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www.corkcomposites.amorim.com
**TechSeal® IS THE NEW FAMILY OF PRODUCTS SPECIFICALLY DESIGNED AND TESTED FOR THE HEAVY DUTY DIESEL MARKET.**

TechSeal® products are designed to withstand the application requirements of heavy duty applications, while providing our customers with manufacturing options that will assure a reliable finished component or engine.

Our product range will meet the application environment where contact with engine oil, gear oil, diesel fuel or biodiesel as well as coolants are required. TechSeal® products are specifically designed for high distortion applications when stamped steel and plastic covers are to be used.

### QUICK REFERENCE GUIDE

#### FLAT GASKET MATERIALS

<table>
<thead>
<tr>
<th>KEY REQUIREMENTS</th>
<th>TS1400</th>
<th>TS1800</th>
<th>TS1300</th>
<th>TS2100</th>
<th>TS2110</th>
<th>TS7000</th>
<th>TS17111*</th>
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</thead>
<tbody>
<tr>
<td>High Temperature Resistance (°C)</td>
<td>125</td>
<td>110</td>
<td>125</td>
<td>110</td>
<td>135</td>
<td>175</td>
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<td>High Load Bearing</td>
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<td>++</td>
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<td>Low Load Bearing</td>
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<td>++</td>
<td>++</td>
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<tr>
<td>B-100 Bio-Diesel</td>
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<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
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<tr>
<td>Diesel (low sulfur)</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Engine oil (15W/40)</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Gear oil (75W90)</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
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<tr>
<td>Hydraulic Fluids</td>
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<td>++</td>
<td>++</td>
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<tr>
<td>MEG Coolant</td>
<td>++</td>
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<td>++</td>
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<td>++</td>
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<td>++</td>
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<tr>
<td>OAT Coolant</td>
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<td>PEG Coolant</td>
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<td>++</td>
<td>++</td>
<td></td>
</tr>
</tbody>
</table>

(a) Not recommended for fuel contact

SAE AMS C-6183 certified materials available upon request

Acceptable Suitable Unsuitable

#### 3D GASKET MATERIALS

<table>
<thead>
<tr>
<th>KEY REQUIREMENTS</th>
<th>A041</th>
<th>A099</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compound</td>
<td>NBR</td>
<td>VMQ</td>
</tr>
<tr>
<td>High Temperature Resistance (°C)</td>
<td>125</td>
<td>180</td>
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<tr>
<td>Low Temperature Resistance (°C)</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Oil Resistance</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Fuel Resistance</td>
<td>++</td>
<td></td>
</tr>
</tbody>
</table>

For recommended service conditions regarding gasket average loading and continuous working temperature please refer to our Material Datasheets.

Check out our “Q-Tool” sealing software on our website for a quick and comprehensive calculation of your joint system, or contact us for additional help to define our best material solution for your sealing requirement.

The data provided in this brochure represents typical values. This information is not intended to be used as a purchasing specification and does not imply suitability for use in a specific application. Failure to select the proper sealing product may result in either severe damage or personal injury. Please contact Amorim Cork Composites regarding specific application recommendations. Amorim Cork Composites expressly disclaims all warranties, including any implied warranties or merchantability or of fitness for a particular purpose. Amorim Cork Composites is not liable for any indirect, special, incidental, consequential, or punitive damages as a result of using the information listed in this brochure, any of its material specification sheets, reproductions of any future use or re-use thereof by any person or entity.

Several Amorim divisions are FSC (Forest Stewardship Council) certified. Recent studies in the Iberian Peninsula state that cork oak forest contributes with more than 20 Million tons of CO2 retention, making it a significant world resource for the environmental balance.

Amorim Cork Composites products and engineering capabilities can provide you with a global advantage when it comes to designing your sealing system. Our systems approach offers you an overall optimized sealing solution.

Amorim Cork Composites products have been tested and are compatible with the new E85 ethanol fuel, as well as B100 bio-diesel fuel. Our products have also been tested for gasoline permeability and can be used to reduce your evaporative emissions levels.

