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RiskTopics

CPVC sprinkler pipe failures

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CPVC sprinkler piping failures have been associated with non-compatible sealants, lubricants, and other related building products.

Introduction

The use of CPVC (chlorinated polyvinyl chloride) sprinkler piping has become commonplace in the construction industry in a variety of residential, commercial, and mixed-use applications. Failures associated with the use of non-compatible sealants, caulks, lubricants, and other products that have resulted in significant construction defect claims can potentially impact General Liability, Builders Risk and Professional Liability policies. Loss exposures are not limited to material incompatibility only but have direct links to inadequate quality assurance and quality control program management.

Discussion

CPVC pipes are manufactured by multiple companies including Tyco, GF Harvel, Charlotte, and Spears. Chemical compatibility issues can lead to degradation and eventual failure with all CPVC pipe manufacturers and compatibility with a variety of ancillary building materials should be verified specific to each CPVC pipe manufacturer's technical data. Pipes bearing the "BlazeMaster®" designation are made from raw product produced by the Lubrizol Corporation and are commonly used for automatic fire sprinkler piping in certain occupancies. For example, failures can occur when Lubrizol manufactured piping has contact Hilti CP 506 Smoke and Acoustic Sealant, although other brands are susceptible to similar failures based on chemical incompatibility. Ancillary building materials includes caulking, thread sealant, pipe tape and fire stopping, but can also include other items that may come into contact with CPVC during or after construction, such as mold cleaners and inhibitors, leak detectors, pipe hangars, waterproofing materials and flexible wires and cable (such as data cabling).

- Literature for the various CPVC products provides a listing of materials by brand that is approved for use with their piping components. Similarly, product literature may also list materials and compounds found through manufacturer or independent testing to degrade CPVC and or cause weakening at connection points and cracking in straight pipe sections from contact. In fact, some pipe manufacturers provide "Do's" and "Don't" guidance that coupled with the technical specifications clearly state the importance of utilizing the correct materials for installation and avoiding contact with non-compatible ones. That stated, there have been instances where packaging for some sealants did not consistently include warnings about incompatibility with certain CPVC pipe types, and there can be conflicting information depending on the reference source.

- Depending on the manufacturer, a partial listing of non-compatible materials and compounds includes; certain cooking oils containing animal fats, solvent or petroleum-based paints / coatings, metal pipe-cutting oils, termiticides and insecticides, mold abating compounds / fungicides, ethylene glycol, propylene glycol and/or contaminated glycerin solutions (anti-freeze), fire stop sealants, non-fire rated expansion and acoustical sealants, certain expanding foam sealants, gasket lubricants, rubber and similar flexible plastic material that may contain certain types of corrosive plasticizers.
- The use of non-compatible materials coupled with inadequate quality controls may contribute to the failure, although other installation defects may contribute as well.

Guidance

- When used for fire protection systems, all CPVC piping and fittings should conform to ASTM F422[1], which is entitled: "Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
- Special care must be taken during the design phase to specify compatible piping, fittings, connection adhesives and caulking or sealants that will come into contact with CPVC piping. Design professionals involved with mechanical systems and general construction elements should coordinate their specifications and contact manufacturers if product compatibility data is unclear or lacking. Pipe and fittings should always be sourced from the same manufacturer.
- Additional care is also required during the product submittal stage to assure that specified piping and associated materials meet the design and do not include substitutes that may inadvertently result in a non-compatible combination.
- Ensure CPVC pipe system installers are trained and certified by the specified pipe manufacturer.
- Follow all manufacturer instructions for proper storage and handling of CPVC pipe materials.
- Establishing enhanced field-based QA/QC protocols is very important to eliminating the possibility of tradespersons using incorrect materials. Daily inspection by project management team members to assure that only "approved" materials are available for use by the piping installers and other trades performing sealing or caulking of pipe penetrations should done. Utilization of daily pre-task planning meetings may be helpful in managing subcontractor compliance.

Conclusion

CPVC sprinkler piping systems may fail due to contact with various incompatible sealants, caulks, or other building products. However, these losses can be mitigated with a thorough understanding of product compatibility, proper selection by the design professionals and proper installation by subcontractors. The development and implementation of enhanced QA/QC protocols is an important key to the process.

For more information on Zurich's extensive Risk Engineering and Sustainability services, please contact your Risk Engineer or visit us at Risk Engineering and Sustainability Services | Zurich Resilience Solutions.

References

[1] "ASTM F442 / F442M – 20." ASTM International – Standards Worldwide, ww.astm.org/Standards/F442.htm.

Other resources

Lubrizol developed a program to ease the burden associated with researching and selecting accompanying construction products. The first link below also includes a whitepaper which discusses chemical incompatibility with Lubrizol products. However, it is important to review similar compatibility resources specific to the actual pipe manufacturer on each project.

FBC System Compatible Program by Lubrizol

"Recommended Practices and Precautions – Do's and Don'ts Guide" by Lubrizol (BlazeMaster®):

"Chemical Compatibility and Installation Information for CPVC Products" by the Charlotte Pipe and Foundry Company (FlowGuard Gold® and Corzan®).

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