NUFLUX™ technology: Blend procedure and guidelines

EVONIK
POWER TO CREATE

NUFLUX™ technology: Blend procedure and guidelines

BEFORE YOU BEGIN

Review Evonik's Oil Additives "Storage and Handling Brochure," which establishes guidelines for the proper storing and dispensing of VISCOBASE® and VISCOPLEX® products.

Review safety documentation. If you do not have safety data sheets, please contact us:

Telephone No.	+1-215-706-0843
Toll Free No.	+1-888-876-4629
Regulatory Specialist	+1-215-706-5800
Or for emergencies;	
CHEMTREC	1-800-424-9300
CANUTEC	613-996-6666 (Canada)

At a minimum, we recommend that employees wear appropriate personal protective equipment (PPE), including lab coat, gloves, safety glasses, and safety shoes when blending industrial gear oils based on NUFLUX™ technology. Additional PPE may be required during the handling of hot materials.

Follow proper kettle cleaning procedures to eliminate/minimize product contamination. If the kettle has an available lid, it should be in place during the filtration operation (Step 9 in this procedure) and should also be in place during the transfer of filtered material to the drums (Step 13 in this procedure).

BLEND PROCEDURE (A) USING HIGH-SHEAR MIXERS

1	Transfer the desired amount of NEXBASE® 3080 base oil to the kettle	
2	Begin agitation and heat to a temperature of 60°C (140°F)	
3	Transfer the desired amount of VISCOBASE® 5-220 to the blend kettle	Preheat VISCOBASE® 5-220 to a minimum temperature of 45°C (113°F) and a maximum of 80°C (176°F). The target is 60°C (140°F). At this temperature the product viscosity is low enough for transfer. See "product handling" section for more information on viscosity temperature profile.
4	Continue agitation and watch for high torque and/or motor overheating	The viscosity will increase quickly once the VISCOBASE® is added.
5	Transfer the desired amount of VISCOPLEX® 1-180 to the blend kettle	Preheat VISCOPLEX® 1-180 to a minimum temperature of 45°C (113°F) and a maximum of 80°C (176°F). The target is 60°C (140°F). See product handling section for more information on viscosity temperature profile.
6	Transfer the desired amount of HiTEC® 307, Afton's industrial gear oil additive package, to the blend kettle	If desired, HiTEC® 307 can also be preheated. Afton recommends a maximum handling temperature of 65°C (150°F). Contact Afton for additional details.
7	Maintain a blend temperature of 60°C for 2 hours	
8	Test the sample for kinematic viscosity at 40°C	Viscosity should be within 10% of viscosity grade reported target.
9	Filter the blend such that an ISO cleanliness of at least X/15/12 is achieved (A 3-micron beta 1000 filter has been useful for meeting this ISO cleanliness requirement. Your situation may vary.)	If possible, we recommend to preheat the filter unit to 60°C (140°F) and/or make sure the blend is at 60°C.
10	Remove an appropriate amount of the blend as a sampling for incorporation of the defoamer	Typically (5 to 20 liters) 1-5 gallons. Be careful to not introduce contamination at this point.
11	Add the desired amount of VISCOPLEX® 14-520 defoamer to the sampling taken from the blend kettle and agitate vigorously	

BLEND PROCEDURE (A) USING HIGH-SHEAR MIXERS CONTINUED...

12	Return the sampling, now containing defoamer, to the blend kettle and maintain agitation at a blend temperature of 60°C for an additional hour (60 minutes).	
13	Transfer the blend from the kettle to clean, particulate-free, epoxy-lined steel drums. Ensure that appropriate measures are taken to avoid particulate contamination during transfer.	Pre-cleaned drums are available.
14	Conduct additional testing, as described in the "Product Performance" section	

BLEND PROCEDURE (B) USING FILTRATION CARTRIDGE

1	Add all components (including defoamer) to the kettle	
2	Heat to 50°C and begin mixing with paddle/prop impeller agitation	
3	Mix for 2 hours or until desired viscosity is reached	
4	Recirculate the entire batch through filtration equipment for at least four (4) full turnovers.	The duration of this filtration will vary depending on the equipment and filters used. Please contact your filter supplier for additional support.
5	Transfer to clean drums	

*This filtration cartridge equipment can be used to re-incorporate the defoamer in aged gear oil samples.

PRODUCT PERFORMANCE: TYPICAL DATA OF NUFLUX™ GEAR OIL

Contact your Evonik representative for additional information.

Property	Method	NUFLUX™ ISO VG 320
Kinematic viscosity @ 40°C	ASTM D445	320 cSt
Kinematic viscosity @ 100°C	ASTM D445	37 cSt
Viscosity Index	ASTM D2270	165
Density @ 15°C	ASTM D4052	0.89 g/cm³
Flash Point, COC	ASTM D92	> 220°C
Pour Point	ASTM D97	-36°C
Elemental analysis	ASTM D5185	Report

PHYSICAL PROPERTIES OF BLEND COMPONENTS

VISCOBASE® 5-220

Temperature, °C	Temperature, °F	Density, g/cm³	Density, lbs/gal
40	104	0.924	7.715
60	140	0.912	7.610
80	176	0.899	7.506
100	212	0.887	7.402

Temperature, °C	Temperature, °F	Kinematic viscosity, cSt
40	104	12000
60	140	3290
80	176	1150
100	212	480

VISCOPLEX® 14-520

Density @ 15°C = 0.93 g/cm³
Kinematic viscosity @ 40°C = 17.5 cSt

VISCOPLEX® 1-180

Temperature, °C	Temperature, °F	Density, g/cm³	Density, lbs/gal
40	104	0.894	7.46
60	140	0.882	7.35
80	176	0.869	7.25
100	212	0.856	7.14

Temperature, °C	Temperature, °F	Kinematic viscosity, cSt
40	104	3400
60	140	1325
80	176	603
100	212	310

EUROPE, AFRICA, MIDEAST
Evonik Resource Efficiency GmbH
Kirschenallee
64293 Darmstadt
Germany

PHONE +49 6151-1809
FAX +49 6151 18-4100

oil-additives@evonik.com
www.evonik.com/oil-additives

AMERICAS
Evonik Oil Additives USA, Inc.
723 Electronic Drive
Horsham, PA 19044-4050
USA

PHONE +1 215 706-5800
FAX +1 215 706-5801
TOLL-FREE +1 888 876-4629

ASIA PACIFIC
Evonik Oil Additives Asia Pacific Pte. Ltd.
3 International Business Park
07-18 Nordic European Centre
Singapore 609927

PHONE +65 6809-6666
FAX +65 6809-6707

EVONIK
POWER TO CREATE