An Air Quality Consultant's Take on Stationary Engines

Presented by ALL4

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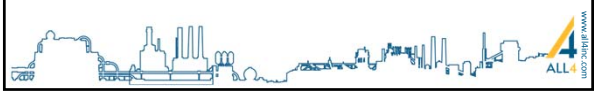

About ALL4

- Air Quality Compliance
- Air Quality Modeling
- Air Quality Permitting
- Ambient Pollutant & Meteorological Monitoring
- Continuous Monitoring Systems
- Environmental Program Management
- Multimedia Regulatory Analysis

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YOUR ENVIRONMENTAL COMPLIANCE IS CLEARLY OUR BUSINESS.

Overview

About Stationary Reciprocating Internal Combustion Engines (RICE)

Federal Engine Regulations

Air Permitting Considerations

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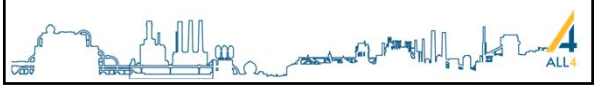
About Stationary RICE – Key Information to Know



About Stationary RICE

- RICE use reciprocating motion to convert heat energy into mechanical work, which can then drive equipment such as generators, pumps, and compressors
- Two types of RICE
  - Compression ignition (CI) typically diesel-fired
  - Spark ignition (SI) typically gasoline-, LPG- or natural gas-fired
- Fuel selection dependent upon criteria such as
  - Proximity and availability of fuel source
  - Engine purpose

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About Stationary RICE

- Two rating (configuration) options
  - Standby: intermittent use (e.g., emergency generator)
  - Prime: continuous use (e.g., power remote location)
- Two typical regulatory classifications
  - Emergency
  - Non-emergency engines
  - Characterization based upon engine use
    - These are not always true:
      "standby = emergency" and "prime = non-emergency"

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About Stationary RICE

Emergency engines

Operate for maintenance/readiness testing and emergencies

- No limit on emergency use in Federal engine regulations
  - U.S. EPA potential to emit (PTE) based upon 500 total hours/year/engine
- Up to 100 hours/year/engine for maintenance/testing
- Of that 100 hours limit, up to 50 hours/year for non-emergency operation
- ***Many states control overall engine operation; limit 50 hours use***
- Local deployments for emergency demand response meeting specific criteria

Non-emergency engines

Do not meet emergency definition and are not fire pumps

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About Stationary RICE

- Manufacturer, model number, and serial number
- Model year of engine
- Certification of engine (e.g., Tier 2, Tier 3, Tier 4), if applicable for model year
- Engine displacement

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About Stationary RICE

Kilowatt (kW)

Rating typically used to describe *electrical output*

- Not kVA rating
- Electrical vs. Mechanical
- Use to describe generator size (nameplate)

Horsepower (hp)

Typically used to describe *engine power*

- 1 hp = kW x 1.341
- Hp calculated from *electrical* kW
- Brake-horsepower (hp or bhp) calculated from *mechanical* kW
  - More accurate in emissions calculations
  - Use if engine hp is requested

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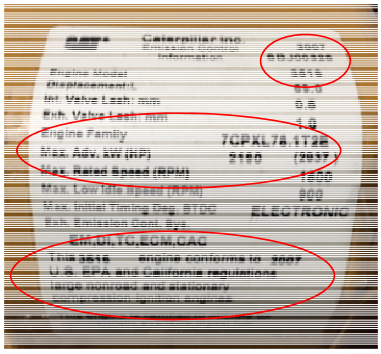
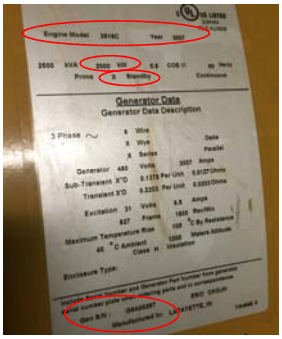
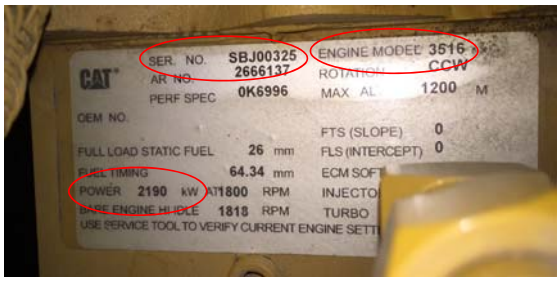
About Stationary RICE



About Stationary RICE



About Stationary RICE



About Stationary RICE

Fuel consumption rate

- Quantity of fuel combusted per hour by engine
- Use on air permitting forms and to quantify fuel consumption
- Differs from fuel flow rate, which is fuel circulating through engine

Exhaust parameters

- Flowrate and temperature found in manufacturer specification sheets
- Stack diameter and height found in construction drawings, measured, or estimated
- Velocity calculated

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About Stationary RICE

KOHLER.

