Cable FIRESTOPPING

Before starting a search for suitable firestop systems, you would be well-advised to decide what general type of firestopping technology you would prefer to use.

By John Valiulis

Firestopping is the technology used to maintain the fire-resistance rating of a floor or wall assembly when the assembly needs to be breached for the passage of a service penetration.

Penetration firestopping is mandated by the Canadian National Building Code (Section 3.1.9), the Canadian National Fire Code (article 2.2.1.2) and the Canadian Electrical Code (Rule 2-124, Fire Spread), however, "firestopping" is not a product, per se.

A "firestop system" is what must be used to restore the fire resistance rating of an assembly when it is breached by a penetration.

A firestop system is a very specific, tested combination of the following parameters: substrate (wall or floor) and its specific properties (e.g. material, fire rating, thickness), penetrating item or items, hole size and shape, cable fill (percent of hole cross-sectional area filled by cables), and devices and/or materials used to seal the hole.

To evaluate firestop systems' compliance with the Canadian Codes, they are frequently tested by independent third-party test labs, such as UL (Underwriters Laboratories), ULC (Underwriters Laboratories Canada), or Warnock-Hersey.

Successfully passing the test results in a Listed firestop system; and the last item above – the device and/or material used to seal the hole, colloquially referred to as firestopping – is a Classified Material.

It is important to note that use of a Classified Material, in and of itself, does not mean a penetration is properly firestopped — it must be used in strict compliance with the firestop system requirements.

Applications outside the firestop system parameters may, or may not, meet the Code. There are approximately 850 penetration firestop systems listed by ULC, and 7,000 firestop systems listed by UL.

Types of cable firestopping: Before starting a search for suitable firestop systems, you would be well-advised to decide what general type of firestopping technology you would prefer to use, so as to greatly narrow the search.

Each category of firestopping products has its advantages and disadvantages. The choices are presented in Table 1, with guidance provided to help the user select the best option for their specific application.

As a general rule, the choice of firestopping types to be used will be most strongly dependent on the level of activity that is expected within the service penetration. If cables are to be installed, firestopped, and remain undisturbed for years at a time (inactive openings), then low-cost solutions exist, which essentially "cement" the cables into the wall or floor.

On the other hand, if cable additions or removal may occur every few years (moderately active openings), or even more than once a year (highly active openings), there now exist many firestopping product and device choices that provide some relative ease for adding and/or subtracting cables, with little to no extra time or cost required to firestop after the change.

Such devices have seen greatly increased usage over the last five years or so, particularly as cable mining has increased in importance.

Firestop system listings

It is useful to first clear up a common misconception that exists among many design professionals in Canada with regards to product certifications.

There is a perception that when searching for a CNBC-compliant firestop system, one must find a ULC Classified product, and ULC published firestop systems (see Figure 1 for the ULC Classification mark).

The truth of the matter is that listing laboratories other than ULC, namely UL and Warnock-Hersey,

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Figure 1: The ULC listing mark

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Table 1: Guide for selection of firestopping sealant and device types, based on application

