



UNITED **PANEL** GROUP

Zheshartsky LPK Ltd.

GLUED PLYWOOD

Technical requirements
TU 5512-001-12886368-2019

1. SCOPE OF APPLICATION

These technical requirements are applied to glued plywood with outer layers from birch veneer and veneer from coniferous species:

- 1) plywood for general purposes.

Scope of application: construction, molding, furniture production, floor construction, interior and exterior decoration, roofing, transport engineering, car and ship building, packaging;

- 2) plywood for intended use (Appendix №3).

Scope of application: for the production of furniture and hockey sticks;

- 3) grade D.

Scope of application: intended for interior decoration, floor construction, use in construction without internal cutting (cutting grooves);

- 4) plywood strips.

2. NORMATIVE REFERENCES

Designation	Denomination
GOST 3916.1-18	Plywood of general purpose with outer layers from hardwood veneer. Technical requirements
GOST 3916.2-18	Plywood of general purpose with outer layers from veneer of softwood species. Technical requirements
GOST 9462-2016	Round timber of hardwood species. Technical requirements
GOST 30427-96	Plywood of general purpose. General rules for classification by appearance
GOST 2140-81	Visible defects of wood. Classification, terms and definitions, measurement methods
GOST 7502-98	Measuring metal tape rulers. Technical requirements
GOST 11358-89	Thickness feeler gauge and indication tube micrometer with graduation mark 0.01 and 0.1 mm. Technical requirements
GOST 15612-2013	Products from wood and wood-based materials. Surface roughness characteristics determination methods
GOST 8925-68	Flat feelers for machine accessories. Construction
GOST 14192-96	Marking of goods
GOST 6507-90	Micrometers. Technical requirements
EN 13986:2004+ A1:2015	Wood-based boards for using in structure. Characteristics, conformity assessment and marking
EN 310-1993	Determination of modulus of elasticity at bending and bending strength
EN 314-1-2005	Plywood. Bonding quality. Part 1. Testing methods.
EN 314-2-1993	Plywood. Bonding strength. Part 2. Requirements.
EN 322-1993	Wood-based panels. Moisture content determination.

ISO 12460-3-2016	Wood-based panels. Formaldehyde release determination. Part 3. Gas analysis method
GOST 9622-2016	Laminated glued wood. Strength limit and modulus of elasticity at tension determination methods;
GOST 12.3.002-2014	Standards system of labor safety. Production processes. General safety requirements
GOST 12.4.011-89	Safety standards system. Safety equipment. General requirements, classification
SP 2.1.2.729-99	Polymer and polymer containing construction materials, items and components. Safety hygienic requirements.
MU 2.1.2.1829-04	Sanitary-hygienic evaluation of polymer and polymer containing construction materials and components intended for applying in accommodation, public and industrial buildings
GOST 12.1.005-88	Safety standards system. General sanitary-hygiene requirements to workplace air.
MU 4525-87	Methodological instructions of formaldehyde concentrations and methanol photometric measurements in workplace area
GOST 12.1.014-84	Safety standards system. Workplace air. Hazardous substances concentrations measurement method by indicator tube.
SP 2.2.1327-03	Sanitary-epidemiological rules. Hygienic requirements for technological processes organization, production equipment and work tools.
GN 2.2.5.1313-03	Hygienic standards of hazardous substances maximum allowable concentration in the ambient air of working area
GOST 17.2.3.02-2014	Protection of the nature. Atmosphere. Regulation of hazardous substances allowable emissions by industrial plants
GN 2.1.6.1338-03	Polluting substance maximum allowable concentration in the atmosphere of populated area
SP 2.1.5.980-00	Hygienic requirements to surface water protection
GOST 12085-88	Natural enriched chalk. Technical requirements
GOST 19607-74	Enriched kaolin for chemical industry. Technical requirements
GOST 7579-76	Melamine. Technical requirements
GOST 2081-2010	Urea. Technical requirements
GOST 2210-73	Technical ammonium chloride. Technical requirements
GOST 2263-79	Technical sodium hydrate. Technical requirements
GOST 8429-77	Borax. Technical requirements
GOST 7045-2017	Bread rye flour. Technical requirements
GOST 12439-79	Continuous sanding belts and sanding rolls. Dimensions
TU 2223-032-00203803-2013	Urea formaldehyde concentrate

3. CLASSIFICATION AND DIMENSIONS

3.1. Plywood is divided into:

- grades according to surface appearance,
- trademarks according to gluing line water resistance,
- sanded or unsanded according to surface processing type.

3.1.1. According to appearance of outer layers from birch veneer plywood is divided into ten grades: B, S, BBx, BB, CP, WG, C, duraFrame, D, plywood strips.

According to appearance of outer layers from coniferous wood plywood is divided into four grades: Bx, BBx, CPx, Cx.

3.1.2. According to gluing line water resistance grade plywood is divided into trademarks:

- PF (WBP) – high water resistance plywood bonded by phenol formaldehyde resins for interior and exterior usage,
- MUF (WBP Melamine) – high water resistance plywood bonded by melamine-urea formaldehyde resins for interior and exterior usage,
- UF (MR) – water resistance plywood bonded by urea formaldehyde resins for interior usage.

3.1.3. According to surface mechanical processing plywood is divided into:

- unsanded – NS,
- sanded from one side – S1,
- sanded from both sides – S2S.

