PIPING SPECIFICATION BREAKS

Specification breaks are required in piping systems for transition from high to low pressure, between high and low temperature service (sometimes), and between corrosive and non-corrosive environments. Temperature is also a consideration because it has an effect on material strength and corrosion resistance.

When setting specification breaks it is important to look at the complete piping system from source to destination. The specification break must be positioned so that there is no possibility for the lower pressure, lower/higher temperature or less corrosive resistant piping to be exposed to the harsher condition under any circumstance. Situations to consider include; operator or instrument failure, startup/shut down conditions, line plugging due to hydrate formation or water deposition and freezing, Joule-Thompson expansion (sub-cooling) and plugging with corrosion products or dirt. Also, the destination system must be properly protected with appropriately sized relief valves, vents, etc.

Methods that are used to protect a lower pressure piping system downstream from the specification break can include:

a. No valves downstream

b. CSO valves downstream, plus a stringent management policy for such valves.

c. Where appropriate, instrument and control valve failure modes that ensure piping system integrity.

d. Tracing and insulation where appropriate to prevent hydrate formation and ice plugs.

e. Frequent inspection where line plugging or corrosion is suspected to be a problem.

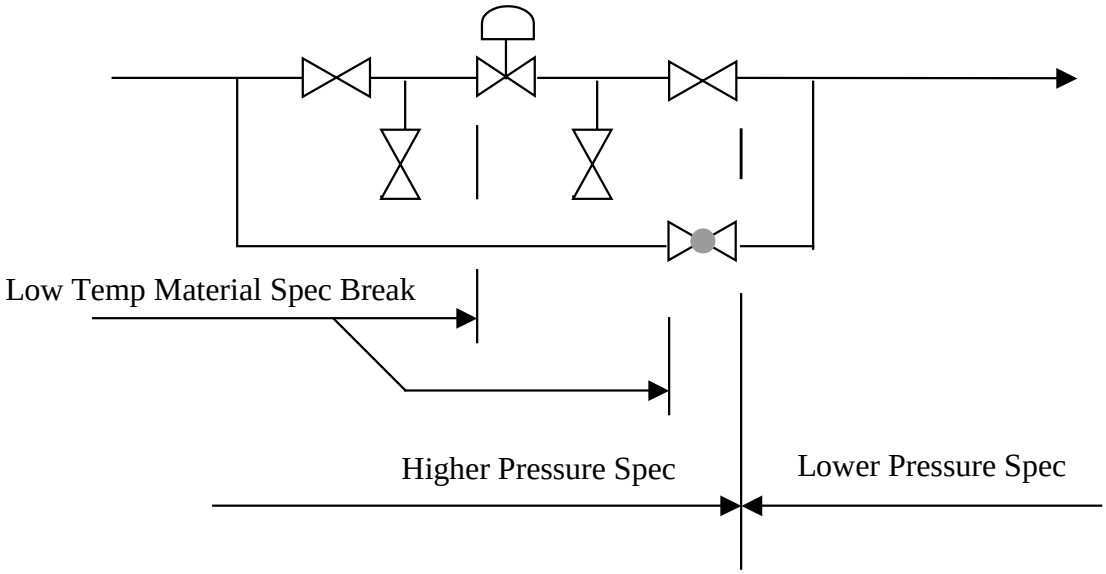
f. Thermal expansion reliefs for trapped fluids.

Where appropriate, the procedural solutions discussed above can be covered in a note on the P&ID, and ultimately can be addressed in the plant operating procedures.

Note: Reference is made to API RP 14J for pressure breaks (Fig 3 to Fig 6, Page 19 & 20) on a typical offshore oil & gas production facility.

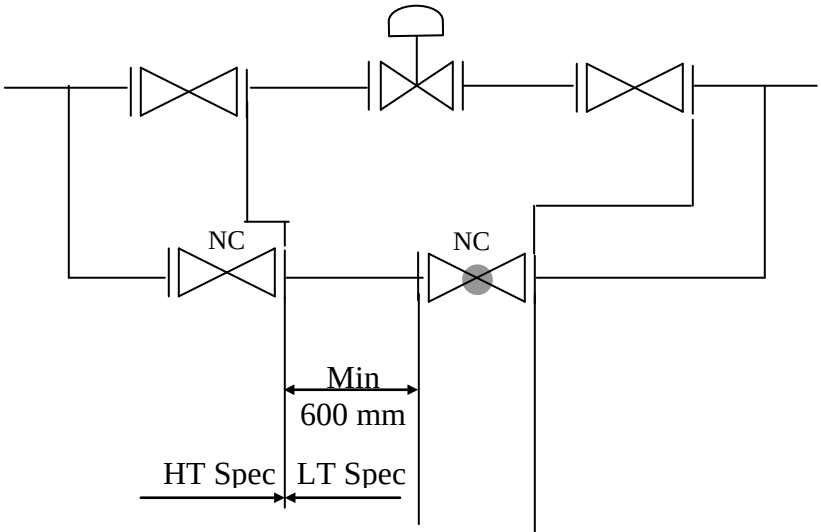
10.1 **High-pressure process systems flowing into lower pressure process systems**

Locate the specification break at the outlet flange of the furthest downstream block valve in the system that is not protected by one of the methods listed above.



10.2 **High-pressure gas or mixed phase systems flowing into lower pressure systems**, resulting in Joule Thomson cooling.