Industrial Diesel Generator Set - KD3250
Tier 2 EPA-Certified for Stationary Emergency Applications

Engine Specifications	60 Hz
Manufacturer	Kohler
Engine model	KDI6/W16
Engine type	4-Cycle, Turbocharged, Intercooled
Cylinder arrangement	16V
Displacement, L (cu. in.)	80 (5048)
Bore and stroke, mm (in.)	175 x 210 (6.89 x 8.46)
Compression ratio	16.0:1
Piston speed, m/min. (ft./min.)	774 (2530)
Main bearings: quantity, type	9; Precision Half Shells
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	3430 (4600)
Cylinder head material	Cast Iron
Crankshaft material	Steel
Valve (exhaust) material	Steel
Governor: type, make/model	KODEC Electronic Control
Frequency regulation, no-load-to-full load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Fuel Consumption	60 Hz
Diesel, Lph (gph) at % load	Standby Rating
100%	920 (216.6)
75%	726 (191.9)
50%	482 (127.4)
25%	279 (73.6)
Diesel, Lph (gph) at % load	Prime Rating
100%	771 (203.7)
75%	642 (169.7)
50%	466 (123.2)
25%	343 (64.1)

Radiator System	60 Hz
Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	375 (99)
Radiator system capacity, including engine, L (gal.)	1192 (315)
Engine jacket water flow, Lpm (gpm)	2707 (715)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	1170 (66537)
Charge cooler water flow, Lpm (gpm)	700 (185)
Heat rejected to charge cooling water at	

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About Stationary RICE

KOHLER.

Industrial Diesel Generator Set - KD3250
Tier 2 EPA-Certified for Stationary Emergency Applications

Exhaust System	60 Hz
Exhaust flow at rated kW, m³/min. (cfm)	711 (25103)
Exhaust temperature at rated kW at 25°C (77°F) ambient, dry exhaust, °C (°F)	489 (912)
Maximum allowable back pressure, kPa (in. Hg)	8.5 (2.5)
Exh. outlet size at eng. hookup, mm (in.)	See ADV drawing

Electrical System	60 Hz
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	24
Ampere rating	140
Starter motor qty. at starter motor power rating, rated voltage (DC)	Standard: 2 @ 9 kW, 24
Battery, recommended cold cranking amps (CCA):	
Quantity, CCA rating each, type (with standard starters)	4, 1110, AGM
Battery voltage (DC)	12

Alternator Specifications	60 Hz
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet Pilot Exciter
Voltage regulator	Solid-State, Volts/Hz
Insulation	NEMA MG1, UL 1446, Vacuum Pressure Impregnated (VPI)
Material	Class H, Synthetic, Nonhygroscopic
Temperature rise	130°C, 150°C Standby
Bearing: quantity, type	2, Sealed
Coupling type	Coupling
Amortisseur windings	Full
Alternator winding type	Form Wound
Rotor balancing	125%
Voltage regulation, no-load to full-load	±0.25%
Unbalanced load capability	100% of Rated Standby Current
Peak motor starting kVA:	(35% dip for voltages below)

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About Stationary RICE

British Thermal Units per hour (Btu/hr)

- Convert from fuel consumption rate (gal/hr or cf/hr) using heat content of fuel (Btu/gal or Btu/cf)
- Use brake-specific fuel consumption (BSFC in Btu/hp-hr) and hp of engine
  - Engine-specific BSFC value from manufacturer specifications
  - BSFC of 7,000 Btu/hp-hr from Chapter 3 of U.S. EPA's AP-42 Emissions Factor Guidance
  - BSFC in Table 4-2 of "Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry"

What if no specification sheet?