3.2. Dimensions:

3.2.1. General and intended purposes plywood length and width are to be in accordance with the table 1.

Table 1

Plywood length (width), mm	Limit deviation, mm
100, 170, 180, 210, 215, 220, 240, 250, 270, 280, 300, 330, 360, 600, 780	±1.0
1200, 1220, 1250, 1270, 1275, 1340, 1350	±3.0
1500, 1525, 1800, 1830, 2100, 2135, 2440, 2500	±4.0
2700, 2745, 3000, 3050, 3600, 3660	±5.0
Notes:	
1. It is allowed to produce plywood of other dimensions in accordance with the terms of contract.	
2. Plywood length is determined along the grain of timber outer layers.	

3.2.2. Plywood thickness is to be in accordance with the specified data:

- for general purposes plywood – in table 2;
- for intended purposes plywood – Appendix №3 in table 1.

Table 2

Nominal plywood thickness, mm	Number of layers in plywood, not less	Sanded plywood		Unsanded plywood		
		Limit deviation, mm	Thickness variation, mm	Limit deviation, mm	Thickness variation, mm	
3	3	+0.3 -0.5	0.6	+0.9 -0.4	1.0	
4; 5	3; 5	+0.3 -0.5		+0.9 -0.4		
6; 6.5; 7	5	+0.4 -0.6		+1.0 -0.5		
8; 9	5; 7	+0.45 -0.65		+1.0 -0.5		
10; 11	7; 9	+0.5 -0.7		+1.1 -0.6		
12	7; 9	+0.5 -0.7		+1.1 -0.7		
14; 15; 16	9; 11	+0.65 -0.85		+1.2 -0.75		1.5
17; 18	11; 13; 15	+0.7 -0.9		+1.3 -0.8		
20; 21	13; 15; 17	+0.8 -0.1		+1.4 -0.9		
24	15; 17	+0.9 -1.1		+1.5 -1.0		
27; 28	17; 19	+1.0 -1.2	1.0	+1.6 -1.1	2.0	
30	19, 21	+1.1 -1.3		+1.7 -1.2		
35	23, 25	+1.2 -1.4	1.2	+1.85 -1.35	2.5	
38	23, 27	+1.3 -1.5		+1.9 -1.4		
40	23, 29	+1.4 -1.6		+2.0 -1.5		

Note: it is allowed to produce plywood of other thicknesses and number of layers according to contract terms. At that limit deviations are determined according to formulas:
for sanded plywood: $+(0.2 + 0.03 Sf)$, $-(0.4 + 0.03 Sf)$;
for unsanded plywood: $+(0.8 + 0.03 Sf)$, $-(0.3 + 0.03 Sf)$,
where Sf – plywood nominal thickness.

3.2.3. Plywood boards are to be cut at right angle. Out-of-the squareness is not to be above 2 mm per 1 m of board edge length.

3.2.4. Deviation from edge straightness is not to be above 2 mm per 1 m of board length.

3.2.5. Plywood specification includes:

- product description,
- outer and inner layers wood species,

- trademark,
- outer layers veneer grades combination,
- emission class,
- surface processing type,
- dimensions,
- existing specification designation.

Example of birch plywood specification with inner layers from birch veneer, trademark UF with combination of outer layers from veneer grades BB/CP, emission class E1, sanded from both sides, with length 1525 mm, width 1525 mm, thickness 8 mm:

Plywood birch/birch, UF (MR), BB/CP, E1, S2S, 1525x1525, 8 mm, TU 5512-001-12886368-2019.

Example of coniferous plywood specification with inner layers from fir veneer, trademark UF with combination of outer layers CPx/Cx, emission class E1, sanded from both sides, with length 1525 mm, width 1525 mm, thickness 8 mm:

Plywood birch/birch, UF (MR), CPx/Cx, E1, Ш2, 1525x1525, 8 mm, TU5512-001-12886368-2019.

4. TECHNICAL REQUIREMENTS

Glued plywood is to be in accordance with these technical requirements (GOST 3916.1, GOST 3916.2) and process procedure as applicable.

4.1. Characteristics:

- 4.1.1. Veneer of hardwood and softwood species is used to produce plywood outer layers. Veneer of other species wood is allowed to use for producing inner layers. Plywood is considered to be produced from that wood species which is used for outer layers.

Plywood produced from wood of one or different species is subdivided into homogenous or combined accordingly.

In case of even-numbered layers of veneer two middle layers are to have parallel direction of grain. Veneer layers located symmetrically over plywood thickness are to be from wood of one species and thickness.

Veneer thickness used for plywood outer and inner layers is not to be above 2.5 mm.

- 4.1.2. Wood flaws and processing defects over the limits specified in tables 1, 2, 3 (Appendix №2) are not allowed in outer and inner layers of plywood from hardwood species.

Wood flaws and processing defects over the limits specified in table 4 (Appendix №2) are not allowed in outer and inner layers of plywood from softwood species.

4.1.3. It is allowed to combine outer layers of grades B, S, BB, BBx, CP, WG, C from unlimited number of veneer strips. For grades B, S, BBx joints are to be parallel to edges and strips color-coordinated. For grade BB strips not in color are allowed, equated to healthy discoloration and matched to the basis /the biggest part of sheet. It is allowed to make up outer layers of grades Bs, BBxs, CPs from strips in accordance with the paragraph 31, table 3 (Appendix №2).

It is allowed to combine softwood species outer layers of grades Bx, BBx, CPx, C from unlimited number of veneer strips. For grade Bx strips not in color are allowed, equated to healthy discoloration and matched to the basis /the biggest part of sheet.

4.1.4. It is allowed to produce plywood with any combinations of outer layers. But veneer grades matching for outer and inner layers in each plywood board is to be in accordance with Appendix №1, table 1 (hardwood species), table 2 (softwood species).

