# Important information for use of lubricating oils with Atlas-Copco-turbomachines

We as a manufacturer recommend that you exclusively use those lubricating oils which have been thoroughly tested by Atlas Copco in long years of practice – starting the day your plant is commissioned.

All machinery which leaves our factory after it has been subjected to successful mechanical or thermodynamic test runs has already been operated and tested with Turbo Oil Plus or Roto-HPlus.

We recommend that you order our oil products already when you conclude your delivery contract in order to reduce the ordering process. Any comparisons and the selection of different products effected at a later point require a lot of time. Also, the plant user assumes responsibility for the application of foreign products whenever he chooses to employ other lubricants than those recommended by us.

For the lubrication of ACT equipment no oils with EP (extreme pressure) properties are allowed. They must not contain any metal-organic, sulphur/phosphorus or zinc containing compounds. Even traces of these materials may form deposits mainly in high temperature zones (bearings/seals), which finally may lead to operating problems.

Atlas Copco Energas GmbH cannot give their permission to use foreign lubricating oils. As a rule, the application of foreign oils in our products does not make null and void the terms of warranty and liability stipulated by Atlas Copco Energas GmbH. However, said use may have a negative effect on the recognition in the framework of said terms of warranty and liability in the event a damage has indeed occurred, as it quite often turns out to be quite difficult and lengthy to assess damage caused by lubricating oil other than those recommended by us.

For associated information on the lubricating oils employed by Atlas Copco Energas please refer to the enclosed data sheets.

Atlas Copco Gas and Process Solutions

# **TURBO OIL PLUS:** SERVING YOUR PRODUCTIVITY

# Turbo Oil Plus:
# Serving your productivity

Continuity is the greatest priority in your production plant. Production downtime is not only very costly, it can also can endanger your productivity. Our main objective? Preventing such downtime, not only with our service offering but also with Turbo Oil Plus. It's a lubrication oil of the highest quality, and it enjoys a superior reputation reputation all over the world. Turbo Oil Plus is produced from high quality base oils treated with hydrogen and a combination of zinc-free additives. This composition guarantees an excellent oxidation consistency, high corrosion protection, low foaming properties, and excellent emulsification characteristics.

**Application areas**

Turbo Oil Plus is available as VG 46, and it is suitable as lubrication oil for thrust bearings and mechanical gears. Turbo Oil Plus can be used for our entire range of turbocompressors and expansion turbines. It ensures strong lubrication and smooth operation.

**Benefits for you**

**Low lubrication costs:**
Turbo Oil Plus offers a long life span – even under demanding operating conditions.

**Low maintenance costs:**
Turbo Oil Plus protects your plant in the long run against rust and corrosion. Properties even under the influence of water and foreign oil contamination ensure that the problems associated with blocked filters are significantly reduced. Turbo Oil Plus has been developed and tested especially for Atlas Copco Gas and Process products, thus fulfilling the guarantee requirements for our machines.

**Always a step ahead of the game**

Not only does our Turbo Oil Plus meet the most important international specifications, it also exceeds them:

- British Standard BS 489.1999
- German Industrial Norm DIN 51515 Part 1
- General Electric GEK 28143A
- Westinghouse 21 T0591
- ISO 8068 Type AP
- Mitsubishi Heavy Industries E00-87182

**Characteristics for more performance**

**High thermal and oxidation stability:**
The use of base oils with high oxidation stability and the addition of oxidation inhibitors prevents loss of quality through oxidation. That, in turn, results in a longer life span, reduced occurrence of acid oxidation deposits, and the formation of sludge.

