

RENOLIN

Lubricants for Turbines



MOVING YOUR WORLD





FUCHS LUBRICANTS GERMANY

We do not just develop lubricants. We develop intelligent solutions for highly complex challenges.

To this end, we have pooled our expertise and experience from a wide range of application areas: FUCHS SCHMIERSTOFFE and FUCHS LUBRITECH became FUCHS LUBRICANTS GERMANY. Our goal: to keep our customers' world in motion. Efficient, sustainable, reliable. Today and tomorrow.

What can we move for you?

FUCHS LUBRICANTS GERMANY

Facts and figures

Company: FUCHS LUBRICANTS GERMANY GmbH,
a company of the FUCHS Group

Locations: Based in Mannheim, with sites in
Bremen, Dohna, Hamburg, Kaiserslautern, Kiel and Wedel; ap-
prox. 1,400 employees

Product range: A full range of more than 3,000 products
for all application areas

Certifications i. a.: ISO 9001, IATF 16949, ISO 14001,
ISO 45001, ISO 50001, ISO 21469, HALAL, KOSHER
(detailed certifications at www.fuchs.com/de/en)

CO₂ neutral production*

Since 1931, we have been pursuing the same goal: to keep the world moving. With innovative and technological lubricant solutions that have a sustainable impact on the future. Unconditional reliability is our top priority, it is the foundation of our company and basis for everything that defines us.

Reliability is both a driver and a demand. And it's a promise to all our customers in the fields of automotive suppliers and OEMs, mechanical engineering, metal processing, mining and exploration, aerospace, energy, construction and transport, agriculture and forestry, as well as the paper, steel, metal, cement, forging and food industries, but also qualified lubricant dealers, car dealerships and workshops.

Long-term experience, high development strength and the fulfillment of far-reaching standards are the basis for the special quality of our world-leading product brands. We deliver solutions that are simply more efficient and therefore more sustainable. We always think in holistic solutions. For the development of individual solutions, we enter into an intensive customer dialog with you. This is the way we live up to our claim of moving your world.

MOVING YOUR WORLD

*Partially also based on compensation



IT ALL DEPENDS ON THE RIGHT LUBRICANT

The global demand for energy continues to increase. Apart from the building of new power stations, an ever greater emphasis is also being placed on increasing the efficiency of energy production.

The demands on turbine oils

The use of new technologies in power stations and the increasing efficiency and performance of gas and steam turbines is placing greater demands on the performance of the lubricants used in these applications.

Significantly lower oil volumes for higher-performance turbines along with the use of oil circuits in combined cycle (so called G&S-units) gas and steam turbines require long-life turbine oils which display, among others, outstanding thermal oxidation stability and excellent water and air release properties.

FUCHS has developed the **RENOLIN ETERNA-series** and **RENOLIN ETERNA SGV-series** to meet the demands of such turbines and machinery as well as highly-stressed gearboxes.

RENOLIN ETERNA

High-tech turbine oils of the highest quality

The RENOLIN ETERNA series was developed to satisfy the increasing demands of today's turbine oils and to facilitate a degree of rationalization in gas and steam power-plants. These oils were also formulated for use in power-plants which integrate highly-stressed gearboxes.

RENOLIN ETERNA series products are perfect for use in gas, steam and expansion turbines as well as turbo-compressors with or without gearboxes. In addition, they can also be used as bearing and sealing oils in hydrogen-cooled generators and as mineral oil-based control fluids in the hydraulic control circuits of turbine units. RENOLIN ETERNA turbine oils can be used as a fully formulated high performance hydraulic fluid type HLP and H(V)LP according to DIN 51524 / ISO 11158.

The objective of our development of RENOLIN ETERNA turbine oils was to offer our customers excellence (EP/AW) wear protection, good ageing stability and minimal sludge and deposit-forming tendencies. RENOLIN ETERNA products offer also excellent corrosion protection (e.g. steel, iron, yellow metal material, bearing material).

