

MAGIESOL®

SOLVENTS FOR THE ALUMINUM INDUSTRY

Calumet offers the aluminum industry a wide range of rolling oils that provide the excellent performance and lubrication characteristics. Known for decades as MAGIESOL, these rolling oils are manufactured in specialty refining operations dedicated to the production of these unique streams.

EXCELLENT PERFORMANCE AND LUBRICATION CHARACTERISTICS

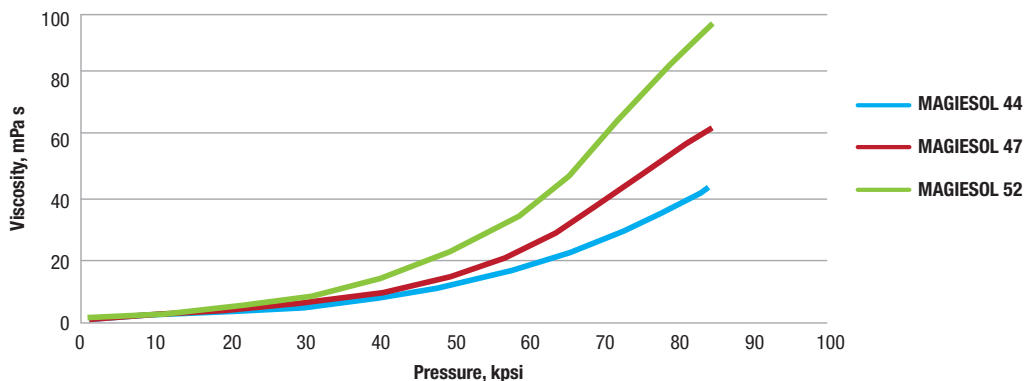
Optimal rolling oils provide cooling, lubrication and cleaning to a rolling operation. The high molecular weights of MAGIESOL rolling oils ensure higher heat capacities and more stable long term production operations. Excellent flash points and low vapor pressures provide a safe product for operations. The combination of low aromatics and high solvency provide a low odor clean process. Film thickness, a critical parameter for efficient rolling operation, is optimally achieved by the molecular weight similarities between MAGIESOLS and modern lubrication additives thereby optimizing elastohydrodynamic lubrication.

Calumet is able to consistently produce highly refined ultra-pure narrow boiling range rolling oils. By utilizing proven technologies such as dedicated narrow range distillation units, select hydrogenation operations and continuous production, our oils provide the performance characteristics that the aluminum rolling industry demands.

PRESSURE VS. VISCOSITY PERFORMANCE

All oils show an increase in viscosity as pressure increases in the process. The stability of MAGIESOL oils enables them to perform optimally as pressure increases and allow a predictable level of viscosity management.

PRESSURE vs. VISCOSITY at 100 °C



References:

- 1) Hombek, R.; Heeman, D.F.; Januszkiewicz, K.R.; Sulck, H.H. Lubr. Eng., 45 (1989),56.
- 2) Kipers, K. Lubr.Eng., 46(1990), 418



MAGIESOL[®] TYPICAL PROPERTIES

PROPERTIES	METHOD	MAGIESOL 44	MAGIESOL 47	MAGIESOL 52
COMPOSITION				
Carbon Type Analysis	ASTM D2140			
Aromatic Carbon Atom %		3	3	0
Naphthenic Carbon Atom %		27	28	31
Paraffinic Carbon Atom %		70	69	69
Aromatics (Wt %)	UV Spectro	0.4	0.8	0.9
Avg. Molecular Weight	BP Elevation	185	206	226
SOLVENCY				
Aniline Point (°F)	ASTM D611	176.0	179.6	188.0
Kauri Butanol Value	ASTM D1133	27.8	26.3	24.2
Distillation, °F				
IBP	ASTM D86	431	485	512
5%		437	493	523
10%		438	494	526
50%		444	501	542
95%		466	527	576
EP		475	539	586
PHYSICAL				
Viscosity, cSt @ 40 °C	ASTM D445	1.91	2.8	3.67
Flash Point (°F)	ASTM (see result)	201 (D93)	242(D93)	270 (D92)
Pour Point (°F)	ASTM D97	-30	-5	10
Specific Gravity 60 °F	ASTM D4052	0.8025	0.817	0.8211
Pounds per Gallon, 60 °F	Calculated	6.681	6.801	6.836
Color, Saybolt	ASTM D156	30	30	30



MAGIESOL® KEY FEATURES

Calumet MAGIESOL rolling oils have several key features that are important to the safe and efficient operation of aluminum rolling.