4.1.5. Inserts from hardwood and softwood species veneer are to be matched to the surface, bonded strong and matched the color and grain direction of plywood outer layer wood species. For grade S inserts are to be matched the wood color.

Inserts with on-grade discoloration matched for basis/the biggest part of sheet are allowed for grades BBx, BB.

On hardwood and softwood species putty should match the wood color, ensure covering materials bonding, it is not to be broken off while mechanical processing and plywood bending, not to be cracked.

4.2. Formaldehyde content in general and intended purposes plywood is to be according to values specified in table 3.

Table 3

Emission class	Formaldehyde content per plywood oven-dry mass, mg (perforator method)	Formaldehyde release	
		Chamber method, mg/m ³ of air	Gas analysis method, mg/m ² per hour
E0.5	Up to 4.0 included	Up to 0.01 mg/m ³ included	Up to 1.5 mg/m ² •h included
E1	Up to 8.0 included	Up to 0.124 mg/m ³ included	Up to 3.5 mg/m ² •h included

4.3. Physical-mechanical characteristics values are to be in accordance with specified:

- for plywood with outer layers from veneer of hardwood species in table 4;

Table 4

№	Parameter name	Thickness, mm	Trademark	Hardwood		Softwood
				Birch	Aspen	Pine, fir, other species of wood with theoretical density less 500 kg/m ³
1	Moisture, %	3-40	PF MUF UF	5-11		
2	Shear strength limit over glue line:					
2.1	after boiling in water for 6 hours, alternate boiling*, MPa, not less	3-40	PF MUF	1.0	0.8	0.8
2.2	after steeping the samples in water for 24 hours at temperature 20±3 °C, MPa, not less		UF PF	1.0	0.8	0.8
3	Static bending strength limit:					
3.1.	along the grain of outer layers, MPa, not less	9-40	PF MUF UF	40		
3.2.	across the grain of outer layers, MPa, not less		PF MUF UF	15		
4	Tensile strength limit along the grain, MPa, not less	3-6.5	PF MUF	40	30	
			UF	30	30	
*Note: boiling in water for 4 hours, drying-out in the larder at temperature 60±3 °C for 16-20 hours, repeated boiling in water for 4 hours, cooling in water at temperature 20±3 °C for 1 hour.						

- for plywood with outer layers from veneer of coniferous species in table 5.

Table 5

№	Parameter name	Thickness, mm	Trademark	Hardwood		Softwood
				Birch	Aspen	Pine, fir, other species of wood with theoretical density less 500 kg/m ³
1	Moisture, %	3-40	PF MUF UF	5-11		
2	Shear strength limit over glue line, MPa, not less:					
2.1	after boiling in water for 6 hours, alternate boiling*	3-40	PF MUF	1.0	0.8	0.8
2.2	after steeping the samples in water for 24 hours at temperature 20±3 °C		UF	1.0	0.8	0.8
3	Static bending strength limit:					
3.1	along the grain of outer layers, MPa, not less	9-40	PF MUF UF	40		
3.2	across the grain of outer layers, MPa, not less		PF MUF UF	15		
4	Tensile strength limit along the grain, MPa, not less	3-6.5	PF MUF	25	25	
			UF	20	20	
*Note: boiling in water for 4 hours, drying-out in the larder at temperature 60 ±3 °C for 16-20 hours, repeated boiling in water for 4 hours, cooling in water at temperature 20±3 °C for 1 hour.						

4.4. Plywood record keeping is done in cubic or (and) square meters. One board volume is determined accurate to 0.00001 m³, plywood batch volume accurate to 0.01 m³. Plywood board area is taken into account accurate to 0.01 m², area of boards in batch accurate to 0.5 m².

In calculating volume and area of boards, maximum limit deviation on length, width and thickness is not taken into account.

4.5. Requirements to raw materials, materials:

4.5.1. Round timber of Hardwood species GOST 9462-88. Round timber of Softwood species GOST 9463-88.

4.5.2. Phenol formaldehyde liquid resin of trademark SF-3014 on GOST 20907.

4.5.3 Melamine GOST 7579.

4.5.4. Urea GOST 2081.

4.5.5. Urea formaldehyde concentrate TU 2223-032-00203803.

4.5.6. Ammonium chloride GOST 2210.

4.5.7. Technical sodium hydroxide GOST 2263.

4.5.8. Technical borax GOST 8429.

4.5.9. Natural enriched chalk GOST 12085.

4.5.10. Bread rye flour GOST 7045.

4.5.11. Continuous sanding belts GOST 22776.

5. ACCEPTANCE PROCEDURE

5.1. Plywood is delivered for acceptance in batches. The batch consists of plywood from wood of one species, trademark, one grade, formaldehyde emission class, surface processing type and dimensions of boards and is to be recorded in one document about quality including:

- name of the manufacturer country,
- name and (or) trademark of manufacturer and his address,
- plywood specification,
- standard process documentation according to which the plywood is produced.

5.2. Boards quality and dimensions are determined by random sampling. According to the contract it is allowed to make an inspection by complete inspection.

Random sampling is made in accordance with GOST 18321 in quantity specified in table 6.

Table 6

Batch volume, number of boards	Test item according to items:			
	3.2.1-3.2.3		4.1.2, 4.1.5, 4.1.6	
	Sample volume	Acceptance number	Sample volume	Acceptance number
Not more 500	8	1	13	1
From 501 to 1200	13	1	20	2
From 1201 to 3200	13	1	32	3
From 3201 to 10000	20	2	32	3

5.3. Moisture, shear strength limit over glue line, static bending along the grain, tensile along the grain are tested for each trademark, thickness and plywood number of layers at least once a month.

