



Fire Tests for Evaluating Wire & Cable Flammability

Scope:

- *Fire Action and Cable Fires*
- *Performance of Cable Flame Tests*
- *Cable Fire Tests*
 - *NFPA 262 Plenum Steiner Tunnel Test*
 - *UL 1666 Riser Cable Fire Test*
 - *UL 1685 Vertical Tray Tests*
 - *UL 1581 / UL 2556 VW-1 Vertical Flame Test*
- *FR Material Implications*
- *Conclusions*

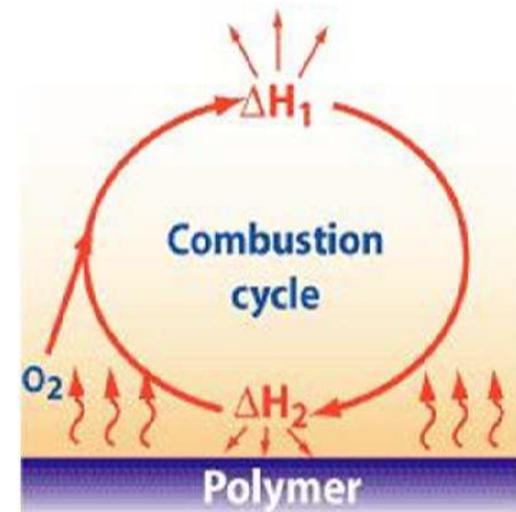
Mechanism of Fire Action

- Fire Triangle - three essential ingredients

- Heat
- Fuel
- Oxygen

- Combustion of cable materials lead to production of heat (and smoke)

- Fraction of heat (H_1) is lost to the surroundings through radiation and convection
- The heat feedback (H_2) pyrolyzes the polymers and promotes the further combustion resulting in flame spread and smoke generation



Fire Spread in Buildings due to Cabling

- Dusseldorf Airport, Germany, April, 1996
- Rockefeller Center, USA, October, 1996
- Garley Building, Hong Kong, November, 1996
- Bangkok President Tower, Thailand, Feb., 1997
- Credit Lyonnais Bank, France, May, 1997
- Heathrow Airport, UK, December, 1997
- Mont Blanc Tunnel, Switzerland, March, 1999



Credit Lyonnaise Bank, France



A series of large building fires have occurred that demonstrate the hazards of highly combustible materials (cable) in concealed spaces.

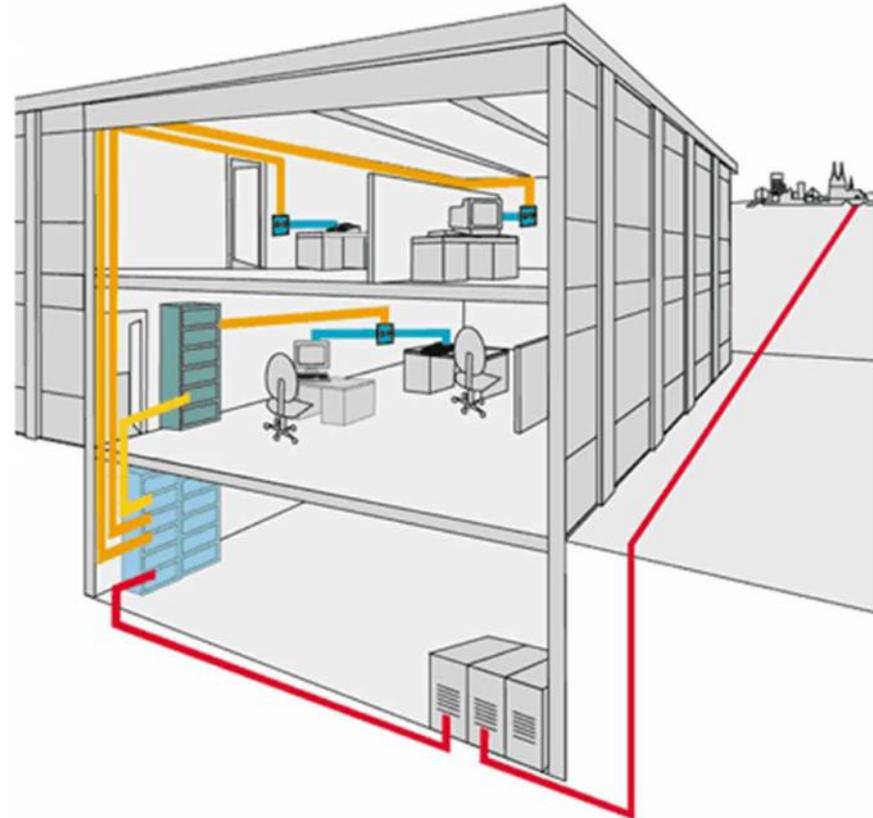
Performance Of Fire Cable Tests

- **Evaluation of fire performance of cables can be achieved with different large scale fire test methods, depending on the degree of fire resistance required for a given installation.**
- **In accordance with the fire safety requirements, the criteria of cable fire tests may include:**
 - Fire spread
 - Heat release
 - Smoke/gases production: sufficient visibility to permit escape and reduce the release of lethal gases



