



PRODUCT SELECTION FOR HIGH PERFORMANCE GREASES



Synthetic esters in greases

Greases, even though they represent a minor share of the total amount of lubricants used worldwide, are high tech products.

The choice of the base oil, which makes up 80 to 90% of the total grease, has obviously a great impact on the product's performance. The market is still dominated by Lithium and Lithium-complex thickeners, and conventional, mineral base fluids. However, synthetics are needed when a broader operating temperature range is met or when biodegradability is a requirement.

In addition, the decreasing availability of group I mineral base stocks will eventually make high viscosity base oils harder to find.

The need for longer lifetimes and renewable raw materials is also a driver for the use of synthetics, and for esters in particular. This is the reason why the use of synthetic esters is increasing in greases.

Performance base fluids for top tier greases

Synthetic esters possess unique properties that can all be taken advantage of in the formulation of greases: outstanding resistance to oxidation, excellent low temperature behavior, polarity, low volatility, and biodegradability.

Synthetic esters may also be used to formulate H1 greases for food contact applications, or European Ecolabel certified greases.

They are available in a very wide range of viscosities so they may cover a broad variety of applications – from high speed small bearings to heavily loaded, slow open gears.

Producing ester based greases

Producing ester based greases is nothing fundamentally different from using traditional base stocks. But the polarity of esters will change the way soaps will form and may impact the rheology of the grease: some adjustments in the chemical nature of the thickener or in the thickener content may be necessary for best results, especially with high viscosity esters.

In particular, during soap formation water and alkali may cause chemical degradation of esters. In order to limit or suppress this phenomenon, various parameters should be adjusted :

- The use of oil-dispersed Lithium hydroxide (like LUBRIZOL® 5280GR) is specifically recommended as it does not require any water. Only a slight excess of alkali should be used to make the soap alkaline. A pre-formed soap may be used as an alternative solution, suppressing any possibility of hydrolysis taking place ;
- Soap formation should be carried out with as little water as possible. Contactor™ (STRATCO®) type of reactors allows for reduced amount of water in the process, or even anhydrous processes ;
- In case several base fluids are blended, soap should be produced in the less sensitive of them.



PAO BASED GREASES

PAO base fluids may be used to produce low temperature greases or incidental food contact greases. In such formulations synthetic esters are a precious tool :

- to increase the polarity of the medium, resulting in improved additive solubility, seal compatibility, thickening power of soaps, and reduced oil bleeding typically observed with PAO ;
- to fortify resistance to oxidation and minimize volatility whilst keeping excellent low temperature properties.

PRODUCT NAME	Kinematic Viscosity @40°C, mm ² /s	Pour point, °C
Nycobase® ADE	7.7	<-72°C
Nycobase® ADD	13.7	<-72°C
Nycobase® ADT	26.6	-54°C
Nycobase® SEH	11.6	<-72°C
Nycobase® 8103	19.7	-45°C
Nycobase® 9300		

The below grease demonstrates outstanding low temperature performance whilst keeping excellent high temperature resistance.

It is recommended for use at temperatures of -73 to 135°C, for high speed bearings.

Performance is achieved through the use of ISO VG 15 blend of PAO and 10% diester, thickened by 15% Li-X soap.