It is allowed testing in accordance with the contract for each batch, therefore 0.1% boards from batch are sampled but not less than one board.

5.4. One plywood board is taken from any sample volume for formaldehyde emission testing. Formaldehyde emission value is tested for plywood of trademarks PF and UF once per 7 days.

- 5.5. Batch is considered to be complying with existing Technical requirements and accepted if in sampling:
- number of plywood boards not complying with the requirements of TU 5512-001-12886368-2019 according to dimensions, out-of-squareness, straightness, wood flaws and processing defects is less or equal to acceptance number specified in table 6,
 - formaldehyde content conforms with standards specified in table 3,
 - physical-mechanical values conform with standards specified in tables 4, 5.

6. TESTING METHODS

- 6.1. Sampling for physical-mechanical testing is according to EN 13986.
- 6.2. Plywood length and width is measured in two points in parallel to edges on distance not less 100 mm from edges by metal tape according to GOST 7502 with an accuracy of 1mm. For actual length (width) of board is taken arithmetic mean value of two measurements results.
- 6.3. Thickness is measured on distance not less 25 mm from edges and in the middle of each board side by thickness feeler gauge graduated in not more 0.1 mm according to GOST 6507.
For actual board thickness is taken arithmetic mean value of four measurements results.
Thickness variation in one plywood board is taken as difference between maximum and minimum thickness of four measurements.
- 6.4. Moisture is according to EN 322.
- 6.5. Shear strength limit over glue line is according to EN 314.
- 6.6. Static bending strength limit and modulus of elasticity is according to EN 310.
- 6.7. Tensile strength limit is according to GOST 9622.
- 6.8. Formaldehyde content is according to ISO 12460-3, GOST 27678.
- 6.9. Flaws in the wood and processing defects measurement are according to GOST 30427, GOST 2140.
- 6.10. Deviation from plywood board edges straightness is determined by measuring maximum clearance between board edge and metal ruler edge is according to GOST 427, with feeler is according to GOST 8925 to an accuracy of 0.2 mm.
- 6.11. Plywood board out-of-squareness is determined by triangle according to GOST 3749, applied on related board edges. Board out-of-squareness value is determined by measuring board edge deviation from the side of triangle with metal ruler according to GOST 427 to an accuracy of not more 0.5 mm.
Plywood board out-of-squareness is determined by triangle according to GOST 3749, applied on related board edges. Board out-of-squareness value is determined by measuring board edge deviation from the side of triangle with metal ruler according to GOST 427 to an accuracy of not more 0.5 mm.

It is allowed to determine plywood board out-of-squareness dimension according to differences of board diagonals length measured by metal measuring reel in accordance with GOST 7502 with graduation mark 1 mm.

- 6.12. Warpage is determined by measuring maximum deflection per 1 m diagonal length of board located on flush horizontal table to an accuracy of not more 0.1 mm.

7. MARKING, STACKING AND PACKAGING

- 7.1. Marking is made by indelible paint on right corner edges. Plywood boards are stacked into packages with higher grade on the top. Manufacturer number, grader number, plywood grade and trademark are specified on the stamp.

- 7.2. Marking is applied on Plywood package, including:

- name of the manufacturer plant and (or) their trademark,
- product name,
- plywood specification,
- geometrical dimensions,
- plywood trademark,
- plywood surface mechanical processing,
- plywood grade,
- number of boards in packing,
- shift,
- conformity national trademark identification for certified products,
- emission class,
- production date,
- number of packager,
- handling marks («Do not use hooks», «Keep dry»),
- barcode.

For the convenience of working in the warehouse, additional marking can be applied in the form of a label or using a stencil.

- 7.3. Plywood for delivery to the customer is subjected to protection from the top, bottom and from the lateral sides by covers. Marking of plywood packets is on one lengthwise, side covers. By agreement with the customer plywood is allowed to be packed with one side cover for application of marking and angle blocks under steel packing strap.
- 7.4. Packet marking is made by paint of green color for plywood of UF trademark and violet color for PF and MUF trademark. By agreement with the customer packet marking by paint of other color is allowed.
- 7.5. Additional marks on packet marking is determined by

- table 7 for general purposes plywood;
- table 1 Appendix №1 for intended purposes plywood.

Table 7

Additional marks on package	Plywood characteristics in the package
SHOP	Plywood with edge defects according to item 20 Appendix №2 of this TU 5512-001-12886368-2019.
UNI	One directional (fractional) plywood – all veneer layers have parallel direction grain
SPLICED	Plywood made with outer layers composed from veneer strips
Note: any other additional packet marking is allowed by agreement with the customer.	

Plywood is to be packed in weight not more 1500 kg according to trademarks, grades, emission class, surface processing types and dimensions.

8. STORAGE AND TRANSPORTATION

- 8.1. Plywood is transported in covered means of transport in accordance with the haulage rules acting for existing mode of transport.
During transportation, it is necessary to avoid moistening of birch plywood in order to avoid changes in the geometric, physical, and quality characteristics of birch plywood and the emission class.
- 8.2. Plywood is stored in horizontally piled packets on pallets or wooden spacers indoors at temperature from -40 to +50 °C and relative humidity of air not more 80%.
Stickers are put in intervals not more 500 mm in one vertical plane. Distance from outermost stickers to edges is not to be more than 150 mm.

