

QUALITY **PERFORMS.**



Royco® Aerospace and Defense Fluids

Product Overview



QUALITY **WORKS.**

LANXESS
Energizing Chemistry

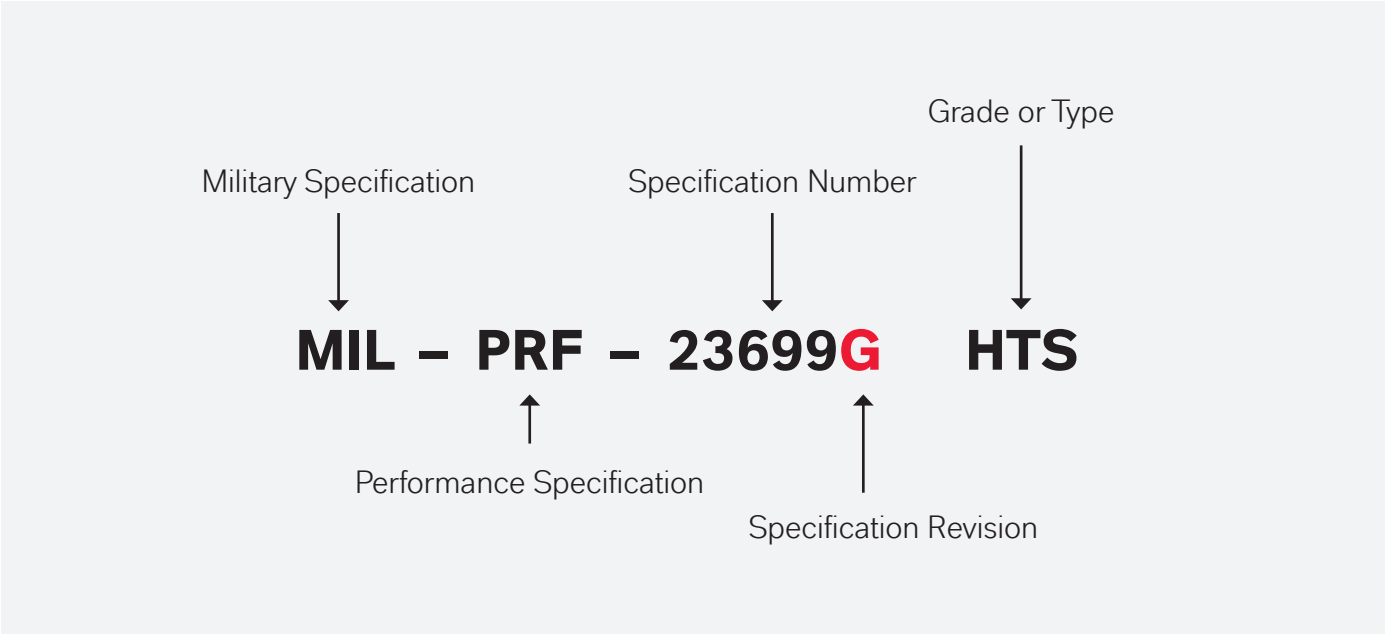
WELCOME TO LANXESS CORPORATION

- Situated on 25 acres in East Hanover, NJ
- Plant supports the Lubricant Additives Business with the manufacturing of **Royco®** Aviation products
- Chemical manufacturing began in 1941
- 4 Operational Areas:
 - Grease Compounding
 - Chemical Manufacturing
 - Finished Fluid Blending
 - Finished Fluid Packaging
- Quality management system:
 - AS9100D / ISO9001:2015
- CAGE CODE: 07950



WHAT IS A MILSPEC?

- **United States Military Specification**
Provides for standardized procurement of products via Qualified Products List (QPL)
- **Aircraft maintenance documents may call out products by MILSPEC:**
 - Turbine Oil: MIL-PRF-23699 HTS (**Royco®** 560)
 - Gear Box Oil: DOD-PRF-85734 (**Royco®** 555)
 - Grease: MIL-DTL-23549 (**Royco®** 49)
- **Other reference commercial specifications:**
 - Grease: SAE-AMS-4343 (**Royco®** 43)
 - Landing Gear Fluid: BMS 3-32 Type 2 (**Royco®** LGF)
- **There may also be OEM specific approval requirements, such as with the turbine engine oils and landing gear fluids**



- Check the status @ <https://quicksearch.dla.mil/qsSearch.aspx>
- Unless otherwise noted, MILSPEC meets current revision

SHELF LIFE OF ROYCO® AVIATION FLUIDS

- Shelf-Life is defined as the period of time during which a material may be stored and remains suitable for use. Many products can be retested beyond this period to determine potential extension of this life
- Royco® Military Specified (MILSPEC) lubricants are manufactured as “Type II shelf-life items”
 - Conformance can be tested within three (3) months prior to the “TEST DATE” in order to reaffirm conformance with the specification for an additional shelf-life term
 - The testing cycle can continue indefinitely until an individual specification requirement fails or the container no longer meets the intended use
 - More information regarding Type II shelf life can be found in MIL-STD-290.
- Unless otherwise noted, Royco® US Military shelf life is 24 months.



ROYCO® AEROSPACE AND DEFENSE PRODUCTS PROVEN PERFORMANCE: NO COMPROMISE

Product Range			
Turbine Fluids	Hydraulic Fluids	Specialty Fluids	Greases
Royco® 481	Royco® LGF	Royco® 308CA	Royco® 1MS
Royco® 500	Royco® 756	Royco® 363	Royco® 11MS
Royco® 555	Royco® 756A	Royco® 482	Royco® 22CF
Royco® 560	Royco® 757	Royco® 483	Royco® 22MS
Royco® 808	Royco® 782	Royco® 568M*	Royco® 27
Royco® 899		Royco® 581	Royco® 43
		Royco® 602	Royco® 44
		Royco® 634E	Royco® 49
		Royco® 885	Royco® 64
		Royco® 950	Royco® 81MS
		Royco® HF-825	Royco® C-201

33 products
25 MIL SPECS
5 Commercial Specs

ROYCO® VALUE STATEMENT

To offer the Aerospace and Defense industry a leading product portfolio that delivers confidence of specification compliance, cost/performance benefit, and solutions to meet evolving industry needs

