

Refinery Systems

CFR Cylinder Overhaul

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BACKGROUND

Refinery Systems, a Division of Core Laboratories is a global organization specializing in Octane and Diesel equipment, providing services and parts for Laboratory as well as On-line Applications. With half a century industry experience we have been standing by our designs and customer support. Our company continues to improve and expand our expertise based on long customer partnership and communication to accommodate Petroleum trade.

- Over 50 years serving the Petroleum industry
- Experience in Octane Analyzers
- Focusing on Laboratories & On-line Applications
- Offering Standard Fuel Program
- Manufacture of Octane Analyzer Systems
- Provides worldwide maintenance services as well as training seminars off and on customer site
- The largest in the world distributor for: CFR Engines Inc. & CFR Support Equipment

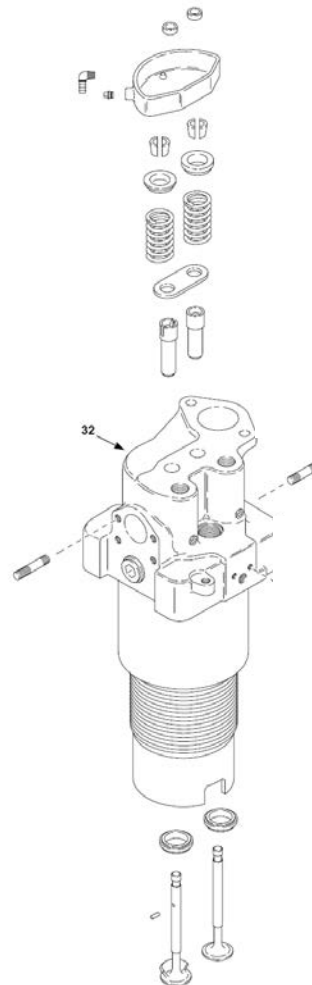
With locations on three continents we are always ready to assist you:

- **Lawrenceville, New Jersey, USA**
- **Darul Ehsan, Selangor, Malaysia**
- **Mumbai, India**
- **Fujairah, United Arab Emirates**

OVERVIEW

Overhaul of the CFR Engine Inc. Cylinder can be challenging and time consuming. Also improper overhaul will cause the CFR Engine to perform poorly with results being off by approx. 5 percent.

Refinery Systems offers cylinder service conducted at customer's site or Lawrenceville, New Jersey location. The service is conducted by Waukesha CFR certified technician and comes with one (1) year warranty against defects and workmanship. Complete cylinder overhaul kits are used each time to ensure that your cylinder is top quality and give you dependable rating performance while meeting critical part tolerances required by the ASTM methods.



PARTS

Refinery Systems provides four (4) overhaul kits for the CFR cylinder. The kits are offered for Standard, 0.010", 0.020" and 0.030" size cylinders. Complete set of parts will allow the customer to rebuild their top end assemblies with all new components and will ensure that all the ASTM specifications are met. Kits also offer the customer a way to purchase them as a set. Please view the chart below.