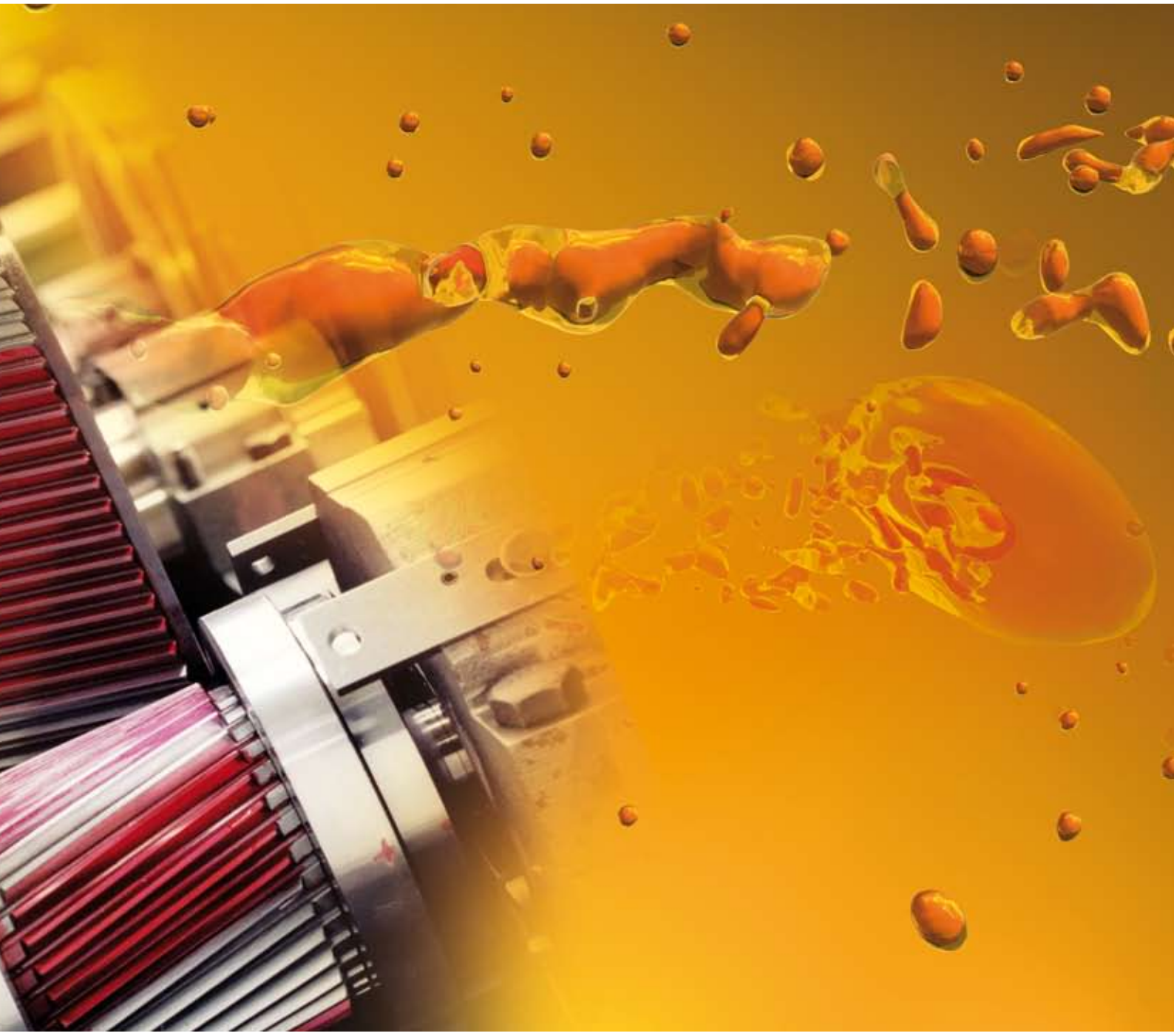
**Superior water separation properties:**
These properties make it possible to easily remove surplus water from the lubrication system, thereby minimising the incidence of corrosion and premature wear and tear.

**Excellent filtration properties:**
Turbo Oil Plus has very good filtration properties, even under the influence of water and foreign oils such as hydraulic oil.

