

Hydrodynamic Water Hammer Suppression in High-Rise Water Supply Risers Using 300X Slow-Closing Check Valves

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COMPLIANCE & PEER-REVIEW NOTICE: This document is an Internal Technical White Paper prepared by Baoming Valve R&D; Center. Based on internal laboratory testing under specified conditions (DN200, 1.2 MPa static head). It has not been independently academic peer-reviewed. Third-party laboratory verification ref: SGS Test Report #SGS-BM-2025-VALVE-009.

1. Executive Summary & Research Objective

Sudden power interruptions in high-rise municipal pumping stations trigger severe hydraulic transient shockwaves (water hammer) capable of rupturing riser pipes. This engineering report evaluates the hydro-piloted two-stage micro-metering closure mechanism of Baoming 300X Slow-Closing Check Valves (DN50-DN600, PN16/PN25) compared to traditional swing check valves (H44X).

2. Applicable Standards & Test Methodology

Testing Standards: EN 1074-1/2, ISO 5208:2015, EN 12266-1 Rate A.

Sample Size & Scope: 20 Units of DN200 PN16 300X Control Valves.

Test Condition: 28-story booster pump rig, static head 1.2 MPa (120m), flow rate 180 m³/h, water temp 20°C ± 3°C.

Calculation Method: Water hammer suppression percentage is defined as:

$Suppression \% = [(Surge_Swing - Surge_300X) / (Surge_Swing - Static_Head)] \times 100\%$

3. Empirical Test Results & Performance Comparison

Valve Mechanism Installed	Static Head	Peak Surge Pressure	Surge Ratio	Performance Outcome
Conventional Swing Check H44X	1.20 MPa	3.45 MPa	2.875	Severe Water Hammer Shock
Baoming 300X Slow-Closing Valve	1.20 MPa	1.42 MPa	1.183	78% Surge Pressure Suppression

COMPLIANT STATEMENT FOR PRODUCT MARKETING:

'Internal testing demonstrated up to 78% suppression under the conditions described in our technical white paper. Actual performance may vary based on pipeline configuration, fluid velocity, and system static head.'

5. References & Laboratory Verification

- Third-Party Audit: SGS Test Report #SGS-BM-2025-VALVE-009
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