Spare Parts List: SS-ORDL 040 RON/MON CFR, STANDARD CYLINDER OVERHAUL

Part Number	Description	U/M	Quantity
106137A	BEARING, CONN. ROD	Each	2
106222A	RING PISTON, COMPRESSION	Each	3
106222B	RING PISTON, COMP, CHROME	Each	1
106424	GASKET CUP	Each	1
106721	GASKET, LOWER CYL GUIDE PLATE	Each	1
109345	GASKET, CARB 4-BOLT MTG (THIN)	Each	1
109346	GASKET, CARB 4-BOLT MTG (THICK)	Each	1
109421	GASKET, WATER INLET CAP	Each	2
110670A	VALVE, BREATHER, DISC	Each	1
111342	GASKET, COMBUSTION PICKUP	Each	1
111346	OIL FILTER ELEMENT	Each	1
111406A	WASHER, CONN ROD BOLT LOCK	Each	2
111460	SPARK PLUG 18MM	Each	1
23065B	PLATE, CYLINDER GUIDE	Each	1
23505	RING PISTON, OIL	Each	1
75552A	GASKET, GAS GAUGE	Each	1
75690	GASKET, CONDENSER BODY	Each	1
923	FILTER, INTAKE AIR	Each	1
B2544	GASKET, UPPER CYL GUIDE PLATE	Each	1
B2557	GASKET, MANIFOLD	Each	1
B4680	FELT WASHER, INTAKE VALVE	Each	2
B5096A	GASKET, WATER PIPE	Each	2
105987A	INSERT	Each	2
23109A	GUIDE, VALVE, EXHAUST	Each	1
23109B	GUIDE, VALVE, INTAKE	Each	1
106625A	VALVE, EXHAUST	Each	1
23436B	VALVE, INTAKE	Each	1
106919	GASKET, GEAR TRAY	Each	1
106917A	GASKET, GEAR COVER	Each	1

SERVICE

One (1) year warranty starts on the day that the cylinder is received by the customer. Coverage includes manufacturing defects and workmanship on any overhauled cylinder by Refinery Systems on and off site. Regular turnaround time for this service is one (1) week depending on the work load. All work performed and all parts used are traceable to ASTM.

The service includes are as follows:

- Cylinder is received and inspected for damage.
- Cylinder is completely disassemble to a bare casting and thoroughly cleaned.
- After cleaning it is inspected and measured to determine if bore is within the wear tolerance. If the wear is out of specification it is sent for honing to the correct tolerances and size. Customer will be contacted if the damage on the cylinder is extensive or if rebuilding is not possible.
- When the cylinder is measured and meets the specifications new seats are installed and new valves are lapped. Then the unit is thoroughly washed again.
- Cylinder is rebuilt using all new components meeting the manufacture's tolerances.
- Cylinder is painted, inspected, carefully packaged and sent back to the customer ready for use.

Note:

If the clamping sleeve is sent with the cylinder, it will be toleranced along with the internal components and replaced if necessary. Cost of the sleeve or sleeve components are not covered by the cylinder overhaul kit.

SCOPE OF WORK

At a pre-arranged date as per mutually agreed between Refinery Systems and the Laboratory representative, the engine(s) will be shut down and made available for the RS technician to conduct the prescribed maintenance sequence. The engines will have a top overhaul conducted, as per the new engine supply. The used cylinders will be reconditioned on-site. Upon completion of the service routine, the engine will be started and warmed-up to equilibrium by the RS technician and a Laboratory representative. Both will be expected to observe an agreed upon acceptance checkout operational test based on the satisfactory testing of Blended Toluene Standardization Fuels and/or standard fuels according to the current ASTM Volume 5.05. Upon completion, the Laboratory representative will take responsibility for the unit.

A comprehensive operation check of all critical test conditions and equipment adjustments to include, but not solely restricted to the following:

- Each laboratory CFR engine will have a complete Top Overhaul service conducted within the 12 month period
- Training will be supplied if time permits
- Replacement of the spark plug
- Valve clearances
- Spark or ignition timing
- Jacket coolant level and condition
- Functional check of the crankcase breather device and the achievement of adequate crankcase vacuum
- RTD Verification and inspection
- Inspection for any pilot lamps, switch, or other engine related electrical malfunction
- Inspection of the exhaust system to insure there is no exhaust leakage
- Inspection of the water cooling system to insure there are no leakage or potential failures
- RON & MON engine checks according to laboratory schedule

