OIL CENTER RESEARCH INTERNATIONAL

OUR HISTORY

Liquid-O-Ring®

• Oil Center Research, Inc. was founded in 1958 from the vision of two individuals with one product to sell. Over the years the company grew so large that it was necessary to open several new companies in order to continue this rapid expansion. The founders realized to expand international sales a new company was needed to focus on the international market. This company was Oil Center Research International, L.L.C (OCRI).

• OCRI was opened to boost international sales for a preexisting, locally made product line that was primarily being sold in the Gulf Coast region.

• Our products were initially brought overseas by our customers operating in foreign markets. From the very beginning, 100% of the sales were exports. OCRI's product line has grown to include over 1,000 products, and its trade name Liquid-O-Ring® is recognized worldwide.

• Today, OCRI sells products to over 130 countries, on 6 continents.

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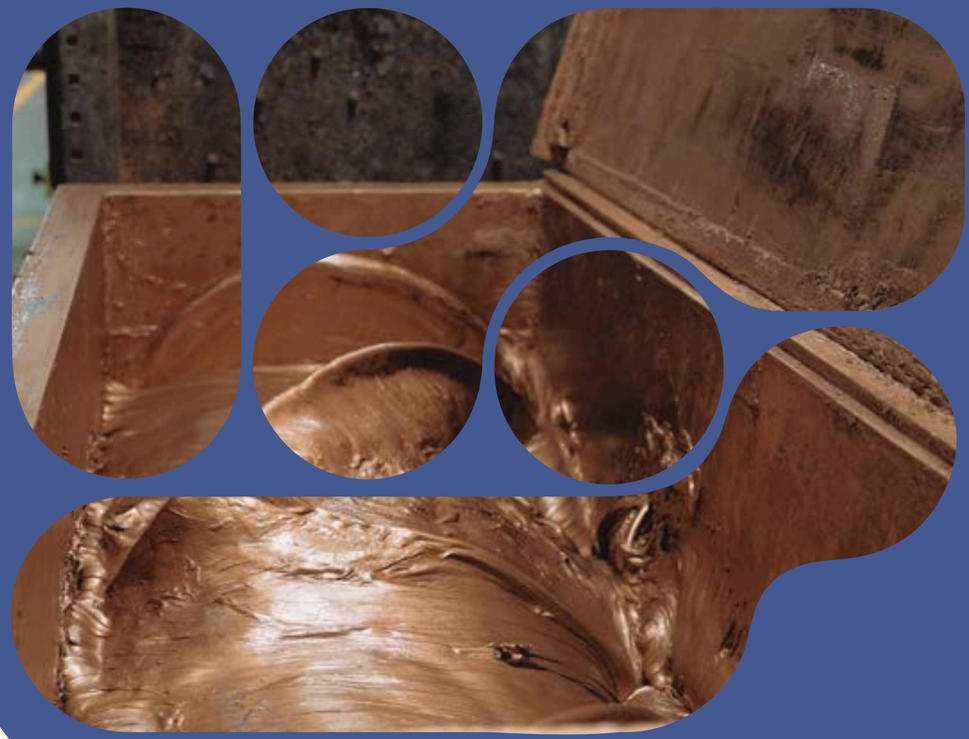

PRODUCT LINE

OIL CENTER RESEARCH INTERNATIONAL CONTINUES TO MEET CUSTOMERS' DEMANDS WITH PRODUCTS AVAILABLE FOR ALL INDUSTRIES AND APPLICATIONS.

OUR PRODUCT LINE INCLUDES THE FOLLOWING:

Anti-Seize Compounds

Anti-seize compounds are applied to bolts, flanges, fasteners and other metal interfaces in order to prevent galling, seizing and corrosion.

111 White Lead Replacement

1850 Moly Paste

HT-1800 Pure Copper Anti-Seize Compound

HT2001 High Temperature Anti-Seize Compound

PM1400L Silver Supreme Made with Liquilon®

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Cleaners and Degreasers

Neutral to alkaline industrial strength cleaners/degreasers for the toughest cleaning jobs.

1091 Mean & Green Heavy-Duty Cleaner

1093B Solve It Biodegradable, Heavy Duty Cleaner And Degreaser

9175 THREAD CLEANER Heavy-Duty Degreaser

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Liquid-O-Ring®

Drilling and Tool Joint Compounds

For heavy drilling applications such as tool joint and drill collar threaded connections. Protectction against seizing, galling and includes corrosion inhibitors.

201ES 1ST CHOICE Environmentally Acceptable Tool Joint Compound

221 Copper Seal II Tool Joint and Drill Collar Compound

235 Biodegradable Tool Joint And Drill Collar Compound

236 Metal-free Tool Joint and Drill Collar Compound

TC30 Premium Grade Anti-galling Thread Compound

ZN50 Zinc Base Tool Joint Compound

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Leg Greases

Heavy load carrying, extreme pressure water and wash-out resistant greases for lubrication of jack-up, spud barges and lift boats.

717 Leg Grease

757 Lift Boat Gear Lube

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Liquid-O-Ring®

Multi-purpose Greases

Multi-functional greases suitable for all types of general lubrication.

PM600 Military Grease

PM900 Synthetic Military Grease

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Liquid-O-Ring®

Pipe Coatings

Cost effective and viable solution to maintain pipe integrity and corrosion protecion during prolonged storage of pipe exposed to outdoor elements.

912 Clear External Pipe Coating

922 Black External Pipe Coating

923 Glossy, Amber External Pipe Coating

1114 Haps-free External Clear Pipe Coating

1122 Haps-free Black, Glossy, Waterborne External Pipe Coating

1123 Haps-free Tinted, Glossy, Waterborne, External Pipe Coating

725 Internal Coating

910 Internal Pipe Coating

710 Biodegradable Internal Pipe Coating

799 Environmentally Acceptable Internal & External Coating

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Pipe Storage Compounds

Formulated to provide corrosion protection to pipe threads during extended storage periods. Water resistant properties help prevent water and moisture intrusion, greatly reducing the risk of rust formation under thread protectors.

