NYCO
INDUSTRY & AUTOMOTIVE

PRODUCT SELECTION FOR
2-STROKE ENGINE OILS

Boost engine performance and durability

The market for 2-stroke engines is divided into several categories which do not follow the same trends :

- small engines used for transport (i.e. motorcycle) have switched from 2-stroke to 4-stroke technology, driven by environmental/pollution concerns.
- 2-stroke engines remain an important technology in the recreational activities market, either outboard or non outboard such as snowmobile.
- 2-stroke engines remain the best technology for mobile power unit tools such as chainsaw engines thanks to their light weight and power.

However, durability may be a concern when using a 2-stroke engine: the selection of the lubricant is a key parameter to ensure long life, high performance and cleanliness of engines. In addition, 2-stroke engines lubrication is a total loss lubrication process, and therefore generates growing needs for improved environmental profile.

NYCO solutions include high performance synthetic esters and formulated 2-stroke engine oils.

SYNTHETIC ESTERS

Diesters, neopolyol and complex esters

- Clean degradation mechanisms
- Added detergency
- Excellent lubricity properties
- Thermo-oxidative stability

FULLY FORMULATED 2-STROKE ENGINE OILS

Ester based performance oils

- For outboard or non outboard engines
- High engine power output
- Superior engine cleanliness
- Improved environmental profile, when required

ADVANTAGES AND BENEFITS

High thermal stability	Suitable for air cooled engines
Added detergency	Engine cleanliness
Biodegradable ester	Reduced environmental impact
Lubricity	Protection against wear and scuffing
	Increased power output

Products references, properties & performance next pages

SYNTHETIC ESTERS

REFERENCE	
Nycobase® 3608	High performance diester with excellent lubricity.
Nycobase® 8311	Low viscosity neopolyol ester with improved lubricity and high biodegradability.
Nycobase® 8311 EL	Low viscosity neopolyol ester with improved lubricity and high biodegradability. LuSC List registered for use in Ecolabel certified formulations.
Nycobase® 8103 **Nycobase® 9300**	Low viscosity neopolyol ester delivering excellent cleanliness and high biodegradability.
Nycobase® 8103 EL **Nycobase® 9300 EL**	Low viscosity neopolyol ester delivering excellent cleanliness and high biodegradability. LuSC List registered for use in Ecolabel certified formulations.
Nycobase® 8306	Synthetic complex ester showing top performance on cleanliness and lubricity.
Nycobase® 8306 EL	Synthetic complex ester showing top performance on cleanliness and lubricity. LuSC List registered for use in Ecolabel certified formulations.

Typical properties

PRODUCT NAME	Kinematic Viscosity @ 40°C mm^2/s	Kinematic Viscosity @ 100°C mm^2/s	Viscosity Index	Pour Point °C	Flash Point °C	Biodegradability OECD 301B %
DIESTER						
Nycobase® 3608	99	13.6	139	-51	300	
NEOPOLYOL ESTER						
Nycobase® 8311	22.6	4.9	148	-36	270	77
Nycobase® 8311 EL	22.6	4.9	148	-36	270	77
Nycobase® 9300	21	4.6	140	-45	260	75
Nycobase® 9300 EL	21	4.6	140	-45	260	75
Nycobase® 8103	19.6	4.4	136	-46	257	79
Nycobase® 8103 EL	19.6	4.4	136	-46	257	79
COMPLEX ESTERS						
Nycobase® 8306	28	5.7	160	-39	268	67
Nycobase® 8306 EL	28	5.7	160	-39	268	67

FULLY FORMULATED 2-STROKE ENGINE OILS

REFERENCE	
Nycolube® 221	Non outboard, low smoke, air-cooled engines – JASO FD
Nycolube® 248	High performance, air-cooled engines, low smoke, biodegradable oil – JASO FD
Nycolube® 210 EL	High performance, marine outboard, biodegradable oil Water-cooled and air-cooled engines European Ecolabel certified (undyed version) – NMMA TC-W3®

Typical properties

PRODUCT NAME	Kinematic Viscosity @ 100°C mm^2/s	Flash Point PM °C	Sulfated Ash %	Total Base Number mg KOH/g	Biodegradability %	Performance level
Nycolube® 221	11	111	0.17	0.69	-	ISO-L-EGD JASO FD
Nycolube® 248	7.8	94	0.1	0.50	64	ISO-L-EGD JASO FD
Nycolube® 210 EL	8.2	258	0.01	3.83	62	NMMA TC-W3® API TC +

