



# TECHNICAL DATA

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## #161 MOLY AIRLINE OIL ISO 22, 32, 46

Moly Airline Oil is a premium quality anti-wear, rust and oxidation inhibited oil that is specially formulated for use in all types of low pressure and high pressure airlines and all types of pneumatic air tool systems. Moly Airline Oil is particularly suited for those airline and pneumatic applications where excessive operating temperatures are seen and protection against the formation of varnish deposits on close clearance servo-valves and other system components is critical

Moly Airline Oil is blended from the finest high viscosity index solvent refined, severely hydro-finished 100% pure paraffin base stocks available. These high viscosity index 100% pure paraffin base stocks provide Moly Airline Oil with the following performance characteristics:

1. **Excellent Thermal Stability**
2. **Excellent Resistance to Oxidation and Thermal Degradation**
3. **A naturally High Viscosity Index. This results in a minimum change in viscosity that helps prevent excessive leakage, sluggish operation and lower overall efficiency and other deficiencies attributed to low viscosity index oils over wide operating temperature ranges.**
4. **Excellent Film Strength.**
5. **Excellent Operating Temperature Reduction. Superior Chemical Stability.**
6. **Low Volatility.**
7. **Low Carbon Forming Tendencies**

The trend among pneumatic equipment system OEMs is to design hydraulic systems with increased power output and pressures, while minimizing the oil reservoir size in order to make the systems more compact. This trend coupled with higher oil flow rates relative to the amount of hydraulic fluid present in the system has resulted in higher operating temperatures, which increases the rate of oxidation and thermal degradation of the lubricant- all resulting in the potential for the formation of varnish and sludge deposits in the system.

Once varnish deposits are formed they can create a host of problems. Once deposited on the metal surfaces of the system, the sticky nature of these deposits can attract wear particles and contaminants to adhere to the metal surface. This sticky abrasive residue can increase overall friction, especially to servo valves resulting in reduced efficiency and responsiveness. Varnish deposits can also result in sticking servo valves which must be cleaned or replaced, restricted oil flow due to clogged or blocked filters and strainers, and poor heat transfer. All of these factors result in increased maintenance costs, system downtime and lost production.

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To combat the formation of varnish deposits a carefully balanced premium anti-wear additive package **Varnish Shield™** is blended into these 100% pure paraffin base oils. **Varnish Shield™** is a patented hydraulic fluid additive technology that is designed to prevent the formation and the build-up of varnish deposits, while providing exceptional anti-wear performance, outstanding thermal and oxidation stability, rust and corrosion protection and rapid water separation. The **Varnish Shield™** additive system provides Moly Airline Oil with a high degree of thermal and oxidative stability thus minimizing the formation of sludge and varnish. If any varnish particles do form, the dispersancy of the **Varnish Shield™** additive will keep these particles suspended and prevent them from depositing on critical internal components. This helps eliminate the replacement of components such as filters and valves and the costs associated with these activities

In addition to protecting against the formation of varnish deposits and keeping the system clean and operating longer the **Varnish Shield™** additive technology provides the following performance benefits:

1. Exceptional and long lasting anti-wear protection to protect system components
2. Extended pump life.
3. Extended bearing life.
4. Enhanced thermal and oxidative stability.
5. Superior hydrolytic stability.
6. Excellent demulsibility characteristics so water separates quickly.
7. Excellent rust and corrosion protection that extends component life and protects multi-metallurgy components.
8. Excellent anti-foaming and air release properties.
9. Reduced sludge, varnish and deposit formation.
10. Improved durability of non-ferrous parts.
11. Reduced filter blockage.
12. Excellent filterability.
13. Enhanced compatibility with existing fluids.
14. Excellent fluid quality reserve to maintain its performance features even under severe service conditions and extended drain intervals.
15. Enhanced fluid life.
16. Enhanced seal life.
17. Reduced system maintenance.

With the trend by pneumatic air tool OEMs to employ higher speeds, higher pressures reduced cycling times and small systems along with the fact that in many applications that the equipment may be operating beyond its design capacity this has resulted in thin film lubrication conditions taking place. These thin film lubrication conditions can result in increased wear conditions and rates taking place. These increased wear conditions and rates can not only result in a loss in system efficiency, reduced equipment life and lead to potentially catastrophic system failure.

Though Moly Airline Oil contains an exceptional anti-wear performance additive system that lasts longer than most conventional anti-wear hydraulic fluids the product's anti-wear capabilities is further enhanced by the addition of Micron Moly®.

