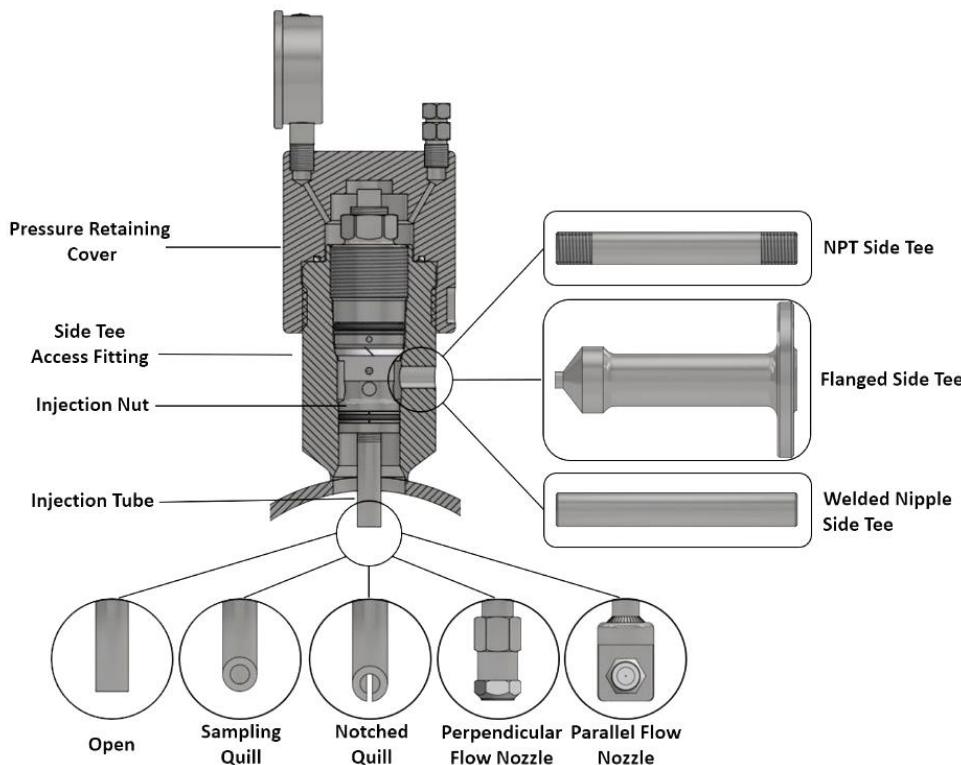


AX2HP-CHEMICAL INJECTION

2" HP Chemical Injection & Sampling System

Pressure ratings up to 6000 psi (413 bar)

Temperature Ratings up to +232°C (+450°F)



Axess Chemical Injection & Sampling Equipment

The injection of chemical treatments and sampling of process fluids are two major requirements for any corrosion control system. Whilst many of these systems can only be serviced and maintained during shutdown conditions Axess provides a range of high and low pressure injection and sampling systems which can be serviced safely online at pressures up to 6,000 PSI / 413 Bar and temperatures up to 232°C / 450°F.

Retrieval tools and some spare parts are common with the corrosion monitoring equipment using the same access system. Costs can therefore be reduced.

Access Fitting

Access fittings normally incorporate a side tee as standard for injection and sampling applications, as they allow the insert assembly to be serviced without dismantling the chemical injection feeder line. The tee can be either NPT thread, a welded plain nipple (Nipolet) or welded flange. Threaded tees are not always acceptable in sour service. Tee fittings are available in all mounting styles: flareweld, buttweld and flanged as well as mechanical and hydraulic variants. The inclusion of the tee often increases the fitting height which must be considered when selecting the injection/sampling accessories, for full details of the product code system for access fittings please consult an Axess Expert.

If existing non-tee fittings are to be used, please see Axess Direct Injection datasheet or consult an Axess Expert for more information.

Insert Components

The insert assembly consists of a solid plug, an injection nut and a tube or quill selected to meet the specific injection requirements. For detailed information on solid plugs please refer to Axess HP Access fitting datasheets. The injection nut length and NPT thread are selected based on the access fitting height and tube/quill diameter - see below. The tube or quill is mounted into the injection nut body and must be selected to deliver the necessary volume of fluid to the selected point in the line based on the line operating pressures and chemical injection pump pressure.

Injection Options: the injection fluid can be drip fed or atomized, though atomization is only useful for injection into gas filled spaces or treating gas systems. Both methods of injection can be either top or middle of line, usually referred to as perpendicular and parallel (to line flow) injection, respectively. Top of line can be specified as flush for pigable lines.

Drip Feed Tubes and Quills: for perpendicular drip feeds an open end tube is used. This method relies on the natural turbulence in the flow to disperse the chemical feed and may not be suitable when complete dispersal of a small volume of chemical is needed. Parallel injection uses a notched quill design at the center of the line which creates an artificial turbulence in the fluid flow to disperse the treatment chemical more effectively. The term quill is derived from the diagonally cut end of the tube which resembles a quill pen. As both designs may be used in fast fluid flows it is necessary to consider the strength and wake frequency of the design. Quill and tube diameters are otherwise selected to suit the rate of injection. Standard sizes range between 1/4" and 3/4".