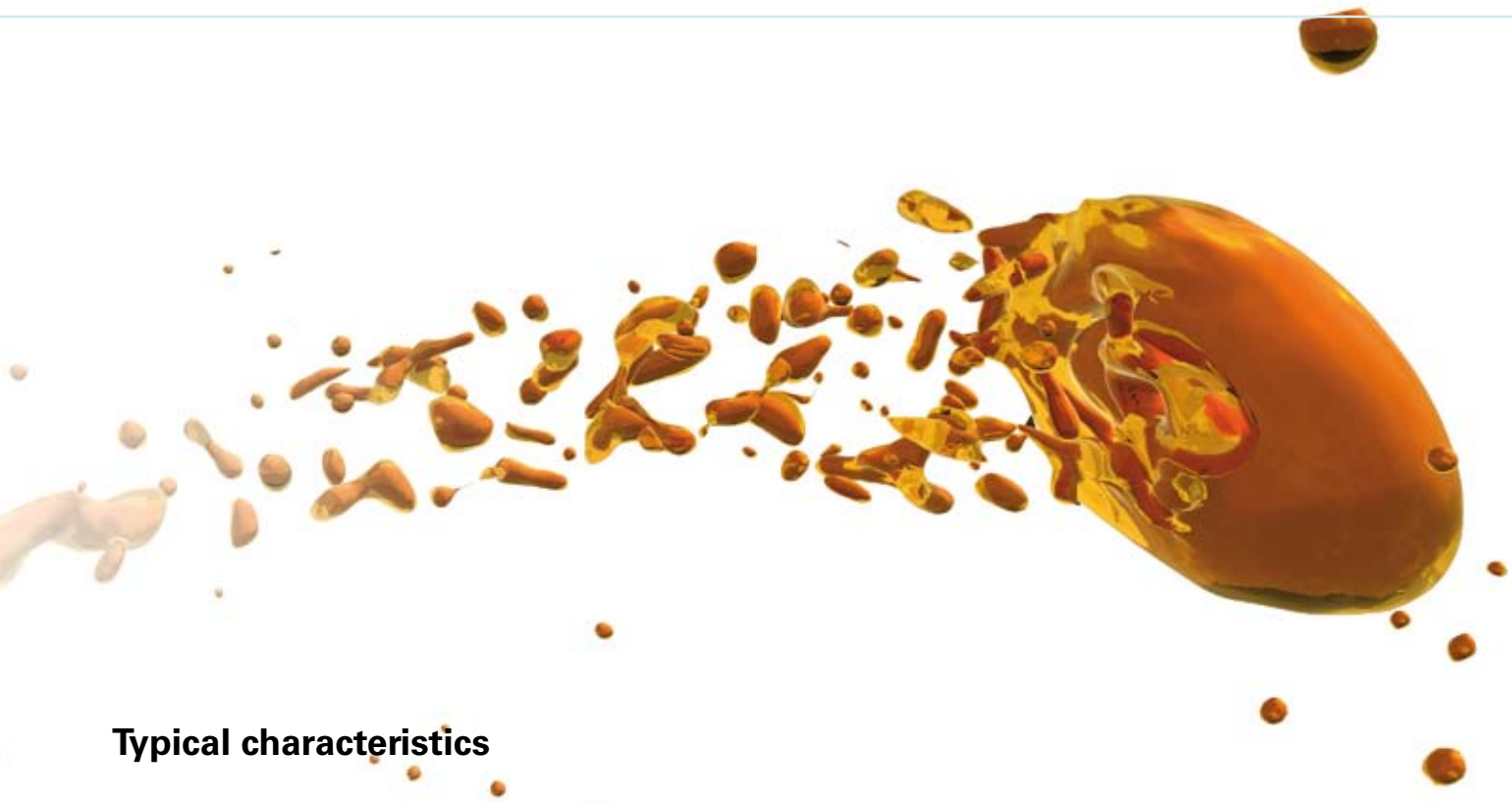
**Excellent corrosion protection:**
Turbo Oil Plus offers excellent corrosion protection. That prevents the formation of rust and corrosion

during operation and during stand-by times, while also affording protection to both plant and machines from moisture and water.

**Low foaming tendency:**
Our Turbo Oil Plus contains a special additive to inhibit the foam build-up. But in the event that foam does develop, it will dissipate quickly. Operating in combination with the oil's superior air separation properties, problems associated with cavitation, hydraulic lubrication failure, premature oxidation and excessive wear and tear are effectively minimised.



**Quality control:**
Using oil analysis, the quality of Turbo Oil Plus can be determined and analysed. For this purpose, Atlas Copco Gas and Process offers an oil analysis kit. Within 24 hours of receiving the oil sample, you will receive a laboratory report in PDF format. Drawing from another valuable tool, we work with a database containing all laboratory reports that have been performed for our customers. We recommend that you perform an oil analysis once per year.



