RHINO LUBRICANTS

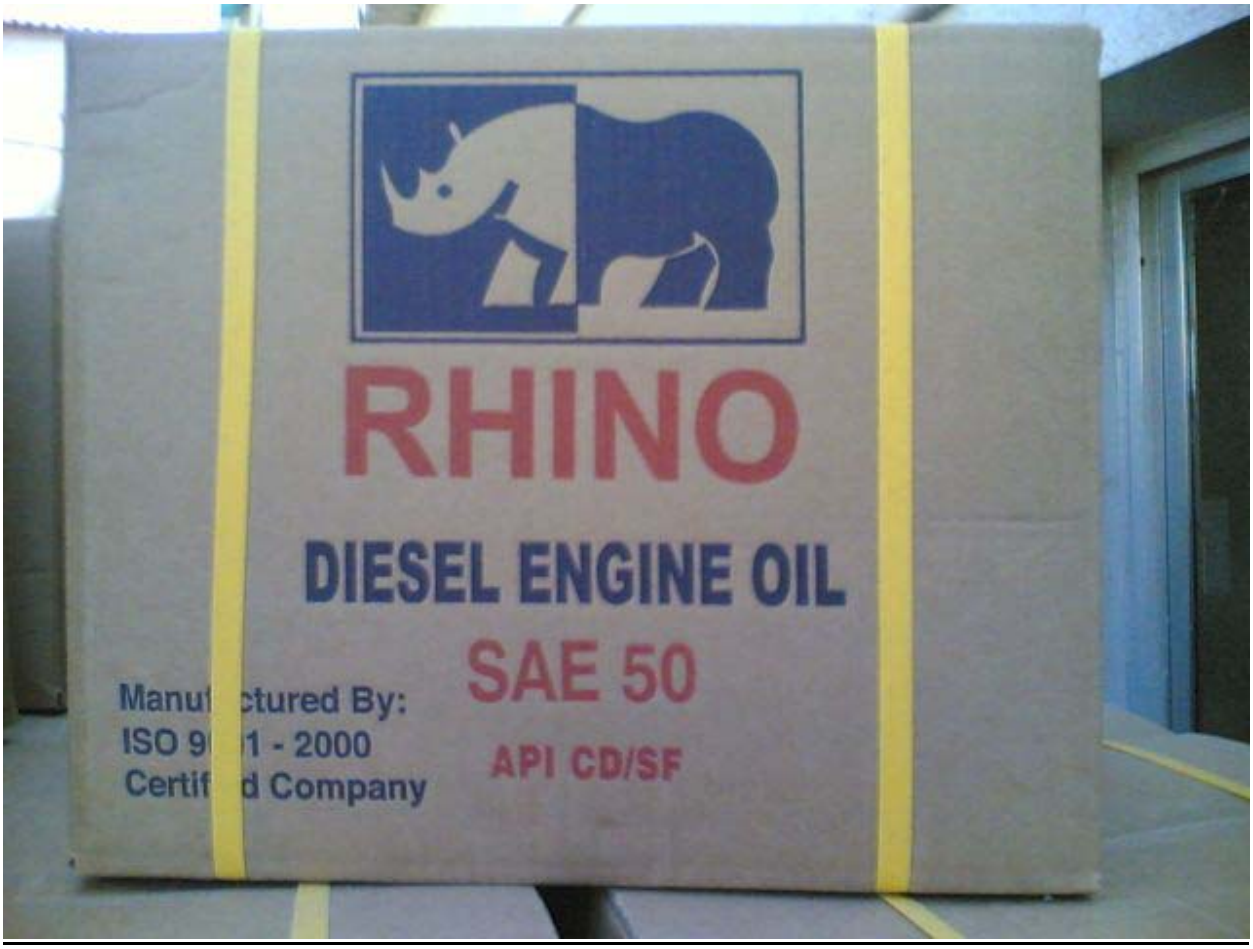
RHINO Lubricants **Product Guide**

This Guide is Applicaple

FOR

Our Three plants products

Rhino Lubricants Product Guide



Rhino Lubricants Product Guide

Introduction

Welcome to the **Rhino Lubricants Product Guide**, Rhino reference to the range of superior quality, high performance Welcome to the Welcome to the **Rhino Lubricants Product Guide**, Rhino reference to the range of superior quality, high performance Welcome to the Welcome to the Welcome to the Welcome to the Welcome to the **RHINO Lubricants Product Guide**, Rhino reference to the range of superior quality, high performance **RHINO** brand lubricants.

RHINO lubricants utilize the most advanced formulations and state of the art technology; the products are fully tried, tested and proven both in laboratory and field.

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We at **RHINO LUBRICANTS** are fully committed towards product quality, the high quality is determined by several factors –first, the testing and research that go into the development of a new product; second, the care observed during the manufacturing process; and third, the laboratory checks made on all the products before they leave the blending plant. In addition, strict quality controls are applied to all packages, drums and containers to ensure highest standards.
The process ensures conformity and consistency of performance of **RHINO** lubricants wherever they may be bought and used around the world.

Product Information contained in this guide provides general descriptions of **RHINO** lubricants together with details of performance requirements satisfied and typical physical characteristics.

For more detailed information than this guide can contain, Rhino customers are requested to avail the services of Rhino **Technical Helpline**, to give you help, advice and assistance. It is Rhino constant endeavor to provide the best possible solution and guidance on lubrication to Rhino customers.

We hope you find this guide both practical and valuable.

Dr.Reyad Khassawneh (Ph.D)
CEO

RHINO LUBRICANTS – U.A.E

Rhino Lubricants Product Guide

Warranty Statement

This publication and the information it contains is considered to be accurate as of the date of printing .No warranty or representation ,expressed or implied ,is made to the accuracy or completeness of the data and information contained in this publication. It is the user's obligation to evaluate and use products safely and to comply with all applicable laws and regulations.
No Statement made in this publication shall be construed as a permission, recommendation or authorization given or implied to practice any patented invention without a valid licence**. RHINO LUBRICANTS** shall not be responsible for any loss or damage or injury resulting from abnormal use of the material from any failure to adhere to recommendations, or from any hazards inherent in the nature of the material.

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Automotive Lubricants and Fluids

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Section I: Automotive Lubricants and Fluids – 1.01

RHINO – GOLD 1 (5W/ 40)
Premium Synthetic Passenger Car Motor Oil

Description and Application
RHINO –GOLD 1 is super – premium quality, fully synthetic, multi grade (5W/40) engine oil, superior detergent type lubricating oil meeting the highest API performance level for gasoline engine oils, suitable for all passenger cars and light duty diesel vehicles .It can be used in all 4-stroke gasoline and diesel engines, naturally aspirated and turbocharged.

Main Benefits
- Highest possible engine protection with stable protective film, even beyond extreme operating temperatures.
- Excellent sludge and oxidation resistance.
- Low volatility and Evaporation loss.
- Reduce fuel consumption.
- Superior cold start performance and efficient cold engine lubrication.
- Optimized high temperature viscosity to meet the latest requirement of OEMs achieving fuel savings and reduced exhaust emissions.

Specifications

Meets API SL/CF, MIL-L-46152E
ACEA A3/B3/98, MB229.1, VW 501.01,505
PORSCHE, BMW

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		5W/40
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.864
3)	Viscosity Index	ASTM D2270	180
4)	Viscosity @ 100°C (cSt)	ASTM D 445	14.5
5)	PRhino Point °C	ASTM D 97	-39
6)	Flash Point (COC) °C	ASTM D 92	220
7)	T.B.N mg KOH/gm	ASTM D 2896	11.0
8)	C.C.S. Viscosity @ - 25°C cP.	ASTM D 5293	3200

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section I: Automotive Lubricants and Fluids – 1.02

RHINO – TOPAZ (10W/ 40)
Premium Semi- Synthetic Passenger Car Motor Oil

Description and Application
RHINO –TOPAZ 2 is super – premium quality, semi- synthetic, multi grade (10W/40) engine oil, superior detergent type lubricating oil meeting the highest API performance level for gasoline engine oils, suitable for all passenger cars and light duty diesel vehicles .It can be used in all 4-stroke gasoline and diesel engines, naturally aspirated and turbocharged.

Main Benefits:

- Highest possible engine protection with stable protective film even beyond extreme operating temperatures.
- Excellent sludge and oxidation resistance.
- Low volatility and evaporation loss.
- Reduce fuel consumption.
- Superior cold start performance and efficient cold engine lubrication.
- Optimized high temperature viscosity to meet the latest requirement of OEMs achieving fuel savings and reduced exhaust emissions.

Specifications:

Meets API SL/CF, MIL-L-46152E
ACEA A3/B3/98, MB229.1
VW 501.01,505, PORSCHE, BMW

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		10W/40
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.874
3)	Viscosity Index	ASTM D2270	160
4)	Viscosity @ 100°C (cSt)	ASTM D 445	14.0
5)	PRhino Point °C	ASTM D 97	-36
6)	Flash Point (COC) °C	ASTM D 92	224

7)	T.B.N mg KOH/gm	ASTM D 2896	11.0
8)	C.C.S. Viscosity @ - 20°C cP.	ASTM D 5293	3200

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section I: Automotive Lubricants and Fluids – 1.03

RHINO – TOP FLEET (20W/ 50)
Premium Passenger Car Motor Oil

Description and Application
RHINO –TOP FLEET is super – premium quality, multi grade (20W/50) engine oil, and superior detergent type
lubricating oil meeting the highest API performance level for gasoline engine oils, suitable for all passenger cars and light duty diesel vehicles .It can be used in all 4-stroke gasoline and diesel engines, naturally aspirated and turbocharged.

Main Benefits:

- Highest possible engine protection with stable protective film even beyond extreme operating temperatures.
- Excellent sludge and oxidation resistance.
- Low volatility and evaporation loss.
- Reduce fuel consumption.
- Superior cold start performance and efficient cold engine lubrication.
- Optimized high temperature viscosity to meet the latest requirement of OEMs achieving fuel savings and reduced exhaust emissions.

Specifications:

Meets API SL/CF, MIL-L-46152E
ACEA A3/B3/98, MB229.1
VW 501.01,505, PORSCHE, BMW

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		20W/50
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.884
3)	Viscosity Index	ASTM D2270	125
4)	Viscosity @ 100°C (cSt)	ASTM D 445	19.0
5)	PRhino Point °C	ASTM D 97	-30
6)	Flash Point (COC) °C	ASTM D 92	230
7)	T.B.N mg KOH/gm	ASTM D 2896	11.0
8)	C.C.S. Viscosity @ - 10°C cP.	ASTM D 5293	4200

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

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RHINO – RHINO (20W/ 50)
Passenger Car Motor Oil
(Available in mono grades 10W, 20W 20, 30, 40,50)

Description and Application
RHINO –RHINO series are high quality versatile gasoline engine oils designed for mixed fleet application. They are formulated using high quality base oils and advanced chemical additive technology to provide high levels of engine protection under severe operational conditions.
It can be used in all 4-stroke gasoline and diesel engines, naturally aspirated and turbocharged.

Main Benefits:

- Highest possible engine protection with stable protective film even beyond extreme operating temperatures.
- Excellent sludge and oxidation resistance.
- Low volatility and evaporation loss.
- Reduce fuel consumption.

Specifications:

Meets API SF/CD

MIL-L-46152C
CCMC G1/ G2/ D1
MB226.1

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		20W/50
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.886
3)	Viscosity Index	ASTM D2270	124
4)	Viscosity @ 100°C (cSt)	ASTM D 445	19.0
5)	PRhino Point °C	ASTM D 97	-30
6)	Flash Point (COC) °C	ASTM D 92	230
7)	T.B.N mg KOH/gm	ASTM D 2896	6.0
8)	C.C.S. Viscosity @ - 10°C cP.	ASTM D 5293	4200

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

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RHINO – MAX POWER(40)
Premium Diesel Engine Oil
(Available in mono grades 10W, 20W 20, 15W/ 40 30, 40,50)
Description and Application
RHINO MAX POWER is super high performance engine oil, is a premium quality, versatile engine oil designed for use in mixed fleets and to meet the most stringent requirements for commercial diesel engines. It is formulated from highly refined conventional base oils, together with a multifunctional additive package. It can be use in both petrol and diesel engines; from cars and vans to turbo-charged diesel trucks and off-highway building machinery. It also meets specific gear oil requirements for some off-highway transmission applications.

Main Benefits:

- For use in mixed fleets where rationalization is sought with retention of high engine protection in both diesel and petrol engines over long drain intervals.
- Excellent internal engine cleanliness and resistance against sludge formation.

- Very good resistance against corrosion and high temperature oxidation.
- Excellent performance under all terrain, all weather conditions.
- Reduce fuel consumption.
- Superior cold start performance and efficient cold engine lubrication.

Specifications:

Meets API CF4 /SJ ,MIL-L-46152E, MIL-L-2104E
CCMC D4/G4/PD 2 ,ACEA A2/B2/E2/98 MB229.1 / 228.1, VW 501.01,505
PORSCHE, BMW , MAN271 CAT TO-2/TO-3, ALLISON C4 / MACK EO-K/2 /MTU Type 1

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		40
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.894
3)	Viscosity Index	ASTM D2270	97
4)	Viscosity @ 100°C (cSt)	ASTM D 445	15.5
5)	PRhino Point °C	ASTM D 97	-18
6)	Flash Point (COC) °C	ASTM D 92	256
7)	T.B.N mg KOH/gm	ASTM D 2896	11.0

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

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RHINO – Extra Super Diesel Oil (15W/ 40)
Premium Diesel Engine Oil
(Available in mono grade - 40)
Description and Application
RHINO – Extra Super Diesel Oil is super high performance engine oil, premium quality, versatile engine oil designed for use in mixed fleets and to meet the most stringent requirements for commercial diesel engines. It is formulated from highly refined conventional base oils together with a multifunctional additive package. can be use in both petrol and diesel engines, from cars and vans to turbo-charged diesel trucks and off-highway building machinery.

Main Benefits:

- For use in mixed fleets where rationalization is sought with retention of high engine protection in both diesel and petrol engines over long drain intervals.
- Excellent internal engine cleanliness and resistance against sludge formation.
- Very good resistance against corrosion and high temperature oxidation.
- Excellent performance under all terrain, all weather conditions.
- Reduce fuel consumption.
- Superior cold start performance and efficient cold engine lubrication.
- Optimized high temperature viscosity to meet the latest requirement of OEMs achieving fuel savings and reduced exhaust emissions.

