Non-compliant Cabling Products – How Big is the Problem and What Can Be Done?

or

"Caveat Emptor" … Let the Buyer Beware

A Warning More Important Than Ever

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A NEXANS COMPANY

On Behalf of the CCCA

CCCA
Communications Cable & Connectivity Association

CCCA COMMUNICATIONS CABLE & CONNECTIVITY ASSOCIATION

Communications Cabling Products

- Codes and Standards in Our Industry
- The Manufacturer's Responsibility
- What's in the Market Today
- Installer Risks
- How to Know What You're Getting
- What Can Be Done?

Codes & Standards

- NFPA 70: National Electrical Code (NEC)
  - Life Safety … flame spread and smoke
  - Enforceable by Law

- TIA 568C.2 Standard- Balanced Twisted-Pair Telecommunications Cabling And Components
  - Transmission Performance Standards … channel and components
  - Voluntary but essential for performance and compatibility

Manufacturer's Responsibilities

- Ensure Compliance of Products
- Fire Safety Testing
  - CMP (Plenum), CMR (Riser)
  - NEC requires listing by recognized independent testing agency
- Transmission Performance
  - Category 5e, 6, 6a, etc.
  - Process controls and production sampling
  - 3rd party verification optional

NEC Requirements

800.113 Installation of Communications Wires, Cables and Raceways.

Installation of communications wires, cables, and raceways shall comply with **800.113(A)** through (L). Installation of raceways shall also comply with **800.110**.

(A) Listing. Communications wires, cables, and raceways installed in buildings **shall be listed**.

NEC Requirements

Definition: Listed.

Equipment, materials, or services included in a **list published by an organization** that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been **tested and found suitable for a specified purpose.**

The Market Today

- Market and Economy weakness
  - Desire to save money
- Cable products imported into North America Market
  - Excess manufacturing capacity worldwide
  - Virtually unknown brand names through non-traditional channels
  - Lure of lower price
  - Unknown quality

The Concerns

- Some imported product marked and advertised as compliant to North America fire codes and industry standards are not
- Marks and labels may be unauthorized
- Public Safety and liability issues

CCCA

Communications Cable & Connectivity Association

- Non-profit association formed in 2007 to address quality and other key issues.
- Members include many of the industry's leading manufacturers of cable and connectivity products, distributors and material suppliers.
- Goal: Ensure all cable products used in the North America market comply with existing codes and standards

CCCA Studies

- 1st study conducted 2008
  - Horizontal cable evaluation
- 2nd study conducted 2009
  - Follow up on horizontal cable evaluation
- 3rd study conducted 2010, 2011
  - Patch cord, plug evaluation

Cable Samples – Round 1: 2008

- 9 samples … 4pr. UTP … all manufactured outside the U.S. Purchased at random from NA distributors
- Brand names generally considered “unknown” in North America.
- All had mark of one or more independent testing organizations – advertised as listed to NFPA codes, tested to TIA performance standards.
- Mix of Category 5e and 6 - CMR (riser) and CMP (plenum)
- Tested by major independent testing organization

Summary of Results – Round 1: 2008

- All 9 failed physical requirements (TIA 568-B and UL 444)
- 4 of the 9 failed to meet minimum electrical requirements (TIA 568-B)
- 4 out of 5 CMR (riser) cables failed the UL 1666 flame test. Many serious failures.
  - All 4 failing cables burned the entire length of the test chamber
  - The worst performing cable burned beyond the maximum length allowed in only 45 seconds and reached a temperature of 2000° F

Summary of Results – Round 1: 2008

- All 4 CMP (plenum) cables failed NFPA 262
  - All 4 samples showed peak smoke levels 3-4X higher than maximum allowable levels
  - Average smoke levels were >3X higher than maximum allowable levels
  - The worst performing cable had extreme failure. Flame spread travelled length of the chamber within 6 minutes