Cabling Paths in a Building

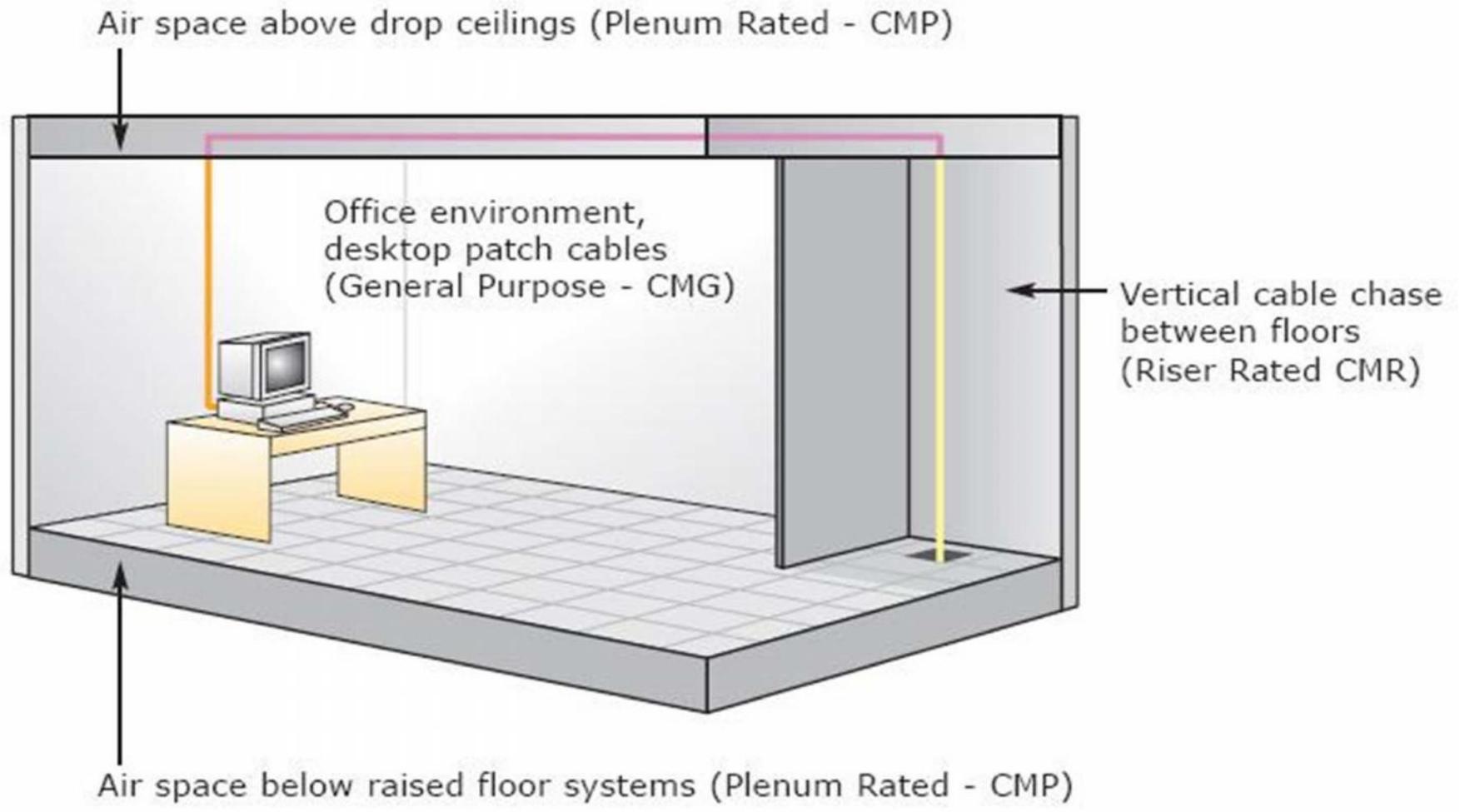
Cables run through open or concealed, vertical and horizontal passages in a building. These route(s) can facilitate flame and/or smoke movement



Source: <http://www.hubersuhner.ca>



Requirements of Data Communication Cables



Cable Flame Tests Ranked by Severity

1. NFPA 262 Plenum Steiner Tunnel Test

- A large scale fire test, used to determine values of **flame propagation** distance and **optical smoke density** of plenum cables

2. UL1666 Riser Cable Fire Test

- A large scale fire test used to determine the **flame propagation** characteristics of riser cables

3. UL 1685 Vertical Tray Tests

- A large scale fire test used to determine values of **cable damage height** and **smoke release** (UL 1685) from general purpose cables,

4. UL 1581 / UL 2556 VW-1 Vertical Flame Test

- A small scale, single cable fire test used to determine the resistance of wire, cable, and cordage to the **vertical propagation of flame** and **dripping of flaming particles**