Specifications:

Meets API CG4 /SJ, API CF, MAN QC 13-017 (M3275)
MIL-L-46152E, MIL-L-2104E, CCMC D5/D4/G4 /PD 2, ACEA A3/B3/B4/E3/98
MB229.1 / 228.3, VW 501.01,505 MAN271, VOLVO, VDS/VDS 2
CAT TO-2/TO-3, ALLISON C4 / MACK EO-L /MTU Type 2 SCANIA EXTENDED DRAIN.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		15W40
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.888
3)	Viscosity Index	ASTM D2270	130
4)	Viscosity @ 100°C (cSt)	ASTM D 445	14.5
5)	PRhino Point °C	ASTM D 97	-36
6)	Flash Point (COC) °C	ASTM D 92	260
7)	T.B.N mg KOH/gm	ASTM D 2896	12.5

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

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RHINO – TURBO DIESEL OIL (15W/40)
Premium Diesel Engine Oil

Description and Application

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RHINO – Turbo Diesel Oil is super high performance diesel engine oil of the highest engine performance class API CH-4,It is a premium quality and versatile engine oil designed for use in mixed fleets and to meet the most stringent requirements for commercial diesel engines. It is formulated from highly refined conventional base oils together with a multifunctional additive package. can be use in both petrol and diesel engines, from cars and vans to turbo-charged diesel trucks and off-highway building machinery. It also meets specific gear oil requirements for some off-highway transmission applications.

Main Benefits:

- For use in mixed fleets where rationalization is sought with retention of high engine protection in both diesel and petrol engines over long drain intervals.
- Excellent internal engine cleanliness and resistance against sludge formation.
- Very good resistance against corrosion and high temperature oxidation.
- Excellent performance under all terrain, all weather conditions.
- Reduce fuel consumption.
- Superior cold start performance and efficient cold engine lubrication.
- Optimized high temperature viscosity to meet the latest requirement of OEMs achieving fuel savings and reduced exhaust emissions.

Specifications:

Meets API CH4 /SJ ,ACEA E5/A3/B4
MB229.1 / 228.1 , VOLVO VDS/VDS2
MAN M3275 ,ALLISON C4 / MACK EO-M /MTU Type2/DDC Type2

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		15W/40
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.883
3)	Viscosity Index	ASTM D2270	130
4)	Viscosity @ 100°C (cSt)	ASTM D 445	14.0
5)	PRhino Point °C	ASTM D 97	-36
6)	Flash Point (COC) °C	ASTM D 92	240
7)	T.B.N mg KOH/gm	ASTM D 2896	12.5
8)	C.C.S. Viscosity @ - 15°C cP.	ASTM D 5293	3200

*C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

RHINO – HD DIESEL OIL (50)
Premium Diesel Engine Oil
(Available in mono grades 10W, 20W/ 20, 30, 40,)

Description and Application

RHINO – HD Diesel Oils are formulated with, high quality base oils and an advanced chemical additive system to provide high levels of engine protection under severe operating conditions.

Recommended for use in turbo-charged and naturally aspirated diesel engines.

Main Benefits:

- High levels of engine cleanliness and wear protection under severe operational conditions.
- Good high temperature stability and oxidation resistance.
- Excellent engine protection and longer engine life.
- Offers longer drain period and reduced oil consumption.

Specifications:

Meets:
API CD /SF
MIL-L-2104D
CAT TO-2 , ALLISON C3

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		50
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.899
3)	Viscosity Index	ASTM D2270	95
4)	Viscosity @ 100°C (cSt)	ASTM D 445	19.0
5)	PRhino Point °C	ASTM D 97	-12
6)	Flash Point (COC) °C	ASTM D 92	260
7)	T.B.N mg KOH/gm	ASTM D 2896	10.5

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

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RHINO –SUPER DIESEL OIL (50)
Diesel Engine Oil
(Available in mono grades 10W, 20W/ 20, 30, 40,)

Description and Application
RHINO – Super Diesel oils are formulated with, high quality base oils and an advanced chemical additive system to provide high levels of engine protection operating under moderate to severe conditions.

Recommended for use in gasoline and diesel engine used in passenger cars and trucks and naturally aspirated diesel engines.

Main Benefits:

- High levels of engine cleanliness and wear protection under severe operational conditions.
- Good high temperature stability and oxidation resistance.
- Good engine protection and longer engine life.

Specifications:

Meets:
API SC/CC
MIL-L-2104B

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		50
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.899
3)	Viscosity Index	ASTM D2270	95
4)	Viscosity @ 100°C (cSt)	ASTM D 445	19.0
5)	PRhino Point °C	ASTM D 97	-12
6)	Flash Point (COC) °C	ASTM D 92	260
7)	T.B.N mg KOH/gm	ASTM D 2896	4.0

*C&B = Clear and Bright
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RHINO –VIVA STUO
Super Tractor Universal Oil – Multipurpose Agricultural Lubricant

Description and Application
RHINO – VIVA is specifically designed to solve with only one product, every kind of lubrication problem.
It is suitable for:
- Diesel engines
- Transmissions
- Hydraulic systems
- Wet brakes and immersed clutches

Main Benefits:

- Low temperature flow.
- Enhanced filterability
- Low volatility
- Excellent Viscosity stability owing to high viscosity index.
- Excellent friction modifier leads to silent brakes without chocks and protect wet discs against wear.

Specifications:

Meets:
API CE/SF , CCMC D4 , MIL-L-2104D
MB 227.1 API GL-4
CAT TO-2 Allison C3/C4 , John DeereJ-20A, Massey Ferguson CMS-1139
FORD ESN M2C 159B , Denison HF-0
Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Viscosity Grade		15W40
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.893
3)	Viscosity Index	ASTM D2270	130
4)	Viscosity @ 100°C (cSt)	ASTM D 445	14
5)	PRhino Point °C	ASTM D 97	-39
6)	Flash Point (COC) °C	ASTM D 92	220

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

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RHINO – 2T Low Smoke Motor Oil
2-Stroke Motor Oil

Description and Application

RHINO – 2T is premium quality 2-stroke engine oil for use in high performance motorcycles with engines equipped with oil injection system or in gasoline/oil mixtures as per manufacturers recommended ratio (typically around 2%). It is suitable for use with unleaded gasoline also.
RHINO -2T is blended using high quality mineral base oils with a combination of latest low ash additive technology and synthetic components.

Main Benefits:

- Premium quality lubricant providing maximum engine protection and reduced exhaust smoke.
- Superior anti-seizure and anti-scuffing performance.
- Excellent anti-corrosion properties.
- High level of engine cleanliness. It prevents piston ring sticking, exhaust system deposit formation and plug problems such as fouling or bridging.
- Provides easy start, better pickup and more power.

Specifications:

Meets API TC/ JASO – FC

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.87
3)	Viscosity Index	ASTM D2270	140
4)	Viscosity @ 100°C cSt)	ASTM D 445	8.9
5)	PRhino Point °C	ASTM D 97	-30
6)	Flash Point (COC) °C	ASTM D 92	100

*C&B = Clear and Bright
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RHINO – 2T Outboard Motor Oil
2-Stroke Outboard Motor Oil

Description and Application

RHINO – 2T Out board Motor Oil is a high performance 2-stroke engine oil for water – cooled 2-stroke outboard engines. The combination of special base oils and additive guarantees long life.
It is possible to use RHINO -2T Out board Motor Oil at up to a 1:50-fuel ratio depending on the manufacturers
recommendation

Main Benefits:

- Premium quality lubricant providing maximum engine protection and reduced exhaust smoke.
- Superior anti-seizure and anti-scuffing performance.
- Excellent anti-corrosion properties.

- High level of engine cleanliness. It prevents piston ring sticking, exhaust system deposit formation and plug problems such as fouling or bridging.

Specifications:

Meets NMMA Specification TC-W3

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.873
3)	Viscosity Index	ASTM D2270	130
4)	Viscosity @ 100°C (cSt)	ASTM D 445	8.45
5)	PRhino Point °C	ASTM D 97	-30
6)	Flash Point (COC) °C	ASTM D 92	80

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

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RHINO – 4T Motor cycle Oil
4-Stroke Motorcycle Oil

Description and Application
RHINO – 4T Motor Oil is a high performance 4-stroke Motor cycle engine oil. It is superior Multigrade superior detergent type lubricating oil meeting the highest API performance level for gasoline engine oils

Main Benefits:

- Excellent high temperature oxidation stability.
- Excellent sludge and varnish control.
- Excellent Anti- wear properties.
- Excellent Viscosity temperature characteristics.
- Low engine deposits.
- Above resulting in extended drain interval
- Superior clutch friction performance.

Specifications:

Meets API SL/CF, MIL-L-46152E
ACEA A3/B3/98, MB229.1, VW 501.01,505

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.884
3)	Viscosity Index	ASTM D2270	125
4)	Viscosity @ 100°C (cSt)	ASTM D 445	19.0
5)	PRhino Point °C	ASTM D 97	-30
6)	Flash Point (COC) °C	ASTM D 92	240
7)	T.B.N mg KOH/gm	ASTM D 2896	11.0
8)	C.C.S. Viscosity @ - 10°C cP.	ASTM D 5293	4200

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Section I: Automotive Lubricants and Fluids – 1.14

RHINO – Gear Oil EP - 80W / 90 / 140 / 85W/90 / 80W/90 / 85W/140
Extreme – Pressure Automotive Transmission Oils (API-GL-5)

Description and Application

EP grades Automotive Transmission oils is designed for use in a hypoid, bevel and spiral gear units, axles and final drives operating under severe conditions and over a wide spectrum of operating conditions.

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Through their mono-grade and multi- grade viscosity characteristics they meet the requirements of several automotive manufacturers for passenger cars and commercial trucks or buses.

Main Benefits:

- Very good wear protection, even under severe load conditions.
- High safety margin against foaming and corrosion
- Superior viscosity /temperature and cold flow properties
- Compatible with all seal and metal types.

Specifications:

Meets API GL-5 and MIL -L- 2105 D and the recommendations of numerous vehicle manufactures such as IVECO, MAN, SCANIA and VOLVO for heavy vehicles rear axles and final drive units.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical	Typical	Typical	Typical
	SAE Grade		80W	90	140	80W90	85W90	85W140
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B*	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.884	0.90	0.92	0.904	0.902	0.91
3)	Viscosity Index	ASTM D2270	99	97	95	98	98	95
4)	Viscosity @ 100°C (cSt)	ASTM D 445	10.1	16.5	30	15.5	17.3	27.5
5)	PRhino Point °C	ASTM D 97	-27	-18	-9	-27	-12	-9
6)	Flash Point (COC)°C	ASTM D 92	200	210	224	210	210	224
7)	Brookfield Viscosity Max temp for Viscosity of 1,50,000 cP `°C	ASTM D2983		-	-	-26	-12	-12

*C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

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RHINO – Gear Oil - 80W / 90 / 140 / 85W/90 / 80W/90 / 85W/140
Automotive Transmission Oils (API –GL- 4)

Description and Application
The Automotive Transmission oil is designed for use in a wide range of gear units with normal bevel or helical gear design including synchronized manual gearboxes, transmissions and axles under moderately severe load and pressure conditions.
It is applicable equally for passenger cars, light and heavy trucks, agricultural and building machinery .even for topping up well run-in hypoid transmission units.
Main Benefits:

- Very good wear protection..
- High safety margin against foaming and corrosion
- Reasonable viscosity /temperature and cold flow properties
- Compatible with all seal and metal types.

Specifications:

Meets API GL-4 and MIL -L- 2105 and are recommended for use in vehicle transmissions according to MAN 341,DB.235.1 and ZF TE –ML-01,02 and 08.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical	Typical	Typical	Typical
	SAE Grade		80W	90	140	80W90	85W90	85W140
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B*	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.884	0.90	0.92	0.904	0.902	0.91
3)	Viscosity Index	ASTM D2270	99	97	95	98	98	95
4)	Viscosity @ 100°C (cSt)	ASTM D 445	10.1	16.5	30	15.5	17.3	27.5
5)	PRhino Point °C	ASTM D 97	-27	-18	-9	-27	-12	-9
6)	Flash Point (COC)°C	ASTM D 92	200	210	224	210	210	224
7)	Brookfield Viscosity Max temp for Viscosity of 1,50,000 cP `°C	ASTM D2983		-	-	-26	-12	-12

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section I: Automotive Lubricants and Fluids – 1.16

RHINO – Gear Oil X- 90 / 140
Automotive Transmission Oils (API –GL- 1)

Description and Application

The Automotive Transmission oil is designed for use in automotive spiral ,bevel and worm gear axles and some manually operated transmissions operating under such mild load and sliding conditions that straight mineral oils give satisfactory performance .

Main Benefits:

- Reasonable viscosity /temperature and cold flow properties
- Compatible with all seal and metal types.

Specifications:

Meets API GL-1

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical
	SAE Grade		90	140
1)	Appearance	Visual	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.9	0.92
3)	Viscosity Index	ASTM D2270	97	95
4)	Viscosity @ 100°C cSt)	ASTM D 445	16.5	30
5)	PRhino Point °C	ASTM D 97	-12	-9
6)	Flash Point (COC) °C	ASTM D 92	260	270

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section I: Automotive Lubricants and Fluids – 1.17

RHINO – ATF - DIII
Automatic Transmission Fluid

Description and Application
RHINO ATF DIII is a Transmission fluid, designed for use in modern automatic gearboxes, where GM Dexron or FordMercon specifications are quoted.

RHINO ATF DIII can also be used in most power shift transmissions, power steering and hydraulic units.

Main Benefits:

- Exceptional low temperature fluidity.
- Excellent resistance to oxidation and high thermal stability
- Durability of friction characteristics and wear protection.
- Protection against rust and corrosion, and good seal compatibility
- Compatibility with new technologies, such as band clutches and new clutch plate materials
- RHINO ATF DIII does not contain sperm oil

Specifications:

RHINO ATF DIII meets
DEXRON III (GM 6297M/Opel/Vauxhall).
Ford MERCON (M2C-185A)
It meets the requirement of Allison C4

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.859
3)	Viscosity Index	ASTM D2270	185
4)	Viscosity @ 100°C (cSt)	ASTM D 445	7.5
5)	PRhino Point °C	ASTM D 97	-48
6)	Flash Point (COC) °C	ASTM D 92	204

* C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section I: Automotive Lubricants and Fluids – 1.18

RHINO – ATF - DII
Automatic Transmission Fluid

Description and Application

RHINO ATF DII is typical fluid, designed for use in modern automatic gearboxes and other transmission units of most passenger cars trucks and buses. It is primarily designed to meet the requirements of DEXRON II and FORD Friction modified specification (not Type F Fluid), but is also suitable for automatic transmission, power-steering and hydraulic units of mobile and off-highway equipment Industrial application and marine hydraulics.