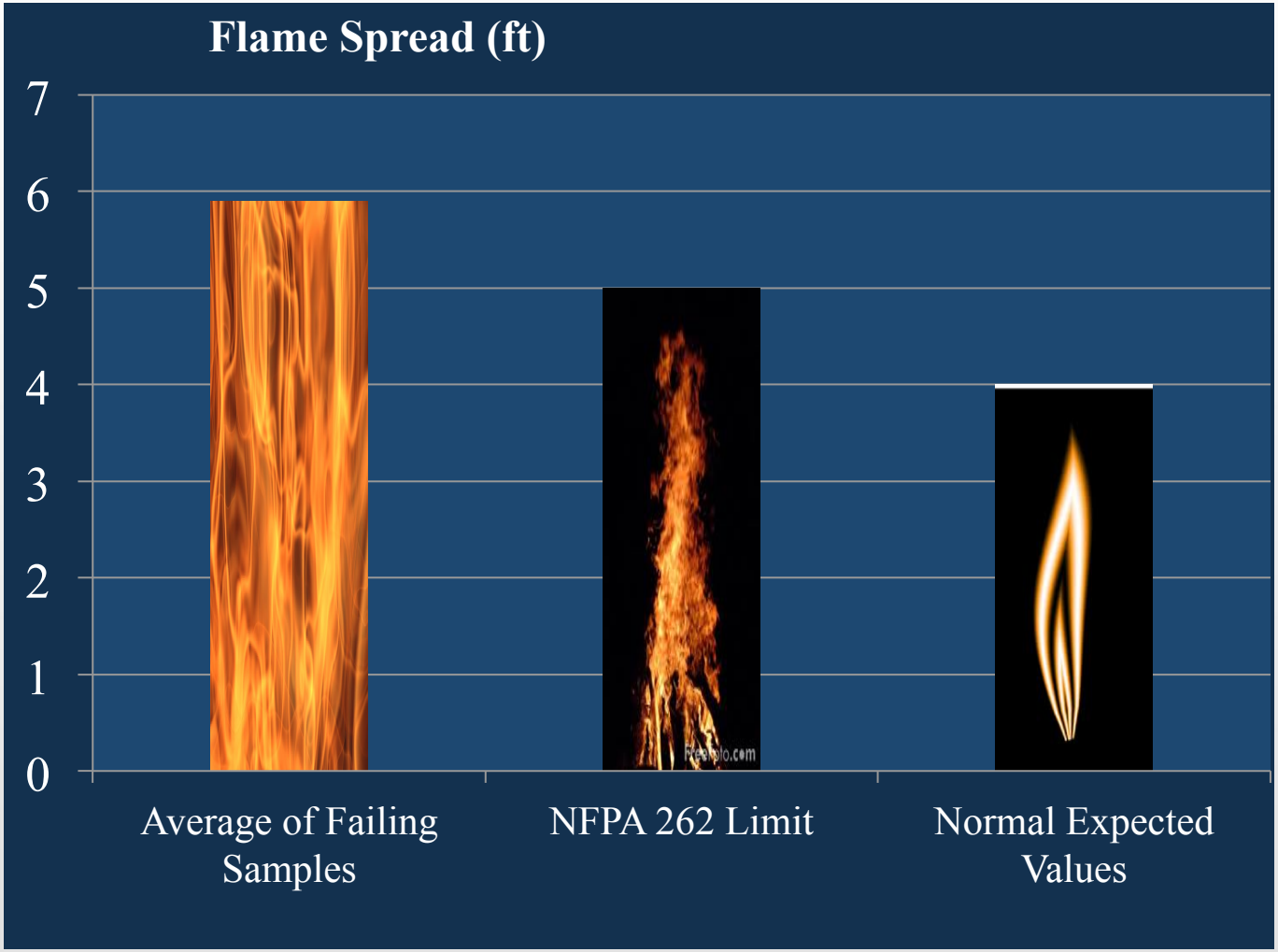
Cable Samples - Round 2: 2009

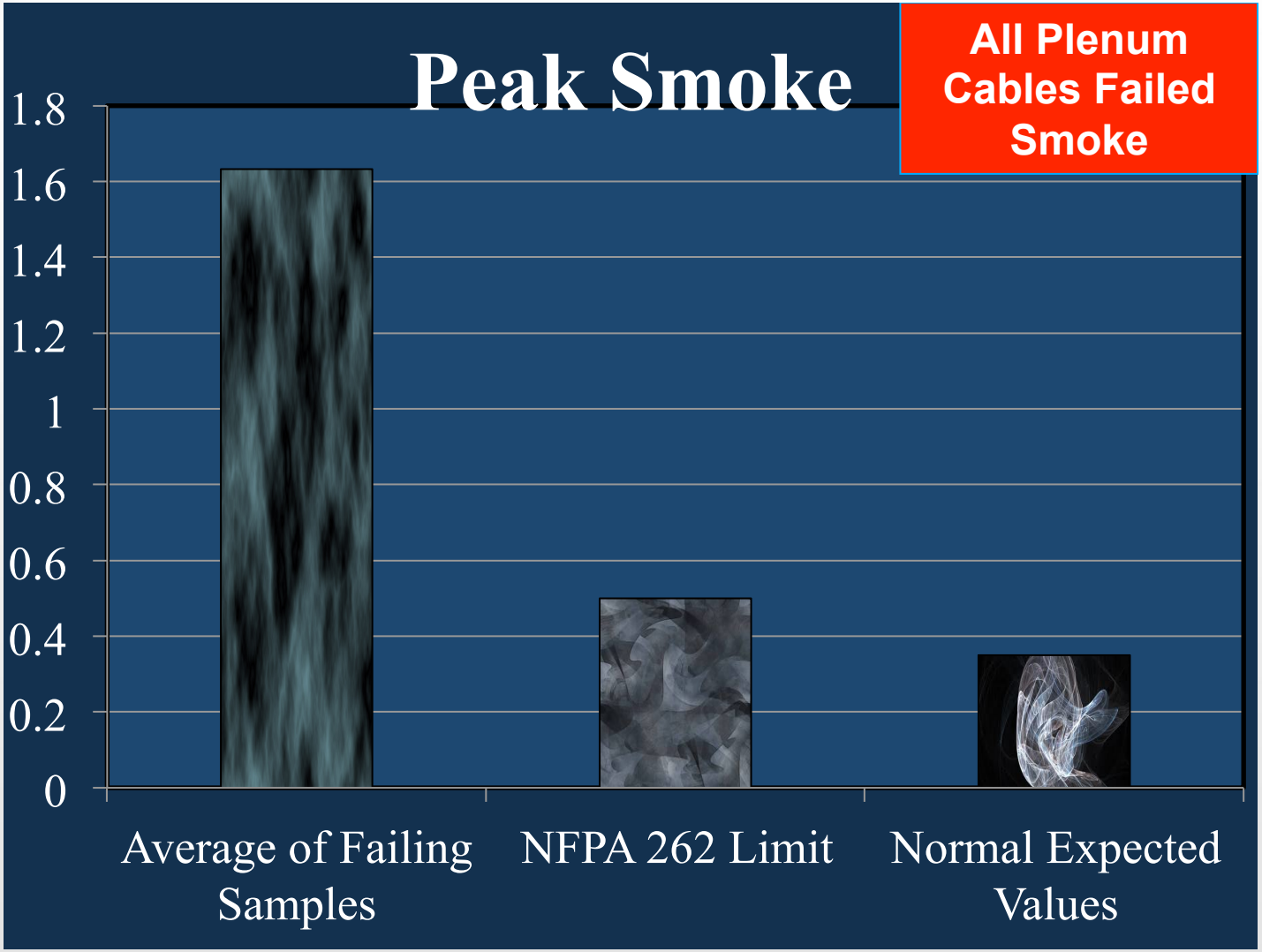
- New set of 8 samples, all manufactured in Asia
- 5 of 8 cables from manufacturers who failed in 2008
- All samples from distribution (March-May ’09)
- All had quality mark of one or more independent testing organizations – listed to NFPA codes - verified to TIA electrical performance standards.
- Mix of Category 5e and 6, CMR (riser) and CMP (plenum)
- Cables analyzed for material composition
- Fire tests by major independent testing organization
- Electrical tests by UL audited test lab

