Proposal Summary

Compressed Air Drying

Updated January 26, 2026

Prepared by: Joe Vukovich (2050 Partners); M M Valmiki (ASK Energy)

Measure Description

This proposal would add the following requirements for new and replacement air dryers that are part of compressed air systems with total combined compressor horsepower (hp) greater than or equal to 25 hp:

1. The system dew point requirement would be required to be listed on construction documents or compliance forms if the required dew point is less than 35°F.
2. If the required dew point is 35°F or greater, an energy-saving refrigerated dryer is required. An energy-saving refrigerated dryer is one that has load-matching features such as cycling, thermal mass, digital scroll compressors, or variable speed drive (VSD) compressors instead of constant speed operation.
3. All desiccant air dryers, which serve dew points below 35°F, would be required to have load-following regeneration controls that reduce energy consumption by limiting regeneration time and the associated energy consumption from purge air, blowers, or heaters. This requirement would not apply to heat-of-compression dryers.
4. Finally, all desiccant dryers with capacity greater than 300 cfm would be required to have internal or external heating to reduce the use of purge air for desiccant regeneration.

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		no changes to third party verification			
		update existing verification requirements			
	X	add new verification requirements			

Justification for Proposed Change

Air compressor systems were first covered by Title 24 Part 6 in 2013 thanks to efforts by the California Statewide Codes and Standards Enhancement (CASE) Program team. Mandatory covered process measures were added that stipulated sizing and control requirements for baseload and trim air compressors. Through another CASE Program effort, additional compressed air system requirements were added as part of the 2022 code cycle with a focus on optimization and sustained efficiency of the distribution and load-side components. This CASE effort added mandatory pipe sizing, monitoring, and leak testing measures to Title 24 Part 6.

The proposed 2025 air dryer code measure additions originated during the development of compressed air system measures for the 2022 energy code cycle. Air dryer measures were not pursued at that time, although not due to any technical or cost-effectiveness barriers. Rather, dryers were excluded simply because the selected measures focused on the distribution system and load-side of compressed air, of which dryers were not considered. Air dryer requirements were identified as a possible measure during discussion and measure selection amongst the Statewide CASE team but were not prioritized at the time and were instead reserved for future efforts.

The team is not aware of any ongoing appliance or energy efficiency standards that cover compressed air dryers or their selection. Air dryer types and selection are discussed in industry documents such as the Compressed Air and Gas Handbook from the Compressed Air and Gas Institute, but no standards or code language yet exists.

Data Needs / Information Requests

The Statewide CASE Team is seeking any relevant information to inform the code change proposal. Data may be provided anonymously. To participate or provide information, please email Joe Vukovich at joevukovich@2050partners.com and M M Valmiki at valmiki@askenergyinc.com and copy info@title24stakeholders.com. Desired information includes:

- Whether dryer rated performance matches actual, in-field performance
- Factors affecting the type and capacity of selected dryer equipment, including any perceived issues affecting categories of products
- How often air dryers are paired with a specific trim compressor
- Dryer performance perspective including efficiency, purge rates, and load-following control abilities
- Market share and costs of various dryer technologies

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(b) – Definitions:

COMPRESSED AIR SYSTEM is a system of at least one compressor providing compressed air at 40 psig or higher and all its components upstream of pneumatic end uses.

LARGEST NET CAPACITY INCREMENT is the largest increase in capacity when switching between combinations of base compressors that is expected to occur under the compressed air system control scheme.

~~**ONLINE COMPRESSORS** are all the compressors that are physically connected to compressed air piping and are available to serve peak load. Online compressors do not include back upcompressors whose only purpose is to be available when an online compressor fails.~~

TRIM COMPRESSOR is a compressor that is designated for part-load operation at least part of the time, handling the short-term variable trim load of end uses, in ~~addition to the~~ contrast to always fully loaded base compressors.

DESICCANT AIR DRYER is an air dryer that uses regenerative desiccant material to remove moisture from compressed air with or without supplemental heat and with or without purge air supplied by the air compressor for regenerating the desiccant material.

HEAT OF COMPRESSION AIR DRYER is a desiccant air dryer that uses heat recovered from the compression process to regenerate the desiccant media.

POINT-OF-USE AIR DRYER is an air dryer that operates at the same location that compressed air is intended to be used.

REFRIGERATED AIR DRYER is an air dryer that uses a refrigeration cycle to remove moisture from compressed air. This includes equipment with a hot gas bypass to prevent freezing at low loads.

ENERGY SAVING REFRIGERATED AIR DRYER is a refrigerated dryer that includes capacity control features to reduce energy consumption in response to varying compressed air load. Capacity control features include cycling, thermal mass, digital scroll, and variable speed drives.

