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Proposed changes to CEC planned regulation of compressors

Additional submitted attachment is included below.

Sullivan Palatek
AIR COMPRESSORS

December 17, 2018

Alex Galdamez
Commission Staff
The California Energy Commission
1516 Ninth Street
Sacramento, CA 95670

The following comments are on behalf of Sullivan-Palatek, Inc.

Issue: Whether the State of California should make changes to its proposed rule for regulation of air compressors in Docket # 18-AAER-05

My background: Bruce C. McFee, Chairman CEO, Sullivan-Palatek, Inc., President, Saylor-Beall Manufacturing Company, PH: 989-224-2371, ext. 229.

Our group herein referred to as Sullivan-Palatek is family owned and we have three product lines, reciprocating air compressors, electric motor driven air compressors, and diesel engine driven air compressors. Our companies employ about 210 people, all located in the US. While we would be considered a small business, we have considerable knowledge, expertise and experience with our staff.

I have worked in the air compressor industry for 34 years. I have visited more than 1,000 customers, hundreds of suppliers and spent substantial time at each of our plant operations. I have two business degrees from the University of Michigan. Prior to joining the air compressor industry, I worked for six years at IBM Corp as a Systems Engineer. I also have participated with our industry association, Compressed Air & Gas Institute (CAGI) since 1990.

During the last few years, we have participated with the Department of Energy's investigations. Navigant (contracted by DOE) consultants toured both of our facilities where we filled out lengthy questionnaires and answered many questions. In the spring of 2015, we also

participated in a manufacturer's survey with Navigant that ended with a four-hour conference call to review our responses. Also, I attended and spoke at the June 20, 2016 meeting in Washington DC. In addition, I have submitted comments to four separate rule making requests for DOE when it has related to compressors and more recently submitted comments to California, Docket 18-AAER-10.

During the same period I have also worked closely with CAGI to better understand the issues and develop an accurate industry response to the DOE NOPR's. The work has included five full days of face to face meetings with other CAGI members, ten regularly scheduled industry association meetings, and numerous conference calls that have continued on for months. The whole group of core members on this CAGI committee has put in lots of hard work and has tried to come up with accurate positions that will meet the needs of DOE, the end customers, and our own companies. I have personally participated in formal CAGI responses to DOE and help drafted selected subsections.

THE COMMENTS: On November 16, 2018, the California Energy Commission published several documents on Doc # 18-AAER-05 describing its plans to regulate rotary screw air compressors. CEC also provided a webinar on November 14, 2018 describing the procedures for regulated companies to register a test laboratory and then register products that would be regulated by CEC.

We appreciate that CEC has responded to previous dialogue and is considering adoption of the AEDM for small volume specialty compressors. As discussed in previous comments there could be thousands of different specialty products given the more than two dozen manufacturers, 13 different mainline compressor horsepowers, at least six different pressure ranges, and many possible specialty variations within these parameters. Some of the specialty units are produced for only a single machine and without an AEDM procedure, most specialty products would likely be withdrawn permanently in California.

We also appreciate that the original one year implementation time table has been extended to three years, because we believe compliance to California's standard could be quite complex.

Three Issues with California Proposal: There are still at least three issues in the proposed regulation that could substantially affect the availability of air compressor models in California.

ISO-1217: A significant difference exists between the proposed test method and the historical industry test standard using ISO-1217. ISO-1217 allows the manufacturer to state its flow and power usage, but in a test is allowed a tolerance as stated in Table B.2 as follows…...

Table B.2 — Maximum deviations permissible at test

Volume flow rate at specified conditions $(m^3/s) \times 10^{-3}$	Volume flow rate %	Specific energy requirement %	Power requirement (at zero volume flow rate or at pressure ratio of 1) [a] %
$0 < q_V \leq 8{,}3$	± 7	± 8	± 10
$8{,}3 < q_V \leq 25$	± 6	± 7	± 10
$25 < q_V \leq 250$	± 5	± 6	± 10
$q_V > 250$	± 4	± 5	± 10
NOTE The tolerance values in this table cover and include manufacturing tolerances of the compressor and tolerances relating to the measurements taken during the test.			
[a] Where specified, the manufacturer shall state the method used.			

Under the proposed California rule, no tolerance is allowed, instead a 95% confidence level is required from a sample mean assuring that 95% of products provided would meet or exceed the minimum isentropic efficiency standard. TN # 225912 from this Doc # 18-AAER-05 states the following description for the confidence level testing…..