Fire Tests for Data Communication Cables

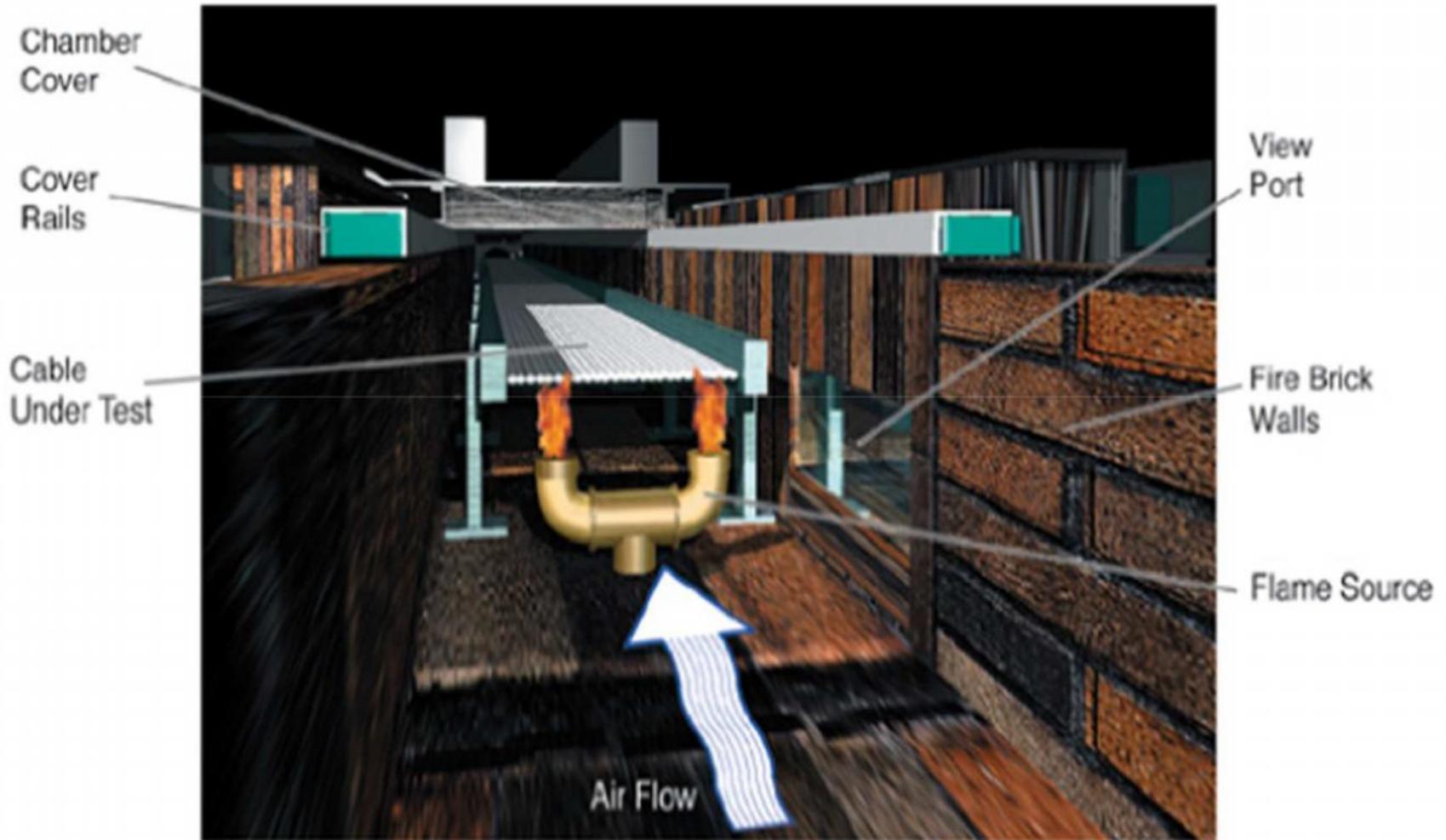
Fire Test	Gas Burner	Orientation	Duration	Application
NFPA 262 Plenum Steiner Tunnel Fire Test	Methane, 86 kW	Horizontal cable tray	20 minutes	Plenum cable CMP, OFNP
UL 1666 Riser Cable Fire Test	Propane, 154.5 kW	Vertical	30 minutes	Riser cable CMR, OFNR
UL 1685 Vertical Tray Test	Propane, 20.6 kW	Vertical cable tray	20 minutes	General purpose cable CM, OFN
VW-1 Vertical Flame Test	Methane, 500 W	Vertical single cable	15 seconds x 5 cycles	Restricted cable CMX