9. SAFETY REQUIREMENTS AND ENVIRONMENTAL PROTECTION

- 9.1. Plywood production process is to be according to the requirements of technology regulations, GOST 12.3.002, SP 2.2.2.1327-03.
- 9.2. The composition of plywood does not contain raw materials, materials and components classified as hazardous waste.
- 9.3. Control over the level of migration of toxic elements from plywood should be carried out in accordance with sanitary rules and hygiene standards at least once a year in an accredited laboratory.
- 9.4. Work with urea-and phenol-formaldehyde resins is to be performed in rooms equipped with supply and exhaust ventilation and local suction devices that ensure the content of harmful substances in the air does not exceed maximum permissible concentration in water.
Plywood is a flammable and toxic product. According to the content of formaldehyde, plywood belongs to the emission class E1, E0.5.
- 9.5. Synthetic materials for the manufacture of plywood can only be used if there is a sanitary and epidemiological conclusion on the products issued by the Russian Federal Agency for oversight of Natural Resource Usage authorities.
- 9.6. Persons not younger than 18-year-old who have passed a medical examination in accordance with the order of the Ministry of health and social development are allowed to work.
- 9.7. Persons connected in the production process are provided with special clothing and personal protective equipment (respiratory organs, ears, eyes, hands) according to GOST 12.4.011.

10. ENVIRONMENTAL PROTECTION REQUIREMENT

- 10.1. Hazardous substances concentration released while producing plywood on the bound of sanitary protection zone is not to be above maximum allowable concentration in accordance with GN 2.1.6.1338-03. For purposes of atmospheric air protection, it is necessary to organize emissions control according to GOST 17.2.3.02-78.
- 10.2. Drain water from plywood production enters plant waste treatment facility. Drain water quality after waste treatment facility is to be in accordance with requirements of Sanitary regulations and Norms 2.1.5.980-00.
- 10.3. Wood wastes are used in fiberboard production, as burnable for boiler in boiler plant, partially are transported to the disposal site.

11. MANUFACTURER WARRANTY

Manufacturer warranties quality conformance of general purposes and intended purposes plywood to technical requirements of transporting and storage.

The guaranteed storage life of UF plywood is three years, of PF plywood is five years.

When using plywood for further processing, it is recommended to contact the manufacturer to clarify the properties and characteristics of the plywood.

Table 1. Hardwood plywood

Plywood grade																				
Designation of layers	E/BB	B	Bs	B+/BB	B/BB	Bs/BB	B/CP	BBxs	BB	BBx/CP	BB/CP	B/C	BBx/C	BB/C	CP	CPs	CP/C	CPs/C	C	dura Frame
Outer face	E	B	Bs	B+	B	Bs	B	BBxs	BB	BBx	BB	B	BBx	BB	CP	CPs	CP	CPs	C	dura Frame
Outer back	BB	B	Bs	BB	BB	BB	CP	BBxs	BB	CP	CP	C	C	C	CP	CPs	C	C	C	dura Frame
Inner layer	1-2		1-3													3				
Inner multiply layer	1-3																			

Table 2. Softwood plywood

Designation of layers	Bx	BBx	CPx	Cx
Outer layer	Bx	BBx	CPx	Cx
Inner layer	1-3			

Table 1. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Veneer

Name of Wood Drawbacks and Defects in accordance with GOST 30427		Measure ment Unit	Plywood with Outer Layers of Veneer of Grades								Acceptance Criteria for Veneer Grades of Inner Plywood Layers			
			B	BBx	S	BB	CP	WG	C	Plywood stripe	D	1	2	3
1	Knots													
a)	Intergrown sound	Not counted	mm	10	10	10	10	Allowed with cracks 1.5 mm, max	Allowed	Allowed	Allowed	Allowed	Allowed	
				Light	Light and dark									
		Allowed	mm	20	20	20	25 with cracks in width 1.0 mm, max							
				pcs/m ² on the surface	8	15	15							20
			Light	Light and dark										
b)	Black knots, non adhering knots and holes	Size	mm	6	6	6	6	6	15	40	60	20	30	60
		Quantity	pcs/m ² of the surface	5	3	3	3	10	10	10	No limit	No limit		
2	Cracks													
a)	Closed cracks	Length	mm	250	300	300	300	No limit		No limit	Allowed	Allowed	Allowed	
		Quantity	pcs/m ² of the board width	5	10	10	10	10	10					

Table 1. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Veneer

Name of Wood Drawbacks and Defects in accordance with GOST 30427			Measure ment Unit	Plywood with Outer Layers of Veneer of Grades								Acceptance Criterias for Veneer Grades of Inner Plywood Layers			
				B	BBx	S	BB	CP	WG	C	Plywood stripe	D	1	2	3
b)	Open cracks	Width	mm	Not allowed	2	2	2	4	4	10		15	3	4	15
		Length	mm		250	250	250	500	500	No limit		400	500	No limit	
		Quantity	pcs/m ² of the board width		2	2	2	4	5	No limit		No limit			
		In case of putty filling-in													
3	Wood structure drawbacks														
a)	Wavy grain, curly grain, feathers			Allowed											
b)	Burrs			Allowed											
c)	Barking pocket intergrown	Light		Allowed											
		Dark		Not allowed	Allowed in the total number of intergrown knots taken into account (item 1a)			Allowed in accordance with item 1a		Allowed in accordance with item 1b		Allowed	Allowed		
d)	Black heart		on the surface %, max	Not allowed	25			75			Allowed	Allowed			
e)	Mottle: invisible bark patches, streaks, stains out of streaks	Length	mm	175	250			Allowed					Allowed		
		Width	mm	4	10										
		Quantity	pcs/m ² of the surface	3	No limit in number										
f)	Streaks in groups		mm	Allowed not more 60 × 40		Allowed					Allowed				

