

From: [Ablson, Maha](#)
To: [Peppers, Nicki](#);
cc: [Molohon, Rob](#);
Subject: 008078 RAM#8 Compressor
Date: Friday, February 18, 2011 3:01:11 PM
Attachments: [8078 RAM8 Compressor.pdf](#)

Nicki,
The processed electronic RAM is attached.

Maha Ablson

*RAM Engineer
WSDOT, Materials Lab
Office: 360.709.5403
Fax: 360.709.5588
mahaab@wsdot.wa.gov*

From: Peppers, Nicki [mailto:peppersn@columbiarivercrossing.com]
Sent: Thursday, February 10, 2011 2:46 PM
To: Ablson, Maha
Subject:
Importance: High

Good Afternoon Maha,

Please find attached RAM No 8. RAM No. 9 and 10 will be separate emails (large file)

I added the shop drawing for both the confined and unconfined bubble ring because some of the bid items related to each of the bubble rings and added them to the RAM.
(I hope that was fine)

Also, RAM-0008 has catalog cuts that were not approved, but at the bottom of the first page indicates approval by PE.

Please let me know if you need additional information.

Thanks,
Nicki

*** eSafe2 scanned this email for malicious content ***
*** IMPORTANT: Do not open attachments from unrecognized senders ***
*** eSafe scanned this email for malicious content ***

*** IMPORTANT: Do not open attachments from unrecognized senders ***

RAM-0008



Washington State
Department of Transportation

Request for Approval of Material

Contract 8078	FA Number _____	SR Interstate 5	Date 2/8/11
Section I-5 Columbia River Bridge (WA 0.3 to OR MP 308.0)		County WA and OR states	
Contractor American Construction Company, Inc.		Subcontractor Pape Rents of Portland, OR (rentals)	

This form shall be completed prior to submittal. If this form is not complete at time of submittal it may be returned for information that was omitted.
For assistance in completing, see Instructions and Example

For WSDOT Use Only
RAM # 8

Bid Item No.	Material or Product/Type	Name and Location of Fabricator, Manufacturer or Pit Number	Specification Reference	PE/QPL Code	Hdqr./QPL Code
2.03	1600 cfm compressors	MP 2/9/11 Ingersoll Rand	Special Provisions	7	*
3.03	1600 cfm compressors	IQ System North America 800 East Beaty Street Davidson, NC 28036	Page 98		
	For both confined and unconfined bubble curtain systems	Doosan Infracore			

Project Engineer <i>Tucker Peppers & Frank Green</i>	Date <i>2/9/11</i>	State Materials Engineer Steve Hughes	Date 2-17-11
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Acceptance Action Codes for use by Project Engineer and State Materials Laboratory

- Acceptance Criteria: Acceptance based upon 'Satisfactory' Test Report for samples of materials to be incorporated into project.
- Acceptance Criteria: Mfg. Cert. of Compliance for 'Acceptance' prior to use of material.
- Acceptance Criteria: Catalog Cuts for 'Acceptance' prior to use of material. Catalog Cut Approved Yes No
- Acceptance Criteria: Submit Shop Drawings for 'Approval' prior to fabrication of material.
- Acceptance Criteria: Only 'Approved for Shipment', 'WSDOT Inspected' or 'Fabrication Approved Decal' material shall be used.
- Acceptance Criteria: Submit Certificate of Materials Origin to Project Engineer Office.
- Acceptance Criteria: Request Transmitted to State Materials Laboratory for Approval Action.
- Source Approved:
- Approval Withheld: Submit samples for preliminary evaluation.
- Approval Withheld:
- Miscellaneous Acceptance Criteria.

Remarks: * Approval shall be by the engineer of record for the design of the compressed air system

* please note red remark on 1st page.
cc: American Construction, peppers

Project Engineer Distribution

- Contractor Region Materials
 Region Operations Engineer State Materials Lab
 Fabrication Inspection M/S 47365

State Materials Engineer Distribution

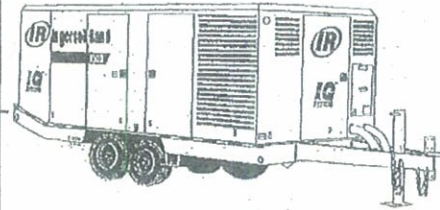
- General File Signing Inspection
 Other _____