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About Stationary RICE

Emissions data

- Emissions standards from Federal engine regulations
- Tier certified emissions data
  - Based upon 5-mode weighted average (D2 Cycle Emissions or Data)
- U.S. EPA's AP-42 Emissions Factor Guidance
  - Often used to calculate emissions for pre-2006 units
- Nominal
  - Presented either in manufacturer specification sheet or separate emissions data sheet
- Not to exceed/Potential site variation
  - Requested of engine dealer/manufacturer
  - Estimated by multiplying nominal emissions data by buffer (e.g., 20%)

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About Stationary RICE

2018 EPA Tier 2 Exhaust Emission Compliance Statement
C3500 D6e
Stationary Emergency
60 Hz Diesel Generator Set

Compliance Information:

Engine Information:

Diesel Fuel Emissions Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	NOx + NMHC	CO	PM	NOx + NMHC	CO	PM
Test Results - Diesel Fuel	4.8	0.5	0.11	6.2	0.7	0.15
EPA Emissions Limit	4.8	2.6	0.15	6.4	3.5	0.20

Test methods: EPA nominal emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A for constant speed engines (ref. ISO8178-4, D2).

Diesel fuel specifications: Cetane number: 40-48. Reference: ASTM D975 No. 2-D, <15 ppm Sulfur

Reference conditions: Air inlet temperature: 25°C (77°F), Fuel inlet temperature: 40°C (104°F), Barometric pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb of dry air required for NOx correction. Restrictions: Intake restriction set to a maximum of 3.7 kPa (15 in H2O). Exhaust restriction set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

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About Stationary RICE

Engine Information:

Model:	Cummins Inc. QSK95-G9	Bore:	7.48 in. (190 mm)
Type:	4 Cycle, VEE, 16 cylinder diesel	Stroke:	8.27 in. (210 mm)
Aspiration:	Turbocharged and Aftercooled	Displacement:	5816 cu. in. (95.3 liters)
Compression Ratio:	15.5:1		
Emission Control Device:	Turbocharged and Aftercooled		
Emission Level:	Stationary Emergency		

Performance Data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby	Full Prime	Full Continuous
BHP @ 1800 RPM (60 Hz)	1362	2576	3789	5051	4309	3963
Fuel Consumption L/Hr (US Gal/Hr)	295 (78)	507 (134)	696 (184)	912 (241)	787 (208)	727 (192)
Exhaust Gas Flow m³/min (CFM)	320 (11298)	500 (17645)	609 (21518)	727 (25665)	662 (23372)	627 (22159)
Exhaust Gas Temperature °C (°F)	343 (650)	359 (678)	408 (767)	489 (913)	443 (830)	420 (786)
Exhaust Emission Data						
HC (Total Unburned Hydrocarbons)	0.27 (103)	0.15 (63)	0.08 (39)	0.05 (25)	0.07 (33)	0.08 (37)
NOx (Oxides of Nitrogen as NO2)	3.3 (1300)	3.4 (1470)	4.7 (2190)	6.1 (2880)	5.2 (2440)	4.9 (2270)
CO (Carbon Monoxide)	0.4 (150)	0.2 (80)	0.2 (80)	0.4 (190)	0.2 (100)	0.2 (80)
PM (Particulate Matter)	0.19 (64)	0.08 (29)	0.05 (20)	0.05 (20)	0.04 (18)	0.05 (19)
SO_2 (Sulfur Dioxide)	0.005 (1.8)	0.005 (1.8)	0.005 (1.8)	0.004 (1.7)	0.005 (1.8)	0.005 (1.8)
Smoke (FSN)	0.89	0.52	0.44	0.53	0.43	0.44

All values (except smoke) are cited: g/BHP-hr (mg/Nm³ @ 5% O2)

The NOx, HC, CO and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

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About Stationary RICE

Motordaten
engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	20V4000G63L (6ETC)				
Application group	3D, 3H				
Emission Stage/Optimisation	EPA Tier 2				
Test cycle	D2				
fuel sulphur content [ppm]	5				
mg/m³ values base on residual oxygen value of [%]	measured				

Not to exceed Werte*
*not to exceed values**

		n1	n2	n3	n4
Cycle point	[-]				
Power (P/Pn)	[-]	1	0.75	0.50	0.25
Power	[kW]	3490	2618	1745	872
Speed (n/nN)	[-]	1	1	1	1
Speed	[rpm]	1800	1800	1800	1800
Exhaust back pressure	[mbar]	64	43	25	10
NOx	[g/kWh]	8.7	7.0	6.0	6.2
	[mg/m³]	2430	1609	1145	871
CO	[g/kWh]	1.3	1.2	1.7	3.8
	[mg/m³]	335	251	294	477
HC	[g/kWh]	0.23	0.32	0.55	0.90
	[mg/m³]	58	67	94	115
O2	[%]	9.1	11.0	12.4	13.7
Particulate measured	[g/kWh]	0.07	0.09	0.21	0.44
	[mg/m³]	16	18	35	56