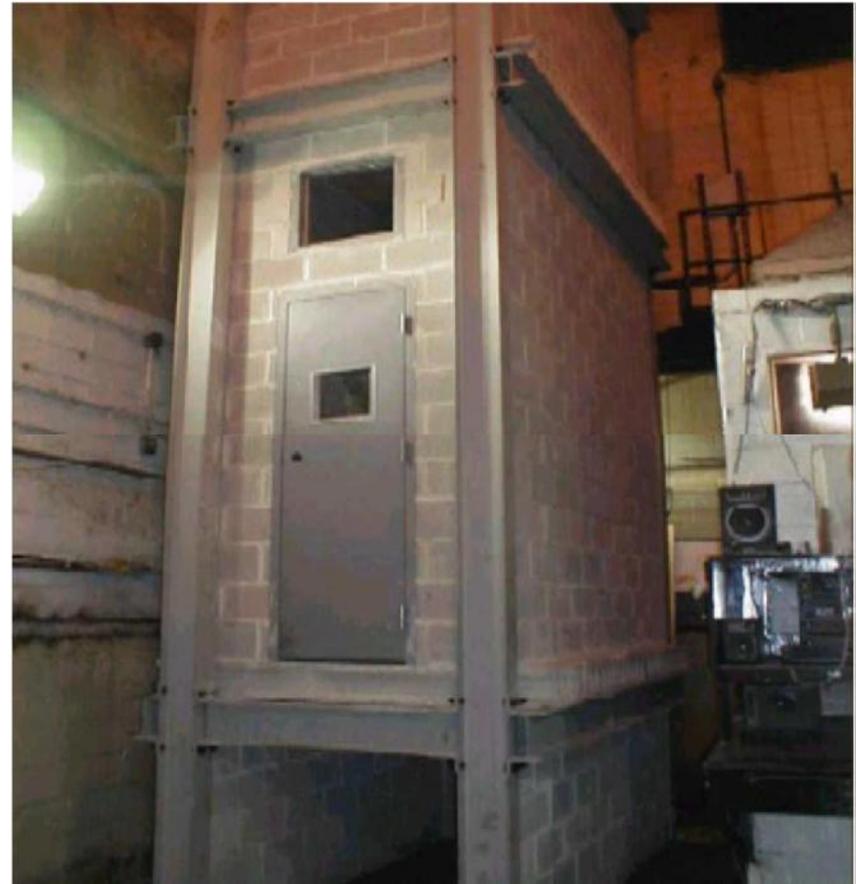
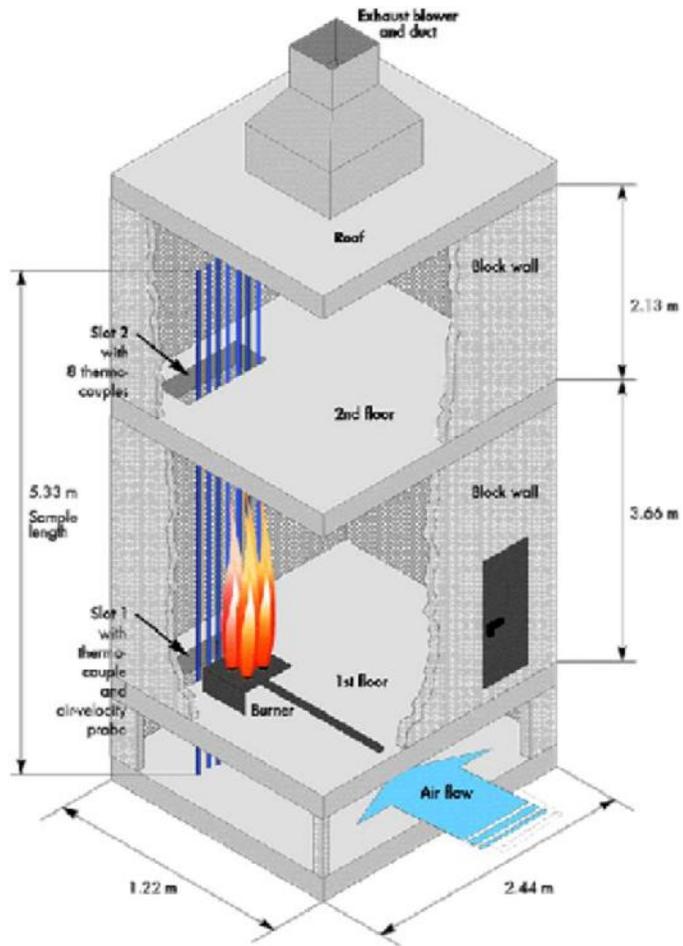
NFPA 262 Steiner Tunnel