They are based on the very latest lubricant technology, containing premium, hydrogenated base oils. The outstanding properties of these base oils are further improved by the inclusion of carefully-selected additives.

RENOLIN ETERNA products are free of organometallic compounds and are therefore zinc- and ash-free.

Advantages:

- Outstanding thermal oxidation stability. RENOLIN ETERNA achieves excellent life of > 10,000 hours in TOST test according to ISO 4263 (see Figure 1) as well as RPVOT test > 1,000 minutes according to ASTM D-2272 (see figure 2).
- Good viscosity-temperature behavior: RENOLIN ETERNA oils have high, shear-stable, natural Viscosity Index (VI ≥ 130).
- Rapid air release: Air release < 4 minutes.
- Low foaming: Seq I at 24°C = 30/0
- Low pourpoint: PP -15°C
- Good wear protection: FZG A/8.3/90 failure load stage >10 according ISO 14635
- Excellent water release after steam treatment: < 50 seconds. (Water separation time)
- Low sludge and deposit forming tendency.
- Prevention of „Varnish and sludge“ due to excellence ageing stability.
- High performance hydraulic fluid according DIN 51524 HLP, H(V)LP
- With approvals from major OEMs

RENOLIN ETERNA Turbine Oils are „Low Varnish“-Oils

Oil ageing, 168 hours at +135°C in a beaker with a steel cylinder (FUCHS In-house test).

Thermal stability and deposit tendency of the various base oils in turbine oil formulations.



Poor thermal stability
Significant deposits



Moderate thermal stability
Moderate deposits



High thermal stability
No deposits

MAN HT-Test (high temperature test)

RENOLIN ETERNA 32 meets and exceeds the requirements of the MAN HT test with excellent results.

RENOLIN ETERNA is characterised by very good wear protection, high oxidation stability and excellent thermal stability.