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About Stationary RICE

Emissions controls

- Type of equipment
  - Selective Catalytic Reduction (SCR)
  - Diesel Oxidation Catalyst (DOC)
  - Diesel Particulate Filter (DPF)
- Pollutants controlled?
- Why used?
- Control or reduction efficiency for each pollutant?
- What parameters require monitoring to ensure proper operation?
- How will monitoring, recordkeeping, and reporting be conducted and completed?
  - Continuous Monitoring Systems (CMS)

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About Stationary RICE

"Temporary" RICE

- Not considered **stationary** by U.S. EPA if portable in nature and does not sit in one location longer than 12 months
- U.S. EPA definition focuses on one particular location at facility
- Unit cannot be moved solely to circumvent regulations
- Project stakeholders may refer to temporary units incorrectly
- States may vary from U.S. EPA's definition

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About Stationary RICE

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Federal Engine Regulations

Introduction to Three RICE Rules

40 CFR Part 63, Subpart ZZZZ

National Emissions Standards for Hazardous Air Pollutants for Stationary *Reciprocating* Internal Combustion Engines (RICE MACT or "Quad Z")

40 CFR Part 60, Subpart IIII

Standards of Performance for Stationary *Compression Ignition* Internal Combustion Engines (CI ICE NSPS or "Quad I")

40 CFR Part 60, Subpart JJJJ

Standards of Performance for Stationary *Spark Ignition* Internal Combustion Engines (SI ICE NSPS or "Quad J")

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40 CFR Part 63, Subpart ZZZZ

Purpose

- 40 CFR Part 63, Subpart ZZZZ (RICE MACT) establishes emissions and operating limitations for **hazardous air pollutants (HAP)** emitted from stationary RICE located at major and area sources of HAP emissions
- Focus on carbon monoxide (CO) and/or formaldehyde
- RICE MACT establishes requirements to demonstrate initial and continuous compliance with required emissions and operating limitations (40 CFR §63.6580)

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40 CFR Part 63, Subpart ZZZZ

Affected Source

- Any existing, new, or reconstructed stationary RICE located at a major or area source of HAP emissions, excluding stationary RICE being tested at a stationary RICE test cell/stand
- ***Note: It is possible to be affected source and not have applicable requirements***
  - *Existing RICE*
  - *Area HAP source*
  - *Follow emergency definition strictly*
  - *Located at residential, commercial, or institutional entity as categorized by U.S. EPA*

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40 CFR Part 63, Subpart ZZZZ

Existing Stationary RICE

- Rating of **more than 500 brake horsepower (bhp)** located at **major source of HAP** where construction or reconstruction commenced **before December 19, 2002**
- Rating of **less than or equal to 500 bhp** located at **major source of HAP** where construction or reconstruction commenced **before June 12, 2006**
- **Any, regardless of bhp rating**, located at **area source of HAP** where construction or reconstruction commenced **before June 12, 2006**

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40 CFR Part 63, Subpart ZZZZ

New Stationary RICE

- Rating of **more than 500 bhp** located at **major source of HAP** where construction was commenced **on or after December 19, 2002**
- Rating of **equal to or less than 500 bhp** located at **major source of HAP** where construction was commenced **on or after June 12, 2006**
- **Any located at area source of HAP** where construction was commenced **on or after June 12, 2006**
- *When CI ICE NSPS ("Quad I") or SI ICE NSPS ("Quad J") also apply, these engines must comply with applicable NSPS Subpart to comply with RICE MACT*

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40 CFR Part 63, Subpart ZZZZ

Applicability

Location	Source Status	Size	Fuel Burned	Use
• Area Source • Major Source	• Existing • New • Reconstructed	• Site rating in bhp	• Gas • Natural gas • Landfill gas • Diesel • Other	• Emergency • Non-Emergency

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40 CFR Part 63, Subpart ZZZZ

Requirements

- Use non-resettable hour meter
- Record every engine operation
  - Date, hour meter readings start and stop, and reason for operation
  - If reason is emergency, also describe what classified it as emergency
- Follow applicable fuel requirements (e.g., maximum sulfur content), depending upon engine
- Maintain fuel documentation