118 Thread Gard Heavy-duty Thread Protection And Wire Rope Coating & Corrosion Inhibitor

125 KUREX Self-Healing Pipe Storage Compound with Enhanced Corrosion Inhibitors

127 Pipe Storage Compound For Oilfield Tubular Goods With Enhanced Corrosion Inhibitors

130 Water Displacer And Corrosion Inhibitor

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Pump Packings

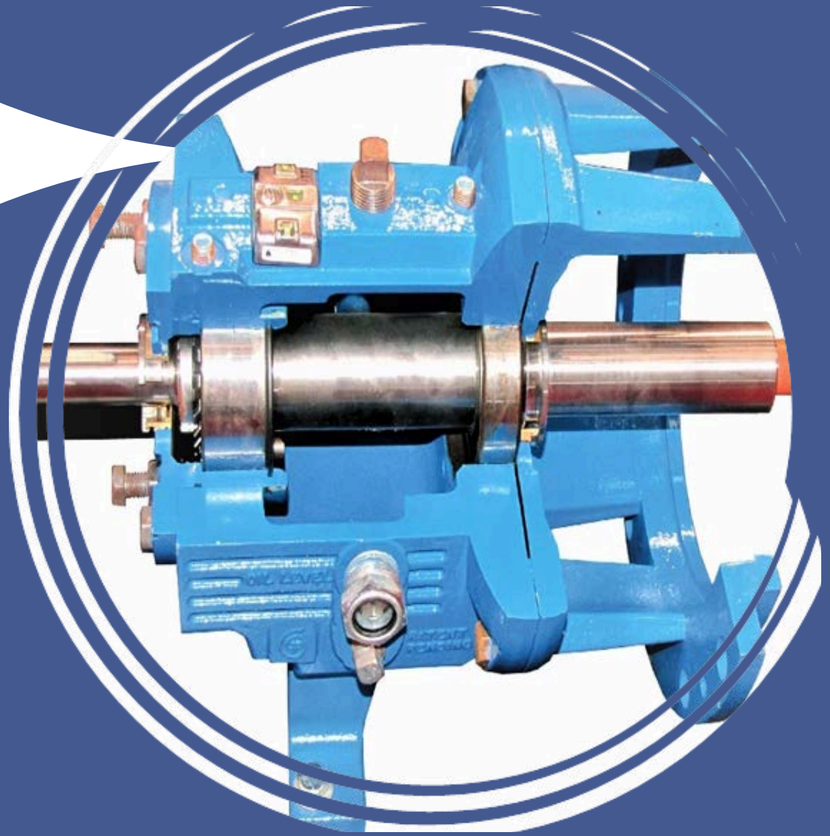
Solid and semi-liquid packing used to seal stuffing boxes and repair scored and pitted shafts.

506 semi-liquid packing Made with LIQUILON®

506SYN Synthetic Semi-Liquid Packing

636G Self-Mold Stick Packing

686 Self Form Packing Synthetic Stick Packing



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Rust and Corrosion Inhibitors

Products to neutralize or prevent the formation of rust and corrosion.

690 Aqua Cure

740 Rustless Rust Preventive

891 Rust Zapper Biodegradable Non-Hazardous Rust Remove

900 Wonder

935 Rust Inhibitor

MP56 Metal Parts Protector

OIL CENTER RESEARCH INTERNATIONAL, L.L.C.
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Specialty Fluids

Rust-inhibing, forging, machining and way lubricant fluids for applications with specific requirements.

1855 Synthetic Bar and Chain Lube

744 Flow-coat

848 Heavy-duty Ep Synthetic Machining Fluid

850 Way Lubricant

983 Forging Die Lube

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Specialty Lubricants

Specifically formulated to be applied where other lubricants fail. High temperature and water resistance with added corrosion inhibitors and special additives for extended service periods and better application performance.

101EU Film Forming Lubricant Made With LIQUILON®

156 MP Grease

166 Synthetic Biodegradable Lubricant

260 Premium Swivel Joint Lube

400 Multipurpose, Water-resistant Lubricant

402 Synthetic Polymer Multipurpose Water-resistant Lubricant

430 Polymer Plus

NC111 Silicone Non-conductive Grease

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Specialty Oils and Additives

Oils and additives designed to improve lubrication and sealing properties.

753 Gear Oil Additive

974 Long Life Silicone Fluid

PM100 Industrial and Automotive Gear Oil

PM100 Industrial Gear Oil

PM4000 Transmission Guard Automatic Hydraulic Transmission Fluid

PM5000 Leak-free Antileak Hydraulic Oil Grades 32, 46, 68, 100,150

PM8000 Compressor Guard Synthetic Compressor Oil

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Specialty Sealants

Manufactured with LIQUILON® to outperform most sealants in the marketplace. Our sealants are resistant to most chemicals such as H_2S and CO_2, seal helical paths and do not harden.