CAT-0007



Ingersoll Rand HP1600WCU Tier 3 Bid Specifications

MANUFACTURER	Doosan Infracore	
MODEL	Ingersoll Rand HP1600WCU TIER 3	
ENGINE		
Make	CUMMINS	
Model	QSX 15	
# of Cylinders	6	
Cylinder Bore(in/mm)	5.39 / 137	
Cylinder Stroke (in/mm)	6.7 / 170	
Displacement (cu in/l)	915 / 15	
Rated Speed (rpm)	1800	
Idle Speed (rpm)	1200	
BHP @ Rated Speed	560	
Fuel/Cooling	DIESEL/WATER	
Electrical Volts/Batteries, CCA	24 / (2) 1400 CCA	
Engine Oil Capacity US Quarts/Litres	88 / 83	
Radiator Coolant Capacity US Gal/Litres	16 / 60.6	
Altitude Capability (Feet/Meters)	8,000 / 2438	
Fuel: GPH/LPH		
50% Load	20.2 / 76.5	
100% Load	22 / 83.3	
Fuel Tank Capacity (gal/l)	230 / 874	
Operating Time (Hours)	10.5 & 11.4	
COMPRESSOR	ISO-1217	
Type	ROTARY SCREW	
Stages	SINGLE STAGE	
Free-Air Delivery (cfm/M3min)	1600 / 45.3	
Rated Operating Press (psig/bar)	150 / 10.3	
Pressure Range (psig/bar)	80 TO 175 / 5.5 TO 12.1	
Air Discharge Outlet Size (inches NPT/mm)	3.0 / 76.2	
Air Discharge Outlet Quantity	1	
Separator Tank Volume (US Gal/Litres)	139 / 526	
Oil Capacity (US Gal/Litres) LUBE OIL	55 / 209	
DIMENSIONS W/RUNNING GEAR	WAGON	TANDEM
Overall Length (in/mm)	241 / 6121	280 / 7388
Overall Width (in/mm)	90 / 2286	90 / 2286
Overall Height (in/mm)	101 / 2565	101 / 2565
Track Width (in/mm)	71 / 1803	71 / 1803
Shipping Weight (lb/kg) no fuel	215/75R17.5H, 16 PLY 16,700 / 7575	215/75R17.5H, 16 PLY 16,690 / 7586
Working weight (lb/kg) with fuel	18,390 / 8342	18,300 / 8319
DIMENSIONS WITHOUT RUNNING GEAR		
Overall Length (in/mm)	222.38 / 5649*	*DEDUCT 12.5" FOR SERVICE VALVE
Overall Width (in/mm)	90 / 2286	
Overall Height (in/mm)	88.5 / 2248	
Shipping Weight (lb/kg)	15,950 / 7435	
Working weight (lb/kg) with fuel	17640 / 8001	
USS / add 600# / 272 kg for IQ SYSTEM		



NOT APPROVED
WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION
BRIDGE AND STRUCTURES OFFICE
BY: CONSTRUCTION SUPPORT ENGINEER
FEB - 1 2011

DATE _____

Not oil free per
Special Provisions

BILL BISHOP/USS & GA 7-28-06

The compressor equipment submitted appears to be capable of providing sufficient air volume and pressure required by the contract and is approved for use.

The submittal was stamped "Not Approved" as compressors are not oil free. If there is the presence of oil film or sheen on the water during operation of bubble rings work shall stop immediately and compressors shall be removed and/or replaced.



Doosan Infracore
Portable Power

Ingersoll Rand HP1600WCU Tier 3 Bid Specifications

FEATURES

ENGINE FEATURES

- Diesel engine with electronic controls to comply with USA/EPA Tier 3 / EU State IIIa exhaust emission requirements.
- Two stage, heavy duty, dry type air cleaner with replaceable primary and secondary elements located inside unit. Air filters have maintenance indicator.
- Fuel/water separator.
- Electric starting system, two 4D, 1400 CCA batteries with battery disconnect switch.
- Starter protection system.
- Ether cold start system.
- Exhaust rain cap.
- Unloaded warm up, start run valve.

PACKAGE FEATURES

- Hinged instrument panel with lockable door.
- Shock mounted engine and compressor.
- Excellent service access through large lockable doors on all four sides with stainless steel "T" type latches for hold open security.
- Shipping tie-downs.
- Side-by-side coolers for easy cleaning.
- Radiator sight glass for easy fluid level checking.
- Large fuel tanks for full shift operation. Lockable fuel fills from either side. Fuel fills are 3 1/2" opening with a 3" strainer.
- Trailer with electric brakes, wheel chocks, breakaway, tail lights for running, brake, and turn signals, 7-wire cable, marker lights, reflectors, and license plate light to comply with US DOT/Federal MVSS 49CFR571.
- Towbar is bolted on.
- Low fuel level shutdown.
- Central drains with valves inside the enclosure.
- Single point internal lifting bail.
- Lifting bail is accessible from inside the compressor for operator safety.
- Cool box design for lower internal temperatures.
- One year or 2000 hour warranty on all components, except engine, tires and battery which carry standard manufacturer's warranty.