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40 CFR Part 63, Subpart ZZZZ

Requirements (continued)

- Set-up, maintain, and operate in accordance with manufacturer recommendations and emissions settings
- Minimize time spent at idle and startup for certain engines
- Follow work practices for some engines
  - Change oil and filter
  - Inspect air cleaner (CI) or spark plugs (SI)
  - Inspect all hoses and belts
- Keep maintenance records

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40 CFR Part 63, Subpart ZZZZ

Requirements (continued)

- Meet emissions standards or reduction efficiencies for other engines (e.g., most non-emergency units)
  - Emissions controls like DOCs may be required
  - Continuous Monitoring Systems
- Test, notify, and report, if applicable

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40 CFR Part 60, Subpart IIII

Purpose

- 40 CFR Part 60, Subpart IIII ("Quad IIII") establishes new source performance standards including emission, operational, monitoring, testing, recordkeeping, reporting, and notification requirements for manufacturers, owners, and operators of stationary CI ICE
- "Quad IIII" limits emissions
  - Non-methane hydrocarbons (NMHC)
  - Nitrogen oxide (NO_x)
  - Carbon monoxide (CO)
  - Particulate matter (PM)

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40 CFR Part 60, Subpart IIII

Applicability

- "Quad IIII" applies to CI ICE that **commence construction after July 11, 2005** where engine is
  - **Manufactured after April 1, 2006** and not fire pump engines
  - **Manufactured** as certified National Fire Protection Association (NFPA) **fire pump engines after July 1, 2006**
  - Modified or reconstructed after July 11, 2005
- *Note: Date construction commences is date CI ICE is ordered by the owner or operator*
  - Differs from RICE MACT where "construction" means installation of equipment

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40 CFR Part 60, Subpart IIII

Applicability

Model Year	Displacement	Use	Size
• Manufactured April 1, 2006 and later	• Liters per cylinder (e.g., less than 10, between 10 and 30, greater than 30)	• Emergency, Non-Emergency, or Fire-Pump	• Site Rating in bhp

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40 CFR Part 60, Subpart IIII

Requirements

- Purchase CI ICE certified by manufacturer to meet applicable emissions standards and maintain Certificate of Conformity
  - U.S. EPA Tier certifications for new equipment – Tier 2, 3, 4
  - Tier 4 certified vs. Tier 4 compliant
- Ensure engine is equipped with non-resettable hour meter
- Record every engine operation
  - Date, hour meter readings start and stop, and reason for operation

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40 CFR Part 60, Subpart IIII

Requirements

- Use only 15 parts per million (ppm) or 0.0015 weight percent sulfur diesel fuel (called ultra-low sulfur diesel or ULSD), and
  - Minimum cetane index of 40, **OR**
  - Maximum aromatic hydrocarbon content of 35 volume percent
- Maintain fuel documentation
- Set-up, maintain, and operate in accordance with manufacturer recommendations and emissions settings
- Keep maintenance records

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40 CFR Part 60, Subpart JJJJ

Purpose

- "Quad JJJJ" limits emissions
  - Non-methane hydrocarbons (NMHC)
  - Nitrogen oxide (NO_x)
  - Carbon monoxide (CO)

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40 CFR Part 60, Subpart JJJJ

Applicability

- "Quad JJJJ" applies to SI ICE that **commence construction after June 12, 2006** where **engine is manufactured on or after**
  - **July 1, 2007**, for engines with maximum engine power greater than or equal to 500 HP (except lean burn engines with maximum engine power greater than or equal to 500 HP and less than 1,350 HP)
  - **January 1, 2008**, for lean burn engines with maximum engine power greater than or equal to 500 HP and less than 1,350 HP
  - **July 1, 2008**, for engines with maximum engine power less than 500 HP
  - **January 1, 2009**, for emergency engines with maximum engine power greater than 19 KW (25 HP)

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40 CFR Part 60, Subpart JJJJ

Applicability (continued)

- *Note: Date construction commences is date SI ICE is ordered by owner or operator (similar to CI ICE)*
  - Differs from RICE MACT where "construction" means installation of equipment

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40 CFR Part 60, Subpart JJJJ

Applicability

Model Year	Displacement	Use	Size
• Various	• < 225 cc or at or above 225 cc	• Emergency, Non-Emergency, or Fire-Pump	• Site Rating in bhp

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YOUR ENVIRONMENTAL COMPLIANCE IS CLEARLY OUR BUSINESS.