Main Benefits:

- Exceptional low temperature fluidity.
- Excellent resistance to oxidation and high thermal stability
- Durability of friction characteristics and wear protection.
- Protection against rust and corrosion, and good seal compatibility
- Compatibility with new technologies, such as band clutches and new clutch plate materials

Specifications:

RHINO ATF D II meets
DEXRON II D , Ford MERCON (M2C-138-CJ)/ (M2C-166-H)
It meets the requirement of Allison C4/CAT TO-2
MB236.6/236.7 , MAN (type 339C)
Meets the requirements of ZF, Voith VW/Audi, Renk, Clark, Scania and many others.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.861
3)	Viscosity Index	ASTM D2270	160
4)	Viscosity @ 100°C cSt)	ASTM D 445	7.5
5)	PRhino Point °C	ASTM D 97	-42
6)	Flash Point (COC) °C	ASTM D 92	210

* C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section I: Automotive Lubricants and Fluids – 1.19

RHINO – ATF – TASA
Automatic Transmission Fluid

Description and Application

RHINO ATF –TASA is a multipurpose transmission fluid, designed for use in automatic gear boxes, where GM Type A suffix A or DX I are quoted.
RHINO ATF –TASA can also be used in many power shift transmissions , Industrial torque converters and manual transmissions ,where a low viscosity fluid is specified.

Main Benefits:

- Exceptional low temperature fluidity.
- Excellent resistance to oxidation and high thermal stability
- Durability of friction characteristics and wear protection.
- Protection against rust and corrosion, and good seal compatibility

Specifications:

RHINO ATF TASA meets, exceeds the requirements of GM type A suffix A or DX I as well as Allison C3 specifications (SAE 10W)

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.861
3)	Viscosity Index	ASTM D2270	170
4)	Viscosity @ 100°C (cSt)	ASTM D 445	7.5
5)	PRhino Point °C	ASTM D 97	-42
6)	Flash Point (COC) °C	ASTM D 92	210

* C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section I: Automotive Lubricants and Fluids – 1.20

RHINO – T4-30/ 40/ 50
Power shift Transmission Fluid

Description and Application
RHINO –T4-30/40/50, designed for use in power shift, direct drive transmissions, wet-disc brakes, differentials and final drives of Caterpillar equipment, where Caterpillar TO-4 performance level is required.

Rhino Lubricants Product Guide

Main Benefits:

- Improved friction and anti-wear performance compared to CD/TO-2 fluids
- Stable friction characteristics, eliminating transmission slippage and reducing excessive brake noise.
- Excellent resistance to oxidation and high thermal stability
- Protection against rust and corrosion, and good seal compatibility

Specifications:

RHINO –T4-30/40/50 meets
Caterpillar TO-4 and Allison C4

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical
			RHINO-T4- 30	**RHINO-T4-40**	**RHINO-T4-50**
	SAE Viscosity Grade		30	40	50
1)	Appearance	Visual	C&B*	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.888	0.894	0.914
3)	Viscosity Index	ASTM D2270	95	95	95
4)	Viscosity @ 100°C (cSt)	ASTM D 445	11.8	14.5	19.5
5)	PRhino Point °C	ASTM D 97	-21	-18	-15
6)	Flash Point (COC) °C	ASTM D 92	220	230	236

* C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Rhino Lubricants Product Guide

Automotive Speciality

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RHINO – Flushing Oil
Automotive Flushing Oil

Description and Application

RHINO Flushing Oil is designed for use in flushing system of gasoline and diesel engines.

Method of Use
In normal use, flushing is carried out for about twenty minutes under hot, fast idle conditions without load. Flushing is particularly recommended where the preceding oil-service period may have been exceeded, or an extended period for the new oil change is envisaged.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	SAE Grade		10
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.876
3)	Viscosity Index	ASTM D2270	104
4)	Viscosity @ 100°C (cSt)	ASTM D 445	5.3
5)	PRhino Point °C	ASTM D 97	-12
6)	Flash Point (COC) °C	ASTM D 92	224

* C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section II: Automotive Speciality – 2.02

RHINO – Brake Fluid DOT -4
Synthetic Brake fluid

Description and Application

RHINO - Brake fluid DOT-4 is a heavy –duty, high boiling point, synthetic brake and hydraulic clutch –release fluid.
It is suitable for all conventional drum and disc brake system under arduous conditions.
Care should be taken that RHINO –Brake fluid DOT-4, should not be used in hydraulic systems for which mineral base fluids are specified.

Main Benefits

- Low vapor pressure and High Boiling Point guard.
- Fluidity at low temperatures and excellent thermal stability.
- Excellent chemical stability and corrosion resistance.
- Compatible with all system seals.

Specifications:

Exceeds Federal Motor Vehicle Safety Standard n°116 **DOT 4**
SAE J 1703, NF R 12-640 , ISO 4925
RHINO Brake fluid DOT-4 meets the requirements of European Manufacturers.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
		as per FMVSS 116 DOT4	
1)	ERBP °C		270
2)	WET ERBP °C		170
3)	Kinematic Viscosity mm Sq.Per second @ -40°C @ 100°C		1250 2.1
4)	PH Value		8.0
5)	Corrosion Test @ 100°C for 120hrs		passes test

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section II: Automotive Speciality – 2.03

RHINO – Brake Fluid DOT -3
Synthetic Brake fluid

Description and Application

RHINO Brake fluid DOT-3 is a heavy –duty, high boiling point, It is suitable for all conventional drum and disc brake system under arduous conditions. It may be used in hydraulic clutch –release systems.
Care should be taken that RHINO –Brake fluid DOT-3, should not be used in hydraulic systems for which mineral base fluids are specified.

Main Benefits

- Low vapor pressure and High Boiling Point
- Fluidity at low temperatures and excellent thermal stability.
- Excellent chemical stability and corrosion resistance.
- Compatible with all system seals.

Specifications:

Exceeds Federal Motor Vehicle Safety Standard n°116 **DOT 3**
SAE J 1703 , NF R 12-640, ISO 4925
RHINO Brake fluid DOT-3 meets the requirements of European Manufacturers.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
		as per FMVSS 116 DOT3	
1)	ERBP °C		238
2)	WET ERBP °C		148
3)	Kinematic Viscosity mm Sq.Per second @ -40°C @ 100°C		1300 2.4
4)	PH Value		9.0
5)	Corrosion Test @ 100°C for 120hrs		passes test

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section II: Automotive Speciality – 2.04

RHINO – Radiator Coolant
Automotive Coolant

Description and Application

RHINO - Radiator Coolant is a specially formulated ready to use engine coolant, for both petrol and diesel engines, It is mixture of mono-ethylene glycol and selected chemical agents to provide outstanding all round protection.

Filling Instruction: Coolant should not be further diluted while using in the system or when topping-up
Prior to filling with the Coolant cooling system should be properly cleaned and cleared of all blockages and suspended rust and dirt in the system should be flushed with clean water.
In a clean cooling system, Coolant will deliver optimum performance and protection for up to one year upon which the system should be drained and refilled with Coolant.

Main Benefits

- Effective engine cooling without boiling.
- A clean cooling system with protection from sludge and scale deposits.
- Protection against corrosion of the alloys used in the cooling system of modern vehicle.
- Protection against frost.
- Prevention against electrolysis.
- Protection against cavitations corrosion.
- Efficient lubrication of water pumps.
- Compatibility with rubbers.

Specifications:

Meets BS 6580(1992) (UK) Standards ,JIS K 2234-97, Class 2
RHINO –Radiator Coolant meets the requirements of Major European Manufacturers.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Density @ 15°C gm/cm3	ASTM D1298	1.08
2)	pH	ASTM D 1121	9.0
3)	Reflux boiling point °C	ASTM D 1120	106
4)	Freezing point °C	ASTM D 1117	-15
5)	Concentration % wt		33.3

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

RHINO – Antifreeze
Automotive Coolant Concentrate

Description and Application
RHINO –Antifreeze is an engine coolant concentrate, for both petrol and diesel engines It is specially formulated mixture of mono-ethylene glycol and selected chemical agents to provide outstanding all round protection.
Filling Instruction: RHINO -Antifreeze should be diluted with clean water (preferably de mineralized) to a concentration of between 30% that ensures satisfactory protection against corrosion for light vehicles and 50% which is the recommended concentration to achieve the best degree of protection performance for larger diesel engines.
In a clean cooling system, Coolant will deliver optimum performance and protection for up to one year upon which the system should be drained and refilled with Coolant.
When topping –up system use Antifreeze diluted with the appropriate amount of water.

Main Benefits

- Effective engine cooling without boiling
- A clean cooling system with protection from sludge and scale deposits.
- Protection against corrosion of the alloys used in the cooling system of modern vehicle.
- Protection against frost.
- Prevention against electrolysis.
- Protection against cavitations corrosion.
- Efficient lubrication of water pumps.
- Compatibility with rubbers.

Specifications:

Meets BS 6580(1992) (UK) Standards, JIS K 2234-97, Class 2
RHINO –Anti-freeze meets the requirements of Major European Manufacturers.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Density @ 15°C gm/cm3	ASTM D1298	1.13
2)	pH (50% vol in water)	ASTM D 1121	8.5
3)	Reflux boiling point °C	ASTM D 1120	160
4)	Freezing point °C @ (50% vol in water)	ASTM D 1117	-36

The above figures are typical

of those obtained with normal production tolerance and do not constitute specifications

Section II: Automotive Speciality – 2.06

RHINO – Protective Oil
Engine Protection Oil

Description and Application

RHINO – Protective Oil is recommended for the protection of the internal surfaces of engines, gear boxes, machines tools and pumps during storage and transportation

On recommencement operations, the protective oil should be drained as soon as possible and the engine filled with the normally approved lubricant.

The Oil has a performance equivalent to the US Army MIL-L-2104C specification and may be used as the crankcase fill, prior to seasonal lay-up for engines which require this type of oil.

Main Benefits:

- Excellent Protection of the engine parts, gear boxes during storage and transit.

Specifications:

Meets:
MIL-L-21260C MIL-L-2104C
MB225.3

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.898
3)	Viscosity Index	ASTM D2270	98
4)	Viscosity @ 100°C (cSt)	ASTM D 445	11.7
5)	PRhino Point °C	ASTM D 97	-15
6)	Flash Point (COC) °C	ASTM D 92	224

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section II: Automotive Speciality – 2.07

RHINO – Shock Absorber Oil
Piston Type- Shock Absorber Oil

Description and Application

RHINO – Shock Absorber Oil is highly refined light mineral oil with good fluidity at the low temperature, and suitable for most piston type dampers and suspension units.

Main Benefits:

- Excellent damping characteristics and suitable for use in struts and shock absorbers
- Excellent anti-wear, anti rust and antifoaming characteristics
- Excellent chemical stability, seal compatibility and low pRhino point.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.872
3)	Viscosity Index	ASTM D2270	100
4)	Viscosity @ 100°C (cSt)	ASTM D 445	4.5
5)	PRhino Point °C	ASTM D 97	-42
6)	Flash Point (COC) °C	ASTM D 92	186

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Rhino Lubricants Product Guide

Section III

Marine Lubricants

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CHDE: Cross Head Diesel Engine
MSDE: Medium Speed Diesel Engine

Section III: Marine Lubricants – 3.01

GOLD 705
Cylinder Lubricant for Cross Head Diesel Engines

Description and Application

GOLD 705 is a high quality cylinder oil of SAE 50 Viscosity incorporating additives which provide very high alkalinity (70 TBN) to minimize corrosive wear of piston rings and cylinder liners, and control deposit formation in ring grooves, port and scavenge spaces.

The oil is intended for use as a cylinder lubricant for large cross-head diesel engines operating on residual fuels. It should be fed to the cylinder lines by mechanical lubricators in a self contained system, and must not be used for any other application.

GOLD 705 meets the requirement of major builders of cross-head engines like MAN, MWM, and NEW SULZER Diesel etc.

Main Features

- High level of level of engine cleanliness.
- High thermal and oxidation stability to prolong service life.
- High alkalinity to neutralize the acidic products of combustion.
- Excellent control of piston ring and cylinder liner wear.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
			GOLD705
	SAE Grade		50
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.915
3)	Viscosity Index	ASTM D2270	97
4)	Viscosity @ 100°C (cSt)	ASTM D 445	19.5
7)	Total Base Number mg/KOH/gm	ASTM D 2896	70
5)	PRhino Point °C	ASTM D 97	-9
8)	Sulphated Ash %wt	ASTM D 874	8.7
6)	Flash Point (COC) °C	ASTM D 92	224

* C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section III: Marine Lubricants – 3.02

GOLD 906
Cylinder Lubricant for Cross Head Diesel Engines

Description and Application

GOLD 906 is a high quality Cylinder oil of SAE 60 Viscosity incorporating additives which provide very high alkalinity (90 TBN) to minimize corrosive wear of piston rings and cylinder liners, and control deposit formation in ring grooves, port and scavenge spaces.

The oil is intended for use as a cylinder lubricant for large cross-head diesel engines operating on residual fuels. It should be fed to the cylinder lines by mechanical lubricators in a self contained system, and must not be used for any other application.

GOLD 906 meets the requirement of certain engine builders of higher viscosity and TBN.

Main Features
- High level of level of engine cleanliness.
- High thermal and oxidation stability to prolong service life.
- High alkalinity to neutralize the acidic products of combustion.
- Excellent control of piston ring and cylinder liner wear.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
			GOLD906
	SAE Grade		60
1)	Appearance	Visual	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.915
3)	Viscosity Index	ASTM D2270	95
4)	Viscosity @ 100°C (cSt)	ASTM D 445	25
5)	PRhino Point °C	ASTM D 97	-9
6)	Flash Point (COC) °C	ASTM D 92	224
7)	Total Base Number mg/KOH/gm	ASTM D 2896	90
8)	Sulphated Ash %wt	ASTMD 874	11.2

* C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section III: Marine Lubricants – 3.03

GOLD – 303 /304 /403/404/ 405
Crankcase Lubricant for Medium-speed Diesel Engines

Description and Application

This range comprises of a series of highly alkaline diesel –engine oil formulated from specially selected base oils with an additive combination providing high levels of detergency, dispersancy, oxidation resistance, gear protection and rust prevention.