- AS 9100 Approved Manufacturer.
- A leader in manufacturing “Superclean” fluids.
- Large aviation portfolio – over 35 product offerings
- A leading supply partner to the United States and other global militaries
- Confidence with over 80 years of lubricant development and manufacturing leadership



ROYCO® PRODUCTS – HYDRAULIC FLUIDS

■ Engineered for the most rigorous applications. Fluids are formulated to provide optimal anti-wear, corrosion, and oxidation performance across broad operating temperatures

- 8 Products:
- Royco® 756 – “Red Oil” Hydraulic Fluid
 - Royco® 756A – “Red Oil” Hydraulic Fluid
 - Royco® 757 – Wide Range Hydraulic Fluid
 - Royco® 782 – Fire Resistance Hydraulic Fluid
 - Royco® LGF – Landing Gear Fluid



ROYCO® 756 Quick Reference Guide



Composition
■ Mineral Oil
■ Antioxidants
■ Corrosion inhibitors
■ Anti-wear
■ Dyes

Uses/Applications
■ Landing gear shock absorbers
■ Missile systems
■ Cherry pickers
■ Boom trucks

Shelf Life
■ US Military 2 years
■ Commercial 4 years
■ NATO 2 years

Specifications
■ MIL-PRF-5606

Operating Temperatures
■ Unpressurized: -54 °C – 90 °C
■ Pressurized up to 3000psi: -54 °C to 135 °C

Key Properties	Method	Ranges
Appearance		Red Fluid
Kinematic Viscosity, cSt		
100 °C	ASTM D445	> 4.90
40 °C	ASTM D445	> 13.2
-40 °C	ASTM D445	< 600
-54 °C	ASTM D445	< 2500
Pour Point, °C	ASTM D97	≤ -60
4 Ball Wear, mm	ASTM D4172	≤ 1.0
Density, lbs/gal	ASTM D287	7.261

Limitations and Packaging
■ Should not be used in systems using natural rubber elastomers.
■ 55 gallon drum
■ 5 gallon pail
■ 6 x 1 gallon case
■ 24 x 1-QT case

ROYCO® 756A

Quick Reference Guide



Composition
- Mineral Oil - Antioxidants - Corrosion inhibitors - Anti-wear - Dyes

Uses/Applications
- Cherry pickers - Boom trucks - Application not requiring “super clean” designation

Shelf Life
Commercial 4 years

Specifications
Meets the requirements of MIL-H-5606A

Operating Temperatures
- Unpressurized: -54 °C – 90 °C - Pressurized up to 3000psi: -54 °C to 135 °C

Key Properties	Method	Ranges
Appearance		Red Fluid
Kinematic Viscosity, cSt		
100 °C	ASTM D445	≥ 4.90
130 °F	ASTM D445	≥ 10.0
40 °C	ASTM D445	≥ 13.2
-40 °C	ASTM D445	≤ 500
-54 °C	ASTM D445	≤ 2500
Pour Point, °C	ASTM D97	≤ -60
Density, lbs/gal	ASTM D287	7.26

Limitations and Packaging
- Should not be used in systems using natural rubber elastomers. 6 x 1 gallon can per case

ROYCO® 757

Quick Reference Guide



Composition
- Mineral Oil - Antioxidants - Corrosion inhibitors - Anti-wear - Dyes

Uses/Applications
- Missile systems - Unmanned Aerial Vehicles (UAV) - Aircraft stabilizers

Shelf Life
Commercial 4 years

Specifications
None

Operating Temperatures
-64 °C to +135 °C

Key Properties	Method	Typical Value
Appearance		Red Fluid
Kinematic Viscosity, cSt		
100 °C	ASTM D445	1.53
40 °C	ASTM D445	3.82
-40 °C	ASTM 2532	1.04
Viscosity Stability, 3hr @ -40 °C	ASTM 2532	0.5
Pour Point, °C	ASTM D97	-66
Density, lbs/gal	ASTM D287	7.26
Density, lbs/gal	ASTM D287	7.261

Limitations and Packaging
- Should not be used in systems using natural rubber elastomers. 55 gallon drums 5 gallon pails

ROYCO® 782

Quick Reference Guide



Composition
■ Synthetic hydrocarbon ■ Antioxidants ■ Metal Deactivators ■ Anti-wear

Uses/Applications
■ Automatic pilots ■ Shock absorbers and brakes ■ Air compressor gear boxes ■ Flap-control mechanisms ■ Missile hydraulic servo-controlled systems ■ Other hydraulic systems using synthetic sealing material

Shelf Life
■ US Military 2 years ■ Commercial 5 years ■ NATO 2 years

Specifications
■ MIL-PRF-83282 ■ SYNTHETIC FIRE RESISTANT HYDRAULIC FLUID

Operating Temperatures
■ -40 °C to 205 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
205 °C	ASTM D445	1.08
100 °C	ASTM D445	3.51
40 °C	ASTM D445	14.2
-40 °C	ASTM D445	2027
Pour Point, °C	ASTM D97	-61
4 Ball Wear, mm	ASTM D4172	0.44
Humidity Cabinet	ASTM D1748	Pass
Fire Point, °C	ASTM D92	251
Specific Gravity@ 15.6 °C	ASTM D1298	0.852

Limitations and Packaging
■ 55 gallon drums ■ 5 gallon pails ■ 1 gallon containers ■ 24 x 1-QT case

ROYCO® LGF

Quick Reference Guide



Composition
■ Mineral Base Oil ■ Antioxidants ■ Corrosion Inhibitors ■ Anti-wear

Uses/Applications
■ Landing gear shock absorbers ■ LGF - In-service

Shelf Life
■ Commercial 4 years

Specifications
■ Boeing BMS3-32 ■ Type II (LGF)

