

**SUPPLEMENTARY PAPER ON TECHNICAL GUIDANCE NOTE 1 (TGN 1)
ADDRESSING OVERCOMING NEGATIVE SUCTION CONDITIONS**

**Option 1: Detailed specifications for vertical turbine fire pump
for fire water supply**

1. Background

Negative suction condition for fire protection system has been discussed during the Technical Sub Committee (TSC) meeting where TSC has agreed an alternative solution alongside with 03 regulatory requirements to address the negative suction condition of fire pump. The RSC has developed an independent implementation guidance based on the outcome of the discussion, which may aid industry in completing their remediation plan in a timely manner.

3 regulatory requirements are as below-

1. Where the top of the reservoir is accessible, and it has the required structural strength, a listed vertical turbine fire pump may be installed.
2. Where there is an existing below ground reservoir, excavate a pit beside the reservoir such that a horizontal fire pump can be installed beside the reservoir at its lowest level.
3. The installation of an appropriately located water reservoir to facilitate a listed horizontal fire pump to be installed in a positive suction arrangement adjacent to the reservoir.

And alternative solution-

4. Install a header tank or break tank in a positive suction arrangement sized to supply the sprinkler system demand plus the inside hose stream allowance for a period not less than 20 minutes. The remaining required water supply may be in an accepted negative suction arrangement.

This supplementary paper to address and provide the technical specifications and implementation guidance on- "Where the top of the reservoir is accessible, and it has the required structural strength, a listed vertical turbine fire pump may be installed."

2. Standard Requirement/s:

Centrifugal pumps shall not be used where a static suction lift is required.

3. Implementation Guidance:

- A. Structural integrity of water reservoir should be determined prior to the installation of vertical turbine pump on top of water reservoir whether the top slab and top slab supported by shear walls or vertical load bearing walls are adequate to bear the overall load of fire pumps with related equipment.



- B. Manufacturer's published instruction shall be followed to maintain the pump submergence requirements.
- C. Determine the capacity of existing water reservoir to comply with minimum 60 minutes (effective) duration for maximum fire protection system demand.
- D. Proper level and plumb are necessary to be ensured for the installation of vertical turbine fire pump. Top of water reservoir should be accessible and properly leveled.
- E. Source of water supply shall be adequate, dependable, and acceptable by the AHJ. Supplying wet pits are preferable for water supplies from reservoirs or tanks.
- F. A suction pit needs to be constructed below the tank so that the total capacity of the tank can be used by the pump.

Condition 1: if the depth and area of existing water reservoir is adequate to maintain the minimum submergence requirement of vertical turbine pump as per the manufacturer's guidance and can provide minimum 60 minutes fire protection water supply duration, additional suction pit is not required.

