

Steam Boilers

They've been with us for over two hundred years, and most of the time, they're so reliable most folks don't give them much thought. They sit in buildings all over the world, transferring heat from fuel to water, allowing us to warm our buildings or complete our processes.

Steam boilers are simple, efficient and reliable. No machine does a better job of moving BTUs from one place to another. We've used them for space heating since before the United States Civil War in 1861.

Even before the Civil War, we used steam boilers for industrial processes. Today we use them to run factories, press clothes, wash dishes, pasteurize milk, sterilize medical equipment, and to heat entire cities! Their capabilities seem endless.

But despite its simplicity, any steam boiler can run into trouble if its control system doesn't act properly. If the energy you put into the boiler exceeds what the boiler can absorb, the boiler can rupture. So you must always be on guard.

A simple safety relief valve of the right capacity and relief-pressure setting protects the boiler from over pressure. But over pressure isn't the only thing that can threaten a steam boiler. There are also the dangers of dry firing.

Should the internal water level drop too low, the boiler can burn out. So here too, you must always be on guard. You see, a steam boiler needs its water to move the heat away from its metal surfaces. Without the right internal level of water, heat quickly accumulates. Too much heat creates a very dangerous operating condition.

Boiler manufacturers have always set up minimum safe water level requirements for their equipment. Our controls help enforce those requirements in two ways:

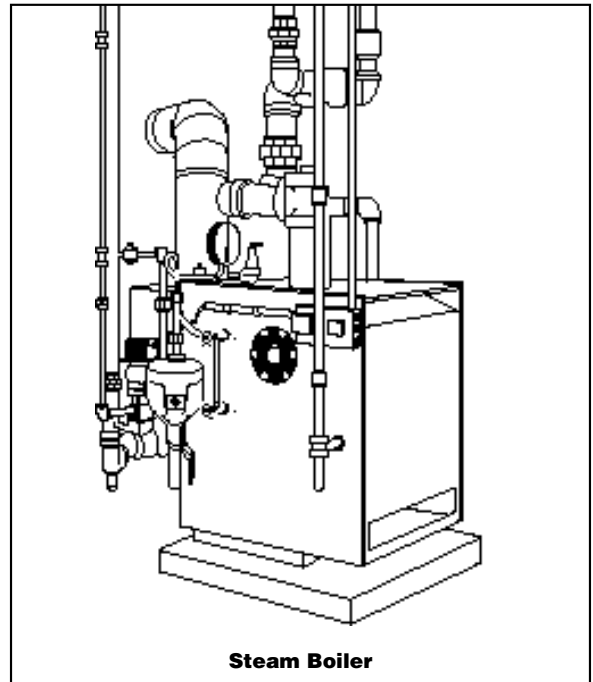
- By maintaining a minimum safe water level in the boiler.
- By signaling the burner to stop should the water level drop below that point.

In this brief Systems Guide we will explain how we do these two very important jobs.

What's a "Normal" Water Level?

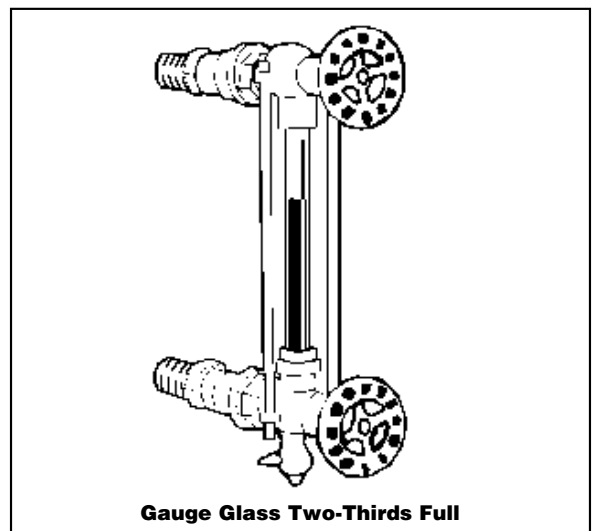
The proper steam boiler water level varies from manufacturer to manufacturer, but generally, we can say that it's "normal" to start by manually filling the boiler to the two-thirds-full point on the gauge glass. As the boiler operates, the water will quickly turn to steam and head out toward the system (Fig. B).

