Rubber and Ceramic Lagging

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represent a true reflection of our current technology and experience. Due to ongoing developments,
certain details may soon become obsolete. We can accept no responsibility for errors or
omissions or misinterpretations given in this brochure.
Conveyor Belt when slips causes significant damage to the drive pulley and the belt. Such damages are not only expensive to repair, but also time consuming and cause enormous loss due to down time.

Belts need good traction with the drive pulley to prevent slips that can cause major damage.

The life span of a conveyor system primarily depends on its being suitably equipped for the specific application and the standard of servicing and maintenance. The conveyor systems often have to perform in the most difficult conditions. For example, rain and sludge, which cause slippage between the conveyor belt and pulleys because of the low friction co-efficient between the two.

Forech offers both plain and patterned pulley lagging with specially developed rubber materials and their plain and patterned surfaces have proved to be very effective in water shedding, preventing material build-up and controlling belt slippage. All lagging products can be provided with a Bonding Layer for easy installation with cold glues. In addition, Forech also offers a buffed and plain surface to suit your particular needs and budget.

A very special range of ceramic pulley lagging is offered by Forech to provide very high levels of drive and wear resistance for conveyor pulleys that operate in medium to heavy duty applications in wet and muddy conditions.

**Why Pulley Lagging?**
- Prevents slippage - reduces pulley wear
- Prevents material build up on pulley
- Reduces chances of mistracking
- Reduces damage to the conveyor belt
- Allows for easy drainage of water and slurry

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Patterned Sheet Pulley Lagging

FORECH-HILTON offers a comprehensive range of Patterned Sheet Pulley Laggings to suit every conceivable conveyor installation. The Pulley Laggings offered by FORECH-HILTON are produced in different thicknesses, rubber qualities and patterns to ensure selection of the most appropriate type, to suit all application requirements.

The Sheet Pulley Laggings offered by FORECH-HILTON come with CN Bonding Layers for better adherence levels as also with buffed surface. The profiled patterns on the top surface, in diamond or square embossing improve belt grip and tracking on conveyors, while reducing belt wear. The Sheet Pulley Lagging is available in various grades of rubber, including FRAS and oil resistant grades.

FORECH-HILTON Strip Lagging is available in a variety of designs to suit the various application requirements. These are manufactured with 60 to 65 Shore hardness rubber compound, having an excellent abrasion resistance. All the designs offered by FORECH-HILTON have excellent water shedding characteristics. Supplied in Roll sizes, ranging from 10 to 85 metres in a width of 205mm, they can be custom fitted to any pulley size with minimal wastage.

Profile dimensions and range

**Patterned Sheet Pulley Lagging**

**BENEFITS**
- Easy to install
- Minimum wastage and economically priced
- Outstanding wear and abrasion resistance
- Reduced adhesive use
- Reduced labour
- Reduced down time
- Customised to pulley size with minimal wastage

**FEATURES**
- Supplied in a 205mm wide strip
- Rolls of 10 to 85 metre strips
- Diamond & Plain Pattern
- CN Bonding Layer, Plain or with Buffed Back options

**Range of profiles and dimensions**
From the second relationship in the diagram \( T_1/T_2 = e^{\mu \phi} \) we see that the tension on the belt (T1) increases significantly as coefficient of friction (\( \mu \)) increase. Increasing the coefficient of the friction therefore has the following benefits:

- Reduced belt tension required
- Reduced slip and therefore less wear on belt and lagging.
- Reduced load on shaft and bearings

The frictional force is significantly increased in the ceramic lagging due to the mechanics of the dimples. However care has been taken that this does not damage the conveyor belt.

**Coefficient of Friction**

The maximum tension \( T_1 \), generated in any conveyor belt is the tension which is required to be imparted on the belt in order to transmit, through traction, at the belt-pulley interface, the tension, \( T_e \), necessary to overcome all the system resistances and convey the desired through put at stipulated operating parameters in the diagram. The residual tension \( T_2 \), is responsible for maintaining the integrity of the belt run and limits the inter-idler sag of the belt to permissible limits. The three tension values are related through mathematical equations, namely.

\[
T_1 - T_2 = T_e, \quad \text{and} \quad T_1/T_2 = e^{\mu \phi}
\]

\( \mu \) = Coefficient of friction between belt and pulley, \( \phi \) = Arc of contact between belt and pulley

The value of \( \mu \) is determined using the dynamic test rig as shown below. A section of belt is wrapped around a pulley (180 degree Arc of Contact) with a constant load on one end. A motor applies a torque force to the pulley. At a threshold torque the pulley begins to rotate.