23 Check Seal

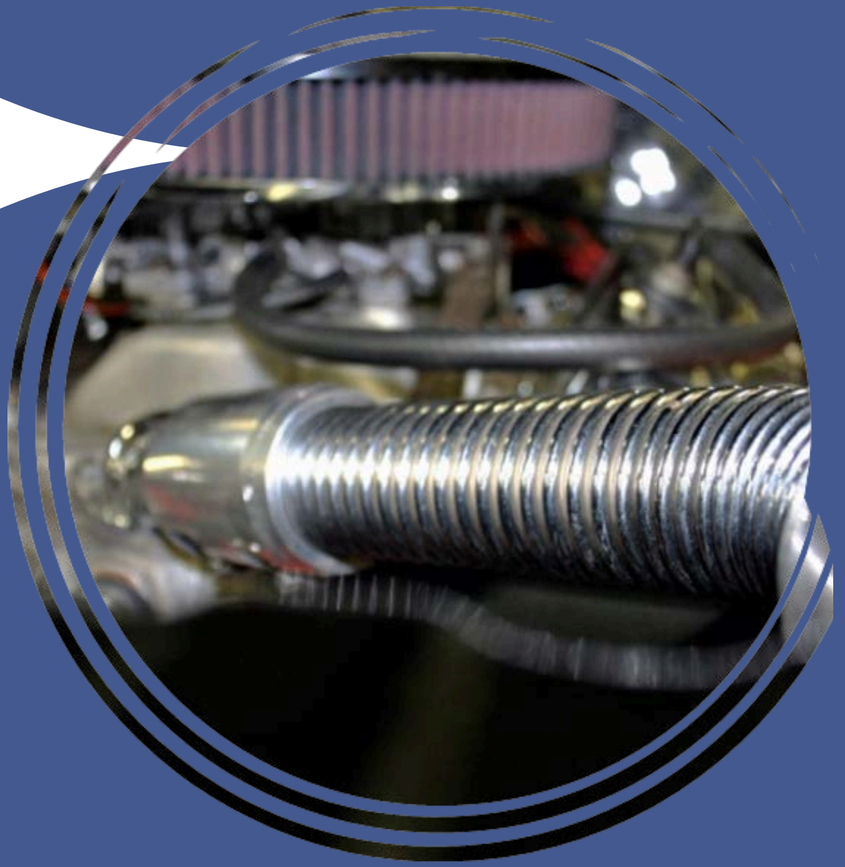
404EU All-purpose Lubricant And Sealant

527 HYPOSEAL made with LIQUILON®

528 HYPOSEAL Made with LIQUILON®

GX Safety Seal Valve Sealant for Hydraulic-controlled Surface and Sub-surface Safety Control Systems Made With LIQUILON®

GX® Seal Hydraulic Fluid Treatment Made With Liquilon®



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Liquid-O-Ring®

Thread Locking Compounds

Two part epoxy compounds used to replace the welding of casing joints and threaded connections.

250 Liqui-lok Thread Locking Compound

252 LIQUI-LOK II Zinc-Free, Environmentally Friendly Thread-Locking Compound

LL003 Liqui-lok

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Thread Sealants

The longer life Liquid-O-Ring® sealants with LIQUILON® offer a higher temperature rating, do not contain metals, are H_2S resistant, seal the helical path, and resist galling and seizing.

104EU Thread Sealant

105EU Thread Sealant

304EU Thread Sealant

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Liquid-O-Ring®

Thread Compounds

For threaded connections during storage, running and hydrostatic testing. Copper-based metal free or biodegradable compounds with proprietary corrosion inhibitors.

167ML50 Premium Anti-seize Lubricant

306 OCR Modified Lead-free Thread Compound

318 Metal-free OCR Modified Thread Compound

325 OCR Modified Biodegradable Thread Compound

326 OCR Modified Petroleum-based, Metal-free And Tfe-free Api Alternative For Tubing And Casing

328 Biodegradable, Premium Connection, Metal-Free Thread Compound

338 Metal-Free OCR Modified

4000 OCR Modified Lead and Zinc Free Thread Compound

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Valve Lubricants, Sealants and Cleaners

Lubricants, sealants and cleaners for ball, butterfly, check, gate, knife and plug valves.

1640 Valve Guardian Core

1656 Guardian II

21 Blackjack Valve Lubricant and Sealant with Moly and Graphite

600/1 Valve Life

600/3 Valve Last Extreme Temperature Valve Lubricant And Sealant

603HV Biodegradable, Synthetic Plug Valve Lubricant and Sealant

617 Resist-all

VC51 Valve Cleaner

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Wireline Greases and Sprays

Corrosion, H_2S and CO_2 resistant pressure control grease and line sprays including a complete line of biodegradable wireline lubricants and sprays.

765 "Grease Seal" Specialized Wireline Lubricant And Sealant For Specific Temperatures

766 Co2 Resistant Wireline Grease Seal

768 Wireline Lubricant And Sealant With Corrosion Package

770 Wireline Lubricant and Sealant with Corrosion Package

772 Line Spray Wireline Corrosion Inhibitor

774 Wireline Lubricant And Sealant With Corrosion Package

776 Wireline Lubricant and Sealant with Corrosion Package

778 Wireline Lubricant And Sealant

780 Grease Seal Biodegradable Wireline Lubricant

782 Biodegradable Line Spray

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Aramco Approval Letter

Aramco Americas
Procurement & Supply Chain Management
Strategic Sourcing Unit
1200 Smith Street
Houston, Texas 77002
Tel: 713-432-4000

March 8, 2024

OIL CENTER RESEARCH INTL LLC
106 MONTROSE AVENUE
LAFAYETTE, LA 70503

TOPIC: APPROVAL LETTER

VENDOR ID: 10020505

Dear Sir/Madam.

Aramco Americas is pleased to inform you that your company is approved to supply the attached list of non-inspectable material numbers.

This approval should not be regarded as a commitment from Aramco to purchase from OIL CENTER RESEARCH INTL LLC.

OIL CENTER RESEARCH INTL LLC shall ensure products meet relevant Saudi Aramco and industry standards.

We would like to take this opportunity to thank you for your interest in doing business with Aramco Americas and Saudi Aramco. Please quote the above referenced VENDOR ID on all future correspondences.