Atomizing Nozzles & Tubes: perpendicular atomizing nozzles are screwed into the end of an injection tube of the required length. Parallel nozzles require a tube with a mounting block holder. Nozzles are selected based on the desired injection flow rate by calculating the pressure differential (ΔP) between the pipe operating pressure and chemical injection pump pressure. The tube diameter must be capable of delivering the required flow and withstanding the system pressures and forces.

Sampling: it is often necessary to obtain samples of the line fluid for laboratory analysis in support of the system management. If there is a pressure drop across an open tube type injection point and the outside pressure is the lower, the system will act as a siphon and allow fluid to be sampled. Plain end and quill end tubes can be used in this way, although quills are not notched as the object is to sample the natural flow as accurately as possible.

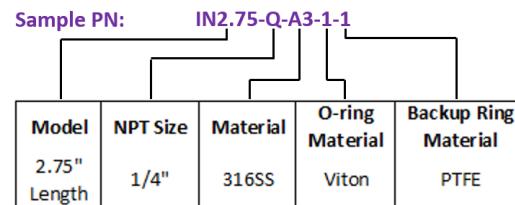
External Components: the outer end of a tee must be fitted with pressure control equipment such as a check or shut-off valve as without this there is no pressure barrier. Valves may be attached to the tee by a threaded nipple, welding, or flange. The plain nipple type tee can also be used with compression fittings. Usual practice is to fit a shut-off valve at the tee and then connect the feed or sample line to the valve, enabling the fitting to be isolated as near to the line as possible. Many injection systems are also fitted with check valves, which provide an additional barrier and can assist with getting the proper performance from atomizing nozzles. Sophisticated combined check/isolation valves and double block-and-bleed valves are also available. Because of the wide range of options, it is only possible to give limited details in this data sheet, please contact an Axess expert for information specific to your requirement. All access points should be fitted with a pressure retaining cover that meets the requirements of the location. Please refer to Axess high pressure access fitting datasheets for details.

Building a System

Step One: Select an access fitting, solid plug, and cover from the appropriate datasheets, considering the tee style, mounting and material requirements.

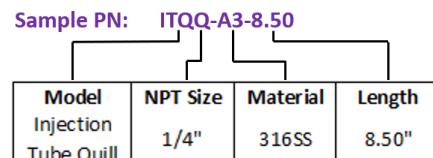
Step Two: Select an injection nut. From Table 1 identify the fitting height and select the correct length and NPT size for the injection device (Note: NPT size determined by injection device selected in Step 3 below). Select materials that meets the application requirements. Standard materials are 316ss for the injection nut body with Viton O rings and PTFE anti-extrusion backup rings. Other material options are available.

Table 1 - Injection Nuts			
Fitting Height	Nut Length	NPT Size Options	
5.25"	1.75"	1/4"	1/2"
6.25"	2.75"	1/4"	1/2"
7.25"	3.75"	1/4"	1/2" 3/4"
8.25"	5.50"	1/4"	1/2" 3/4"
9.25"	5.50"	1/4"	1/2" 3/4"



Step Three: Select the Quill/Tube/Nozzle configuration and diameter required. Table 2. gives a guide to the acceptable rate of flow for each tube diameter.

Table 2 - Tube Diameter Flow		
Injection Tube SCH 40	Litres/Min @2.17 PSI ΔP	US Gallon/Min @0.15 Bar ΔP
1/4"	20	5.3
1/2"	65	17
3/4"	115	30



To calculate the tube/quill length, firstly calculate the basic dimension (K) from:

$$K = (H + MF^* + FG^* + WG) - (P + N)$$

Where:

- H = The Access fitting height (inches)
- MF = The mating flange height (inches) (for flanged fittings only)
- FG = The flange gap allowance 0.06" (for flanged fittings only)
- WG = The weld gap allowance 0.06"
- P = The solid plug length (2.51" for mechanical, 3.93" for hydraulic)
- N = The nut length (inches) as selected from table 1.

*MF & FG are only required for flanged fittings.

The result (K) is the distance from the base of the injection nut to the OD of the pipe. This dimension is used in calculating tube/quill lengths as follows.

Open Tube and Quills (all dimensions in inches)

Middle of the Line	K + 1/2 Pipe OD + Thread Make-up (Table 3)
Flush	K + Pipe wall thickness + Thread make-up (Table 3)
Top of Line	Flush length + projection distance required.

Table 3 - Thread Make-up	
NPT Size	Thread Make-up
1/4"	3/8" (0.375")
1/2"	7/16" (0.4375")
3/4"	1/2" (0.5")

Atomizing Nozzles (1/4" tube only)

Middle of line parallel	K + ½ Pipe OD + 0.394"
Flush	K + Pipe wall thickness - 0.866"

Please visit www.Axess-Corrosion.com/resources for more information or contact an Axess expert to discuss your chemical injection and sampling requirements.