The oil is intended for the crankcase and cylinder lubrication of medium speed trunk –piston diesel engines operating on high –sulphur residual or distillate fuels.

Selection of the most suitable grade for any specific application is influenced by severity of its operating conditions, but the general rule is to select the oil with the lowest initial TBN that will give an acceptable stabilized TBN in continuous service. Alternatively some engine manufacturers recommend selection of oil TBN according to the sulphur level of the fuel in use.

Rhino Lubricants Product Guide

It is recommended that **GOLD303/304/403/404/405** is continuously centrifuged and /or filtered in accordance with the manufacturer's instructions. Additionally it is important that engine manufacturers' oil change intervals be observed.

GOLD303/304/403/404/405 meets requirements of API CD

Main Features

- High level of engine cleanliness and minimum piston deposits.
- High thermal and oxidation stability to prolong service life.
- High alkalinity to neutralize the acidic products of combustion.
- Excellent control of piston ring and cylinder liner wear.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical	Typical	Typical
			GOLD303	GOLD304	GOLD403	GOLD404	GOLD405
	SAE Grade		30	40	30	40	50
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.910	0.915	0.915	0.918	0.92
3)	Viscosity Index	ASTM D2270	97	96	96	96	96
4)	Viscosity @ 100°C cSt)	ASTM D 445	11.5	14	11.5	14	19
5)	PRhino Point °C	ASTM D 97	-12	-12	-12	-12	-12
6)	Flash Point (COC) °C	ASTM D 92	230	236	230	236	250
7)	Total Base Number mg/KOH/gm	ASTM D 2896	30	30	40	40	40
8)	Sulphated Ash %wt	ASTMD 874	3.8	3.8	5.0	5.0	5.0

- C&B = Clear and Bright

  The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section III: Marine Lubricants – 3.04

GOLD – 253 / 254
Crankcase Lubricant for Medium-speed Diesel Engines

Description and Application
This range comprises of a series of highly alkaline diesel –engine oil formulated from specially selected base oils with an additive combination providing high levels of detergency, dispersancy, oxidation resistance, gear protection and rust prevention.
The oil is intended for the crankcase and cylinder lubrication of medium speed trunk –piston diesel engines operating on high –sulphur residual or distillate fuels.

Selection of the most suitable grade for any specific application is influenced by severity of its operating conditions, but the general rule is to select the oil with the lowest initial TBN that will give an acceptable stabilized TBN in continuous service. Alternatively some engine manufacturers recommend selection of oil TBN according to the sulphur level of the fuel in use.

It is recommended that **GOLD253/254** is continuously centrifuged and /or filtered in accordance with the manufacturer's instructions. Additionally it is important that engine manufacturers' oil change intervals be observed.

GOLD 253/254 meets requirements of API CD
Main Features
- High level of engine cleanliness and minimum piston deposits.
- High thermal and oxidation stability to prolong service life.
- High alkalinity to neutralize the acidic products of combustion.
- Excellent control of piston ring and cylinder liner wear.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical GOLD253	Typical GOLD254
	SAE Grade		30	40
1)	Appearance	Visual	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.90	0.910
3)	Viscosity Index	ASTM D2270	96	96
4)	Viscosity @ 100°C (cSt)	ASTM D445	12.5	13.6
5)	Total Base Number	ASTM D2896	12	14
6)	Flash Point °C	ASTM D92	236	236
7)	Pour Point °C	ASTM D97	-12	-12

	mg/KOH/gm	2896		
8)	Sulphated Ash %wt	ASTMD 874	3.3	3.3

* C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section III: Marine Lubricants – 3.05

GOLD – 203 / 204
Crankcase Lubricant for Heavy Duty Diesel Engines

Description and Application

This range comprises of a series of highly alkaline diesel –engine oil formulated from specially selected base oils with an advanced additive system providing a TBN level of 20 designed to combat the corrosive effects of high sulphur in fuel.

The oil is intended for use in turbo-charged and naturally aspirated diesel engines driving automotive, industrial and marine equipment, and operating on fuels with sulphur contents above 0.5%wt.

GOLD 203/204 meets requirements of API CD and also meets Caterpillar TO-2 requirements

Main Features
- High level of engine cleanliness and minimum piston deposits.
- High thermal and oxidation stability to prolong service life.
- High alkalinity to neutralize the acidic products of combustion.
- Excellent control of piston ring and cylinder liner wear.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical
			GOLD2 03	**GOLD2 04**
	SAE Grade		30	40
1)	Appearance	Visual	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.90	0.910
3)	Viscosity Index	ASTM D2270	96	96
4)	Viscosity @ 100°C cSt)	ASTM D 445	12.0	15.8
5)	PRhino Point °C	ASTM D 97	-12	-12
6)	Flash Point (COC) °C	ASTM D 92	224	236
7)	Total Base Number mg/KOH/gm	ASTM D 2896	20	20
8)	Sulphated Ash %wt	ASTMD 874	2.6	2.6

* C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section III: Marine Lubricants – 3.06

GOLD – 153 / 154 / 123/ 124/125
Trunk Piston Lubricant for Diesel Engines

Description and Application
This range comprises of a series of high performance, alkaline diesel –engine oil formulated from specially selected base oils with an additive combination providing high levels of detergency, dispersancy, oxidation resistance, gear protection and rust prevention.

Rhino Lubricants Product Guide

The oil is intended for the lubrication of highly rated marine truck piston engines operating with ISO8217 type DMA/DMB/DMC Fuels with sulphur levels upto 2% and where there is a requirement for API CD diesel detergency.
The meets the requirement of major engine builders and exceeds the performance requirements of **APICD, MIL-L-46152 and MIL-L-2104C.**

It is recommended that **GOLD153/154/123/124/125** is continuously centrifuged and /or filtered in accordance with the manufacturer's instructions. Additionally it is important that engine manufacturers' oil change intervals be observed.

Main Features

- High level of engine cleanliness and minimum piston deposits.
- High thermal and oxidation stability to prolong service life.
- High alkalinity to neutralize the acidic products of combustion.
- Excellent control of piston ring and cylinder liner wear.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical	Typical	Typical
			GOLD153	GOLD 154	GOLD 123	GOLD124	GOLD125
	SAE Grade		30	40	30	40	50
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.906	0.907	0.906	0.907	0.92
3)	Viscosity Index	ASTM D2270	97	97	98	98	96
4)	Viscosity @ 100°C (cSt)	ASTM D 445	12.2	15.8	12.0	15.0	19.0
5)	PRhino Point °C	ASTM D 97	-18	-9	-18	-9	-9
6)	Flash Point (COC) °C	ASTM D 92	236	246	236	246	254
7)	Total Base Number mg/KOH/gm	ASTM D 2896	15	15	12	12	12
8)	Sulphated Ash %wt	ASTMD 874	1.95	1.95	1.6	1.6	1.6

* C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section III: Marine Lubricants – 3.07

GOLD 630/ 640
Cross Head – System Oil

Description and Application

GOLD 630 is high performance alkaline oil for the crankcase lubrication of low speed marine crosshead engines.
The oil is recommended for the main system lubrication of all low speed crosshead engines.
GOLD 630 meets the requirement of major engine builders of marine crosshead diesel engine.

Main Features

- High level of level of engine cleanliness.
- High thermal and oxidation stability to prolong service life.
- High alkalinity to neutralize the acidic products of combustion.
- Excellent control of piston ring and cylinder liner wear.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical 630	Typical 640
	SAE Grade		30	40
1)	Appearance	Visual	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.884	0.892
3)	Viscosity Index	ASTM D2270	98	98
4)	Viscosity @ 100°C (cSt)	ASTM D 445	11.5	14.5
5)	PRhino Point °C	ASTM D 97	-9	-9
6)	Flash Point (COC) °C	ASTM D 92	220	220
7)	Total Base Number mg/KOH/gm	ASTM D 2896	6	6
8)	Sulphated Ash %wt	ASTMD 874	-	-

- C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section III: Marine Lubricants – 3.08

RHINO Stern Tube Lube 150/ 220 / 320 / 460
Stern Tube bearing lubricant

Description and Application

It is high quality oil blended from high viscosity index paraffinic base oils. It is mainly used for the lubrication of heavy duty stern tube bearing in ships and is also recommended for lubrication of parts with the presence of water to a certain level.

Main Features

- Excellent anti-wear and rust prevention properties
- Excellent emulsion stability.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical	Typical
	Viscosity Grade (ISOVG)		150	220	320	460
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.888	0.897	0.90	0.91
3)	Viscosity Index	ASTM D2270	97	96	96	95
4)	Viscosity @ 40°C (cSt)	ASTM D 445	150	220	320	466
5)	PRhino Point °C	ASTM D 97	-9	-9	-9	-9
6)	Flash Point (COC) °C	ASTM D 92	240	248	254	268

* C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section III: Marine Lubricants – 3.09

RHINO General Purpose Oil 68/ 150 / 220
General Purpose circulatory oil for Marine application

Rhino Lubricants Product Guide

Description and Application

This series oils are straight mineral oils for general purpose application for marine.

They are intended for use for lubrication of air compressors, pumps and gear boxes.

They are also suitable for cylinder lubrication when running –in low speed cross-head diesel engines on diesel fuel in accordance with manufacturers' instructions

These oils meet the approval requirements of major equipment manufacturers worldwide.

Main Features

- Wide range of application.
- Long service life.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical
	Viscosity Grade (ISOVG)		68	150	220
1)	Appearance	Visual	C&B*	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.878	0.888	0.897
3)	Viscosity Index	ASTM D2270	97	97	96
4)	Viscosity @ 40°C (cSt)	ASTM D 445	68	150	220
5)	PRhino Point °C	ASTM D 97	-12	-9	-9
6)	Flash Point (COC) °C	ASTM D 92	230	240	248

* C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Rhino Lubricants Product Guide

Section IV

Greases

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Section IV: Greases – 4.01

RHINO – Multipurpose Grease 2/ 3
Lithium Base grease
(Available in NLGI NO 0, 1)
Description and Application

RHINO – Multipurpose grease is a series of high quality, lithium hydroxy stearate grease, with oxidation and corrosion inhibitors, which help to ensure long service life of the grease and a high level of protection for ferrous surfaces.

It is recommended for all grease –lubricated parts in automotive applications. The NLGI No.2 grade is suitable for use in centralized greasing systems in service stations. It has excellent water – resistant properties.

Rhino Lubricants Product Guide

These greases are for use in plain and rolling bearings of all types and in all kinds of machinery- including electrical motors, machine tools, textile, paper making and wood working machines and construction equipment –where the continuous operating temperatures are within the specified limits.

These greases can be used at higher temperatures of upto 180°C for short duration or with frequent replacement. Continuous operating temperature range for these greases: -20 to 130°C.

Main Benefits

- Long service life.
- Low friction torque.
- Good pump ability.
- Resistant to wash –off by water.
- Good shear –stability and resistance to vibration.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical
	Thickener Type		Lithium	Lithium
1)	NLGI Classification		2	3
2)	Texture		Smooth	Smooth
3)	Color	Visual	Pale Yellow	Pale Yellow
4)	Dropping Point °C	ASTM D 566	190	190
5)	Worked Penetration @25°C 60 strokes	ASTM D 217	265/295	220/250
6)	Wheel Bearing leakage after 6hrs @ 110°C gms	ASTM D 1263	<2	<2
7)	Water washout resistance %wt	ASTM D 1264	< 5	< 5
8)	Copper Strip Corrosion for 24hrs @100`C	ASTM D 4048	-ve	-ve

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section IV: Greases – 4.02

RHINO – Multipurpose Grease -- EP 2/ 3
Lithium Base grease
(Available in NLGI NO 0, 1)
Description and Application

RHINO – Multipurpose grease EP is a series of high quality, lithium hydroxy stearate extreme pressure grease. . It incorporates a lead free EP additive and is for use where surfaces are subjected to heavy or shock loading. It also contains oxidation and corrosion inhibitors, which help to ensure long service life of the grease and a high level of protection for ferrous surfaces

These greases are for use in plain and rolling bearing operating under severe conditions of shock loading all types and in all kinds of machinery- including electrical motors, machine tools, textile, paper making and wood working machines and construction equipment –where the continuous operating temperatures are within the specified limits .

These greases can be used at higher temperatures of upto 180°C for short duration or with frequent replacement. Continuous operating temperature range for these greases: -20 to 130°C

Main Benefits:

- Long service life.
- Low friction torque
- Good pump ability
- Resistant to wash –off by water
- Good shear –stability and resistance to vibration.
- High Load carrying capacity and low wear.
- Fully compatible with other Lithium greases

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical
	Thickener Type		Lithium	Lithium
1)	NLGI Classification		2	3
2)	Texture		Smooth	Smooth
3)	Color	Visual	Pale Yellow	Pale Yellow
4)	Dropping Point °C	ASTM D 566	190	190
5)	Worked Penetration @25°C 60 strokes	ASTM D 217	265/295	220/250

6)	Wheel Bearing leakage after 6hrs @ 110°C gms	ASTM D 1263	<2	<2
7)	Water washout resistance %wt	ASTM D 1264	< 5	< 5
8)	Copper Strip Corrosion for 24hrs @100`C	ASTM D 4048	-ve	-ve
9)	FRhino ball weld lead Kg	IP 239	<260	<260

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section IV: Greases – 4.03

RHINO – Chassis Grease
Calcium base grease

Description and Application

Rhino Lubricants Product Guide

RHINO – Chassis grease is Calcium –based grease specially formulated for vehicle chassis lubrication and protection. It is water resistant and contains extreme pressure and tackiness agents, making it particularly effective in severe application such as large trucks and off-highway equipment, used in the construction industry. It is an NLGI NO 1 grade and pump able from centralized greasing systems even at low temperatures.

