

SCOPE

- I 1.1 This practice covers the design and installation of facilities to obtain samples of liquid and gaseous materials from piping and process equipment, and fluidized solids particles from regenerator catalyst and coke transfer lines. It does not cover laboratory sampling facilities which are part of analyzer sampling systems for obtaining analyzer validation samples.
- I 1.2 **An asterisk (*) indicates that additional information is required. If the 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 standard which shall be used with this practice.

TABLE 1

PRACTICES			
IP 3-6-1	Piping for Instruments	IP 3-18-1	Piping Fabrication Shop or Field
IP 3-10-1	Piping Selection and Design Criteria		
CODES AND STANDARDS			
ANSI Standard			
B31.3	Process Piping		

SYSTEM DESIGN

- S *3.1 **The types of sampling facilities will be specified per the following:**

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

Notes:

- The dimensions of the piping arrangement given in Figure 1 and Figure 2 are designed to accommodate a 300 cm³ sample cylinder.
- The dimensions for the funnel given in Figure 7 is 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)].
- The dimensions for the enclosure given in Figure 9 are designed to accommodate a 5 gal container [approximately 12 in. diam. by 14 in. high (300 mm diam. by 350 mm high)].
- Sample system types are defined as follows:
 - A - Gas
 - B - Liquids that could vaporize or that are hazardous
 - C - Liquids that will not vaporize and are not hazardous
 - D - Fluidized solids

* 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.

- C *3.2 **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.

IP 3-2-7		Manual Sampling Systems	EXXON INTERNATIONAL PRACTICE
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(This practice is appropriate for attachment to Inquiry or Purchase Document)

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COOLING/HEATING FOR LIQUID AND GAS SAMPLES

- S 3.3 **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.
- S 3.4 **Sample coolers** shall be used as required **to cool the sample to 140°F (60°C)** 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°F (14°C) above the pour point and the freezing point of the sample.
- R 3.5 **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.
- R * 3.6 **Sample system heaters.** With fluids having a pour point or a freezing 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 25°F (14°C) above the pour point and the freezing point of the sample to assure its flow into the sample container.

LIGHTING

- O 3.7 **A minimum in-service illumination level of 20 ft candles (215 lux)** shall be provided **for sampling facilities**. If lighting is provided specifically for the sampling system, a local switch shall be provided.

SAMPLE CONNECTIONS

- S,O 4.1 **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 (e.g., they shall not be in areas inside pump toewalls).
- O 4.2 **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.
- O 4.3 **Sample tap orientation** shall be per the following:
 - a. Sample taps should be installed in vertical lines with upward liquid flow and downward vapor flow.
 - b. When sample taps are installed in horizontal lines, side entry of probe is preferred.
- S 4.4 **Process vents and drains shall not be used as sample connections.**
- O 4.5 **Sample connections shall not be used for the installation of indicators or other instruments** that are extraneous to the sampling operation.

PIPING

DESIGN

- S 5.1 **Sample piping** shall be as **short** as possible and shall be **adequately supported and braced** to minimize the probability of it being damaged by vibration, accidental impact, or reaction forces caused by valve operation.
- S 5.2 **Soft sealed ball and plug valves** shall **not** be used **as block valves** on lines discharging to the atmosphere.

MATERIALS

- R * 5.3 All **valves in liquid and gas sampling systems** shall be Type 304 or Type 316 **stainless steel**, unless other materials of construction are required because of the fluid to be sampled. **Valves in fluidized solids sampling systems** are described in **Figure 4**.
- S * 5.4 Where the **temperature of the stream being sampled** can be **below -20°F (-29°C)**, including when the cold temperature results from flashing, all piping, valves, and fittings shall **have suitable low-temperature properties**.

