



NATIONAL PETROCHEMICAL COMPANY
STANDARDS

CONSTRUCTION STANDARD
FOR
TESTING, FLUSHING & REINSTATMENT OF PIPING

NPCS-CS-PI-04

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1 SCOPE

- 1.1 This standard covers the minimum requirements for flushing, pressure testing, draining and reinstatement of piping systems and does not cover the testing of pressure vessels, exchangers, piping in fired steam generators and other equipment, which are tested in accordance with the codes and specifications under which they have been built.
- 1.2 Complete package units delivered by other vendors shall not be flushed and pressure tested, unless specifically decided.
- 1.3 Flushing and pressure testing and steam blowout of complete package units in **vendor's** shop in principle shall be in accordance with this standard, unless manufacturer foresees damage to the package in which case manufacturer shall provide alternative method for approval, by purchaser.
- 1.4 Sewers or non pressure drains and open vents shall not be pressure tested. These lines shall be filled with water and drained.
- 1.5 All low pressure piping and equipment shall be **pressure tested** with air and a colored smoke bomb using soap and water.

2 STANDARDS AND CODES

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| ANSI B31.3 | Chemical Plant and Petroleum Refinery Piping. |
| NPCS-CS-PI-02 | Construction Standard for Piping Fabrication and Erection. |



3 GENERAL REQUIREMENTS PRIOR TO FLUSHING AND
PRESSURE TESTING

- 3.1 Piping is to be inspected for completeness and conformity to piping drawings and specifications.
- 3.2 All required Non Destructive Testing (NDT) and air soap tests of reinforcing rings shall be completed with results satisfactory to client (air soap testing of reinforcing rings shall be executed in the prefabrication shop as far as possible).
- 3.3 All lines shall be tested in accordance with ANSI B31.3 and this standard.
- 3.4 Client shall release all piping systems for flushing and hydrotesting after he has satisfied himself that the system is complete and ready for testing. Piping shall be divided into test systems by using blinds, caps or plugs suitably.
- 3.5 All joints (welded, screwed and flanged) whether above or underground, shall be free of painting, coating or insulation to enable a complete visual inspection (except for those under ground lines which are specifically designated as "Dead weight test").
- 3.6 Documents for testing shall be available as per section 9 of this standard before any test is started.
- 3.7
- a) All instruments in the test system shall be excluded from the flushing/testing by isolation or removal, unless otherwise approved by client in writing.
 - b) Instruments shall be shut-off, with their bleeders vented to the atmosphere.
 - c) Instrument piping shall be tested up to the first block valve.
 - d) All other valves in the system shall be kept in open position.

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- 3.8 Items to be removed or blanked off prior to flushing/testing shall include, but shall not be limited to:
- Check valve internals which shall be removed or locked open. Lines containing check valves shall be pressurized from the upstream side of the valve.
 - Relief valves and rupture discs.
 - Orifice plates, flow nozzles or other similar restrictions.
 - Venturi type flow meters (flanged).
 - Internals of equipment (trays, demisters, level instrument floats, float cages, etc.), if included in the test system.
 - Control valves.
 - Expansion joints (or provide temporary restrains).
 - Any items not designed to withstand the test pressure, e.g. pressure gauges.
 - Internals of strainers and filters, steam/air traps, etc.

- 3.9 All tests executed with day temperature of 5°C and lower or when frost is expected during night and system may stay filled over night shall have anti-freeze, which is an ethylene glycol water solution as per attachment 3. During flushing no anti-freeze is required. Avoid flushing when temperature is below 0°C.

- 3.10 All temporarily installed items (blanks, spools, strainers, etc.), shall be adequately marked using red paint or tags for easy traceability.

- 3.11 Piping supported by counterweight or spring without "down travel stop", shall be temporarily supported prior to filling with water. A spring with "down travel stop" shall have the "stop" (wedges or block) inserted prior to filling with water. Care shall be taken that gas lines have been suitably supported to carry the liquid load. If necessary, temporary supports shall be installed.

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