DESICCANT REGENERATION CONTROLS are controls that reduce energy consumption during the regenerative process of the desiccant material in a desiccant air dryer. The controls shall reduce regeneration cycle times and reduce overall energy consumption in response to the direct measurement of air dew point directly or indirect dew point measurement via other measures of desiccant material moisture and absorption.

…

SECTION 120.6 – MANDATORY REQUIREMENTS FOR COVERED PROCESSES

(e) Mandatory requirements for compressed air systems.

All new compressed air systems~~, and all additions or alterations of compressed air systems~~ where the total combined horsepower (hp) of the compressor(s) is 25 hp or more shall meet the requirements of Subsections 1 through ~~5~~7. These requirements apply to the compressors, related piping systems, dryers, and related controls that provide compressed air and do not apply to any equipment or controls that use ~~or process~~ the compressed air.

EXCEPTION 1 to Section 120.6(e): Medical gas compressed air systems serving healthcare facilities.

1. Trim compressor and storage. The compressed air system shall be equipped with an appropriately sized trim compressor and primary storage to provide acceptable performance across the range of the system and to avoid control gaps. The compressed air system shall comply with Subsection A or B below:

A. The compressed air system shall include one or more variable speed drive (VSD) compressors. For systems with more than one compressor, the total combined capacity of the VSD compressor(s) acting as trim compressors must be at least 1.25 times the largest net capacity increment between combinations of compressors. The compressed air system shall include primary storage of at least one gallon per actual cubic feet per minute (acfm) of the largest trim compressor; or,

B. The compressed air system shall include a compressor or set of compressors with total effective trim capacity at least the size of the largest net capacity increment between combinations of compressors, or the size of the smallest compressor,

whichever is larger. The total effective trim capacity of single compressor systems shall cover at least the range from 70 percent to 100 percent of rated capacity. The effective trim capacity of a compressor is the size of the continuous operational range where the specific power of the compressor (kW/100 acfm) is within 15 percent of the specific power at its most efficient operating point. The total effective trim capacity of the system is the sum of the effective trim capacity of the trim compressors. The system shall include primary storage of at least 2 gallons per acfm of the largest trim compressor.

~~**EXCEPTION 1 to Section 120.6(e)1**: Alterations where the total combined added or replaced compressor horsepower is less than the average per-compressor horsepower of all compressors in the system.~~

~~**EXCEPTION 2 to Section 120.6(e)1**: Alterations where all added or replaced compressors are variable speed drive (VSD) compressors and compressed air system includes primary storage of at least one gallon per actual cubic feet per minute (acfm) of the largest trim compressor.~~

EXCEPTION ~~3~~1 to Section 120.6(e)1: Compressed air systems that have been approved by the Energy Commission Executive Director as having demonstrated that the system serves loads for which typical air demand fluctuates less than 10 percent.

~~**EXCEPTION 4 to Section 120.6(e)1:** Alterations of existing compressed air systems that include one or more centrifugal compressors.~~

2. Controls. Compressed air systems with three or more compressors and a combined horsepower rating of more than 100 hp shall operate with controls that are able to choose the most energy efficient combination and loading of compressors within the system based on the current compressed air demand.

3. Monitoring. Compressed air systems having a combined horsepower rating equal to or greater than 100 hp shall have an energy and air demand monitoring system with the following minimum requirements:

A. Measurement of system pressure.

B. Measurement of amps or power of each compressor.

C. Measurement or determination of total airflow from compressors in cfm.

D. Data logging of pressure, power in kW, airflow in cfm, and compressed air system specific efficiency in kW/100 cfm at intervals of 5 minutes or less.

E. Maintained data storage of at least the most recent 24 months.

F. Visual trending display of each recorded point, load, and specific energy.

4. Leak testing of compressed air piping. Compressed air system piping greater than 50 adjoining feet in length shall be pressure tested after being isolated from the compressed air supply and end uses. The piping shall be pressurized to the design pressure and test pressures shall be held for a length of time at the discretion of the authority having jurisdiction, but in no case for less than 30 minutes, with no perceptible drop in pressure.

If dial gauges are used for conducting this test, these gauges must conform with California Plumbing Code Sections 318.3, 318.4, and 318.5.

Piping less than or equal to 50 adjoining feet in length shall be pressurized and inspected. Connections shall be tested with a noncorrosive leak-detecting fluid or other leak detecting methods at the discretion of the Authority Having Jurisdiction.

5. Pipe sizing. Compressed air piping greater than 50 adjoining feet in length shall be designed and installed to minimize frictional losses in the distribution network. These piping installations shall meet the requirements of Section 120.6(e)5A and either Section 120.6(e)5B or 120.6(e)5C:

A. Service line piping shall have inner diameters greater than or equal to ¾ inch. Service line piping are pipes that deliver compressed air from distribution piping to end uses.

