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SAMPLING SYSTEMS

(PROJECT STANDARDS AND SPECIFICATIONS)

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1. SCOPE

1.1 This Technical Specification covers typical requirements governing the design and installation of facilities to obtain samples of liquid and gaseous materials from piping, process equipment, and tankage; and fluidized solids particles from regenerator catalyst and coke transfer lines

1.2 This Technical Specification does not cover sampling systems for water treating units.

2. SYSTEM DESIGN

2.1 The location of sample connections will be specified.

2.2 The types of sampling facilities will be specified per the following:

USE	SAMPLE SYSTEM TYPE	REFERENCE	AUXILIRIES	SAMPLE COOLER OR HEATER
Gas	A	Fig. 1	Fig. 6 - Sample Tap	As required. Cooler to be commercially available type or per Fig. 11. Heater to be commercially available type or designed for the specific duty.
Liquid	B	Fig. 2	Fig. 6 - Sample Tap	
	C	Fig. 3	Fig. 6 - Sample Tap Fig. 8, 9 - Sample Enclosure (2) Fig. 7 - Sample Discharge	
	D	Fig. 4	Fig. 6 - Sample Tap Fig. 7 - Sample Discharge Fig. 10 - Sample Funnel (2)	
Fluidized Solids Particles	E	Fig. 5	- Sample Tap (Details to be specified) Fig. 7 - Sample Discharge Fig. 12 - Sample Enclosure (3)	Not required.

Notes :

(1) The dimensions of the piping arrangement given in Figure 1 and Figure 2 are designed to accommodate a 300 cm3 sample cylinder.

(2) The dimensions for the enclosure and funnel given in Figure 9 and Figure 10, respectively, are designed to accommodate a 1-quart bottle

[approximately 3-3/4 in. diam. by 8-3/16 in. high (95 mm diam. by 210 mm high).

(3) The dimensions for the enclosure given in Figure 12 are designed to accommodate a 5 gal container [approximately 12 in. diam. by 14 in. high (300 mm diam. by 350 mm high)].

If the size of the sample containers to be used is different from those specified in Notes (1), (2) and (3) above, the dimensions shall be altered accordingly.

2.3 If the specified, a common circulating loop shall be provided for both the sampling system and the analyzer where an on-stream analyzer is also installed. The sample point shall be as close as feasible to the analyzer.

2.4 Separate sampling systems shall be provided for each sample outlet, unless otherwise specified.

2.5 The use of proprietary type sampling valves will be specified. Installation details shall be submitted for review by the Owner's Engineer.

Note: Proprietary type valves and systems for special applications include: interlocked valves, "ram-type" piston valves, samplers that use a septum on the sample bottle, and samplers that use a reciprocating sampling piston.

If a "ram-type" valve is specified: (1) the piston shall extend approximately 1 in. (25 mm) into the pipe or vessel: (2) the valve shall have an indicator to show the position of the piston; (3) no block or check valves shall be installed in the sampling line for asphalt or materials of like viscosity.

COOLING/HEATING FOR LIQUID AND GAS SAMPLES

2.6 Sample coolers shall be designed for the pressure/temperature conditions of the stream being sampled. Materials of construction shall be suitable for the process fluid.

2.7 Sample coolers shall be used as required to cool the sample to 140 oF (60 oC) or lower, but: (1) not below a temperature that would result in a viscosity greater than 500 cP, and (2) not to a temperature less than 25 oF (14oC) above the pour point and the freezing point of the sample.

2.8 Coolers for tar, asphalt, and residuum shall use co-current flow of water and the fluid being sampled, and a water preheater, to avoid plugging of the cooler.

2.9 Sample system heaters. With fluids having a pour point above the lowest ambient design temperature, or having a viscosity greater than 500 cP at the lowest ambient design temperature, facilities shall be provided to heat the sampling system to 25oF (14oC) above the pour point and the freezing point of the sample to assure its flow into the sample container.

2.10 The location of the cooler or heater, i.e., in the circulation loop or in the discharge line, shall be reviewed with the Owner's Engineer.

LIGHTING

2.11 Ten foot-candles (108 lx) minimum lighting shall be provided for sampling facilities. If lighting is provided specifically for the sampling system, a local switch shall be provided.

3. SAMPLE CONNECTIONS

3.1 Sample takeoff connections in pipe, vessels and tankage will be specified. Connections in pipe shall be per Figure 6 for liquid and gases. Connections for vessels and tankage, with the exception of “ram-type” piston valves, shall not be installed in the bottom.

3.2 The final locations of sample points shall be governed by the following considerations for personnel safety and accessibility:

a. They shall be convenient to normal operating locations as far as practicable
b. The sample points shall preferably be accessible from ground level. If this is not practical, they shall be accessible from permanent platforms
c. At least two escape routes shall be available for personnel
d. They shall allow personnel to stand upwind, based on the prevailing wind pattern
e. They are not to be in areas of possible contamination if a spill of a hazardous material should occur (they shall not be in areas inside pump walls).

3.3 Sample tap positioning shall be per the following
:

a. Liquid or gas streams. Sample taps shall not be closer than 20 pipe diameters downstream or 10 pipe diameters upstream from the junction of two streams. Where two-phase flow can exist, sample taps shall be no closer than 12 pipe diameters downstream from a pressure reducer.

b. Fluidized solids streams. Sample taps shall not be closer than 8 pipe diameters downstream or 2 pipe diameters upstream from a junction of two fluidized solids streams, an elbow, valve, or other flow disruption.

3.4 When piping, equipment, or platforms are subject to process or equipment induced vibrations, a more stable location shall be selected for the sample outlet.

3.5 Process vents and drains shall not be used as sample connections.