

SPECIALTY PROCESS OILS

CALSOL™

**Consistent Refinement,
Unsurpassed Performance**

Calumet refineries have over 90 years of experience manufacturing Specialty Process Oils. Our extensive CALSOL product line of Naphthenic and Paraffinic base stocks are engineered to meet your rigorous requirements.

www.calumetspecialty.com



SPECIALTY PROCESS OILS
CALSOL™

**CALSOL™ Naphthenic and
Paraffinic Base Oils by Calumet**

Calumet Specialty Products Partners, L.P. produces naphthenic and paraffinic base oils by using a multi-stage hydrotreating process operating at pressures above 2500 psi. This process offers the unique ability to produce base stocks that meet currently established performance standards.

CALSOL specialty process oils are refined from a select blend of crude oil using a state-of-the-art, multistage hydrogenation process. This severe hydrotreating process offers the unique ability to produce specialty process oils that meet currently established performance standards for a variety of applications. The quality control practices that Calumet implements regarding crude oil selection and subsequent refining processes ensure consistent uniformity and product performance.



WHO WE ARE

**Calumet Has Over 90 Years of Experience
Producing High-Quality Base Oils**



Specialized Expertise

With over 90 years of experience producing high-quality base oils, we've honed the craft of consistent, quality production.



Cost-Effective Supplier

Our centrally located base oil refineries and blending/distribution terminals offer convenient rail and truck access.



Forward Thinking

Ongoing investments support new product development, operational excellence and ISO-9000 quality-related initiatives.



Formulation Flexibility

With nearly 600 unique base oil products, our product portfolio offers a wide range of viscosity and solvency characteristics.



Proven Partner

Calumet base oils are used by top companies and well-known brands across the globe.

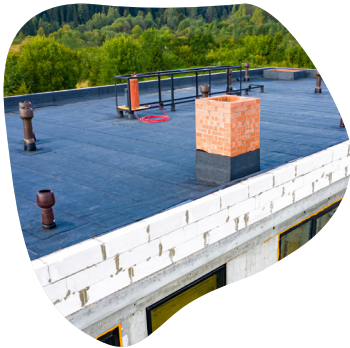


Research & Development

Our network of leading R&D and technical expertise is integrated into the development and support of every product we produce.

COMMITTED TO EXCELLENCE

The CALSOL™ Specialty Process Oils Line Offer a Broad Range of Options for the Chemical and Manufacturing Industries



CALSOL™ 5 Series

NON-STAINING NAPHTHENIC
PROCESS OILS

When the highest levels of color stability, oxidation and aging resistance are required, the CALSOL 5 Series is simply the “Best of the Best.”

- Low Aromatic Levels
- Very Low Polar Compound Levels
- Extremely Low UV Absorptivity

The CALSOL 5 Series is an ideal choice whenever the balance of hardness and color stability is critical. For example: thermoplastics, radial and styrene elastomers.

CALSOL™ 8 Series

HIGH VISCOSITY-GRAVITY
CONSTANT (VGC) PROCESS OILS

Offering color stability, elastomer compatibility, and strong process characteristics, the CALSOL 8 Series aligns with current industry standards and provides optimum compatibility and performance in elastomeric rubber applications.

- High VGC levels
- Low Aniline Points
- Very Low Polar Compound Levels

The CALSOL 8 Series is available in a wide range of viscosities and exhibit the balance of properties that also make them the preferred choice for non-rubber applications such as resin extending, PVC, textiles, and caulking compounds.

CALSOL™ P9 Series

HIGHLY-REFINED PARAFFINIC
PROCESS OILS

Providing excellent color stability without sacrificing elastomer compatibility and process characteristics, the CALSOL P9 Series is aligned to current elastomeric rubber industry standards.

- Low Volatility
- Moderate Aniline Points
- Very Low Polar Compound Levels

The CALSOL P9 Series is available in a wide range of viscosities and exhibit the balance of properties that also make them the preferred choice for non-rubber applications such as EPDM Compounding, PVC, textiles, and caulking compounds.