SAFETY FEATURES

- 110% Full containment base to control liquid spills.
- Two safety chains mounted to the drawbar.
- Automatic safety shutdowns: high discharge air temp, low engine oil pressure, and high engine coolant temp.
- Manual and automatic blowdown valves.
- Minimum pressure device.
- ASME safety relief valve.
- Fan and belt guards.
- Battery disconnect switch
- Operating and maintenance manuals.
- Operating and safety decals.

COMPRESSOR

- The compressor is a single stage, oil flooded asymmetrical rotary screw.
- The actual air delivery is 1600 cfm (45.31 M³/min).
- The rated operating pressure is 150 psig (10.3 bar).
- The pressure range is 80-175 psig (5.5-12.1 bar).
- The regulation system is 100% stepless.
- The air service valve is 3 inch.

Portable Air Compressor



Doosan Infracore
Portable Power

Ingersoll Rand HP1600WCU Tier 3 Bid Specifications

COMPRESSOR FEATURES

- Two stage, heavy duty, dry type air cleaner with replaceable primary and safety elements located inside unit.
- Air filters have maintenance indicator.
- Regulation and bleed orifice have heaters for cold weather operation.
- 25-micron spin-on oil filter.
- Oil separation system - two stage vertical tank with sight gauge and over-fill protection.
- Finned tube coolers.
- Engine driven flexible drive coupling.
- Two-year or 4000 hour warranty.

INSTRUMENTS AND CONTROLS

- Air discharge pressure gauge.
- Hourmeter.
- Tachometer.
- Engine water temperature gauge.
- Engine oil pressure gauge.
- Discharge air temperature gauge.
- Voltmeter.
- Fuel level gauge.
- Indicator warning lights for low engine coolant level, low fuel level, alternator malfunction and air filter maintenance.
- Indicator lights for shutdown due to low engine oil pressure, high engine coolant temperature, high discharge air temperature, and low fuel level.
- Engine and compressor malfunction fault indicator display (digital).
- Gauges are backlit for night operations.
- Electronic micro-processor control interface for maintenance fault code read out.

OPTIONAL EQUIPMENT--FACTORY INSTALLED

- **INGERSOLL RAND IQ SYSTEM®**
 - Integral aftercooled with water separator, 25 degrees F approach to ambient temperature, two coalescing filters, all condensate evaporated through the engine exhaust/downstream of muffler, and excess filter pressure drop safety shutdown.
 - Filters:
 - Primary. Coalescing filter (available with aftercooled only) Removes liquid aerosol to .5 ppm by weight and particulates to 1-micron size. Maintenance indicator.
 - Secondary. High efficiency coalescing filter. Removes liquid aerosols to .01 ppm by weight and particulates to .01 micron size. Maintenance indicator. (Requires first coalescing filter above)
 - Safety shutdown for excess pressure drop through filters above.
 - Indicator light near control panel shows cause of shutdown.
 - (Note: This system adds 600 lbs. to weight)
- AC 120 volt heater Kit contains engine block heater, engine oil pan heater, and battery heater.
- Special paint - lead free only (requires DuPont paint number for Centari® or Imron®)
- Keyed ignition.
- Isolation mounting for wagon steer version less running gear.
- Wagon wheel steerable running gear.
- Parking brake for wagon steer only.
- Less running gear for wagon steer version.
- Skid mounting.
- Automatic start/stop control.
- Special paint - lead free only (requires DuPont paint number for Centari® or Imron®)

Portable Air Compressor

SPECIFICATIONS

TYPE

- Self contained, fully enclosed, diesel engine driven, heavy duty portable air compressor mounted on a four wheel trailer with a minimum rated capacity of 1600 cfm, free air delivery, at an operating pressure of 150 psi in accordance with ISO 1217.
- The rated pressure shall be measured after oil separation.

GENERAL

- The equipment shall be a standard product of the manufacturer.
- The compressor unit shall meet the EPA noise level regulations of 76 dBa at 7 meters.
- The manufacturer shall have local parts and service facilities capable of complete machine overhaul, ensuring minimum down time.
- Additionally, the compressor manufacturer shall have a flexible airend repair program; i.e., parts and training may be obtained to make repairs, or the airend may be exchanged for a new or remanufactured unit.
- The equipment shall adhere to the specifications contained herein.