RENOLIN ETERNA 32
Fresh oil room temperature



RENOLIN ETERNA 32
Fresh oil 120°C



RENOLIN ETERNA 32
Fresh oil 150°C

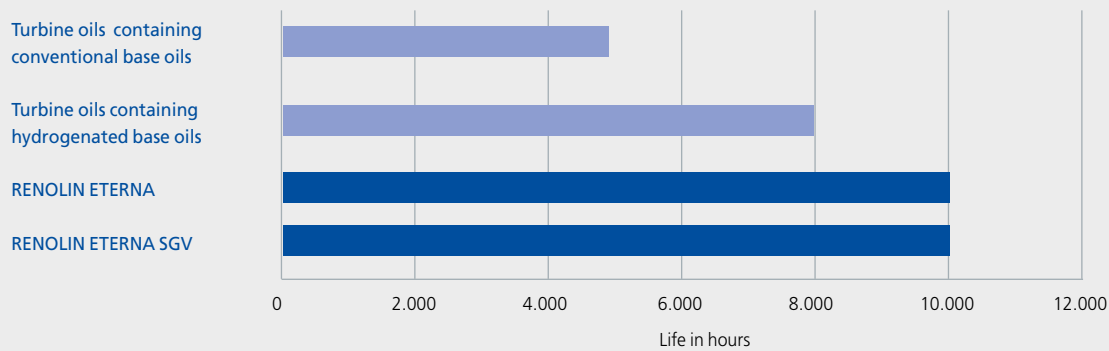


RENOLIN ETERNA 32
Fresh oil 180°C

RENOLIN ETERNA Turbine oils are „Long Lifetime“-fluids

TOST Test acc. to ISO 4263; excellent oxidation stability

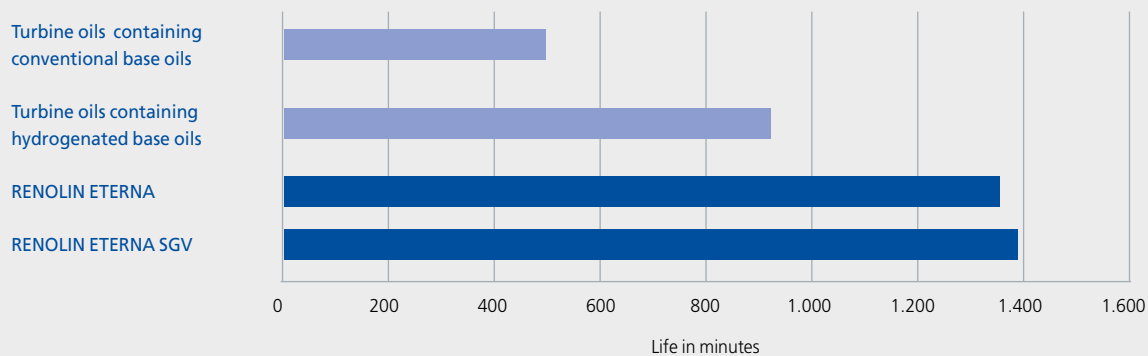
Figure 1: Typical oxidation stability in TOST test comparison of common turbine oils based on various base oils (TOST= Turbine Oxidation Stability Test)



High oxidation stability

RPVOT Test acc. to ASTM D-2272

Figure 2: Typical oxidation stability in RPVOT test comparison of common turbine oils based on various base oils (RPVOT= Rotating Pressure Vessel Oxidation Test)



RENOLIN Products for turbine applications: Turbine oils, fire resistant hydraulic fluids, cleaning fluids, corrosion protection (VCI additive concentrate)

Product-name	Classification / base oils	Density at 15 °C [kg/m ³]	Flash Point Clev. [°C]	Kin. Visc. at 40 °C [mm ² /s]	Kin. Visc. at 100 °C [mm ² /s]	VI Viscosity index	Pour-point [°C]	Main application areas
RENOLIN ETERNA 32	Turbine oils L-TD and L-TG acc. DIN 51515 Part 1 and Part 2 Group III base oils, TDP, TGP acc. DIN 51515 HLP acc. DIN 51524 EP/AW-FZG > 10	842	220	32	5,8	126	-15	Turbine oils for gas- and steam turbines with EP/AW for gear-boxes, control fluid for turbine units, and for turbo compressors
RENOLIN ETERNA 46		846	220	46	7,6	132	-15	
RENOLIN ETERNA 68		851	230	68	9,5	120	-15	
RENOLIN ETERNA 32 SGV	Turbine oils L-TD and L-TG acc. DIN 51515 Part 1 and Part 2 Group III base oils, TD and TG acc. DIN 51515 EP/AW-FZG ≥ 7	838	220	32	5,8	126	-15	Turbine oils for gas- and steam turbines without EP additives, especially suited for compression of synthesis gases and ammonia, higher thermal stability
RENOLIN ETERNA 46 SGV		846	220	46	7,6	132	-15	
RENOSAFE TURBO 46 HF	Fire resistant hydraulic fluid based on phosphoric acid ester; HFD-R46 acc. ISO 12922, universal applicable	1150	262	44,5	5,0	-	-24	Special HFD-R fluid for control circuits of turbine units, excellent miscibility and compatibility with conventional HFDR fluids
RENOLIN ETERNA CLEAN ISO VG 46	Polar cleaning fluid for turbine circuits miscible and compatible with: RENOLIN ETERNA, recommended treat rate 5% -10 %	893	238	46	6,83	-	-42	Universal applicable cleaning fluid for turbine circuits, excellent miscibility and compatibility with RENOLIN ETERNA (5-10 % treat rate)
RENOLIN ETERNA CLEAN ISO VG 32		910	220	29	4,84	-	-42	
RENOLIN VCI BOOST	Additiv concentrate for the use in RENOLIN gear-, hydraulic- and turbine oils, contains VCI components (Volatile Corrosion Inhibitors) recommended treat rate 2%	905	155	105	12,5	112	-12	Universal applicable VCI corrosion protection concentrate for the use in RENOLIN ETERNA products, easy to handle (2 % treat rate)

Note

The information contained in this product information is based on the experience and know-how of FUCHS LUBRICANTS GERMANY GmbH in the development and manufacturing of lubricants and represents the current state-of-the-art. The performance of our products can be influenced by a series of factors, especially the specific use, the method of application, the operational environment, component pre-treatment, possible external contamination, etc. For this reason, universally-valid statements about the function of our products are not possible.