Best Regards,

Sameer Yousef
Supervisor, Strategic Sourcing Unit
Procurement & Supply Chain Management Department
Aramco Americas

Aramco Americas
Procurement & Supply Chain Management
Strategic Sourcing Unit
1200 Smith Street
Houston, Texas 77002
Tel: 713-432-4000

March 8, 2024

OIL CENTER RESEARCH INTL LLC
106 MONTROSE AVENUE
LAFAYETTE, LA 70503

TOPIC: APPROVAL LETTER

VENDOR ID: 10020505

Your manufacturing facility is approved to supply the following Aramco material numbers:

Int. material no.	Material description
1000031358	TOOL JOINT COMPOUND:
6000003893	COMPOUND; TOOL JOINT PIPE DOPE; DRILL PI
6000003894	COMPOUND: THRD; ROTARY SHOULDER; DR1
6000003965	SOLVENT; DEGREASER; GENERAL PURPOSE; LIQ
6000003966	SOLVENT: DEGREASE/CLEAN; DRLG MUD; DR1
6000003891	COMPOUND; CASING & TUBING RUNNING; HIGH
6000003892	COMPOUND: THRD; CSG & TBG; DR1
6000003897	COMPOUND; CASING & TUBING RUNNING; HIGH
6000003898	COMPOUND: THRD; THREAD LOCKING; DR1
6000003971	INHIBITOR; CORROSION/SCALE;
6000003972	INHIBITOR: CORROSION/SCALE; DR1
6000003895	COMPOUND; THREAD STORAGE; ANTI-CORROSION
6000003896	COMPOUND: THRD; STORAGE/ANTI-CORR; DR1

Classification: General Use

Aramco Approved Products

Products approved for use by Aramco

MPN material	Material description	Int. material no.	MPN (Oil Center Research International, L.L.C.)	Manufact.
5000123395	TOOL JOINT COMPOUND:	1000031358	ZN50 Zinc Base Tool Joint Compound	10020505
5000924863	COMPOUND; TOOL JOINT PIPE DOPE; DRILL PI	6000003893	221 Copper Seal II Tool Joint and Drill Collar Compound	10020505
5000924864	COMPOUND: THRD; ROTARY SHOULDER; DR1	6000003894	220 Copper Seal	10020505
5000926526	SOLVENT; DEGREASER; GENERAL PURPOSE; LIQ	6000003965	570 Super Blue Max Cleaner and Degreaser	10020505
5000926527	SOLVENT: DEGREASE/CLEAN; DRLG MUD; DR1	6000003966	1093B Solve It Biodegradable, Heavy Duty Cleaner And Degreaser	10020505
5000928459	COMPOUND; CASING & TUBING RUNNING; HIGH	6000003891	306 OCR Modified Lead-Free Thread Compound	10020505
5000928460	COMPOUND: THRD; CSG & TBG; DR1	6000003892	4000 OCR Modified Lead and Zinc Free Thread Compound	10020505
5000928815	COMPOUND: THRD; THREAD LOCKING; DR1	6000003898	250 Liqui-lok Thread Locking Compound	10020505
5000939668	COMPOUND; THREAD STORAGE; ANTI-CORROSION	6000003895	127 Pipe Storage Compound for Oilfield Tubular Goods with Enhanced Corrosion Inhibitors	10020505
5000939669	COMPOUND: THRD; STORAGE/ANTI-CORR; DR1	6000003896	128 Storage Compound For Oilfield Tubular Goods	10020505

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aramco

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ZN50

Zinc Base Tool Joint Compound

PRODUCT DESCRIPTION

ZN50 Tool Joint Compound is manufactured with the finest powdered metallic zinc and a high temperature, extreme pressure, petroleum base composition. The zinc used in the manufacture of ZN50 meets API and IADC requirements. ZN50 reduces plating and buildup of zinc, a problem encountered with other zinc products. This product conforms to the recommendation of "Tool Pushers Manual" (IADC-International Association of Drilling Contractors), Section B-2, Pages 1 and 2, and API (American Petroleum Institute) RP 5A3/ ISO 13678. ZN50 contains less than 0.3% sulfur as recommended by tool joint manufacturers.

ZN50 has good brushability over a wide range of temperatures, is resistant to water washout, has good adhesion to surfaces, and prevents against rust and corrosion.

APPLICATION

ZN50 is for use on tool joints, drill collars, and rotary shouldered connections. It meets torque break-out, circumferential tightening and makeup torque as recommended by tool joint manufacturers.

ZN50 is designed for drilling hard formations, deep drilling, for breaking in new tool joints, for directional drilling, crooked holes, and other high torque conditions.

TYPICAL OBSERVATIONS

Color	Gray
Texture	Smooth
Soap Type	Lithium Base
Density, lb/gal @ 77°F (25°C)	14.90
Specific Gravity @ 77°F (25°C)	1.785
Dropping Point, ASTM D-2265	395°F (185°C)
Flash Point, ASTM D-92	350°F (177°C)
Penetration,	
ASTM D-217 worked @ 77°F (25°C)	275–305
Base Oil Viscosity	
cSt @ 40°C	370
cSt @ 100°C	21
Evaporation Loss,	
ASTM D-972 @ 212°F (100°C)	0.4%
Shell 4-Ball,	
ASTM D-2596 Weld Point, kgf	620
Oil Separation,	
ASTM D-1742 @ 77°F (25°C)	0.6%
Copper Strip Corrosion, ASTM D-4048	1A
Temperature Range	0°F to 375°F (-17°C to 190°C)
Friction Factor, API RP 5A3 Annex I	1.0
Shelf Life (unopened container)	Four years

The Friction Factor is determined using standardized equipment and tests performed in accordance with API RP 5A3/ISO 13678 under laboratory conditions. In actual field use pipe size, metallurgy, thread geometry, and drilling mud contamination can effect the makeup torque. Adjustments may be required based on experience and knowledge.