**APPLICATIONS INCLUDE:**
- Powertrain
- Non-Powertrain
- Gear & Chain Covers
- Dust Covers

**FEATURES:**
- Easy to fabricate
- Tolerance to extreme surface finishing conditions, such as ASCAT
- Conformable to flanges with higher “out-of-flatness” values, such as stamped steel and plastic covers
- Lower bolt torques possible
- Fewer fasteners in the system
- Smaller or lower grade fasteners
- Components with less mass and more distortion
- Stable damping values across the frequency range reducing vibrations effectively

**PRODUCT DEVELOPMENT & ENGINEERING SUPPORT**

Amorim Cork Composites provides engineering support during your product development. Our testing facility is fully equipped for Verification & Validation of any joint system. FEA analysis of the joint system using material aging prediction, is a tool that is available for our customers when working together in early development programs.

**TECHNOLOGY THAT PAYS**

Amorim Cork Composites offers a global advantage when it comes to designing your sealing system. Our systems approach offers you an overall optimized sealing solution.

**READY FOR THE FUTURE**

Amorim Cork Composites products have been tested and are compatible with the new E85 ethanol fuel, as well as B100 bio-diesel fuel. Our products have also been tested for gasoline permeability and can be used to reduce your evaporative emissions levels.

**AMORIM CORK COMPOSITES**

Amorim Cork Composites is a registered trademark of Amorim Cork Composites

**AMORIM CORK COMPOSITES**

**TechSeal® **

The Quality Seal

Amorim Cork Composites has many years of experience in providing sealing solutions to numerous industries, developing know-how and technical expertise; anticipating market trends and “problem solving” with our clients.

**TechSeal®** has many years of experience in providing sealing solutions to numerous industries, developing know-how and technical expertise; anticipating market trends and “problem solving” with our clients.

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**TechSeal®** is a registered trademark of Amorim Cork Composites
NATURAL GAS & LPG SEALING SOLUTIONS

www.corkcomposites.amorim.com
TechSeal® The Quality Seal

Amorim Cork Composites has many years of experience in providing sealing solutions to numerous industries, developing know-how and technical expertise, anticipating market trends and “problem solving” with our clients.

TechSeal® is the new family of products specifically designed and tested for natural gas & LPG applications.

TechSeal® products are designed to withstand the requirements of Natural Gas & LPG appliances, valves, devices or gas installations, while providing our customers with manufacturing options that will assure a reliable finished component or product.

CHARACTERISTICS AND ADVANTAGES

- **TOLERANCE TO EXTREME SURFACE FINISHING CONDITIONS, SUCH AS “AS CAST”.
- **CONFORMABLE TO FLANGES WITH HIGHER “OUT-OF-FLATNESS” VALUES, SUCH AS STAMPED STEEL AND PLASTIC COVERS.
- **LOWER BOLT TORQUES POSSIBLE
- **FEWER FASTENERS IN THE SYSTEM
- **SMALLER OR LOWER GRADE FASTENERS.
- **allows for components with less mass and more distortion.
- **EASY TO FABRICATE.
- **GOOD CHEMICAL COMPATIBILITY WITH BURNING GASES WITH VERY LOW GAS PERMEABILITY
- **very low side-flow improving crush-out resistance.

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Several Amorim divisions are FSC (Forest Stewardship Council) certified. Recent studies in the Iberian Peninsula state that cork oak forest contributes with more than 20 Million tons of CO₂ retention, making it a significant world resource for the environmental balance.

Each time cork is harvested, cork bark regenerates itself. Cork oak trees store CO₂ in order to regenerate, and therefore a harvested cork oak tree absorbs 3 to 5 times more than one which is not harvested, thus benefiting the atmosphere.

Check out our “Q-Tool” sealing software on our website for a quick and comprehensive calculation of your joint system, or contact us for additional help to define our best material solution for your sealing requirement.

