Armofor® steel cord reinforced thermoplastic strip

The reliable solution for high pressure resistance
Bekaert Armofor®

Steel cord reinforced composites developed for the oil and gas industry

Steel cords have a long history as reinforcement in rubber. Now Bekaert has developed a proprietary production process to position steel cords with high precision side-by-side in a thermoplastic matrix thus forming composite strips with superior strength.

**Bekaert Armofor®** composites offer steel cord performance
• High strength to weight ratio
• Flexibility
• Zero creep
• Ductile behavior
• Excellent corrosion protection

Both polymer matrix and cord properties can be tailored for strength, flexibility and temperature resistance.

Bekaert Armofor® is delivered as an easy to wind composite strip.
Bekaert Armofor® allows you to design flexible high-pressure pipes.

Value elements

Bekaert Armofor® is the reinforcement of choice when you design thermoplastic pipes that must offer the combination of HIGH PRESSURE RESISTANCE with one or all of these value elements:
- LIGHT WEIGHT compared to steel pipe alternatives
- FLEXIBILITY for spoolable pipes
- TEMPERATURE RESISTANCE to handle the pressure in ultra low, normal or high temperature operating conditions
- CORROSION RESISTANCE for long-term sustained performance

Positioning

<table>
<thead>
<tr>
<th></th>
<th>Bekaert Armofor® reinforced thermoplastic pipes</th>
<th>Compared to Aramid reinforced thermoplastic pipes</th>
<th>High performance rigid steel pipes</th>
<th>Glass reinforced epoxy pipes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spoolability</td>
<td>✔</td>
<td>✔</td>
<td>✘</td>
<td>✘</td>
</tr>
<tr>
<td>Low weight</td>
<td>✔</td>
<td>✔</td>
<td>✘</td>
<td>✔</td>
</tr>
<tr>
<td>Resistance to high temperature</td>
<td>✔</td>
<td>✘</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Corrosion resistance</td>
<td>✔</td>
<td>✔</td>
<td>✘</td>
<td>✔</td>
</tr>
<tr>
<td>High pressure performance</td>
<td>✔</td>
<td>✘</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Impact resistance</td>
<td>✔</td>
<td>✔</td>
<td>✘</td>
<td>✘</td>
</tr>
<tr>
<td>Resistance against abrasion and wear</td>
<td>✔</td>
<td>✔</td>
<td>✘</td>
<td>✔</td>
</tr>
<tr>
<td>Fluid sensitivity</td>
<td>Hydrocarbons</td>
<td>Hydrocarbons</td>
<td>Acid, base and H2S</td>
<td>Water, base</td>
</tr>
</tbody>
</table>
Global presence to support your business

Being part of your solution means being part of your business. Backed by our global presence and technological leadership, we can respond quickly to your needs, wherever you are located.

Where shall we meet?

When you choose Bekaert, you will benefit from our commitment to local service, supported by our global presence. We aim to excel as a dependable, ever-advancing supplier.

- plants
- offices and distribution centers

North America
1 800 personnel
Combined sales: € 469 million
14%

EMEA
6 500 personnel
Combined sales: € 823 million
25%

Latin America
7 200 personnel
Combined sales: € 1 237 million
37%

Asia-Pacific
10 000 personnel
Combined sales: € 814 million
24%

Financial figures based on year results 2009
Personnel as per mid 2010
Performance

The design flexibility of Bekaert steel cord allows the development of cost efficient high performance solutions compared to traditional fibers.

Typical strength/strain curves for steel wire and steel cord.  
1. At the same diameter the steel wire shows a lower tensile strength than steel cord A.  
2. The same is true when comparing the steel wire and steel cord B having similar linear densities.  
3. The steel wire has an important plastic elongation before failure while steel cord behaves elastic in the entire test range.

<table>
<thead>
<tr>
<th>Steel Wire</th>
<th>Steel Cord A</th>
<th>Steel Cord B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter (mm)</td>
<td>Strain (%)</td>
<td>Tensile</td>
</tr>
<tr>
<td>HT Steel Wire - 1.5</td>
<td>1.5</td>
<td>13.5g/m</td>
</tr>
<tr>
<td>HT Steel Cord A - 1.5</td>
<td>1.5</td>
<td>9.8g/m</td>
</tr>
<tr>
<td>HT Steel Cord B - 1.7</td>
<td>1.7</td>
<td>13.5g/m</td>
</tr>
</tbody>
</table>

Bekaert Armofor® can be designed to meet your specific requirements for burst pressure and working pressure at a given pipe diameter.

A typical curve is shown of the burst pressure versus the diameter of the pipe for 2 layers of Bekaert Armofor® with a steel cord with a diameter of 1.85mm. As safety factor for this application a factor 3 is chosen. Higher burst pressures can be achieved with more layers of Bekaert Armofor®.

Packaging

Our packaging allows for an easy transfer onto your strip winding line.

Approvals

[DNV, NACE]
Imagine what we can achieve together ...

If you want to expand your capabilities while reducing your risk to do business, don’t hesitate to get in touch. We would be delighted to talk about how we can work together.

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