Minimum Submergence Required for Vortex Suppression

200. A.05 (Effective April 1, 2021)

The formation of vortices is both variable, and has a negative impact on $NPSH_a$, making the presence of vortices highly undesirable. The following guidance should be followed to prevent the possibility of free vortices forming.

Using the relationship between pump inlet diameter and flow, the following graphs illustrate the minimum submergence required for vortex suppression.

Notes:

1. This guidance is only for the prevention of free vortices, the installation will still need to ensure there is sufficient $NPSH_a$ with an appropriate margin of safety applied. Check performance curves for NPSH required. Submergence to satisfy NPSH requirement may be greater than "S".

2. Minimum submergence values are based on ideal flow conditions, for example, two (2) times the bell distance between pump centerlines (for multiple pumps in the same sump). Refer to ANSI/HI Standard 9.8 "Pump Intake Design" (latest edition) or refer to factory for more information regarding installation specifics, conditions which are less than ideal will require additional submergence.

3. Per HI Standard, minimum submergence is measured from the lip of the suction bell/bowl. Xylem's pump selection software Xylem Online (XOL) utilizes the same HI calculations described in this document, but may show this dimension to the bottom of the pump for convenience, please note the location of the dimensional reference.

4. As minimum submergence is solely a function of pump diameter and flow, the value should be the same across pumps of the same diameter and flow, regardless of the manufacturer. Please note that diameter refers to suction bell / bowl diameter. Please refer to dimensions "D" or "D1" as appropriate in Xylem Engineering Data D200A01, choose the line of closest approximation.

5. ANSI/HI Standard 9.8 "Pump Intake Design" is updated periodically. Historically, recommendations have become more conservative over time. When comparing current values to older values for the same flow and pump model, it is likely that the current required submergence will be higher.