Main Benefits:

- Long service life.
- Excellent Tackiness
- Good pump ability
- Good water resistant
- Good shear –stability and resistance to vibration.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	Thickener Type		Calcium
1)	NLGI Classification		1
2)	Color	Visual	Greenish Red
3)	Texture		Smooth , Homogenous
4)	Dropping Point °C	ASTM D 566	100
5)	Worked Penetration @25°C 60 strokes	ASTM D 217	310/340
6)	Copper Strip Corrosion for 24hrs @100`C	ASTM D 4048	-ve

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section IV: Greases – 4.04

RHINO – Wheel Bearing Grease
Sodium base grease

Description and Application

RHINO – Wheel bearing grease is Sodium –based grease specially developed for the lubrication of automotive wheel bearings over a wide range of temperature. It is particularly suitable where high bearing temperature occur on breaking from high speeds. These have excellent mechanical stability and high dropping point.

Main Benefits:

- Long service life.
- Good pump ability
- Good shear –stability and resistance to vibration.
- Excellent mechanical stability and high dropping

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
	Thickener Type		Sodium
1)	NLGI Classification		3
2)	Color	Visual	Dark Brown
3)	Texture		Smooth , Homogenous
4)	Dropping Point °C	ASTM D 566	200
5)	Worked Penetration @25°C 60 strokes	ASTM D 217	220/250
6)	Copper Strip Corrosion for 24hrs @100`C	ASTM D 4048	-ve

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section IV: Greases – 4.05

RHINO – Lplex 1/ 2/ 3
Lithium – complex grease

Description and Application

RHINO – Lplex 1/ 2/ 3 is a series of high quality, lithium complex grease having high water tolerance and mechanical stability, combined with excellent high temperature performance .these are ideally suited for application by centralized grease systems due to good resistance to oil separation under pressure mechanical stability .

RHINO –Lplex 1/2/3 provide excellent performance in anti-friction bearings and much longer life compared to Sodium or Lithium soap base greases, It is recommended for wheel bearings earth moving equipment, gear couplings, electric motors and general industrial machinery.

These greases are widely used in Steel Plants, Mining and Engineering Industry

Main Benefits:

- Long service life.
- Low friction torque
- Good pump ability
- High temperature grease
- Resistant to wash –off by water
- Good shear –stability and resistance to vibration.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical
	Thickener Type		Lithium	Lithium	Lithium
1)	NLGI Classification		1	2	3
2)	Texture		Smooth	Smooth	Smooth
3)	Dropping Point °C	ASTM D 566	270	270	270
4)	Worked Penetration @25°C 60 strokes	ASTM D 217	310/340	265/295	220/250
5)	Wheel Bearing leakage after 6hrs @ 110°C gms	ASTM D 1263	<2	<2	<2

6)	Water washout resistance %wt	ASTM D 1264	< 5	< 5	< 5
7)	Copper Strip Corrosion for 24hrs @100`C	ASTM D 4048	-ve	-ve	-ve

The above figures are typical of those obtained with normal production tolerance and

Section IV: Greases – 4.06

RHINO – Graphite Grease 2/ 3
Lithium base grease

Description and Application

RHINO – Graphite greases are recommended for general lubrication under comparatively high load and low relative displacement of inter-acting surfaces. .

These greases are recommended for leaf springs, hydraulic rams, plungers, slides, elevator cables, pantograph pans, steel wire ropes and certain anti –seize purpose.

These greases can be used at higher temperatures of upto 180°C for short duration or with frequent replacement.

Continuous operating temperature range for these greases: -20 to 130°C

Main Benefits:

- Long service life.
- Low friction torque
- Good pump ability
- Resistant to wash –off by water
- Good shear –stability and resistance to vibration.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical
	Thickener Type		Lithium	Lithium
1)	NLGI Classification		2	3

2)	Texture		Smooth	Smooth
3)	Color	Visual	Dark grey	Dark grey
4)	Dropping Point °C	ASTM D 566	190	190
5)	Worked Penetration @25°C 60 strokes	ASTM D 217	265/295	220/250
6)	Wheel Bearing leakage after 6hrs @ 110°C gms	ASTM D 1263	<2	<2
7)	Water washout resistance %wt	ASTM D 1264	< 5	< 5
8)	Copper Strip Corrosion for 24hrs @100`C	ASTM D 4048	-ve	-ve

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section IV: Greases – 4.07

RHINO – Moly 2/ 3
Lithium base grease

Description and Application

RHINO – Moly greases is multipurpose extreme pressure lithium hydroxy stearate grease incorporating molybdenum disulphide.
They are recommended for use in vehicle applications where a grease of this type is specified by the vehicle manufactures.
These greases are recommended for leaf springs, hydraulic rams, plungers, slides, elevator cables, pantograph pans, steel wire ropes and certain anti –seize purpose.

These greases can be used at higher temperatures of upto 180°C for short duration or with frequent replacement.
Continuous operating temperature range for these greases: -20 to 130°C

Main Benefits:

- Long service life.
- Low friction torque
- Good pump ability

- Resistant to wash –off by water
- Good shear –stability and resistance to vibration.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical
	Thickener Type		Lithium	Lithium
1)	NLGI Classification		2	3
2)	Texture		Smooth	Smooth
3)	Color	Visual	Dark grey	Dark grey
4)	Dropping Point °C	ASTM D 566	190	190
5)	Worked Penetration @25°C 60 strokes	ASTM D 217	265/295	220/250
6)	Wheel Bearing leakage after 6hrs @ 110°C gms	ASTM D 1263	<2	<2
7)	Water washout resistance %wt	ASTM D 1264	< 5	< 5
8)	Copper Strip Corrosion for 24hrs @100`C	ASTM D 4048	-ve	-ve

The above figures are typical of those obtained with normal production tolerance and

Section V

Industrial Lubricants

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Section V: Industrial Lubricants – 5.01

RHINO – HYDRAULIC OIL
Hydraulic Oil (Anti-wear type)

Description and Applications:
RHINO – Hydraulic oils, are mineral oil based and are manufactured in a range of viscosity grades to meet the requirements of hydraulic equipment manufacturers for rust and oxidation –inhibited and anti-wear mineral-oil hydraulic fluids. They are compatible with the seal materials commonly used in hydraulic system.
These Oils are primarily for use in hydraulic equipment, but are suitable for other duties in which lubricants with good oxidation stability and lubrication performance are required. The quality of its base oils and additives permits their application in lightly loaded gears for use as circulating oil in applications where rust and oxidation inhibited oil is required.

Main Benefits
- Outstanding thermal & oxidation stability and good service life.
- Good anti-wear properties and rust inhibitor.
- Superior hydrolytic stability and excellent demulsibility.
- Compatible with the seals commonly used in hydraulic systems

Specifications

Meets the specification requirements of
DIN 51524Part 2. ISO Type HM
Sperry Vickers 35VQ25
Cincinnati Milacron P-68, P-69, P-70 Denison HF0 and HF2

Sr No	Test Parameters	Test Method						
	Viscosity Grade (ISO VG)		22	32	46	68	100	150
1)	Appearance	Visual	C&B *	C&B*	C&B*	C&B*	C&B *	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.864	0.870	0.874	0.878	0.882	0.888
3)	Viscosity Index	ASTM D2270	100	100	98	96	98	95
4)	Viscosity @ 40°C (cSt)	ASTM D 445	21	32	46	68	100	150
5)	PRhino Point °C	ASTM D 97	- 12	- 12	- 12	- 12	- 12	- 12
6)	Flash Point (COC) °C	ASTM D 92	222	224	224	230	230	240
7)	Corrosion-Rust protection	ASTM D 665 (A&B)	Pass	Pass	Pass	Pass	Pass	Pass
8)	Air release @ 50°C (minutes)	ASTM D 3427	<3.0	<3.0	<3.0	<4.0	<5.0	<5.0
9)	Copper Corrosion 3h/100°C	ASTM D 130	1B	1B	1B	1B	1B	1B
10)	FZG gear test, load stage failure	IP 334	-	12	12	12	12	12
11)	Foam Tendency SeqI/SeqII/SeqIII (ml)	ASTM D892	20/0 50/0 20/0	20/0 50/0 20/0	20/0 50/0 20/0	20/0 50/0 20/0	20/0 50/0 20/0	20/0 50/0 20/0
12)	Demulsibility (ml) -	ASTM D1401	40/40/ 0	40/40/0	40/40/0	40/40/0	40/40/ 0	40/40/ 0

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.02

RHINO – HYDRAULIC OIL – (XHVI)
Hydraulic Oil (Anti-wear type with High V.I.)

Description and Applications:
RHINO – Hydraulic oil (XHVI) , a range of high performance mineral oil-based hydraulic fluids possessing high viscosity index (VI) and containing high performance anti-wear additives, The selection of shear stable VI-improvers ensures that the viscosity is maintained at desired levels in service.
These oils are intended for severely stressed hydraulic systems requiring a high level of anti-wear performance in two main types of duty.
-outdoor plant likely to operate in very wide variations of temperatures ,such as in machinery subjected to very cold start –up conditions and high temperature continuous running.- off –highway /construction equipment .
-indoor manufacturing equipment that incorporates control systems requiring a hydraulic fluid whose viscosity change with temperature is minimal – precision machine tools and copying machines.
Main Benefits
- Wide operating temperature range
- Easy cold start –up

- Highest degree of equipment protection
- Extended oil life and improved tolerance to severe service
- Leading performance in anti-wear protection ,oxidation resistance and thermal stability
- Superior hydrolytic stability and excellent demulsibility.

Specifications:
Meets the specification requirements of
DIN 51524Part 2. ISO Type HM Sperry Vickers 35VQ25, Cincinnati Milacron P-68, P-69, P-70
Denison HF0 and HF2

Sr No	Test Parameters	Test Method					
	Viscosity Grade (ISO VG)		22	32	46	68	100
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.864	0.870	0.874	0.878	0.882
3)	Viscosity Index	ASTM D2270	150	152	150	146	135
4)	Viscosity @ 40°C (cSt)	ASTM D 445	21	32	46	68	100
5)	PRhino Point °C	ASTM D 97	-36	- 33	- 33	- 33	- 33
6)	Flash Point (COC) °C	ASTM D 92	222	224	224	230	230
7)	Corrosion-Rust protection	ASTM D 665 (A&B)	Pass	Pass	Pass	Pass	Pass
8)	Air release @ 50°C (minutes)	ASTM D 3427	<3.0	<3.0	<3.0	<4.0	<5.0
9)	Copper Corrosion 3h/100°C	ASTM D 130	1B	1B	1B	1B	1B
10)	FZG gear test, load stage failure	IP 334	-	12	12	12	12
11)	Foam Tendency SeqI/SeqII/SeqIII (ml)	ASTM D892	20/0 50/0 20/0	20/0 50/0 20/0	20/0 50/0 20/0	20/0 50/0 20/0	20/0 50/0 20/0
12)	Demulsibility (ml) -	ASTM D1401	40/40/0	40/40/0	40/40/0	40/40/0	40/40/0

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.03

RHINO – Circulatory- Oil
Circulatory Oil

Description and Applications:
RHINO – Circulatory –Oil is a range of high quality, additive free mineral oils inherently possessing good resistance to oxidation, demulsification properties, and high viscosity index.

These oils have a variety of application such as in circulatory systems for rolling mills and calendars (both rolling and plain bearings), vacuum pumps and hydraulic systems where a fluid type ISO HH is required.

Also suitable for once-through lubrication systems and gears not requiring heavy duty oils.

Main Benefits:

- Wide range of application.
- Long service life.

Sr No	Test Parameters	Test Method				
	Viscosity Grade (ISO VG)		32	46	68	100
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.874	0.878	0.881	0.884
3)	Viscosity Index	ASTM D2270	100	98	96	96
4)	Viscosity @ 40°C (cSt)	ASTM D 445	32	46	68	100
5)	PRhino Point °C	ASTM D 97	- 12	-12	-9	-9
6)	Flash Point (COC) °C	ASTM D 92	220	230	240	240

Sr No	Test Parameters	Test Method				
	Viscosity Grade (ISO VG)		150	220	320	460
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.887	0.888	0.895	0.92
3)	Viscosity Index	ASTM D2270	96	95	95	95
4)	Viscosity @ 40°C (cSt)	ASTM D 445	150	220	320	440
5)	PRhino Point °C	ASTM D 97	-9	-9	-9	-9
6)	Flash Point (COC) °C	ASTM D 92	248	258	270	284

*C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.04

RHINO – GOLD-EP
Industrial Gear Oil

Description and Applications:
RHINO – GOLD –EP, is a range of high quality ,lead free EP oils The EP properties are provided by sulphur -phosphorus additive., the additives are compatible with ferrous and non ferrous metals used in industrial gear units,
These oils are recommended for the lubrication of all types of industrial enclosed steel gear drives which present load/speed conditions of extreme severity and for the lubrication of worm gears units where bulk oil temperature are below the recommended maximum of 100 °C.
Although designed, primarily, for the lubrication of gears, their high overall performance makes it possible to extend their use to systems involving gears, plain bearings, rolling element bearings and sliding surfaces.

Main Benefits:
- Outstanding thermal stability and higher oxidation resistance compared to conventional gear oils.
- Good demulsibility, low foaming tendency, Maximum protection against corrosion and wear.
- Attention free operation between standard overhauls even at elevated temperatures and in adverse conditions.
- Very good viscosity characteristics ensure that starting torques is not excessive in cold conditions.

Specifications:
Meets the specification requirements of
DIN 51517 Part 3. US Steel Requirement No.224
AGMA Standard 250.04 ,David Brown SL.53.101
ASLE Standard G-315,G-1 000, G-1 500, G-2 150,

is available in ISO Viscosity grades 68 – 1000

Sr No	Test Parameters	Test Method				
	Viscosity Grade (ISO VG)		68	100	150	220
1)	Appearance	Visual	C&B *	C& B*	C&B *	C&B *
2)	Density @ 15°C	ASTM D1298	0.888	0.892	0.90	0.91
3)	Viscosity Index	ASTM D2270	97	96	95	95
4)	Viscosity @ 40°C (cSt)	ASTM D 445	68	100	150	220
5)	PRhino Point °C	ASTM D 97	-12	-12	- 6	-6
6)	Flash Point (COC) °C	ASTM D 92	232	236	240	242
7)	Corrosion-Rust protection	ASTM D 665 (B)	Pass	Pass	Pass	Pass
8)	Phosphorus, % wt.	Spectrometric	0.04	0.04	0.04	0.04
9)	FRhino Ball EP Test -	IP 239	220	230	230	240

	Welding Load, Kg					
10)	Timken O.K Load, lbs	IP 240	60	60	60	60
11)	FZG gear test, load stage Failure	IP 334	>12	>12	>12	>12

*C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.05

RHINO – Turbine Oil

Premium Turbine Oil

Description and Applications:

RHINO – Turbine oils , are based on specially selected mineral base oils and additives to obtain a high degree of oxidation stability, furthermore they contain additives to protect metal surfaces against corrosion and to suppress foaming ,whilst retaining the good air release properties. The oils have been formulated to be compatible with the components used in turbines and associated equipment and they contain an inhibitor to prevent catalytic acceleration of auto-oxidation of lubricants hydrocarbons by trace metal. The formulation is Zinc free and ash less. These oils are recommended for the lubrication and cooling of bearings and gear boxes of steam, gas and water turbines and associated equipment, such as turbine governor systems, turbo-couplings as well as for the lubrication of turbo compressors.