If the Joule Thomson cooling can result in a temperature that requires special low temperature piping, locate the low temperature material specification break at the inlet flange of the control or globe valve in the system as illustrated below and the pressure specification break as illustrated in figure below. The piping downstream of the pressure specification break also needs to be low temperature material.

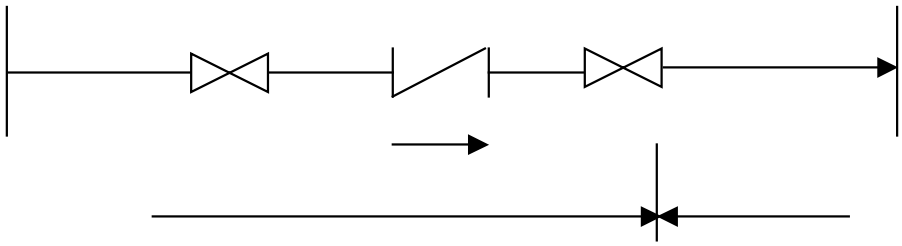


Key :

: Globe Valve

10.3 **High-pressure utility systems flowing into lower pressure process systems**.

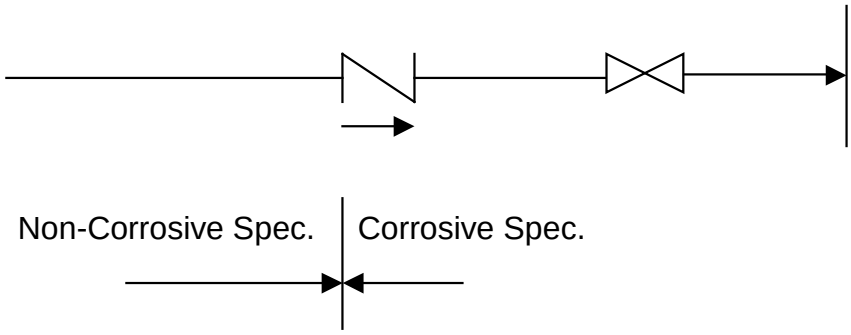
Locate the specification break at the outlet flange of the furthest downstream block valve in the utility line.



Utility Spec. Process Spec

10.4 **Non-Corrosive material flowing into a corrosive system**.

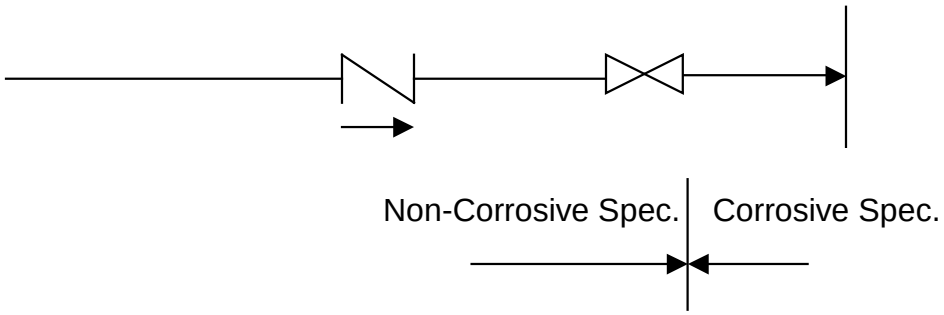
Generally, there will be a check valve in the line to prevent corrosive material from back flowing into the non-corrosive resistant system and block valve or control valve to control or shut off flow. If the check valve is upstream of the block or control valve, locate the material specification break at the inlet flange to the check valve. If the check valve is downstream of the block or control valve, locate the material specification break at the inlet flange to the block or control valve.



10.5 **Corrosive material flowing into a non-corrosion resistant system**.

As a minimum, the specification break should be at the last valve flange (block or check) before the material enters the non-corrosive system. If the corrosive material flow is continuous, this may not be enough. Depending on the nature of the corrosive material, it may be necessary to use an injection quill or to provide corrosion resistant materials in the non-corrosion resistant piping system a few diameters upstream and downstream of the mix point. If there is any doubt about the application, a metallurgist should be consulted.

In cases where there is a corrosive material and also pressure differences that would cause piping specification changes, both need to be considered. In some unusual cases, this might result in two specification breaks; one for pressure and the other for piping metallurgy.



10.6 **Pump suction piping** components should be rated for pump discharge pressure downstream of:

a. automatically operated suction valves, and

b. manually operated suction or pump isolation valve which may be erroneously closed out of sequence (e.g. during a maintenance operation).

This may be waived if appropriate administrative controls are provided that preclude the operation of the suction valve(s) prior to adequate isolation from high pressure sources, and a properly sized relief path is available that will prevent the suction piping from being overpressured.

If the discharge of the pump enters a high pressure system which has an independent source of pressure which could overpressure the pump suction in the event of a pump shutdown and discharge check valve failure, then a pump discharge SDV actuated by pump SD or suction PSH is required. Example of such an installation would be crude shipping pumps discharging into pipelines with several independent pressure sources.

10.7 **Compressor piping** should be rated and specification breaks shown based on the following:

a. For positive displacement type compressors (e.g. reciprocating), all piping downstream of and including the suction block valve should be equal in design rating to the discharge piping.

b. For kinetic energy type compressors (e.g. centrifugal), the pressure rating of the suction piping downstream of and including the suction block valve(s) should be at or above the settle out pressure of the compressor system following emergency or other shutdown of the compressor.