## Typical characteristics

| Turbo Oil Plus | | PN 6970298401 | |
|---|---|---|---|
| **Viscosity** | | ISO VG | 46 |
| **Kinematic Viscosity** | | DIN 51562-1 | |
| **at 40° C** | $mm^2/s$ | | 46 |
| **Density at 15° C** | $kg/m^3$ | DIN 51757 | 880 |
| **Flash point COC** | °C | DIN ISO 2592 | 210 |
| **Pour point** | °C | DIN ISO 3016 | -11 |
| **Neutralisation point** | mg KOH/g | DIN 51558-1 | 0,07 |
| **Water separation** | sec | DIN 51589-1 | 120 |
| **Air separation at 50° C** | min | DIN 51381 | 4 |
| **Corrosion protection properties towards steel** | Degree of Corrosion | DIN ISO 7120 | O-A |
| **Ageing characteristics (TOST)** | | | |
| **Increase of the NZ after 2000 h** | mg KOH/g | DIN 51587 | < 2 |
| **Life Test** | h | ASTM D 943 | > 5000 |
| **Oxidation test (RBOT)** | min | ASTM D 2272 | > 750 |
| *Subject to changes resulting from product and production developments.* | | | |

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Atlas Copco Energas GmbH
Gas and Process Division
Service department

Product code: 6970298401.01

# SAFETY DATA SHEET

# Turbo Oil Plus

## 1. Identification of Substance/Preparation and Company

Product name: **Turbo Oil Plus**

Use of the substance/preparation

**Turbomachinery**

**Supplier:**
**Atlas Copco Energas GmbH**
**Gas and Process Division**

**Address:**
**Am Ziegelofen 2**
**50999 Köln**

**Contact numbers:**
**HSE informations: ++49 (0)2236 9650 855**
**Emergency telephone number: +49 (0)2236 9650 855**

## 2. Composition/Information on Ingredients

**Preparation Description:**
**Blend of highly refined mineral oils and additives.**
**Dangerous components:**

| CAS no. | EINECS no. | Content | Label | R-phrases | Name |
|---|---|---|---|---|---|
| 90-30-2 | 201-983-0 | < 0.2 % | Xn, N | R20/22, R43, R50/53 | Phenyl alpha naphtylamine |

## 3. Hazards Identification

**Human Health Hazards:**
**Prolonged or repeated exposure may give rise to dermatitis.**

**According to the EU dicrectives this product is not classified as dangerous. But the product containing at least one substances classfied as sensitising in a concentration equal or grater than 0.1 %. This may produce an allergic reaction.**

**Safety hazards:**
**Contains mineral oil for which an exposure limit for oil mist applies.**

**Environmental hazards:**
**Avoid spillage.**
**Not readily biodegradable.**

## 4. First Aid Measures

**Other information:**

**First aid - inhalation**
Remove to fresh air.
If rapid recovery does not occur, obtain medical attention.

**First aid - skin:**
Remove contaminated clothing and wash affected skin with soap and water.
If high pressure injection injuries occur, obtain medical attention immediately.

**First aid - eye:**
Rinse immediately with plenty of water for at least 10 minutes and seek medical advice.

**First aid - ingestion:**
Do not induce vomiting
If rapid recovery does not occur, obtain medical attention

**Advice to physicians:**
Treat symptomatically

## 5. Fire Fighting Measures

**Extinguishing media:**
Foam, Dry chemical powder, carbon dioxide, sand or earth.

**Unsuitable extinguishing media:**
Do not use water in a jet

**Specific hazards:**
Combustion is likely to give rise to a complex mixture of gases and airborne particulates, including carbon monoxide, oxides of sulphur, and unidentified organic and inorganic compounds.

## 6. Accidental Release Measures

**Personal precautions:**
Ventilate contaminated area thoroughly
Minimise contact with skin.

**Environmental precautions:**
Prevent further leakage or spillage and prevent from entering drains
Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers.

**Clean-up methods:**
Absorb or contain liquid with sand, earth or spill control material
Shovel into a suitable, clearly marked container for disposal or reclamation in accordance with local regulations.