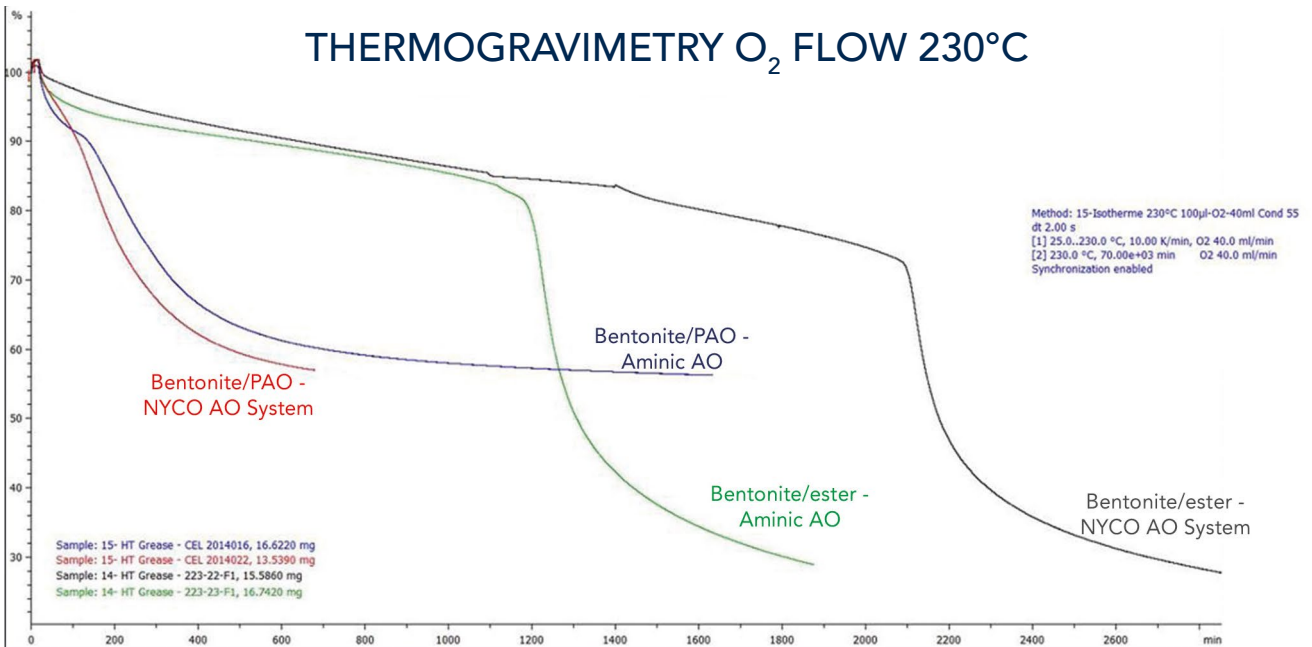
PROPERTIES	UNIT	RESULT	TEST METHOD
Dropping point	°C	250	ISO 2176
Worked penetration 60 strokes 100,000 strokes	1/10 mm	306 332	ISO 2137
Oil separation after 30 h @100°C	%w	3	ASTMD6184
Evaporation loss 500 h @121°C 22 h @100°C	%w	7 0.5	ASTMD972
Oxidation stability – 100 h / 500 h	kPa	10 / 55	ASTMD942
Torque @ -73°C (starting / 1h) Without water With 10% water	Nm	0.7 / 0.07 0.9 / 0.1	ASTMD1478
Bearing performance @135°C	h	>1000	ASTMD3336
Elastomer compatibility NBR-L – 168 h @70°C	%V	16	ASTMD4289



HIGH TEMPERATURE GREASES

Neopolyol esters may be used in performance greases for high temperature applications. By carefully selecting the ester base fluid and the anti-oxidant system, it is possible to produce greases resisting temperatures exceeding 230°C, showing unusually low volatility and leaving very little residue.

PRODUCT NAME	Kinematic Viscosity @40°C, mm ² /s	Evaporation %, 6 h at 200°C
Nycobase® 1040X	100	1.7
Nycobase® 1060X	240	2.2
Nycobase® 9600X	390	2.2





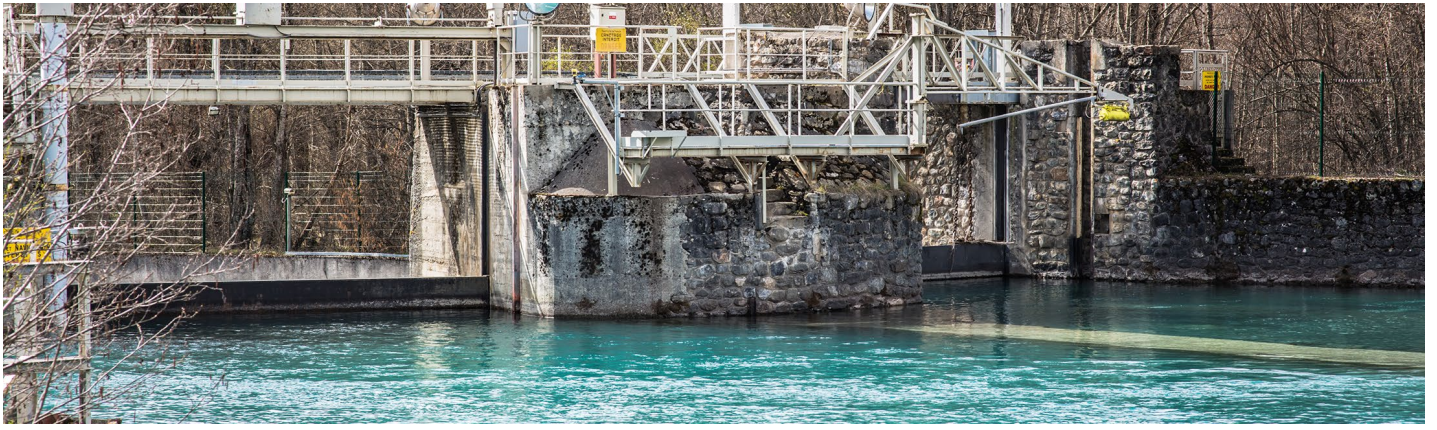
GREASES BASED ON HIGH VISCOSITY FLUIDS

Limited market offer on high viscosity base fluids generates increasing use of polymers to bring the base oil to the desired viscosity. Complex esters are available at viscosities of up to 10 000 mm²/s at 40°C.

