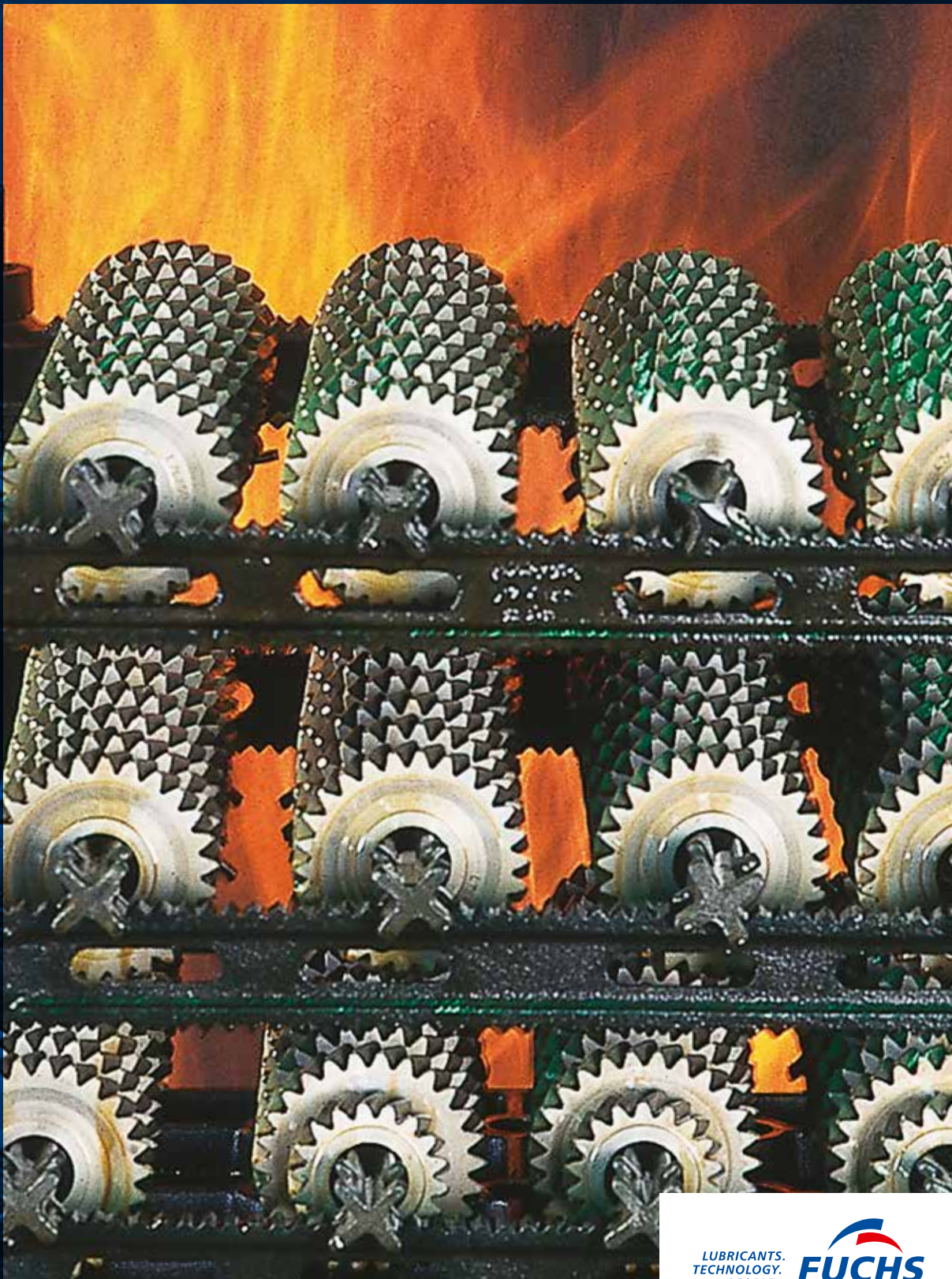


THERMISOL

Quenching Oils and Polymer Quenchants



LUBRICANTS.
TECHNOLOGY.
PEOPLE.



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;
approx. 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

THERMISOL GIVES COMPONENTS THE NECESSARY STRENGTH

Fluids play an important role in the area of heat treatment. Only by selecting the right quenching medium, can the required microstructural composition be achieved along with the resulting material hardness.

The quenching characteristics of a medium have a direct effect on the future properties of the material and thus its subsequent use.

Pivotal to an optimum quenching process, apart from the selection of the best quenching medium, is the exact control of all accompanying process parameters.