Table 1. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Veneer

Name of Wood Drawbacks and Defects in accordance with GOST 30427			Measurement Unit	Plywood with Outer Layers of Veneer of Grades							Acceptance Criteria for Veneer Grades of Inner Plywood Layers			
				B	BBx	S	BB	CP	WG	C	Plywood stripe	D	1	2
4	Mineral streaks			Not allowed			Allowed				Allowed			
5	Fungal disease													
a)	Sap stains (blue sapwood, coloured sap spots)		on the surface not more %	30	50		Allowed				Allowed			
b)	Brow stain		On the surface not more %	Not allowed	50		Allowed				Allowed			
					Total area of brow stain and black heart should not exceed 50 % of board surface									
6	Insects damages			Allowed in accordance with the item 1b							Allowed in accordance with the item 1b			
7	Knotting and inserts													
a)	Wood inserts	Quantity	pcs/m ² of the surface	Not allowed		1	12	Allowed						
b)	Double inserts	Quantity	pcs per sheet	Not allowed			2	Allowed						

Table 1. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Veneer

Name of Wood Drawbacks and Defects in accordance with GOST 30427			Measurement Unit	Plywood with Outer Layers of Veneer of Grades								Acceptance Criteria for Veneer Grades of Inner Plywood Layers		
				B	BBx	S	BB	CP	WG	C	Plywood stripe	D	1	2
c)	Non adhering insert			Not allowed				Allowed in case of putty filling-in followed by sanding	Allowed					
8	Passes from straps	Quantity	pcs per sheet	Not allowed	2	1	5	5	Allowed					
9	Spots of production type			Not allowed					Allowed					
10	Glue penetration			Allowed in the form of strip in length not more 175 mm	Allowed slight in the form of spots 25 × 25	Allowed slight filamental not more 1% of board surface	2% for thickness from 3 mm to 21 mm and 5% from 24 mm and more	Allowed						
		Quantity	pcs/m ²	1	1									
11	Scratches, grooves, bumps, dents	Size	mm	Not allowed		Dents 10 mm		Dents 20 mm	Allowed					
		Quantity	pcs/m ²			3		4						
						In case of putty filling-in								

Table 1. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Veneer

Name of Wood Drawbacks and Defects in accordance with GOST 30427			Measure Unit	Plywood with Outer Layers of Veneer of Grades							Acceptance Criteria for Veneer Grades of Inner Plywood Layers		
				B	BBx	S	BB	CP	WG	C	Plywood stripe	D	1
12	Warpage			In plywood with thickness up to 5 mm is not taken into account, and with thickness more 5 mm is allowed not more 15 mm per 1 m of plywood board diagonal length									
13	Sanding through		on the surface %, max	Not allowed		10 cm ²	5	25	Allowed		Allowed		
						Within the limit deviations in thickness							
14	Lack of veneer												
a)	of outer layers	Length	mm	2	5			15					
b)	of inner layers	Length	mm	2	5			150					
15	Surface roughness			Roughness parameters R_{max} according to GOST 7016 no more 100 microns for sanded plywood, 200 microns for unsanded plywood									
16	Fiber pockets		on the surface %, max	Not allowed		5	15	Allowed					
17	Crimps (for sanded plywood) chatter marks			Not allowed			Allowed						
18	Delaminations, blisters			Not allowed									
19	Bark patching, rotten wood			Not allowed				Allowed					

Table 1. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Veneer

Name of Wood Drawbacks and Defects in accordance with GOST 30427			Measure ment Unit	Plywood with Outer Layers of Veneer of Grades							Acceptance Criterias for Veneer Grades of Inner Plywood Layers		
				B	BBx	S	BB	CP	WG	C	Plywood stripe	D	1
20	On plywood SHOP:			Allowed on the distance from one edge of the board							Allowed		
	Drawbacks in the wood and processing defects of this table												
	Additional defects: Mechanical damages, defects not cut down, non adhering insert, pressed-in wastes, hollow imprints, bark patching	Size	mm	150	200	250							
21	Additional requirements maximum quantity of veneer strips	Quantity	pcs per sheet	Not allowed	2			Allowed					
		Color matching			Yes	No							
		Texture matching			No								
22	Joint clearance			Allowed in total number with acceptance criterias item 2b of this table									

Note: Wood drawbacks and processing defects not specified in Table 2 are not allowed.

Table 2. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of duraFrame Grade Veneer

Name of Wood Drawbacks and Defects in accordance with GOST 30427	Plywood with Outer Layers of duraFrame Grade Veneer
1. Pin knots (in diameter up to 6 mm)	Allowed
2. Sound inter-grown light and dark knots	Allowed
3. Partially inter-grown knots, black knots, open knots, holes from them, worm hole	Allowed with a diameter no more than 100 mm
4. Closed cracks	Allowed
5. Open cracks	Allowed with width no more than 25 mm without limit in number, but not more of total width of cracks per one side 250 mm
6. Light barking pocket	Allowed
7. Inbark	Allowed
8. Variations in the structure of wood	Allowed
9. Sound discoloration	Allowed
10. Unsound discoloration	Allowed
11. Rotten wood	Not allowed
12. Pin hole	Allowed in total number with acceptance criteria item 3 of this table
13. Overlap	Allowed
14. Lack of veneer, defects in the edges of the board during sanding and trimming as well as any other edge defects other than rot and delamination	Allowed at a distance from the edge of the board not more than 150 mm
15. Availability of adhesive tape	Allowed in outer layers
16. Glue penetration	Allowed

Table 2. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of duraFrame Grade Veneer

