

2.2E Parallam® PSL vs 24F-V4 and V8 DF/DF Glued Laminated Beams

Benefits of specifying 2.2E Parallam PSL beams:

- Higher F_b , F_v , E allowable design stresses
- Zero camber with no structural 'up or down' leading to potential mis-installation for glued laminated beams (GLB)
- No additional tension laminations as required for a custom order, fire-rated glued laminated beams
- No need to specify special order V8 layup for continuous or cantilever span applications
- Design round holes in ForteWEB™ software
- Readily available

Higher allowable design stresses of 2.2E Parallam PSL compared to 24F-V4 or V8 DF/DF GLB allows 2.2E Parallam PSL, of equal or greater cross-sectional size, to be substituted for 24F-V4 or V8 DF/DF GLB. The basic allowable design properties for moment, shear, and stiffness (EI) for 5.25" wide 2.2E Parallam PSL will be greater than 5.5" wide 24F-V4 or V8 GLB. In addition, 11.875" & 16" deep 2.2E Parallam PSL can replace 12" & 16½" deep 24F-V4 or V8 GLB, respectively. With the exception that $F_{C_{perp}}$ is slightly lower, requiring a check when this parameter controls. See Table 1 for a comparison of design stresses. See Table 2 for applicable size substitutions.

Table 1 - Design Stress Comparisons

Product	$E_{(true)} \times 10^6$ (psi)	$E_{(Apparent)} \times 10^6$ (psi)	Species	$F_b(Tension)$ (psi)	$F_b(Compression)$ (psi)	$F_{C_{perp}}$ (psi)	F_v (psi)	Density (lbs/ft ³)
2.2E Parallam® PSL	2.2	-	DF	2900		625	290	45
24F-V4 DF/DF GLB	1.9	1.8	DF	2400	1850	650	265	35
24F-V8 DF/DF GLB	1.9	1.8	DF	2400	2400	650	265	35

- Refer to ICC-ES ESR-1387 for Parallam PSL beams and NDS Supplement for Glued Laminated Beams for complete table of values.
- Design stresses based on 12 in. depth.

As with any proposed material substitution, always seek approval from the project owner and their consulting team.

Fire design of exposed Parallam PSL beams may be calculated in accordance with chapter 16 of the National Design Specification (NDS) as stated in Parallam PSL code evaluation report, ICC-ES ESR-1387. Technical Report 10 (TR10) from American Wood Council (AWC) summarizes the results of fire-resistance tests of exposed structural composite lumber beams which demonstrate that a nominal char rate of 1½" per hour, commonly used for sawn lumber and GLB, is appropriate for Parallam PSL. Therefore, the char depth and effective char depths shown in NDS Table 16.2.1A apply to Parallam PSL. Strength adjustment factors shown in NDS Table 16.2.2 also apply. No special order Parallam PSL is required unlike GLB which require additional tension laminations to replace core laminations when a fire-rated beam is needed.

For applications under the IBC, the fire resistance of exposed Parallam PSL may be calculated in accordance with chapter 16 of the ANSI/AWC NDS. Parallam PSL of equivalent sizes to that of sawn lumber may be substituted for sawn lumber in fire resistance rated floor and roof assemblies as specified in Table 721.1(3) of the IBC.

TRUS JOIST® PRODUCT TECHNICAL INFORMER

(SW-N137)

For more information, see our *Beams, Headers, and Columns Specifier's Guide TJ-9020 and Fire-Rated Assemblies and Sprinkler Systems Guide TJ-1500*.

Table 2 – GLB to 2.2E Parallam PSL Conversions

24F – V4 or V8 DF/DF GLB					2.2E Parallam® PSL Conversion
3⅞ x 12	3½ x 12				3.5 x 11.875
3⅞ x 15	3½ x 13½				3.5 x 14
3⅞ x 16½	3½ x 16½				3.5 x 16
3⅞ x 19½	3½ x 18				3.5 x 18
3⅞ x 21	3½ x 21				3.5 x 20
3⅞ x 22½	3½ x 22½				3.5 x 22
3⅞ x 25½	3½ x 24				3.5 x 24
3⅞ x 10½	3½ x 10½	5⅞ x 9	5½ x 9		5.25 x 9.5
3⅞ x 13½	3½ x 13½	5⅞ x 12	5½ x 12		5.25 x 11.875
3⅞ x 16½	3½ x 16½	5⅞ x 13½	5½ x 13½		5.25 x 14
3⅞ x 19½	3½ x 18	5⅞ x 16½	5½ x 16½		5.25 x 16
3⅞ x 21	3½ x 21	5⅞ x 18	5½ x 18		5.25 x 18
3⅞ x 24	3½ x 24	5⅞ x 21	5½ x 19½		5.25 x 20
3⅞ x 27	3½ x 25½	5⅞ x 22½	5½ x 22½		5.25 x 22
3⅞ x 28½	3½ x 28½	5⅞ x 24	5½ x 24		5.25 x 24
3⅞ x 12	3½ x 12	5⅞ x 10½	5½ x 10½		7 x 9.5
3⅞ x 15	3½ x 15	5⅞ x 13½	5½ x 13½	6¾ x 12	7 x 11.875
3⅞ x 18	3½ x 18	5⅞ x 15	5½ x 15	6¾ x 13½	7 x 14
3⅞ x 21	3½ x 21	5⅞ x 18	5½ x 18	6¾ x 16½	7 x 16
3⅞ x 24	3½ x 22½	5⅞ x 19½	5½ x 19½	6¾ x 18	7 x 18
3⅞ x 27	3½ x 25½	5⅞ x 22½	5½ x 22½	6¾ x 21	7 x 20
3⅞ x 30	3½ x 28½	5⅞ x 25½	5½ x 24	6¾ x 22½	7 x 22
3⅞ x 31½	3½ x 31½	5⅞ x 27	5½ x 27	6¾ x 25½	7 x 24

Table General Notes:

- All substitutions shall be verified by designer of record.
- Beam sizes shown were checked for moment, shear, & stiffness (EI) only.
- Smaller Parallam PSL sizes may be possible based on specific application spans and loads.
- GLB sizes are based on a span to depth (L/d) ratio of 21. When L/d > 21, sizes should be determined by calculations.
- Simple span beams, dry-service conditions were assumed.