Only the optimum matching of all heat treatment parameters can guarantee constant and almost warp-free heat treatment results.

Place your trust in a partner who fully understands all heat treatment processes, who is glad to share its comprehensive knowledge and who can offer you carefully matched system solutions – all to your ultimate benefit.

FUCHS is also your expert partner for all prior and subsequent manufacturing processes ranging from forming and machining to cleaning and corrosion protection. Make use of our know-how to optimize your entire manufacturing operations.

Precision even at the highest temperatures

THERMISOL QB

Neat quenching oils offer lower quenching intensity and are usually used for the quenching of alloyed tool steels with simple geometries.

THERMISOL QH

These high-performance, high-additive quenching oils contain special wetting-improvers for more intense quenching. High performance quenching oils are widely used because their optimized wetting behaviour makes them particularly suitable for warp-prone components.

THERMISOL QH MC series

High-performance, high-additive quenchants based on hydrocracked oils. In addition to their optimum wetting characteristics and high quenching intensity, these products are extremely low-evaporation and thermally stable.

THERMISOL QWA

Mineral oil-based heat treatment and annealing oils whose high viscosity allows high oil bath temperatures to be used.

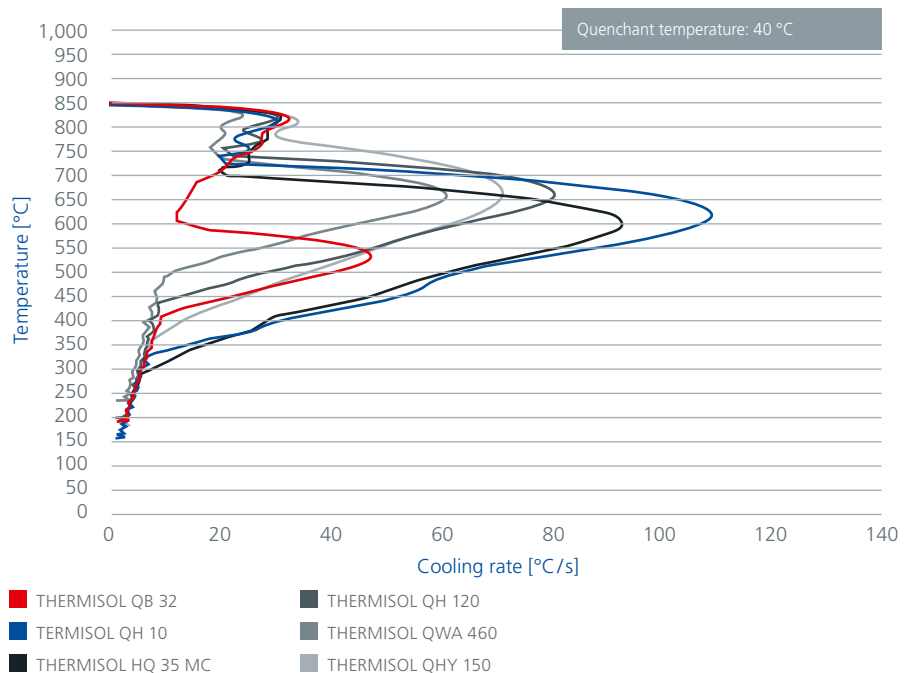
THERMISOL QHY series

These synthetic high-performance quenching and tempering oils are characterized by a high flashpoint and low drag-out losses. After treatment, these oils leave surfaces as bright and residue-free as they were originally.

THERMISOL QZS

Water-miscible, polymer quenchants for use after induction heating or for submersion tempering operations. High-alloy materials through to tool steels can be quenched by selecting particularly mild polymer solutions.

**IVF-Quenchttest according to FLV-A-18
(FUCHS LUBRICANTS GERMANY GmbH test method)
and based on ISO 9950**



Mineral oil-based and synthetic quenchants – selection and application areas



When selecting the most suitable high-performance quenching oil for a particular application, an initial rough differentiation can be made between high-viscosity and low-viscosity quenching oils.

Specifying an absolute threshold viscosity is not possible because of the different quenching oil grades.