Name of Wood Drawbacks and Defects in accordance with GOST 30427	Plywood with Outer Layers of duraFrame Grade Veneer
17. Hollow, imprint, ridge	Allowed. Depth within the thickness tolerances, mm
18. Fiber pockets	Allowed
19. Sanding through	Allowed
20. Warpage	In plywood with thickness up to 6.5 mm are not taken into account; In thickness of 6.5 mm or more is allowed with a deflection arrow not more 15 mm on 1 m diagonal of the plywood board
21. Metal inclusions	Non-ferrous metal brackets are allowed
22. Joint clearance	Allowed
23. Delamination, blisters, inbark	Not allowed
24. Crimps (for sanded plywood), fuzziness, chatter marks	Allowed
25. Surface roughness	Roughness parameter R_{max} according to GOST 7016 not more than 100 microns for sanded plywood, 200 microns for unsanded
26. Inserts from wood	No limit in number
27. Double insert	No limit in number
28. Streaks	Allowed no limit
29. Hollow, imprint, ridge	Allowed. Depth within the thickness tolerances, mm
30. Additional defects: – pressed-in wastes; – mechanical breakages for the entire length of the board as well as edges	Allowed Allowed in width up to 150 mm with no limit in number, in total width on one side not more than 300 mm
<p>Notes:</p> <ol style="list-style-type: none"> Acceptance criteria of processing defect “lack of veneer” refers also to inner layers of plywood. DuraFrame is specified as a grade for labeling products (boards and packages). 	

Table 3. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Plywood, Made of Strips

Name of Wood Drawbacks and Defects in accordance with GOST 30427	Plywood with Outer Layers of Grade Veneer			
	Bs	BBxs	CPs	C
1. Pin knots (in diameter up to 6 mm)	Allowed 3 pcs per m ² of board surface	Allowed		
2. Sound inter-grown light and dark knots: – diameter not more, mm; – quantity per 1 m ² of board surface not more, pcs; – with cracks in width not more, mm	Allowed 15 mm 5 pcs 0.5	Allowed 25 mm 10 pcs 1.0		Allowed No limit in quantity
3. Partially inter-grown knots, black knots, open knots, holes from them, worm hole: – diameter not more, mm; – quantity per 1 m ² of board surface not more, pcs	Allowed 6 mm 3 pcs	Allowed 6 mm 6 pcs	Allowed 6 mm 10 pcs	Allowed 40 mm No limit in quantity
4. Closed cracks: – in length not more, mm; – in quantity per 1 m ² of board width not more, pcs	Allowed 200 mm 2 pcs		Allowed	
5. Open cracks: – in length not more, mm; – in width not more, mm; – in quantity per 1 m ² of board width not more, pcs	Not allowed	Allowed 200 mm 2 mm 2 pcs In case of putty filling-in	Allowed 300 mm 2 mm No limit (up to 600 mm length, 5 mm width in case of putty filling-in)	Allowed No limit in length 10 mm No limit in quantity
6. Light barking pocket	Not allowed	Allowed		
7. Inbark	Not allowed	Allowed in total number with acceptance criteria item 2 of this table		Allowed
8. Variations in the structure of wood: slope of grain, curly grain, feather	Allowed			

Table 3. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Plywood, Made of Strips

Name of Wood Drawbacks and Defects in accordance with GOST 30427	Plywood with Outer Layers of Grade Veneer			
	Bs	BBxs	CPs	C
9. Sound discoloration (in total per the whole board), not more, % of board surface	5 %	20 %	Allowed	
10. Unsound discoloration	Not allowed		Allowed	
11. Rotten wood	Not allowed			
12. Pin hole	Allowed in total number with acceptance criteria item 3 of this table			
13. Overlap in outer layers – in length not more, mm; – in quantity per 1 m ² of board width not more, pcs	Not allowed	Allowed 100 mm 1 pc.	Allowed 200 mm 2 pcs	Allowed No limit in quantity
14. Overlap in inner layers, in quantity per 1 m ² of board width not more, pcs	Not allowed	2 pcs	Allowed	
15. Lack of veneer, defects in the edges of the board during sanding and trimming, in width not more, mm	2 mm	4 mm		5 mm
16. Availability of adhesive tape	Not allowed			
17. Glue penetration, not more, % of board surface	Not allowed	2 %	5 %	Allowed
18. Scratches	Not allowed		Allowed	
19. Hollow, imprint, ridge	Not allowed	Allowed in depth (height) within the limit values for thickness and in diameter not more 6 mm in quantity not more 3 defects per sheet	Allowed	

Table 3. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Plywood, Made of Strips

Name of Wood Drawbacks and Defects in accordance with GOST 30427	Plywood with Outer Layers of Grade Veneer			
	Bs	BBxs	CPs	C
20. Fiber pockets, not more, % of board surface	Not allowed	3 %	15 %	Allowed
21. Sanding through	Not allowed			Allowed
22. Warpage	In plywood with thickness up to 6.5 mm are not taken into account; in thickness of 6.5 mm or more is allowed with a deflection arrow not more 15 mm on 1 m diagonal of the plywood board			
23. Metal inclusions	Not allowed		Non-ferrous metal brackets are allowed	
24. Joint clearance	Not allowed	Allowed from the edge in total number with acceptance criteria in item 5 of this table		
25. Delamination, blisters, inbark	Not allowed			
26. Crimps (for sanded plywood), fuzziness, chatter marks	Not allowed		Allowed	
27. Surface roughness	Roughness parameter R_{max} according to GOST 7016 not more 60 microns for sanded plywood, 200 microns for unsanded		Roughness parameter R_{max} according to GOST 7016 not more 100 microns for sanded plywood, 200 microns for unsanded	
28. Inserts from wood	Not allowed			Allowed
29. Double insert	Not allowed			Allowed
30. Streaks: – in length not more, mm; – in width not more, mm; – quantity per 1 m ² of board surface not more, pcs	Allowed 150 mm 4 mm 3 pcs	Allowed 250 mm 4 mm 20 pcs	Allowed	