PERFORMANCE TESTS SUMMARY

NYCOLUBE® 210 EL

Extracts from Lubrizol and EG&G Automotive Research Technical Reports

BENCH TESTS RESULTS		
DESCRIPTION	**RESULT**	**LIMITS**
Compatibility	Pass	Homogeneous after mixing separately with each ref. oil (* - **) and stored for 48hours
Brookfield @ -25°C, cP (Candidate / Evaluation)	4170 / Pass	Less than 7500 cP
Miscibility @ -25°C, inversions (Candidate / Reference / Evaluation)	83 / 104 / Pass	No more than 10% inversions than reference (*)
% Rust (Candidate / Reference / Evaluation)	5.27 / 7.12 / Pass	Equal or better than reference (*)
Filterability, % change (Candidate / Evaluation)	-1.05 / Pass	Decrease in flow no greater than 20%
Biodegradability according to OECD 301B	62%	

ENGINE TESTS RESULTS		
DESCRIPTION	**RESULT**	**LIMITS**
OMC 40 hp test - 98 hours	Cand./ Ref./ Evaluation	
Average Piston Varnish	8.9 / 9.3 / Pass	Not lower than 0.6 below reference (*)
Top Ring Stick	9.0 / 9.5 / Pass	Not lower than 0.6 below reference (*)
OMC 70 hp test - 100 hours	Cand. /Ref. / Evaluation	
Average Piston Deposits	7.3 / 5.3 / Pass	Equal or better than reference (***)
Second Ring Stick	10.0 / 7.4 / Pass	Equal or better than reference (***)
Mercury 15 hp test 2 tests x 100 hours each	1st test / 2nd test / Evaluation	
Average second ring sticking	10 / 10 / Pass	8 or greater
Average second land deposits	8.03 / 7.72 / Pass	6 or greater
Compression loss	4 / 1 / Pass	< 20 psig
Circumferential scuffing	0 / 3 / Pass	< 15%
Area scuffing	0 / 1 / Pass	< 20%
Bearing stickiness	Pass / Pass / Pass	Pass
Ring wiping	0 / 0 / Pass	< 5%
Yamaha CE50S lightening / lubricity test	Cand. / Ref. / Evaluation	
Torque drop, lb-in	5.71 / 5.64 / Pass	Equal or better than ref. (**) with 90% confidence level
Yamaha CE50S Preignition test (100 hours)	Cand. / Ref. / Evaluation	
Major Preignitions	1 / 1 / Pass	Equal or better than reference (*)

CHAINSAW ENGINE TEST		
DESCRIPTION	RESULT	
Test Number	HVA 266 - HTS 434 @ 260°C	
Ring Stick	9.5	10 = free
Ring Groove Lacquer	9.0	10 = clean
Crown Land Lacquer	5.2	10 = clean
Skirt Exterior Lacquer	9.9	10 = clean
Undercrown Lacquer	9.9	10 = clean
Evaluation	**Pass**	

BNM DT-6 on HVA 346	
Test approved	Yes
Ringsticking	No
Scuffing	No
Classification	
Piston top	4-/3
Topland	3
Piston skirt	3
Ring + ringland	3/2.5
Piston pin	3
Pin bearing	3
Combustion chamber	3/3-
Exhaust port	3
Sparkplug	3
SUM 1 (high)	**27.75**
SUM 2 (low)	**26.25**

(*) = #93738 (TC-W II ref oil) / (**) = XPA-3259 / (***) = OR-71591OR-71591

The above values are typical values. They do not constitute any contractual commitment.

