



APPLICATION NOTE #15

Sour Water – Floating Roof Tanks Application Note

The Sour Water Tank is a large tank used as part of the low sulfur projects. In the sulfur removal processes, such as hydrotreating, the H₂S (Hydrogen Sulfide) is captured in a water phase (Sour Water). H₂S is one of the primary components removed in the de-sulfurization processes. H₂S is toxic to plant personnel and an environmental pollutant. Due to the high amount of H₂S in this water the Sour Water Tank has a floating roof and a layer of hydrocarbon (usually diesel) to blanket the water. This keeps the H₂S from escaping the tank. The Sour Water has a few uses around the refinery. One of which is wash water for the desalters.

The overall level of the tank must be monitored to ensure that the proper amount of water to maintained in the tank at all times. A non-contacting radar guage is decent choice for this measurement.

The 2-3 foot layer of hydrocarbon must also be monitored to ensure that it is sufficiently thick to contain the H₂S. If the hydrocarbon layer is too thin some H₂S may escape to the atmosphere and if the layer is too thick there may not be enough water in the tank for the refineries usage. Typically an Agar ID-201 with a 24" Coated Antenna is used for this monitoring. The probe is mounted through the floating roof so that the measurement will always be referenced to the top of the liquid layer. The probe length must be sufficiently long to penetrate the floating roof (typically 2-3'). Since floating roofs do not have any pressure on them a Seal Housing is not required. The probes are held with the 3/4" compression fitting used in a typical seal housing, but there is no U-Cup seal or isolation valve needed. From the Probe head to the top of the tank a 3 conductor coiled cable is used so that the cable will retract as the roof raises and extend as the roof drops.

Calibration of the probe is performed by either moving the oil / water interface up and down over the probe to get zero and span calibration or by calibrating the probe in a small vessel (bucket or tank) outside the vessel. The fluids for the calibration must be water and oil from the process, not

different source like fire water or tap water. Typically for calibration the probe is pulled up, into the oil phase, then pushed down into the water phase. Since these installations are on floating roofs technicians may have a difficult time getting to the probes to raise or lower the probe.

Floating roofs will have legs, or stands used to ensure that the roof does not drop all the way to the bottom of the tank. Piping and other structures at the bottom of the tank can damage the roof or be damaged by the roof. When specifying this probe we must know how long these legs are. The probe cannot penetrate further than the length of the legs. If the probes are too long, when the tank is taken out of service or the level drops low the probe will be bent or the roof will be damaged by the probes.

Some refineries have looked at using a guided wave radar to perform this measurement. Guided wave radar has been used to monitor interfaces and level, but the interface cannot have a emulsion layer. In the presence of an emulsion layer the radar will loose the signal and not provide interface measurement. When the radar is installed in a floating roof there must be an opening in the float to allow the radar guide to pass through and not allow any of the hydrocarbon vapor to escape. This is not an easy task. The ID-201 is more suitable to controlling the interface, and will not allow emissions to escape the tanks.

Refineries also use floating roofs in for slop oil tanks. The application is often very similar as the Sour Water Tank, but for a slop oil tank refineries may also install a probe at the bottom of the tank to control the water drain.