Operating Temperatures
■ None specified

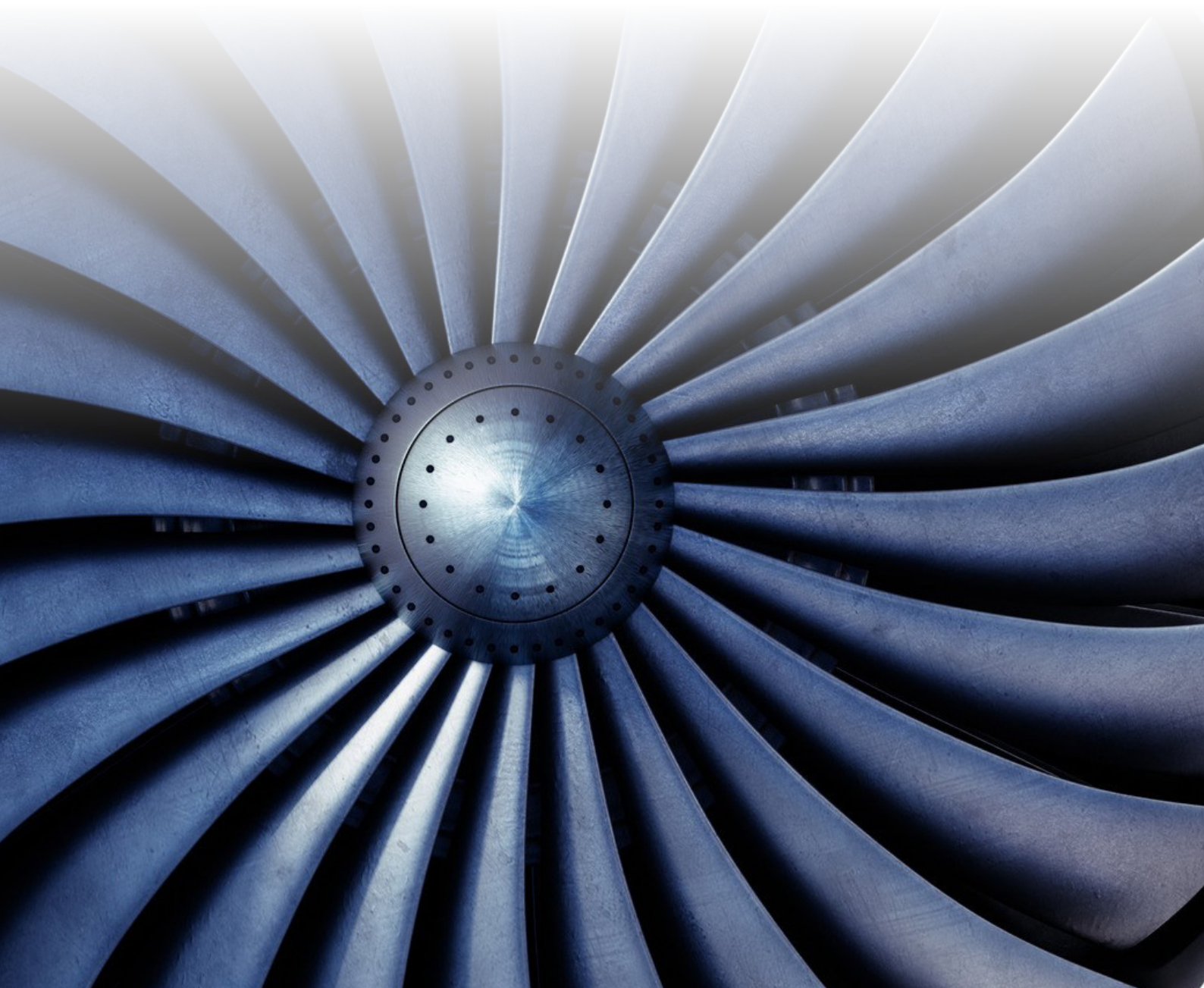
Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
40 °C	ASTM D445	> 13.2
Acid Number	ASTM D974	2.9 / 2.7
API Gravity	ASTM D4052	30.05
Zinc Content, ppm	ICP	1700
Density @ 15.6 °C	ASTM D1298	7.323

Limitations and Packaging
■ 55 gallon drums ■ 5 gallon pails

ROYCO® PRODUCTS – TURBINE ENGINE OILS

■ Engines are consuming less oil and increasing the number of thermal stress cycles, which results in a more stressful lubrication environment. Critical properties include high temperature performance, deposit control, wear control, and function as a heat transfer sink

- 6 Products:
- Royco® 481 – Mineral Oil Turbine Engine Oil
 - Royco® 560 – High Temperature Stability Turbine Oil
 - Royco® 500 – Synthetic Turbine Engine Oil
 - Royco® 555 – Turbine Oil and Helicopter Transmission Lubricant
 - Royco® 808 – Low Viscosity Turbine Engine Oil
 - Royco® 899 – Corrosion Inhibited Turbine Engine Oil



ROYCO® 481 Quick Reference Guide



Composition
■ Mineral Oil base
■ Antioxidants

Uses/Applications
■ Lubrication of gas turbine engine components and as a flushing and preservative fluid
■ Intended for the use in specific models of military aircraft jet engines
■ Approved as a P-10 preservative under MILSTD- 2073-1C for use in gas turbine engines and fuel systems, and components

Shelf Life
■ US Military 3 years
■ Commercial 4 years
■ NATO 3 years

Specifications
■ MIL-PRF-6081 Grade 1010, 1010N
■ Jet Engine Lubricating Oil

Operating Temperatures
■ Not provided

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
38.8 °C	ASTM D445	10.15
-40 °C	ASTM D2532	2444
Viscosity Stability 3 hr @ -40 °C, % change	ASTM D2532	0.52
Pour Point, °C	ASTM D97	-62
Trace Sediment	ASTM D2273	0.000
Acid Number	ASTM D974	0.0.03
Ash 1.2µ mg/L	FTM 3010	0.51
Density, lbs/gal @ 15.6 °C	ASTM D1298	7.34

Limitations and Packaging
■ 275 Gallon IBC
■ 55 gallon drums
■ 5 gallon pails

ROYCO® 500

Quick Reference Guide



Composition
Polyol ester Antioxidants Metal Deactivators Anti-wear

Uses/Applications
Gas turbine engines and gear boxes for air, sea, and ground mobility equipment STD class oil is intended for use in normal performance turbo equipment

