ROHRBACK COSASCO SYSTEMS

# COSASCO® SAND PROBE EROSION MONITORING SYSTEM

# User Manual

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# INTRODUCTION

# CHAPTER 1

Sand production in oil and gas producing wells can cause rapid erosion and wear of top side equipment such as chokes, valves, and flow-lines. In addition, it may cause serious formation damage. The areas experiencing the most severe effects of erosion are the outer diameters of bends and areas downstream of changes in pipeline diameter.

Early detection of erosion is key to prevent serious damage and to prevent safety risks from potential leaks or malfunction of process equipment. The Sand Probes are sacrificial tubes used to detect the presence of sand in the flow stream. Their intended harmless sacrificial failure gives an early indication of impending expensive and potentially disastrous equipment failures, unless appropriate remedial action is taken.

# GENERAL

# CHAPTER 2

To obtain a complete, functional Sand Probe, erosion detection system, a pressure sensing assembly is necessary for transmission of pressure from the Sacrificial tube to a pressure sensing/recording device. This can be achieved by a pressure gauge or pneumatic or electric switch/sensor. The standard Cosasco Sand Probe (sacrificial tube portion) is 5/8” (15.9 mm) OD and a wall thicknesses of 0.035” (0.889mm), other tube thickness can be provided.

Cosasco’s sacrificial sand probe concept is that the midpoint of the sacrificial tube is placed approximately 60% into pipeline diameter (ID). This placement allows for maximum theoretical sand impingement at center-of-line where product flow velocity could be greatest, yet also allows for heavier suspended particles riding slightly lower in the flow stream to also contact the sacrificial tube.

Consideration should be given the sand probe location. Experience has shown that the worst case erosion can occur immediately downstream of a change of flow direction - especially immediately downstream of a choke, outer bend radius of an elbow or pipe T section. Sand normally returns to the approximate middle of the flow stream about ten pipe diameters downstream of an elbow.

**Sand Probe (Typical)**

# POSITIONING OF SAND PROBES

# CHAPTER 3

Cosasco's concept of placement within the pipeline is that the midpoint of the Sand Probe sacrificial tube is placed approximately 60% into the pipeline inside diameter (ID). This placement allows for maximum theoretical sand impingement at the center-of-line where product flow velocity is greatest; yet also allows for heavier suspended particles riding slightly lower in the flow stream to also contact the sacrificial tube. Wall thicknesses offered as standard are in a range allowing an approximate safety factor of ten (10). That is; for the most widely used standard pipe walls:

.035" is an approximate of 1/10th of .375" (average standard wall thickness for 8" and 10" nominal OD pipes and standard for 12" and larger nominal OD pipes).

Careful consideration should be given to sand probe monitoring locations. Experience has shown that the most erosion occurs immediately downstream of every change of flow direction; and, especially on the outside of a turn. Sand normally returns to the approximate middle of the flow stream about ten pipe diameters downstream of each turn or an average of two (2) feet, downstream from a choke. Additionally, changes of direction which occur after a long straight run tend to experience more severe erosion rates than do those occurring after shorter runs of straight flow.