BENEFITS

- No plating or zinc buildup
- Prevents rust and corrosion
- Resists washout
- Water-repellent
- Sticks to wet surfaces
- Friction factor of 1.0
- Brushable over a wide temperature range
- Low sulphur content
- Meets API and IADC requirements

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221

Copper Seal II Tool Joint and Drill Collar Compound

PRODUCT DESCRIPTION

221 Copper Seal II is a lead free, zinc free, quality lubricating compound that handles high temperatures and provides anti-seize performance required for breaking in new tool joints and lubricating drill collars. It is used in all drilling and anti-seize applications in the petroleum industry including refineries, petrochemical plants, and the water well industry. 221 Copper Seal II is recommended for use on all rotary shouldered connections and provides protection against galling and seizing or damage to threads on drill collars and tool joints, even under the most demanding conditions, including the deepest, hottest wells. It eliminates the need for wire brushing of threads to remove buildup often experienced with compounds that contain lead or zinc.

221 Copper Seal II assures constant makeup torque, is effective when used on downhole production tools or pumping equipment, and is recommended for use in areas of high temperatures.

TYPICAL OBSERVATIONS

Color	Copper
Texture	Smooth
Density, lb/gal@ 77°F (25°C)	10.25
Specific Gravity @ 77°F (25°C)	1.23
Dropping Point, ASTM D-2265	500°F (260°C)
Flash Point, ASTM D-92	>400°F (>204°C)
Penetration, ASTM D-217 @ 77°F (25°C)	310–330
Base Oil Viscosity	
cSt @ 40°C (104°C)	360
cSt @ 100°C (212°F)	21
Evaporation Loss, ASTM D-972 @ 210°F (98°C)	0.2%
Oil Separation, ASTM D-1742 @ 77°F (25°C)	Nill
4-Ball, Weld Point, Kgf (ASTM D-2596)	620 Typical
Salt Spray Test, ASTM B-117	500+ hours
Temperature Range	0°F to 450°F (-18°C to 233°C)
Friction Factor, API RP 7A1	1.15
Brushable To	0°F (-18°C)
Shelf Life (unopened container)	Four years

APPLICATION

221 COPPER SEAL II is recommended for drill collars, drill pipe, tool joints, rotary-shouldered connections, tubing, casing, and fishing tools. 221 COPPER SEAL II is also recommended for application to stainless steel connections as well as threaded and flanged connections in steam injection, primary recovery, and fire flood wells.

BENEFITS

- **Provides a tough protective coating**
- **Resists corrosion and contamination**
- **Prevents galling & seizing**
- **High temperature performance**
- **Lead and zinc-Free**
- **Friction Factor of 1.15**
- **Consistent makeup**
- **Will not buildup in thread roots**
- **Increases tool joint thread life**
- **Will not build up on threads**

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220

Copper Seal

PRODUCT DESCRIPTION

220 Copper Seal is a premium copper based tool joint and drill collar compound formulated for use on oilfield tubular goods. The extreme pressure and anti-wear additives of 220 Copper Seal provide protection against galling and seizing and consistent makeup on all rotary shouldered connections under the most demanding conditions. 220 Copper Seal handles high temperatures and provides anti-seize performance required for breaking in new tool joints and lubricating drill collars. This lead-free compound is used in all drilling and anti-seize applications in the petroleum industry including refineries,petrochemical plants, and the water well industry. 220 Copper Seal will not build up in thread roots, a problem often experienced in other compounds. 220 Copper Seal assures constant makeup torque, is effective when used on downhole production tools or pumping equipment, and is recommended for use in areas of high temperatures.

TYPICAL OBSERVATIONS

Color	Copper
Texture	Smooth
Density, lb/gal @ 77°F (25°C)	11.75
Specific Gravity @ 77°F (25°C)	1.40
Dropping Point, ASTM D-2265	484°F (251°C)
Flash Point, ASTM D-92	>400°F (>204°C)
Penetration, ASTM D-217 Worked @ 77°F (25°)	325–355
Base Oil Viscosity, cSt @ 40°C	375
Evaporation Loss, ASTM D-9 72 @ 210°F (98°C)	0.2%
Oil Separation, ASTM D-1742 @ 77°F (25°C)	Nil
Corrosion Resistance, ASTM B-117	1000+ hrs
Friction Factor, API RP 5A3 Annex I	1.0
Temperature Range	10°F to 450°F (-12°C to 232°C)
Shelf Life (unopened container)	Four years

APPLICATION

220 Copper Seal is recommended for use on rotary-shouldered connections, and all drilling operations including high temperature applications.

BENEFITS

- Friction factor of 1.0
- Lead-free
- Resists corrosion
- Extreme pressure and anti-wear additives
- Protects against galling & seizing
- Consistent makeup
- Will not build up on threads roots
- Used in high temperature applications
- Lubricates drill collars
- Increases tool joint thread life

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570

SUPER BLUE MAX Cleaner and Degreaser

PRODUCT DESCRIPTION

570 Super Blue Max is an excellent heavy-duty cleaner and degreaser, specially designed for industrial use. A non-hazardous, water-based product 570 Super Blue Max penetrates and dissolves the buildup of grease, oil, wax, and soil without harming the environment. 570 Super Blue Max is non-corrosive to metals, safe on fabrics, and will not dull painted surfaces.

APPLICATION

570 Super Blue Max is a versatile product for degreasing and cleaning auto and industrial engines, oil rigs, vinyl, plastic, machinery, equipment, and whitewall tires. 570 Super Blue Max industry applications include automotive, industrial, marine, aviation, metal fabrication, and electronics.