Shelf Life
US Military 3 years Commercial 5 years NATO 4 years

Specifications
MIL-PRF-23699 STD; Synthetic Turbine Engine Oil SAE AS5780 SPC

Operating Temperatures
Designed for operation within the approximate bulk oil temperature range of -40 °C to 204 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
100 °C	ASTM D445	5.12
40 °C	ASTM D445	25.4
-40 °C	ASTM D445	8875
Pour Point, °C	ASTM D97	-59
Rubber Swell, %	FTM 3604	16.9
Neutralization Number	SAE ARP5088	0.06
Evaporation, 204 °C, 6.5hrs, %loss	ASTM D972B	3
Density, lbs/gal @ 15.6 °C	ASTM D1298	8.35

Limitations and Packaging
STD class oil is not intended for use where there are concerns about ferrous material (gears and bearings) corrosion induced from extended periods of downtime in a moist environment Not intended for use in gas turbine systems containing silicone and fluorosilicone seals which operate at elevated temperatures 55 gallon drums 5 gallon pails 24 x 1-QT case

ROYCO® 555

Quick Reference Guide



Composition
Polyol ester Antioxidants Metal Deactivators Anti-wear

Uses/Applications
Gas Turbine Helicopter transmissions and gearboxes for air, sea, and ground mobility equipment

Shelf Life
US Military 3 years Commercial 5 years NATO 4 years

Specifications
DOD-PRF 85734 Synthetic Base helicopter transmission system lubricating oil

Operating Temperatures
Designed for operation within the approximate bulk oil temperature range of -40 °C to 175 °C (-40 °F to 350 °F)

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
100 °C	ASTM D445	5.27
40 °C	ASTM D445	26.7
-40 °C	ASTM D445	10080
Pour Point, °C	ASTM D97	-57
Rubber Swell, %	FTM 3604	16.9
Neutralization Number	SAE ARP5088	0.47
Evaporation, 204 °C, 6.5hrs, %loss	ASTM D972B	3
Density, lbs/gal @ 15.6 °C	ASTM D1298	8.27

Limitations and Packaging
55 gallon drums 5 gallon pails 24 x 1-QT case

ROYCO® 560

Quick Reference Guide



Composition
■ Polyol ester ■ Antioxidants ■ Metal Deactivators ■ Anti-wear

Uses/Applications
■ Gas turbine engines and gear boxes for air, sea, and ground mobility equipment ■ HTS class is for use in hot running engine designs where evidence of oil coking and/or oil degradation is noted

Shelf Life
■ US Military 3 years ■ Commercial 5 years ■ NATO 4 years

Specifications
■ MIL-PRF-23699 HTS; Synthetic Turbine Engine Oil ■ SAE AS5780 SPC

Operating Temperatures
■ Designed for operation within the approximate bulk oil temperature range of -40 °C to 204 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
100 °C	ASTM D445	5.25
40 °C	ASTM D445	26.7
-40 °C	ASTM D445	10765
Pour Point, °C	ASTM D97	-58
Rubber Swell, %	FTM 3604	16.9
Neutralization Number	SAE ARP5088	0.28
Evaporation, 204 °C, 6.5hrs, %loss	ASTM D972B	3
Density, lbs/gal @ 15.6 °C	ASTM D1298	8.35

Limitations and Packaging
■ Not intended for use in gas turbine systems containing silicone and fluorosilicone seals which operate at elevated temperatures ■ 55 gallon drums ■ 5 gallon pails ■ 24 x 1-QT case

ROYCO® 808

Quick Reference Guide



Composition
■ Polyol ester base ■ Antioxidants ■ Metal Deactivators ■ Anti-wear

Uses/Applications
■ Specific models of aircraft turbine engines, helicopter transmissions, accessory and auxiliary power units ■ Grade 3 is intended for normal use unless otherwise specified

Shelf Life
■ US Military 3 years ■ Commercial 5 years ■ NATO 4 years

Specifications
■ MIL-PRF-7808 Grade 3 ■ Synthetic Base Lubricating Turbine Engine Oil

Operating Temperatures
■ Designed for operation within the approximate bulk oil temperature range of -40 °C to 204 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
100 °C	ASTM D445	3.1
40 °C	ASTM D445	12.05
-51 °C	ASTM D2532	10
Viscosity Stability 6 hr @ -51 °C, % change	ASTM D2532	0.2
Acid Number	SAE ARP 5088	0.29
Evaporation, 204 °C, 6.5hrs, % loss	ASTM D972B	22
Density, @ 15 °C	ASTM D1298	0.952

Limitations and Packaging
■ Not intended for higher viscosity applications. ■ 55 gallon drums ■ 5 gallon pails ■ 24 x 1-QT case

ROYCO® 899

Quick Reference Guide



Composition
■ Polyol ester ■ Antioxidants ■ Corrosion inhibitors ■ Metal Deactivators ■ Anti-wear

Uses/Applications
■ Gas turbine engines and gear boxes for air, sea, and ground mobility equipment ■ C/I class oil is intended for applications where corrosion inhibition is desired

Shelf Life
■ US Military 3 years ■ Commercial 4 years ■ NATO 4 years

Specifications
■ MIL-PRF-23699 Cl; Synthetic Turbine Engine Oil

Operating Temperatures
■ Designed for operation within the approximate bulk oil temperature range of -40 °C to 204 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
100 °C	ASTM D445	4.94
40 °C	ASTM D445	25.6
-40 °C	ASTM D445	11455
Pour Point, °C	ASTM D97	-72
Neutralization Number	SAE ARP5088	0.63
Evaporation, 204 °C, 6.5hrs, %loss	ASTM D972B	3.4
API Gravity	ASTM DD287	10.59

Limitations and Packaging
■ Not intended for use in gas turbine systems containing silicone and fluorosilicone seals which operate at elevated temperatures. ■ 55 gallon drums ■ 5 gallon pails ■ 24 x 1-QT case



■ Addressing broad spectrum of aviation needs from coolants to dielectric protection, through to gear and sliding surface lubricant requirements

- 11 Products:
- Royco® 308CA – General Purpose, Lubricating and Preservative Oil
 - Royco® 363 – Low Temperature, General Purpose
 - Royco® 482 – Aircraft Piston Engine and Parts Preservative Fluid
 - Royco® 483 – Aircraft Turbojet Engine and Parts Preservative Fluid
 - Royco® 581 – Preservative CONCENTRATE for Aircraft Engines
 - Royco® 586M – High Temperature Load Carrying Lubricant
 - Royco® 602 – Hydrolytically Stable Coolant and Dielectric Lubricating Fluid
 - Royco® 634E – Advanced Multipurpose Cleaner, Lubricant, Preservative Fluid
 - Royco® 885 – Low Volatility Instrument and General Lubricating Fluid
 - Royco® 950 – Fuel System Calibration Fluid
 - Royco® HF-825 – Assembly Fluid