OIL SELECTION GUIDE

CALSOL™ Specialty Process Oil and Extender Oils

| Compounding Polymer | APPLICATION OBJECTIVE | | | | | |
|---|---|----------------------------------|-------------------------|--------------------|----------------------|----------------------|
| | General Purpose | Maximum Compatibility | Maximum Color Stability | Maximum Volatility | Low Temp Flexibility | High Temp Resistance |
| Butyl (IIR) | P910 thru P9250**, 5550 thru 5160S** | P910 | P190 5550 | P9250 5260S | P910 | P9250 5160S |
| Ethylene Propylene (EPR) (EPM) | P910 thru P9250**, 5550 | P910 5550 | P910 P950** 5550 | P9250 5160S | P910 | P9250 |
| Ethylene Propylene Diene (EPT) (EPDM) | P910 thru P9250**, 5550 thru 5160S**, 810 thru 8240** | P910, 810 thru 8240** | P910 5550 | P9250 5260S | P910 | P9250 5160S |
| Natural (NR) | P910 thru P9250** | P910 510 | P910 5550 | P9250 5260S | P910 | P9250 5160S |
| Neoprene Polychloroprene (CR) | 810 thru 8240**, 5550 thru 5160S** | See Max Oil Loading (PHR) Table | 5550 | 8240 | 510 | 8240 |
| Polyisoprene (IR) | P910 thru P9250**, 5550 thru 5160S** | P910 510 | P910 5550 | P9250 5260S | P910 | P9250 5160S |
| Polybutadiene (BR) | P910, P950, 5550 thru 5160S**, 810 thru 8240** | 510 810 | 5550 | 5160S 8240 | P910 | 5160S 8240 |
| Styrene-Butadiene (SBR) | P950, 810 thru 8240** | 810 | P910 5550 | 5160S 8240 | P910 | 8240 |
| Thermoplastic, Styrenic (SBS) (YSBR) (SIS) (SEBS) | P910, P9250**, 5550 thru 5160S** | 510 thru 5160** | 5550 | P9250 5260S | P910 | P9250 5160S |
| Thermoplastic, Olefinic | 5550 thru 5160S** | P910, P9510**, 5550 thru 5160S** | 5550 | P9250 | P910 | P950 P9250 |

** Specific grade used depends on volatility requirements

| Maximum Oil Loading (PHR) for Various Neoprenes | | | | |
|---|-----|----|-----|----|
| Grade | GNA | W | WHV | T |
| CALSOL 510 | 15 | 25 | 22 | 25 |
| CALSOL 810 | 20 | 30 | 22 | 30 |
| CALSOL 8240 | 20 | 22 | 22 | 25 |

OSHA Hazardous Communication Status

CALSOL specialty process oils do not require labeling as carcinogenic under the OSHA Hazard Communication Standard.

FDA Status

CALSOL specialty process oils meet requirements of FDA 21 CFR 178.3620(c)



CALSOL™ 8 SERIES

High Viscosity-Gravity Constant (VGC) Process Oils

CALSOL™ 5 SERIES

Nonstaining Naphthenic Oils

CALSOL™ 9 SERIES

Highly Refined Paraffinic Process Oils

| CAL SOL™ 8 Series | | | | | | | | | |
|--------------------------------|-------------|--------|--------|-------------|--------|--------|--------|--------|--------|
| Physical Properties* | ASTM Method | 806 | 810 | Calight RPO | 815 | 850 | 875 | 8120 | 8240 |
| Viscosity, cSt / 40°C | D445 | 9.5 | 20.6 | 29.6 | 30.6 | 95.9 | 146.3 | 233.1 | 448.3 |
| Viscosity, cSt / 100°C | D445 | 2.4 | 3.6 | 4.3 | 4.6 | 8.0 | 9.4 | 12.2 | 16.6 |
| Viscosity, SUS / 100°F | D2161 | 59.8 | 108.9 | 154.3 | 158.8 | 512.5 | 794.5 | 1283.0 | 2515.9 |
| Viscosity, SUS / 210°F | D2161 | 34.2 | 38.3 | 40.6 | 41.9 | 53.2 | 58.4 | 68.7 | 87.1 |
| API, Gravity, 60°F (15°C) | D287 | 26.8 | 24.1 | 23.4 | 24.5 | 21.4 | 20.5 | 20.3 | 18.8 |
| Specific Gravity, 60°F, (15°C) | D1250 | 0.8938 | 0.9091 | 0.9134 | 0.9070 | 0.9254 | 0.9309 | 0.9321 | 0.9414 |
| Viscosity-Gravity Constant | D2501 | 0.861 | 0.871 | 0.871 | 0.862 | 0.871 | 0.878 | 0.869 | 0.871 |
| Weight, Lbs. / Gal | D1250 | 7.4524 | 7.5817 | 7.6160 | 7.5622 | 7.7155 | 7.7612 | 7.7714 | 7.8491 |
| Molecular Weight | D2502 | 270 | 305 | 315 | 345 | 370 | 365 | 390 | 405 |
| Pour Point, °F | D97 | -82 | -58 | -43 | -55 | -22 | -11 | 0 | 12 |
| Color | D1500 | L0.5 | L0.5 | L0.5 | L0.5 | 1.0 | 1.0 | L1.0 | 1.0 |
| UV Absorptivity / 260 NM | D2008 | 0.9 | 2.1 | 0.9 | 1.7 | 3.2 | 3.3 | 3.2 | 2.3 |
| Volatility, Wt% @ 225°F | D972 | 60.4 | 13.5 | 5.4 | 12.1 | 3.3 | 1.7 | 1.0 | 0.1 |
| Flash Point, COC, °F | D92 | 302 | 335 | 345 | 325 | 377 | 399 | 423 | 446 |
| Refractive Index | D1747 | 1.4871 | 1.4956 | 1.4973 | 1.4941 | 1.5024 | 1.5118 | 1.5065 | 1.5107 |
| Aniline Point, °F | D611 | 159.5 | 162.1 | 165.7 | 179.0 | 180.0 | 180.0 | 185.8 | 184.6 |
| Clay-Gel, Wt% | D2007 | | | | | | | | |
| Asphaltenes | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Polar Compounds | | 0.01 | 0.03 | 0.00 | 0.26 | 0.65 | 0.89 | 1.78 | 0.01 |
| Aromatics | | 27.58 | 33.60 | 33.56 | 34.58 | 39.20 | 35.60 | 41.42 | 25.96 |
| Saturates | | 72.41 | 66.37 | 66.44 | 65.16 | 60.15 | 63.51 | 56.80 | 74.03 |
| Carbon Type Analysis, % | D2140 | | | | | | | | |
| Ca | | 8 | 10 | 10 | 8 | 8 | 17 | 9 | 9 |
| Cn | | 50 | 49 | 50 | 48 | 52 | 38 | 50 | 52 |
| Cp | | 42 | 41 | 40 | 44 | 40 | 45 | 41 | 39 |
| FDA 21 CFR 178.3620 (c) | FDA | PASS | PASS | PASS | PASS | PASS | PASS | PASS | PASS |