Table 3. Acceptance Criteria for Limiting Drawbacks in the Wood and Processing Defects in the Outer Layers of Plywood, Made of Strips

Name of Wood Drawbacks and Defects in accordance with GOST 30427	Plywood with Outer Layers of Grade Veneer			
	Bs	BBxs	CPs	C
31. On plywood SHOP: – drawbacks of wood and processing defects according to items 1–29 of this table; – additional defects: significant mechanical damages, not cut down defects, open (knocked down) insert, pressed-in wastes	Allowed at a distance from the edge of the board 150 mm	Allowed at a distance from the edge of the board 200 mm	Allowed at a distance from the edge of the board 250 mm	
32. Additional requirements: – maximum quantity of veneer strips per plywood board, pcs; – width of veneer strips not more, mm; – veneer strips matching according to color; – texture matching	8 200 Compulsory Compulsory	13 130 Compulsory No	17 100 No No	No limit No limit No No

Notes:

1. Acceptance criteria of processing defect "lack of veneer" is also applied to the inner layers of plywood.
2. Drawbacks of wood and processing defects not specified in Table 3 are not allowed.
3. For grades Bs, BBxs total quantity of knots according to items 2 and 3 must not exceed the value specified in item 2.
4. Plywood boards SHOP are stacked with defects on one lengthwise (or crosscut) side.
5. The width of the edge strips does not affect the grade of the board. Edge strips are included in the total number of allowed strips on the board. Edge strips with non-parallel edges are allowed for the main boards in the BBxs and CPs grades. Strips with non-parallel edges for the main boards in the center of the board are allowed only in grade C. In grade Bs all the strips must be parallel.
6. Procedure for marking the grade of plywood using top veneer made up of several strips:
 - 6.1 When using veneer of the same grade on both sides of plywood, the grade of plywood is marked with the veneer grade of one side.
Example: On both sides of plywood 6 mm format 1525 × 1525 used veneer BBxs; plywood boards and the indication of the grade on the package is applied as 6 mm BBxs 1525 × 1525 mm.
 - 6.1 When using different types of veneer on the sides of plywood, the product is marked with the indication of the grade of each side:
Example: On one side of the 6 mm plywood of the 1525 × 3050 mm format, the BBxs veneer is used, on the other side the CPs veneer is used.
Plywood boards and grade indication on the packages is indicated as follows: 6 mm BBxs / CPs 1525 × 3050 mm.

This Appendix is for intended purposes plywood having veneer layers with parallel direction grain

Table 1

Plywood nominal thickness, mm	Number of layers, not less	Sanded plywood		Unsanded plywood	
		Limit deviation, mm	Thickness variation, mm	Limit deviation, mm	Thickness variation, mm
8; 9	7	± 0.45	0.6	+ 1.0 - 0.5	1.0
10; 11	9	± 0.5		+ 1.1 - 0.6	
12	9	± 0.5		+ 1.1 - 0.7	
14; 15; 16	11	± 0.65		+ 1.2 - 0.75	1.5
17; 18	13	± 0.7		+ 1.3 - 0.8	
20; 21	15	± 0.8		+ 1.4 - 0.9	
24	17	± 0.9		+ 1.5 - 1.0	
27; 28	19	+ 1.0 - 0.2	1.0	+ 1.6 - 1.1	2.0
30	21	+ 1.1 - 1.3		+ 1.7 - 1.2	
35	23	+ 1.2 - 1.4	1.2	+ 1.85 - 1.35	2.5
38		+ 1.3 - 1.5		+ 1.9 - 1.4	
40		+ 1.4 - 1.6		+ 2.0 - 1.5	
<p>Note: it is allowed to produce plywood of other thicknesses and number of layers as agreed between the manufacturer and the consumer. At that limit deviations are determined according to formulas: for sanded plywood: + (0,2 + 0,03 Sf), - (0,4 + 0,03 Sf); for unsanded plywood: + (0,8 + 0,03 Sf), - (0,3 + 0,03 Sf).</p>					

- 1.1. When producing plywood with parallel direction veneer grains it is allowed to use one or several veneer layers located perpendicular to main plywood layers and symmetrically to core layer.

Physical-mechanical properties for intended purposes plywood

Table 2

№	Characteristic designation	Thickness, mm	Trademark	Hardwood		Softwood
				Birch	Aspen	Pine, fir (other kinds of wood with theoretical density less 500 kg/m ³)
1	Moisture, %	20-40	UF	5-11		
2	Shear strength limit over glue line, MPa, not less:					
2.1	after steeping samples in water for 24 hours at temperature 20 ±3 °C	20-40	UF	1,0	0,8	0,8
3	Static bending strength limit:					
3.1	along grain of outer layers, MPa, not less	20-40	UF	40		

Table 3

Additional marks on packages	Plywood characteristics in package
SHOP	Plywood with edge defects according to item 20 Table 1, Appendix №2 of this TU 5512-001-12886368-2019
UNI XI UNI X2	One directional (fractional) plywood – all veneer layers have parallel direction grain of wood excluded one or two perpendicular located symmetrically.
SPLICED	Plywood made with outer layers composed from veneer strips.
Note: any other additional package marking is allowed by agreement with the customer.	