

Strainer Selection Guideline for Industrial Process Piping Systems

1.0 Maintenance Objective & Frequency

The objective of this guideline is to provide a standardized procedure for selecting the appropriate strainer for industrial process piping systems. Proper strainer selection prevents debris, scale, and particulate matter from entering downstream equipment such as pumps, valves, heat exchangers, and instrumentation, thereby reducing unplanned downtime and extending equipment life. This guideline is to be applied during new system design, retrofit projects, or when replacing an existing strainer. Frequency is as-needed, triggered by system modifications, process changes, or observed debris-related issues.

2.0 Lockout/Tagout (LOTO) & Safety

- **Process Isolation:** Isolate the section of piping where the strainer is to be installed or replaced. Close upstream and downstream isolation valves and apply lockout/tagout devices.
- **Pressure Relief:** Vent any trapped pressure in the isolated section using a bleed valve or petcock. Verify zero pressure with a gauge before proceeding.
- **Process Fluid Hazard:** Identify the process fluid (e.g., water, oil, chemical) and ensure appropriate PPE is worn. For hazardous fluids, use chemical-resistant gloves, face shield, and apron.
- **Hot Work Permit:** If cutting or welding is required for strainer installation, obtain a hot work permit and have a fire watch present.
- **Mandatory PPE:** Safety glasses, steel-toed boots, and work gloves are required at all times. Hearing protection if using impact tools.

3.0 Required Tools, Parts & Lubricants

- Strainer body (material: carbon steel, stainless steel, bronze, or PVC as per process compatibility)
- Strainer screen element (mesh size: 20, 40, 60, 80, 100, or 200 as per particle size requirement)
- Gaskets or O-rings (material compatible with process fluid and temperature)
- Pipe wrenches or strap wrenches (size appropriate for strainer connection)
- Thread sealant (PTFE tape or pipe dope for threaded connections)
- Torque wrench (if flanged connections, torque to flange bolt specification)
- Flashlight and inspection mirror
- Process fluid compatibility chart (for material selection)
- Pressure drop calculation chart or software (for mesh size verification)

4.0 Step-by-Step Maintenance Procedure

1. Identify the process fluid, operating temperature, and maximum operating pressure. Refer to the process flow diagram (PFD) or piping and instrumentation diagram (P&ID) for system parameters.

2. Determine the pipe size and connection type (threaded, flanged, or welded) at the intended strainer location. Measure the pipe outside diameter and note the flange rating (e.g., 150#, 300#) if applicable.
3. Select the strainer body material based on process fluid compatibility. Use a compatibility chart: carbon steel for water and oil, stainless steel for corrosive fluids or high-purity applications, bronze for potable water, PVC for low-pressure chemical lines.
4. Choose the strainer type: Y-type for general service and small pipe sizes (up to 4 inches), basket type for larger pipes or high debris loads, duplex strainer for continuous operation where cleaning cannot interrupt flow.
5. Determine the required mesh size based on the smallest particle that must be removed. For pump protection, use 40 mesh (0.016 inch openings) as a default. For instrumentation, use 100 mesh (0.006 inch) or finer. For heat exchangers, consult the tube diameter—mesh opening should be less than 1/3 of the tube ID.
6. Verify the selected strainer mesh size does not cause excessive pressure drop. Calculate pressure drop using the manufacturer's data or standard formula: $\Delta P = (K * \rho * V^2) / (2 * g)$, where K is the strainer loss coefficient, ρ is fluid density, V is velocity, and g is gravity. Ensure ΔP is below 2 psi for normal operation.
7. Select the screen material: stainless steel (304 or 316) for most applications, monel for seawater, or polypropylene for chemical resistance. Ensure the screen material is compatible with the fluid and temperature.
8. If the strainer is to be installed in a horizontal line, orient the strainer with the screen element pointing downward (for Y-type) or with the basket cover accessible from the side (for basket type). For vertical lines, ensure flow is upward through the strainer.
9. Install the strainer using appropriate thread sealant or gaskets. For threaded connections, apply PTFE tape to male threads (3-5 wraps) and tighten with a pipe wrench to snug plus 1/2 turn. For flanged connections, install gasket, align bolt holes, and torque bolts in a star pattern to the flange specification (e.g., 80 ft-lbs for 2-inch 150# flange).
10. After installation, slowly open the upstream isolation valve to pressurize the system. Check for leaks at all connections. Then open the downstream valve. Monitor pressure gauges upstream and downstream of the strainer to ensure the pressure drop is within acceptable limits.

5.0 Verification & Return to Service

1. Verify the strainer is installed in the correct orientation with the flow arrow matching the direction of process flow. Confirm all connections are leak-free under operating pressure.
2. Record the strainer type, mesh size, body material, and screen material in the maintenance log or CMMS (ServiceGrid). Note the installation date and expected cleaning interval based on process debris load.
3. Perform a functional test: run the system at normal operating conditions for 30 minutes. Monitor downstream equipment for any signs of debris (e.g., pump cavitation, valve sticking, heat exchanger fouling). If no issues occur, the strainer selection is verified.
4. If the strainer is part of a new installation, update the P&ID to reflect the strainer tag number and specifications. Provide a copy of the selection rationale to the maintenance team for future reference.
5. Sign off on the work order in ServiceGrid, documenting the strainer selection criteria, installation details, and verification results. Schedule the first strainer inspection and cleaning based on the recommended interval (e.g., 30 days for initial check, then adjust based on findings).

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.