| CAL SOL™ 5 Series | | | | | | | | | |
|--------------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Physical Properties* | ASTM Method | 5550 | 5160S | P904 | P910 | P915 | P930 | P960 | P9250 |
| Viscosity, cSt / 40°C | D445 | 97.1 | 283.4 | 4.0 | 20.1 | 30.4 | 63.9 | 122.6 | 492.0 |
| Viscosity, cSt / 100°C | D445 | 9.0 | 17.0 | 1.5 | 4.1 | 5.3 | 8.3 | 12.6 | 31.7 |
| Viscosity, SUS / 100°F | D2161 | 514.4 | 1539.3 | 39.9 | 105.7 | 156.6 | 331.1 | 642.5 | 2641.2 |
| Viscosity, SUS / 210°F | D2161 | 56.8 | 88.3 | 31.0 | 39.9 | 43.7 | 54.1 | 70.0 | 155.4 |
| API, Gravity, 60°F (15°C) | D287 | 25.2 | 23.2 | 36.8 | 33.5 | 32.3 | 30.3 | 29.0 | 27.0 |
| Specific Gravity, 60°F, (15°C) | D1250 | 0.9029 | 0.9146 | 0.8408 | 0.8575 | 0.8638 | 0.8745 | 0.8816 | 0.8927 |
| Viscosity-Gravity Constant | D2501 | 0.840 | 0.838 | 0.833 | 0.809 | 0.810 | 0.809 | 0.809 | 0.799 |
| Weight, Lbs. / Gal | D1250 | 7.5285 | 7.6258 | 7.0140 | 7.1498 | 7.2022 | 7.2820 | 7.3410 | 7.4430 |
| Molecular Weight | D2502 | 420 | 495 | 210 | 365 | 400 | 470 | 535 | 695 |
| Pour Point, °F | D97 | -36 | -16 | -85 | 5 | 5 | 10 | 13 | 20 |
| Color | D1500 | L0.5 | L1.0 | L0.5 | 1.0 | L1.0 | L1.5 | 2.0 | L3.5 |
| UV Absorptivity / 260 NM | D2008 | 0.5 | 1.7 | 0.1 | 0.1 | 0.4 | 0.3 | 0.6 | 0.8 |
| Volatility, Wt% @ 225°F | D972 | 0.3 | 0.1 | 50.6 | 2.1 | 0.4 | 0.3 | 0.1 | 0.1 |
| Flash Point, COC, °F | D92 | 438 | 499 | 280 | 402 | 436 | 465 | 503 | 598 |
| Refractive Index | D1747 | 1.4918 | 1.4999 | 1.4609 | 1.4698 | 1.4747 | 1.4786 | 1.4834 | 1.4892 |
| Aniline Point, °F | D611 | 209.5 | 217.8 | 176.0 | 220.7 | 223.9 | 240.6 | 248.2 | 269.6 |
| Clay-Gel, Wt% | D2007 | | | | | | | | |
| Asphaltenes | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Polar Compounds | | 0.02 | 0.19 | - | 0.00 | 0.10 | 0.25 | 0.31 | 2.00 |
| Aromatics | | 18.41 | 21.23 | - | 9.40 | 8.30 | 6.72 | 11.47 | 28.00 |
| Saturates | | 81.56 | 78.58 | 93.30 | 90.60 | 91.60 | 93.03 | 88.22 | 70.00 |
| Carbon Type Analysis, % | D2140 | | | | | | | | |
| Ca | | 4 | 7 | 2 | 0 | 3 | 0 | 2 | 1 |
| Cn | | 44 | 38 | 43 | 36 | 31 | 35 | 31 | 29 |
| Cp | | 52 | 55 | 55 | 64 | 66 | 65 | 63 | 70 |
| FDA 21 CFR 178.3620 (c) | FDA | PASS | PASS | - | PASS | PASS | - | - | - |

*All product specifications are typical values, unless otherwise noted.

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**For Product or Technical Questions Contact Your
Sales Representative or Calumet Product Support**

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www.calumetspecialty.com

SHIPPING LOCATIONS

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