

This issue of TechNotes was prepared by a task group of the NFSA Engineering and Standards Committee.

Compatibility with CPVC Piping

Through the observations and investigation of field installations, and with laboratory analyses, it has been shown that the exposure of certain chemicals and chemical combinations can affect the overall performance of CPVC products. This has become a noteworthy issue in regards to the reliability of fire sprinkler systems over the past several years. Laboratories and manufacturers have addressed this issue by releasing literature identifying products that are compatible with CPVC products, as well as literature listing specific products that are not compatible with these CPVC products.

For a product to be considered “compatible” with CPVC it must be identified as suitable by CPVC manufacturers, or suppliers, for use with all CPVC products and combination (or hybrid) systems and/or it must be deemed suitable for use in such systems by a third party when tested to a generally accepted protocol. There are a number of these protocols available for the purpose of evaluating suitability.

When addressing compatibility issues with CPVC, we can organize our concerns by viewing them in three specific areas. The first area of concern is the presence of internal antimicrobial coatings for steel pipe when used in combination with CPVC products (i.e. hybrid systems). The second area involves ancillary products used with CPVC products such as cutting oils, thread sealants, and antifreeze. The third area is with the non-ancillary chemicals and products used by other trades and building owners. Non-ancillary products are those that are not directly associated with sprinkler system installation and include products such as cooking oils, paints, and pesticides.

Ultimately, all three areas have to be considered when installing CPVC products. The best way to mitigate compatibility issues is to be knowledgeable about the products used on each project and to be aware of the resources that are available. These resources are product listings and approvals from nationally recognized testing laboratories, the various manufacturers’ compatibility programs, and manufacturers’ installation instructions for the products being used.

Dealing with Antimicrobial Internally Coated Steel Pipe on Hybrid Systems

FM Approvals is one of several nationally recognized testing laboratories in the United States. Through their Approval Guide, an online resource of FM Approvals, they offer information on the compatibility of antimicrobial coated steel pipe with CPVC products when used in hybrid systems. To access this

information, you must register to access the Approval Guide, but it is free and only requires an email and some user information to login.

FM’s Approval Guide:

http://www.approvalguide.com/CC_host/pages/public/custom/FM/login.cfm

Once you are in the Approval Guide, in order to find compatible internally coated steel pipe you would navigate through the fire protection tab and open up to steel pipe subfolders. Once you open a folder for a specific type of steel pipe, you will find a list of products similar to Figure 1. Next to the product name you will find superscript letters which indicate various notes for each product. At the time of this publishing, the letters of interest for CPVC compatibility were the letters ‘n’ and ‘o’. The superscript ‘n’ indicates uncoated steel pipe is compatible in hybrid systems with plastic piping. The superscript ‘o’ indicates a coated steel pipe is compatible in hybrid systems with CPVC products. It is important to recognize that the ‘o’ approval is for specific coatings applied by the manufacturer and does not apply to aftermarket coatings applied by any other party. As an example, this is pointed out in Figures 1 and Figures 2 in regards to Mega-Flow and EDDY-Flow, respectively.

Add link

Product	Listing Country	Nominal Pipe Size, mm(in.)	Rated Working Pressure, psi	Rated Working Pressure, kPa	Certification Type
Mega-Flow ^{a, c, h, m, n, o, q}	United States of America	1 1/4, 1 1/2, 2, 2 1/2, 3, 4	300	2070	FM Approved

- a -FM Approved for use with FM Approved pipe couplings on rolled grooves.
- c -FM Approved for use in welded systems when supplied with standard bevel on ends.
- g -FM Approved for use with plain-end fittings.
- h -FM Approved for use when the listings of the couplings or fittings make specific mention of their suitability with this sprinkler pipe.
- m -FM Approved for use in all steel sprinkler systems composed of uncoated or coated (MIC Shield) steel pipe.
- n -FM Approved for use in hybrid sprinkler systems composed of uncoated steel and plastic piping.
- o -FM Approved for use in hybrid sprinkler systems composed of coated (MIC Shield) steel and CPVC plastic piping.

Figure 1 – Mega-Flow with MIC Shield

Product	Listing Country	Nominal Pipe Size, mm(in.)	Rated Working Pressure, psi	Rated Working Pressure, kPa	Certification Type
EDDY-Flow ^{a, c, d, h, m, n, o}	United States of America	1 1/4, 1 1/2, 2, 2 1/2, 3, 4	300	2070	FM Approved

- a -FM Approved for use with FM Approved pipe couplings on rolled grooves.
- c -FM Approved for use in welded systems when supplied with standard bevel on ends.
- d -When hot dip galvanized by factory, the sprinkler pipe is FM Approved for dry pipe systems.
- g -FM Approved for use with plain-end fittings.
- h -FM Approved for use when the listings of the couplings or fittings make specific mention of their suitability with this sprinkler pipe.
- m -FM Approved for use in all steel sprinkler systems composed of uncoated or coated (Eddy Guard II) steel pipe.
- n -FM Approved for use in hybrid sprinkler systems composed of uncoated steel and plastic piping.
- o -FM Approved for use in hybrid sprinkler systems composed of coated (Eddy Guard II) steel and CPVC plastic piping.