**Other information:**

## 7. Handling and Storage

**Handling:**
When using do not eat or drink.
When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
Prevent spillages.

**Storage:**
Avoid direct sunlight, heat sources, and strong oxidising agents.
Recommended materials:
mild steel high density polyethylene
for containers or container linings.

## 8. Exposure Controls/Personal Protection

**Engineering control measures:**

**Occupational exposure standards:**

| Component name | Limit type | Value/Unit | Other Information |
|---|---|---|---|
| Oil mist | 8-h TWA | 5 mg/m3 | ACGIH |
| 15-min STEL | 10 mg/m3 ACGIH | | |

**Other information:**

Respiratory protection:
Not normally required.
If oil mist cannot be controlled, a respirator fitted with an organic vapour cartridge combined with a particulate pre-filter should be used.

Hand protection:
PVC or nitril rubber gloves if splashes are likely to occur and if applicable.

Eye-Protection: Safety spectacles

Body Protection: Minimise all forms of skin contact.

Hygiene measures:
Don't keep oily rags in your pockets.
Wash hands before eating and drinking.

## 9. Physical and Chemical Properties

**Physical state:**

Form....: Liquid

Colour..: clear

**Safety relevant data:**

Change of physical state:

Pourpoint -12°C (DIN ISO 3016)

Flashpoint: 215°C (DIN ISO 2592)

Vapour pressure: ( 20 °C): < 0.01 hPa

Density ( 15°C): 872 kg/m3(DIN 51 757 D)

Solubility in water ( 20°C): Negligible

n-octanol/water partition coefficient: Not applicable

Kin.Viscosity ( 40°C): 46 mm2/s (DIN 51 562, T.1)

## 10. Stability/Reactivity

**Stability:**
Stable under normal use conditions

**Materials to avoid:**
Strong oxidising agents

**Hazardous decomposition products:**
Hazardous decomposition products are not expected to form during normal storage.

**Other information:**

## 11. Toxicological Information

### Toxicological Data:

Acute toxicity - oral:

LD 50 expected to be > 2000 mg/kg.

Specific symptomatic results: Not available

Skin irritation:

Eye irritation: Expected to be slightly irritant

Skin sensitisation: Not expected to be a skin sensitiser

Prolonged and/or repeated contact:
Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis and may make the skin more susceptible to irritation and penetration by other materials.

Carcinogenicity:
Product is based on mineral oils of types shown to be non-carcinogenic in animal skin-painting studies.
Other components are not know to be associated with carcinogenic effects.

### Human effects:

### Other information:
Information given is based on a knowledge of the toxicology of similar products.

## 12. Ecological information

### Persistence/degradability:
Information given is based on data on the components and the ectotoxicology of similar products.
Not readily biodegradable.

### Mobility:
Floats on water.
Liquid under most environmental conditions.
If it enters soil, it will adsorb to soil particles and will not be mobile.
Product has the potential to bioaccumulate.

### Ecotoxicity:
Product is expected to be practically non-toxic to aquatic organisms, LC/EC50 >100mg/L.

### Other Information:

## 13. Disposal Considerations

**Product:**
Precautions:
Dispose to licensed disposal contractor
European waste code: 13 02 05

**Container disposal:**
Drain container thoroughly
Dispose to licensed disposal contractor

Recomanded cleaning procedure:
Cleaning by disposal contractor

## 14. Transport Information

Not dangerous for conveyance under UN, IMO, ADR/RID and IATA/ICAO codes.

## 15. Regulatory Information

**EC Classification:**
According to Annex V / Directive 1999/45/EC (Dangerous Preparation Directive) the following labelling is required:
Contain phenyl-alpha-naphthylamine.
May produce an allergic reaction.

**National Regulations:**
Contant of VOC regarding EU directive (1999/13/EC) and Swiss regulation:
none

## 16. Other Information

R-Phrases (chapter 2 und 3):
R20/22 Harmful by inhalation and if swallowed
R43 May cause sensitization by skin contact
R50/53 Very toxic to aqutic organisms, may cause long-term adverse
effects in aquatic environment.

Recommended restrictions on use:
None at conventional use.

**Additional informations:**
Concawe Report 5/87 Health Aspects of Lubricants.
This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.