40 CFR Part 60, Subpart JJJJ

Requirements

- Purchase SI ICE certified by manufacturer (which is voluntary for many types of engines) to meet applicable emissions standards and maintain Certificate of Conformity **OR** follow maintenance plan and keep maintenance records
  - If engine is uncertified and meets certain size criteria, also conduct initial stack testing as required
  - If engine is uncertified and greater than 500 hp, also conduct initial stack testing as required, and then every three years or 8,760 hours, whichever occurs first

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40 CFR Part 60, Subpart JJJJ

Requirements (continued)

- Ensure engine is equipped with non-resettable hour meter
- Record every engine operation
  - Date, hour meter readings start and stop, and reason for operation
  - If reason is emergency, also describe what classified it as emergency
- Set-up, maintain, and operate in accordance with manufacturer recommendations and emissions settings
- Keep maintenance records

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"One-Off" Examples

- In "Quad JJJJ", new emergency engines <25 hp follow applicability date for engines with a maximum engine power less than 500 hp
  - Unique – for smallest engines, "Quad JJJJ" bases applicability date only on size
- New emergency engines >500 hp at a major HAP source, subject to "Quad IIII", also meet the criteria for a new engine under RICE MACT (due to a construction date after late 2002)
  - Unique – engine subject to both "Quad IIII" and RICE MACT requirements

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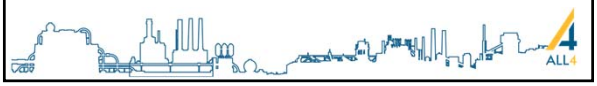
U.S. EPA RICE Resources

www.epa.gov/stationary-engines/implementation-tools-neshap-reciprocating-internal-combustion-engines

www.epa.gov/stationary-engines/implementation-tools-nsps-compression-ignition-internal-combustion-engines

www.epa.gov/stationary-engines/implementation-tools-nsps-spark-ignition-internal-combustion-engines

Air Permitting and Other Considerations



Air Permitting Considerations

- Permitting requirements vary by state, facility, and project
  - Exemption thresholds for individual units or aggregate units can be emissions-based or categorical/size-based
  - Sometimes emissions from equipment will trigger air permitting, even if there are categorical or size exemptions, and vice versa
  - Permitting fees also vary
    - Per equipment
    - Per permitting action

Air Permitting Considerations

- Review regulatory requirements impacting equipment selection and proper permitting
  - Permit exemptions (e.g., by size, emissions)?
  - Fuel?
  - How will engine be used - emergency vs. non-emergency?
  - Control technology needed (e.g., SCR, DOC) and why?
  - Emissions from project/equipment and entire facility

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Emissions Standards

- Federal engine regulations contain emissions standards for numerous engines based upon age, location, use
- States may have own emissions standards, often called Best Available Control Technology (BACT) limits
  - May be stricter than Federal engine regulations
  - Texas has NOx emissions limits under their Permit by Rule 512 program, dependent upon engine size, age, and fuel type
  - Pennsylvania has BAT emissions limits addressing multiple pollutants
  - Virginia (particularly Northern VA) has policy memo addressing BACT for multiple pollutants but only emissions limit is NOx

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Emergency Demand Response

- Engine operations creating confusion
  - Operating for emergency demand response or during deviation in voltage or frequency of 5% or greater from standard values
  - These operations are non-emergency
    - They used to be emergency functions
  - On May 1, 2015, Court issued decision to vacate these functions; allowed one year to take effect
  - Engines must meet non-emergency emissions standards to comply with Federal engine regulations

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Emergency Demand Response

- However…
  - Some states allow engines to operate for these purposes without re-permitting them from emergency to non-emergency as long as engines meet Federal requirements
  - Some states require SCR or other emissions controls to operate for these purposes, regardless of Federal requirements

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Other Considerations

- Consider equipment layout and stack configuration if stack testing may be required
- Fuel storage associated with engines impacts
  - Tank registration, if applicable
  - Spill Prevention, Control, and Countermeasure (SPCC) plan
  - Hazardous materials storage and reporting (also potentially impacted by batteries and engine oil reservoirs)

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Where Do We Find Stationary RICE?

Everywhere!

Manufacturing Plants

Shipyards

Data Centers

Hospitals

Colleges/ Universities

Commercial/ Office Buildings

Parking Garages

Oil and Gas Industry
Natural Gas Compressor Station

Landfills

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Thank you!

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