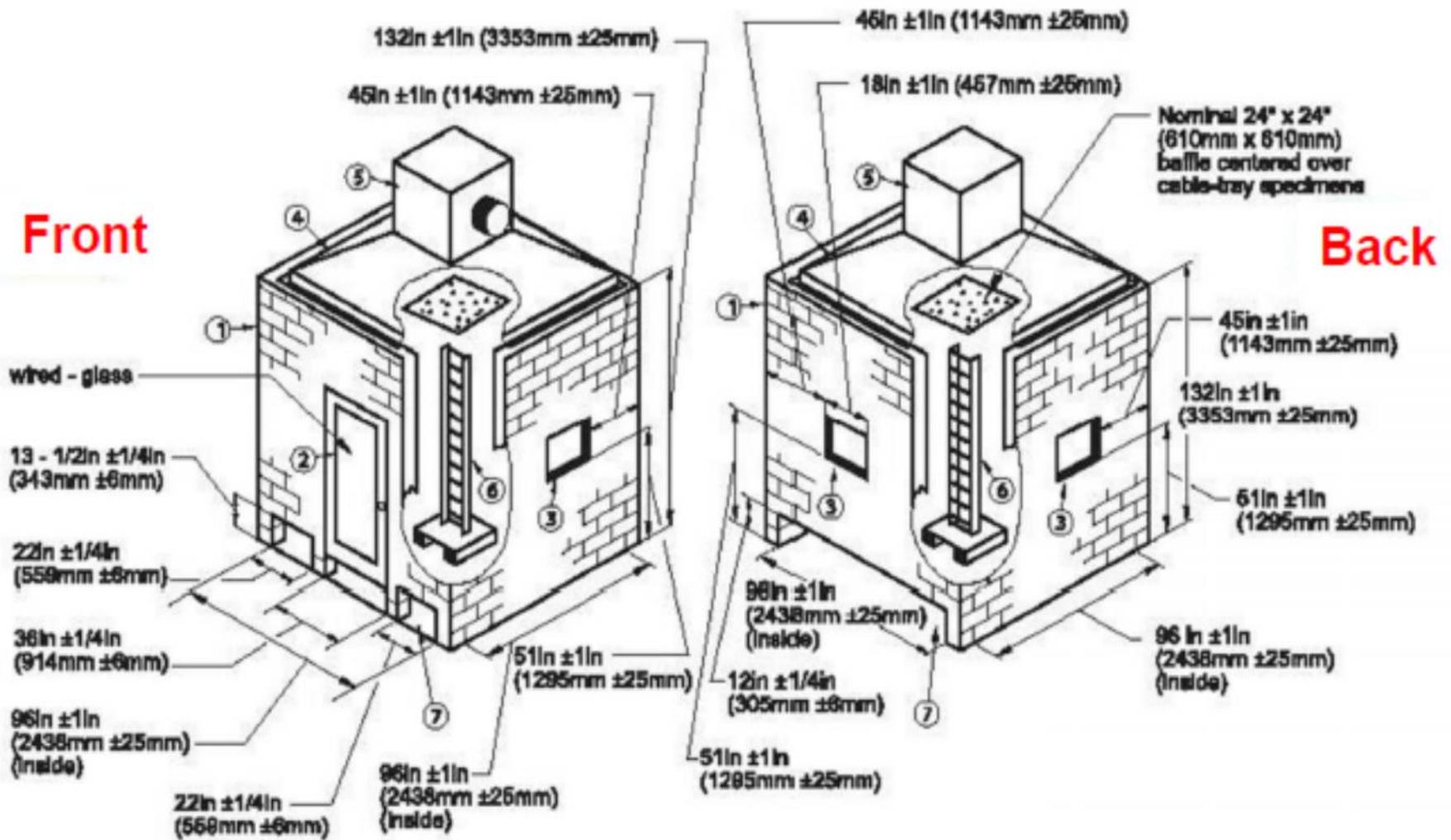
NFPA 262 Design Test



UL 1666 Riser Test and Facility



UL 1685 Vertical Tray Test Facility

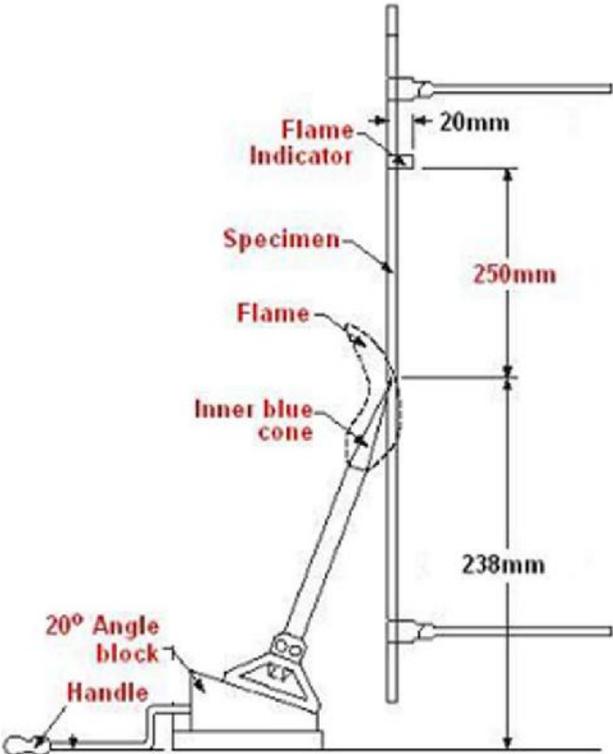


UL 1685 Vertical Tray Test Facility



VW-1 Vertical Flame Test Equipment

Flame Application on Vertical Specimen



SUMMARY

- Different building spaces present unique fire risks to cable. It is essential to identify these risks and install the correct cable based upon local fire (and smoke) requirements.
- Large and small-scale cable fire tests are valuable tools to assess fire and smoke performance. These tests allow the evaluation of new materials and designs to reduce cable fire risks.
- More complex and higher performance materials are required to pass Plenum and Riser cable fire tests due to the severity of the test and the pass/fail requirements.
- UL has developed a wide array of tests to assess cable fire performance to ensure building safety



MARKET SURVEY DATA

- Market survey for Telecom Cables conducted
- All samples selected from AP region manufacturers failed “catastrophically”
- Analytical testing showed that there was an absence of flame retardant and smoke suppressant properties in the materials used to construct the cables



About Underwriters Laboratories



• Underwriters Laboratories (UL) is an independent standards writing and product safety certification organization that has been testing products and writing Standards for Safety for over a century