Main Benefits:

- Long life, wide operating temperature range.
- Good air release properties.
- Good demulsibility, low foaming tendency, Maximum protection against corrosion and wear.
- Good compatibility with standard seal materials and non-ferrous metals

Specifications:

Meets the specification requirements of
DIN 51515 Part 1. Type L-TD ISO 8068 L-TSA and L-TGA
Siemens AG –KWU Group TLV-901301(Steam turbine turbo sets)
TLV-901302 (Industrial Steam turbines)
TLV-901303 (Gas turbines)
ABB HTGD90 117D

Sr No	Test Parameters	Test Method			
	Viscosity Grade (ISO VG)		32	46	68
1)	Appearance	Visual	C&B*	C&B *	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.866	0.871	0.875
3)	Viscosity Index	ASTM D2270	105	102	100
4)	Viscosity @ 40°C (cSt)	ASTM D 445	32	46	68
5)	PRhino Point °C	ASTM D 97	- 12	- 12	- 12

6)	Flash Point (COC) °C	ASTM D 92	230	230	240
7)	Corrosion-Rust protection	ASTM D 665 (A&B)	Pass	Pass	Pass
8)	Color	ASTM D 1500	L1.0	L1.0	L1.0
9)	Air release @ 50°C (minutes)	ASTM D 3427	<3.0	<3.0	<4.0
10)	TOST life/Acidity,1000hr mg KOH/gm	ASTM D 943	<0.5	<0.5	<0.5
11)	FZG gear test, load stage failure	IP 334	-	7	7
12)	Foam Tendency SeqI/SeqII/SeqIII (ml)	ASTM D892	0/0 70/0 0/0	0/0 70/0 0/0	0/0 70/0 0/0
13)	Demulsibility	ASTM D1401	40/40/0	40/40/0	40/40/0

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.06

RHINO – Air compressor Oil
Premium Air Compressor Oil

Description and Applications:

RHINO – Air compressor oils, are formulated from highly refined base oils, and incorporate additives that minimize oxidation, deposit formation, foaming and filter-blocking,
These oils are ash less recommended for the lubrication of rotors, bearings and gears in rotary compressors, especially the oil-flooded screw type with delivery temperatures of up to 120`C.The grades in this range are suitable for both static and mobile systems, operating at ambient temperatures ranging from -25`C to 50`C .

Main Benefits:
- Low deposit –forming tendency.
- Prevention of oil-filter blockage in the presence of water.
- Excellent anti-wear performance to extend service life of compressors.
- Rapid separation of Oil/ air in the air –coalescer for long air –filter life and lower oil – carryover.
- Excellent Demulsibility and anti-corrosion properties.

Specifications:
Meets the specification requirements of
ISO DP 6521 for mineral oils
L-DAA and L-DAB for reciprocating compressors

L-DAH and L-DAG for rotary air compressors
DIN 51352-Part 2 and DIN 51506 VD-L

Sr No	Test Parameters	Test Method			
	Viscosity Grade (ISO VG)		32	46	68
1)	Appearance	Visual	C&B *	C&B *	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.875	0.878	0.880
3)	Viscosity Index	ASTM D2270	102	102	102
4)	Viscosity @ 40°C (cSt)	ASTM D 445	32	46	68
5)	PRhino Point °C	ASTM D 97	- 36	- 33	- 33
6)	Flash Point (COC) °C	ASTM D 92	210	210	220
7)	Corrosion-Rust protection	ASTM D 665 (A&B)	Pass	Pass	Pass
8)	Copper Corrosion 3h/100°C	ASTM D 130	1B	1B	1B
9)	Air release @ 50°C (minutes)	ASTM D 3427	1.5	2.5	4.0
10)	FZG gear test, load stage failure	IP 334	>12	>12	>12
11)	Demulsibility	ASTM D1401	40/40/ 0	40/40/ 0	40/40/ 0
12)	Foam Tendency SeqI/SeqII/SeqIII (ml)	ASTM D892	20/0 40/0 20/0	20/0 40/0 20/0	20/0 40/0 20/0

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.07

RHINO – Reciprocating Air compressor Oil
Premium Air Compressor Oil

Description and Applications:

RHINO – Reciprocating Air compressor oils, are formulated from highly refined base oils, and incorporate additives that minimize oxidation, deposit formation, foaming and filter-blocking,

These oils are recommended for the lubrication of reciprocating –type air compressors, They are particularly suitable for compressors with high air-delivery .temperatures, upto 220`C, where oils of inferior quality would readily deteriorate and leave carbonaceous deposit within the compressor and discharge system., they can also be used for drip-feed vane –type compressors that require oils with good oxidation stability and rust inhibitors. It can also be used in circulatory lubrication systems of plain and rolling bearings operating at high temperatures.

Main Benefits:

- Low deposit –forming tendency.
- Excellent Oxidation stability
- Extended Oil drain interval .

Specifications:

Meets the specification requirements of
ISO DP 6521 for mineral oils
L-DAA and L-DAB for reciprocating compressors air discharge temperatures of upto 220`C
DIN 51352-Part 2 and DIN 51506 VD-L

Sr No	Test Parameters	Test Method			
	Viscosity Grade (ISO VG)		68	100	150
1)	Appearance	Visual	C&B *	C&B *	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.880	0.884	0.897
3)	Viscosity Index	ASTM D2270	102	98	92
4)	Viscosity @ 40°C (cSt)	ASTM D 445	68	100	150
5)	PRhino Point °C	ASTM D 97	- 33	- 30	-12
6)	Flash Point (COC) °C	ASTM D 92	220	224	246
7)	Corrosion-Rust protection	ASTM D 665 (A&B)	Pass	Pass	Pass
8)	Copper Corrosion 3h/100°C	ASTM D 130	1B	1B	1B
9)	Air release @ 50°C (minutes)	ASTM D 3427	1.5	2.5	4.0
10)	Demulsibility (10 minutes)	ASTM D1401	40/40/0	40/40/0	40/40/0
11)	Foam Tendency SeqI/SeqII/SeqIII (ml)	ASTM D892	20/0 40/0 20/0	20/0 40/0 20/0	20/0 40/0 20/0

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.08

RHINO – General Purpose Oil
General Purpose Oil

Description and Applications:

Rhino Lubricants Product Guide

RHINO-General purpose oils, is a range of high quality, additive free mineral oils inherently possessing good resistance to oxidation, demul sification properties, and high viscosity index.

These oils have a variety of application such as in circulatory systems for rolling mills and calendars (both rolling and plain bearings), vacuum pumps and hydraulic systems where a fluid type ISO HH is required.
Also suitable for once-through lubrication systems and gears not requiring heavy duty oils.

Main Benefits:

- Wide range of application.
- Long service life.

Sr No	Test Parameters	Test Method				
	Viscosity Grade (ISO VG)		32	46	68	100
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.874	0.878	0.881	0.884
3)	Viscosity Index	ASTM D2270	100	98	96	96
4)	Viscosity @ 40°C (cSt)	ASTM D 445	32	46	68	100
5)	PRhino Point °C	ASTM D 97	- 12	-12	-9	-9
6)	Flash Point (COC) °C	ASTM D 92	220	230	240	240

Sr No	Test Parameters	Test Method				
	Viscosity Grade (ISO VG)		150	220	320	460
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.887	0.888	0.895	0.92
3)	Viscosity Index	ASTM D2270	96	95	95	95
4)	Viscosity @ 40°C (cSt)	ASTM D 445	150	220	320	440
5)	PRhino Point °C	ASTM D 97	-9	-9	-9	-9
6)	Flash Point (COC) °C	ASTM D 92	248	258	270	284

*C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.09

RHINO – Refrigeration Oil (X)
Refrigeration Compressor Oil

Description and Applications:

RHINO – Refrigeration oils, is a range of highly refined naphtenic mineral oils for use in both large industrial and small domestic refrigeration units.

These oils function as lubricants, coolants and sealant in refrigerating compressors. They maintain good lubrication properties at the high temperatures reached during the compression phase and good fluidity at the low temperatures within the evaporators' .excellent lubrication of moving parts in the compressor as well as recycling of the oil. Entrained into the system by the refrigerant .The Chemical stability of these oils prevents them from reacting with the refrigerants used in refrigeration system to form potentially disruptive breakdown products , They are suitable for use in systems with Ammonia (NH3) as refrigerant as well as halogenated hydrocarbon .

Main Benefits:
- High thermal and chemical stability
- Good low temperature flow characteristics

Sr No	Test Parameters	Test Method				
	Viscosity Grade (ISO VG)		32	46	68	100
1)	Appearance	Visual	C&B*	C&B*	C&B*	C&B *
2)	Density @ 15°C gm/cm3	ASTM D1298	0.892	0.896	0.90	0.904
3)	Viscosity @ 40°C (cSt)	ASTM D 445	32	46	68	100
4)	PRhino Point °C	ASTM D 97	- 51	-45	-42	-36
5)	Flash Point (COC) °C	ASTM D 92	170	180	186	220
6)	Neutralization Value mgKoH/gm	ASTM D 974	0.01	0.01	0.01	0.01
7)	Flocculation point R12 °C	DIN51351	<-50	<-50	<-50	<-50

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.10

RHINO – Refrigeration Oil (F)
Refrigeration Compressor Oil

Description and Applications:

RHINO – Refrigeration oils (F) , is a range of highly refined naphtenic mineral oils which have been especially refined to possess low pRhino points and low floc

These grades are suitable for applications where manaufactures recommend naphtenic oils and where the low evaporator temperatures demand the use of a lubricant with a low floc point
It is suitable for use in systems where Freon 22, 11, 112,113 ,114, 502 and 522 are employed.

Main Benefits:

- Very low floc point
- Low levels of paraffinic hydrocarbons resulting in extremely low wax content.
- Good miscibility with HFC refrigerants at low temperatures.

Sr No	Test Parameters	Test Method		
	Viscosity Grade (ISO VG)		32	46
1)	Appearance	Visual	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.917	0.925
3)	Viscosity @ 40°C (cSt)	ASTM D 445	32	46
4)	PRhino Point °C	ASTM D 97	- 51	-45
5)	Flash Point (COC) °C	ASTM D 92	170	180
6)	Neutralization Value mgKoH/gm	ASTM D 974	0.01	0.01
7)	Flocculation point R12 °C	DIN51351	<-50	<-50

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.11

RHINO – HTF / HTF X
Heat Transfer Fluids

Description and Application

RHINO – HTF oils are specially developed mineral oils for use in heat transfer industrial application. These oils possess excellent thermal and oxidation stability, low volatility and low vapor pressure to give long and trouble free service life in heat transfer systems. RHINO HTF Oil are recommended for well designed heat transfer systems up to 260 °C and 300°C respectively

RHINO HTF X oil is a premium heat transfer fluid is manufactured using superior additive containing selected anti-oxidants. RHINO HTF X oil are recommended for well designed heat transfer systems up to 320 °C .

Main Benefits:

- Excellent Heat –transfer properties.
- Very good thermal stability, allowing the fluid to be used at higher bulk –fluid temperature.
- Containing all essential characteristics for a long and trouble free service.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical HTF	Typical HTFX
1)	Appearance	Visual	C&B*	C&B*
2)	Density @ 15°C gm/cm3	ASTM D1298	0.874	0.875
3)	Viscosity Index	ASTM D2270	100	100
4)	Viscosity @ 100°C (cSt)	ASTM D 445	4.9	5.2
5)	PRhino Point °C	ASTM D 97	-15	-12
6)	Flash Point (COC) °C	ASTM D 92	210	220
7)	Fire Point (COC) °C	ASTM D 92	234	244
8)	Auto Ignition Temperature	ASTM D 2155	340	350
9)	Co-efficent of thermal expansion per °C		0.00077	0.00077
10)	Thermal Conductivity temperatures			

	200° C kcal/mh°C 300° C		0.60 0.097	0.60 0.097
11)	Specific Heat 200° C kcal/kg°C 300° C		 0.60 0.69	 0.60 0.69
12)	Normal Operating range °C		-10-320	-10-320

*C&B = Clear and Bright

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.12

RHINO – RP 1/ 2/ 3

Temporary Corrosion Preventive (Solvent Based)

Description and Application

RHINO – RP is a series solvent deposited, water displacing corrosion preventive Oils, The product leaves a transparent gelled oil film on evaporation of the solvent base.

RHINO – RP 1 is particularly suited for the protection of bright wire, tubes and bars, It is especially recommended for inter-process and transit protection of pressed panels prior to assembly. It provides short term protection

RHINO – RP-2 is particularly suited for the protection of highly machined precision parts such as automotive engine components, taps and dies, hand tools, gears spring s and bright bars. It provides medium term protection.

RHINO – RP-3 is particularly suited for the protection of highly machined precision parts such as automotive engine components, taps and dies, hand tools, gears spring s and bright bars. It provides long term protection.

The product is best applied by dipping but can be spray or brush applied. They can be removed with hydrocarbon solvent or suitable alkaline cleaners.

Main Benefits:

- Excellent Water displacing properties.
- Effective in acidic or other aggressive atmospheres.
- Suitable for wide range of application
- Increased coverage capacity
- Efficient finger print corrosion suppressant
- High flash point –reduced evaporation loss

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical	Typical	Typical
			RP1	RP2	RP3
1)	Appearance	Visual	Brown	Brown	Brown
2)	Density @ 15°C gm/cm3	ASTM D1298	0.81	0.810	0.810
4)	Viscosity @ 40°C (cSt)	ASTM D 445	2.4	2.0	6.1
5)	Flash Point (PMCC) °C	ASTM D 93	60	60	60
6)	Dry Film Thickness microns Coverage m2/litre		2.0 100	2.0 75	5.0 55
7)	Typical Protection times -indoor (months) -outdoor (covered)		 6 1	 9 3	 2(yrs) 1(yrs)
8)	Salt Spray cabinet hrs	ASTM B 117	96	96	360

*C&B = Clear and Bright
The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.13

RHINO – RP X
Corrosion Preventive

Description and Application

RHINO – RP X is a premium quality coating or slushing oil for the protection of steel sheet and strip during storage and transit to customer .The product is based on highly refined mineral oils and a synergistic blend of additives.

