

Loading Structural Steel Joists In Roof Assemblies

As the world's leading provider of passive fireproofing products, Isolatek International addresses the proper application of roof assembly UL Designs, specifically loading requirements and limitations for roof joists listed therein.

Selecting the appropriate UL fire resistance design for a roof assembly can be difficult. There are many factors that need to be considered such as insulation type and thickness, type of decking, and the hourly fire resistance rating requirements. Often, the loading limits of the structural member in a given UL roof assembly are overlooked. Loading limits are a critical factor when determining the appropriate design and material to use.

UL conducts full-scale fire tests on roof-ceiling assemblies in accordance with ANSI/UL 263 test method, loading the assemblies up to 30,000 psi (30 ksi). This loading is a standard outlined by the Steel Joist Institute (SJI) and is a nationally recognized structural design criterion for roof systems and structural supports. Loading limits are identified in UL designs under steel supports, beams or joists and are identified by maximum tensile strength. ANSI/UL 263 Fire Tests of Building Construction and Materials allows manufacturers to reduce the maximum load and list it in a particular design if they so choose. The standards for the loading of roof supports is 30 ksi. UL provides loading procedures under Loading of Test Specimens, in the introductory portion of the UL Fire Resistance Directory Volume 1.

When a UL roof-ceiling design (P-series and/or S-series) is utilized and lists structural members loaded to less than 30 ksi, a structural engineer needs to be consulted to determine how that compares to loading conditions on the project. If the project roof-ceiling assembly is subjected to a load greater than that which is referenced in the design, then an alternate UL design must be utilized to obtain a UL fire resistance rating. A UL design that does not list a maximum tensile strength has been loaded to 30 ksi.

Manufacturers may choose to test under-loaded designs to ensure adhesion and to allow for reduced UL design thicknesses. Utilizing under-loaded designs (i.e. P741) will result in lower thickness requirements for SFRMs. These lower thicknesses are not sufficient and will not provide the required UL fire resistance ratings for a roof joist loaded to 30 ksi.

It is Isolatek International's mission to test to industry standards and provide accurate information to industry professionals. This is a critical life safety issue that must be addressed in the design phase of every project.

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