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Engineering Modifications to Fire Tested and Listed Assemblies - *Innovation* January/February 2007

For both new and existing construction, the BC Building Code mandates that some structural elements such as exterior walls, load bearing walls, columns, beams, floor/ceiling assemblies and roofs achieve a minimum fire resistance rating. Similarly, fire-rated separations or assemblies are also required between different uses and occupancies. When a fire-rated assembly is penetrated by closures, doors, piping, wires, conduits, ducting or other elements, it requires adequate protection systems to maintain the level of fire separation of the assembly. Typically, building designers either specify a design listed by a testing/certification agency or use generic designs or assemblies outlined in the Building Code.

Fire-rated assemblies are tested in accordance with a standard fire test and assigned an hourly fire resistance rating based on time to failure. In Canada, this standard is CAN/ULC-S101-04, Standard Methods of Fire Endurance Tests of Building Construction and Materials. Similar standards, such as ASTM E119 and UL 263, are used in the US to establish a fire resistance rating for various building materials.

In Canada, these tests must be carried out by independent testing/certification agencies accredited by the Standards Council of Canada. These agencies play an important role in the certification and quality control of tested products. These certifications are then listed in their directories and these listings may be used by architects, engineers, designers, authorities or contractors in designing and assessing the fire resistance rating of various assemblies and systems.

- Over the years, questions have been raised regarding modifications to listed assemblies – that is, when a manufacturer, supplier, designer, contractor or installer makes changes to the assembly that were not included and/or contemplated as part of the original testing/listing of that product. The ULC list of equipment and materials includes some supplementary information to assist the users in deviations from the listed assemblies; these acceptable deviations are listed under heading “Consideration of Variations from Tested Designs” and provide guidance with respect to limits to these variations and/or transfer of components from one design to another before these changes impact the performance of the assembly. Any modification to a listed assembly or system beyond that envisioned under the applicable standard should be assessed to ensure the level of performance expected by the listing.

From a practical point of view, listed assemblies are often modified either during the design or construction stages of building projects. As the manufacturers of various assemblies/systems have a vested interest in the use of their products and generally have an in-depth knowledge of them, they are often asked to evaluate and provide suggestions for modifying their listed systems to suit specific construction conditions. However, it is not feasible for manufacturers to test every variation of a product. In order to assist engineers and architects in such matters, the performance of modifications to listed assemblies may be formally commented upon by manufacturers based on the test results from similar tested assemblies/systems and often without the consent of the listing agency that originally certified the product.

For instance, in the case of the firestop industry, some firestop manufacturers have been issuing commentaries on modifications to listed assemblies in the form of “Engineering Judgements.” “Engineering Judgements” are often presented in such a manner that they can cause confusion as the document may refer to an expectation that the modified assembly will pass a ratings test. Many engineers, architects, designers, authorities, and contractors have traditionally accepted these “Engineering Judgements,” assuming that they either have current listing, or that they have been reviewed and someone is taking responsibility for this modification.

The fact is that these manufacturer supplied “Engineering Judgements” need to include an engineer’s seal. Otherwise engineers and/or architects may unknowingly take responsibility for these modifications under their Letters of Assurance. This concern was brought to the attention of the APEGBC Building Codes Committee and in July 2006 the Committee issued a letter to several firestop manufacturers indicating that all “Engineering Judgments” should carry confirmation of engineering review.

Technical documents dealing with modifications to listed assemblies or the development of new assemblies not specifically listed relating to fire protection applications in buildings involves the practice of professional engineering as defined in the *Engineers and Geoscientists Act of British Columbia*. On this basis, these documents must be sealed by a professional engineer registered or licensed in BC who shall take responsibility for the design under seal.

In summary, if any modification is made to a listed assembly to address conditions outside a listing, or to address changes in materials or methods of installation to a listed assembly, these designs require confirmation of engineering review and all deviations to a listed assembly must be clearly identified as such. Confirmation of engineering review is provided by the engineer placing his professional seal on the document. This professional engineer must be registered or licensed in BC. The noted exception being where confirmation of the acceptability of the modifications is provided by the appropriate listing agency accredited by the Standards Council of Canada.