Such esters do not only increase viscosity, they also contribute to grease adhesiveness and resistance to water, as well as reduced oil bleeding thanks to their polarity.

PRODUCT NAME	Kinematic Viscosity @40°C, mm ² /s	Viscosity Index	Pour point, °C
Nycobase® 8361	320	149	-33
Nycobase® 8397	1,000	166	-24
Nycobase® 8851	515	163	-33
Nycobase® 4045	424	155	-33
Nycobase® 8898	1,200	177	-24
Nycobase® 6001	10,000	243	-9





ENVIRONMENTALLY ACCEPTABLE GREASES

A number of neopolyol esters show high levels of biodegradability according to OECD 301B, including high viscosity grades, particularly useful for highly adhesive biodegradable marine open gear greases for instance. Esters are therefore recommended for the formulation of biodegradable greases complying with the European Ecolabel, the VGP requirements and other environmental standards.

PRODUCT NAME	Kinematic Viscosity @ 40°C mm ² /s	Kinematic Viscosity @ 100°C mm ² /s	Viscosity Index	Pour Point °C	Biodegradability %
Nycobase® 7300 EL	13.8	3.4	124	-66	85
Nycobase® 8103 EL	19.6	4.4	136	-46	79
Nycobase® 9300 EL	21.0	4.6	140	-45	75
Nycobase® 8311 EL	22.6	4.9	148	-36	77
Nycobase® 8306 EL	28	5.7	160	-39	67
Nycobase® 8318S EL	42.5	7.7	151	-36	67
Nycobase® SNG EL	45.6	8.1	153	-30	72
Nycobase® 8345 EL	45.2	8.2	158	-41	81
Nycobase® 3118 EL	47	9.2	184	-45	84
Nycobase® STM EL	96	13.6	143	-30	65
Nycobase® SMP EL	147	18.3	138	-39	80
Nycobase® 8361 EL	330	34.6	149	-33	75
Nycobase® 8397 EL	1015	85	166	-24	70



FOOD GRADE GREASES

NYCO's range of HX-1 certified esters for use as an ingredient of greases certified for incidental food contact are available at viscosities ranging from 8 to 10 000 mm²/s at 40°C. These products may combine all of the benefits described above: excellent high and low temperature behavior, outstanding resistance to thermo-oxidation, low volatility, polarity, biodegradability – in addition to being registered for incidental food contact.

PRODUCT NAME	Kinematic Viscosity @ 40°C mm ² /s	Kinematic Viscosity @ 100°C mm ² /s	Viscosity Index	Pour Point °C	Flash Point °C
Nycobase® 20307 FG	11.7	3.3	164	-66	224
Nycobase® 30401 FG	20	4.5	143	-45	255
Nycobase® 30409 FG	21.2	4.6	141	-48	255
Nycobase® 30502 FG	23	5	150	-36	267
Nycobase® 40810 FG	45	8.1	157	-39	265
Nycobase® 43203 FG	325	34	147	-33	276
Nycobase® 43608 FG	320	36.2	160	-39	278
Nycobase® 32506 FG	390	25.3	89	-20	295
Nycobase® 45004 FG	503	50.3	163	-33	284
Nycobase® 46115 FG	10077	622	243	-6	286



NYCO
INDUSTRY & AUTOMOTIVE



NYCO

Corporate headquarters

66 avenue des Champs-Élysées, BP 414,
75366 Paris Cedex 08
France
Tel.: +33 1 45 61 50 00

UNITED-STATES

NYCO America LLC, a subsidiary of NYCO

87 Amlajack Way, Newnan, GA 30265,
United-States
Tel.: +1 877 872 6926

GERMANY

Deutsche NYCO GmbH, a subsidiary of NYCO

Heinrich-Helbing-Str. 22a
D-22177 Hamburg Germany
+49 40 411 609 0
de.info@nyco-group.com

ASIA PACIFIC

NYCO Asia Pacific Pte Ltd

690 West Camp Road
JTC Aviation Two, Unit#10-11/12
Singapore 797523
Tel.: +65 8750 0283

RUSSIA

LLC NYCO Vostok, a subsidiary of NYCO

8th floor, Khlebnyi per. 19A, 121069 Moscow,
Russia
Tel.: +7 495 180 13 62
mail@nycovostok.ru

INDIA

AVI-OIL India [P] Ltd., a joint venture of Indian Oil Corporation Ltd Balmer Lawrie and Co. Ltd. and NYCO

Logix City Center Office Tower, 12th Floor, Tower – A, Sector – 32,
Noida, Uttar Pradesh – 201301
India
Tel.: +91 11 2373 0607 / 08 / 09
info@avi-oil.com



NYCO
Solutions ahead

NYCO, 66 avenue des Champs-Élysées BP 414 - 75366 Paris Cedex 08 - FRANCE
Tel : +33 1 45 61 50 00 - info@nyco-group.com - www.nyco-group.com