

Changes shown by

SCOPE

- I 1.1 This practice covers layout, support, anchorage, and the provision of thermal expansion and contraction flexibility for piping.
- I 1.2 **An asterisk (*)** indicates that additional information is required, or that a decision by the Owner's Engineer is required. If a job is contracted, this additional information is furnished in the Job Specification.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I * 2.1 **Table 1** lists the practices and codes which shall be used with this practice as specified by the Purchaser.

TABLE 1

PRACTICES			
IP 4-2-2	Pipe Supports	IP 10-3-3	Rotary Screw Compressors
IP 10-1-1	Heavy Duty Centrifugal Pumps	IP 10-3-4	Axial Compressors
IP 10-3-1	Special Purpose Centrifugal Compressors	IP 10-7-1	General Purpose Steam Turbines
IP 10-3-2	Packaged, Integrally Geared Centrifugal Air Compressors	IP 10-7-2	Special Purpose Steam Turbines
CODES			
ASME Codes			
B31.1	Power Piping		
B31.3	Process Piping		

LAYOUT

- S 3.1 **Process lines and utility lines critical to safe operation or shutdown** of a process unit shall not pass through another unit which will be turned around separately. Such lines shall be located at least 15 ft (4.5 m) from other process areas, except a 20 ft (6 m) spacing from light ends units or fired heaters is required.
- R 3.2 **Pipe trenches and valve boxes (pits)** shall not be used unless approved by the Owner's Engineer. Where valve boxes are used, **valve handwheels** shall be **extended to permit operation from ground level**.
- R 3.3 **Process piping** shall **not** be routed **underground** unless approved by the Owner's Engineer. Underground piping shall be protected from corrosion by wrapping or coating, or some other means approved by the Owner's Engineer.
- O 3.4 **Utility stations** shall be located so that the entire area to be serviced may be reached with a maximum hose length of 100 ft (30 m) for nitrogen and 50 ft (15 m) for all other services.

ISOLATION PROVISIONS

- M 3.5 **Isolation Provisions.** Piping systems shall be designed with sufficient flexibility to permit blinds (spectacle or spacer and blind) to be readily installed for isolation of equipment in accordance with the following:
- In the piping or at the nozzle of all process and utility connections to vessels where necessary to provide safe entry for inspection and maintenance personnel.
 - In the suction and discharge lines of all turbines and compressors, except atmospheric suction of air fans.
 - At the inlets and outlets of process piping to fired heaters, unless otherwise specified.
 - All fuel and pilot gas headers to each fired heater.
 - Spared equipment capable of being bypassed for maintenance.
 - Safety valve bypass lines.
 - Process battery limits.
- R,M * 3.6 **Flanges** shall only be **used when required** for equipment maintenance or operation. **The final location of flanges** shall be approved by the Owner's Engineer.

UTILITY SUPPLY AND HEADER CONNECTIONS

- S 3.7 **Utility stations** shall be fed from supply headers that can remain in operation during normal unit downtime.



- O 3.8 **Steam, instrument air, and fuel gas connections** shall be from the **top of the supply header**.

PIPEWAY AND PIPE SUPPORT CLEARANCES

- O * 3.9 Unless otherwise specified, **minimum vertical clearances** between finished grade (or top of floor plate) and the bottom of the piping, insulation, or support beam (whichever controls) are as follows:

LOCATION	MINIMUM CLEARANCE	
Above major roads (such as periphery of process unit area limits)	20 ft	6100 mm
Within process unit areas:		
a. Above internal roadways provided for access of maintenance and firefighting equipment.	16 ft	4880 mm
b. Under pipeways where access is:		
1. Required for vehicular equipment	12 ft	3650 mm
2. Required only for portable (temporary) service equipment	10 ft	3050 mm
Above walkways and elevated platforms	6 ft 9 in.	2050 mm
Under any low level piping in paved or unpaved areas	1 ft (1)	300 mm
Under low point drains	6 in.	150 mm
Over railroads from top of rails	22 ft	6700 mm

Note: (1) Measured to bottom of pipe disregarding flanges and insulation.

LIQUID DRAINAGE

- O,R * 3.10 **Sloped process and utility lines within process unit areas.** If not otherwise specified, lines designated to be sloped (for liquid drainage) shall have a **minimum** slope of 1:500.
- O,R 3.11 Driplegs or other means of **condensate removal** from steam systems shall be provided at:
- The downstream end of low point horizontal runs.
 - Immediately upstream of valves located in a horizontal pipe run.
 - Immediately downstream of valves located in vertical pipe runs.

ACCESS

- O,R * 3.12 **Valves and non-welded piping connections** shall be reasonably **accessible** to the extent good engineering practice allows. **Access shall be from permanent ladder, rolling stairs, platform, grade, or other means** as required for operations, maintenance, inspection and emissions monitoring.
- R 3.13 Where **stagnant areas of piping** are unavoidable due to piping layout requirements, the design of all such piping shall be **approved by the Owner's Engineer**.

