

IS YOUR GAUGE GLASS FAILING OFTEN?

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A customer had been facing gauge glass failures ever since the boiler was commissioned. He asked me how could this happen. He reported that water keeps on trickling down the gauge glass from steam side. This happens in both side water level gauges.

There can be two reasons for this. One is Foaming of boiler water. Another reason can be the un-insulated pipes connecting the level gauge. Insulation of the pipes can be easily attended to. Foaming leads to dancing of water level gauge. You may observe water fluctuations to an extent of 50 mm. Foaming can occur due to several reasons. Foaming not only affects the water level but also steam purity.

Foaming - This is the formation of foam in the space between the water surface and the steam off-take. Foam on a glass of beer sits on top of the liquid, and the liquid / foam interface is clearly defined. In a boiling liquid, the liquid surface is indistinct, varying from a few small steam bubbles at the bottom of the vessel, to many large steam bubbles at the top.

The following are indications and consequences of foaming:

- Water will trickle down from the steam connection of the gauge glass; this makes it difficult to accurately determine the water level. It leads to frequent gauge glass failure.
- Level probes, floats and differential pressure cells have difficulty in accurately determining water level.
- When low water level happens, the boiler will trip unnecessarily.
- Phosphate levels are uncontrollable. Phosphate hide out is experienced. All of a sudden you will find phosphate level going up even after stopping chemical dosage.
- Smaller drum sizes may lead to permanent foaming. At low loads the foaming may not be experienced. The trend is towards smaller boilers for a given steaming rate. Smaller boilers have less water surface area, so the rate at which steam is released per square metre of water area is increased. This means that the agitation at the surface is greater. It follows then that smaller boilers are more prone to foaming.
- TDS level - As the boiler water TDS increases, the steam bubbles become more stable, and are more reluctant to burst and separate.
- Oil / Grease contaminated water will lead to high level of foaming.

REMEDIAL MEASURES

- Look for sources of suspended matter ingress. It can happen due to pre-boiler system corrosion. In many plants pH correction is not being done at DM / RO plant outlet. This leads to corrosion of piping / tank and thus boiler feedwater will be contaminated with iron powder. This accumulates in steam drum over the steam – water interface. Go for lining of the tanks. Raise pH at water treatment plant outlet itself.
- There can be sections of steam user equipment which is being started / stopped often. During every start, this process equipment sends its entire corrosion product to boiler along with condensate. Look for steam capping / Deaerated hot water circulation arrangement to preserve the process equipment from corrosion.
- The boiler itself foams if not preserved properly during outages.

- Turbidity increase during rainy season, if not treated properly can get into boiler water leading to foaming.
- Don't dose excess chemicals. Don't simply dose chemicals as per chemical vendor advice. Understand the purpose and regulate the chemical dosage.
- In some plants chemical dosing is done without continuous chemical dosing system.
- Condensate pH control can be adopted by use of volatile chemical dosage. Thus condensate line corrosion can be avoided.
- Anti-foaming agents may be added to the boiler water. These operate by breaking down the foam bubbles. However, these agents are not effective when treating foams caused by suspended solids.