ROYCO® 308CA

Quick Reference Guide



Composition
■ Mineral Oil Base
■ Corrosion inhibitors
■ Anti-oxidants

Uses/Applications
■ General preservative oil
■ Protecting against corrosion of certain small arms and automatic weapons
■ Locks, hinges, electric motors, chains
■ Fishing, hunting and camping equipment

Shelf Life
■ US Military 2 years
■ Commercial 4 years
■ NATO 4 years

Specifications
■ MIL-PRF-32033 TYPE 1 CLASS 1

Operating Temperatures
■ Not for temperature below -40 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
40 °C	ASTM D445	11.16
-40 °C	ASTM D445	4137
-54 °C	ASTM D445	34199
Pour Point, °C	ASTM D97	-60
4-Ball Wear, 40kg, mm	ASTM D4172	0.67
Evaporation, 100 °C, 22hrs, %loss	ASTM D972	17.2
Water Displacement	FTM 3007	Pass
Rust Protection, 110 °F, 168hrs	Spec	Pass

Limitations and Packaging
■ Oil becomes very viscous at low temperatures so that its use at temperatures below -40°C is limited by a number of machine design factors and should be proved for any specific item application by test before adoption
■ Do not use this oil in the processing or handling of food or allow product to contact food
■ 55 gallon drums
■ 5 gallon pails
■ 6 x 1 gallon can per case

ROYCO® 363

Quick Reference Guide



Composition

- Mineral Oil Base
- Corrosion inhibitors
- Anti-oxidants

Uses/Applications

- General purpose lubrication of instrument and airframe components
- Including bearings, actuators, hinges and latches on both military and civilian aircraft

Shelf Life

- US Military 3 years
- Commercial 4 years
- NATO 4 years

Specifications

- MIL-PRF-7870

Operating Temperatures

- 54 °C to 120 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
38 °C	ASTM D445	10.15
-40 °C	ASTM D445	3304
Pour Point, °C	ASTM D97	-63
Acid Number, mg KOH/g	ASTM D974	0.20
Evaporation, 100 °C, 22hrs, %loss	ASTM D972	11.5
Water Displacement	FTM 3007	Pass
Rust Protection, 110 °F, 168hrs	Spec	Pass
Density, lbs/gal		7.387

Limitations and Packaging

- Limited use at high temperatures - unless provisions are made for frequent re-lubrication
- 55 gallon drums
- 5 gallon pails
- 6 x 1 gallon can per case

ROYCO® 482

Quick Reference Guide



Composition

- Mineral Oil Base
- Corrosion inhibitors

Uses/Applications

- Preservation grade engine oil for the preservation of aircraft internal combustion engines or engine parts and accessories during moderate outdoor to long term indoor storage periods
- Designated a preservative under MIL-STD-2073-1C.

Shelf Life

- US Military 3 years
- Commercial 3 years
- NATO 3 years

Specifications

- MIL-C-6529 Type 2

Operating Temperatures

- None specified

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
@ 100 °F	ASTM D445	256
@ 210 °F	ASTM D445	20.5
Flash Point, °F	ASTM D92	≥ 400
API Gravity, 60/60 °F	ASTM D287	27.4
Density, lbs/gal		7.41

Limitations and Packaging

- When used as a “flyaway” oil for reciprocating engines, operation of engines preserved with the diluted material should be limited to a maximum of fifty hours before oil change
- 55 gallon drums
- 5 gallon pails

ROYCO® 483

Quick Reference Guide



Composition
- Mineral Oil Base - Corrosion inhibitors

Uses/Applications
Preservation grade engine oil for internal preservation of turbojet engines or engine parts and accessories during moderate outdoor to long term indoor storage periods

Shelf Life
- US Military 3 years - Commercial 3 years

Specifications
MIL-C-6529 Type 3

Operating Temperatures
None specified

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
@ 100 °F	ASTM D445	21.8
@ 210 °F	ASTM D445	4.28
Flash Point, °F	ASTM D92	≥ 275
API Gravity, 60/60 °F	ASTM D287	28.0

Limitations and Packaging
- Can be used as a “flyaway” oil, though use must be limited 55 gallon drums 5 gallon pails

ROYCO® 581

Quick Reference Guide



Composition
- Mineral Oil Base - Corrosion inhibitors

Uses/Applications
- Used as a concentrated engine oil additive for the internal preservation of engines or engine parts and accessories - Also used for industrial gasoline/ diesel engines, industrial gearboxes and machine tools - Moderate outdoor to long term indoor storage periods

Shelf Life
- US Military 3 years - Commercial 3 years

Specifications
MIL-C-6529 Type 1

Operating Temperatures
None specified

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
@ 100 °F	ASTM D445	279
@ 210 °F	ASTM D445	21.54
Viscosity Index		95
Carbon Residue (MCRT), %wt	ASTM D189	0.22
Lead Corrosion, 300 °F 4 hrs	FTM 5321	12.2
Flash Point, °F	ASTM D97	544
API Gravity, 60/60 °F	ASTM D287	25.05

Limitations and Packaging
- Can be used as a “flyaway” oil, though use must be limited 55 gallon drums

ROYCO® 586M

Quick Reference Guide



Composition
■ Mineral Oil Base ■ Antioxidants ■ Anti-wear additives ■ Corrosion Inhibitor

Uses/Applications
■ Gears exposed to light to moderate load and low to moderate speed applications ■ Grade M is intended for use in moderate to warm climates ■ Helicopter gearboxes ■ General-purpose industrial applications requiring an E.P. lubricant for heavily loaded gears

Shelf Life
■ US Military 3 years ■ Commercial 4 years ■ NATO 4 years

Specifications
■ MIL-PRF-6086 Grade M

Operating Temperatures
■ Down to -40 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
@ 37.8 °C	ASTM D445	73.9
@ 98.9 °C	ASTM D445	9.18
Viscosity Index		111
Acid Number, mg KOH/g	ASTM D974	38
Pour Point, °C	ASTM D97	12.2
Load Wear Index, kg	ASTM D2783	52.2
Flash Point, °F	ASTM D97	544
Density, lbs/gal		7.587