Firestop type	Advantages	Disadvantages	Best used for	Not very suitable for
FOR INACTIVE SERVICE PENETRATIONS				
Intumescent caulk	- low cost	- hard when cured		- large gaps
FOR MODERATELY ACTIVE SERVICE PENETRATIONS				
Flexible intumescent putty	- re-usable (non-hardening) - easy-to-install		- Single cables or small bundles - irregular-shaped holes	- Large gaps in the wall or floor (annular space > 125 mm)
Flexible intumescent foam "plugs" (Fig 4)	- One-sided installation - excellent smoke seal - stays flexible - re-usable - very quick installation		- Blank openings up to 100 mm	- Non-circular holes
Firestop boards (Fig 5)	- Excellent smoke seal - one-sided installation cost-effective for large openings - some types very easy to cut	- Some types difficult to cut - requires mechanical fastening to wall	- Large holes (>300mm x 600mm) - cable trays - blank openings	- small holes - multiple spaced/ separated penetrating items within one hole
Firestop pillows	- Re-usable	- Compression required (often difficult) - cannot be cut to fit - higher smoke leakage - irregular shape makes large openings awkward to fill - wire mesh or cover plate usually required	- Cable trays - busways	- Very large openings (>300mm x 600mm)
FOR HIGHLY ACTIVE SERVICE PENETRATIONS				
Intumescent foam blocks (Fig 6)	- Re-usable - no compression required - can be cut to shape for irregular openings - systems with very low smoke leakage - some one-sided installation systems	- mesh or cover plate needed when annular space >100mm	- multiple separate penetrants - Can be used together with firestop board as hole gets bigger	
Pre-installed or post-installed firestopping sleeves (Fig 7)	- Simple installation - excellent smoke seal (for some models) - some suitable from 0% to 100% visual fill	- some require a re-assembly of components - some cannot be used as retrofit	- Any low-voltage cabling application	
Cast-in place firestop devices	- Eliminates need to core holes in floor - Simple installation - quick/easy cabling changes	- Additional materials may be needed around cables, e.g. mineral wool, putty - must be pre-planned (prior to concrete pour)	- Large cable bundles that fill the device opening - large diameter conduit	- Small bundles or individual wires

FIGURE 7

FIGURE 6

FIGURE 4


FIGURE 5

also provide firestop systems listings that comply with test standard ULC-S115, and have products that are Classified for use in Canada.

UL is accredited by the Standards Council of Canada (SCC) as both a Certification Organization (CO) and a Testing Organization (TO). With its SCC accreditations, UL certifies products with the UL Mark for the Canadian

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Figure 2

Figure 3

marketplace in accordance with Canadian standards and codes.

Products certified by UL in accordance with Canadian requirements will bear the listing ma rk "C-UL."

If certified in accordance with both Canadian and U.S. requirements, products will bear the listing mark "C-UL-US". The listing symbols (logos) are as shown in figures 2 and 3, respectively.

The best centralized sources for finding firestop system designs are the listing directories published by the testing and certification labs. Each of them publishes a paper listings directory. That information is also available from each on CD.

However, there is a cost associated with ordering the paper or electronic directories, and they become outdated as soon as they are published.

A more modern way of finding firestop system listings is to use the online directories provided by each lab. Unfortunately, performing those searches is far from user-friendly.

As a reference, the boxes below provide some step-by-step guidance on using each of the Web sites to find what you need.

Choices abound – a blessing, and a curse: With the hundreds of tested and listed cable firestop systems, there exists a solution for almost every situation. Table 1 is aimed at helping you to narrow down which general types of firestopping systems would provide the best choice for your applications. The boxed reference info on using the online certification directories can then assist you in browsing the hundreds of available systems.

Finally, if this all appears overwhelming, be aware that most firestop system manufacturers provide a high degree of technical sales support, and are eager to assist customers in the selection process. Contact phone numbers can usually be found quite easily from Web sites and catalogs. CNS

John Valiulis is Director, Codes & Standards, at Hilti, Inc. He is a registered professional engineer in Fire Protection Engineering. His education includes a Bachelor's degree in Chemical Engineering from McGill University, and a Master's degree in Fire Protection Engineering from Worcester Polytechnic. He can be contacted at john.valiulis@hilti.com

Finding firestop systems listed by Underwriters Laboratories of Canada (ULC)

To find cable firestopping systems in the ULC online directory, go to http://database.ul.com/cgi-bin/XYV/template/LISCANADA/1FRAME/index.html .

To search for penetration firestop systems, enter UL category code number XHEZC.

The search of this category yields 1005* results, meaning 1005 unique penetration firestop systems. By also adding the word "Cable" as a keyword in the Search parameters box, you can narrow down the results to 259* systems. If you also know the name of the firestop system manufacturer whose systems you would like to see, enter the company name here in the field "company name."

