



RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

STUDENT PROJECT PROSPECTUS

Understanding the effects of fire water pressure surge on plastic piping

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Background: NFPA 24: “Standard for the installation of private fire service mains and their appurtenances”, does not address pressure surges on plastic piping (High-Density PolyEthylene (HDPE) or Glass Reinforce Plastic (GRP)) installed in underground fire water piping systems. Industrial experiences has shown that pressure surges caused by pump start-ups or shut-downs, can dislodge these pipe joints. The purpose of this literature and modeling study is to identify relationships between the physical effects on underground fire water piping using fiber-reinforced piping such as High-Density Polyethylene and Glass Reinforced Plastic during fire water pump start-up and shut-down.

Research Goal: The overall goal is to conduct a literature review and modeling study to identify relationships between the physical effects on underground fire water piping using fiber-reinforced piping such as High-Density Polyethylene (HDPE) and Glass Reinforced Plastic (GRP) during fire water pump start-up and shut-down. The transient analysis modeling on case scenarios must be carried out to identify potential leak points, and identify solutions.

Project Tasks:

1. **Literature review:** Conduct a literature review to identify the physical characteristics including pipe size, piping modulus, bonding/joint types of High-Density Polyethylene (HDPE) and Glass Reinforced Plastic (GRP) piping installed in underground fire water piping systems.
2. **Scenario Development and Modelling:**
 - Develop probable scenarios of pressure surges in underground fire water piping joints to identify potential leak points. The scenarios should be reviewed and clarified with the panel.
 - This task should consider implementing the above scenarios through the use of transient modelling software to determine and understand the location of pressure surges on plastic piping and the resultant effects.
3. **Future Research:** Identify the needs for future research on this topic, including experimental validation.
4. **Final Report:** Summarize the above tasks in the form of a final report.

How this information will be used:

Project deliverables will be useful for Technical Committees: NFPA 24, “Standard for the Installation of Private Fire Service Mains and Their Appurtenances” and NFPA 15, “Standard for Water Spray Fixed Systems for Fire Protection”.