For recommended service conditions regarding gasket average loading and continuous working temperature please refer to our Material Datasheets.
Gasoline engines used in both handheld and non-handheld equipment are under pressure to comply with new evaporative emission standards. Cost effective and reliable sealing solutions are needed to help you comply with these new requirements.

**TechSeal®** products cover a wide range of applications in small gasoline engines. Verification & Validation testing in industry reference engines, assure our customers a reliable, cost-effective, leak-free solution. Excellent established torque retention show that our materials are the best sealing solution for small gasoline engines.

TechSeal® products provide an average gasket loading from 2 MPa (290 psi) up to 30 MPa (4300 psi) and compressive strengths inside the bolt head to exceed 70 MPa (10000 psi).

Our products need lower torque to seal vs the valve cover and crank case. They present excellent out-of-flatness tolerance eliminating the need for high cost silicone screen printed gaskets, or machined surfaces.

**TechSeal®** standard materials withstand up to 135ºC (275ºF) which means that they will comfortably meet the range of operating temperatures for soft gaskets in the engine. Premium grades are available for high-temperature applications and fuel media contact.

**TechSeal® products** prevent lower gasoline vapor transmission rates when compared with other sealing materials in the market (fibers and silicone RTV). Low gasoline vapor transmission rates when compared with other sealing materials in the market (fibers and silicone RTV).

**TechSeal®** materials are a global performance sealing solution for Small Gasoline Engines. TechSeal® products cover a wide range of applications in small gasoline engines. TechSeal® products provide an average gasket loading from 2 MPa (290 psi) up to 30 MPa (4300 psi) and compressive strengths inside the bolt head to exceed 70 MPa (10000 psi).

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**Environmental Contribution**

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**TechSeal® materials** are a global performance sealing solution for Small Gasoline Engines.

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www.corkcomposites.amorim.com
TechSeal® products are specifically designed for high-distortion applications when compared to steel and plastic covers to be reused.

RECOMMENDED SERVICE CONDITIONS

<table>
<thead>
<tr>
<th>TechSeal®</th>
<th>T1 1300</th>
<th>Light Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>0º C</td>
<td>35 º C</td>
</tr>
<tr>
<td>Pressure</td>
<td>0.25 MPa</td>
<td>1.5 MPa</td>
</tr>
</tbody>
</table>

MATERIAL PROPERTIES

| Density (g/cm³) | 1.30-1.35 |
| Hardness (Shore A) | 35-45 |
| Elongation (%) | 300-500 |
| Tensile Strength (MPa) | 12-18 |
| Density (kg/m³) | 20-60 |

Characteristics and Advantages

- TOLERANCE TO EXTREME SURFACE FINISHING CONDITIONS, SUCH AS "AS CAST".
- CONFORTABLE TO TIMELINES WITH HIGHER "OUT-OF-FLATNESS" VALUES, SUCH AS STAMPED STEEL AND PLASTIC COVERS.
- LOWER BOLT TORQUES POSSIBLE.
- FEWER FASTENERS IN THE SYSTEM.
- SMALLER OR LOWER GRADE MATERIAL.
- COMPONENTS WITH LESS MISE AND MORE DETORITION.
- STABLE DAMPING VALUES ACROSS THE FREQUENCY RANGE REDUCING VIBRATIONS EFFECTIVELY.
- EASY TO FABRICATE.

TERMINOLOGY THAT PAYS

Amorim Cork Composites products have been tested and are compatible with the new E85 ethanol fuel, as well as diesel and B100 bio-diesel fuel. Our products have also been tested for gasoline permeability and can be used to reduce your evaporative emissions levels. The usage of cork as a natural, renewable raw material with an important role in CO₂ reduction in our products also contributes to the environmental sustainability approach of your business.