Once you get to whatever list of results you have searched for, all that you will see is a list of system numbers, which would be of the format "SP-123", which is simply a sequential listing number for their service penetration firestop systems. You would then need to click on each of them manually, to see if that particular system could be used for your specific conditions of wall or floor type, size and shape of hole, % cable fill within the hole, and cable type.

To see the most recently listed systems, which are often likely to be the most innovative, most user-friendly or most economical, particularly from the larger manufacturers, it can help to start your browsing with the largest system numbers first (those at the bottom of the list).

In this era of easily navigable Web sites, the ULC site unfortunately does not provide a "next" button that could be used to quickly and easily browse through the 259 available cable firestop systems. You must click on a system, look at it, go "Back" to the list and then click on another system. So browsing for suitable cable firestopping solutions is certainly not an easy thing to do.

Searching for firestop systems tested and listed by ULC is certainly well worth the time, but one really should not stop there. There is an abundance of other innovative and useful Canadian firestop systems that can be found in the directories from UL and from Warnock-Hersey.

** as of 8/22/08*

Finding firestop systems listed by Warnock-Hersey (ETL)

For Warnock-Hersey listed products, go to http://www.intertek-etlsemko.com, and click on "Product Directories". Select "WH and OPL mark directory."

Unfortunately, there is not an easy way to perform a search and to refine it for cable firestopping systems. This site is best used by searching for a desired firestop manufacturers' name, and browsing among the offerings from that manufacturer.

Finding firestop systems listed by Underwriters Laboratories

Cable firestop systems that meet the UL test requirements are all listed as also meeting the Canadian code/test requirements as well, since the UL/ASTM standard is more stringent than ULC-S115 for every type of penetrant other than plastic pipes.

To find cable firestopping systems in the UL online directory, go to http://database.ul.com/cgi-bin/XY/template/LISEXT/1FRAME/gothernbr.html The top right hand-box, which is labeled "though-penetration firestop system", is used to search for individual firestop systems, or to obtain a list of systems that can be used for a specific type of wall or floor construction and penetrating item.

The search term must be entered using the UL firestop system numbering nomenclature. Without launching into a tutorial on the nomenclature, below is a table that will indicate what to enter in the search box, depending on what you need the firestopping system for:

When you perform the search as indicated above, the result will be a list of firestop systems that meet the specific wall or floor type, and penetrating item type. The list can include dozens or even hundreds of listings.

You will still need to manually click through (search through) those results one-by-one to find suitable firestop systems that meet all of the other systems parameters, such as percent fill of the hole, specific cable type, hole shape and size, and firestopping product to be used.

To help narrow down the number of choices, you can click on "Refine your search" at the top of the results list. You can then enter a specific manufacturer's name if you wish to use their firestop products.

Note that the company name must be entered in the "company" field at the bottom of the page, not in the middle of the page. If you are planning on using a specific firestopping product, you can also enter the specific product name in the Keywords block.

Table 2

Construction being penetrated	Penetrating item	Enter this in the search box
Framed wall using gypsum wallboard	Cables	W-L-3*
Concrete or masonry walls ≤200 mm thick	Cables	W-J-3*, and C-AJ-3*, and C-BJ-3*
Framed floor	Cables	F-C-3*
Concrete floor ≤125 mm thick	Cables	F-A-3*, and C-AJ-3*
Concrete floor > 125 mm thick		F-B-3*, and C-BJ-3*
Concrete floor with protective ceiling membrane below	Cables	F-E-3*
See wall/floor descriptions above	Cable tray	Use a "4" instead of a "3" inthe search codes above
See wall/floor descriptions above	Cables in metallic conduit	Use a "1" instead of a "3" in the search codes above
See wall/floor descriptions above	Cables in non-metallic conduit	Use a "2" instead of a "3" in the search codes above