ADVANCED MATERIALS FOR THE AUTOMOTIVE INDUSTRY
INNOVATION

TENMAT is a leading manufacturer of specialised, high performance engineering materials and components with over 100 years of experience.

SAFETY

TENMAT stands for innovation, safety products, commitment to our customers and the latest quality standards worldwide.

SERVICE

QUALITY

A World of Materials

The diversified product range includes, composite wear parts and bearings, engineering ceramics, hard metals, high temperature resistant materials, and passive fire protection solutions.

Commitment to Quality

TENMAT operates a ISO 9001:2008 Quality Management System for the design, development and manufacture of specialized high performance engineering materials and components.
Engineers in Composites

Award Winning Products

In 2012 and 2013 TENMAT’s commitment to the development of high quality products and materials was awarded with the prestigious Queen’s Awards.
Eager to maintain its best-in-class position, **TENMAT** is constantly working with its customers and partners to develop revolutionary solutions and materials, such as slipcoats for automotive weather seals and cutting edge ceramic coatings for hyper performance brake discs.
Railko PV103 and Railko Xtra Glide slip coats are used and specified by major car manufacturers worldwide for automotive weather seal applications.

These proven slip coats create a low friction surface that is long lasting and wear resistant.

Compared to older systems using floc, weather seals with Railko co-extruded slip coats give advantages of lower cost, less operations, and simpler processing.

Railko PV103 has excellent abrasion resistance and low friction.
Railiko Xtra Glide is a more flexible grade to suit modern light weight weather seals without metal support and does not scuff or mar on installation.

**Key Features:**
- Low coefficient of friction
- Low stick slip
- Abrasion resistant
- Stable to light and weather
- Resistant to cleaning fluids

**Customer Benefits:**
- Easy and smooth glass movement
- Long wear life
- No bleed out
- No marking on glass
- No colour fade

**Application Thickness**

Railko slip coats are co-extruded at a recommended thicknesses from 100 to 150 micron. The exact thickness depends on a number of factors and there are applications where a lesser or greater thickness is applied.

The thickness is chosen to be give a thick enough layer to provide durability during life time cycle testing and to retain flexibility where needed.

It is unusual to apply Railko slip coats at less than 100 micron thickness, however low loaded areas with little abrasion requirements can be coated with only 60 microns.

Rarely, thicknesses of around 200 micron are applied in areas needing high wear resistance, such as in the base of glass run channels, where there is uneven movement of the window due to an imbalance of the window actuators.

Examples of the thickness of Railko slip coats in production profiles are given below:

<table>
<thead>
<tr>
<th></th>
<th>Profile A Europe</th>
<th>Profile B Europe</th>
<th>Profile C USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness on lips</td>
<td>80 - 110</td>
<td>90 - 110</td>
<td>80 - 100</td>
</tr>
<tr>
<td>Thickness on base</td>
<td>120 – 150</td>
<td>120 – 150</td>
<td>100 – 120</td>
</tr>
<tr>
<td>Comment</td>
<td>-</td>
<td>Polypropylene support</td>
<td>No metal support</td>
</tr>
</tbody>
</table>
Functional testing of the weather seal

The weather seal is subject to several types of testing: Friction, wear, aging, and glass cycles.

**Friction Test:**
The coefficient of friction is measured on the co-extruded profile typically on a friction sled where two runners of co-extruded strip cut from the profile are attached to the base of the sled. The weight of the sled, the exact shape of co-extruded strip (lips are often tapered), and the contact area with the glass influence the tested value. The sliding force to move the window in the frame is done either on the complete window assembly or on small scale mock ups.

With these variations the typically measured coefficient of friction values on co-extruded profiles are:

- Railko PV103: 0.15
- Railko Xtra Glide: 0.15 - 0.25

The coefficient of friction of Railko slip coats is not dependent on the thickness of the slip coat. However, the dynamic response of functional lips will change due to the thickness of the applied slip coat. This may be noticed in window sliding force tests.