Steaming takes place at a constant rate of about one-half gpm per 240,000 BTU/HR (D.O.E. Heating Capacity



Steam Boiler

Fig. A



Gauge Glass Two-Thirds Full

Fig. B



CHARACTERISTIC	Low Water Cut-Offs								Low Water Cut-Off and Level Controls									
	61	63	64	PS-850	750P-MT	750-MT	750B-L	750B-L	42S	93/193	94/194	150S/157S	150S-MD/157S-MD	150E/157E	750B-P	750BM-P	750B-LP	750B-DLP
Integral Water Column Model							750B-C#	750B-C#		193	194	157S	157S-MD	157E	750B-C#	750B-C#	750B-C#	750B-C#
FUNCTION:																		
Low Water Cut-Off	X	X	X	X	X	X	X	X									X	X
Differential Level Control																		
LWCO & Differential Level Control									X	X	X	X	X	X			X	X
WATER LINE STABILITY:																		
Stable Water Line - Minimal fluctuations	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
"Fairly Unstable Water Line <2" Fluctuations"				X	X	X	X	X	X	X	X			X	X	X	X	X
"Very Unstable Water Line >2" Fluctuations"							X	X							X	X	X	X
PRESSURE SENSITIVITY:																		
Differential / setpoints affected by operating pressure	Yes	Yes	Yes	No	No	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No
MAX. BOILER PRESSURE:																		
Hot Water Boilers psi (bar)		50 (3.5)	50 (3.5)	160 (11.2)	160 (11.2)	250 (17.3)	250 (17.3)	250 (17.3)	50 (3.5)	150 (10.5)	250 (17.3)	150 (10.5)	50 (3.3)	150 (10.5)	250 (17.3)	250 (17.3)	250 (17.3)	250 (17.3)
Steam Boilers psi (bar)	20 (1.4)	50 (3.5)	50 (3.5)	15 (1.0)	15 (1.0)	250 (17.3)	250 (17.3)	250 (17.3)	50 (3.5)	150 (10.5)	250 (17.3)	150 (10.5)	50 (3.5)	150 (10.5)	250 (17.3)	250 (17.3)	250 (17.3)	250 (17.3)
LIQUID LEVEL SENSING:																		
Floater mechanism	X	X	X						X	X	X	X	X					
Probes				X	X	X	X	X						X	X	X	X	X
Pump Differentials in. (mm)	N/A	N/A	N/A	N/A	N/A	N/A	Adjust*	Adjust*	3/4 (19)	1 (25)	1 (25)	3/4 (19)	3/4 (19)	Field Adjust**	Adjust*	Adjust*	Adjust*	Adjust*
BELLOWS	X	X	X						X			X	X					
PROBES:																		
Integral Probe Sensors with self-cleaning feature				X	X													
Integral Probe Sensors																X		
Remote Probe Sensors								X							X	X	X	X
Probe Sensitivity ohms				7,000	20,000	20,000	26,000	26,000						60,000	26,000	26,000	26,000	26,000
CONTROL:																		
Passive (no electricity required)	X	X	X						X	X	X	X	X					
Non-Passive (electricity required to power unit)				X	X	X	X	X						X	X	X	X	X
SWITCHES:																		
Snap Action burner & pump	X	X	X						X	X	X	X	X					
Snap Action burner & Proportional valve										Opt	Opt							
Magnetic Repulsion									X	X								
Integral Relays				X	X	X	X	X						X	X	X	X	X
NPT Connection Size in.	1	1	1	3/4	3/4				1	1	1-1/4	1	1	1				
Manual Reset Lockout (CSD-1) Available	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X
Electrical Ratings at 120 VAC (Amperes):	7.4	10.2	7.4	7.5	7.5	7.5	7.2	7.2	7.4	345 VA	345 VA	7.4	7.4	16 Field Adjust. 0 to 60	7.2	7.2	7.2	7.2
BURNER-OFF TIME DELAY Seconds	N/A	N/A	N/A	N/A	N/A	N/A	Fixed 3	Fixed 3	N/A	N/A	N/A	N/A	N/A		Fixed 3	Fixed 3	Fixed 3	Fixed 3
CONTROL BOX INSTALLATIONS:																		
Panel Mount							X								X		X	X
Modular								X								X		
VOLTAGE SUPPLY:																		
24 VAC				X			X	X										
120 VAC				X	X	X	X	X						X	X	X	X	X
INDICATING LIGHTS:																		
Green "Power on"							X	X								X		
Red "Low Water"							X	X								X		
TEST SWITCH:																		
Standard				X	X	X								X				
DEM / field installed							X	X							X	X	X	X

