

Proposal Summary



Process Boiler #2 Automatic Blowdown & Deaerator Settings

Updated January 27, 2026

Prepared by: Shafi Amoni (Cascade Energy); Lily Baldewicz, Amy Droitcour and Emma Conroy (2050 Partners); Ryan Swanson (Enesfere)

Measure Description

This proposal would add the following requirements for all newly installed process steam boiler systems with capacities at or above 10 MMBtu/h:

- 1) The boilers have an automatic surface blowdown controller that is programmed to be controlled by conductivity, and
- 2) For systems that use the boiler steam header to pressurize the deaerator, the steam supply line pressure regulator serving the deaerator must be set at or under 5 pounds per square inch of gauge pressure (psig) and between 2 and 5 psig for boilers with tubes not rated for oxidizing conditions.

The requirement would apply to all sites with new process steam boilers, including replacement boilers and boilers in additions to existing facilities, with the following exceptions:

Exceptions for the automatic blowdown requirement:

- Boiler systems with returned condensate composing more than 90 percent of feedwater flow,
- Boilers with make-up water treated by a reverse osmosis system, and
- Boilers with a heat exchanger that recovers energy from the blowdown to heat make-up water or another process stream, with or without a flash tank (blowdown heat recovery).

Exception for the steam supply line pressure regulator requirement:

- Sites with swings in make-up water equal to or above 20 percent of feedwater flow.

This proposal would require updates to compliance documents and a verification of blowdown controls, deaerator control settings, and qualification for applicable exceptions by a field technician.

Boilers used in oilfield production and utility and municipal power generation are not expected to be within the scope of Title 24, Part 6.

Table 1: Scope of Proposed Code Change

An "X" indicates the proposed code change is relevant.

Building Type(s)		single family	Construction Type(s)	X	new construction
		multifamily		X	additions
	X	nonresidential		X	alterations
Type of Change	X	mandatory	Updates to Compliance Software	X	no updates
		prescriptive			update existing feature
		performance			add new feature
Third Party Verification	X	no changes to third party verification			
		update existing verification requirements			
		add new verification requirements			

Justification for Proposed Change

High conductivity in boiler water indicates high mineral content, which leads to fouling of the boiler heat exchanger tubes, increased thermal stress, and lower boiler efficiency. In addition, high dissolved solids concentrations can lead to foaming and carryover of boiler water into the steam, which can foul downstream components, trigger water hammer, and accelerate system wear and tear. To limit the levels of suspended and dissolved solids in steam boilers, water is periodically or continuously discharged or "blown down." This surface blowdown removes dissolved solids that accumulate near the surface of the boiler water.

Given that blowdown discharges hot water, it also results in fuel, water, and chemical losses. Manual boiler blowdown is typically excessive, resulting in unnecessary losses. Automatic blowdown systems avoid excessive blowdown by monitoring and maintaining water conductivity within manufacturer-specified setpoints. This eliminates the need for operators to make manual valve adjustments and offers the following benefits:

- a. Fuel, water, and chemical savings
- b. Improved conductivity control which can extend boiler useful life and slow efficiency degradation

A deaerator is a pressurized vessel that removes dissolved air from steam boiler feedwater to protect the system from corrosion and ensure high heat transfer rates. Deaerators heat the feedwater to temperatures that release the dissolved gases (mainly O₂ and CO₂) from the water and are present in nearly all large boiler systems. At higher pressures, water boils at a higher temperature, so higher pressure setpoints heat the feedwater to higher temperatures, using more energy. As pressures increase, more dissolved gases are removed. A higher deaerator pressure provides a greater margin of assurance for removing dissolved gases but also results in greater steam losses.

Deaerators may be operated at higher-than-necessary pressures. Over-pressurization leads to excess venting, while under-pressurization can lead to insufficient air removal that may result in oxygen pitting and corrosion on contact surfaces. Ensuring proper deaerator pressurization through the steam supply line regulator saves energy and has no additional cost for end users.

Preliminary savings calculations and assumptions can be found in the blowdown and deaerator pressure savings calculations document. In addition to the energy benefits, these practices would reduce local photochemical smog and improve air quality. The value of improved air quality is amplified by the consideration that many industrial facilities are located near Low- and Moderate-Income (LMI) housing, which is disproportionately exposed to lower air quality.

Data Needs / Information Requests

The Statewide CASE Team is seeking the following information to inform the code change proposal. Data may be provided anonymously. To participate or provide information, please email Emma Conroy at emmaconroy@2050partners.com directly and copy info@title24stakeholders.com.

- Typical boiler blowdown temperatures and flowrates
- Typical boiler makeup water flowrates and temperatures
- Typical boiler deaerator pressure setpoints
- Typically used boiler blowdown methods/schedules
- Prevalence of sites with poor or very poor water quality programs and/or maintenance programs
- Fouling rates and/or rates of boiler efficiency drop for boiler systems with poor and very poor water quality management
- Labor and material costs, ongoing maintenance costs, and lifetimes of blowdown valves, valve controllers, and conductivity probes
- Implementation of methods for measuring or calculating system steam flow and conducting automatic leak detection for blowoff valves at existing sites

- Note: A steam blowoff valve is a valve that vents boiler steam to the atmosphere for system capacity control. A steam blowoff valve is not a boiler blowdown valve.
- The costs of chemical conditioning for feedwater and wastewater
- Labor and material costs of boiler retubing

Draft Code Language

1.1 Guide to Marked Up Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2025 documents are marked with blue underlining (new language) and ~~strikethroughs~~ (deletions).