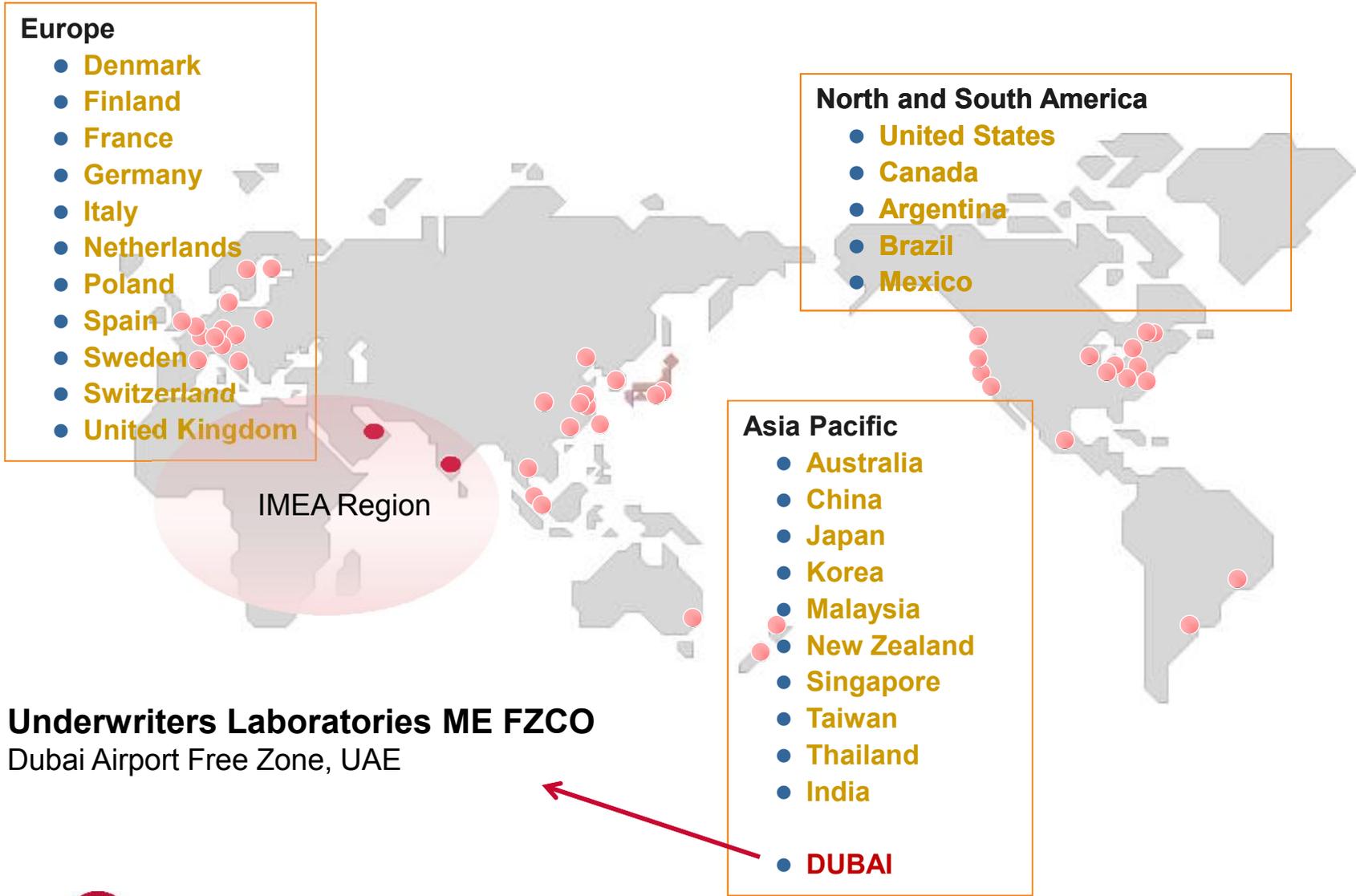
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UL facts and figures

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98,454 evaluations of products in UL laboratories

19,450 different types of products evaluated by UL

126 UL Inspection Centers worldwide

99 countries with UL customers

1,201 current standards of the UL family of companies

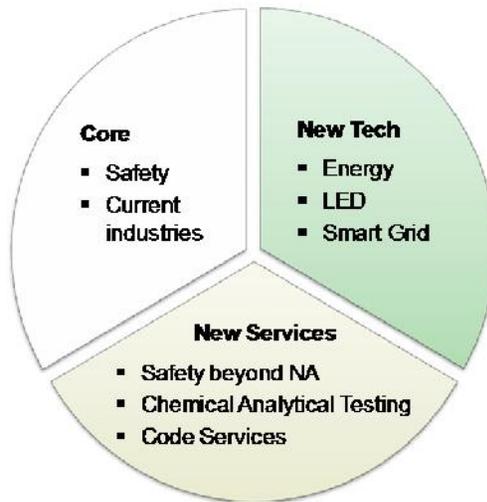
62 testing and certification facilities worldwide

7,000 staff in the UL family of companies working for public safety

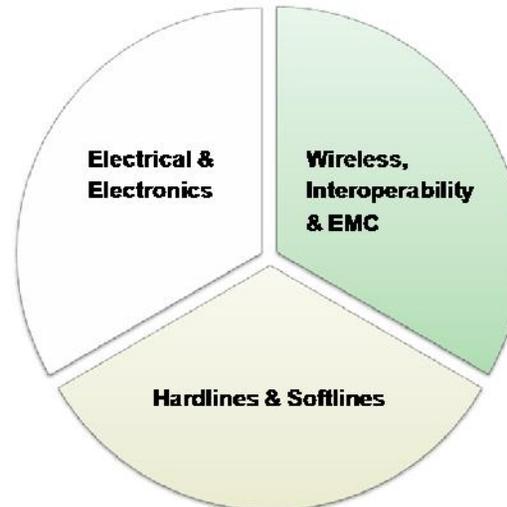


UL's 5 Business Units – expanded portfolio

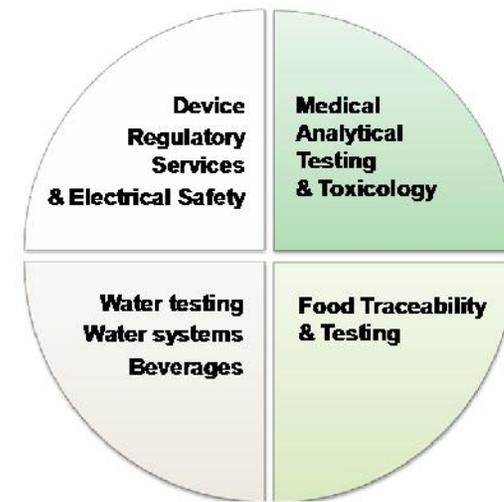
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Life & Health Sciences