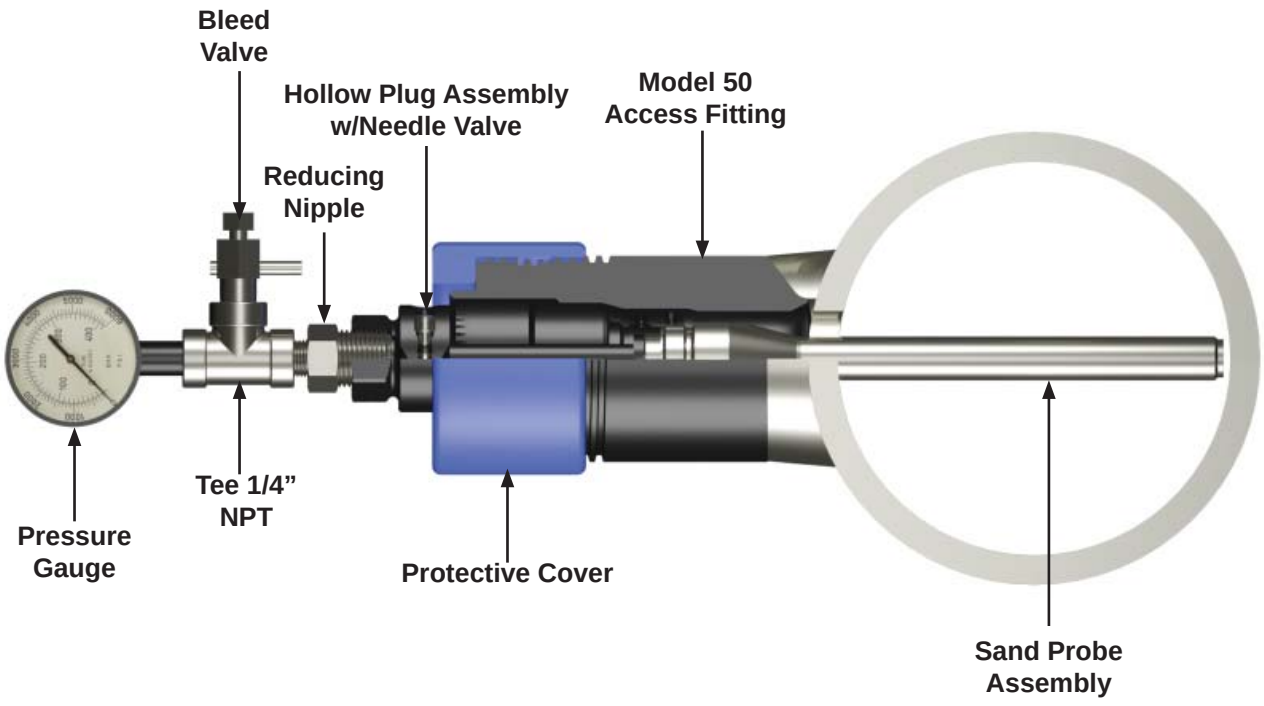
# CHAPTER 4

# SAND PROBE PRESSURE GAUGE ASSEMBLY, ASSEMBLING & FITTING

To obtain a complete, functionable Sand Probe monitoring system, a pressure sensing assembly is necessary for transmission of pressure through the hollow plug assembly to a pressure sensing recording device.

A typical Sand Probe Pressure Gauge Assembly is shown below. This type of Pressure Gauge Assembly uses a dual scale 6000 psi (414 bar) gage. The Assembly is composed of:

| Part No. | Description |
|---|---|
| 202036 | Bleed Valve |
| 129453 | Tee, 1/4” NPT |
| 200743 | Pressure Gauge, Dual Scale psi/bar |
| 129440 | 1/2” MNPT x 1/4” MNPT Hex Reducing Nipple |