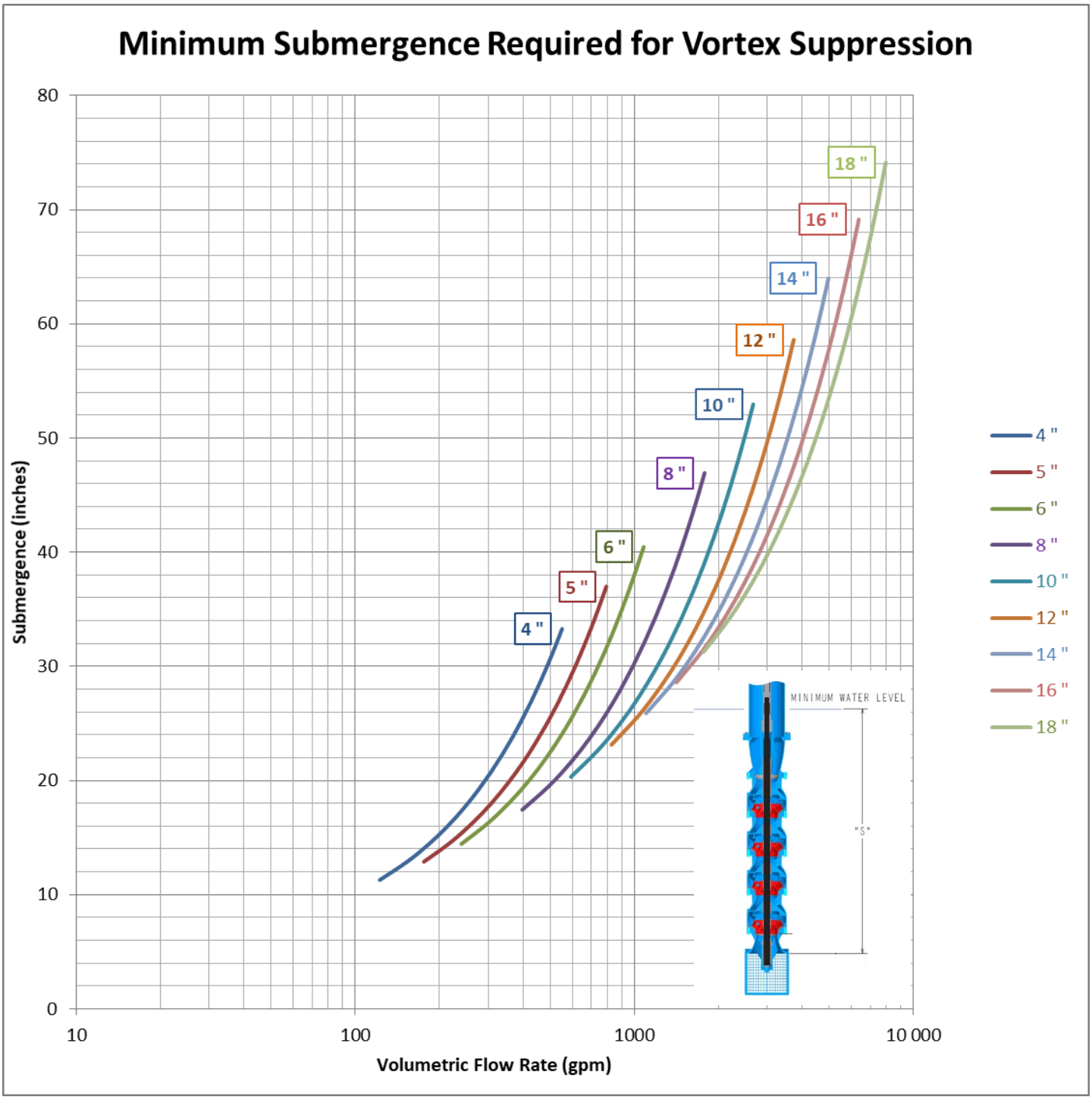

Figure 1 - Minimum Submergence Curves - Diameters 4" - 18" – Imperial Units

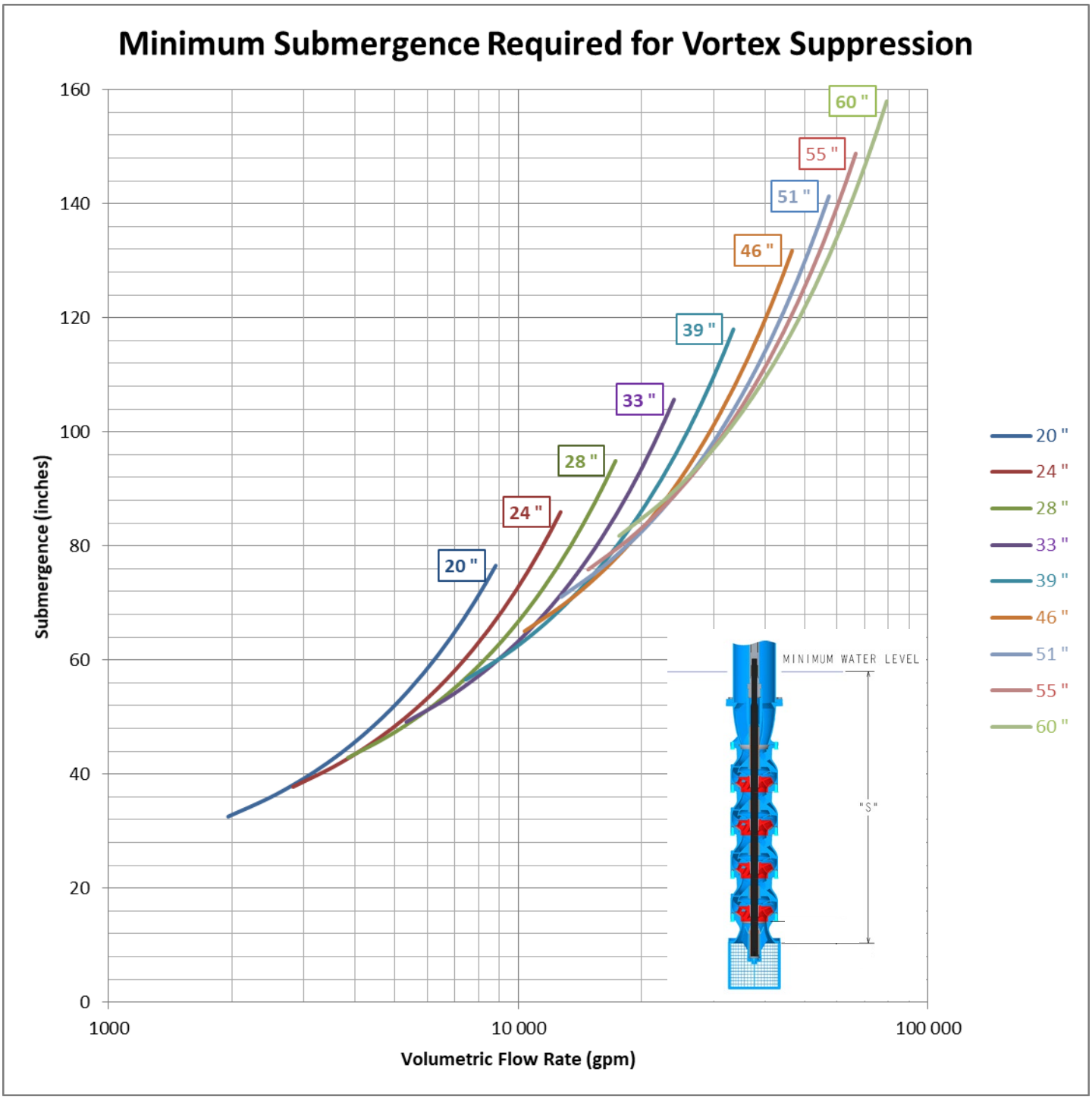

