

3.08 Mass Timber Fire Resistance Rating Validation

There are two main paths to establishing fire resistance ratings for the primary and secondary structure: calculation method and fire performance testing.

1. National Design Specification (Calculation Char Depth Method)

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a.— Primary and Secondary Structure:

a. Methods outlined in either National Design Specification (NDS) or the Fire Design Specification (FDS) may be used to calculate the fire resistance rating of mass timber members.

i. Fire resistance ratings beyond the scope of the specifications, additional verification (e.g., existing data or testing) of the char rates utilized for design will be needed.

ii. The design team may utilize existing test char rate or char depth data as approved for use by the AHJ.

1. Note: The USDA Forest Products Laboratory has 3-hour char depth data for Douglas Fir, American Spruce, or European Spruce.

b. Approved and previously established performance-based design methods may also be used to calculate the fire resistance rating.

i.— The utilization of NDS provisions and calculations for the determination of char depth is a well-established and industry recognized procedure. For the scope of this guideline, it is recommended that the following (additional) items be considered:

ii.— Load Resistance Factored Design Fire Factors: 2022 Fire Design Specification (FDS) for Wood Construction has included additional Fire Factors (not currently covered in NDS) for the use of Fire Factors with LRFD provisions.

iii.— Extreme Event Loading: For loading in a fire scenario, the designer is referenced to the the most current edition of the Fire Design Specification (FDS) for Wood Construction.

iv.— Fire Resistance Ratings Beyond 2-hours: For members requiring fire resistance ratings beyond 2-hours, which is the duration the current NDS provisions have been validated for, it is recommended the design team provide specific testing, verifying the char rates utilized for design. The calculated char depth for a given duration should not be reduced beyond those calculated based on extrapolation of the current NDS equations.

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v. For projects utilizing Douglas Fir, American Spruce or European Spruce, the design team is advised to refer to the 3-hour testing provided by the USDA Forest Product Laboratory for the Ascent project.

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2. ~~Other testing options~~Fire Performance Testing

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b.a. Testing plan approved by AHJ and peer reviewers to be carried out by qualified laboratory on the components or systems (e.g., connections or wall and floor assemblies) for the fire resistance rating requirements.

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