# SAND PROBE REMOTE ALARM/SHUT-IN PRESSURE ASSEMBLY, ASSEMBLING & FITTING

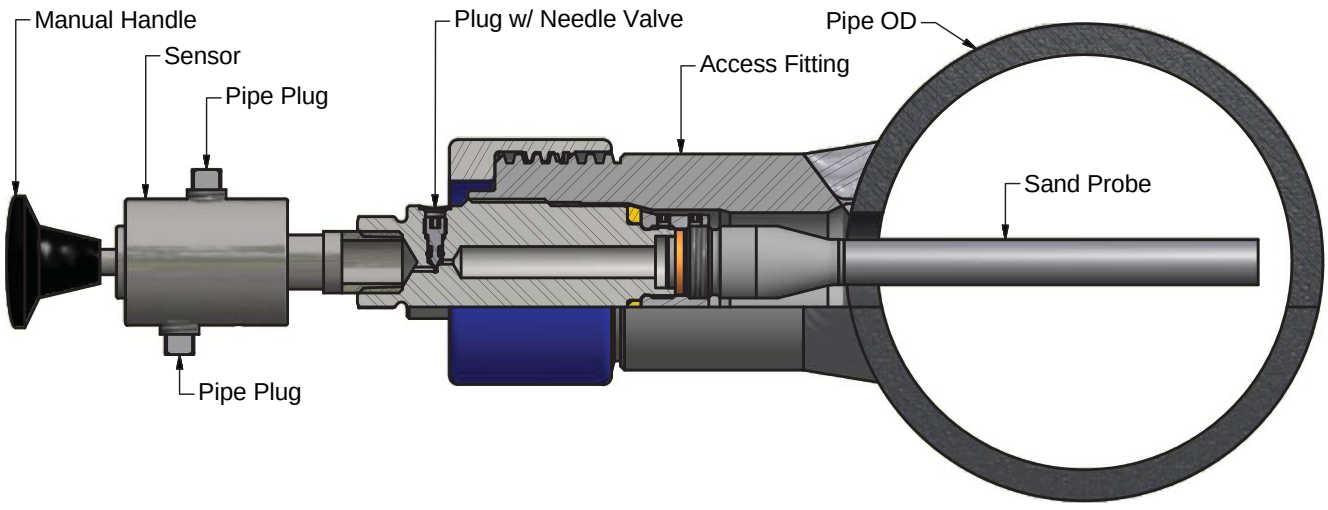
# CHAPTER 5

As in the pressure gage assembly described in Section 4; when using an automatic remote alarm/ shut-in pressure assembly, the flow stream is directed through the hollow plug assembly to a sensor (three-way block and bleed valve). The sensor is piston-actuated by transmitted pressure. The movement of the piston stem closes the control pressure inlet to the control pressure outlet. As this happens, the control pressure in the system is bled off from the outlet port to the exhaust port, which can then trigger a remote alarm or shut-in the system. A manual handle on the sensor may be used to either test, trip, or act as a visual indicator to the system status. The sensor has a vent port to prevent slow pressure build-up and premature tripping due to thermal expansion.

Also, the sensor incorporates features allowing it to be directly or remotely connected to the Sand Probe monitoring point on the flow line; or, it can be directly or remotely connected to the control valve which triggers the remote alarm or shuts-in the system.

A typical Sand Probe Remote Alarm/Shut-in Pressure Assembly is shown below. The assembly is composed of:

| Part No. | Description |
|---|---|
| 129439 | Sensor Valve |
| 124839 | 1/4” Pipe Plug (2) |



# FITTING OF SAND PROBES

# CHAPTER 6

First, it is assumed that the Access Fitting body and/or welded end fitting is already in place on the pipeline. If not, Manual 740074, trepanning, Positioning, and Welding should be consulted for proper instructions for its attachment. Additionally, if a Hot Tapping procedure is necessary to gain access to the pressurized pipe, consult 741045 Hot Tap Tool Work Instruction.

Second, if the above is already completed, and retrieving or installing Cosasco Solid Plug Assemblies with their attached Sand Probes is necessary while pipelines are under operating pressure,follow the following steps.

**Insertion of Sand Probe Assembly**

1. Insert needle valve using a 1/8” allen key hand tight. Make sure needle valve is flush with plug.
2. Insert Hollow Plug Assembly with Sand Probe according to the steps in the following work instructions related to your retrieval equipment.

741027-COSASCO RBS/RBSA Retriever and Single Isolation Service Valve
741038-COSASCO RBS/RBSA Retriever and Double Isolation Service Valve
741036-COSASCO RSL Retriever and Single Isolation Service Valve
741039-COSASCO RSL Retriever and Double Isolation Service Valve

3. Once Hollow Plug Assembly and Sand Probe are installed, attach Remote Alarm Assembly or Pressure Sensor Gauge. Once installation is complete, loosen needle valve using a 1/8” allen key.

**Retrieval of Sand Probe Assembly**

1.Tighten needle valve using a 1/8” allen key. Make sure needle valve is flush with plug. Open bleed valve to make sure no pressure is passing through.
2. Remove Remote Alarm Assembly or Pressure Sensor Gauge.
3. Consult appropriate Work Instruction as noted above for retrieval of Sand Probe.