PERFORMANCE TESTS SUMMARY

NYCOLUBE® 221

Extract from Lubrizol Technical Report K11313

ISO L-EGD PERFORMANCE DATA		
DESCRIPTION	**RESULT**	**LIMITS**
Honda detergency (3hr GD DIX)	154	125 min
Piston Skirt Varnish (GD VIX)	105	95 min
Lubricity Index (LIX)	112	95 min
Torque Index (TIX)	99	98 min
Suzuki Blocking (BIX)	158	90 min
Suzuki Smoke (SIX)	116	85 min

PIAGGIO HEXAGON PERFORMANCE DATA	
DESCRIPTION	**RESULT**
RING STICK & PISTON RATING	MERIT RATING
Top	5.5
Second	10.0
LAQUER MERIT	
Groove Top	1.6
Groove Second	9.5
Land Top	3.9
Land Second	9.2
Undercrown	2.7
Skirt	9.8
CARBON MERIT	
Groove Top	8.5
Groove Second	10.0
Land Top	8.6
Land Second	10.0
Piston Crown	7.1
Cylinder Head	6.0
TOTAL	**102.4**
AVERAGE MERIT RATING	**7.3**

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PERFORMANCE TESTS SUMMARY

NYCOLUBE® 248

Extract from Lubrizol Technical Report K12124

ISO L-EGD PERFORMANCE DATA		
DESCRIPTION	**RESULT**	**LIMITS**
Honda detergency (3hr GD DIX)	136	125 min
Piston Skirt Varnish (GD VIX)	106	95 min
Lubricity Index (LIX)	98	95 min
Torque Index (TIX)	100	98 min
Suzuki Blocking (BIX)	109	90 min
Suzuki Smoke (SIX)	95	85 min

PIAGGO HEXAGON PERFORMANCE DATA			
DESCRIPTION	**NYCOLUBE 248**	**PIAGGIO HIGH REF (RL203)**	**PIAGGIO LOW REF (RL204)**
RING STICK & PISTON RATING		MERIT RATING	
Top	5.60	6.30	4.00
Second	10.00	10.00	4.00
LAQUER MERIT			
Groove Top	2.81	1.50	0.79
Groove Second	8.98	3.29	2.38
Land Top	5.29	4.01	2.30
Land Second	7.59	6.68	3.92
Undercrown	6.92	3.26	0.60
Skirt	9.54	8.66	7.32
CARBON MERIT			
Groove Top	8.52	5.78	4.16
Groove Second	9.95	9.52	8.39
Land Top	5.29	8.55	8.24
Land Second	9.88	9.60	6.42
Piston Crown	6.76	8.12	7.35
Cylinder Head	6.12	5.02	5.95
TOTAL	**106.86**	**90.29**	**65.82**
AVERAGE MERIT RATING	**7.63**	**6.45**	**4.70**
Exhaust Port Blocking %	Trace	3	10

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PERFORMANCE TESTS SUMMARY

NYCOLUBE® 248

Extract from Lubrizol Technical Report K12124

APRILIA SR50 DITECH PERFORMANCE DATA			
DESCRIPTION	NYCOLUBE 248	FULL SYNTH. REF. OIL	PARTLY SYNTH. REF. OIL
RING STICK & PISTON RATING	MERIT RATING		
Top	10.00		
Second	10.00		
LAQUER MERIT			
Groove Top	2.00		
Groove Second	3.44		
Land Top	2.69		
Land Second	3.41		
Undercrown	5.30		
Skirt	7.86		
CARBON MERIT			
Groove Top	8.40		
Groove Second	9.90		
Land Top	8.65		
Land Second	9.65		
Piston Crown	9.00		
Cylinder Head	8.98		
SCUFFING	**None**		
AVERAGE MERIT RATING	**7.09**	**7.38**	**5.48**
Exhaust Port Blocking %	1	6	3

CHAINSAW ENGINE TEST			
DESCRIPTION	**HVA 272**	**DESCRIPTION**	**HVA 346**
Test Number	HTS 542	Test number	41
Ring Stick 1 merit	10.00	Test Approved	YES
CEC Rating Summary		Ringsticking	NO
Ring Groove Lacquer 1 merit	4.75	Scuffing	NO
First Land Lacquer 1 merit	5.32	Piston top	4-/3
Skirt Exterior Lacquer merit	9.22	Top land	3
Undercrown Lacquer merit	9.95	Piston skirt	3/3-
Total CEC Piston Rating	**29.24**	Ring + ringland	3/3-
Average	**7.31**	Piston pin	3
Exhaust Port Blocking %	Trace	Pin bearing	3
		Combustion chamber	3+/3-
		Exhaust port	3
		Sparkplug	3
		SUM	**28**

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NYCO
INDUSTRY & AUTOMOTIVE

NYCO

Corporate headquarters
66 avenue des Champs-Elysées, 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
Tel.: +49 40 411 609 14
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