570 Super Blue Max may be used for pressure washing, steam cleaning, brushing, or spraying.

Dilutions vary depending on type of soil to be removed and type of equipment being used.

For difficult jobs: 1 pt (473 ML) 570 Super Blue Max per gallon (4 L) of water
For heavy-duty jobs: 8 oz (.24 L) 570 Super Blue Max per gallon (4 L) of water
For medium-duty job: 4 oz (.12 L) 570 Super Blue Max per gallon (4 L) of water
For light-duty jobs: 2 oz (.10 L) 570 Super Blue Max per gallon (4 L) of water

TYPICAL OBSERVATIONS

Color	Blue
Appearance	Liquid
Odor	Mild
pH	12.75
Density lb/gal @ 77°F (25°C)	8.70
Specific Gravity @ 77°F (25°C)	1.043
Vapor Pressure @ 20°C	<0.04
Boiling Point	212°F (100°C)
Flash Point	None
Freezing Point	28°F (-2°C)
Auto Ignition	None to 500°F (260°C)
Evaporation Rate	>1
Solubility in water	Complete
Shelf Life (unopened container)	Two years

BENEFITS

- **Environmentally safe**
- **Heavy-duty**
- **Non-flammable**
- **Non-hazardous**
- **Non-toxic**
- **Non-caustic**
- **Non-combustible**
- **Dissolves grease and oil**
- **Safe on fabrics**
- **Will not dull painted surfaces**

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1093B

1093B Solve It Biodegradable, Heavy Duty Cleaner And Degreaser

PRODUCT DESCRIPTION

1093B SOLVE IT is a excellent, heavy-duty, biodegradable, all-purpose cleaner and degreaser. Specially designed for tough industrial jobs, 1093B SOLVE IT contains a unique combination of detergents, grease dissolving agents, corrosion inhibitors, and emulsifiers that enable 1093B SOLVE IT to penetrate and remove buildups of many greases, oils, waxes, and soils. Non-corrosive to metals, this very versatile product finds uses in many industries.

TYPICAL OBSERVATIONS

Color	Clear Blue Liquid
Odor	Mild Solvent
pH	10.5-11.5
Density, lb/gal @ 77°F (25°C)	8.56
Flash Point, COC	Non-flammable
Specific Gravity	1.026
Viscosity, ASTM D-1200	
#4 Ford cup @ 77°F (25°F)	10 sec
Water Solubility	Complete
Shelf Life (unopened container)	Two Years

APPLICATION

1093B SOLVE IT applications include degreasing and cleaning auto and industrial engines, oil rigs, vinyl, plastic, machinery, equipment, and whitewall tires. 109B3 SOLVE IT also cleans floors, terrazzo, ceramic tile, and concrete.

Apply 1093B SOLVE IT using a pressure washer or pump-up garden sprayer.

BENEFITS

- Heavy-duty
- Non-corrosive to metals
- Versatile
- Biodegradable
- Environmentally safe
- Contains corrosion inhibitors emulsifiers
- Penetrates and removes greases, oils, waxes, and soils

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PRODUCT DESCRIPTION

306 OCR Modified is a superior thread compound for casing, tubing, and line pipe that meets the performance requirements of API RP 5A3/ISO 13678. 306 OCR Modified was researched and field-tested long before others were on the drawing board. Having the same appearance, consistency and sealing properties of API thread compounds, 306 OCR Modified is used with excellent results during hydrostatic testing, and in downhole service. It contains corrosion and H_2S inhibitors to eliminate thread corrosion and pitting. The component materials used in the manufacture of 306 OCR Modified meet or exceed performance objectives stated for API thread compounds.

APPLICATION

306 OCR Modified is recommended for use on oilfield tubing, casing, and line pipe. 306 OCR Modified may also be used as a pipe storage compound and running compound as well as for hydrostatic testing.

TYPICAL OBSERVATIONS

Color	Copper/Black
Texture	Smooth Paste
Specific Gravity, at 77°F (25°C)	1.372 – 1.431
Corrosion Preventive Properties, ASTM D-1743 at 125°F (51°C)	Pass
Flash Point, ASTM D-92	>400°F (>204°C)
Temperature Range	0°F to >350°F (-17°C to >176°C)
Shelf Life (unopened container)	Four years

API RP 5A3/ISO 13678

Dropping Point, ASTM D-2265	443°F (228°C)
Evaporation, % loss 24 h at 212°F (100°C)	Pass
Gas Evolution, cm³ 120 h at 151°F (66°C)	Pass
Oil Separation, % 24 h at 212°F (100°C)	Pass
Penetration, ASTM D-217 worked at 77°F (25°C)	320 – 330
Mass Density, lb/gal at 77°F (25°C)	11.45 – 11.95
Water Leaching, % loss 2 h at 151°F (66°C)	Pass
Application & Adherence, 2 h at 0°F (-18°C)	Pass
Compound Stability	Pass
Copper Corrosion, ASTM D-4048	1B
Salt Spray Test, ASTM B-117	500+ hours
Friction Factor, API RP 5A3 Annex I	1.0

The Friction Factor is determined using standardized equipment and tests performed in accordance with API RP 5A3/ISO 13678 under laboratory conditions. In actual field use pipe size, metallurgy, thread geometry, and drilling mud contamination can effect the makeup torque. Adjustments may be required based on experience and knowledge.