READY FOR THE FUTURE

Amorim Cork Composites products have been tested and are compatible with the new E85 ethanol fuel, as well as diesel and B100 bio-diesel fuel. Our products have also been tested for gasoline permeability and can be used to reduce your evaporative emissions levels. The usage of cork as a natural, renewable raw material with an important role in CO₂ reduction in our products also contributes to the environmental sustainability approach of your business.

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FLEXIBLE & EFFECTIVE SOLUTIONS

- MATERIAL CHARACTERISTICS ALLOWS FOR SMALL THICKNESS AND NESTING SOLUTIONS
- ADHESIVE BACKING FOR FAST OPTIONS ASSEMBLY.
- MATERIALS ARE SUPPLIED IN ROLLS FOR QUICK SET-UP IN YOUR OPERATIONS, WITH THICKNESS RANGING FROM 0.5 mm (0.020 in.) UP TO 0.2 mm (0.015 in.).
- STANDARD ROLL WIDTHS OF 40 in.
- ROLL LENGTHS CAN BE CUSTOMIZED TO MEET YOUR PRODUCTION SET-UP.
- SHEETS AND OTHER THICKNESS ARE AVAILABLE UPON REQUEST.

APPLICATIONS INCLUDE:

- Air Cleaner Gasket
- Breather Passage Gasket
- Breather Gasket
- Carburetor Gasket
- Intake Gasket
- Valve Cover Gasket
- Crankcase Gasket
- Breather Gasket

TechSeal® is a trademarked name of Amorim Cork Composites.
Amorim T&D for Transformers & Accessories

Amorim Cork Composites is the leading world producer of materials and gaskets for the transformer industry. We've greatly increased our customer base around the world and proved to the industry that Amorim materials mean quality and reliability.

Amorim T&D IS THE NEW FAMILY OF PRODUCTS SPECIFICALLY DESIGNED AND TESTED FOR THE TRANSMISSION AND DISTRIBUTION MARKET.

In the global business era, we've prepared ourselves to be a world-wide player, efficiently delivering products through our distribution network. Our product portfolio includes:

- **MATERIAL TECHNOLOGY THAT WORKS**
  - Cork oak bark regeneration
  - Cork oak trees store CO₂
  - Cork is harvested in a sustainable way

Amorim Cork Composites provides technical support from material recommendations to deep involvement in application programs.

**SEALING**
- Proven long term performance in the field
- Products with wide load range and suitable for extreme operation temperatures
- Tolerance to extreme surface finish conditions and high out-of-flatness designs
- Experience in designing gaskets for multiple industries and applications

**VIBRATION CONTROL**
- Proven noise and vibration solutions working in major OEM’s around the world
- Internal pads for distribution transformers
- External pads for power transformers
- Extensive product testing and application engineering support

**RUBBER MOULDINGS**
- Wide range of rubber compounds designed for use in the industry
- Certified formulations available
- Moultioning, extrusions and press-cut products
- Technical support and material testing facilities

### Key requirements

<table>
<thead>
<tr>
<th>Specification</th>
<th>Materials</th>
<th>Key requirements</th>
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<tbody>
<tr>
<td>Density (g/cm³)</td>
<td>VC12100</td>
<td>1.60 - 1.80</td>
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<tr>
<td>Tensile Strength (MPa)</td>
<td>VC12100</td>
<td>2.0 - 3.0</td>
</tr>
<tr>
<td>Hardness (Shore A)</td>
<td>VC12100</td>
<td>55 - 70</td>
</tr>
<tr>
<td>Creep Rate (%)</td>
<td>VC12100</td>
<td>0.19 – 0.25</td>
</tr>
<tr>
<td>High Temperature Resistance (ºC)</td>
<td>VC12100</td>
<td>1040 – 1050</td>
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<tr>
<td>Oil Resistance</td>
<td>VC12100</td>
<td>++ – ++</td>
</tr>
<tr>
<td>Gasket Resistance</td>
<td>VC12100</td>
<td>++ – ++</td>
</tr>
</tbody>
</table>