(A) *Measures of energy efficiency.* Any represented value of the full- or part-load package isentropic efficiency or other measure of energy efficiency of a basic model for which customers would favor higher values is less than or equal to the lower of:

(*1*) The mean of the sample, where:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

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And $\bar{x}$ is the sample mean; n is the number of samples; and x_i is the measured value for the i^{th} sample; or,

(*2*) The lower 95 percent confidence limit (LCL) of the true mean divided by 0.95, where:

$$LCL = \bar{x} - t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

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And $\bar{x}$ is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.95}$ is the t statistic for a 95 percent one-tailed confidence interval with n−1 degrees of freedom (from appendix A of this subpart); and

This leads to a question whether years of previously published data sheets would be allowed given that it might not be possible to convert old numbers with a tolerance into new numbers with a 95% confidence level. If the data sheets are not allowed, it may require more than 10,000 new tests to meet the various horsepower ranges, pressure ranges and selective

models. One company, Atlas Copco already published a comment to Rule 10, dated July 3, 2018 stating that it has more than 800 machines that might need to be retested.

Lack of Certified Test Capacity: A second issue involves a potential and very major bottleneck in testing. The recognized test lab for CAGI, Intertek in Plano TX performs sample testing of manufacturers as a means to validate manufacturer's data sheets as being reasonable. The lab currently performs about 40 such tests per year.

Tests are very detailed and the Intertek charge is $1,200 per occurrence. The test also involves shipment of a compressor to Intertek, and hook up of the air and electrical components prior to running the test. The manufacturer usually sends an engineer to witness the test and provide guidance on the operation of its specific machine. In the event that data from previously published data sheets are not usable for the California rule, a significant expansion of certified test lab capacity will be needed.

Higher pressure compressors may not pass the standard: A third issue involves the substantial known difference in isentropic efficiency between pressure ranges. Many CAGI members publish data sheets at different pressures. A common method is to produce the performance at 125 psi, then a very similar model with similar horsepower at 175 psi.

The proposed isentropic efficiency curve does not allow any deviation for pressure within a given flow, despite that fact that data sheets when converted into isentropic efficiency show a significant efficiency drop at higher pressures. If no allowance is provided to accommodate higher pressures, California may learn that it is hard to find approved compressors to operate at pressures of 175 psi and higher.

Historical information on compressors and efforts to improve energy efficiency: While the goal of improved energy efficiency is a noble one, compressed air systems are often customized and very complex. Unlike household appliances that operate in standalone processes, compressors are usually integrated into incredibly unique and diverse systems that must be balanced. Therefore, any effort to place an efficiency standard on the air compressor component must also consider how the standard will impact air compressor systems.

Many people consider compressed air as a fourth utility, behind only electricity, water, and natural gas utilities. The applications of compressed air are broad, affecting manufacturing, energy production, food packaging, water treatment, vehicle maintenance, construction and almost anything else that uses mechanical automation. Likewise, the diverse range of compressed air users may include manufacturing plants, hospitals, dairy farms, underground mines, dry cleaners, small repair shops, pharmaceutical laboratories, large office buildings,

outdoor construction sites and many more. The diverse nature of these uses requires many specialized products that cannot be easily regulated in a one size fits all standard.

As a result, there may be numerous designs using custom motors for indoor use, outdoor use or explosion proof designs when compressors are used near flammable materials. Other applications need to consider salty air when near the ocean and require special materials to avoid corrosion. Each system, whether NEMA 4 or NEMA 7 represents a different configuration and each motor type also creates a different model that must comply with the performance standard.

Some compressors need to operate in a cold environment. Because of freeze up issues, special consideration is given to the air flow direction on intake and exhaust. Also the aftercooler configuration might be unique, in some cases a stainless steel aftercooler is required, and in other cases the size of the aftercooler is varied. The design requirements are different for a compressor planned for indoor use. If the environment is in a hot desert, the design requirements would be different again. In many cases where heat is a concern, a water cooled compressor is needed, demonstrating an additional distinction for custom applications.

Another variation that might occur with special inlet and downstream filtration that is needed for a custom application, but ends up changing the compressor package and possibly its efficiency.