Micron Moly® is a liquid soluble type of moly that plates itself to the sliding, rolling and rubbing metal surfaces of the hydraulic and compressor systems. This plating action forms a long lasting solid lubricant film on these rubbing, rolling and sliding surfaces. This moly film will withstand pressures up to 500,000 pounds per square inch. Once plated to the sliding, rolling and rubbing metal surfaces the Micron Moly® not only produces a smooth finish surface, but also reduces friction between the moving parts. This results in less heat being generated, which in turn not only reduces operating temperatures, but also downtime.

Moly Airline Oil meets and exceeds the following OEM lubrication requirements: Copper Power Tools, Ingersoll Rand, Intool (formerly Dresser), Stanley Air Tools, Cleveland Vibrator, Aro Corporation, Pruderer Machine, Bicknell Manufacturer, Kent Air Tool, Merrick Machine.

### Typical Properties

ISO Grade	22	32	46
AGMA Grade	----	----	1
Specific Gravity 60°F/15°C	.8467	.8626	.8625
Viscosity SUS 100°F (ASTM D-445)	105-122	155-207	123-250
Viscosity cSt 40°C (ASTM D-445)	20.00-23.5	30-40	41.40-48.50
Viscosity cSt 100°C (ASTM D-445)	4.0-4.5	5.0-6.0	6.2-7.1
Viscosity Index (ASTM D-2270)	98	100	100
Flash Point °F/°C (ASTM D-92)	400°/204°	410°/210°	410°/210°
Pour Point °F/°C (ASTM D-97)	-25°/-32°	-10°/-23°	0°/-18°
Aniline Point °F/°C (ASTM D-611)	220°/104°	220°/104°	228°/109°
Total Acid Number (ASTM D-664)	0.91	0.91	0.91
Copper Strip Corrosion Test 3 hrs. (ASTM D-130)	1A	1A	1A
Rust Test (ASTM D-665)			
Procedure A (Distilled Water)	Pass	Pass	Pass
Procedure B (St Water)	Pass	Pass	Pass
Four Ball EP Test (ASTM D-2783)			
Weld Point, kg	126	160	160
Four Ball Wear Test (ASTM D-4172)			
(1hr/40kg/130°)			
Mean Scar Diameter, mm	0.4	0.4	0.4
Four Ball Wear Test (ASTM D-4172)			
(1hr/20kg/130°)			
Mean Scar Diameter, mm	----	.27	.27
Falex Continuous Load lbs. (ASTM D-3233)			
Failure Load, lbs.	----	1250	1250
Conradson Carbon Residue (ASTM D-189)			
% Residue	0.3	0.3	0.3
Foam Tendency (ASTM D-892)			
Sequence I	0/0	0/0	0/0
Sequence II	0/0	0/0	0/0
Sequence III	0/0	0/0	0/0
FZG Test (ASTM D-5182)			
Load Stage Pass	----	12 <sup>TH</sup>	12 <sup>TH</sup>

**TYPICAL PROPERTIES CONTINUED**

ISO Grade	22	32	46
Hydrolytic Stability (ASTM D-2619)			
Copper Wt. Loss mg/cm <sup>2</sup>	0.0556	0.0566	0.0566
Acidity of Water mg/KOH	0	0	0
Demulsibility Test (ASTM D-1401)			
O-W-E	40-40-0	40-40-0	40-40-0
Time, min	15	15	15
Denison Filterability Test TP-02100			
Filtration Time, without water (seconds)	----	146	146
Filtration Time with 2% water (seconds)	----	163	163
Oxidation Stability Test (ASTM D-943)			
Hours to TAN of 2	3500+	3500+	3500+
Sludge Tendencies (ASTM D-4310)			
Neutralization Number after 1000 hours	0.34	0.34	0.34
Insoluble Sludge, Total Copper, mg.	39.4	39.4	39.4
Total Copper, mg	0.1	0.1	0.1
Thermal Stability Test (ASTM D-2070)			
168 hr/135°C, copper/Steel Catalyst)			
Sludge (mg/100ml)	1.8	1.8	1.8
Copper weight loss,mg/100ml	0.2	0.2	0.2
Condition of Copper rod	3	3	3
Air Release (ASTM D-3427)			
Time, (Min. @ 122°F)	6.2	6.2	6.2
Denison T6H20C Hybrid Pump Test			
Phase 1 1700 rpm 230°F/110°C weight loss	---	5.1	5.1
Phase 2 1700 rpm 176°F/80°C + 1% water	---	5.8	5.8
Vickers 35VQ25 Pump Test			
Total Wt. Loss Vane, mg	----	5	5
Total Wt. Loss Ring, mg	----	11	11
Total Wt. Loss, mg		16	16

Packaging: 161 Moly Airline Oil is available in 55 gallon drums, 30 gallon drums and 5 gallon pails