12.Pinholes	Not allowed	General number allowed as per item 3 of present table	General number allowed as per item 3 of present table	General number allowed as per item 3 of present table	General number allowed as per item 3 of present table
13.Veneer overlap	Not allowed	Not allowed	Allowed no more than 100mm in quantity of no more than 1 piece for 1m of panel width	Allowed no more than 200mm in quantity of no more than 2 pieces for 1m of panel width	Allowed
14.Lack of veneer, defects of panel edges due to sanding or squaring	Not allowed	Allowed with a width of no more than 2mm	Allowed with a width of no more than 4mm	Allowed with a width of no more than 4mm	Allowed with a width of no more than 5mm
15.Presense of glue tape	Not allowed	Not allowed	Allowed in non-sanded plywood	Allowed in non-sanded plywood	Allowed in non-sanded plywood
16.Glue bleed through	Not allowed	Not allowed	Allowed no more than 2% of panel surface	Allowed no more than 5% of panel surface	Allowed
17.Scratches	Not allowed	Not allowed	Allowed	Allowed	Allowed
18.Indentations or imprints	Not allowed	Not allowed	Allowed if depth/height is in range of thickness variance	Allowed if depth/height is in range of thickness variance	Allowed
19.Torn Grain, Brashy Fibers	Not allowed	Not allowed	Allowed no more than 5% of panel surface	Allowed no more than 15% of panel surface	Allowed
20.Grinding	Not allowed	Not allowed	Not allowed	Not allowed	Allowed
21.Warp and twist	Does not apply to thickness under 6,5mm. If over 6,5mm then allowed with sag	Does not apply to thickness under 6,5mm. If over 6,5mm	Does not apply to thickness under 6,5mm. If over 6,5mm	Does not apply to thickness under 6,5mm. If over 6,5mm	Does not apply to thickness under 6,5mm. If over 6,5mm

	of no more than 15mm over 1M panel's diagonal length	then allowed with sag of no more than 15mm over 1M panel's diagonal length	then allowed with sag of no more than 15mm over 1M panel's diagonal length	then allowed with sag of no more than 15mm over 1M panel's diagonal length	then allowed with sag of no more than 15mm over 1M panel's diagonal length
22.Metal inclusions	Not allowed	Not allowed	Not allowed	Color metal staples are allowed	Color metal staples are allowed
23.Gap in slice joint	Not allowed	Not allowed	Allowed with width of no more than 1mm in 1 piece for 1M of panel sheet	Allowed with width of no more than 2 mm in 1 piece for 1M of panel sheet	Allowed
24.Delamination, bubbles, etc	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
25.Waviness(for sanded plywood), charter marks	Not allowed	Not allowed	Not allowed	Allowed	Allowed
26.Rough or torn grain	Roughness parameter(Rm) is per GOST 7016; 100 for sanded plywood and 200 for non-sanded	Roughness parameter(Rm) is per GOST 7016; 100 for sanded plywood and 200 for non-sanded	Roughness parameter(Rm) is per GOST 7016; 100 for sanded plywood and 200 for non-sanded	Roughness parameter(Rm) is per GOST 7016; 100 for sanded plywood and 200 for non-sanded	Roughness parameter(Rm) is per GOST 7016; 100 for sanded plywood and 200 for non-sanded
27.Wooden plugs	Not allowed	Not allowed	Allowed in repair up to 8 pieces for 1m ² of panel	Allowed with no limits	Allowed with no limits
28.Overlapped plugs	Not allowed	Not allowed	Allowed no more than 2 pieces per 1m ² of panel	Allowed	Allowed

Note:

- 1. Norm of manufacturing defects "lack of veneer" refers both to outer and core lines.
- 2. Wood and manufacturing defects which are not mentioned in Table 3 are not allowed.



TABLE 4

Grade of Face Veneer	Maximum amount of permitted defects for wood and manufacturing (in pieces)
E	No visible defects
I	3
II	6
III	9
IV	Amount of wood and manufacturing defects is unlimited. Limits on dimensions is in accordance with items 3,5,11,12,14,24 of Table 3



APPENDIX A

COMPARATIVE CHART OF GRADE MARKING IN THIS GOST, IN GOST 10.55-71 AND GOST 3916.1-89 GRADES

GOST 3916.1-96	GOST 10.55-71	GOST 3916.1-89
E	-	A
I	B	AB
II	BB	B
III	CP	BB
IV	C	C



TABLE 5

Index	Thickness(mm)	Glue bond	Birch	Alder Beech	Pine Larch Fir Silverfir Cedar	Lime Asp Poplar
Moisure content	3-30	FSF FK	5-10	5-10	5-10	5-10
Shear strenght (MPa) not less than						
after boiling in water for 1 hour	3-30	FSF	1,5	1,2	1,0	0,6
after soaking in water for 24 hours		FK	1,5	1,0	1,0	0,6
Static bending strength of fibres (MPa) not less than	9-30	FSF	60	50	40	30
		FK	55,0	45,0	35,0	25,0
Tensile strength	3-6,5	FSF	40,0	40,0	40,0	40,0

along fibers, MPa, no less than		FK	30,0	30,0	30,0	30,0
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Note: Shear strength along glue line of 1.2. Mpa is permitted in accordance with terms of a sales contract.

TABLE 6

Glue Emission Class	Formaldehyde content in 100 grams of dry plywood mass, in mg.
E1	Up to 10
E2	From 10 to 30

TABLE 7

Volume for the lot	Index of control on the items below(in panels)			
	3.2.1.; 3.2.3; 3.2.3; 4.1.2; 4.1.6; 4.1.7; 4.3			
	Selection Volume	Number for Acceptance	Selection Volume	Number for Acceptance
Up to 500	8	1	13	1
501 to 1200	13	1	20	2
1201 to 3200	13	1	32	3
3201 to 10000	20	2	32	