YOU’RE NOT JUST BUYING LUBRICANTS
YOU’RE BUYING RELIABILITY

Rando® HEES 46
Biodegradable Hydraulic Fluid

- Optimal Drain Intervals
- Controlled Maintenance Costs
- Exceptional Performance
- Minimal Downtime
- Maximum Profitability

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• Background to Biodegradable Hydraulic Fluids
• Trends
• Rando® HEES 46 properties
• Application
• Compatibility & Changeover procedure
Biodegradable Products

• Chevron has a long tradition in developing and producing biodegradable Lubricants.
• From the 70’s Texaco developed and produced biodegradable greases, gear oils, hydraulic oils, chain saw oils and process oils.
• Initially these products were based on vegetable base oils like rapeseed oil, sunflower oils.
• The industry demanded a complete new generation of biodegradable lubricants which meet the performance standards of conventional lubricants.
Biodegradable Products

• Conventional mineral or synthetic lubricants are harmful for the environment and stay a long time present due to their poor degradability.
• The new range biodegradable products are high-performance products and environmentally friendly.
• A number of laws and regulations are resulting in high fines for polluters.
• In some sensitive areas only biodegradable products are allowed to be used.
Biodegradable Hydraulic Oils

Hydraulic fluids (Biodegradable)

- Unsaturated Ester based
  - Hydra® 32 & 46
    - DIN ISO 15380 HETG
    - VDMA 24568 HETG
    - SS 15 54 34

- Saturated Ester based
  - Rando® HEES 46
    - DIN ISO 15380 HEES
    - VDMA 24568 HEES
    - SS 15 54 34

New
Why Saturated Esters?

- Initially, first formulations Texaco’s R&D worked on since 1970’s for biodegradable oils were based on rapeseed oil. These formulations were sensitive to hydrolysis and did not meet the performance requirements or standards for conventional hydraulic oils.
- Ester-based formulations were introduced to meet the standards.
- Still not all esters suited the requirements of OEMs: low TAN products were needed to prevent Zinc leaching (dissolving of Zinc from the hydraulic system components into the oil).
- Due to changing environmental regulations, Hydra was excluded to be certified on Eco-label (R&S phrases)
- Also, the addition of anti-corrosion additives to the previous formula meant that we couldn’t apply for the Eco Label.
- Increased environmental concern by customers meant that we needed to introduce the product which can meet latest Blue Angel claim and obtain Eco Label.
- Introduction of the new formula based on saturated esters helped us having a product which meets environmental standards, satisfies OEM performance requirements at a manageable cost.
Rando® HEES 46

**Properties:**

– Environmentally compatible, readily biodegradable according to OECD 301F: >70%

– Lower friction values allow lower service temperatures
  • Service temperature: -30°C up to 90°C, short term 120°C

– Extended oil change intervals due to high oxidation resistance

– Not subjected to special labelling according to “GefStoff” (regulations for hazardous materials)

– WGK 1 rating according the German WGK Classification

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Approvals/Performance/Certifications

– DIN ISO 15380 HEES
– VDMA 24568 HEES
– Awarded with UZ 79 “Blue Angel”
– Positieve olielijst voor MIA-Vamil-regelingen
– Swedish-Standard 15 54 34: [www.sp.se/km/hydraul](http://www.sp.se/km/hydraul)
Where can Rando® HEES 46 be used?

- Forestry and timber industry
- Horticulture and landscaping
- Municipal vehicles and facilities
- Vehicles for ski racing track maintenance
- Track laying machinery
- Paper presses
- Concrete pumps
- Mobile hydraulics in road construction and drainage areas
- Off-shore and harbour equipment, sluices
- Water power plants, sewage plants
- Fresh water recovery
- Floater dredgers, water maintenance boats
## Compatibility Chart (based on testing)

<table>
<thead>
<tr>
<th></th>
<th>Q8 Holbein Bio Plus 46</th>
<th>Statoil Hydraway Bio SE 32-46</th>
<th>Agrol Mendo G4</th>
<th>Mobil EAL Hydraulic 46</th>
<th>Panoline HLP Synth 46</th>
<th>Shell Naturelle SE 46</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Texaco® Rando® HEES 46</strong></td>
<td>Fully compatible</td>
<td>Demulsibility issues</td>
<td>Fully compatible</td>
<td>Fully compatible</td>
<td>Fully compatible</td>
<td>Fully compatible</td>
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<th>Statoil Hydraway SE 46 HP</th>
<th>Statoil Hydraway Bio SE 32-68</th>
<th>Biohydraul Long Life 46</th>
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</tr>
</tbody>
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### Legend:

- **Fully compatible**
- **Item of concern**
Product Maintenance and Handling

• When changing over to Rando® HEES 46, the Guidelines for changing fluids from Mineral-based oils to environmentally acceptable fluids according DIN ISO 15 380 (HEES) has to be followed.

• Check with OEMS for specific change over procedures.
Change over procedure according to DIN ISO 15 380 HEES

Change from HH, HL, HM or HV mineral-based hydraulic oils to HEES type of environmentally acceptable fluids

- Checklist (elements to be checked to determine whether the installation is suitable for the use of environmentally acceptable hydraulic fluids):

<table>
<thead>
<tr>
<th>Reservoir a, b temperature</th>
<th>Seals, plastics, adhesives</th>
<th>Metallic materials</th>
<th>Filter elements(^c)</th>
<th>Paint coating</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°C to +80°C</td>
<td>Industrial elastomers(^e)</td>
<td>Lead, tin and zinc in pure form are to be avoided.</td>
<td>Subject to attack. Paper filter cartridges and zinc coated filter elements.</td>
<td>Compatibility with paint coating</td>
</tr>
<tr>
<td></td>
<td>Plastics and soluble adhesive compounds.</td>
<td>Alloys of these metals are subject to possible corrosion(^f) in conjunction with aged liquids and at elevated temperatures.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

-\(^a\) Higher temperatures have an unfavourable influence on compatibility with seals and ageing characteristics.
-\(^b\) In hydrosystems, temperatures of up to 25°C higher can be permitted for a short time or locally
-\(^c\) Manufacturer to be consulted for suitability
-\(^d\) Change from HH, HL, HM or HV mineral-based hydraulic oils to HEES type of environmentally acceptable fluids
-\(^e\) The number of flushes depends on the installation. It is possible that the residual volumes quoted cause filtration or foaming problems.
-\(^f\) Recommended industrial elastomers. Refer to footnote \(c\).
-\(^g\) There is at present no recognized procedure for assessment.
-\(^h\) HD stands for heavy duty. To include fluid discrepancy and detergency
Change over procedure according to DIN ISO 15 380 HEES

Measures during and after changeover

- Remaining residual volume\(^d\) max.
  - 1% (target)
  - This is to ensure thorough cleaning, emptying and flushing of the installation
  - When HD\(^g\) needs to be replaced, 0.50% is allowed to remain

- Periods between oil changes
  - Periods between changes depend on the installation and the application and have to be agreed with the manufacturing of the liquid.
  - In order to determine these changeover periods, running, investigations, for instance of water content and solid particle contamination as well as of viscosity, NN, IR and spectrographic analysis, are necessary

- Periods between filter changes
  - Filter changes when converting to the new liquid and after 50h.
  - Further changes have to be established bearing in mind the installation and application details.
  - Higher percentages of mineral oil shorten the periods between changes.

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