Remediation Interpretation Bulletin – Positive Pressure Supply to Fire Pumps (5.5)

Scope
This interpretation clarifies the application of requirements governing the installation of fire protection water supplies for hydrants, rising mains (standpipes), and automatic fire sprinkler systems in the Alliance Fire Safety and Structural Integrity Standard (version 1.1) for factories inspected by the Alliance for Bangladesh Worker Safety, its staff, and designated Qualified Assessment Firms and their employees.

Purpose
This interpretation addresses issues related to the requirement of NFPA 20 to maintain continuous positive pressure (head) on the suction side of centrifugal fire pumps supplying fire protection systems.

Alliance Requirements
All new installations and design requirements outlined in BNBC Part 4 Chapter 4 for water supplies shall be replaced by the requirements of NFPA 20 (fire pumps), NFPA 22 (water tanks), and NFPA 24 (underground water mains). Existing water supplies shall be evaluated for reliability and support the hydraulic demands and duration of any new or existing systems supplied.

Background
Reticulated public water supply systems in Bangladesh rarely provide adequate flow and pressure to meet the demands of the fire protection systems required in most ready-made garment factories. As such, most factories require reservoirs, cisterns, or tanks and fire pumps to supply sufficient capacity to meet fire flow requirements for hydrants, rising mains (standpipes), and automatic fire sprinklers. Ordinarily these reservoirs or tanks also supply at least a portion of the water required for other purposes. In many instances, these reservoirs, cisterns, or tanks are already in place.

Prior to the Alliance initiative, rooftop water tanks were often provided to supply occupant-use hose lines and other firefighting equipment. In some instances, these tanks themselves presented a structural hazard due to the concentrated live load they created. Where this is the case, the Alliance has required the removal of rooftop tanks or structural retrofits to safely accommodate the added live load.

The use of small tanks similar to those previously used for limited water supply firefighting appliances like hose reels has been suggested as a practical way of maintaining suction head to ensure the fire pump remains primed and ready to draw continuous suction from an in-ground (non-pressurized) supply at start-up.

Discussion
The requirement to maintain continuous positive pressure (head) on the suction side of a centrifugal fire pump can be avoided by installing a vertical turbine fire pump in which the impellers are fully immersed in the water column of the reservoir, cistern, or tank. However, the installation of such pumps is unusual and presents maintenance challenges in Bangladesh. In many instances, the in-ground cisterns or
reservoirs supplying fire protection systems are so located that the installation of vertical turbine pumps would make it difficult to provide appropriate physical protection of the installation.

Elevated or pressurized storage tanks complying with NFPA 22 present another viable, albeit less than practical alternative in most cases due to site constraints and structural limitations.

The historical use of elevated or rooftop tanks to provide gravity-head to pumps has significant precedent and utility in cases where such installations do not in or of themselves pose a structural hazard. Nevertheless, the use of such tanks to supply all of the required capacity for fire protection systems is impractical due to structural limitations. As such, most installations use a combination of elevated tanks and in-ground reservoirs or cisterns to supply fire protection systems.

Instructions
1. Recommend the installation and use of vertical turbine fire pumps in all cases where their use is practical and appropriate physical protection of the installation can be provided.
2. Avoid the use of pressurized storage tanks in all installations.
3. Permit the use of elevated or rooftop storage tanks for all or part of the required fire protection water supply when the structural capacity of the building is adequate to support the superimposed load.
4. Verify the installation of the tank complies with the requirements of NFPA 22, especially those provisions governing the arrangement of valves and maintenance and monitoring of tank water level.
5. Verify through acceptance testing of the fire pump installation conducted in accordance with NFPA 20 that the positive pressure water supply provided by an elevated or rooftop tank is sufficient to prevent cavitation under all flow conditions.

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