Main Benefits:

- Improved anti-corrosion protection.
- Good resistance to bacterial infection.
- Good resistance to UV ageing.
- Good adhesivity properties –low drainage

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
			RPX
1)	Appearance	Visual	Clear Brown
2)	Density @ 15°C gm/cm3	ASTM D1298	0.890

4)	Viscosity @ 40°C (cSt)	ASTM D 445	30
5)	Flash Point (COC) °C	ASTM D 92	206
6)	Salt Spray cabinet hrs	ASTM B 117	24

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section V: Industrial Lubricants – 5.14

RHINO – SOLCUT
General Purpose soluble cutting fluid

Description and Application

RHINO – Solcut, is a general purpose soluble cutting fluid which on dilution with water forms a milky stable emulsion, the boundary properties afforded by the high oil content not only provides good machining performance but the ability to leave fluid corrosion inhibiting oil residues.

It is suitable for all general purpose machining operations –drilling, milling, turning and sawing of a variety of medium tensile steels and certain alloys of aluminum and copper

Suggested dilution ratios vary according to the application and the severity of the operation:

Ferrous/ Nonferrous metals
Turning,drilling,sawing 5-7%
Milling,reaming 5-8%

Main Benefits:

- Very easily miscible with water
- Outstanding emulsion stability even when hard water is used for the diluents
- Very good machine tool lubrication due to high oil content.
- Good resistance to bacterial degradation.
- Compatible with good quality paints used on machine tools
- Pleasant to work with.

Typical Characteristics

Sr. No	Test Parameters	Test Method	Typical
1)	Appearance	Visual	Amber
2)	Density @ 15°C gm/cm3	ASTM	0.93

		D1298	
3)	Viscosity @ 40°C (cSt)	ASTM D 445	60
4)	Mineral Oil Content %		80
	Dilution		
5)	pH (5% dilution)		9.0
6)	Appearance		Milky emulsion
7)	Filter paper Corrosion test 3%)	IP287	0/0-0
8)	Herbert Corrosion test (4%)	IP125	Nil

The above figures are typical of those obtained with normal production tolerance and do not constitute specifications

Section VI

Appendices

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ENGINE OIL CLASSIFICATION SYSTEM FOR AUTOMOTIVE GASOLINE SERVICE
"S " SERVICE OILS

API Automotive gasoline Engine service categories	**Previous API Engine categories**	**Related Industry Definition**	**Engine Test Requirements**
SA	ML	Straight Mineral Oil	None
SB	MM	Inhibited Oil Only	CRCL-4* or L-38: Sequence IV*
SC	MS (1964)	1964 MS Warranty Approved	CRCL-38, Sequence IIA *: Sequence IIIA*,Sequence IV*: Sequence V*: Caterpillar L-1* (1.0% sulphur)
SD	MS (1968)	1968 MS Warranty Approved	CRCL-38, Sequence IIB *: Sequence IIIB*,Sequence IV*: Sequence VB*: Falcon Rust *;Caterpillar L-1* or 1H* (1.0% sulphur)
SE	None	1972 Warranty Approved	CRCL-38, Sequence IIB * or IIC or IID: Sequence IIIC* or IIID*,Sequence VC* or V-D
SF	None	1980 Warranty Approved	CRCL-38, Sequence IID : Sequence IIID*, Sequence V-D: Based on CMA code of practice

SG	None	1989 MS Warranty Approved	CRCL-38, Sequence IID : Sequence IIIE, Sequence VE: Caterpillar IH2
SH	None	1994 MS Warranty Approved	CRCL-38, Sequence IID : Sequence IIIE, Sequence VE: Based on CMA code of practice
SJ	None	1997 MS Warranty Approved	CRCL-38, Sequence IID : Sequence IIIE, Sequence VE: Based on CMA code of practice

* This test is obsolete: engine parts, and /or test fuel; and/or reference oils are no longer generally available and the test is no longer monitored by the developer or ASTM

Section VI: Appendices - 6.02

ENGINE OIL CLASSIFICATION SYSTEM FOR AUTOMOTIVE DIESEL SERVICE
"C " COMMERCIAL OILS

API Automotive gasoline Engine service categories	**Previous API Engine categories**	**Related Industry Definition**	**Engine Test Requirements**
CA	DG	MIL-L2104A	CRC L-38; CATERPILLAR L-1* (0.4% Sulphur)
CB	DM	MIL-L-2104A,supplement 1	CRC L-38; CATERPILLAR L-1* (1% Sulphur)
CC	DM	MIL-L-2104B, MIL-L46152B	CRC L-38; CATERPILLAR 1H2*, SEQUENCE IID
CD	NONE	MIL-L45199B, SERIES 3 MIL-L-2104C/D/E	CRC L-38; CATERPILLAR 1G2*
CD-II	NONE	MIL-L-2104 D/E	CRC L-38; CATERPILLAR 1G2* ; DETRIOT DIESEL 6V53T*
CE	NONE	NONE	CRC L-38; CATERPILLAR 1G2* ; CUMMINS NTC-400 : MACK T-6; MACK T-7
CF-4	NONE	NONE	CRC L-38; CATERPILLAR 1K ; CUMMINS

			NTC-400 : MACK T-7
CF	NONE	NONE	CRC L-38; CATERPILLAR 1M-PC
CF2	NONE	NONE	CRC L-38; CATERPILLAR 1M-PC DETROIT DIESEL 6V92TA
CG4	NONE	NONE	CRC L-38; SEQUENCE IIIE; GM6.2L, CATERPILLAR 1N ,MACKT-8 ,
CH4	NONE	NONE	SEQUENCE IIIE; GM6.2L, MACKT-9 , MACK T8 E; CAT 1K; CAT1P: CUMMINS M 11; RFWT

* This test is obsolete: engine parts, and /or test fuel; and/or reference oils are no longer generally available and the test is no longer monitored by the developer or ASTM

Section VI: Appendices - 6.03

API ENGINE SERVICE CLASSIFICATIONS

The API Engine Service Classification system currently includes twenty classes of service: nine for service station (S series) and eleven for commercial application (Cseries) It is an open ended system which allows for the addition of new designations without changing or deleting existing ones.

"S" Service Station Classification

SA formerly for utility Gasoline and Diesel Engine Service Oils in this category should not be used in any engine unless specifically recommended by the equipment manufacturer.
SB for Minimum Duty Gasoline Engine Service: Oils in this category should not be used in any engine unless specifically recommended by the equipment manufacturer.
SC for 1964 Gasoline Engine Maintenance Service: Service typical gasoline engines in 1964 models of passenger cars and some truck operating under engine manufacturers' warranties in effect during those model years. Oils designed for this service provide control of high and low-temperature deposits, wear, rust and corrosion in gasoline engines
SD for 1968 Gasoline Engine Warranty Maintenance Service: Service typical of gasoline engines in 1968 through 1970 models years. Also may apply to certain 1971 and/ or later models as specified (or recommended) in the owners manuals. Oils designed for this service provide more protection against high and low-temperature engine deposits, wear, rust and corrosion in gasoline engines, than oils which are satisfactory for API Engine Service Classification SC and may be used when API Engine Service Classification SC is recommended.
SE for 1972 Gasoline Engine Warranty Maintenance Service.: Service typical of gasoline engines in passenger cars and some trucks beginning with 1972 models and certain 1971 models operating under engines manufactures' warranties. Oils designed for this service provide more protection against oil oxidation, high-temperature engine deposits, rust and corrosion in gasoline engines, than oils which are satisfactory for API Engine Service Classification SD or SC and may be used when either of this classification is recommended.
SF for 1980 Gasoline Engine Warranty Maintenance Service.

Service typical of gasoline engines in passenger cars and some trucks beginning with 1980 models operating under engines manufactures' recommended maintenance procedures. Oils developed for this service provide increase oxidation stability and improved anti-wear performance relative to oils which meet the minimum requirements to API Service Category SE. These oils also provide protection against engine deposits, run and corrosion. Oils meeting API Service Category SF may be used where API Service Categories SE, SD, or SC are recommended
SG for 1968 Gasoline Engine Warranty Maintenance Service The Category SG denotes service typical of gasoline engines in passenger cars, vans and light trucks beginning with 1989 model year operating under engine manufacturers' recommended maintenance procedures. Category SG quality oils include the performance properties of API Service Category CC. (Certain manufacturers of gasoline engine require oils also meeting API Service Category CD). Oils developed for this service provide improved control of engine deposits, oil oxidation, and engine wear relative to oils developed for previous categories. These oils also provide protection against rust and corrosion. Oils meeting API Service Category SG may be used where API Service Categories SF, SE, SF/CC or SE/CC are recommended.
SH for 1994 Gasoline Engine Warranty Maintenance Service. The Category SH denotes service typical of gasoline engines and earlier passenger cars, vans and light truck operation under vehicle manufacturer recommended maintenance procedures. Engine oils developed for this category provide performance exceeding the minimum performance requirements for API SG, which it is intended to replace, in the areas of deposit control, oil oxidation, wear, rust and corrosion. Engine oils meeting the API SH designation have been tested according to the Chemical manufacturers Association (CMA) Product approval Code of Practice, may utilize the API Base oil interchange and Viscosity Grade Engine Testing Guidelines and may be used where API Service Category SG and earlier categories have been recommended.
SJ for 1997 Gasoline Engine Warranty Maintenance Service. API Service Category SJ was adopted for use in describing engine oils available inn 1996. These oils are for use in service typical of gasoline engines in current and earlier passenger-car, sport utility vehicle, van, and light truck operations under vehicle manufactures' recommended maintenance procedures. Engine oils that meet the API Service Category SJ designation may be used where API Service Category SH and earlier Categories have been recommended.
SL-2001 Gasoline Engine Warranty Maintenance Service API Service Category SL was adopted for use in describing engine oils available in 2001. These oils are for used in service typical of gasoline engines in current and earlier passenger cars, sport utility vehicles, and light-duty trucks operating under vehicle manufacturers' recommended maintenance procedure. Engine oils that meet the API Service Category SL designation may be used where API service category SJ and earlier categories have been recommended. Engine Oils that meet the API service category SL designation have been tested in accordance with the American Chemistry Council (ACC) Code and may use the API Base Oil Interchangeability Guidelines and the API Guidelines for SAE Viscosity-Grade Engine Testing.

API ENGINE CLASSIFICATIONS

The API Engine Service Classification system currently includes twenty classes of service: nine for service station (S series) and eleven for commercial application (Cseries) It is an open ended system which allows for the addition of new designations without changing or deleting existing ones.

"C" Commercial Classification

CA for light Duty Diesel Engine Service Service typical of diesel engines operated in mild to moderate duty with high-quality fuels and occasionally has included gasoline engines in mild service. They are widely used in the late 1940's but should not be used in any engine unless specially recommended by the equipment manufacturer.
CB for Moderate Duty Diesel Engine Service Service typical of diesel engines operated in mild to moderate duty with lower-quality fuels which necessitate more protection from wear and deposits. Oils designed for this service were introduced in 1949.
CC for Moderate Duty Diesel and Gasoline Engine Service Service typical of certain naturally aspirated turbocharged or supercharged diesel engines operated in moderate to severe-duty service and certain heavy-duty gasoline engines. Oils designed for this service provide protection from high-temperature deposits and bearing corrosion in these diesel engines and also from rust, corrosion and low-temperature deposits in gasoline engines. These oils were introduced in 1961.
CD for Severe Duty Diesel Engine Service Service typical of certain naturally-aspirated turbocharged or supercharged diesel engines where highly effective control of wear and deposits is vital, or when using fuels of a wide quality range including high-sulphur fuels. Oils designed for this service were introduced in 1955 and provide protection from bearing corrosion and from high-temperature deposits in these diesel engines.
CD-II severe Duty Two-Stroke Cycle Diesel Engine Service Service typical of two-stoke cycle diesel engine requiring highly effective control over wear and deposits. Oils designed to this service also meet all performance requirement of API Service Category CD.
CE for Severe Duty Turbocharged or Supercharged Diesel Engine Service Service typical or turbocharged or supercharged diesel engines manufactured since 1983 and operated under both low-speed, high-load & high speed high-load conditions. Oils designed for this service may also be used when previous API engines service categories for diesel engines are recommended.
CF – Indirect – Injected Diesel Engine Service Service typical of indirect-injected diesel engines and other diesel engines that use a broad range of fuel types, including those using fuel with high sulfur content, for example, over 0.5% wt. Effective control of piston deposits, wear and copper-containing bearing corrosion is essential for these engines, which may be naturally aspirated, turbocharged or supercharged. Oils designated for this service have been in existence since 1994 and may be used when API Service Category

CD is recommended.
CF – 2 – Severe – Duty Two – Stoke Cycle Diesel Engine Service Service typical of two-stroke cycle diesel engines requiring highly effective control over cylinder and ring-face scuffing and deposits. Oils designed to this service have been in existence since 1994 and may be also be used when API Engine Service Category CD-II is recommended. These Oils do not necessarily meet the requirements of API CF or CF-4 unless they pass the test requirements for these categories.
CF – 4 – 1990 Diesel Engine Service Describe oils for use in high-speed, fRhino-stroke-cycle, diesel engines, API CF – 4 oils exceed the requirements for the CE category providing improved control of oil consumption and piston deposits. These oils should be used in place of CE oils. They are particularly suited for on-high way, heavy-duty truck applications.
CG – 4 – 1994 Severe Duty Diesel Engine Service API Service Category CG-4 describes oils for use in high-speed fRhino stroke-cycle diesel engines used in both heavy-duty on-highway (0.05% wt. sulfur fuel) and off-highway (less than 0.5% wt. sulfur fuel) applications. CG-4 oils provide effective control over high-temperature piston deposits, wear, corrosion, foaming, oxidation stability, and soot accumulation. These oils are especially effective in engines designed to meet 1994 exhaust emission standards and may also be used in engines requiring API Service Categories CD, CE and CF – 4. Oils designed for this service have been in existence since 1994.
CH – 4 – 1998 Severe Duty Diesel Engine Service API Service Category CH – 4 describes oils for use in high-speed, fRhino-stroke diesel engines designed to meet 1998 exhaust emissions standards as well as for previous model years. CH -4 oils are specially compounded for use with diesel fuels ranging in sulfur content up to 0.5 percent weight.