BENEFITS

- **Conforms to API RP 5A3/ISO 13678**
- **Lead-free**
- **Contains corrosion inhibitors**
- **Contains H_2S inhibitors**
- **Eliminates thread corrosion and pitting**
- **Prevents galling in thread connections during make-up**
- **Water resistant**
- **Readily brushable**

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306

OCR Modified Lead-free Thread Compound

PRODUCT DESCRIPTION

4000 OCR MODIFIED is a lead and zinc free superior alternative API Modified. 4000 OCR MODIFIED is manufactured using components that meet or exceed the listed performance objectives in API RP 5A3/ISO 13678. These components are unaffected to chemical change and temperatures in excess of 500°F (260°C). 4000 OCR MODIFIED is high pressure rated, provides excellent service characteristics in the areas of lubricity, sealing properties, make-up/breakout torque, and long-term corrosion protection during periods of storage. 4000 OCR MODIFIED contains corrosion and H_2S inhibitors for added protection to tubular threads.

APPLICATION

THREAD PREPARATION: MAKE SURE PIPE THREADS ARE CLEAN AND FREE OF ALL CONTAMINANTS. DO NOT apply 4000 OCR Modified before proper conditioning has been done to pipe which has been exposed to H_2S, CO_2, or downhole chemicals. Carefully wash threads with Aqua Cure 690 to remove any salt deposits, residual chlorine from thread cutting operations, dirt, and grease. Use a stiff brush to remove all rust and corrosion. DRY THREADS COMPLETELY BEFORE APPLICATION. All residual water from cleaning procedure, re-threading operations, or hydrostatic testing should be completely dried and then treated using a moisture displacer such as 130 Moisture Displacer.

APPLICATION INSTRUCTIONS: 4000 OCR MODIFIED should be applied with a #2 Dope Brush or other equipment specifically designed for use with thread compounds (avoid using a paint brush). Use the dope brush bristles to force the compound into the roots of the threads. Take care to cover the entire threaded area. A VISUAL INSPECTION IS ADVISED. For optimum protection, apply 4000 OCR MODIFIED to thread protectors as well.

INSPECTION: One month after application of 4000 OCR MODIFIED, thread protectors should be randomly removed and inspected for corrosion. Subsequent inspections are recommended every three months.

TYPICAL OBSERVATIONS

Color	Black Copper
Texture	Paste
Contains	Inert nonmetallic solids, copper, and other additives
Service Rating	500°F (260°C)
Specific Gravity, at 77°F (25°C)	1.27
Flash Point, ASTM D-92	>400°F (>204°C)
Water Washout Characteristics	
ASTM D-1264 at 100°F (37°C)	Nil
Brushable To	10°F (-12°C)
NLGI	1
Shelf Life (unopened container)	Four years

API RP 5A3/ISO 13678

Dropping Point, ASTM D-2265	>500°F (>260°C)
Evaporation, % loss 24 h at 212°F (100°C)	Pass
Gas Evolution, cm³ 120 h at 151°F (66°C)	Pass
Oil Separation, % 24 h at 212°F (100°C)	Pass
Penetration, ASTM D-217	
worked at 77°F (25°C)	NLGI 1
Mass Density, lb/gal at 77°F (25°C)	10.5
Water Leaching,	
% loss 2 h at 151°F (66°C)	Pass
Application & Adherence,	
2 h at 0°F (-18°C)	Pass
Compound Stability	Pass
Salt Spray Test, ASTM B-117	1000+ hours
Copper Corrosion, ASTM D-4048	1B
Friction Factor, API RP 5A3 Annex I	0.9

The Friction Factor is determined using standardized equipment and tests performed in accordance with API RP 5A3/ISO 13678 under laboratory conditions. In actual field use pipe size, metallurgy, thread

BENEFITS

- **Conforms to API RP 5A3/ISO 13678**
- **Lead-Free**
- **Zinc-Free**
- **High temperature and high pressure rated**
- **Non-contaminating**
- **Contains corrosion and H_2S inhibitors**

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4000

OCR Modified Lead and Zinc Free Thread Compound

PRODUCT DESCRIPTION

250 Liqui-Lok Thread Locking Compound is a two part epoxy compound used to replace the welding of casing joints and threaded connections. 250 Liqui-Lok is unaffected by vibration, pounding, or expansion due to temperature changes. It withstands high break-out torque and provides a leakproof seal. 250 Liqui-Lok is easily mixed under varying temperatures due to its workable consistency in excess of one hour.

APPLICATION

1. Thoroughly clean male and female threads to remove all thread dope, oil, and grease.
2. Dry threads completely prior to application of Liqui-Lok.
3. Thoroughly mix contents of can; add entire bottle of hardener and continue mixing until completely uniform.
4. When used in conjunction with float equipment, apply Liqui-Lok to male threads using a putty knife or spatula.
5. Make up joints final torque without delay.

NOTE

Setting action begins immediately after addition of the hardener. The mixture will remain in a workable consistency from 45 minutes to 2 hours under average conditions. Curing time may be reduced by elevating the temperature up to 250°F (121°C) or increased by lowering the temperature. The cure seal may be broken out by heating the joint to >450°F (232°C). Wet joints or high moisture conditions may affect curing ability.

BENEFITS

- **Friction factor of 1.5**
- **Mixes easily**
- **Workable consistency in excess of one hour**
- **Water resistant**
- **Oxidation resistant**
- **Withstands high breakout torque**
- **Provides a leakproof seal and strong permanent bond**
- **Self lubricating**
- **Unaffected by vibration and pounding**
- **Excellent adhesion**

TYPICAL OBSERVATIONS 250

Chemical Family	Epoxy Polymer Resin
Color	Gray
ASTM Penetration @ 77°F (25°C)	355–365
NLGI Grade	0
Type Curing	Thermo Curing
Density, lb/gal	14.25–14.75
Specific Gravity @ 25°C	1.707–1.767
Flash Point	>400°F (>204°C)
Solubility in Water	Insoluble
Friction Factor	1.5
Shelf Life	Three years

