

2.2E Parallam® PSL vs. 24F-V4 & 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 Forte®WEB 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 2018 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 2018 National Design Specification (NDS) as stated 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 the 2018 NDS, Table 16.2.1A, apply to Parallam® PSL. Strength adjustment factors shown in the 2018 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.

Parallam® PSL is a suitable alternative in heavy timber construction if it meets or exceeds the minimum dimensions shown in Table 602.4 in the 2015 International Building Code (IBC) and Table 2304.11 in the 2018 IBC. Tests conducted at multiple accredited testing laboratories indicate that the fire resistance of Parallam® PSL is equivalent to that of sawn lumber or glued laminated beam.

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

TRUS JOIST® PRODUCT TECHNICAL INFORMER

June 2021 (SW-N137)

Table 2 – GLB to 2.2E Parallam PSL Conversions

24F – V4 or V8 DF/DF GLB					2.2E Parallam® PSL Conversion
3/8 x 12	3/2 x 12				3/2 x 11 7/8
3/8 x 15	3/2 x 13 1/2				3/2 x 14
3/8 x 16 1/2	3/2 x 16 1/2				3/2 x 16
3/8 x 19 1/2	3/2 x 18				3/2 x 18
3/8 x 21	3/2 x 21				3/2 x 20
3/8 x 22 1/2	3/2 x 22 1/2				3/2 x 22
3/8 x 25 1/2	3/2 x 24				3/2 x 24
3/8 x 10 1/2	3/2 x 10 1/2	5/8 x 9	5 1/2 x 9		5/4 x 9 1/2
3/8 x 13 1/2	3/2 x 13 1/2	5/8 x 12	5 1/2 x 12		5/4 x 11 7/8
3/8 x 16 1/2	3/2 x 16 1/2	5/8 x 13 1/2	5 1/2 x 13 1/2		5/4 x 14
3/8 x 19 1/2	3/2 x 18	5/8 x 16 1/2	5 1/2 x 16 1/2		5/4 x 16
3/8 x 21	3/2 x 21	5/8 x 18	5 1/2 x 18		5/4 x 18
3/8 x 24	3/2 x 24	5/8 x 21	5 1/2 x 19 1/2		5/4 x 20
3/8 x 27	3/2 x 25 1/2	5/8 x 22 1/2	5 1/2 x 22 1/2		5/4 x 22
3/8 x 28 1/2	3/2 x 28 1/2	5/8 x 24	5 1/2 x 24		5/4 x 24
3/8 x 12	3/2 x 12	5/8 x 10 1/2	5 1/2 x 10 1/2		7 x 9 1/2
3/8 x 15	3/2 x 15	5/8 x 13 1/2	5 1/2 x 13 1/2	6 3/4 x 12	7 x 11 7/8
3/8 x 18	3/2 x 18	5/8 x 15	5 1/2 x 15	6 3/4 x 13 1/2	7 x 14
3/8 x 21	3/2 x 21	5/8 x 18	5 1/2 x 18	6 3/4 x 16 1/2	7 x 16
3/8 x 24	3/2 x 22 1/2	5/8 x 19 1/2	5 1/2 x 19 1/2	6 3/4 x 18	7 x 18
3/8 x 27	3/2 x 25 1/2	5/8 x 22 1/2	5 1/2 x 22 1/2	6 3/4 x 21	7 x 20
3/8 x 30	3/2 x 28 1/2	5/8 x 25 1/2	5 1/2 x 24	6 3/4 x 22 1/2	7 x 22
3/8 x 31 1/2	3/2 x 31 1/2	5/8 x 27	5 1/2 x 27	6 3/4 x 25 1/2	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.