ENGINE

- The diesel engine shall be a turbocharged and aftercooled, industrial, water-cooled six cylinder, with a continuous duty rating of no less than 560 SAE brake horsepower, at 1800 rpm.
- The engine shall have electronic controls and comply with USA/EPA Tier 3 / EU State IIIa exhaust emission requirements.
- The engine shall have a 24-volt electrical system and each battery shall have a minimum rating of 1400 cold cranking amps in accordance with SAE J537 specifications for 30-second test. A battery disconnect switch is required.
- A dedicated heavy duty, three stage, dry type air cleaner, with replaceable primary and secondary elements and an automatic filter maintenance indicator, shall be used to filter intake air.
- The fuel system shall have a capacity of at least 230 gallons with a 3" fuel fill strainer, a fuel/water separator, and a replaceable fuel filter.
- Fuel fill shall be from either side. Fuel fill caps shall be lockable.
- The engine exhaust shall have a rain cap.

COMPRESSOR AIREND

- The compressor airend shall be an oil flooded rotary screw type with asymmetrical rotor profiles incorporating tapered roller thrust bearings.
- The airend shall be driven through a flexible coupling to isolate engine and compressor vibrations.
- The regulation system shall permit low load engine starting and warm up. It will also provide stepless engine speed control.
- Regulation and bleed orifice shall have heaters for cold weather operation.
- A dedicated heavy duty, three stage, dry type air cleaner, with replaceable primary and secondary elements and an automatic filter maintenance indicator, shall be used to filter intake air.

COOLING SYSTEM

- The engine and airend heat exchangers shall be finned tube type coolers arranged in a side-by-side configuration for easy cleaning.
- The cooling air fan shall draw air into the unit, across the airend and engine and then expel it through the coolers.
- This routing shall be used to maintain internal package temperatures of no more than 20 degrees F above that of the ambient.
- There shall be a low coolant level indicator on the control panel.



Doosan Infracore
Portable Power

Ingersoll Rand HP1600WCU Tier 3 Bid Specifications

AFTERCOOLING and FILTRATION* (IQ SYSTEM®)

- An aftercooler* and water separator* shall be incorporated in the design to cool the compressed air to within 25 degrees F of the ambient air temperature.
- Two coalescing filters* shall be included downstream from the aftercooler. The primary shall remove particles down to 1 micron and liquid aerosols to .5 ppm by weight. The secondary shall remove liquid aerosols down to .01 ppm by weight and particulates to .01 micron.
- The aftercooler and two coalescing filters as described above shall comply with ISO-8573.1 (class 1 for particulate size and class 2 for oil aerosol content; only) and ISA-S7.0.1-1996 (for particulate size and oil aerosol content; only). A desiccant dryer is required to meet the Dew Point of these standards.
- Coalescing filters shall have excess pressure drop shutdown.*
- All condensate shall be evaporated through the engine exhaust.*

A valve system* shall be supplied to bypass the aftercooler*.

COMPRESSOR OIL SYSTEM

- The compressor oil system shall incorporate a vertical separator tank, a temperature bypass valve, an oil cooler, and a 25-micron spin-on oil filter.
- The separator tank shall meet ASME Section VIII Code requirements, have a minimum capacity of 139 gallons, and include an oil level sight gauge and over-fill protection.

TRAILER

- The trailer shall be a four-wheel type design with shipping tie-downs, heavy-duty leaf spring running gear, 17.5-inch tires, and a track width of no less than 71".
- The base shall be capable of containing all liquids.
- The engine and airend shall be rubber mounted directly to the trailer to minimize vibration.
- An internal, single point, lifting bail capable of lifting the complete unit shall also be included.
- The lifting bail shall be accessible from the inside so as to eliminate the need to climb on the roof of the compressor.
- Trailer with electric brakes, wheel chocks, breakaway, tail lights for running, brake, and turn signals, 7-wire cable, marker lights, reflectors, and license plate light shall comply with US DOT/Federal MVSS 49CFR571.
- Towbar shall be bolted on and have two safety chains mounted to the drawbar.
- Central drains shall be provided with valves inside the trailer frame.

ENCLOSURE

- A sheet metal housing shall fully enclose the compressor unit providing protection as well as noise attenuation.
- Access for routine maintenance shall be provided through the large doors located on all sides of the compressor.
- These doors shall be lockable and equipped with no-rust aluminum hinges and stainless steel "T" type latches to hold doors open.