Figure 2 - Minimum Submergence Curves - Diameters 20" - 60" – Imperial Units

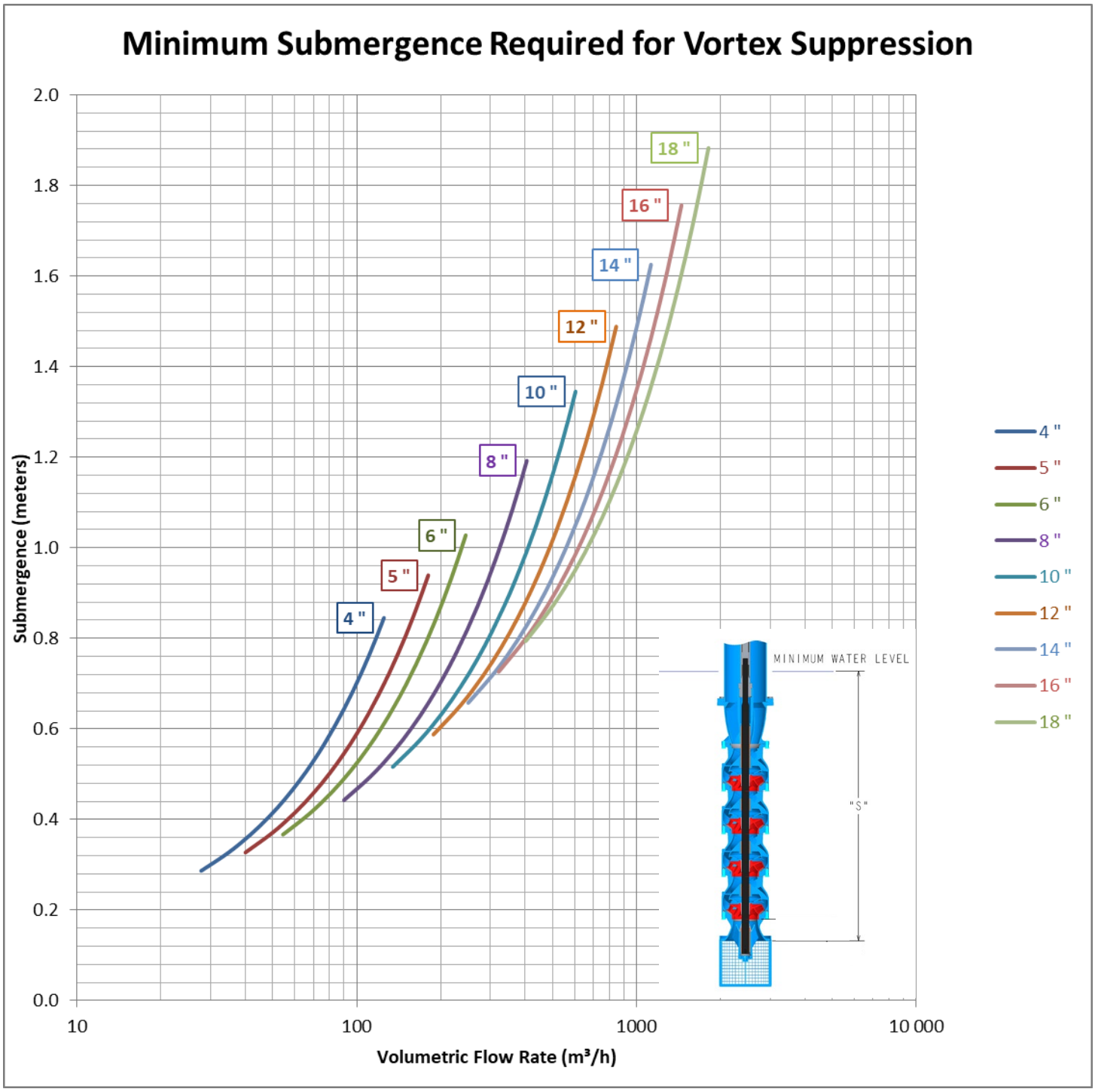

Figure 3 - Minimum Submergence Curves - Diameters 4" - 18" - SI Units