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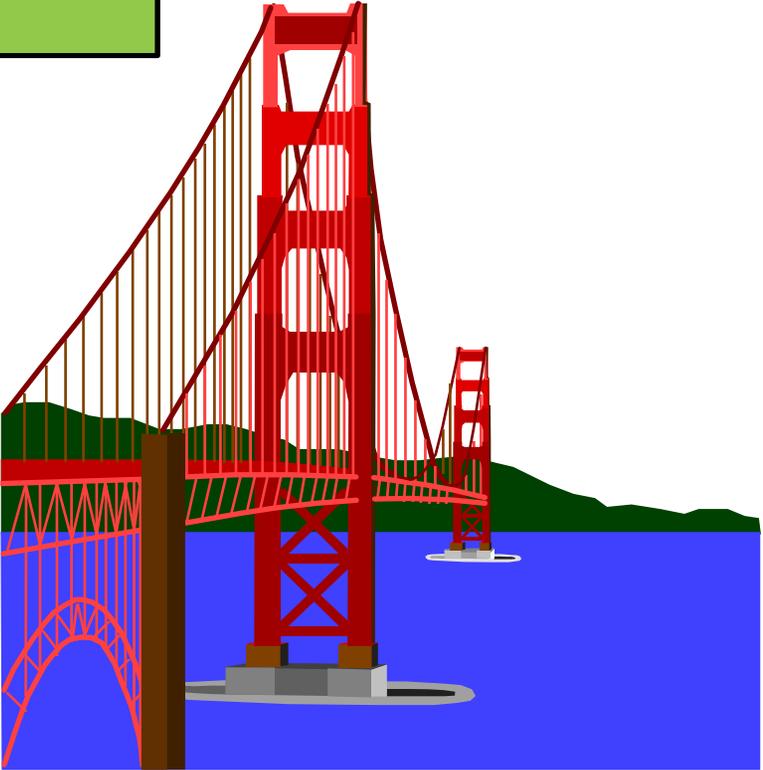
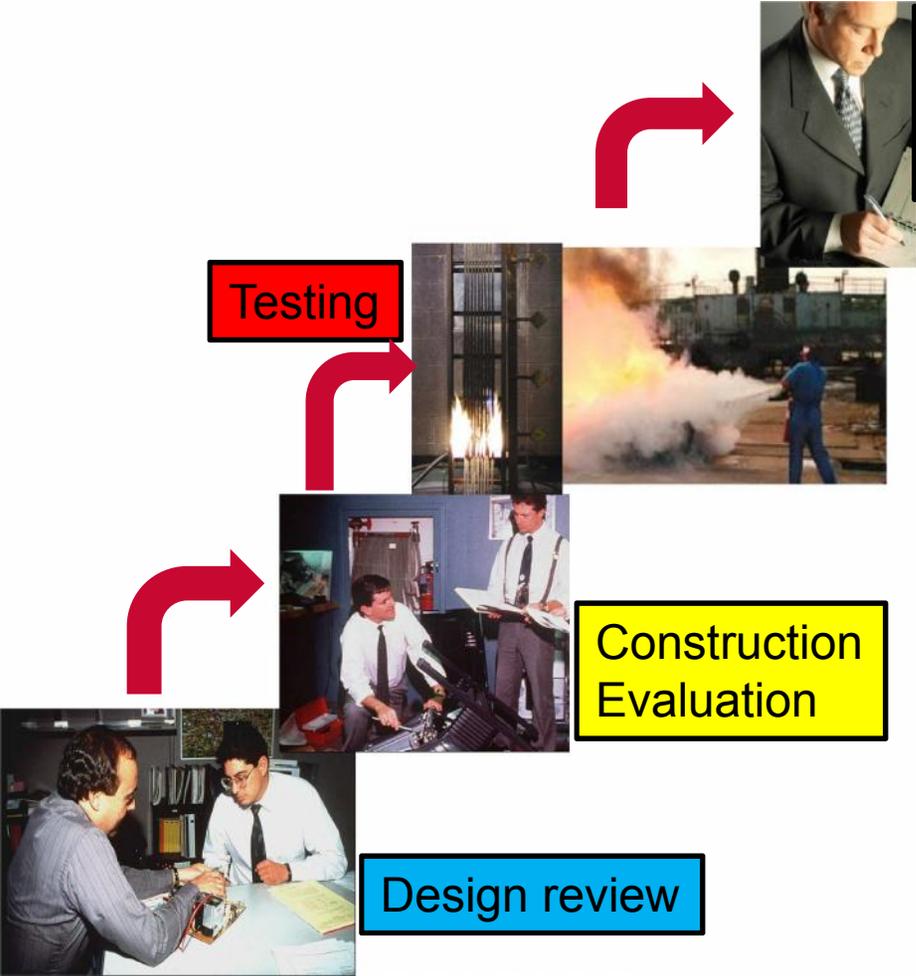


UL University





End Product
• Design
• Evaluation



Quotes from CCCA Articles

- “A disturbing growing trend of substandard Category cables from certain “no name” cable producers in China and Taiwan being sold in the U.S. and other regions has led to an initiative by a relatively new industry association that wants such fraud to stop.”
- “Observed the CCCA press release, “We believe that the manufacturers of these failing products are using substandard materials for profit motives, without regard to the safety of building inhabitants.”
- “The amount of substandard cable coming through could be in the millions of feet per year, he said, acknowledging that there is no way of knowing for sure.”
- “He added that this is an issue that is not going to go away, and that it is possible that some government agency, once aware of the risk to public safety, could take decisive and very public action that makes a clear statement to all concerned how important this issue is.”