Our products must not be used in aircraft or spacecraft. Our products may be used in the manufacture of components for aircraft or spacecraft if they are removed without residue from the components prior to assembly into the aircraft or spacecraft.

The information given in this product information represents general, non-binding guidelines. No warranty expressed or implied is given concerning the properties of the product or its suitability for any given application. We therefore recommend that you consult a FUCHS LUBRICANTS GERMANY GmbH application engineer to discuss application conditions and the performance criteria of the products before the product is used. It is the responsibility of the user to test the functional suitability of the product and to use it with the corresponding care. Our products undergo continuous improvement. We therefore retain the right to change our product program, the products, and their manufacturing processes as well as all details of our product information sheets at any time and without warning, unless otherwise provided in customer-specific agreements. With the publication of this product information, all previous editions cease to be valid. Any form of reproduction requires express prior written permission from FUCHS LUBRICANTS GERMANY GmbH.

RENOLIN ETERNA CLEAN

Cleaning fluid for turbine oil circuits

The formation of sludge, varnish and ageing products in turbine units (steam and/or gas turbines) can cause extreme problems. The question in this application is how to clean the circuits efficiently and accurately. FUCHS has developed RENOLIN ETERNA CLEAN as an universal cleaning fluid for turbine oil circuits. RENOLIN ETERNA CLEAN is a polar cleaning fluid especially designed for the cleaning of turbine oil circuits. With RENOLIN ETERNA CLEAN old deposits, varnish and other oil degradation products can effectively be removed from the system before an intended oil change. There will be no impairment of the new filling and no deterioration of the air and water separation behavior or other negative impacts which occur with conventional cleaners (detergents).

RENOLIN ETERNA CLEAN contains a complete additive system adjusted to the turbine oils of RENOLIN ETERNA series. Therefore a „weakening“ of the turbine oil filling – arising by addition of conventional cleaners / detergents – will be prevented.

RENOLIN ETERNA CLEAN is compatible with all common turbine oils and is ideally used according to the following scheme:

In general it is recommended to add approx. 5-10 % RENOLIN ETERNA CLEAN to the existing turbine oil filling. RENOLIN ETERNA CLEAN should be used during 2-4 months

(mild cleaning effect) together with an anti-varnish unit (so called ESP, VMU units from different manufactures).

After the cleaning, the oil can be drained off and the new oil can be filled into the system without prior flushing. During the whole cleaning process oil monitoring analysis should help to interpretate the status of the cleaning procedure / of the cleaning effect. RENOLIN ETERNA CLEAN is compatible with all common turbine oils.

RENOLIN ETERNA CLEAN offers a mild but continuous cleaning effect of old deposits and varnish. In general there is no additional flushing necessary (with regard to remaining quantity of RENOLIN ETERNA CLEAN).

RENOLIN ETERNA CLEAN does not influence the air and water separation behavior of the existing oil filling. Nor is there any other negative impact on the performance of the turbine filling.

RENOLIN ETERNA CLEAN contains a complete turbine oil additive system (the functionality of the turbine oil filling the remains untouched during the cleaning process).

RENOLIN ETERNA CLEAN is a safe, efficient and economical alternative of cleaning turbine oil circuits which are contaminated with varnish, deposits and/or sludge.