Low-viscosity, high-performance quenching oils:

- Application temperature range <math><100^{\circ}\text{C}</math> (Please always read the respective Product Information Sheet!)
- Quenching of alloyed and unalloyed quenched and tempered steels or case-hardening steels
- Good hardening penetration and depth
- Hardening of mass-produced parts and small components
- Hardening of gearbox components

High viscosity, high-performance quenching oils:

- Quenching bath oils for applications >math>100^{\circ}\text{C}</math>
- Tool steels
- Hardening of particularly warp-prone components with large diameters
- Warp-prone gearbox components, large gears, sprockets
- Low-warp hardening of sheet steel
- Bainite and grey cast iron hardening at high temperatures

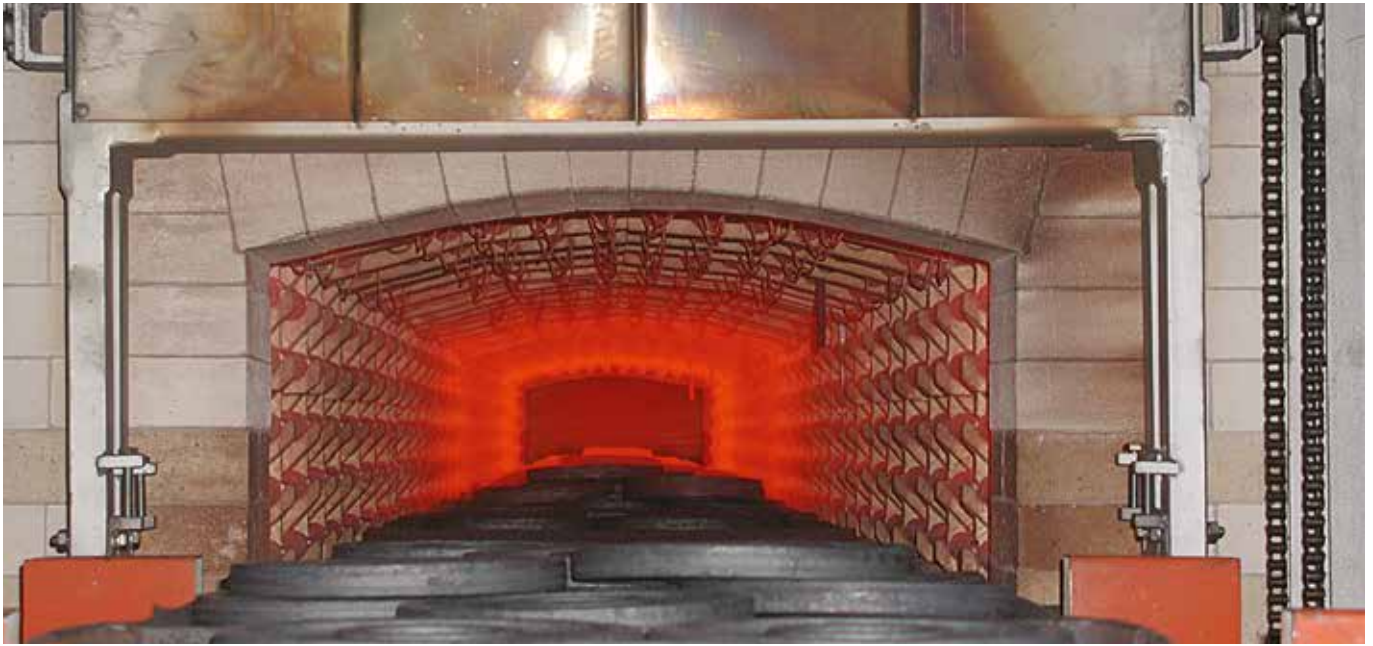
THERMISOL QB- / QH- / QH-MC and QWA series – mineral oil-based quenchant program

Conventional mineral oil-based quenching oils continue to offer good ageing stability, low evaporation losses and minimum maintenance.

With corresponding additives, they display a relatively high evaporation stability and a high flashpoint which means that they can be used for a large number of applications.