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EFFORTS TO STOP BAD CABLES 11

At IWCE, the CCAA presented an update on the flow of bad and potentially hazardous cables coming to the U.S. and ULN Wire Galen spoke about plans to help resolve the problem. Featured, 34, are CCAA Board of Directors Secretary Peter Lucifora, Antonio CCAA President Kevin Rosales, Tom Flabrotonis, and CCAA Executive Director Frank Post, who insists that everyone has to be part of the solution.

PLANT TOUR IN TURKEY 46

WAL President to meet Ayala, U with Walter Stein, one of the founders of Watan Cable, S.S., a leading cable company in Turkey. Attendance at Istanbul Cable & Wire 09, per on Nov. 3-5 by four industry organizations (SCMAE, PWA, CEF and WAL) were able to tour the company's 114,000-sq-ft plant in Cankir, which manufactures

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A WIRE JOURNAL INTERNATIONAL

CCCA: 1 year later, flow of sub-par cables to U.S. continues; UL reports measures to counter the problem

There was both good news and bad news to report regarding the flow of sub-par manufacturer-sourced cables to North America. The bad news is that the Communications Cable and Connectivity Association, Inc. (CCCCA) reported at IWCE that, a year after its initial field report issued that eight of nine randomly selected samples from Asia failed to meet the minimum requirements for the safety, the follow-up field test showed that the U.S. cable marketplace continues to receive sub-standard cables. The good news, however, also reported at IWCE, is that UL announced a series of steps it plans to take to counter that situation.

Steve Galen, General Manager of UL's Wire and Cable Services Strategic Business Unit, outlined those specific measures to include a new random program that will test cables obtained anonymously through cable distributors; the "tagging" of different cable constructions from cable manufacturers so that a test matrix can be developed; and all imported cable categories, which include the boxes that all cables carry in. Exact dates for when those efforts will also often have our best interests at heart, but it will be sometime in 2010, he said. He added that, "in one of these categories is a silver braid," but collectively, along with efforts by UL and CCAA to educate the industry and its customers, it will become more difficult for suppliers of such cables to get sub-standard product through.

Specifically, UL will initiate a market surveillance program, to be a permanent part of its Follow-Up Services (FUS), said Galen, plus noted that his organization has had considerable success with review programs for decorative lighting and flexible cord. This program will allow for a wide range of sample selection, including wire obtained long haul for a full-sized flame test to be considered. "Each sample can now be taken to determine if the requirements are 'too good to be true,'" and if it's not, to attempt for a complete test, he said. The program will be global in scope, targeting not just Asia, with the goal being ever less "to sample everybody," he said.

UL will also build a database of different cable constructions for companies that have tested and approved cables for plenums, stair and vertical riser applications to develop a test matrix by which it can be determined whether they are making the cables properly. Galen said. If a company has been found to have violated its construction or materials, UL would take appropriate action. That could include deterring of the particular cable, and if it is seen as an endemic problem, a complete deterring.

Finally, Galen said that UL's plans go beyond the cables themselves, requiring holographic labeling for the boxes that all imported cables come in. He noted that this step is important as four of eight samples of cables had come in

get that goes into the baggies, such as those shown in the below photo, would be very difficult to duplicate, he said. Galen said that more details will be presented at a UL webinar that likely will go out in December. He added that UL is working likely to be held in either January or February. Galen can be contacted at steve.galen@ul.com.

The CCAA's 2009 report found that six of the eight samples failed to meet the minimum NFPA code requirements for low flame spread and/or smoke production for installations in commercial buildings, schools and multi-family resi-



Samples of baggies that UL plans to require for cables placed on boxes containing telecom cables.

dencies. It noted the following details: All of the failing samples exhibited serious failures, including an unacceptable public safety hazard and/or flame. In 2008, an initial report found that eight out of nine randomly selected samples failed to meet the minimum requirements for fire safety. Five of the eight samples tested this year were chosen from companies whose products failed the 2008 fire safety tests. Four out of the five repeat companies' samples failed the fire safety tests for a second year in a row.

CCCA Executive Director Frank Post, whose organization represents communications cable makers and distributors who have to compete with lower-priced cables that may be under code, said that he sees the story going forward from this point as a positive one, as an example of what competitive efforts can do. "The industry, or a whole, is going to be a lot better off," he said.

CCCA's 2009 report also noted that three of the eight samples marked as meeting the minimum electrical performance required by industry standards for Cat 5e and/or Cat 6 cables failed to do so. Post, who had been criticized by some people last year for not releasing the names of the distributors whose samples had failed, said that he chose not to do that because "showing names offers little value because flows are easily changed and non-compliant cable will still be sold under a new name."

INDUSTRY NEWS



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Nov 2, 2009

ccca
Offshore-made cables, new quality measures are pending

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CCCA Study-- Offshore Cables Still Fail on Fire Safety, Says CCA; New Quality Measures are Pending
UPDATE 11/10/2009: Cabling Industry News
Full disclosure: Accu-Tech is a member of the CCA.





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ATTENTION*