Proven track record

- Klübersynth GEM 4-320 N has been used successfully across the globe in diverse conditions and by a majority of major wind turbine OEMs
- Klübersynth GEM 4-320 N is approved by nearly all major gearbox OEMs in the wind industry

Your benefits

- Long lasting gear oil, more than 6 years drain interval
- Longer life and improved reliability of gearbox
- Reduced downtime of turbines and significantly lower maintenance costs
- State of the art oil condition analysis

Klüber Lubrication is present worldwide.
Please meet our wind energy experts.

http://www.klueber.com/en/contact

Local presence. Global competence.
Overcoming the 4 main challenges in wind turbine gearboxes

1 Foaming

The tendency of an oil to foam reduces its lubricating properties. Klübersynth GEM 4-320 N overcomes this problem with its excellent anti-foaming properties as demonstrated in the Flender foam test. Furthermore, it also fulfills the filtration test requirements of CC Jensen and Hydac.

<table>
<thead>
<tr>
<th>GG-V 425 Rev. 1</th>
<th>Klübersynth GEM 4-320 N</th>
<th>Competitor oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 min after stopping the motor</td>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /></td>
</tr>
<tr>
<td>5 min after stopping the motor</td>
<td><img src="image3" alt="Image" /></td>
<td><img src="image4" alt="Image" /></td>
</tr>
</tbody>
</table>

2 Micropitting

Operators are often faced with micropitting, which bears a risk of follow-up failures. With its advanced additives, Klübersynth GEM 4-320 N offers a high micropitting resistance of load stage ≥ LS 10 (GFT “High”) according to FVA 54/7 over a wide temperature range. Furthermore, it maintains a GFT “High” result even after more than 6 years of use in the gearbox.

3 Residue formation

Some gear oils contain additives that may break down, form residues and cause problems in operation. Our product has been developed as a combination of carefully tuned pure base oils and advanced additive technologies ensuring minimum residue formation.

Klübersynth GEM 4-320 N  High-performance PAO

Clean appearance  Brownish discolouring

4 Bearing wear

The right gear oil contributes decisively to preventing bearing failures and replacements. Klübersynth GEM 4-320 N passed the most demanding FAG 4 stage test with excellent results, confirming the optimum bearing protection of this oil against wear and premature fatigue.

<table>
<thead>
<tr>
<th>Stage</th>
<th>FAG 4 stage test criterion</th>
<th>Test</th>
<th>Result (1 = best, 5 = failed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wear at boundary lubrication</td>
<td>FE8 80h</td>
<td>1.0  passed</td>
</tr>
<tr>
<td>2</td>
<td>Fatigue behaviour at mixed condition</td>
<td>FE8 800h</td>
<td>1.0  passed</td>
</tr>
<tr>
<td>3</td>
<td>Fatigue behaviour at EHL condition</td>
<td>L11 700h</td>
<td>1.0  passed</td>
</tr>
<tr>
<td>4</td>
<td>Fatigue behaviour and residues with water added</td>
<td>FE8 WT</td>
<td>1.0  passed</td>
</tr>
</tbody>
</table>

Summary 1.0  passed