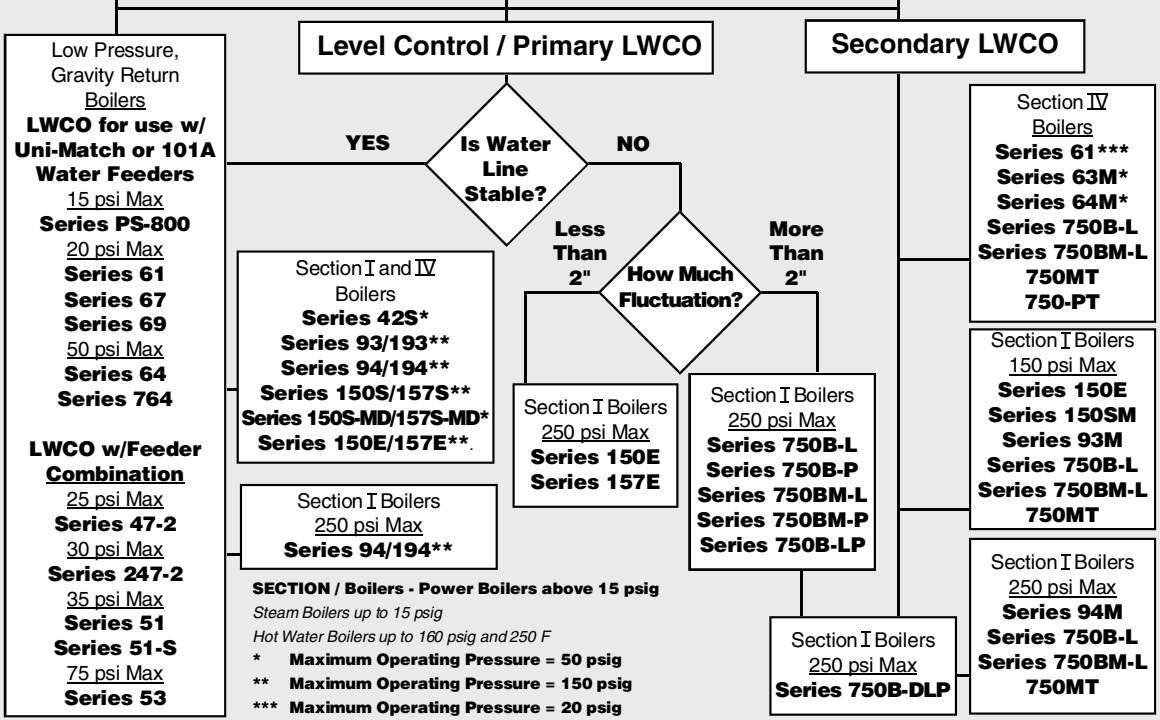
* Adjustable - Custom cut probes provide differentials as needed.

** Field adjustable - 2 positions [3/4 or 1-3/16 in. (19 or 30 mm)]

*** 750C Chamber assembly includes sensing probes.



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HOT WATER BOILERS (PRIMARY LWCO)

