103.4 WATER COLUMNS, GAGE CLASSES, AND LEVEL TRANSMITTERS

All boilers having a fixed water level are required to have at least one gage glass installed and operational (Section I, PG-60). Boilers with maximum allowable working pressure above 400 psi (3 MPa) are required to have two independent water-level indicators, with at least one being a gage glass. There are no alternate devices to a gage glass that are allowed to replace the specified “transparent device that permits visual determination of the water level.” Figure 103.4-1 shows typical gage glasses installed on water columns for attaching to a boiler. Section I, PG-60 contains additional specifics regarding the water-level indicators, including gage glasses and water columns, and their design and installation.

The water level in a steam boiler is critical to safe operation. The boiler manufacturer’s lowest permissible water level is required to be at least 2 in. (50 mm) below the lowest visible level in the gage glass or of any remote level indicator. If this level or higher cannot be maintained, the only safe option is to shut down the boiler in the normal manner, keeping the feedwater supply on until the water level returns to normal. See 201.3.2 for more discussion on this subject.

If the inservice gage glass is not readily visible from the normal workstation of the operator who controls the feedwater supply, the operator must have two independent remote level indicators continuously available and readily viewable at the normal workstation. If one of these indicators is an image displayed on a computer screen, all screens (pages) on that computer must include the indication of water level.

A water column is a vertical pipe connected to the steam drum water space below the lowest permissible water level and to the steam space above the highest permissible water level. A water column is considered an extension of the boiler water/steam spaces, and isolation valves between the water column and the drum are not required, but are optional per Section I. If furnished, such valves must be locked or sealed open.

Water columns allow multiple devices such as gage glasses and remote level indicators to be connected to the boiler water/steam space without adding multiple connections directly to the boiler. Section I, PG-60 provides direction on connecting to the boiler and to the water column.

103.4.1 Proper Blowdown Procedure. Gage glasses and water columns are required to be blown down to prevent sludge from interfering with their proper operation. Improper blowdown can result in sludge accumulating and inaccurate boiler status being available to the operator. Figure 103.4.1-1 shows and explains proper gage glass and water column blowdown.

103.4.2 Proper Valve Types. Isolation valves between the drum and a water column or a gage glass are required to be Code-compliant through-flow construction. Gate-type or globe-type valves with straight through-flow construction are most commonly used. See Figure 103.4.2-1 for an illustration of a typical Code-compliant globe valve body of through-flow.