1. CHEMICAL COMPOSITION

„P540” is a special nonmagnetic, austenitic Mn-Cr-N-steel with a nitrogen content of ≤2%.

<table>
<thead>
<tr>
<th>C</th>
<th>Mn</th>
<th>Cr</th>
<th>Mo</th>
<th>N</th>
<th>Ni</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. 0,05</td>
<td>19,0-21,0</td>
<td>17,0-19,5</td>
<td>0,30-0,80</td>
<td>min. 0,50</td>
<td>0,8-2,0</td>
</tr>
</tbody>
</table>

2. MECHANICAL PROPERTIES

Following mechanical properties (tested at room temperature) are achieved by a special cold-working process over the full length of the collar:

- Yield Strength (min.): OD up to 9 1/4” 0,2%-offset method OD 9 1/2” and larger
  - 120 ksi 830 N/mm²
  - 110 ksi 760 N/mm²
- Tensile Strength (min.):
  - 130 ksi 900 N/mm²
- Elongation (min.):
  - 20% 20%
- Reduction of area (min.):
  - 50% 50%
- Impact energy (min.):
  - 90 ft.lb 122 J
- Endurance Strength / N=10⁶ (min.):
  - ± 65 ksi ± 455 N/mm²
- Hardness Brinell:
  - 285-400 HB

3. MAGNETIC PROPERTIES

Relative permeability: ≤1,005.

4. CORROSION RESISTANCE

- Transgranular SCC: Prevented by special surface treatments (Hammer peening, roller burnishing, shot peening).
- Intergranular SCC: The occurrence of material sensitization is prevented by quenching after warmforging. Each collar is tested according to ASTM A 262, Pract.A and E, last edition.
- Pitting Corrosion: Due to a high chromium- and nitrogen content a high resistance to pitting corrosion is given.

5. NON-DESTRUCTIVE TESTING

- Magnetic inspection: Drill collars are 100% tested by a proprietary probe-testing process using a Förster Magnetomat 1.782. (“Hot Spot”-test). Magnetic permeability of each collar is certified with the printout of probe-testing.
- Ultrasonic inspection: Each collar is ultrasonically inspected over 100% of the volume according to ASTM E 114, last edition as a minimum level.