Dopeless® Technology
Benefits Proven by Extensive Product Field Experience

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Dopeless® technology is a dry, multifunctional coating applied to TenarisHydril premium connections for casing and tubing in the mill.

- The coating is applied in a fully automatic process, assuring that the exact amount of the lubricant required by each connection is distributed in a controlled and uniform way on its surface.
- The process is carried out on dedicated production lines at the mills and manufacturing facilities.
- The main objective of the Dopeless® coating is to eliminate the thread compounds used for casing & tubing, providing a “ready-to-use” product.
Dopeless® technology. Concept
Dopeless® technology. Concept

Pin side

Extra corrosion protection
Lubricant Layer
Corrosion Protection
Blasting
Dopeless® technology. Concept

Box Side

Metal

Product C (Extra corrosion protection)

MN Phosphate

Product D (Torque reduction)
Dopeless® technology. Products

- Blue® Series, Wedge Series 500™, Wedge Series 600™ and ER™ connections.
- Carbon, Chrome and CRA grades.
- Size range: 2³/₈” – 24½”. 
Production and service capabilities

- **Dopeless® technology production lines**
- **Dopeless® technology accessories and repair units**
## Dopeless® Sales History

<table>
<thead>
<tr>
<th>Country</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORWAY</td>
<td>1</td>
</tr>
<tr>
<td>RUSSIAN FEDERATION</td>
<td>2</td>
</tr>
<tr>
<td>SAUDI ARABIA</td>
<td>3</td>
</tr>
<tr>
<td>UNITED STATES</td>
<td>4</td>
</tr>
<tr>
<td>PERU</td>
<td>5</td>
</tr>
<tr>
<td>CANADA</td>
<td>6</td>
</tr>
<tr>
<td>VENEZUELA</td>
<td>7</td>
</tr>
<tr>
<td>DENMARK</td>
<td>8</td>
</tr>
<tr>
<td>UNITED ARAB EMIRATES</td>
<td>9</td>
</tr>
<tr>
<td>LIBYA</td>
<td>10</td>
</tr>
</tbody>
</table>

82% of Sales

<table>
<thead>
<tr>
<th>Region</th>
<th>Tons</th>
<th>Footage [Ft]</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Sea</td>
<td>40,449</td>
<td>2,273,656</td>
</tr>
<tr>
<td>RUSSIAN AREA</td>
<td>21,828</td>
<td>1,605,916</td>
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<tr>
<td>South America</td>
<td>19,606</td>
<td>1,166,672</td>
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<tr>
<td>Middle East</td>
<td>16,215</td>
<td>736,644</td>
</tr>
<tr>
<td>USA / CANADA</td>
<td>14,824</td>
<td>1,050,153</td>
</tr>
<tr>
<td>North Africa</td>
<td>7,452</td>
<td>343,548</td>
</tr>
<tr>
<td>EU &amp; Caspian SEA</td>
<td>5,900</td>
<td>405,051</td>
</tr>
<tr>
<td>West Africa</td>
<td>3,115</td>
<td>176,202</td>
</tr>
<tr>
<td>South East Asia</td>
<td>2,784</td>
<td>133,126</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>132,172</strong></td>
<td><strong>7,890,970</strong></td>
</tr>
</tbody>
</table>

### Dopeless Technology Sales History - FOOTAGE

*Footage, Forecast Footage, Acc.Footage, accum foot bdg*
## Benefits of the technology

### Improved operational performance
- Increased Efficiency
- Reliability

### Health & Safety
- Cleaner, Safer rigs & pipe-yards
- Less casing handling

### Environment
- Zero Discharge
- Protector Recycling / Re-use

### Improved well productivity
- Elimination of dope generated formation damage
- Better downhole operations
Benefits of the technology
Field experience—Snøhvit project, Norway

- Subsea gas field inside the Arctic circle
- Dope freezes in sub-zero temperatures
- Strict environmental and Health / Safety regulations. Zero Discharge Policy

“Less operations on the pipe leads to lower potential for injuries. No doping on the rig floor.” (Statoil Well Informed Magazine, December 2004)

- Complete Dopeless Field (10 wells, 40 strings)
- **100% Dopeless® technology well**
- **7 years of ongoing reliability, flawless performance**
Field experience - Eastern Siberia - Russia

**FASTER RUNNING IN SIBERIA**

**Reason for using Dopeless® technology**
Arctic environment
Dope freezes in sub-zero temperatures, making pipe preparation and running difficult.

**Large development**
The number of wells made operational efficiency a priority.

**Benefits observed**
Faster and safer preparation and running
Dopeless® technology renders thread compounds superfluous making operations simpler and cleaner.

**Average running speeds**
- Doped connections: 11 joints/hour
- Dopeless® connections: 14 joints/hour
- Zero rejects in all jobs
- More than 9,310 tons (878,600 feet) of pipes installed in 73 wells
# Field experience - Gas Wells in the Peruvian Amazon

## First Eco-well in the Peruvian Jungle

<table>
<thead>
<tr>
<th>Operator/customer</th>
<th>Field</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repsol</td>
<td>Onshore (Amazon jungle)</td>
<td>Ucayali-Madre de Dios basin (Peru)</td>
</tr>
</tbody>
</table>

**Reason for using Dopeless® technology**

*Environmental protection*

The operation took place in a delicate habitat, home to numerous indigenous communities and rich biodiversity. In this setting there was a need to avoid releasing potentially hazardous chemicals while cleaning, making up or breaking out pipe.

**Benefits observed**

- First eco-well in a jungle environment to have all casing, liner and tubing strings made up with Dopeless® connections
- No storage or running compounds used
- No fresh water or chemicals needed to clean up connections prior to installation

**Environmental impact caused by dope discharges**
Elimination of dope related formation damage

- Dope is exuded inwards and outwards of the connection during make up.
- A suspension of dope in well fluids is formed. It penetrates and damages the formation.
- Tenaris demonstrated through lab analysis that these chemicals can create formation damage in some wells.
- The study shows significant reductions in permeability, at the front face of the core sample.

*Dopeless® eliminates the damage caused by pipe dope in the formation, by being a completely dry solution.*
Elimination of dope related formation damage

*Dope is exuded inwards and outwards of the connection.*
Elimination of dope related formation damage
A suspension of dope in well fluids is formed. It penetrates and damages the formation.
Elimination of dope related formation damage
Tenaris demonstrated through lab analysis that these chemicals
  can create formation damage in some wells.

- Reservoir Core Samples from an Argentinean oilfield.
- Pressure measured at the front and at the middle of the load cell.
Elimination of dope related formation damage

The study shows significant reductions in permeability, at the front face of the core sample.

Core Front Face. Core Rear face.

Core Front Face. Core Rear face.

Core Front Face.

Core Rear face.

K_{\text{final}}/K_{\text{initial}} = 0.0062 \quad \text{--} \quad K_{\text{final}} = 0.496 \text{ mD} \quad (-99.38\%)
Conclusions

• The elimination of pipe dope from casing and tubing is possible and brings an array of benefits.
• These benefits can be described in four categories: Improved operational performance, Improved well productivity, Health & Safety and Environment.
• Dopeless® technology has 9 years of experience in all kind of drilling & completion operations, covering all type of wells and environments.
• It is a zero discharge and “rig-ready” technology.
• It has been industrialized and its available for the whole range of dimensions and materials used in casing and tubing.