1.2 Title 24, Part 1

There are no proposed changes to Title 24, Part 1.

1.3 Title 24, Part 6

SECTION 100.1 – DEFINITIONS AND RULES OF CONSTRUCTION

Section 100.1(b) – Definitions: Recommends new or revised definitions for the following terms:

BOILER BLOWDOWN VALVE is a valve used for discharging water from a boiler to maintain the desired concentration of solids and chemicals to deter scale buildup, corrosion and carryover of impurities in the boiler water.

AUTOMATIC BOILER BLOWDOWN CONTROLLER is an automated system that optimizes surface-blowdown rates by regulating the volume of water discharged from the boiler in relation to the concentration of dissolved solids present.

BOILER DEAERATOR is a system that is used for the removal of oxygen and other dissolved gases from the feedwater to steam generating boilers. Dissolved gases in boiler feedwater cause corrosion damage in steam systems by attaching to metallic components and forming oxides, or rust.

BLOWDOWN HEAT RECOVERY is a heat exchanger that recovers energy from the blowdown to heat makeup water or another process stream, with or without a flash tank.

SUBCHAPTER 3 – NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, HOTEL/MOTEL OCCUPANCIES, AND COVERED PROCESSES-- MANDATORY REQUIREMENTS

SECTION 120.6 – MANDATORY REQUIREMENTS FOR COVERED PROCESSES

120.6 (d) Mandatory requirements for process boilers.

1. Combustion air positive shut-off shall be provided on all newly installed process boilers as follows:

A. All process boilers with an input capacity of 2.5 MMBtu/h (2,500,000 Btu/h) and above, in which the boiler is designed to operate with a nonpositive vent static pressure.

B. All process boilers where one stack serves two or more boilers with a total combined input capacity per stack of 2.5 MMBtu/h (2,500,000 Btu/h).

2. Process boiler combustion air fans with motors 10 horsepower or larger shall meet one of the following for newly installed boilers:

A. The fan motor shall be driven by a variable speed drive; or.

B. The fan motor shall include controls that limit the fan motor demand to no more than 30 percent of the total design wattage at 50 percent of design air volume.

3. Newly installed process boilers with an input capacity greater than 5 MMBtu/h (5,000,000 Btu/h) shall maintain stack-gas oxygen concentrations at less than or equal to 3.0 percent by volume on a dry basis over firing rates of 20 to 100 percent. Combustion air volume shall be controlled with respect to measured flue gas oxygen concentration. Use of a common gas and combustion air control linkage or jack shaft is prohibited.

Exception to Section 120.6(d)3: Boilers with steady state full-load combustion efficiency 90 percent or higher.

4. [Placeholder for Stack Economizer code]

5. Automatic Blowdown. Newly installed process steam boilers with an input capacity greater than or equal to 10 MMBtu/h (10,000,000 Btu/h) shall have an automatic boiler surface blowdown controller that is programmed to be controlled by conductivity.

Exception 1 to Section 120.6(d)5: Systems with returned condensate composing more than 90 percent of feedwater flow.

Exception 2 to Section 120.6(d)5: Boilers with make-up water treated by a reverse osmosis (RO) system.

Exception 3 to Section 120.6(d)5: Boilers employing blowdown heat recovery.

6. Deaerator Pressure Control. For systems that use the boiler steam header to pressurize the deaerator, the steam supply line pressure regulator serving the deaerator shall be set at or under 5 psig for all newly installed process steam boilers with an input capacity greater than or equal to 10 MMBtu/h (10,000,000 Btu/h). For boilers with tubes that are not rated for oxidizing conditions, the steam supply line pressure regulator setpoint shall be within 2 to 5 psig.

Exception 1 to Section 120.6(d)6: Sites with swings in make-up water equal to or above 20 percent of feedwater flow.

1.4 Reference Appendices

Appendix NA7 – Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes.

NA7.21 Process Boiler Acceptance Tests

NA7.21.1 [Place holder for Process Boiler Stack Economizer]

NA7.21.2 Process Boiler Automatic Blowdown

Acceptance tests for process boilers in accordance with Section 120.6(d)5.

NA7.21.2.1 Construction Inspection

Verify and document the planned installation of a boiler blowdown valve, valve controller, and conductivity probe (automated blowdown system) prior to functional testing. If the boiler is pursuing an exception, verify and document the planned installation of the according heat recovery equipment, RO system, or adequate condensate return infrastructure.

NA7.21.2.2 Functional Testing

Acceptance testing, performed by field technician, shall be added to verify and document the following for newly installed process boilers with an input capacity equal to or greater than 10 MMBtu/h (10,000,000 Btu/h):

automatic blowdown is programmed to be controlled by conductivity.

blowdown heat recovery equipment, RO system, or condensate return equipment is operational if the boiler is pursuing the associated exception.

NA7.21.3 Process Boiler Deaerator Pressure

Acceptance tests for process boilers in accordance with Section 120.6(d)6.

NA7.21.3.1 Construction Inspection

None.

NA7.21.3.2 Functional Testing

Acceptance testing, performed by field technician, shall be added to verify and document the following for newly installed process boilers with an input capacity equal to or greater than 10 MMBtu/h (10,000,000 Btu/h): that deaerator pressure setpoint is at or under 5 psig and within 2 to 5 psig for boilers with tubes that are not rated for oxidizing conditions.