Limitations and Packaging
■ 5 gallon pails

ROYCO® 602

Quick Reference Guide



Composition
■ Synthetic Base

Uses/Applications
■ Dielectric cooling fluid ■ Aircraft avionics systems, ■ High-powered transmitter equipment ■ Power supplies ■ Radar, navigation and other electronic systems

Shelf Life
■ US Military 3 years ■ Commercial 5 years

Specifications
■ MIL-PRF-87525

Operating Temperatures
■ -54 °C to 200 °C

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
@ 100 °C	ASTM D445	1.72
@ 40 °C	ASTM D445	5.18
@ -40 °C	ASTM D445	274
@ -54 °C	ASTM D445	1137
Acid Number, mg KOH/g	ASTM D664	0.03
Pour Point, °C	ASTM D97	-100
Dielectric Breakdown Voltage, KV	ASTM D877	53
Flash Point, °C	ASTM D97	158
High Temperature Stability	MIL-PRF-87252	Pass

Limitations and Packaging
■ The synthetic based oils used in this product may soften certain paints and elastomers ■ Do not use with neoprene or natural rubber elastomers ■ Components should be evaluated for compatibility if there is any question ■ Not Recommended with Ethylene Propylene, Buna N, SBR, Polychloroprene ■ 55 gallon drums ■ 5 gallon pails

ROYCO® 634E

Quick Reference Guide



Composition
■ Synthetic base ■ Mineral components ■ Antioxidants ■ Corrosion inhibitors ■ Metal deactivators

Uses/Applications
■ Cleaner Lubricant Preservative - guards against particulate infiltration ■ Handheld weapons, and weapons systems of both large and small caliber ■ Automotive, aviation, marine, and general plant maintenance of industrial equipment

Shelf Life
■ US Military 3 years ■ Commercial 4 years ■ NATO 3 years

Specifications
■ MIL-PRF-63460

Operating Temperatures
■ -65 °F to +150 °F

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
@ 40 °C – with solvent	ASTM D445	14.6
@ -40 °C – solvent evaporated	ASTM D445	1225
4-Ball wear, 40kg, 1200rpm, mm		0.34
Acid Number, mg KOH/g	ASTM D2532	11.6
Salt Spray Corrosion Resistance	ASTM D2270	Pass
Humidity Cabinet Resistance		Pass
Water Displacement Stability		Pass
Chemical Agent Reactivity	MIL-PRF-63460	Pass

Limitations and Packaging
■ 55 gallon drums

ROYCO® 885

Quick Reference Guide



Composition
■ Synthetic base ■ Anti-oxidants ■ Corrosion inhibitors ■ Metal deactivators

Uses/Applications
■ Aircraft instruments ■ Electronic equipment ■ Aircraft air cycle equipment ■ Other instruments and accessories.

Shelf Life
■ US Military 3 years ■ Commercial 5 years ■ NATO 4 years

Specifications
■ MIL-PRF-6085

Operating Temperatures
■ None specified

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
@ 100 °C	ASTM D445	3.1
@ -40 °C	ASTM D445	12.05
@ -51 °C	ASTM D445	7.675
Acid Number, mg KOH/g	ASTM D664	0.13
Viscosity Stability, -51 °C, 6hr	ASTM D2532	0.2
Evaporation Loss, 205 °C, 6.5hr	ASTM D9728	22
Flash Point, °C	ASTM D92	220
Density, 15 °C g/ml		0.952

Limitations and Packaging
■ The synthetic based oils used in this product may soften certain paints and elastomers ■ Do not use with neoprene or natural rubber elastomers ■ Components should be evaluated for compatibility if there is any question ■ 55 gallon drums ■ 5 gallon pails ■ 6 x 1 gallon cases

ROYCO® 950

Quick Reference Guide



Composition
■ Stoddard solvent

Uses/Applications
■ Calibration of fuel system components in both reciprocating and gas turbine aircraft engines

Shelf Life
■ US Military 2 years
■ Commercial 2 years

Specifications
■ MIL-PRF-7024 Type II

Operating Temperatures
■ None specified

Key Properties	Method	Typical Value
Specific Gravity, 15.6/15.6 °C	ASTM D1298	0.767
Kinematic Viscosity, 25 °C, cSt		1.17
Aromatics, % vol	ASTM D1319	8.8
Olefins, % vol	ASTM D1319	3.1
Total Acid Number, mg KOH/g	ASTM D3242	<0.01
Initial Boiling Point, °C	ASTM D86	158
Final Boiling Point, °C	ASTM D86	200
% Recovery	ASTM D86	99.1
Flash Point, TCC °C	ASTM D92	42

Limitations and Packaging
■ 55 gallon drums
■ 5 gallon pails

ROYCO® HF-825

Quick Reference Guide



Composition
■ Methacrylate-polymer
■ Diester based oil

Uses/Applications
■ Assembly aid to “stick-hold” parts in multi-component mechanisms such as gearboxes, pumps, and engine accessories
■ “Wetting” agent to lubricate O-rings prior to pressing them into cavities

Shelf Life
■ Commercial 5 years

Specifications
■ None

Operating Temperatures
■ None specified

Key Properties	Method	Typical Value
Kinematic Viscosity, cSt		
@ 100 °C	ASTM D445	329
@ 100 °F	ASTM D1319	2468
Flash Point, °C	ASTM D92	203
Fire Point, oC	ASTM D92	222
Specific Gravity, 60 oF/60 oF	ASTM D1298A	0.912
Density, lbs/gal		7.60
API Gravity	ASTM D287	23.6
Acid Number, mg KOH/g	ASTM D664	0.2

Limitations and Packaging
■ 24 x 1.75 pound can per case

ROYCO® PRODUCTS – GREASES

■ Designed for the most demanding lubricant requirements when exposed to high altitudes and corrosive / marine environments, from severely loaded gears to extreme pressure sliding surfaces