### Compositions

<table>
<thead>
<tr>
<th>Composition</th>
<th>Density (kg/m³)</th>
<th>Hardness (Shore A)</th>
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</thead>
<tbody>
<tr>
<td>Compressed</td>
<td>950</td>
<td>2,5</td>
</tr>
<tr>
<td>Liquid</td>
<td>1050</td>
<td>1,4</td>
</tr>
</tbody>
</table>

### Accessories

- Tank cover Oil gauge Valve Isolator CT LV bushings HV bushings

Sealed in the global business era, we've prepared ourselves to be a world-wide player, efficiently delivering products through our distribution network. Our product portfolio includes:

- **SEALING**
  - Proven long term performance in the field
  - Products with wide load range and suitable for extreme operation temperatures
  - Tolerance to extreme surface finish conditions and high out-of-flatness designs
  - Experience in designing gaskets for multiple industries and applications

- **VIBRATION CONTROL**
  - Proven noise and vibration solutions working in major OEM’s around the world
  - Internal pads for distribution transformers
  - External pads for power transformers
  - Extensive product testing and application engineering support

- **RUBBER MOULDINGS**
  - Wide range of rubber compounds designed for use in the industry
  - Certified formulations available
  - Moultioning, extrusions and press-cut products
  - Technical support and material testing facilities

Available in rolls or sheets, with thickness ranging from 1.0mm (0.040in) up to 12.0mm (0.472in).

### FAQ

- **Q-Tool**
- Material Datasheets
- Transformer and Distribution Application Guide
- Switchgear
- HV bushings
- LV bushings
- Low Temperature Resistance
- High Temperature Resistance

### FSC Certification

- Several Amorim divisions are FSC (Forest Stewardship Council) certified. Recent studies in the Brazilian Patagonia state that cork oak forest contributes with more than 20 Million tons of CO₂ retention, making it a significant world resource for the environmental balance.

- Cork oak bark regeneration involves the tree's natural ability to regenerate, and therefore a harvested cork oak tree absorbs 3 to 5 times more than one which is not harvested, thus benefiting the atmosphere.
TESTING & VALIDATION

Amorim T&D sealing materials are unique because they compress mostly within themselves, showing less extrusion than rubber gaskets.

Flat gaskets will assure that you will have enough contact area, reducing the risk of misassembled gaskets (off-centre). They will also guarantee that you always get enough compression even when surface imperfections in the flange exist (distortion, paint or welding defects, etc).

Flat gaskets eliminate the need for controlled compression system designs, therefore cutting your manufacturing costs (materials and labour).

Most flanges will also present some “bow” when placed under load. Gasket conformability is critical in such conditions, and Amorim T&D material will provide a leak-free solution.

Amorim T&D materials were submitted to very severe ageing cycles (over 1500 hours @ 167ºC under compression and in full contact with oil) in order to show correlation with over 30 years of service life.

This test protocol, based on similar industry long term validation tests, confirms that Amorim T&D materials withstand transformer service life requirements and are suitable for service conditions of 125ºC or higher (up to 175ºC).

Application testing to reproduce extreme field temperatures like arctic conditions, with thermal cycles down to -60ºC, show that Amorim T&D materials remain flexible and retain the right amount of sealing stress in those conditions.

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Transformer noise is a *hum* characterized by spectral spikes at harmonics of the fundamental frequency which is twice the line supply of the electrical frequency (50 Hz/60 Hz). Transformer’s **low frequency tonal** noise components are the major source of annoyance. Other sources of noise, such as the cooling fans and the pumps, are considered to be negligible contributors to the far-field noise.