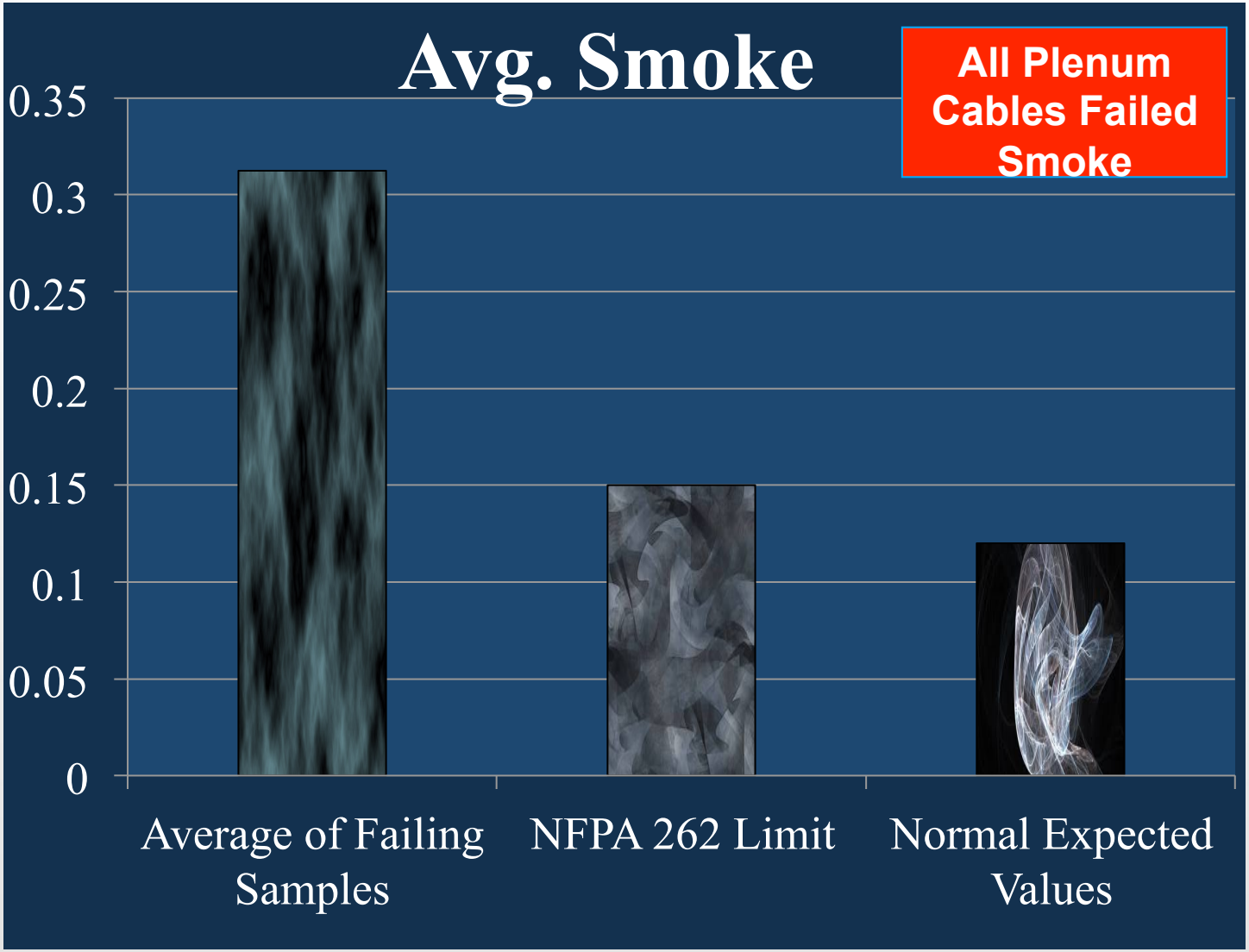
Summary of Results – Round 2: 2009

- 4 of the 5 samples from manufacturers from Round 1 failed fire safety again.
- 3 of the 4 CMR (riser) cables failed UL 1666 flame test.
  - Failed cables burned entire length of test chamber, reaching temperatures of almost 1000° F.
- 2 of the 3 “new” manufacturers failed fire test

CMP Test Failures




Peak Smoke
All Plenum Cables Failed Smoke
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Average of Failing Samples
NFPA 262 Limit
Normal Expected Values


Avg. Smoke
All Plenum Cables Failed Smoke
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Average of Failing Samples
NFPA 262 Limit
Normal Expected Values

What is my Risk?

- Contractors installing non-compliant cable may be held liable for:
  - Violation of state building codes and regulations
  - Damages stemming from negligence, fraud, and breach of warranty , breach of contract
- Does not require that the contractor has prior knowledge the cable is non-compliant*

*State and local laws and codes may vary. This is true for CT, VA, FL

Possible Penalties*

- Criminal liability
  - Fines
  - Imprisonment
  - Replacement costs