- 11 Products:
- Royco® 1MS – Anti-Seize, Severe Duty Grease
 - Royco® 11MS – Severe Duty Grease
 - Royco® 22CF – Wide Temperature Multi-function Grease
 - Royco® 22MS - Wide Temperature, High Load Grease
 - Royco® 27 – Multi-purpose Instrument and Airframe Grease
 - Royco® 43 – Lithium Grease
 - Royco® 44 – Graphite Anti-Seize Compound
 - Royco® 49 – Molybdenum Extreme Pressure Grease
 - Royco® 64 – Molybdenum Synthetic Grease
 - Royco® 81MS – High Temperature Molybdenum Grease
 - Royco® C-201 – High Temperature PTFE Grease



ROYCO® 1MS
Quick Reference Guide



Composition
■ MoS ₂
■ Petrolatum

Key Properties	Method	Typical Value
Worked Penetration, 77 °F	ASTM D217	230
Stability	Paragraph 4.3.3	PASS
Composition		PASS

Uses/Applications
■ Aircraft engine spark plugs
■ Threaded fasteners
■ Fittings

Limitations and Packaging
■ Should be used with discretion in or near electrical equipment.
■ It is not a sealing compound
■ Should not be used in oxygen systems.
■ Should not be used in lieu of sealing compound, pipe joint and thread
■ 24 x 1.75 pound can per case

Shelf Life
■ Commercial 3 years

Specifications
■ MIL-PRF-83483

Operating Temperatures
■ Below 427 °C

ROYCO® 11MS

Quick Reference Guide



Composition
■ Mineral base

Uses/Applications
■ Bogie pivot pins
■ Landing gear assemblies
■ Actuators
■ Other Airframe applications

Shelf Life
■ Commercial 3 years

Specifications
■ MIL-G-7711A obsolete

Operating Temperatures
■ -40 °F to 300 °F

Key Properties	Method	Typical Value
Worked Penetration, 77 °F	ASTM D217	332
Color	Dark gray	PASS
Workmanship		PASS

Limitations and Packaging
■ Should not be used in high-speed bearing applications without prior performance evaluation
■ Product is not available under REACH in the EU.
■ 35 pound pails
■ 25 x 14 ounce cartridge per case

ROYCO® 22CF

Quick Reference Guide



Composition
■ Synthetic base
■ Inorganic gel thickener

Uses/Applications
■ Aircraft wheel bearings, instruments, gear boxes, anti-friction bearings, rotor bearings, actuators
■ General airframe applications.

Shelf Life
■ US Military 2 years
■ Commercial 3 years
■ NATO 3 years

Specifications
■ MIL-PRF- 81322

Operating Temperatures
■ -54 °C to 177 °C (-65 °F to 350 °F).

Key Properties	Method	Typical Value
Worked Penetration	ASTM D217	283
Dropping Point, °F	ASTM D2265	292
4-Ball Wear	ASTM D2266	0.42
Oil Separation, 177 °C, 30 hrs	FTM 321	7.7
Rust Protection	ASTM D1743	Pass
Evaporation, 177 °C, 22 hrs	FTM 3604	4.7
Low temperature Torque, -54 °C, Nm	ASTM D1478	
Starting		0.37
Running		0.05

Limitations and Packaging
■ 35 pound pails
■ 6 x 6.5 pound can per case
■ 25 x 14 ounce cartridge per case

ROYCO® 22MS

Quick Reference Guide



Composition
■ Synthetic base

Uses/Applications
■ High loads
■ Extreme pressure on sliding surfaces
■ Splines
■ Ball screws
■ Anti-friction bearings

Shelf Life
■ US Military 3 years
■ Commercial 3 years

Specifications
■ MIL-PRF- 81827

Operating Temperatures
■ May include temperatures as high as 450 °F and as low as -65 °F

Key Properties	Method	Typical Value
Worked Penetration	ASTM D217	282
Dropping Point, °C	ASTM D2265	292
4-Ball Wear	ASTM D2266	0.5
Oil Separation, 177 °C, 30 hrs	FTM 321	1.4
Rust Protection	ASTM D1743	Pass
Evaporation, 177 °C, 22 hrs	FTM 3604	5.7
Low temperature Torque, -54 °C, Nm	ASTM D1478	
Starting		0.5
Running		0.08

Limitations and Packaging
■ Should not be used on surfaces other than steel-on-steel without prior performance evaluation
■ 24 x 1.75 pound can per case
■ 25 x 14 ounce cartridge per case

ROYCO® 27

Quick Reference Guide



Composition
■ Synthetic base

Uses/Applications
■ Highly loaded gears and actuators
■ Instruments and high-speed bearings

Shelf Life
■ US Military 2 years
■ Commercial 3 years
■ NATO 3 years

Specifications
■ MIL-PRF- 23827 Type I

Operating Temperatures
■ -73 °C to 121 °C

Key Properties	Method	Typical Value
Worked Penetration	ASTM D217	288
Dropping Point, °C	ASTM D2265	184
Load Carrying Capability, kgf	ASTM D2596	42
Oil Separation, 100 °C, 30 hrs	FTM 321	3.6
Rust Protection	ASTM D1743	PASS
Evaporation, 100 °C, 22 hrs	FTM 3604	1.1
Low temperature Torque, -73 °C, Nm	ASTM D1478	
Starting		0.62
Running		0.04

Limitations and Packaging
■ May soften natural rubbers, neoprene, some types of electrical insulating compounds, and certain paints
■ 35 pound pails
■ 6 x 6.5 pound can per case
■ 25 x 14 ounce cartridge per case

ROYCO® 43

Quick Reference Guide



Composition
■ Synthetic base

Uses/Applications
■ Pneumatic systems
■ Pressurized aircraft bulkhead grommets
■ Any other mechanisms requiring rubber to metal lubrication

Shelf Life
■ US Military 2 years
■ Commercial 3 years
■ NATO 3 years

Specifications
■ SAE-AMS-G-4343, which supersedes MIL-G- 4343

Operating Temperatures
■ Suitability for low T operation where slow moving torque are available, should be established by simulated service test

Key Properties	Method	Typical Value
Worked Penetration	ASTM D217	283
Dropping Point, °C	ASTM D2265	399
Oil Separation, 100 °C, 30 hrs	FTM 321	2.44
Evaporation, 210 °F, 22 hrs	ASTM D2595	0.77
Copper Corrosion, color	FTM 5309	PASS
Bomb Oxidation, 210 °F, 100hr, P change psi	ASTM D942A	1.22