Section VI: Appendices - 6.05

U.S.MILITARY SPECIFICATION DESCRIPTIONS

MIL – L – 2104A – Obsolete specification for crankcase oils. Required performance in the L -1 diesel engine test and the L -4 gasoline test.
MIL – L – 2104A (Supplements 1) - Obsolete specification for crankcase oils. Same engine tests as Mil – L2104A but performance requirement made stricter by using higher sulphur fuel in the diesel engine test.
MIL – L – 2104B – Obsolete Specification for crankcase oils for general duty service. Required performance in the 1-H, L-38 and LTD engine tests.
MIL – L – 2104C - Obsolete specification for crankcase oils for service in tactical military vehicles. Equivalent to API Service CD in diesel performance and API Service SC to SD in gasoline engine performance.
MIL – L – 2104D - Obsolete specification for crankcase oils for service in tactical military

vehicles. Equivalent to API Service CD in diesel performance and API Service SD to SE in gasoline engine performance. MIL – L2104D replaced Mil-L2104C and represents higher performance criteria. Indicates in most cases API-CD/SE level.
MIL – L – 2104E – Current specification for crankcase oils for service in tactical military vehicles. Equivalent to API Service CD-II in diesel performance and, while exceeding API Service SF in gasoline engine performance, does not quite match API Service SG performance level.
MIL – L – 2105 – Obsolete specification for multi-purpose gear lubricants. Required performance at a level equivalent to API Service GL-4
MIL – L -2105B – Obsolete specification for multi-purpose automotive gear lubricants. Required performance in the L – 37 and L – 42 gear tests and L – 33 moisture corrosion test Equivalent to API Service GL – 5.
MIL – L – 2105C – Current specification for multi-purpose automotive gear lubricants. Same performance requirements as MIL-L2105B but covers SAE 75w, 80w-90 and 85w-140 grades.
MIL-L-2105D – As in MIL-L 2105C but allows the use of re-refined base oils.
MIL-L-45199B – Obsolete specification for crankcase oils for severe service in diesel engines. Equivalent to Caterpillar Superior Lubricants (Series 3) with addition of L-38 test.
MIL-L-46152A – Obsolete specification for commercial vehicles operated by the military and government agencies. Does not contain restrictions on the use of re-refined base oils. Includes a limit of 0.14% on phosphorus, which was inserted to reduce fouling of catalytic converters. Combines performance requirements of API Service SE and CC.
MIL-L-46152B – Obsolete specification for commercial vehicles operated by the military and government agencies. Combines performance requirements of API Service DF and CC. Does not contain restrictions on the use of re-refined base oils. Includes a limit of 0.14% on phosphorus,
MIL-L-46152 C – Replaced MIL-L-46152B but the changes are minor including the presentation of certificate that the oil blends do not contain carcinogens among other things .none of these minor changes made any effect on the performance level which is still at API-SF/CC.
MIL-L-46152D – Obsolete specification for crankcase oils for commercial vehicles operated by the military and government agencies. Combines performance requirements of API Service SC and CC.Provides improved dispersancy, anti wear and antioxidant properties over the MIL-L-46152C product.
MIL-L-46152E – Specification for crankcase oils for commercial vehicles operated by the military and government agencies. Combines performance requirements of API Service SC and CC.and stipulates only multi grade oils limits are included for both HTHS Viscosity and evaporation loss.

API GL-1
Specified for some manual transmission. No friction modifiers or EP additive permitted.

API GL-2
Worm gears –Industrial Oils.

API GL-3
Manual transmission/. Moderately loaded spiral bevel axles

API GL-4
Spiral bevel drive axles light duty hypoid, manual transmissions and European transaxles .

API GL-5
Hypoid drive axles .Equivalent to MIL-L-2105C

API GL-6
Passenger car hypoid axle's height offset.

AXLE AND MANUAL TRANSMISSION LUBRICANT
VISCOSITY CLASSIFICATION SAE J306 OCT 91

SAE viscosity Grade	**Maximum temperature for viscosity of 150,000 cP °C**	**Viscosity (cSt) at 100 °C**	
		Min.	Max.
70W	-55	4.1	-
75W	-40	4.1	-
80W	-26	7.0	-
85W	-12	11.0	-
90	-	13.5	<24.0
140	-	24.0	<41.0
250	-	41.0	-

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ENGINE OIL VISCOSITY CLASSIFICATION – SAE J300 revised APR 97[1]

SAE viscosity Grade	Low-temperature (°C) cranking viscosity (2), cP max .	Low-temperature (°C) pumping viscosity (3), cP max .with no yield stress	Low-Shear–rate Kinematic viscosity (4) (cSt) at 100° C min .	Low-Shear–rate Kinematic viscosity (4) (cSt) at 100° C Max .	High-Shear–Rate(5)(cP)150°C and $10^6 S^{-1}$ Max.
0W	3250 at -30	60,000 at -40	3.8	-	-
5W	3500 at -25	60,000 at -35	3.8	-	-
10W	3500 at -20	60,000 at -30	4.1	-	-
15W	3500 at -15	60,000 at -25	5.6	-	-
20W	4500 at -10	60,000 at -20	5.6	-	-
25W	6000 at -5	60,000 at -15	9.3	-	-
20	-	-	5.6	<9.3	2.6
30	-	-	9.3	<12.5	2.9
40	-	-	12.5	<16.3	2.9(0W-40,5W-40,10W-40, grades)
50	-	-	12.5	<16.3	3.7(15W-40,20W-40,25W-40,40 grades)
60	-	-	16.3	<21.9	3.7
			21.9	<26.1	3.7

Note: 1cP = 1mPas ; 1cSt =1mm2/S

(1) All values are critical specifications as defined by ASTM D3244
(2) ASTM D5293
(3) ASTM D4684
(4) ASTM D445
(5) ASTM D4683, CEC L-36-A-90 (ASTM D4741)

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ISO/ASTM VISCOSITY SYSTEM FOR INDUSTRIAL FLUID LUBRICANTS

Viscosity System Grade Identification	Mid-point Viscosity cSt (mm2/s) @ 40`C	Kinematic Viscosity limits cSt (mm2/s) @ 40`C	
		Minimum	Maximum
ISO VG 2	2.20	1.89	2.42
ISO VG 3	3.20	2.88	3.52
ISO VG 5	4.60	4.14	5.06
ISO VG 7	6.80	6.12	7.48
ISO VG 10	10	9.00	11.00
ISO VG 15	15	13.50	16.50
ISO VG 22	22	19.80	24.20
ISO VG 32	32	28.80	35.20
ISO VG 46	46	41.40	50.60
ISO VG 68	68	61.20	74.80
ISO VG 100	100	90	110
ISO VG 150	150	135	165
ISO VG 220	220	198	242
ISO VG 320	320	288	352
ISO VG 460	460	414	506
ISO VG 680	680	612	648
ISO VG 1000	1000	900	1100
ISO VG 1500	1500	1350	1650

NLGI LUBRICATION GREASE CLASSIFICATIONS

NLGI Consistency number	Worked penetration Range 25`C (0.1 mm)	NLGI Consistency number	Worked penetration Range 25`C (0.1 mm)
000	445-475	3	220-250
00	400-430	4	175-205
0	355-385	5	130-160
1	310-340	6	84-115
2	265-295		

GLOSSARY OF COMMON TERMS

Additive: Any material that is incorporated into a product to provide new properties or enhance existing properties.
Antifoam: Any additive used in lubricating oils to stop foaming caused by agitation and the release of entrained or entrapped air.
API: AMERICAN PETROLEUM INSTITUTE
ASTM: AMERICAN SOCIETY FOR TESTING MATERIALS
Corrosion: The chemical deterioration of solid materials as in the oxidation of metal.
Demulsibility: The ability of a lubricant to separate from water.
Dispersancy: The ability of oil to disperse and suspend potential deposit forming materials so they can be removed from the system when the oil is drained.
Drop Point: Temperature at which the first drop liquid separates when the grease is heated under prescribed conditions.
EP Additive : Extreme Pressure additive ,a chemical compound which gives an oil extreme pressure characteristics with the objective of reducing wear by preventing metal to metal contact when the oil film breaks.
Film strength: The ability of a film of lubricant to resist rupture due to load speed and temperature.
Flash point: The temperature at which vapors rising from oil will ignite momentarily upon application of flame under specified conditions.
Load Carrying Capacity: The ability of a lubricant to resist film rupture and protect against wear and surface destruction under conditions of high speeds,high temperatures or combinations of these.
MIL: Prefix used to designate US Military Specifications
Miscible: Able to mix with or dissolve completely
NLGI: National Lubricating Grease Institute.
Oxidation Stability: Ability of a lubricant to resist oxidation and deterioration resulting from high temperatures and/or exposure to air.
Penetration: Consistency of greases, expressed as the distance a standard needle or cone penetrates vertically into a sample of the material under prescribed conditions of loading time and temperature.
PRhino Point: Lowest temperature at which the liquid petroleum product will flow when it is cooled under the conditions of the standard test method.
SAE: Society of Automotive Engineers
Tackiness Agent: Additive used to improve the adhesive properties of a lubricant.
Viscosity: Measure of the resistance to flow, or internal friction, of the fluid. Viscosity changes with temperature so the temperature at which the measurement was made must always be specified.
Viscosity Index: An Arbitrary scale used to show the magnitude of viscosity changes with changes in temperature .The larger VI, the less the lubricant is affected by temperature.

Section VI: Appendices - 6.10

HEALTH, SAFETY AND ENVIRONMENT

Rhino Lubricants produces a wide variety of lubricating oils and greases for a large number of applications .The potential hazards and the recommended methods of handling may differ to some extent with each type .Consequently ,advice on such hazards and on the appropriate precautions, use of protective clothing, First Aid and other information is given in the Health Safety and Environmental data provided in the Material Safety Data Sheets (MSDSs) compiled for the individual products .In the event of accident or misuse of products ,these sheets provide guidance on remedial action that should be taken to deal with medical conditions that might arise ,and information on spillage and disposal is included .

To obtain RHINO Lubricants MSDSs please refer to RHINO **Lubricants Technical Helpline:**

Where good standards of personal and industrial hygiene are observed, the great majority of lubricants present little or no hazard to the user; Key factors for their safe handling are as follows:

PERSONAL PRECAUTIONS:

1. Employ working methods and equipment that minimize skin contact with lubricants.
2. Avoid unnecessary handling of oily components.
3. Use only disposable wipes
4. Never put oily rags or oily tools into pockets of overalls or working clothes.
5. Use soluble metal cutting oils or synthetic fluids at their recommended dilutions only and avoid skin contact with their ‘ concentrates ‘
6. Obtain First Aid treatment for any injury, however slight.
7. All staff should make themselves familiar with the contents of the MSDS`s

WORKPLACE PRECAUTIONS:

1. Fit effective and properly positioned splash guards on machine tools where appropriate.
2. Adequate washing facilities.
3. Regular provision of Clean protective clothing ,gloves goggles and cleaning rags.
4. All workplaces should have clear signs indicating features such as fire exits and precautions such as no smoking.
5. All staff should make themselves familiar with fire precautions and methods of fighting fire.

Material Safety Data Sheets and the Health Safety and Environmental information contained in them are considered to be accurate as of the date stated on them .However, no warranty or representation, express or implied is made as to the accuracy or completeness of the data and information contained in any data sheet.

It is the users obligation to evaluate and use all products safely and to comply with all applicable laws and regulations. No statement made in any data sheet shall be construed as a permission, recommendation or authorization given or implied to practice any patented invention without a valid licence .

RHINO LUBRICANTS shall not be responsible for any damage or injury resulting from abnormal use of the material, from any failure to adhere to recommendations, or from any hazards inherent in the nature of the material.

Section VI: Appendices - 6.11

STORAGE AND HANDLING

Proper standards of storage and handling are necessary with all lubricants. Packages should be treated with care at all stages, to prevent both contamination of their contents and damage to the containers.

With regard to Quality Assurance, **RHINO LUBRICANTS**recommend all packed and drummed products should be stored indoors, ideally in conditions of controlled temperature. The most important factors in the storage of lubricants are temperature, shelf life and moisture. Although most lubricants have a long shelf life in good storage conditions, some grades tend to deteriorate if storage conditions /or are affected by extreme and repeated fluctuations of temperature.

Among the products that should always be stored indoors are insulating oils, , automotive brake fluids, refrigeration oils ,white oils, greases and any cutting oils that contain fatty components that are likely to solidify and become separated in cold weather.

Packages can be stored in three ways :

1. freely stacked ,so that containers rest on other containers .and are piled to height that depends on their stability and the weight that the lower containers can support .
2. palletized ,so that the containers rest on shallow wooden frames
3. on racking that is made from angle iron ,slotted steel or clamped tubes.

Where outdoor storage is unavoidable, they should preferably be covered but allowed free access to circulating air, they should be checked at fixed intervals for signs of water and leakage. Outdoor storage facilities should not be sited near dusty areas because layer of dust on containers is likely to obliterate markings and contaminate the contents when the bungs are removed.
Drums should not be stored in direct contact with the ground , especially not on poorly drained or acidic surfaces .Drums that stand in the open suffer variations of temperature and corresponding variation of internal pressure. If the bung seal is not tight, this can lead to “breathing “the entry of air and the accumulation of moisture within the drum.

Rhino Lubricants Product Guide

When packaged lubricants are stored outdoors, the opening and dispensing operations should always take place under cover, and the opened packages should be kept under cover.

If packages of any size are likely to be stored for long periods, they too should be taken from the store on a basis of ‘first in first out ‘in order to ensure a reasonable rotation of stocks.

A separate area should be set aside for dealing with any containers that have become damaged on site or during storage .Spillage from leaking containers can be cleaned up more easily some distance away from the main storage areas.

Good housekeeping and storekeeping procedures are likely to be influenced strongly by health and safety regulations, such influences can apply to the choice and the amount of equipment and handling aids, as well as to protective clothing, Customer Store Managers are advised to consult the relevant **RHINO LUBRICANTS** Health Safety and Environment data sheets and to contact

RHINO LUBRICANTS Technical Helpline