

Homogeneous and combined Glued Plywood. Characteristic values of the properties associated to each Resistant Kind

Properties		Resistant Kind				Resistant Kind			
		GL24h	GL28h	GL32h	GL36h	GL24c	GL28c	GL32c	GL36c
Resistance , in N/mm ²									
Flexion	$f_{m,g,k}$	24	28	32	36	24	28	32	36
Parallel traction	$f_{t,0,g,k}$	16,5	19,5	22,5	26	14	16,5	19,5	22,5
Perpendicular traction	$f_{t,90,g,k}$	0,4	0,45	0,5	0,6	0,35	0,4	0,45	0,5
Parallel compression	$f_{c,0,g,k}$	24	26,5	29	31	21	24	26,5	29
Perpendicular compression	$f_{c,90,g,k}$	2,7	3,0	3,3	3,6	2,4	2,7	3,0	3,3
Cutting	$f_{v,g,k}$	2,7	3,2	3,8	4,3	2,2	2,7	3,2	3,8
Rigidity, in kN/mm ²									
Medium parallel elasticity module	$E_{0,g,medio}$	11,6	12,6	13,7	14,7	11,6	12,6	13,7	14,7
5th percentile parallel elasticity module	$E_{0,g,k}$	9,4	10,2	11,1	11,9	9,4	10,2	11,1	11,9
Medium transverse module	$E_{90,g,medio}$	0,39	0,42	0,46	0,49	0,32	0,39	0,42	0,46
Medium perpendicular elasticity module	$G_{g,medio}$	0,72	0,78	0,85	0,91	0,59	0,72	0,78	0,85
Density, in kg/m ³									
Characteristic density	$\rho_{g,k}$	380	410	430	450	350	380	410	430

Safety partial coefficient for Glued Plywood

Fundamental combinations:	g_M	1,25
Accidental combinations:	g_M	1,0

Values of the k mod factor for Glued Plywood

Kind of service	Kind of length of the load				
	Permanent	Long	Medium	Short	Instantaneous
1	0,60	0,70	0,80	0,90	1,10
2	0,60	0,70	0,80	0,90	1,10
3	0,50	0,55	0,65	0,70	0,90

Kinds of Service

A moisture rise reduces the mechanical properties, that is why one needs to take into account the target of the structure in order to make the necessary corrections when assigning resistant and deformation values.

CS 1	For a temperature of 20 +/- 2° C, relative moisture of the air over 65% just a few weeks of the year.	Under cover and closed structures.
CS 2	For temperature of 20 +/- 2° C, relative moisture of the air over 85% just a few weeks of the year	Swimming-pools, porches, tiers, ...
CS 3	Environmental conditions with higher moisture contents.	Footbridges, piers, pergolas, ...

Limitation of the sheet's thickness

	CS 1		CS 2		CS 3	
CONIFER	45 mm	10000 mm ²	45 mm	9000 mm ²	35 mm	7000 mm ²
LEAFY	40 mm	7500 mm ²	40 mm	7500 mm ²	35 mm	6000 mm ²

For curved elements, the sheet's thickness is also limited by the radius of curvature and the resistance characteristic to flexion of the toothed joint. Thickness should not exceed:

$$t \leq (r/250) (1 + f_{m,k}/80)$$

Therefore, in a piece of GL28 plywood and sheet thickness of 34 or 45 mm, the radii of curvature must be over 6.30 or 8.35 m respectively.

Wood Protection: Risk Kinds

Risk Kind 1	The structural element is under cover protected from wind and weather and not exposed to moisture. Moisture content under 20%. No risk of fungi's attack and can be attacked by beetles and occasionally by termites Examples: shopping centres, showrooms, sports centres...
Risk Kind 2	The structural element is under cover protected from wind and weather. Moisture content over 20% occasionally. Risk of cromogenous or xylophagous fungi's attack. Risk of attack by insects similar to those of kind 1. Examples: Indoor swimming-pools.
Risk Kind 3	The structural element is uncovered, not in contact with the ground and subjected to frequent humidifying. Moisture content over 20%. Higher possibility of attack by the same organisms as in kind 2. Examples: pedestrian footbridges, bridges, pergolas.
Risk Kind 4	The structural element is in contact with the ground or with fresh water. Moisture content over 20% permanently. In addition to the organisms in previous cases, possibility of attack by rotting fungi and a higher risk of attack by termites. Examples: constructions in fresh water and pillars.
Risk Kind 5	The structural element is in permanent contact with salt water. Moisture content over 20% permanently. In addition to the previous cases, one should consider the risk of attack by sea xylophagous. Examples: Constructions in salt water.

Types of protection against biotic agents and impregnation methods

Superficial protection	The average penetration reached by the protector is 3mm, being 1 mm as a minimum at any part of the surface treated. By means of brush strokes, pulverisation and brief immersion. With hydrosoluble or hydrodispersable products, or with organic solvents. P2 of UNE EN 315-1
Medium protection.	The average penetration reached by the protector is higher than 3 mm in any area treated, not reaching 75% of the impregnable volume. By means of prolonged immersion, by means of impregnation through autoclave: vacuum-vacuum and vacuum-pressure. With hydrosoluble salts, the protectors in organic solvents and the natural organic ones. P3 to P7 of UNE EN 315-1.
Deep protection	The average penetration reached by the protector is equal to or higher than 75% of the impregnable volume. By means of autoclave: vacuum-vacuum and vacuum-pressure. With hydrosoluble salts, the protectors in organic solvents and the natural organic ones. P8 to P9 of UNE EN 315-1.

KIND OF PROTECTION	NEEDED	ADVISABLE
Risk Kind 1	None	Superficial
Risk Kind 2	Superficial	Medium
Risk Kind 3	Medium	Deep
Risk Kind 4	Deep	
Risk Kind 5	Deep	