DOCKETED	
Docket Number:	18-AAER-05
Project Title:	Commercial and Industrial Air Compressors
TN #:	226210
Document Title:	CEC Air Compressor Public Hearing Presentation
Description:	Presentation for Commercial and Industrial Air Compressors proposed regulation
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Commercial and Industrial Air Compressors
Docket # 18-AAER-05
Public Hearing

January 3, 2019

10 a.m. to noon

Alejandro Galdamez
Appliances Office
Efficiency Division
California Energy Commission

Public Hearing

- Pursuant to Government Code, §11346.8
- Public comment on proposed regulatory language and proposed negative declaration
- No Commissioners will be present
- No decisions will be made

Rulemaking Timeline

- November 16, 2018: Rulemaking documents posted
- November 28, 2018: California Environmental Quality Act (CEQA) document posted
- ➢ December 31, 2018: 45-day (rulemaking) and 30-day (CEQA) public comment periods end
- January 3, 2019: Public hearing
- January 9, 2019: Proposed Business Meeting adoption
- January 1, 2022: Proposed effective date

CEQA

- Standards will reduce electricity consumption, criteria pollutants, and other particulates
- No significant change to materials or manufacturing No change to product lifetime of air compressors
- No significant adverse effect on environment
- Recommend that the Energy Commission adopt the proposed negative declaration at the January 9, 2019, business meeting

Background – Standard

- U.S. Department of Energy (DOE)
  - Pre-publication final rule notice – December 05, 2016
  - Never published in Federal Register
    - California is not preempted form setting State efficiency standards

Background – Standard

- Lifetime of compressors is 13 to 14 years
- California shipments ~ 3,700 per year
- Commission staff relied heavily on DOE analysis
  - DOE Technical Support Document, December 2016
  - DOE Energy Conservation Standards for Air Compressors: Final Rule, December 05, 2016
  - California Investor Owned Utilities Codes and Standards Enhancement (CASE) Initiative Analysis, March 26, 2018

Scope - §1601

- Rotary Air Compressors, lubricated, liquid or air cooled with a fixed or variable speed brushless motor
- Full load operating pressure greater or equal to 75 psig but less than or equal to 200 psig

Proposed Definitions - §1602

- Consistent with DOE definitions in test procedure and pre-publication final rule
- Minor modifications referring to California's jurisdiction
  - o "Offered for sale in California" instead of "distributed in commerce"
- "State-regulated compressors" definition introduced since regulation affects only compressors sold in California
- All other definitions consistent with DOE final rule

Test Procedure - §1604

- Uniform Test Method for Certain Air Compressors,

  10 CFR 431, Subpart T, Appendix A

  Parts of ISO 1217 Displacement compressors

- Allowance of Alternative Efficiency Determination Methods (AEDMs)
  10 CFR § 429.63 and §429.70

Proposed Standard - §1605.3

- Commercial and industrial air compressors sold or offered for sale in California have to meet energy standards for state-regulated compressors
- Standard is based on calculated values that take into account the calculated isentropic efficiency compared to a minimum package isentropic efficiency calculated and dependent on the volumetric flowrate

Proposed Standard

- Calculate the Isentropic Efficiency as defined in ISO 1217.
  - $$\eta_{isen} = \frac{P_{isen}}{P_{real}}$$
  - *V_1 (flowrate) is plugged into package isentropic efficiency reference curve (η_{Regr}) and used in conjunction with Percentage loss reduction (d-Value) to calculate the Standard Level for the tested compressor*