Figure 2. EDDY-Flow with Eddy Guard II

Comparing Figure 1 with Figure 2, we see that Mega-Flow is approved with its manufacturer-applied MIC Shield coating, while we see that EDDY-Flow is approved with its manufacturer-applied Eddy Guard II coating. Again, it is important to understand that these approvals do not apply to aftermarket coatings on steel pipe and only to the manufacturer’s applied coating.

Ancillary Products

Programs exist that list ancillary products that have been tested and deemed as compatible for use with CPVC products. Conversely, there exist various programs that also list ancillary products as incompatible with CPVC products after testing. Current lists have been updated frequently over the last several years, demonstrating the ongoing efforts of various parties to provide up-to-date information.

Below are links to two compatibility programs, which provide content on both compatible and incompatible products:

Blazemaster FBC Program -

<https://www.lubrizol.com/CPVC/Resources/System-Compatible-Program.html>

Flameguard Program -

http://www.spearsmfg.com/flameguard/FGAPL-7_web.pdf

CAUTION: Because these programs are updated from time to time, they should be referenced frequently for up to date information.

Some typical products used during the installation of CPVC products include thread sealants and cutting oils. While PTFE tape (such as Teflon® tape) is an acceptable method of thread sealant for sprinklers in

pipe, there are many additional sealants and compounds that are compatible. In regard to cutting oils, at the time of this publication there are several cutting oils that are CPVC system compatible.

A product not listed as compatible does not guarantee that it is incompatible. The same is true for any incompatible list: simply because it is not identified on an incompatible list does not guarantee that a product would be compatible. This is why it is important to be familiar with the multiple lists discussed. The only products listed are those that have gone through sufficient testing and analysis to prove they are either compatible or incompatible. For products that are not on either a compatible or incompatible list, you should refer to the manufacturers of the products for supplemental compatibility information.

Non-ancillary Chemicals and Products

Addressing the concern of non-ancillary chemicals and products is by far the most challenging area when dealing with CPVC compatibility, simply because it is impossible to predict every chemical that may come into contact with the CPVC products after installation. Having said that, there are several steps a contractor can take to mitigate these concerns. The first is to be aware of the occupancies of rooms and buildings where CPVC products are going to be installed. One product that has shown to create compatibility issues is cooking oils. Therefore, running exposed CPVC products through a residential or industrial kitchen could prove harmful to the system over time. In such applications, CPVC should be shielded in some manner, placed either above the ceiling or within a soffit.

Beyond preparing for expected occupancy hazards that are associated with certain rooms, like a kitchen, the second issue is dealing with other sub-trades. The only way to deal with these issues is to have an open communication by both requesting lists of materials sub-trades plan on using on a project and also providing literature on acceptable chemicals and products. This allows all parties to ensure that all contact with the CPVC product is compatible.

Several years ago, members of the CPVC provider community developed coordinated turnover documents to be used to inform contractors, sub-trades and owners of some issues and conditions that may have an adverse effect on the performance of CPVC product. These consist of a CPVC sprinkler contractor notice, a jobsite notice for sub-trades which include “Do’s” and “Don’ts” when handling CPVC products, and a turnover letter for the building owner that lists products and practices to avoid in regard to the CPVC products. These three documents are available from each of the manufacturers and should be utilized consistently. The following pages contain links to the CPVC providers’ respective turnover documents as well as other product information:

Spears:

<http://www.spearsmfg.com/flameguard.htm>

Harvel:

<http://www.harvelblazemaster.com/contractor-resources/>

Ipex Inc.:

<http://www.ipexinc.com/Content/Products/Product.aspx?ProductId=39&&LanguageCode=en-CA>

Tyco Fire Protection Products:

http://tyco-fire.com/?P=disp_news&article=%20184

Viking Group:

http://www.vikinggroupinc.com/en/literature/viking_plastics

Underwriters Laboratories is in the process of developing product listing requirements to evaluate the compatibility of CPVC products in the built environment. The goal is to establish a listing program for evaluation of both ancillary and non-ancillary chemicals and products that may come in contact with CPVC products.

Conclusion

Dealing with compatibility issues of CPVC products is an ongoing task that requires knowledge to be passed on to responsible parties. All parties handling the CPVC products should have appropriate training and be familiar with the manufacturer's installation instructions for products being used on the project. Open communication from the sprinkler contractor to the building owner, general contractor, and sub-trades is critical in helping to mitigate the chance of CPVC product failure over the life of a system due to compatibility issues. One simple step towards open communication would be to provide the appropriate turnover documents and this issue of *TechNotes* to responsible parties.

It is important to note that compatibility issues should be investigated for all components connected to CPVC products. Even with all of these resources available, it is still difficult to guarantee that a CPVC product will not come into contact with harmful chemicals. While this document addresses best practices for CPVC products, the use of other nonmetallic products should be investigated similarly with the appropriate manufacturers.

Guidelines in this *TechNotes* apply to both new and existing projects.