- Civil liability (monetary damages)

*State and local laws and codes determine the extent of these penalties and may differ

Patch Cord Testing: 2010

- 499 Category 6 patch cords of various lengths from 16 different brands purchased through distribution
- 379 samples from lesser known brands
- 120 samples from well known U.S. manufacturers

Test Results
CAT 6 Patch Cords

Source	# Samples Tested	# Failing NEXT	% Failing
Lesser known Manufacturers	379	322	85%
Major Manufacturers	120	0	0%

78% of the failing samples failed by a margin of 3dB or more!

45% of the failing samples failed by margin of 6dB or more!

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Tests conducted by UL audited test lab

Other Patch Cord Issues

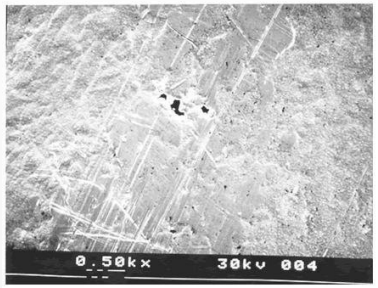


Figure 1

- Non-compliant plugs detected
  - Not meeting FCC requirements
  - Substandard gold plating on contacts
    - Porosity, oxidation, conductivity, contact resistance and corrosion problems adversely affect transmission
  - Contact spacing and dimensional issues
    - Causing intermittent connections and link loss

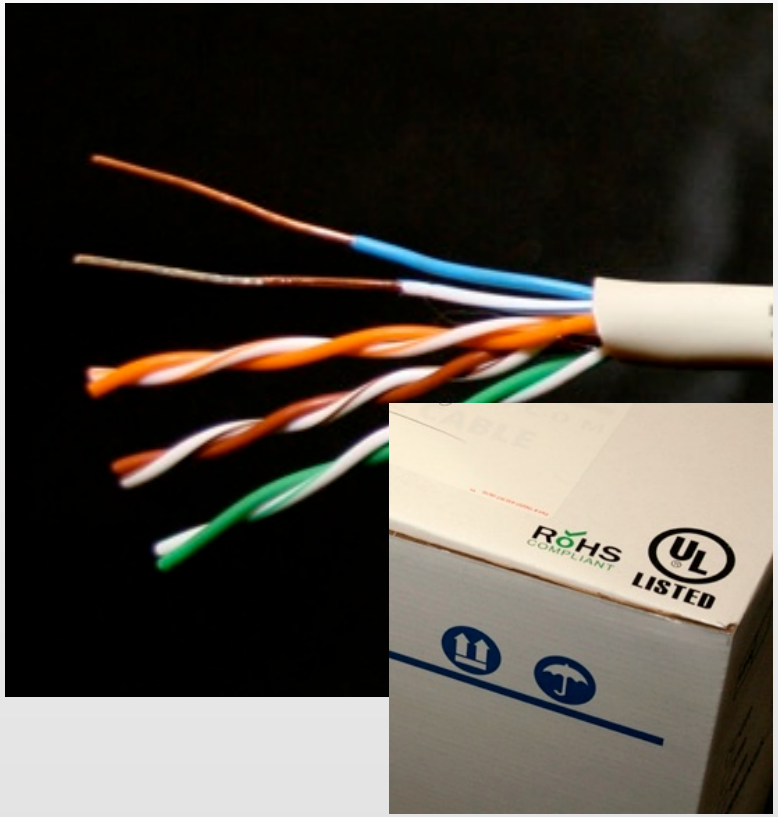
What's the difference?