Proposed Standard

Equipment Class	Minimum Package Isentropic Efficiency†	η_{Regr} (package isentropic efficiency reference curve)	d (Percentage Loss Reduction)
Rotary, lubricated, air-cooled, fixed-speed compressor	$\eta_{Regr} + (1 - \eta_{Regr}) * \left(\frac{d}{100}\right)$	$-0.00928 * ln^2(.4719 * V_1) + 0.13911 * \ln(.4719 * V_1) + 0.27110$	-15
Rotary, lubricated, air-cooled, variable-speed compressor	$\eta_{Regr} + (1 - \eta_{Regr}) * \left(\frac{d}{100}\right)$	$-0.01549 * ln^2(.4719 * V_1) + 0.21573 * ln(.4719 * V_1) + 0.00905$	-10
Rotary, lubricated, liquid-cooled, fixed-speed compressor	$.02349 + \eta_{Regr} + (1 - \eta_{Regr}) * \left(\frac{d}{100}\right)$	$-0.00928 * ln^2(.4719 * V_1) + 0.13911 * ln(.4719 * V_1) + 0.27110$	-15
Rotary, lubricated, liquid-cooled, variable-speed compressor	$.02349 + \eta_{Regr} + (1 - \eta_{Regr}) * \left(\frac{d}{100}\right)$	$-0.01549 * ln^2(.4719 * V_1) + 0.21573 * ln(.4719 * V_1) + 0.00905$	-15

Proposed Standard - §1605.3

- New state efficiency standard for commercial and industrial air compressors
  - Identical to DOE efficiency level two (EL 2)
  - Proposed effective date of January 1, 2022

Proposed Data Submittals - §1606

- Removed exception that compressors were not subject to data submittal requirements
- Additional data fields required compared to DOE pre-publication final rule
  - Used for validation of submitted data

Proposed Marking - §1607

- No product specific marking
- General requirements for all appliances
  - Manufacturer or brand name
  - Model number
  - Date of manufacture

Proposed Compliance and Enforcement - §1608

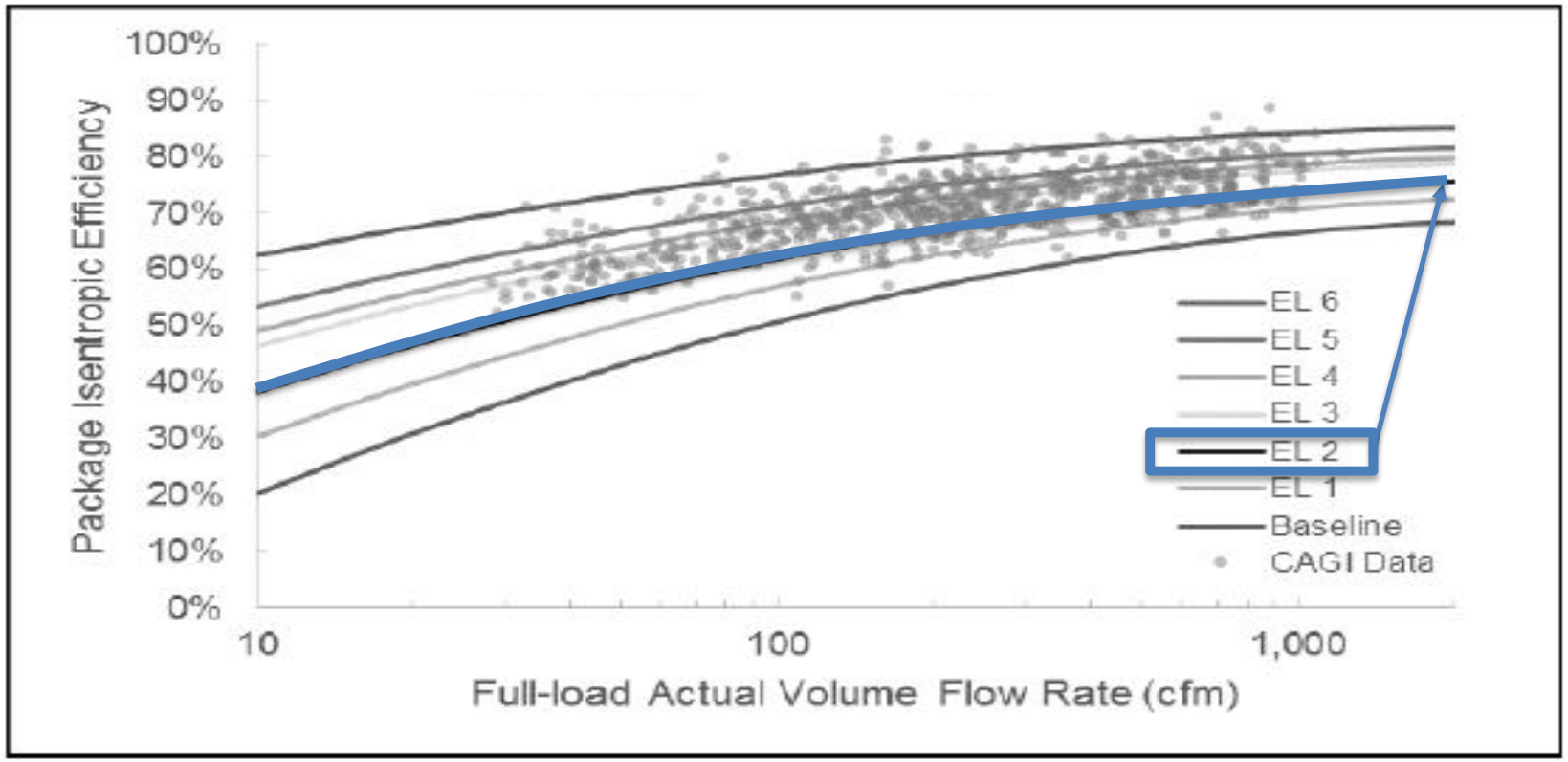
- Removed exception that compressors were not subject to enforcement