TESTING

- S 6.1 **Hydrostatic testing:**
- All piping shall be hydrostatically tested per **ANSI B31.3**.
 - Austenitic stainless steel piping and tubing shall be tested and flushed with water having less than 500 ppm (500 mg/L) of chlorides. Potable water will meet this requirement. The piping and tubing shall be drained immediately after flushing and residual water removed by blowing with air.
- S 6.2 **A leakage test** shall be conducted on the entire system, at the specified design pressure. Maximum permissible leakage rates are as follows:
- Gas Systems:** 5% change per hour.
 - Liquid Systems:** No visible leakage.
 - Fluidized Solids Systems:** No visible dust plume.

INSULATING FOR PERSONNEL PROTECTION

- S 7.1 **Equipment surfaces operating above 150°F (65°C)** and located within 1 ft (300 mm) horizontally of a normal access, walkway, or work area shall be **insulated to protect personnel**.
- S 7.2 **Where insulation is not permitted**, personnel shall be **protected by open guards, shields, or railing**.

SAMPLE POINT IDENTIFICATION

- S * 8.1 **Sample points** shall be **identified** with a permanent, corrosion resistant tag securely fastened (adhesive fastening is not acceptable). Each tag is to include the following information:
- Unit name.
 - Unit sample identification.
 - Sample identification for accounting purposes.
 - Physical state (liquid, vapor or solid).
 - Temperature.
 - Pressure.

Revision Memo

1/83
1/85
12/92
6/97

Original Issue of Basic Practice
Revision 1
Revision 2

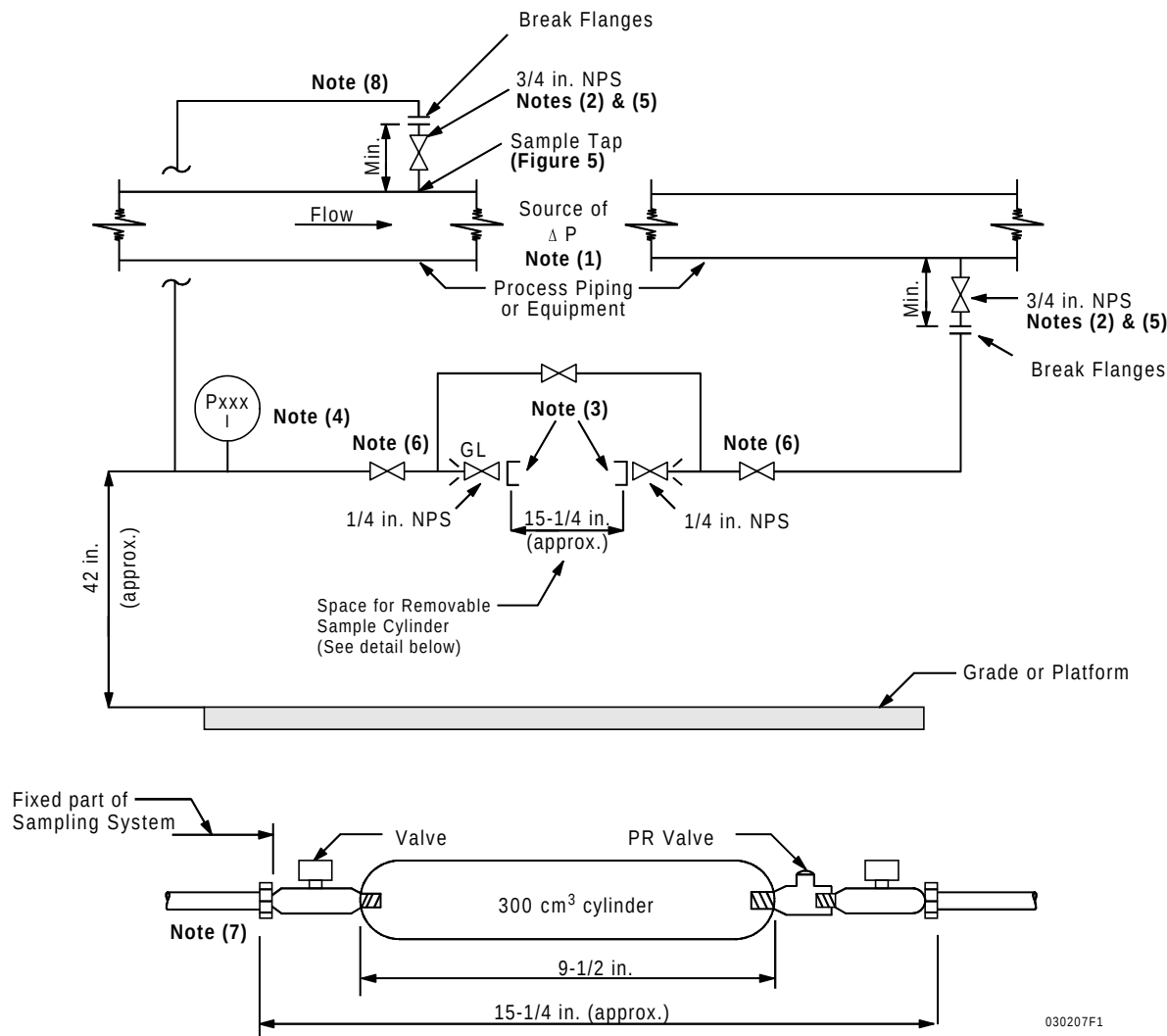
Revision 0 - Original Issue of International Practice