| Product name | Kin. viscosity at 40 °C [mm ² /s] | Application temperature [°C] | Description |
|--|--|------------------------------|--|
| THERMISOL QB series: Neat quenching oils | | | |
| THERMISOL QB 32 | 31 | 50–90 | Neat quenching oils are low evaporation and ageing stable normal speed quenching oils with moderate quenching intensity. Quenching behaviour is principally governed by the viscosity of the oil. Neat quenching oils are mostly used for the hardening of tool steels and warp-prone components. Suitable for use in open and closed quenching lines. |
| THERMISOL QB 46 | 46 | 50–100 | |
| THERMISOL QH series | | | |
| THERMISOL QH 10 | 12 | 50–80 | Accelerated, mineral oil-based quenchants whose special additives offer a very short vapour phase and very intensive cooling. |
| THERMISOL QH 15 LE | 16 | 50–80 | |
| THERMISOL QH 25 | 21 | 50–100 | THERMISOL QH series products offer improved protection against warping and less risk of cracking. Suitable for use in all open and closed quenching lines. |
| THERMISOL QH 40 | 45 | 50–110 | |
| THERMISOL QH 80 | 78 | 50–160 | |
| THERMISOL QH 120 | 119 | 50–170 | |
| THERMISOL QH MC series | | | |
| THERMISOL QH 10 MC | 11 | 50–80 | Low-evaporation, mineral oil-based, high-performance quenching oils. The THERMISOL QH MC series is recommended for continuous quenching lines. |
| THERMISOL QH 30 MC | 26 | 50–100 (max. 150) | Both products are suitable for open and closed lines. In addition, THERMISOL QH 30 MC can also be used in vacuum ovens. |
| THERMISOL QH 35 MC | 37 | 40–80 (max. 150) | High-performance quenching oil for a broad range of applications. THERMISOL QH 30 MC is recommended for continuous quenching lines and for varying batch sizes. Is suitable for open and closed lines as well as vacuum ovens. |
| THERMISOL QWA: Annealing and tempering oils | | | |
| THERMISOL QWA 460 | 503 | 100–180 (max. 275) | Particularly oxidation-stable, mineral oil-based annealing and tempering oils for higher oil bath temperatures. |

THERMISOL QHY series – synthetic, high-performance quenching oils



The synthetic, high-performance THERMISOL QHY series of oils display the benefits of mineral oil-based quenchants such as ageing stability and low maintenance. However, these products offer a significantly higher flashpoint and are even more low evaporation than mineral oil products with the same quenching performance.

- Universally applicable for nearly all applications
- Particularly broad temperature spectrum
- Suitable for open and closed quenching lines
- Rapidly biodegradable

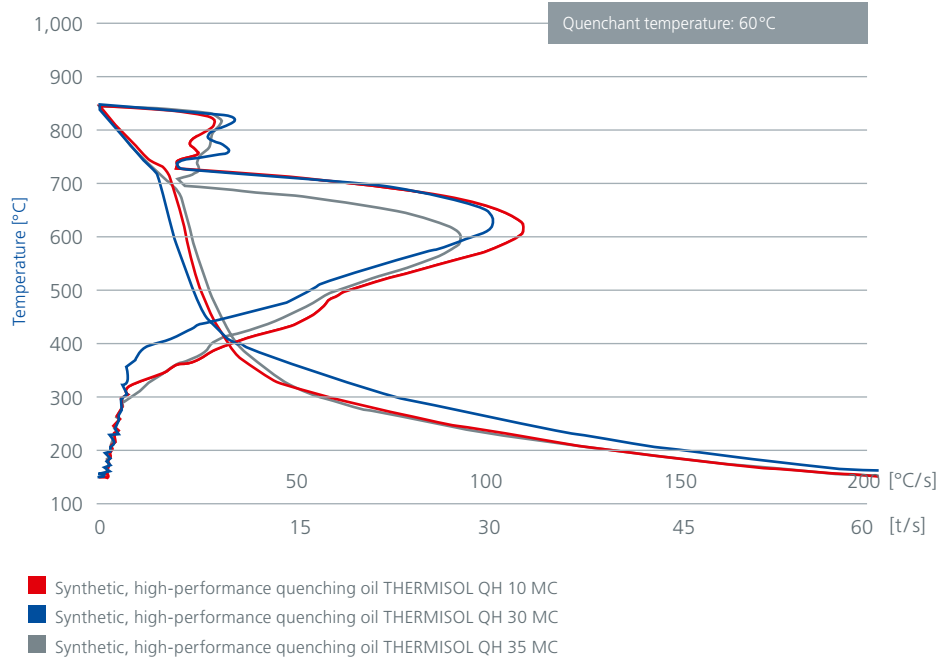
Further positive features at a glance:

- Extremely short vapour phase allows almost instant wetting of the whole component surface and thus especially warp-free quenching
- Reduces warping during quenching to an absolute minimum
- Due to its narrow boiling range and good thermal stability, Thermisol QHY produces consistent quenching results even in extremely difficult conditions

