

# VISCOPLEX<sup>®</sup> Viscosity Index Improvers

for Crankcase Engine Oil Formulations



# VISCOPLEX® VI Improvers for Crankcase Engine Oil Formulations

RohMax Oil Additives is a leading global supplier of high performance VISCOPLEX® lubricant additives and VISCOBASE® synthetic base fluids for use in automotive and industrial lubricants. We also produce dewaxing aids used in refinery processing and cold flow improvers for biodiesel. We form part of the Coatings & Additives business unit of Evonik Industries, a market leader in specialty chemicals. Our broad line of viscosity index improvers (VIIs) and pour point depressants (PPDs),

derived from proprietary polyalkyl methacrylate (PAMA) technology, helps formulators achieve fuel efficiency targets and cold flow optimization. Our cold flow improvers (CFIs) alter the problematic cold flow properties of biodiesel and our dewaxing aids boost process efficiency through optimized solvent dewaxing. State-of-the-art technology centers, worldwide manufacturing facilities and a global supply chain enable us to provide customized products and solutions to our customers around the world.

Fuel-economy expectations as well as extended drain intervals and low-temperature used-oil viscosity require reliable, robust and long-life lubricants. Our halogen- and phosphorous-free dispersant VISCOPLEX® high performance additives - see Table 1 - contribute to fuel efficiency, engine cleanliness and reduced wear. They also allow the formulation of HDD oils that securely meet used-oil pumpability requirements, even at high soot loadings.

Treat rates to formulate stay-in-grade oils after the Bosch Diesel Injector 30 and 90 cycle tests and the 10 hour CRC L-38 test are shown in Tables 2, 3 and 4 respectively. Treat rates needed for formulations which only meet the fresh oil viscosity targets of SAE J300 are detailed in Table 5.

# VISCOPLEX® VIIs for Crankcase Engine Oil Formulations

## Product Overview

VISCOPLEX®	PSSI in 10W-40 (30 cycles Bosch Diesel Injector; ASTM D6278)	PSSI in 10W-40 (90 cycles Bosch Diesel Injector; ASTM D6278 modified)	PSSI in 10W-40 (10-hour CRC L-38)	Product Type					Thickening Effect at 100 °C	
				Conventional OCP Solution	Highly Concentrated OCP	Dispersant Compatible PAMA/OCP mixture	AMA-Styrene Copolymer	Dispersant PAMA	wt. % in SN 150 (KV100 = 5.4 mm <sup>2</sup> /s)	Viscosity mm <sup>2</sup> /s (ASTM D445)
2-360	32	36	11				x		10.0	15.5
2-540	25	28	12			x			10.0	17.4
2-602	32	36	20			x			10.0	20.7
4-477	20	22	5		x				2.8	10.0
4-577	24	26	11		x				2.8	10.6
4-677	28	31	15		x				2.8	11.5
4-560	26	28	13	x					10.0	11.8
6-565	30	34	9					x	10.0	14.7
6-850	45	48	21					x	10.0	16.0
6-954	45	48	21					x	10.0	15.8
Low temperature performance										

PAMA = Polyalkylmethacrylate

AMA = Alkylmethacrylate

OCP = Olefinocopolymer

Table 1

**Treat rates (wt. %) to formulate stay-in-grade oils after the Bosch Diesel Injector 30 cycles test**

VISCOPLEX®	15W-50	5W-40	10W-40	5W-30	15W-40	0W-20	20W-50	10W-30	20W-40
2-360	10,1-12,3	9,9-12,1	8,2-10,0	5,7-6,9	5,9-7,2		4,4-5,4	4,1-5,1	0,5-0,6
2-540	7,7-9,4	6,9-8,5	6,2-7,6	4,1-5,1	4,7-5,7		4,0-4,8	3,5-4,3	0,8-1,0
2-602	7,5-9,1	7,5-9,1	6,1-7,5	4,4-5,4	4,4-5,4	3,7-4,5	3,3-4,1	3,2-3,9	0,4
4-477	4,2-5,2	4,1-5,0	3,5-4,3	2,3-2,9	2,5-3,1		2,0-2,4	1,9-2,3	0,5-0,6
4-577	4,0-4,9	3,7-4,6	3,2-4,0	2,3-2,8	2,4-2,9		1,9-2,3	1,8-2,1	0,4
4-677	3,8-4,6	3,4-4,2	3,0-3,6	2,2-2,6	2,3-2,8		1,8-2,2	1,6-2,0	0,3
4-560	11,4-14,0	10,7-13,0	9,1-11,1	6,1-7,5	6,5-7,9		5,0-6,1	4,8-5,8	0,7-0,9
6-565	9,9-12,1	9,5-11,6	8,3-10,1	5,4-6,6	5,9-7,2	2,4-3,0	5,2-6,4	4,3-5,3	0,7-0,9
6-850		8,1-9,9	7,1-8,7	4,6-5,6	4,5-5,5	3,9-4,7	4,0-4,8	3,2-3,9	0,5-0,6
6-954		10,2-12,4	8,4-10,2	5,9-7,2	6,4-7,8	1,7-2,1	5,1-6,3	4,5-5,5	0,8-1,0

