

Proper Water Sight Glass Usage

By Ken Olsen

The boiler water level sight glass is a vital piece of equipment on steam locomotives of all scales. The following practice applies to steam locomotives which run at Train Mountain and other Live Steam clubs.

A water level sight glass is a vertically mounted glass tube, frequently surrounded by a shield to protect the crew in case of breakage. It is connected to the back-head of the boiler so that the bottom of the glass is **a minimum of ½ inches** or more **above the highest point** of the crown sheet in the firebox.

The recommended water glass connection to the top of the boiler should be several inches long, in either brass or copper. This is so that steam entering the glass from the top of the boiler will be partially cooled on its way to the glass, resulting in a constant flow of condensate to the glass. This cleans the glass, prevents corrosion of the glass by dry steam, and shows that the glass is functioning properly.

Every crew member in the cab should train themselves to glance at the water glass every 15 seconds or less. What to check for are:

Is the water level observable, and in the safe range for operation?

Is the water moving in the glass? Motion of the engine and agitation of the circulating water will cause the water level in the glass to be constantly bouncing, at least slightly, if the glass is functioning properly.

Is the water clean? With a constant source of condensate into the top of the glass there should be only clear water in the glass, no matter how much dirt or scale the boiler water may have accumulated since its last boiler wash. Brown or milky water in the glass indicates not only that the glass is malfunctioning, but that the boiler has dirty water.

If the glass appears to be malfunctioning, it must receive immediate attention to determine the cause and find a remedy.

Do you see what is wrong with the image of a water safety device pictured to the left? Note the valve just below the water glass and compare this with the water glass's middle valve on the right.



The configuration on the left is incorrect because the Middle Valve will not allow proper blow-down of the Sight Glass. The configuration on the right allows closing the Middle valve, controlling Boiler Water, and opening the bottom valve to drain the Water Level Glass. Steam will exhaust out of the Drain (bottom) Valve.

During the steam engine safety-testing at Train Mountain, you will do the following in the presence of the TM authorized witness:



Top valve: also referred to as Valve #3 or Steam Valve

Middle valve or Water Valve: also referred to as the one connected to the boiler below the water line. Valve #2

Drain Valve: Valve #1

The above image is courtesy of LocoParts. They have three different variations of the safety sight glass available.

Directions to test the water sight glass (also known as “Blowing Down the Water Glass”):

First, the Top Valve known as the Water Valve and the Middle Valve will be open and the Drain Valve is closed to start. Also confirm that the bottom of the sight glass is $\frac{1}{2}$ " above the crown sheet or that a mask is provided over the sight glass with its top $\frac{1}{2}$ " above the crown sheet.

1. Ascertain the water level in the glass and open the drain valve (bottom valve). The water should empty out of the glass.
2. Close the Water Valve (middle valve) to the glass. Now steam should be blowing through the glass and out the Drain Valve.
3. Close the Top Valve. Now nothing should be exiting the Drain Valve.
4. Fully open the Water Valve. The glass should fill with water and the water should be exiting the Drain Valve.
5. Fully open the Steam Valve. The steam should blow the water out of the glass.
6. Close the drain valve. The water should return quickly to the level it was before the glass was blown down.

Make sure that while operating that both the Steam Valve and Water Valve are full open. Otherwise, the water level in the glass will appear lower than what is in the boiler.

This procedure should be followed frequently during operation. Make sure that all engineers that run your engine understand how to do this test.

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