Compressors often operate at different output pressures. Published pressures often consist of 100 psi, 115 psi, 125 psi, 150 psi, 175 psi and 200 psi. While compressor units can often operate at multiple pressure ranges, a compressor pump model has a sweet spot for energy efficiency and is unlikely to perform identically at each pressure.

Considering the different horsepower ranges in CAGI categories, we have 5, 7.5, 10,15, 20,25, 30, 40, 50, 60,75,100,125, 150, 200, 250, 300, 350, 400 and 450 horsepower model, each size needing to accommodate the different variations of motors, temperature considerations, pressure differences and other custom type applications needed by the customers.

In many cases the application affected the most might be a critical system such as a water treatment plant or water delivery system. In the event we could no longer use compressed air and no substitute was implemented, the standard of living we know would likely cease to exist. Therefore, any good social policy will support the effective use of compressed air.

Compressed Air Challenge: Several decades ago, the US Department of Energy (DOE) and the Compressed Air & Gas Institute (CAGI) established a program focused on improving the energy efficiency in compressed air systems. CAGI is the US based trade association representing manufacturers of compressed air equipment. The program named the Compressed Air Challenge has a purpose of helping industry lower the cost of energy in a compressed air system.

In addition to helping users of compressed air identify wasteful air leaks, it focuses on optimization of system design as a way to save energy. A compressed air energy audit usually examines whether a system is using the correct air pressure, whether there is a better way to handle irregular periods of compressed air usage, whether the piping and air storage system is appropriate for the application, whether the system starts too often, whether the filtration system used to meet unique air quality needs is appropriate for the system and many other items that might reduce energy usage. As a result, a good energy audit can reduce energy consumption by 10-50%.

CAGI Performance Verification Program of rotary compressors: CAGI also oversees a voluntary performance verification program where manufacturers provide selected models for testing by a third party. The purpose of this testing was to bring confidence to the consumer public that performance data could be relied upon. The program also has brought increased attention to the energy efficiency ratings on compressors and forced manufacturers to make improvements to their compressor packages. We believe that the Performance Verification Program is contributing to energy improvements that would occur without regulation, and thus should not be counted as a benefit of regulation.

Regarding Section 1605.3: It appears the State is adopting a performance standard similar to that of:

DEPARTMENT OF ENERGY
0 CFR Parts 429 and 431
[Docket Number EERE-2013-BT-STD-0040]
RIN 1904-AC83

While Section 1605.3 uses the same standard as the US Department of Energy, it differs significantly on the date of implementation. Section 1605.3 uses a date of Jan. 1, 2022, whereas the DOE standard allowed five years for manufacturers to adjust their product designs and testing.

Two other points coming out of the standard rule included that 1) the rule would result in a 6/10 of one percent reduction in energy consumption by covered compressors, 2) The rule was expected to cost manufacturers $121 million in expenditures of redesigning their products, and changing their test methods.

Conclusion: Compressors are very important to the standard of living and they are much more complex and diverse than most other regulated appliances.

In the event that the three issues described in the top part of this document are not addressed, there may be a significant loss of product availability to California users of air compressors. The losses could include companies that decline to participate in CEC's registration process and for companies that do participate, a reduction in models that are offered. The three issues causing this loss of product access would include inability to retest models if ISO-1217 previous test data is not accepted, significant lack of certified test facilities and an unreasonable performance standard for pressures over 174 psi.

Also, it should be noted that the DOE analysis expected energy savings of 6/10 of one percent and about $49 million per year that is anticipated by CEC. However, this analysis did not recognize improvement that may come from the CAGI Performance Verification Program, thus the real dollar savings to California could be considerably less.

DOE estimated a cost to manufacturers of $121.3 million as a result of the regulation. At least five of the manufacturers and packagers analyzed by DOE were classified as small business. Implementation of this rule in California, may cause a similar fixed cost to manufacturers, without the benefit of nationwide volume. This is part of the reason California risks a loss of suppliers.

The federal rule also was drafted with a five year time delay after admission to the Federal Register before any standard would take place to give manufacturers time to change their products and adjust testing procedures. 18-AAER-05 offers only three years to manufacturers to make these adjustments and design changes and this reduced period of time will further stress manufacturers.

Given the number of complexities, if CEC must regulate air compressors, we recommend that the **timeline be extended from three years to five years** for implementation, **previous ISO-1217 test results be accepted**, and a **reduced standard be applied to higher pressure compressors** after a formal analysis of existing data sheets is considered.

Sincerely,

Bruce C. McFee
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