



## Using Hot Standby on Steam Boilers

Carlo Zaskorski, Product Manager

### WHAT IS HOT STANDBY?

Hot standby is a function of a lead/lag scheme. The concept is that the boiler is kept hot while it is in standby to the system. This is so that the production of steam is hastened when the boiler is brought online.

Without a lead/lag scheme the idea of hot standby doesn't make sense. Suppose the need is to keep a boiler with a 100psi setpoint at 300°F when it is in standby. 300°F corresponds to approximately 52psi on the steam table. This correlation between temperature and pressure is often overlooked when trying to understand the concept of hot standby. Looking at it from the perspective of pressure, if the reading was 52psi, the boiler would be running anyway because it is well under the 100psi setpoint.

The only way that the concept of hot standby works is if a third-party such as a lead/lag system, building management system or a boiler operator manually controlling the system is sending an enable/disable signal via the limit string to override the operating control. In that case, a parallel means to enable the boiler must be provided based upon water temperature that would maintain the desired 300°F even when the lead/lag or building management system is not enabling the boiler.

### WHY SHOULD HOT STANDBY USE TEMPERATURE AS THE PROCESS VARIABLE?

While pressure can be used as the process variable for hot standby, it is not a good practice to do so. This is not even an option unless the boiler is isolated with a non-return valve. If it isn't, the header pressure will be read by the boiler pressure sensor indicating that the boiler is ready to produce steam, but the actual water in the vessel will not be up to temperature. A boiler system that doesn't have non-return valves would not be ideal for a lead/lag system in the first place as these boilers would most likely either be operated manually or simultaneously.

More likely, the non-return valves will leak which would manifest itself in much the same way as if the non-return valve was not installed. The boiler may indicate that the pressure is at or above the hot standby setpoint, but since the pressure was back-fed the water below the steam could be much colder. By using the water temperature it is ensured that the water is actually reaching the setpoint. Note that it is common for non-return valves to leak. If the boiler is not kept hot, there is a potential for damage to the vessel from over-firing while cold. A more practical ramification is that there can also be a large delay in the production of steam when a boiler is brought on-line if it is not already at a higher temperature.





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## SUPPORTING HOT STANDBY

If there is a lead/lag system or building management system providing an enable and hot standby is desired as an independent function, this can be done using a temperature stat (same as the operating control used on a hot water boiler) in the shell of the boiler where the water is. The lead/lag system or building management system connects an enable relay in series with the operating limit as per normal. In parallel with this relay would be the output from the temperature stat. This would allow the boiler to fire to maintain temperature even when commanded to be idle. Another relay or switch could be wired in series with the temperature stat to disable the hot standby function when desired.

It is important that the hot standby enable is in parallel with the remote enable relay or switch only and doesn't cause any other operating limits to be bypassed.

## STEAM TABLE

PSIG	°F	°C	PSIG	°F	°C	PSIG	°F	°C	PSIG	°F	°C
0	212	100	30	274	134	100	338	170	200	388	198
1	215	102	32	277	136	105	341	172	205	390	199
2	219	104	34	279	137	110	344	173	210	392	200
3	222	106	36	282	139	115	347	175	215	394	201
4	224	107	38	284	140	120	350	177	220	396	202
5	227	108	40	286	141	125	353	178	225	397	203
6	230	110	42	289	143	130	356	180	230	399	204
7	232	111	44	291	144	135	358	181	235	401	205
8	233	112	46	293	145	140	361	183	240	403	206
9	237	114	48	295	146	145	363	184	245	404	207
10	239	115	50	298	148	150	366	186	250	406	208
12	244	118	55	300	149	155	368	187	255	408	209
14	248	120	60	307	153	160	371	188	260	409	209
16	252	122	65	312	156	165	373	189	265	411	211
18	256	124	70	316	158	170	375	191	270	413	212
20	259	126	75	320	160	175	377	192	275	414	212
22	262	128	80	324	162	180	380	193	280	416	213
24	265	129	85	328	164	185	382	194	285	417	214
26	268	131	90	331	166	190	384	196	290	418	214
28	271	133	95	335	168	195	386	197	295	420	216





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