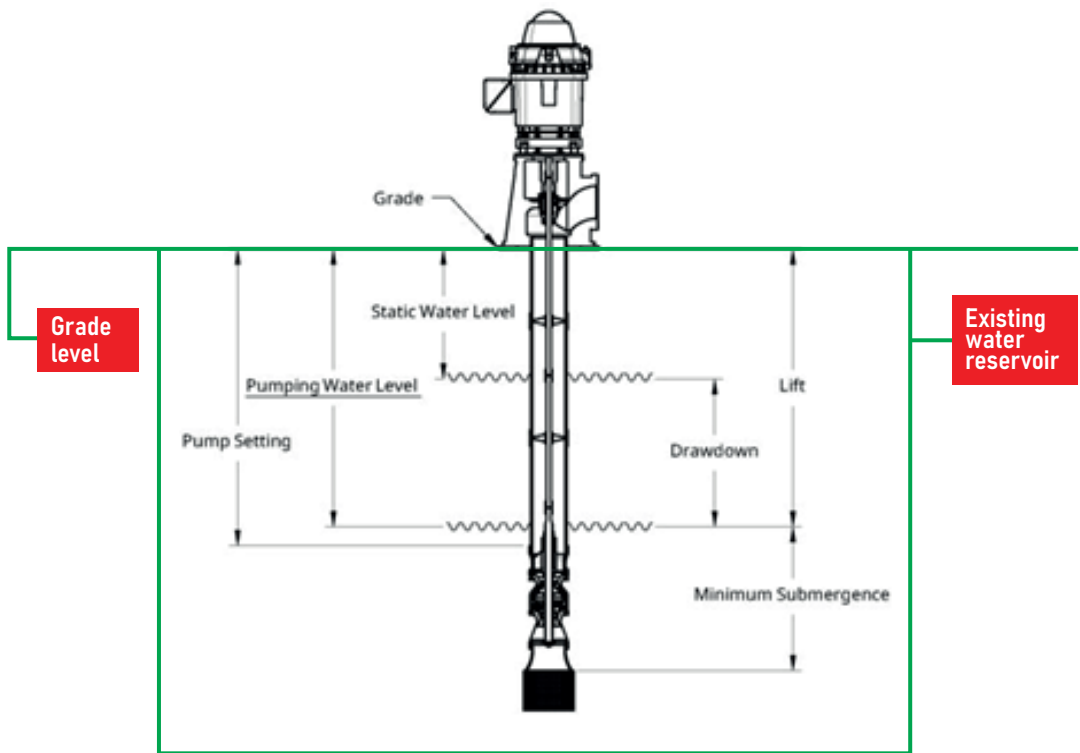


Figure1: Schematic diagram of water reservoir without suction pit

Condition 2: if the depth and area of existing water reservoir is not adequate enough to maintain the minimum submergence requirement of vertical turbine pump as per the manufacturer's guidance and has the shortfall of providing minimum 60 minutes fire protection water supply duration, a suction pit is required below existing water reservoir. Determining the depth of suction pit depends upon the submergence requirements provided by the pump manufacturer.



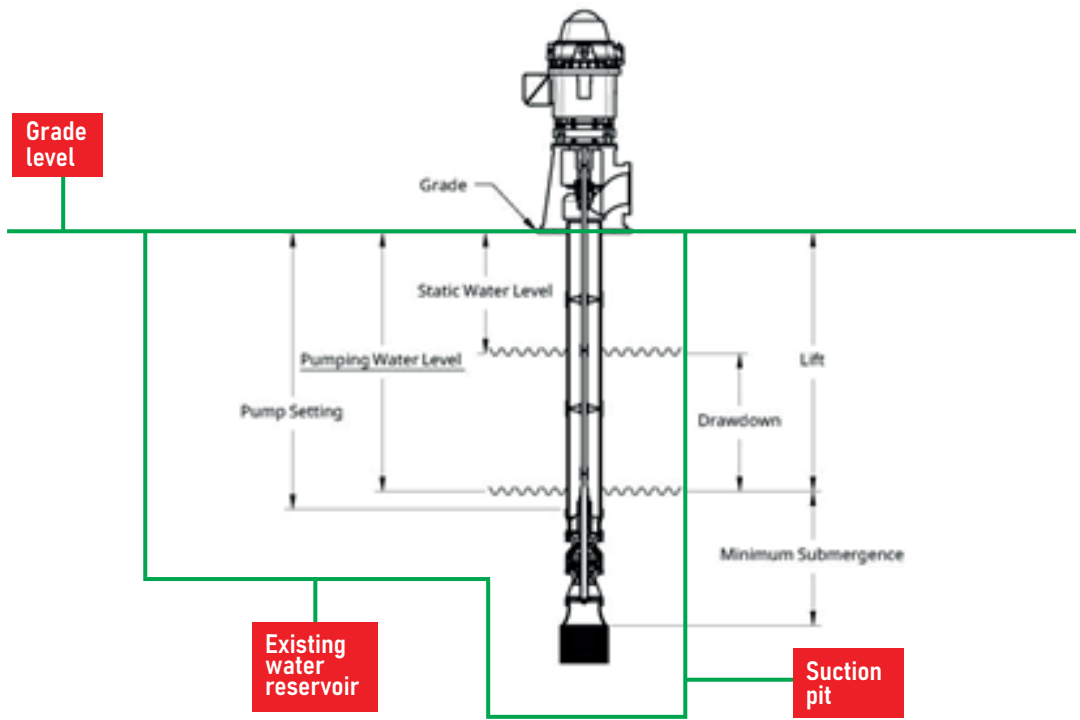
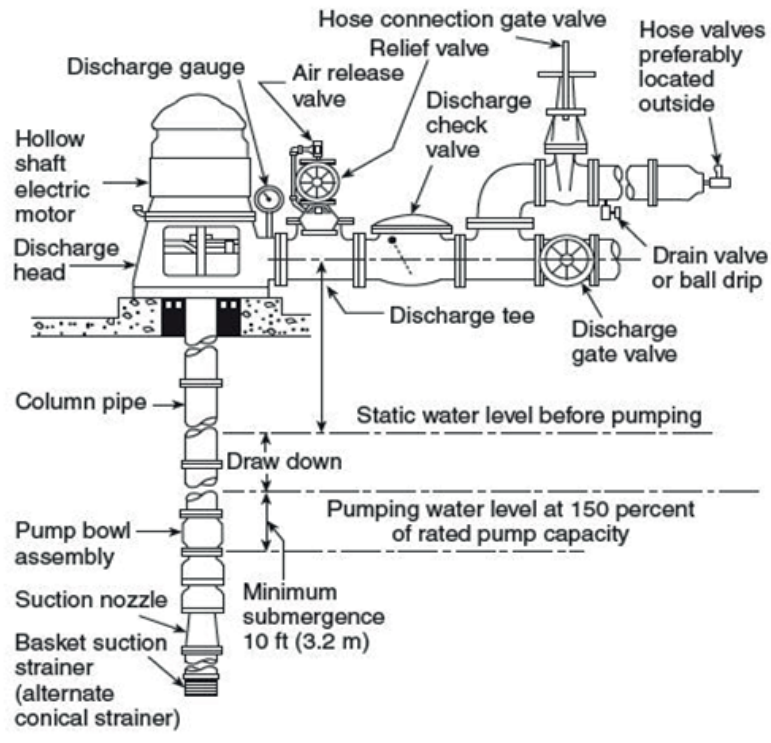