Core vibration caused by **Magnetostriiction of core material**
- 120, 240 and 360 Hz with some 480 Hz for 60 Hz operation
- 100, 200, 300 and 400 Hz for 50 Hz operation

Cooling Equipment Noise – caused by **Fans and Pumps**
- Fan blade or Motor noise: low -frequency components < 100 Hz

An unexpected high level of a frequency component would indicate core / tank resonance.
Transformer Noise Abatement Techniques

Source: IEEE Std C57.136-2000
VIBRATION PADS – DESIGN GUIDLINES

VIBRATION ISOLATION

PAD

WEIGHT, DIMENSIONS AND CONSTRAINTS

MEDIUM

CENTER OF GRAVITY

TEMPERATURE

FREQUENCY

NOISE REDUCTION

Amorim T&D solutions for Transmission and Distribution applications
OUR SOLUTION – Use our PLUG & PLAY Calculation Tool
VIBRATION PADS – TRANSMISSIBILITY CURVE

Transmissibility, TR, provides a common measure of Vibration Control performance, and can be expressed in linear units or logarithmically, for example, in decibels (dB).

Briefly, transmissibility is a measure of the vibration response of a system divided by the magnitude of the vibration input to the system.

- Lower transmissibility implies greater isolation.
- Increasing the pad thickness (maintaining the geometry) decreases the natural frequency, and hence increasing the isolation region.
VIBRATION PADS – TRANSMISSIBILITY

Isolation vs. Dampening

Amorim Vibration Control Materials exhibit high material loss factors resulting in low amplification at resonance, giving them operational effectiveness over a broad range of frequencies.

The amount of damping in the isolation system will determine the magnitude of peak transmissibility (Fn) for the system. As damping increases, this peak value will decrease.

A vibration isolator lowers the natural frequency of a system to below the excitation (or disturbing) frequency, keeping these two frequencies greatly apart reduces or isolates vibration.

Note: Properly designed metal springs and rubber mounts can be good isolators but have almost no damping capability.
VIBRATION PADS – TRANSMISSIBILITY

Material Loss Factor

The loss factor of a material represents the ratio of energy it dissipates to the amount it stores, temporarily for each cycle of vibration. Energy dissipation is achieved through the conversion into heat.

Our specific polymer formulations and the inclusion of CORK, due to its unique compressibility and recovery characteristics, absorb energy, yielding high material loss factors.

Cork cells are minute, irregular pentagonal or hexagonal prisms. The cell height rarely exceeds 50 micrometers. Fifty per cent of cork is an air-like gas enclosed in the cork cells. Suberin makes the cork cell membrane impermeable and the cell airtight.
# Transformer Vibration Control Materials

<table>
<thead>
<tr>
<th></th>
<th>VC 2100</th>
<th>VC1001</th>
<th>VC5200</th>
<th>VC 6400</th>
<th>VC 7000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum Load</strong></td>
<td>2,0 MPa</td>
<td>0,25 MPa</td>
<td>0,6 MPa</td>
<td>2,0 MPa</td>
<td>10,0 MPa</td>
</tr>
<tr>
<td></td>
<td>(290 psi)</td>
<td>(36 psi)</td>
<td>(87 psi)</td>
<td>(290 psi)</td>
<td>(1450 psi)</td>
</tr>
<tr>
<td><strong>Work Load Range</strong></td>
<td>0,5 - 1,5 MPa</td>
<td>0,05 - 0,2 MPa</td>
<td>0,2 - 0,5 MPa</td>
<td>0,5 - 1,5 MPa</td>
<td>1,0 - 6,0 MPa</td>
</tr>
<tr>
<td></td>
<td>(72 - 217 psi)</td>
<td>(7 - 29 psi)</td>
<td>(29 - 72 psi)</td>
<td>(72 - 217 psi)</td>
<td>(145 - 870 psi)</td>
</tr>
<tr>
<td><strong>Temperature Range</strong></td>
<td>-40°C to 125 ºC</td>
<td>-40°C to 90 ºC</td>
<td>-40°C to 110 ºC</td>
<td>-30°C to 110 ºC</td>
<td>-60°C to 175 ºC</td>
</tr>
<tr>
<td></td>
<td>(-40°F to 257°F)</td>
<td>(-40°F to 194°F)</td>
<td>(-40°F to 230°F)</td>
<td>(-22°F to 230°F)</td>
<td>(-76°F to 347°F)</td>
</tr>
<tr>
<td><strong>Density (kg/m³)</strong></td>
<td>850</td>
<td>500</td>
<td>700</td>
<td>1000</td>
<td>1100</td>
</tr>
<tr>
<td><strong>Hardness (Shore A)</strong></td>
<td>65</td>
<td>25</td>
<td>60</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td><strong>Tensile Strength (MPa)</strong></td>
<td>2,0</td>
<td>0,3</td>
<td>1,2</td>
<td>2,5</td>
<td>3,0</td>
</tr>
<tr>
<td><strong>Creep Rate (%)</strong></td>
<td>2,0</td>
<td>3,0</td>
<td>2,5</td>
<td>1,4</td>
<td>1,5</td>
</tr>
<tr>
<td><strong>Loss Factor</strong></td>
<td>0,19</td>
<td>0,21</td>
<td>0,21</td>
<td>0,20</td>
<td>0,05</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Internal Vibration Control (Oil Contact)</td>
<td>External Vibration Control</td>
<td>External Vibration Control</td>
<td>External Vibration Control</td>
<td>Internal Vibration Control Dry Transformers</td>
</tr>
</tbody>
</table>