SCOPE OF WORK

- Operational check that the standard engine safety cut-off devices are functional Engine speed and zero setting
- Setting cylinder height
- Change oil and oil filter when required
- Change tubing and parts when required
- Thorough wipe-down of the engine equipment and the associated instrument console
- Inspection of the engine intake air humidification system
- A three day visit will be conducted by our skilled engineer to carry out the required CFR cylinder overhaul service
- All checks are to be performed in accordance with Research (D2699), Motor (D2700) and Cetane (D613)
- Cylinders will be reconditioned on-site
- Cleaning and inspection of all components
- Replacement of piston rings
- Remove & replace Replacement of Intake & Exhaust Valves
- Light honing or glaze-breaking of cylinder when necessary
- Thread cleaning/re-tapping of spark plug and pickup holes
- Resurfacing of external machined surfaces to the degree possible
- Replacement of valve guides when necessary
- Recording of all work and measurements will be incorporated in a comprehensive overhaul report
- Complete calibration of cylinder to ensure that it meets all specifications according to A.S.T.M. vol 05:05
- A full detailed report will be issued at the time of completion

Duration Period onsite 3 days for a complete Top Overhaul

SERVICE CONTRACT OPTIONS

A.S.T.M. CFR Engine Maintenance Service Contract

Refinery Systems, a Division of Core Laboratories (**RS**) can provide a complete ASTM Engine service for all laboratory CFR engines (Details of the parts required are attached). At a pre-arranged date as per mutually agreed between RS and the Laboratory representative, the engine/s will be shut down and made available for the RS technician to conduct the prescribed maintenance sequence. The used cylinders will be reconditioned on-site. Upon completion of the service routine, the engine will be started and warmed-up to equilibrium by the RS technician and a Laboratory representative. Both will be expected to observe an agreed upon acceptance checkout operational test based on the satisfactory testing of Blended Toluene Standardization Fuels and/or standard fuels according to the current ASTM Volume 5.05. Upon completion, the Laboratory representative will take responsibility of the unit. All contracts are tailored to your individual laboratory further information can be issued from any of our Refinery Systems office's.

Benefits of a Service Contract

- Fixed Annual Costs
- Tailored Service Contracts
- Planned Maintenance
- Reduced Downtime
- Increased Productivity
- Independent Verification of Equipment by a highly skilled Experienced CFR Engineer certified by CFR Engines Inc
- Detailed Compliance Report in accordance the Manufacturer's guidelines and ASTM
- Priority VIP Service
- VIP Access to the largest CFR stock inventory globally insuring quick delivery to your site

ADDITIONAL PRODUCTS

- **COMOC 6**

Refinery System's premier octane analyzer system connects to multiple CFR knock testing engines for comprehensive control of up to ten engines and three in-line blenders. COMOC 6 leverages the power of technologies such as client server web based software and the Windows Server operating system to control a network of engines via the COMOC 6 I/O cabinet and consoles.

- **Reference Fuel System – Octane and Cetane**

Easy to use for blending Octane primary reference fuels and standardization fuels. Cetane reference system supplies high and low check fuels. Four Burette Octane Stations and Two Burette Cetane Stations are manufactured to ASTM specifications. Equipped with flow restricted dripless spout dispensing valves and Power & Pump Panel with intrinsically safe-pak. Custom units and Amber burettes are available upon request.

- **CFR Services**

Refinery Systems provides on-site engine/analyzer troubleshooting, diagnostic support and maintenance services worldwide. Technicians are available to provide customer support in any manner related to CFR engines, maintenance, operation, or to any of the support products offered. On-site as well as off-site services are available for site evaluation, systems maintenance, as well as training services.

CONTACT US

Address all correspondence – including order to:

Refinery Systems

11 Princess Road, Suite H

Lawrenceville, NJ 08648

Telephone: (609) 896 – CORE (2673)

Telefax: (609) 896 – CLRS (2577)

Email: refsys.info@corelab.com

Web Page: www.corelab.com/refinery

1. Give a complete description and a part number of required items.
2. Be certain to give a complete street address where the parts are to be shipped to and billed.
3. Specify method of the shipment – parcel post, freight, air express, etc.
4. Prices and F.O.B. supplier's plant and subject without notice.
5. The minimum order is \$100.00USD.
6. Title passes on delivery to common carrier. Claims for loss or damage must be filed with the delivering carrier immediately.