- IP Security Camera

Photos courtesy of Anixter

The Latest Issue

- Copper Clad Aluminum UTP
  - Noncompliant with UL 444
  - Noncompliant with TIA 568C.2
- Resistance Problems



Sure, we're compliant…

- But…
  - <manufacturer> provides the information and specifications herein on an "AS IS" basis, with no representations or warranties, whether express, statutory or implied. In no event will <manufacturer> be liable for any damages (including consequential, indirect, incidental, special, punitive, or exemplary damages) whatsoever, even if <manufacturer> has been advised of the possibility of such damages, whether in an action under contract, negligence or any other theory, arising out of or in connection with the use, or inability to use, the information or specifications described herein.
- Cable listed as having a 40% CU, 60% CCA conductor
- No record of <manufacturer> on UL web site

How could this happen?

- There is a desire to reduce cost on cabling projects
- Unauthorized/counterfeit use of safety and testing markings
- Bait and Switch
  - Samples sent for listing are compliant
  - Actual production uses lower cost materials, etc.
- Manufacturers not subject to follow-up testing with independent procurement of material

What CCCA Is Doing About The Problem

- Advocating tighter quality assurance procedures by independent testing agencies … with emphasis on follow-up sampling
  - UL 

  - ETL 

- Training and educational tools
- Further product testing and monitoring

Initial actions by UL

Public Notice: UL warns of communication cable with unauthorized reference to UL

"This cable does not comply with the standard for safety for the United States and Canada, and is not authorized to bear the UL Mark or reference UL."

Long Term UL Actions

UL Mark Integrity Program

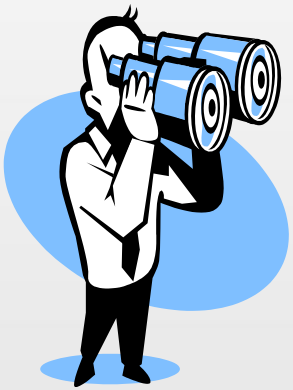
- Field Surveillance
- Holographic Labels
- Materials Testing
- Listing removal policy

Actions Taken by CCCA Members

- Anixter lawsuit against Commodity Cables
  - Deceptive trade practices
  - False advertising
  - Unfair competition
  - Breach of contract

How to know what you are getting

- Consider known name brands as your best protection from non-compliant cable products.
- Investigate unknown brands before you buy
  - Look for authentic marks and labels, e.g. UL holographic label
  - Validate listing and verification by checking product directories on UL and ETL websites
- Add to our surveillance and be alert for non-compliant cabling products
- Inform the appropriate testing agency
- Provide information and test data, if available, to CCCA via website



www.cccassoc.org

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Conclusions

- Fire test failures raise serious, unresolved public safety and liability concerns in the event of fire.
- Cable deficiencies and high margins of failure in patch cords can significantly degrade network performance.
- More than ever, due diligence of quality is needed.