Technical Feasibility

- Technical feasibility can be achieved with available technology for redesign:
  - Multi-staging
  - Air-end improvement
  - Auxiliary component improvement

Technical Feasibility

Rotary Fixed-Speed Lubricated Air Cooled Compressors



Cost Effective

Compressor Type	Life Span	Incremental Cost ($ / unit)	Per unit Savings ($ / unit per year)	Lifecycle Net Benefit ($/unit)
Rotary; Lubricated; Air-cooled; Fixed Speed	13	$ 904	$ 596	$ 5,434
Rotary: Lubricated; Liquid-Cooled; Fixed speed	13	$ 1,714	$ 1,025	$ 9,187
Rotary; Lubricated; Air-Cooled; Variable speed	13	$ 1,108	$ 364	$ 2,763
Rotary Lubricated Liquid-cooled Variable speed	14	$ 2,550	$ 842	$ 6,961

Estimated Savings

	First Year Electricity Savings	First Year Monetary Savings ($)	Lifecycle Annual Electricity Savings	Lifecycle Net Monetary Savings ($)*
Per Unit	2100 to 7000 kWh	$364 to $1,025	2,100 to 7,016 kWh	$2,700 to $9,200
Statewide	17 GWh	$ 2.4 Million	217 GWh	$ 22 million per year

Benefit Cost Ratio: From 2:1 to 6:1

* 3% discount rate

Test Lab Application

Step 1. Set up an account in MAEDbS

Step 2. Apply to be a test laboratory

- Conducted tests using the applicable test method in the previous 12 months
- Followed the test procedure in section 1604
- Properly calibrates and maintains equipment
- Maintains copies of all test reports and provides them to the Commission upon request
- Allows the Commission to witness testing

Step 3. Submit test data from an approved test laboratory

- Test data can be from a test that was conducted before the test laboratory was approved
- As long as the test follows the applicable test procedure in section 1604

Step 4. Reapply for approval at the end of each calendar year

Conclusion

- Staff finds the proposed standards are
  - Technically feasible
  - Cost-effective to the consumer over the lifetime of the appliance
- Staff will recommend the Energy Commission to adopt the proposed regulations at the January 9, 2019, business meeting

Proposed Adoption

Energy Commission business meeting

January 9, 2019, 10 a.m.
1516 Ninth Street
Art Rosenfeld Hearing Room – First Floor
Sacramento, California 95814
(Wheelchair Accessible)

Webex:

Public Comments

- Public comments from in-person participants
  - Come to microphone
  - Please state name and affiliation for court reporter
  - A copy of your comments is appreciated but not required
- Public comments from Webex
  - Use raise-hand feature and you will be un-muted
  - Please state name and affiliation for court reporter

  or
  - Type comment into chat-box and it will be read into record
  - Please include name and affiliation for court reporter
- Phone only participants
  - All lines will be un-muted
  - Please state name and affiliation for court reporter

Thank You!

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