Typical applications for RENOLIN ETERNA CLEAN



Deposits on bearing material



Deposits in tank



Deposits in cooler

RENOLIN VCI BOOST

Active corrosion protection additive concentrate for the use in FUCHS gear, hydraulic and turbine oils

RENOLIN VCI BOOST is an additive concentrate for the use in FUCHS industrial gear oils, turbine oils, machine oils and hydraulic oils. By using RENOLIN VCI BOOST all metal parts are protected against corrosion. This is an absolutely clean and economic way of corrosion protection and represents an efficient alternative to conventional temporary corrosion preventives.

The advantages of RENOLIN VCI BOOST:

- Excellent corrosion protection of iron metal and non-iron metal
- Excellent miscibility and compatibility with RENOLIN ETERNA turbine oils
- Easy to use and to add to RENOLIN ETERNA turbine oils (in general a treat rate of 2% is RENOLIN VCI BOOST in RENOLIN ETERNA turbine oils is recommended)
- Universally applicable
- Excellent economic solution for corrosion protection
- No nitrite and no secondary amines.
- RENOLIN VCI BOOST can be stored in original packages at temperatures of +5 °C till 60 °C over a period of 1 year

RENOSAFE TURBO 46 HF

Fire-resistant hydraulic fluid based on special new phosphoric acid esters

RENOSAFE TURBO 46 HF is a water-free fire-resistant hydraulic fluid type HFD-R according to DIN 51502 based on special phosphoric acid esters providing good oxidation stability. RENOSAFE TURBO 46 HF meets the specifications of the VDMA uniform guideline sheet 24 317 „Guidelines on fire-resistant pressurized fluids, group HFD-R“.

RENOSAFE TURBO 46 HF is used mainly as a hydraulic fluid in steam turbine control systems. It was specially developed for this purpose and is also highly suitable for lubricating bearings in steam and gas turbines. It is also used for industrial hydraulics located in areas of high fire risk.

The advantages of RENOSAFE Turbo 46 HF:

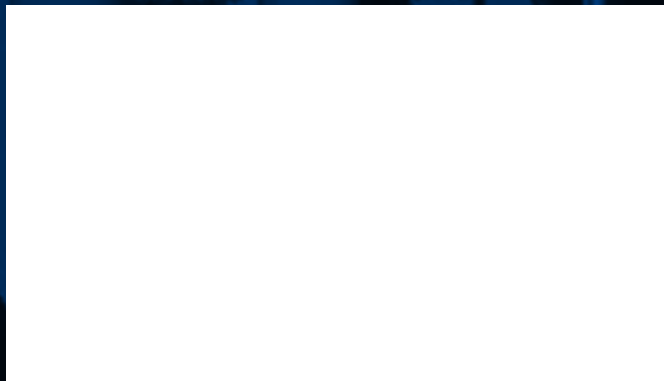
- Excellent fire-resistance, excellent oxidative stability, good air release, excellent foaming behavior and good water separability.
- RENOSAFE TURBO 46 HF is non-toxic and free of chlorine or PCBs.
- RENOSAFE Turbo 46 HF is a fully functional HFD-R 46 fluid in accordance to ISO 12922 based on selected phosphoric acid esters.
- RENOSAFE Turbo 46 HF has been approved by well-known turbine manufactures.
- RENOSAFE Turbo 46 HF is miscible and compatible with conventional HFD-R fluids. It is based on phosphoric acid esters and therefore hygroscopic.

FUCHS Lubricants

Innovative lubricants need experienced application engineers

Every lubricant change should be preceded by expert consultation on the application in question. Only then can the best lubricant system be selected. Experienced FUCHS engineers will be happy to advise on products for the application in question and also on our full range of lubricants.

Contact:



FUCHS LUBRICANTS GERMANY GmbH
Friesenheimer Straße 19
68169 Mannheim/Germany
Phone +49 621 3701-0
Fax +49 621 3701-7000
E-mail zentrale-flg@fuchs.com
www.fuchs.com/de/en

Export Division
Friesenheimer Straße 19
68169 Mannheim/Germany
Phone +49 621 3701-1703
Fax +49 621 3701-7719
E-mail export-flg@fuchs.com
www.fuchs.com/de/en