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**Comparison Table for Co-efficient of Friction**

<table>
<thead>
<tr>
<th>Co-efficient of Friction</th>
<th>Bare Steel Pulley</th>
<th>Rubber Lagging</th>
<th>Ceramic Lagging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>0.25</td>
<td>0.50</td>
<td>0.75</td>
</tr>
<tr>
<td>Wet</td>
<td>0.15</td>
<td>0.35</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Forech ceramic pulley lagging provides the best grip for your drive pulley. The ceramic inserts in the lagging surface provide both high friction and high wear resistance—providing the best protection for your pulley and belt in the most demanding conditions. Ceramic pulley lagging is ideally suited for wet and muddy conditions where belt slippage can be a major problem.

The high co-efficient of friction of the ceramic tile inserts with the belt also allows for belt tension to be reduced. This also improves the life of the belt, as well as that of the other belt components as they come under less stress.

The surface of the lagging is profiled similar to that of profiled rubber pulley lagging. This allows for effective drainage.

**Forech Ceramic Lagging**

Forech Ceramic Lagging is offered as easy to install strips. These come with a bonding layer backing, or a buffed surface as per your needs and budget.

Ceramic tiles embedded in rubber, are also supplied in Fire Resistant Anti Static (FRAS) approved grades of rubber compound for underground applications.
Ceragrip Lagging with Square Ceramic Tiles Profile

Ceragrip Lagging with triangular Ceramic Tiles Profile

Water Shedding Action

www.forech.com
Summary Results of Pulley Lagging Adhesion Tests

<table>
<thead>
<tr>
<th>Time (hour)</th>
<th>Rubber to Metal Adhesion (N/mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
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<td>24</td>
<td>12</td>
</tr>
<tr>
<td>48</td>
<td>14</td>
</tr>
<tr>
<td>72</td>
<td>16</td>
</tr>
<tr>
<td>168</td>
<td>12</td>
</tr>
</tbody>
</table>

CeraGrip Ceramic Lagging Features:

- Square/Triangular Tiles with Raised Dimples
- 92% Aluminium Oxide tile material
- Rubber Compound blended with CN polymers
- Low Sulphur rubber compound
- Ceramic Tiles fully encapsulated and chemically bonded to rubber on 5 sides
- Special Rubber compound to meet FRAS and MSHA requirements
- Supplied in 205, 385 and 418mm wide Strip forms with bonding layer and buffed back surfaces
- Can be supplied as individual strips with rubber section at each end of Ceramic section

CeraGrip Ceramic Lagging Benefits:

- Improved traction as dimples grip belt
- Improved belt tracking due to positive grip
- Reduced belt tension required due to increased coefficient of friction.
- Extreme wear resistance
- Outstanding adhesion: - Rubber to Ceramic
  - Rubber to Metal
  - Rubber to Rubber
- Minimal change in rubber hardness with age
- Tiles more resistant to cracking or “pull out”
- Suitable for use in underground mines
- Easy to install with less joins
- One product suits all pulley face widths
- For customers who prefer a rubber edged pulley lagging

Ceramic Tile Specifications

<table>
<thead>
<tr>
<th>Test</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium Oxide (min) Al₂O₃</td>
<td>92%</td>
</tr>
<tr>
<td>Density (g/cc)</td>
<td>3.65</td>
</tr>
<tr>
<td>Hardness (R 45 N)</td>
<td>79 min.</td>
</tr>
<tr>
<td>Cold Crushing Strength (Mpa)</td>
<td>2050 min.</td>
</tr>
<tr>
<td>Flexural Strength at Room Temp. (Mpa)</td>
<td>240 min.</td>
</tr>
<tr>
<td>Water absorption (%)</td>
<td>0%</td>
</tr>
</tbody>
</table>

Base Rubber Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compound Code</td>
<td>R-1608</td>
</tr>
<tr>
<td>Polymer</td>
<td>SBR</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.13 +/- 0.03</td>
</tr>
<tr>
<td>Shore Hardness °A</td>
<td>60 +/- 5</td>
</tr>
<tr>
<td>Elongation at break % Min.</td>
<td>450%</td>
</tr>
<tr>
<td>Tensile Strength (N/mm²)</td>
<td>17.5 N/mm²</td>
</tr>
<tr>
<td>Abrasion Loss</td>
<td>150 mm² at 10N</td>
</tr>
</tbody>
</table>

Hot Bonding of precured Rubber & Ceramic Lagging

Forech Lagging is also available, and is specially manufactured strips that allows it to be hot bonded onto pulleys. This unique innovation allows for press cured strip lagging to now have the additional advantage of hot bond to the steel pulley. The high physical properties that are achieved from a press-cured sheet, manufactured under heavy tonnage, can now be incorporated in a hot bond application, thereby achieving the greatest possible bond strength.