PURITY

All MAGIESOLS are highly refined to meet US FDA regulations for indirect and direct food contact applications as noted below:

- 21 CFR 178.3910: Metallic Surface Lubricants – Foil and Sheet Rolling
- 21 CFR 172.884: Odorless Light Petroleum Hydrocarbons – Direct Food Additives (see regulation for limitations)
- 21 CFR 178.3650: Odorless Light Petroleum Hydrocarbons – Indirect Food Contact
- 21 CFR 178.3620(b): Technical White Mineral Oils – Indirect Food Contact
- 21 CFR 178.3620(c): Mineral Oils – Non Food Use

OXIDATION RESISTANCE

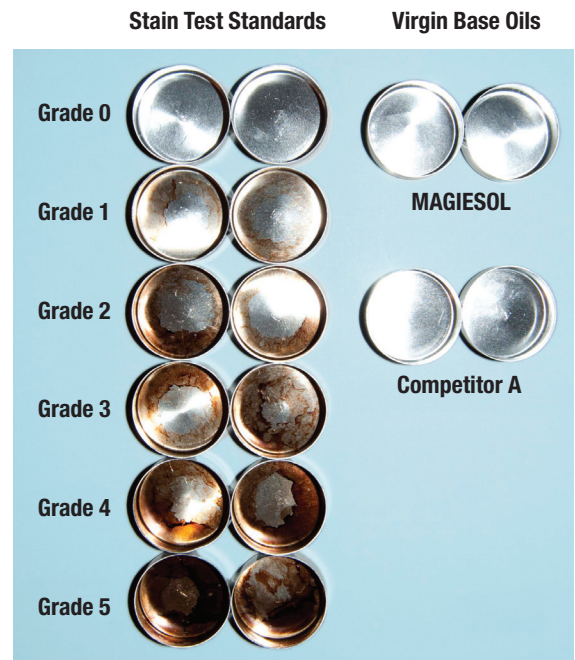
The formation of off-flavor compounds has been attributed to the oxidation of the rolling oil into compounds containing carbonyl groups such as aldehydes and ketones. While these materials are formed from any rolling oil, they are most often produced from performance additives such as alcohols and esters (1,2). Anti-oxidants, such as BHT, can effectively control the formation of these oxidation products. It has been shown, however, that using severely hydrotreated oils such as MAGIESOLS can resist the buildup of carbonyl compounds over twice as long as the normal paraffin materials (1).

FLAVOR

Flavor performance is a critical parameter for certain rolling oil applications. Trace amounts of oxidation products can lead to poor flavor performance in aluminum products. All rolling oils leave a residue on a finished surface even after acid washing. To ensure ongoing flavor performance of our materials, MAGIESOLS are routinely tested and accepted by a major brewery for use as a suitable aluminum rolling oil.

STAIN

Stain formation in aluminum production is a processing problem related to oxidation. Stain, although difficult to measure, is most commonly measured in milligrams of weight gain per millimeter of oil used. When compared to distillates and normal paraffin's, the tight boiling ranges of MAGIESOL rolling oils provide superior oxidation performance to inhibit stain formation.





TECHNICAL ASSISTANCE

For product or technical questions, contact your Sales Representative or Calumet Product Support at (800) 437-3188 or email technical@calumet.com.

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Calumet's sampling and testing procedures in effect at the time of production will be used for certification testing. Results may be based on tank certification, manufacturing data, periodic testing and/or most recent product restock. Typical values only represent the values one would expect if the property were tested in our laboratories with our test methods on the specified date. Some product properties are not frequently measured, and accordingly typical values are not based on a statistically relevant number of tests. The information in this document relates only to the named product. The user is solely responsible for all determination regarding any use and any process.

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Rev. 9/24



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