General technical and editorial revision to **BP 3-2-7**, Revision 2, to align the IP with other company practices.

Specific revision include: Deleted **Old Pars. 1.2, 2.1, 2.3, 2.9, 3.1, 2.5, 2.8, 4.2, 4.3, 4.5, 4.6, 4.7, 4.9, 4.10**. Added section 2, summary of additional requirements, section 2.1, **Table 1**, list of International Practices & Standards to be used with this practice. **Par. 3.7** changes minimum illumination level for lighting to 20 ft candles (215 lux). **Figure 1**, note 1, reordered sentence to move examples of differential pressure. **Figure 1** added note 8, requiring the specification of take-off orientation. **Figure 2**, note 1, reordered sentence to move examples of differential pressure. **Figure 1**, added note 11, requiring the specification of take-off orientation. **Figure 3**, note 1 reordered sentence to move examples of differential pressure. **Figure 3**, added note 9 requiring specification of take-off orientation. **Figure 8**, note 5 was added to specify CSO valves in cooling water outlet lines.

Renumbered Pars. 2.2 to 3.1, 2.4 to 3.2, 2.5 to 3.3, 2.6 to 3.4, 2.7 to 3.5, 2.8 to 3.6, 2.10 to 3.7, 3.2 to 4.1, 3.3 to 4.2, 3.4 to 4.3, 3.6 to 4.4, 3.7 to 4.5, 4.1 to 5.1, 4.4 to 5.2, 4.8 to 5.3, 4.11 to 5.4, 5.1 to 6.1, 5.2 to 6.2, 6.1 to 7.1, 6.2 to 7.2, 7.1 to 8.1.

FIGURE 1
SAMPLING FACILITIES FOR GASES-TYPE A



- Notes:**
- (1) Any conveniently located source of differential pressure (heat exchanger, pumps, control valve, etc.) with the exception of orifice plates.
 - (2) Sealweld threaded connections.
 - (3) Threaded female connections to mate with male connections of sample cylinder. Connections shall not put torque on the tubing or piping.
 - (4) PI shall be located and positioned for reading by person collecting sample.
 - (5) Brace block valve in two planes.
 - (6) Install when block valves at sample takeoff and return points are not easily accessible.
 - (7) Install flexible tubing from globe valve to sample cylinder.
 - (8) Orientation of take-off connection will be specified. Connections, with the exception of "ram-type" piston valves shall not be installed on the bottom of pipes, vessels or tanks.

ACCEPTABLE METRIC EQUIVALENTS					
in.	1/4 NPS	3/4 NPS	9-1/2	15-1/4	42
mm.	8	20	240	385	1050