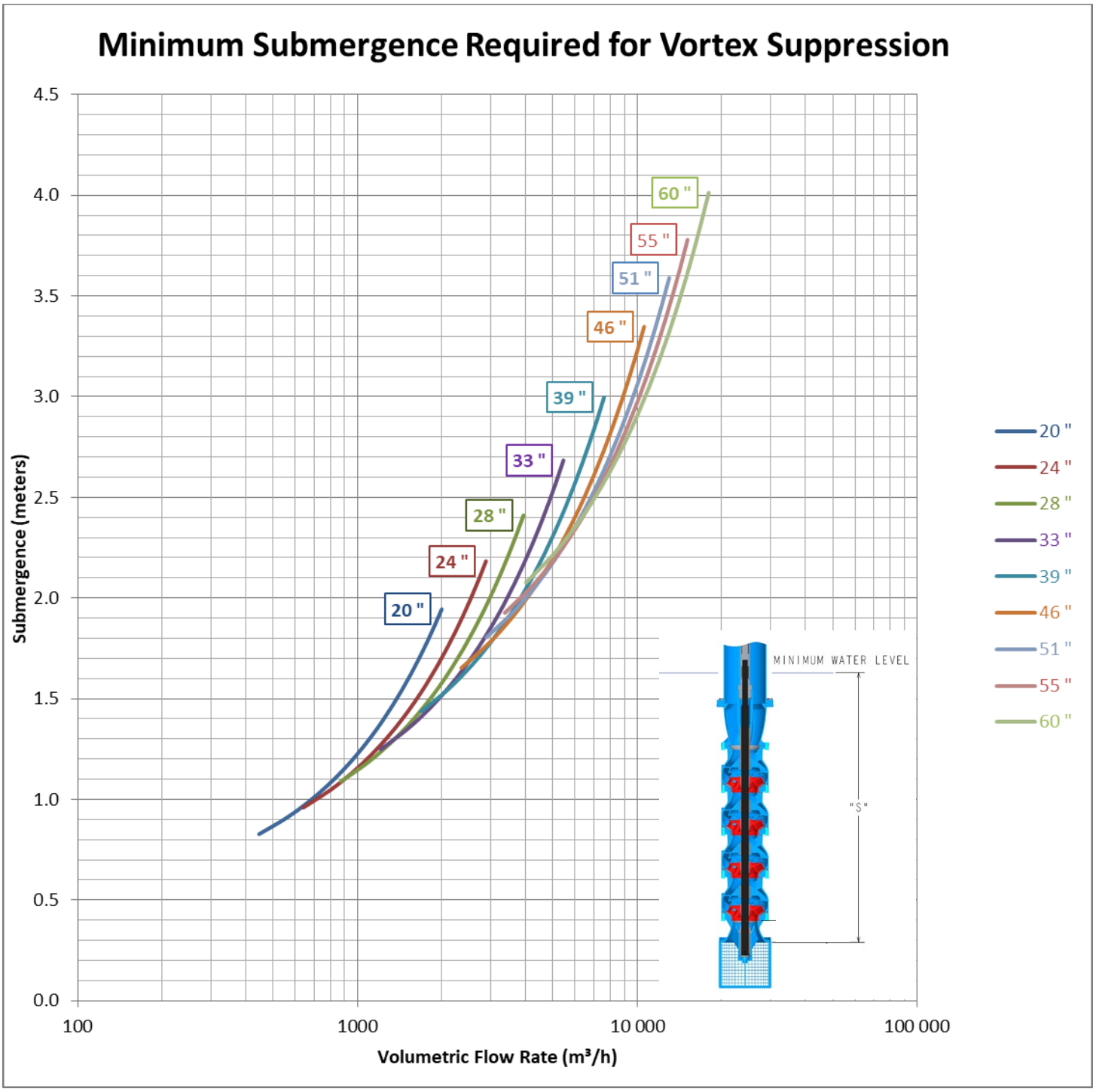

Figure 4 - Minimum Submergence - Diameters 20" - 60" - SI Units

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