INSTRUMENTS & CONTROLS

- The instruments and controls shall be clearly labeled and located on the front of the unit, accessible without opening the main side doors, and protected with a separate lockable door. Gauges shall be backlit for night operations.
- The instrument panel shall be hinged for easy access and it shall include the following gauges: hourmeter, tachometer, voltmeter, discharge air pressure, discharge air temperature, engine water temperature, engine oil pressure, and fuel level. Gauges shall be backlit for night operating.
- An electronic micro-processor control interface system shall provide digital data on operation, control, warning, and fault signal diagnosis of the compressor and engine. The system shall be in a NEMA 6 enclosure.
- The instrument panel shall include indicator warning lights for low engine coolant, alternator malfunction; air filter service indicator, and a low fuel level light with delayed shutdown.

Portable Air Compressor



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Portable Power

Ingersoll Rand HP1600WCU Tier 3 Bid Specifications

- The instrument panel shall include shutdown indicator lights for low engine oil pressure, high engine coolant temperature, high air discharge temperature, and low fuel level.
- The instrument panel shall have engine and compressor malfunction fault indicator display (digital).
- The instrument panel shall have an electronic control interface to show maintenance fault codes.

SAFETY FEATURES

- The base shall have the holding capacity to contain all fluids.
- The compressor unit shall incorporate the following features to ensure operator safety and to protect the equipment: fan guards meeting OSHA recommendations, operating and maintenance manuals, operating and safety decals in accordance with ANSI Z535.4-1996, automatic and manual blowdown valves, an ASME approved pressure relief valve on the oil separator tank, safety shutdown devices in case of high compressor discharge temperature, low engine oil pressure, high engine coolant temperature and low fuel level.
- The engine starting motor shall be protected from excessive wear by the presence of a starter protection system.

WARRANTY

- The air compressor package shall be warranted to be free of defects in material and workmanship for a period of one year or 2000 operating hours, whichever occurs first.
- The airtend itself shall be warranted for two years or 4000 hours, whichever occurs first.
- The battery, tires, and engine shall be warranted by their respective manufacturers.

Portable Air Compressor



Doosan Infracore
Portable Power

Ingersoll Rand HP1600WCU Tier 3 Bid Specifications

Ingersoll Rand IQ SYSTEM® COOL, CLEAN, DRY COMPRESSED AIR OPTION*

(Requires aftercooler/coalescing filter IQ option above)

Heatless Regenerative **AIR DRYER RD1600A/Skid Mounted*** **TYPE**

- Heatless Regenerative with dual pressure vessels.
- Self contained, mounted on a skid with forklift slots.

GENERAL

- The skid shall contain an inlet coalescing filter, two pressure vessels, an outlet coalescing filter, and all necessary valving and controls necessary for alternate drying and purging cycles.
- All filters and vessels shall be properly sized for the compressed air volume and pressure of the supply air compressor.

INLET Pre-FILTER

- The inlet coalescing filter shall be capable of removing liquid aerosols to .01 PPM by weight and particulate to .01 micron size.

HEATLESS REGENERATIVE AIR DRYER

- The air dryer shall be a "Heatless Regenerative" desiccant type that shall utilize two pressure vessels, along with appropriate valving and controls, to switch between the active and the regenerating vessel. One vessel shall be actively drying the compressed air while the other vessel is being regenerated. The two vessels shall alternate with the regenerated vessel becoming the active drying vessel, as the other vessel is regenerated by "purge air" from the active vessel. Switching between vessels shall be by shuttle valve. Purge air shall be adjustable.
- These pressure vessels shall meet ASME Section VIII Code.
- Compressed air from the vessel(s) shall be consistently -40 degree F (-40 degrees C) Dew Point temperature.
- Temperature: Maximum inlet shall be 140 F. Operating Range shall be 35 F to 125 F Ambient.
- Cold Ambient -20 F Option shall be available.
- Pressure: Maximum working pressure shall be 150 psig. Maximum inlet pressure shall be 175 psig.
- Scfm Flow: Maximum inlet shall be 1600 scfm @ 100 psig and 100 F; Outlet shall be 1360 scfm at -40 F dewpoint.
- Electrics: Shall be NEMA 4 Enclosure and 115 volt, AC external power source.

OUTLET After-FILTER

- The outlet coalescing filter shall be capable of removing particulate to 1-micron size.

SKID

- The skid shall have heavy-duty construction, lifting eyes, and fork lift slots for transport.
- Dimensions: Height 98.25"; Width 73.62"; Length 78" Weight 6500 lbs.
- Connections: Inlet/Outlet 3" NPT.

OUTLET AIR QUALITY

- Outlet compressed air from the dryer shall exceed:
 1. Instrument Society of America: "Quality Standard for Instrument Air"; S7.0.01-1996; when used with the Ingersoll Rand IQ SYSTEM® aftercooler and filters.
 2. ISO-8573.1 when used with the Ingersoll Rand IQ SYSTEM® aftercooler and filters.

Portable Air Compressor