LOCATION AND ORIENTATION OF VALVES

VALVE LOCATION

- O 4.1 **Manually operated valves in piping systems.** If the center of a valve handwheel or handle is more than 6 ft (1.8 m) above grade or platform, the valve shall have a remote operating device of a type approved by the Owner's Engineer.
- O 4.2 Valve **handwheels and/or stems** shall be oriented to **not infringe on the minimum width of walkways or accessways**. **Chain operators, where permitted, shall not obstruct accessways.**
- R 4.3 **Valves at pressure vessels** shall be located as follows:
- Valves shall **not** be located **within a vessel skirt**, unless approved by the Owner's Engineer.
 - For **double block valve installations**, with one block valve located at the vessel nozzle, the second block valve may be located up to 20 ft (6 m) from the vessel.
- O 4.4 **Check valves** shall **not** be installed in **vertical downflow piping**.

VALVE ORIENTATION

- O 4.5 **Stems of valves in horizontal lines** shall **not** be oriented **below horizontal** unless specified.

- O,R 4.6 **Valves in low temperature service (operating temperature less than -50°F or -45°C)** shall be installed with the stems oriented as follows:
- Liquid service:** Stems shall be oriented vertically upward or within 45 degrees of that position. Installation of valves in the vertical run of liquid lines shall be avoided.
 - Vapor service:** Stems shall not be below horizontal.
- S * 4.7 **Gate valves in pressure relieving paths** shall be installed with the **stems in the horizontal position**. The stems may be oriented downward if approved by the Owner's Engineer.
- O * 4.8 **Gate valves in coking service** shall be installed with the stem oriented vertically upward or within 45 degrees of that position.
- O,R 4.9 **Butterfly type control valves** shall be installed to operate with the rotating shaft in the horizontal plane, except in cryogenic services. In **cryogenic services**, the shaft shall be in the vertical plane.
- O 4.10 **For wafer type check valves in horizontal piping, hinge pin orientation** shall be:
- Vertical for dual plate.
 - Horizontal for single plate.
- O 4.11 **Check valves**, excluding dual plate wafer type, shall be installed to ensure **gravity-seating**.

ADDITIONAL LOCATION REQUIREMENTS FOR EMERGENCY SHUTDOWN AND ISOLATION VALVES (EBV)

- S 4.12 **Valve handwheels** shall be **directly accessible** and positioned to be **within normal reach** for operation. For elevated locations, platforms with ladders for direct access from grade shall be provided.
- S 4.13 **Limitations governing the installation of EBV's designated Type A, B, or C** are given below:
- Note:** **Type A** is a manually operated valve located at the equipment nozzle. **Type B** is a manually operated valve located in the piping system. **Type C** is a power operated valve located in the piping system with the actuator button mounted on the actuator.
- Type A EBV.** No additional restrictions on valve location.
 - Type B and Type C EBV restrictions:**
There are no elevation restrictions for EBV's identified as "Battery Limit (BL)" block valves. Battery Limit block valves shall be labeled and shall be at least 40 ft (12 m) from a recognized fire zone.
 - Personnel access to valve handwheel (or actuator button for Type C).** Piping and accessway layout shall ensure that personnel have a direct route of access to the valve without having to pass within 25 ft (7.5 m) of the equipment being protected, i.e., the source of potential leak. For fired heaters, this distance shall be 40 ft (12 m); and for marine pier facilities, this distance shall be 100 ft (30 m).
 - Elevation above grade.** If location is within 75 ft (22.5 m) of the source of potential leak, the valve shall not be positioned more than 15 ft (4.5 m) above grade. If a Type C EBV is specified and it is not practicable to meet this 15 ft limitation, then the valve operation shall be changed to the requirements of a Type D EBV.
 - Proximity to catch basins.** Valves shall not be located near a catch basin that will drain a potential leak from the equipment being protected.
- 4.14 **Limitations governing the installation of power operated EBV's and their remotely located actuator buttons, designated Type D,** are as follows:
- S a. **Actuator buttons** shall be located **at grade** near an accessway and positioned to be at least 40 ft (12 m) from the nearest source of a potential leak from the equipment served. For marine pier facilities, this distance shall be 100 ft (30 m). **In addition:**
- Actuator buttons shall be **grouped to the extent practicable**.
 - Actuator buttons shall be **mounted at an elevation** of about 4 ft 6 in. (1400 mm).
 - Actuator button stations shall be **identical across the plant** (refinery, chemical plant, etc.) and shall be **provided with indicating lights** to show valve position, **and nameplates** to identify each valve service.
 - Actuator button stations shall be equipped with an **"emergency action" button** (or equivalent device) that when activated **sends the valve to it's "emergency" position**.
- S b. **Each EBV installation in compressor or fired heater service, or in any depressuring service**, shall have an **additional actuator button** located in the **manned control house**.