Table 2

**Treat rates (wt. %) to formulate stay-in-grade oils after the Bosch Diesel Injector 90 cycles test**

VISCOPLEX®	15W-50	5W-40	10W-40	5W-30	15W-40	20W-50	10W-30	20W-40
2-360	10,6-13,0	10,3-12,5	8,5-10,3	5,9-7,2	6,3-7,7	4,8-5,8	4,4-5,4	0,5-0,6
2-540	7,7-9,5	7,0-8,6	6,3-7,7	4,2-5,2	4,8-5,8	4,1-5,0	3,6-4,4	0,9-1,1
2-602	7,7-9,5	7,7-9,5	6,4-7,8	4,7-5,7	4,7-5,7	3,5-4,3	3,3-4,1	0,4
4-477	4,3-5,3	4,1-5,1	3,6-4,4	2,4-3,0	2,6-3,2	2,1-2,5	1,9-2,3	0,5-0,6
4-577	4,1-5,0	3,9-4,7	3,4-4,1	2,3-2,9	2,5-3,1	2,0-2,4	1,8-2,2	0,4
4-677	3,9-4,7	3,6-4,4	3,2-3,9	2,3-2,8	2,4-3,0	1,9-2,3	1,7-2,1	0,3
4-560	12,0-14,7	11,1-13,5	9,4-11,5	6,4-7,8	6,8-8,3	5,1-6,3	5,0-6,1	0,7-0,9
6-565	9,8-12,0	9,8-12,0	8,2-10,0	5,8-7,0	6,0-7,4	5,2-6,4	4,3-5,3	0,9-1,1
6-850		8,9-10,9	7,7-9,4	5,0-6,2	4,7-5,7	4,3-5,3	3,4-4,2	0,5-0,7
6-954		10,5-12,9	8,7-10,7	6,2-7,6	6,7-8,1	5,3-6,5	4,8-5,8	0,8-1,0

Table 3

**Treat rates (wt. %) to formulate stay-in-grade oils after the 10-hour CRC L-38 test**

VISCOPLEX®	15W-50	5W-40	10W-40	5W-30	15W-40	20W-50	10W-30	20W-40
2-360	7,7-9,5	7,9-9,7	6,5-7,9	4,1-5,1	4,5-5,5	3,3-4,1	3,1-3,7	0,4
2-540	6,5-7,9	6,0-7,4	5,4-6,6	3,6-4,4	3,9-4,7	3,2-4,0	3,1-3,7	0,7-0,9
2-602	6,3-7,7	6,6-8,0	5,4-6,6	3,8-4,6	3,8-4,6	2,7-3,3	2,7-3,3	0,3
4-477	3,6-4,4	3,5-4,3	3,1-3,7	2,0-2,4	2,2-2,6	1,7-2,1	1,6-2,0	0,4
4-577	3,4-4,2	3,3-4,1	2,8-3,5	1,9-2,4	2,1-2,5	1,6-2,0	1,5-1,8	0,3
4-677	3,2-4,0	3,2-3,9	2,6-3,2	1,9-2,3	2,0-2,4	1,5-1,9	1,4-1,7	0,2
4-560	9,5-11,6	9,5-11,6	8,1-9,9	5,2-6,3	5,7-6,9	4,3-5,3	4,1-5,1	0,6-0,8
6-565	7,5-9,1	7,7-9,4	6,3-7,7	4,1-5,1	4,4-5,4	3,6-4,4	3,1-3,7	0,6-0,8
6-850	6,1-7,5	6,2-7,6	5,1-6,3	3,4-4,2	3,2-3,9	2,7-3,3	2,3-2,8	0,3
6-954	7,9-9,7	7,9-9,7	6,6-8,0	4,3-5,3	4,6-5,6	3,5-4,3	3,2-4,0	0,5-0,6

Table 4

**Treat rates (wt. %) needed to meet SAE J300 fresh oil viscosity requirements**

VISCOPLEX®	15W-50	5W-40	10W-40	5W-30	15W-40	20W-50	10W-30	20W-40
2-360	7,0-8,6	7,1-8,7	5,9-7,2	3,7-4,5	4,1-5,0	3,1-3,7	2,8-3,4	0,5-0,6
2-540	5,8-7,0	5,4-6,6	4,9-5,9	3,2-3,9	3,4-4,2	2,8-3,4	2,7-3,3	0,7-0,9
2-602	5,2-6,4	5,6-6,8	4,6-5,6	3,0-3,6	3,0-3,6	2,2-2,6	2,2-2,6	0,3
4-477	3,4-4,2	3,4-4,2	3,0-3,6	1,9-2,3	2,1-2,5	1,6-2,0	1,5-1,9	0,3
4-577	3,2-3,9	3,2-3,9	2,7-3,2	1,8-2,1	1,8-2,3	1,4-1,8	1,4-1,7	0,2-0,3
4-677	2,9-3,5	2,9-3,5	2,3-2,9	1,6-2,0	1,6-2,0	1,3-1,5	1,2-1,4	0,2
4-560	8,3-10,2	8,8-10,7	7,4-9,0	4,8-5,8	5,0-6,2	3,9-4,8	3,7-4,5	0,6-0,7
6-565	6,8-8,4	7,0-8,6	5,8-7,0	3,8-4,6	4,0-4,8	3,2-4,0	2,9-3,5	0,5-0,7
6-850	4,9-5,9	5,5-6,7	4,3-5,3	2,7-3,3	2,5-3,1	2,2-2,6	1,8-2,2	0,3
6-954	6,3-7,7	6,6-8,0	5,4-6,6	3,4-4,2	3,6-4,4	2,9-3,5	2,6-3,2	0,4

Table 5

### Additional Information

For additional information on product availability, performance data and Material Safety Data Sheets, please contact your RohMax Account Manager or Customer Service Representative.

For an overview of our entire VISCOPLEX® and VISCOBASE® product range and complete information on handling and storage, please visit the Products & Applications section on our website [www.rohmax.com](http://www.rohmax.com).

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