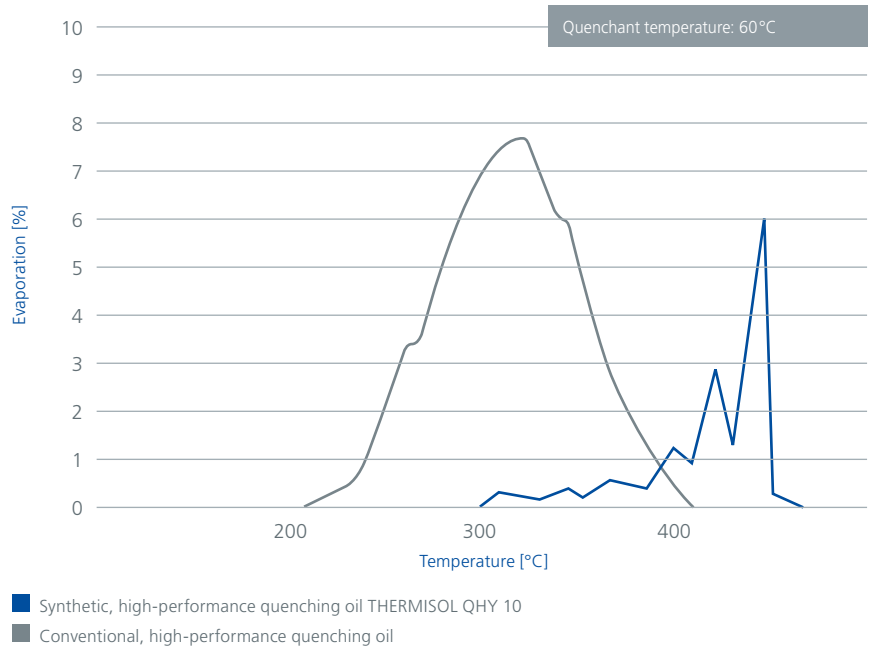
| Product name | Kin. viscosity at 40 °C [mm ² /s] | Application temperature [°C] |
|-------------------|--|------------------------------|
| THERMISOL QHY 10 | 11 | 50–130 |
| THERMISOL QHY 35 | 37 | 60–200 |
| THERMISOL QHY 150 | 145 | 60–260 |

IVF-Quenchttest

Inconel 600 test slug, Dimensions:
12.5 mm ø x 60 mm
Temperature/time and temperature/
cooling speed.



Evaporation acc. to DIN 51581-T02
depending on temperature at the same
viscosity.



THERMISOL QZS – water-miscible polymer quenching concentrates



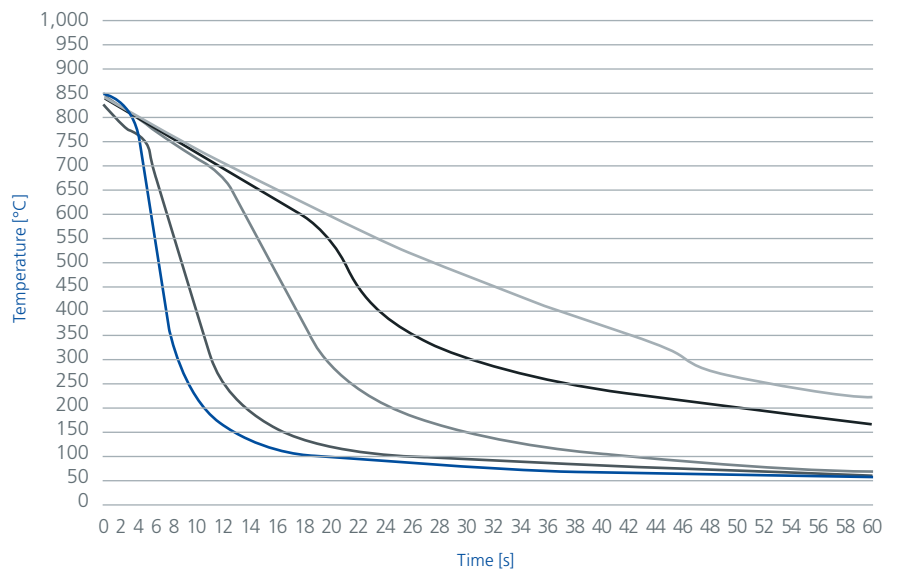
Apart from conventional quenchants whose advantages lie in their ageing stability and low maintenance requirement, water-miscible, polymer-based products are increasingly being used to treat low- and high-alloy steels. These products minimize fire risks and the creation of oil mists. In addition, water-miscible products are gaining favour because of their significantly lower mixture costs and drag-out losses. By varying the polymer concentration, the demands of different microstructures can be met without the need to completely change the content of the bath. Although the use of polymer quenchants in the past was limited to induction hardening and the hardening of low-alloy materials because of the abrupt cooling they offered, the new generation of polymer quenchants satisfy a broad range of quenching applications.