TYPICAL OBSERVATIONS 250 Hardener

Appearance	Liquid
Color	Pale Straw Colored
Odor	Aminic
Density, lb/gal @ 77°F (25°C)	8.51
Specific Gravity	1.019
Solubility in Water	Appreciable (>10°%)
Percent Volatile	Nil
Flash Point	>250°F (121°C)

COVERAGE CHART

(FOR 1 POUND KIT)

PIPE SIZE	NO. OF JOINTS
4½"	20 Joints
5½"	12 Joints
6⅝"–7"	8 Joints
7⅝"–9⅝"	6 Joints
10¾"–13⅜"	4 Joints
16"–20"	2 Joints

(FOR 1/2 POUND KIT)

PIPE SIZE	NO. OF JOINTS
4½"	10 Joints
5½"	6 Joints
6⅝"–7"	4 Joints
7⅝"–9⅝"	3 Joints
10¾"–13⅜"	2 Joints
16"–20"	1 Joint

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250

Liqui-lok Thread Locking Compound

PRODUCT DESCRIPTION

127 Pipe Storage Compound is specially formulated to provide corrosion protection to pipe threads during periods of extended storage. Unlike API Modified Compounds which contain 65% solids and could promote corrosion on threads, 127 Pipe Storage Compound does not contain metals to create a corrosive atmosphere. It is designed to control formation of rust and pitting on thread surfaces, problems which may be attributed to moisture intrusion. It also contains inhibitors to minimize the corrosive effects of downhole treating chemicals, hydrogen sulfide, carbon dioxide, or other contaminants. This orange colored compound forms a protective film on metal surfaces, which inhibits oxidation and retards rust formation. The water resistant properties of 127 Pipe Storage Compound help prevent water and moisture intrusion, greatly reducing the risk of rust formation under the thread protector.

APPLICATION

127 Pipe Storage Compound is designed for use on tubular connections in mills and storage pipeyards. Water on connection surfaces must be removed using 130 Water Displacer and Corrosion Inhibitor, or equivalent moisture displacer, before 127 Pipe Storage Compound is applied.

Other uses include 127 Pipe Storage Compound as a lubricant for general use where a water resistant, corrosion inhibited grease is recommended. 127 Pipe Storage Compound is not designed to seal and should never be used to run pipe downhole or for any other application where sealing is desired.

TYPICAL OBSERVATIONS

Color	Orange
Appearance	Smooth Paste
Base Thickener	Lithium
Consistency	Smooth
Penetration, worked @ 77°F (25°C)	290–320
Classification	Corrosion Inhibitor
Specific Gravity, @ 60°F (15°C)	0.839-0.899
Density, lb/gal	7.0-7.5
Dropping Point, ASTM D-566	365°F (185°C)
Flash Point, ASTM D-92	445°F (229°C)
Corrosion Test,	
ASTM D-130 Copper Corrosion 3 hours @ 212°F (100°C)	1a
ASTM B-117, 5% Salt Spray Rating @ 2,000 hours	Pass
Temperature Range	10°F to 400°F (-12°C to 204°C)
Heat Storage Stability, @ 120°F (48°C) after 1000 hours	No change in color
Friction Factor, API RP 5A3 Annex I	1.3
Shelf Life (unopened container)	Four years

The Friction Factor is determined using standardized equipment and tests performed in accordance with API RP 5A3/ISO 13678 under laboratory conditions. In actual field use pipe size, metallurgy, thread geometry, and drilling mud contamination can effect the makeup torque. Adjustments may be required based on experience and knowledge.

BENEFITS

- Provides corrosion protection
- Environmentally safe
- Water resistant
- Non-toxic
- Displaces moisture
- Metal deactivator
- Adhesive

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127

Pipe Storage Compound For Oilfield Tubular Goods With Enhanced Corrosion Inhibitors

128

Storage Compound For Oilfield Tubular Goods

PRODUCT DESCRIPTION

128 Storage Compound is specially formulated to provide corrosion protection to pipe threads during periods of extended storage. Unlike API Modified Compounds that contain 65% solids and could promote corrosion on threads, 128 Storage Compound does not contain metals to create a corrosive atmosphere. It is designed to control formation of rust and pitting on thread surfaces, problems that may be attributed to moisture intrusion. It also contains inhibitors to minimize the corrosive effects of downhole treating chemicals, hydrogen sulfide, carbon dioxide, or other contaminants. 128 Storage Compound is colored green and is designed for use in mills. It forms a protective film on metal surfaces, which inhibits oxidation and retards rust formation. Its water resistant properties help prevent water and moisture intrusion, greatly reducing the risk of rust formation under the thread protector.

128 Storage Compound is not recommended for make-up.

APPLICATION

128 Storage Compound is designed for use in mills. Other uses include 128 Storage Compound as a lubricant for general use where a water resistant, corrosion inhibited grease is recommended. 128 Storage Compound is not designed to seal and should not be used to run pipe downhole or in any other application where sealing is desired.

TYPICAL OBSERVATIONS

Color	Green
Texture	Buttery
Consistency	Smooth
Penetration, worked @ 77°F (25°C)	300–310
Specific Gravity, @ 60°F (15°C)	0.929-0.989
Density, lb/gal	7.75-8.25
Dropping Point, ASTM D-566	450°F (232°C)
Flash Point, ASTM D-92	445°F (229°C)
Corrosion Test	
ASTM D-1743 Rust Rating	1.1.1
ASTM D-130 Copper Corrosion 3 hours @ 212°F (100°C)	1a
ASTM B-117 - 5% Salt Spray Rating @ 2,000 hours	Pass
Shelf Life (unopened container)	Four years

BENEFITS

- Provides corrosion protection
- Environmentally safe
- Water resistant
- Non-toxic
- Displaces moisture
- Metal deactivator
- Adhesive

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THANK YOU