Figure 2: Schematic diagram of water reservoir with suction pit



Note: The distance between the bottom of the strainer and the bottom of the wet pit should be one-half of the pump bowl diameter but not less than 12 in. (305 mm).

Figure 3: Vertical shaft turbine type pump installation in a well with minimum submergence requirement (reference: NFPA 20)



- G. Wet pit design shall be according to NFPA 20 Chapter 7 Section 7.2.2.2 and accepted by the AHJ.
- H. Hydraulic calculation shall be performed considering the exact suction head of vertical turbine fire pump.
- I. Determine the standard size (length, width, and height) of fire pump room to fit all necessary equipment and adequate to accommodate-
 - 1) Clearances for installation and maintenance
 - 2) Clearance for electrical equipment
 - 3) Orientation of pump to suction piping
- J. Fire pump room must comply to the requirement of NFPA 20 Chapter 7 Section 7.4.1.
- K. Equipment protection of fire pump room must be ensured according to NFPA 20 Section 4.12.
- L. Standard installation of vertical turbine fire pump must comply to the requirement of NFPA 20 Chapter 7.
- M. Check the existing water reservoir to comply with the requirements of NFPA 22.
- N. Design drawing and related hydraulic calculations must be accepted and reviewed by the RSC prior to the execution of this option.
- O. The installation contractor is responsible for installation, testing & commissioning of fire protection system in accordance with NFPA 25.

4. Recommendation:

Section 3 within this supplementary paper provides detailed specifications/ guidance on installation of vertical turbine fire pump above to an existing water reservoir, which will assist the user with adequate guidance and knowledge on completing the remediation with standard requirement accordingly.

5. References:

NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection.

NFPA 22, Water Tanks for Private Fire Protection.

NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

Technical Guidance Notes for Fire and Building Safety Remediation in Bangladesh

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