B. Piping section average velocity. Compressor room interconnection and main header piping shall be sized so that at coincident peak flow conditions, the average velocity in the segment of pipe is no greater than 20 ft/sec. Compressor room interconnection and main header piping are the pipes that deliver compressed air from the compressor outlets to the inlet to the distribution piping. Each segment of distribution and service piping shall be sized so that at coincident peak flow conditions, the average velocity in the segment of pipe is no greater than 30 ft/sec. Distribution piping are pipes that deliver compressed air from the compressor room interconnection piping or main header piping to the service line piping.

C. Piping total pressure drop. Piping shall be designed such that piping frictional pressure loss at coincident peak loads is less than 5 percent of operating pressure between the compressor and end use or end use regulator.

6. Compressed air dryers. Compressed air dryers, other than point-of-use dryers, and their controls shall comply with Subsections A, B, C, and D below:

A. Where required facility dewpoints are greater than 35°F, refrigerated air dryers shall be specified.

B. Any refrigerated air dryer shall be an energy saving refrigerated air dryer.

EXCEPTION 1 to 120.6(e)6B: Air dryers specified for applications that must maintain a precise dewpoint across all operating conditions.

C. All desiccant air dryers shall have controls that reduce regeneration time based on measurement of the desiccant material moisture load.

EXCEPTION 1 to 120.6(e)6C: Heat of compression air dryers.

D. Desiccant air dryers with capacity of 300 cfm or greater shall have internal or external heating to reduce purge compressed air.

EXCEPTION 1 to 120.6(e)6D: Air dryers that are supplying conditioned air to plants that need dew points less than or equal to -40 °F.

EXCEPTION 2 to 120.6(e)6D: Air dryers specified for applications that must maintain a precise dewpoint across all operating conditions.

~~6~~7. **Compressed Air System Acceptance**. Before an occupancy permit is granted for a compressed air system subject to Section 120.6(e), the equipment and systems shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the equipment and systems meet the acceptance requirements specified in NA7.13.

…

Section 141.1 – Requirements for Covered Processes in Additions, Alterations to Existing Nonresidential, and Hotel/Motel Buildings

(f) Mandatory requirements for compressed air systems.

All added or replaced compressed air systems where the total combined horsepower (hp) of the compressor(s) is 25 hp or more shall meet the requirements of Subsections 1 through 7. These requirements apply to the compressors, related piping systems, dryers, and related controls that provide compressed air and do not apply to any equipment or controls that use the compressed air.

EXCEPTION 1 to Section 141.1(f): Medical gas compressed air systems serving healthcare facilities.

1. Trim compressor and storage. All added and replacement air compressors shall meet the requirements of 120.6(e)1.

EXCEPTION 1 to Section 141.1(f)1: Alterations where the total combined added or replaced compressor horsepower is less than the average per-compressor horsepower of all compressors in the system.

EXCEPTION 2 to Section 141.1(f)1: Alterations where all added or replaced compressors are variable speed drive (VSD) compressors and compressed air system includes primary storage of at least one gallon per actual cubic feet per minute (acfm) of the largest trim compressor.

EXCEPTION 3 to Section 141.1(f)1: Compressed air systems that have been approved by the Energy Commission Executive Director as having demonstrated that the system serves loads for which typical air demand fluctuates less than 10 percent.

EXCEPTION 4 to Section 141.1(f)1: Alterations of existing compressed air systems that include one or more centrifugal compressors.

2. Controls. All added and replacement air compressors shall meet the requirements of 120.6(e)2.

EXCEPTION 1 to Section 141.1(f)2: Additions or replacements of less than a combined 100 hp in air compressor capacity.

3. Monitoring. All added and replacement air compressors shall meet the requirements of 120.6(e)3.

EXCEPTION 1 to Section 141.1(f)3: Additions or replacements of less than a combined 100 hp in air compressor capacity.

4. Leak testing of compressed air piping. All added and replacement compressed air piping greater than 50 adjoining feet in length shall meet the requirements of 120.6(e)4.

5. Pipe sizing. All added and replacement compressed air piping greater than 50 adjoining feet in length shall meet the requirements of 120.6(e)5.

6. Compressed air dryers. All added or replacement compressed air dryers shall meet the requirements of 120.6(e)6.

7. Compressed Air System Acceptance. Before an occupancy permit is granted for a compressed air system subject to Section 141.1(f), the equipment and systems shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the equipment and systems meet the acceptance requirements specified in NA7.13.

1.4 Reference Appendices

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

The Statewide CASE Team will provide recommended changes to the compressed air NA7.13 reference appendix in the Final CASE Report.

1.5 Compliance Manuals
There are no proposed changes to compliance manuals.

1.6 ACM Reference Manual
There are no proposed changes to the ACM Reference Manual.

1.7 Compliance Forms
The NRCC-PRC-E, PRCI-PRC-E, and NRCA-PRC-01-F compliance forms would be updated to reflect the proposed change. The Statewide CASE Team can support the CEC in implementing these updates if the proposed change is adopted.