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Flame Die-out of Glued Laminated Japanese Larch Lumber Columns with a Fire-retardant Shell-layer

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Abstract: According to the Building Standard Law of Japan, flame die-out of the specimen is required to certify fireproof wooden beams and columns in addition to structural strength in the ISO 834-1 fire test. In this study, we dealt with Japanese larch (*Larix kaempferi*) laminated lumber columns and presented a practical specification for flame die-out of wooden columns by using fire-retardant treated wood. This idea has been suggested but had not been applied successfully. We are attempting to develop wooden fireproof columns by putting fully fire-retardant impregnated wood as a flame die-out layer at appropriate positions in the glued laminated lumber. We used polyphosphatic carbamate as a fire-retardant. Japanese larch is classified among the less permeable species. We also showed how to make laminas whose content of fire-retardant chemicals ranges from 0 to more over 70 kg/m³ within a lamina. Incising treatment with a CO₂ laser was conducted for the flame die-out part and sealer was brushed on the core zone part of the lamina prior to the impregnation treatment. These fire-retardant-impregnated laminated lumber columns stopped burning after exposure to fire.

Keywords: glued laminated lumber, fire resistance, flame die-out, fire retardant, laser



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