**Wear Test:**
Abrasion tests are typically done on sections cut from the weather seal. Glass chisel tests for abrasion resistance use different weights for base and lip applications.

PV103 and Xtra Glide pass the 10,000 cycles glass chisel test.

**Aging Test:**
Aging tests use aggravated conditions of heat, sunlight, etc. to speed up the natural aging process. Railko slip coats pass the most stringent aging tests of car manufacturers around the world, such as the Exterior Weatherometer SAE J1960 with 3 max delta E and the Interior Weatherometer SAE J1885 with 3 max delta E.

**Glass Cycle Test:**
Slip coats are subject to complete in-door life cycle tests with the window, and tests on small sections of co-extruded profile cut from the weather seal.

PV103, as well as Xtra Glide, pass the 40,000 cycles in door window cycle tests

**Overmoulding**

The glass run channels and the header are joined by corner over-moulding. It is important that a stable slip coat with good over-moulding properties is chosen. Railko slip coats show excellent bonding to the over-moulding.

Competitor slip coats suffer from what is described as oil bleed out, bloom, or exudation. This refers to oil or wax type materials that migrate to the surface of the slip coat and prevent good over-moulding. This poor over-moulding and the development of splits may be visible immediately after over-moulding or may develop over time when the weather seal is in service.
The TENMAT Story

The TENMAT success story began more than 100 years ago in Trafford Park, one of the first planned industrial estates in the world and still the largest of its kind in Europe.

It has been here at TENMAT, where some of the world’s first non-asbestos composite materials were developed, manufactured and supplied around the globe.

Since the 1990’s the company has experienced unparalleled growth, expanding to become a multinational corporation with presence in the United Kingdom, Italy, Sweden, the USA, Germany, and France.

In 2006 TENMAT acquired Railko Ltd., further strengthening its leading position in the rail and marine markets.

Today, TENMAT is part of Diamorph AB and employs over 300 people worldwide in the manufacturing and distribution of technically advanced materials and components.

To meet tomorrow’s needs for innovative solutions, TENMAT operates a state-of-the-art in-house R&D laboratory and continuously develops highest quality products.

You can count on TENMAT to deliver the next generation of advanced materials for the world’s most demanding applications.
**Advanced Materials and Components**

**TENMAT** manufactures a diverse range of thermosets, thermoplastics, hard metals, engineering ceramics, intumescent, and refractory products. **TENMAT** components offer outstanding resilience, toughness, wear protection, temperature resistance, and long lasting performance.

<table>
<thead>
<tr>
<th><strong>FEROFORM</strong></th>
<th>Low friction, thermoset composites, ideal for wet and dry conditions</th>
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<tbody>
<tr>
<td><strong>RAILKO</strong></td>
<td>Full range of slipcoats for TPV/TPE and EPDM.</td>
</tr>
<tr>
<td><strong>FEROGLIDE</strong></td>
<td>Metal backed self lubricating bearings</td>
</tr>
<tr>
<td><strong>FEROBIDE</strong></td>
<td>Weldable tungsten carbide tiles</td>
</tr>
<tr>
<td><strong>REFEL</strong></td>
<td>Fine grained reaction bonded silicon carbide</td>
</tr>
<tr>
<td><strong>NITRASIL</strong></td>
<td>Reaction bonded silicon nitride</td>
</tr>
<tr>
<td><strong>ARCLEX</strong></td>
<td>Glass bonded mica</td>
</tr>
<tr>
<td><strong>SINDANYO</strong></td>
<td>Non-asbestos fibre reinforced cement boards</td>
</tr>
<tr>
<td><strong>REFRAVER</strong></td>
<td>High temperature glass cement composite</td>
</tr>
<tr>
<td><strong>FIREFLY</strong></td>
<td>Advanced thermal millboard and innovative passive fire protection solutions</td>
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TENMAT is committed to the highest standards in customer service and our international staff is looking forward to assist you.

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