Intensive research by FUCHS led to the development of a series of polymer quenchants which satisfy every application, ranging from induction hardening to the quenching of low- and high-alloy steels. By adjusting the concentration and bath flow, homogeneous microstructures and more even through-hardening of components can be achieved. Depending on the material, very soft structures through to Bainite can be treated because of the particularly long vapour phase. Polymer quenchants are also perfectly suitable for open quenching baths and constantly changing component geometries.

Would you like to find out more? Then just give us a call. We would be glad to offer you personal advice.



Quenching THERMISOL QZS series



- THERMISOL QZS 700 – induction hardening medium
- THERMISOL QZS 150 MM – low concentration
- THERMISOL QZS 150 MM – high concentration
- THERMISOL QZS 550 – low concentration
- THERMISOL QZS 550 – high concentration

THERMISOL QZS – water-miscible polymer quenching concentrate



Application:

- Polymer quenchants are used to reduce the quenching intensity of water alone
- The quenching effect is influenced by the circulation, temperature and concentration of the polymer solution which is normally between 5 and 30 %

Benefits at a glance:

- No fire hazards and no oil misting
- Low preparation costs
- Reduced consumption
- Homogeneous microstructural composition and improved through-hardening by adjusting the concentration, temperature and circulation of the polymer solution
- Depending on the material, soft to Bainitic structures are possible

Recommended applications

THERMISOL QZS 700

- Induction and flame hardening
- Especially when good corrosion protection is required



THERMISOL QZS 400

- Induction and flame hardening
- Especially suitable for crack-prone components
- Dip quenching of low- and non-alloyed steels



THERMISOL QZS 300 ALU

- Quenching of aluminium (Aerospace industry)
- Universally-applicable for induction and flame hardening
- For the quenching of low- and non-alloyed materials



THERMISOL QZS 150 MM

- Tempering of forged parts
- Induction hardening of particularly crack-prone components



THERMISOL QZS 550

- Tempering of forged parts
- Hardening of low-alloy materials through to tool steels
- To achieve particularly mild quenching



Complete solutions for all your manufacturing operations

With system solutions from FUCHS, the world's largest independent manufacturer of lubricants with the most extensive program of metalworking fluids, you have chosen an absolute specialist. And thus, benefit from all the know-how, years of application engineering experience and customized solutions.

Example: Gearbox manufacturing.



ECOCOOL

MACHINING: WM*

- High performance
- Economical
- Outstanding lubricity



ECOCUT

MACHINING: NEAT**

- Increased reliability
- Economical
- Low misting and low evaporation



THERMISOL

QUENCHING

- Low distortion
- Low consumption
- Good compatibility



RENOCLEAN

CLEANING

- Highly effective
- Unproblematic processes
- Outstanding emulsification and demulsification



RENOLIT

LUBRICATION: GREASES

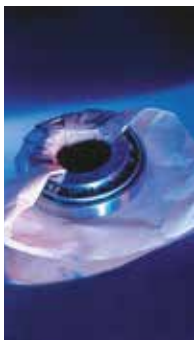
- Compatible
- Long-term and life-long lubrication
- Optimum compatibility with sealing materials



RENOLIN

LUBRICATION: OILS

- Compatible
- Excellent corrosion protection
- Optimum wear protection



ANTICORIT

PROTECTION

- Optimum protection
- Clean application



CPM

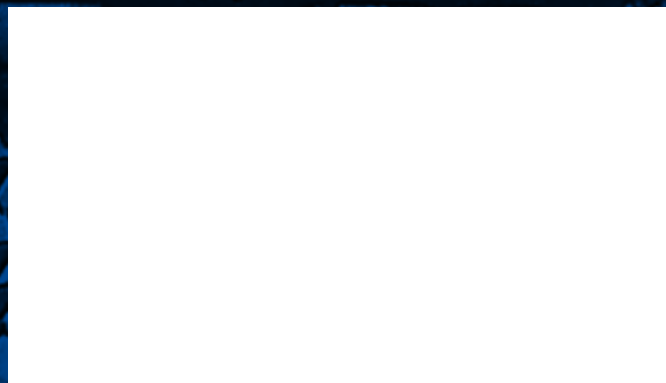
FLUID MANAGEMENT

- For all fluids
- Auditable documentation
- Better performance
- Higher process reliability
- Cost reductions

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