Limitations and Packaging
■ Use with natural rubber elastomers is not recommended
■ Materials should be evaluated for compatibility before use
■ 35 pound pails
■ 6 x 6.5 pound can per case
■ 24 x 1.75 pound can per case

ROYCO® 44

Quick Reference Guide



Composition
■ Graphite
■ Petrolatum

Uses/Applications
■ Aircraft engine spark plugs, igniters
■ Threaded fasteners and fittings

Shelf Life
■ Commercial 3 years
■ NATO 4 years

Specifications
■ SAE-AMS-2518

Operating Temperatures
■ None specified

Key Properties	Method	Typical Value
Worked Penetration, mm	ASTM D217	193
Stability	Paragraph 4.5.1	PASS
Material	Paragraph 3.1	PASS

Limitations and Packaging
■ Not compatible with aluminum, magnesium, ferrous, zinc and cadmium alloys or plated coatings
■ The compound must not come into contact with spark terminals or electrodes
■ Do not use in oxygen systems - explosion may result!
■ 24 x 1.75 pound can per case

ROYCO® 49

Quick Reference Guide



Composition
■ Mineral base

Uses/Applications
■ Low to moderate speeds
■ High loads
■ Extreme pressure
■ Salt water or high-pressure steam environment

Shelf Life
■ Commercial 3 years

Specifications
■ MIL-DTL-23549

Operating Temperatures
■ Normal high temperatures up to 177 °C (350 °F) or brief exposure to temperatures up to 204 °C (400 °F)

Key Properties	Method	Typical Value
Worked Penetration	ASTM D217	296
Dropping Point, °C	ASTM D2265	310
Load Carrying Capability, kgf	ASTM D2596	59
Oil Separation, 177 °C, 30 hrs	FTM 321	0.88
Boiling Water immersion, 10mn	ASTM D1743	Pass
Evaporation, 177 °C, 22 hrs	ASTM D2595	2.34
Salt Spray Corrosion, galvanic	FTM 5322	Pass
Copper Corrosion, 149 °C, 24h	FTM 5309	1B

Limitations and Packaging
■ Should not be used in high-speed anti-friction bearings without prior performance evaluation
■ 35 pound pails
■ 6 x 6.5 pound can per case
■ 24 x 1.75 pound can per case

ROYCO® 64

Quick Reference Guide



Composition
■ Synthetic base

Uses/Applications
■ Sliding steel on steel surfaces
■ Low to moderate speed antifriction bearings carrying high unit loads

Shelf Life
■ US Military 2 years
■ Commercial 3 years
■ NATO 3 years

Specifications
■ MIL-G-21164

Operating Temperatures
■ Especially recommended for use in extreme low temperature, -100°F and high temperatures up to 275°F

Key Properties	Method	Typical Value
Worked Penetration	ASTM D217	277
Dropping Point, °C	ASTM D2265	181
Load Carrying Capability, kgf	ASTM D2596	55
Oil Separation, 100 °C, 30 hrs	FTM 321	3.2
Evaporation, 100 °C, 22 hrs	FTM 5309	1.03
Worked Stability, 100,000st	FTM 313	285
Copper Corr., 100 °C, 24hr	FTM 5309	1B
Low temperature Torque, -73 °C, Nm - Starting	ASTM D1478	0.62
Running		0.06

Limitations and Packaging
■ Should not should not be used in high-speed antifriction bearings without prior evaluation
■ The persistence of the molybdenum disulfide and the high penetrating properties of the synthetic base oil make this material difficult to remove from surfaces
■ The synthetic oil in Royco® 64 may soften natural rubber and neoprene as well as some paints
■ 35 pound pails
■ 6 x 6.5 pound can per case
■ 24 x 1.75 pound can per case
■ 25 x 14 ounce cartridge per case

ROYCO® 81MS

Quick Reference Guide



Composition
- Methyl Phenyl Polysiloxane synthetic oil - MoS₂

Uses/Applications
- Slow speed sliding metal on metal surfaces operating at temperatures up to 400°C , as found in aircraft gas turbine engines - Anti-seize compound on threaded parts at temperatures up to 760°C

Shelf Life
Commercial 3 years

Specifications
DOD-L-25681

Operating Temperatures
- Up to 400 °C (~750 °F), for sliding surfaces - Up to 760 °C (~1400 °F) on threaded parts

Key Properties	Method	Typical Value
Base Fluid Properties		
Viscosity, cSt	ATSM D445	
@ 100°C		16
@ 40°C		71
Flash Point, °C	ASTM D92	338
Color	ASTM D1500	0.4
Molybdenum Disulfide, wt%	SAE-AMS-M-7866	50
Materials	Specification	Conforms

Limitations and Packaging
- STIR WELL IMMEDIATELY BEFORE USING - The persistence of the molybdenum disulfide and the high penetrating properties of the synthetic base oil make this material difficult to remove from surfaces - May also stain yellow metals. - Use of on antifriction bearings has not been investigated 24 x 1.75 pound can per case

ROYCO® C-201

Quick Reference Guide



Composition
Fluorosilicone base

Uses/Applications
- High temperature spline couplings, bearings, actuators - Other aggressive environments in operating range

Shelf Life
Commercial 3 years

Specifications
None

Operating Temperatures
-45 °C to 260 °C (-50 °F to +500 °F)

Key Properties	Method	Typical Value
Worked Penetration, mm	ASTM S217	294
Dropping Point, °C	ATSM D566	> 260
Water resistance, 37.8 °C, %loss	FTM 321.2	NIL
Copper Corrosion, 24hrs, 100°C		1B
Load Wear Index	ASTM D130	2.5
Evaporation, 24hrs, 204 °C, %	ASTM D2783	2.5
Rust Protection, 100RH, 14days	ASTM1748	No rust/staining
Low Temp Torque, -51 °C, g.cm, Starting	ASTM D1478	2.400
Running		2.400

Limitations and Packaging
24 x 1.75 pound can per case



LANXESS Corporation
Business Unit Lubricant Additives

2 Armstrong Road
Shelton, CT 06484
USA
Tel: +1 203-575-2000

lubricant.additives@lanxess.com
lab.lanxess.com

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