(1) ASTM D297
(2) ASTM D412, Die C
(3) ASTM D2240
(4) ISO 8013

*Amorim T&D* solutions for Transmission and Distribution applications
VIBRATION PADS – DESIGN FOR LIFE

CREEP or DRIFT

Creep is a Log decrement phenomenon, this means that the amount of deflection varies linearly with the Log of time. The amount of deflection in 1 day is the same as that in 10 days, is the same as that in 100 days, etc. This deflection has to be accounted for in the design process.

Amorim Vibration Control materials have been tested according to ISO8013 above their load working conditions, and even so show an excellent retention in height.
On Site Validations & Trouble Shooting

Portable sound instrument system:

- Sound level measurements in the field.
- Sound Intensity measurements in the field
- Reverberation measurements in the field
- Diagnostic tests to indicate weak links in the acoustic system.
Amorim T&D solutions for Transmission and Distribution applications

CASE I – Interior Control

VC2100 is used as an internal mat (or pad) replacing Pressboard

- Higher damping => lower amplification at resonance
- Higher isolation level starts to isolate well below pressboard (60/100 Hz versus 210 / 270 Hz)
**CASE II – Exterior Control – VC6400 @ 40mm**

VC6400 in Power Transformer (40MVA) External Pads

- Current Noise Level - 62dBA
- Target Noise Reduction - 3dBA

- Pad Dimensions: 900 mm x 200 mm x 40mm
- Weight: 32 tons
- Fluid: mineral oil
- Number of pads: 3

- Material = VC6400 (within load range)
- Transmissibility at 100 Hz (at 40mm) = -28dB
- Isolation = 96%

VC6400 grade has been specifically formulated to perform in longevity in the application environment when subject to the application conditions, such as the presence of Ozone/UV.¹

¹ Ozone gas is produced during electric discharge by sparking or corona discharge (or static electricity build up) for example. Ozone is also produced by the action of sunlight on volatile organic liquids (VOL’s).

Noise measurements performed resulted in a decrease of -5 dBA in the result of using VC6400 Vibration Control Material
CASE III – Exterior Control – VC6400 @ 40mm

Power Transformer 20ton (8/10MVA) with anchor bolts

- Pad Dimensions: 890 mm x 300 mm x 40mm
- Weight: 20 tons + 4xM20 Anchor bolts (25% - 75% yield torque)
- Number of pads: 2

- Stress = 0.66 – 1.25MPa
- Transmissibility at 100 Hz (at 40mm) = -28.4dB - 29.6dB
- Isolation = 96% - 97%
- Shape Factor = 2.8
CASE IV – Exterior Control – VC5200 @ 30mm

Power Transformer 6,3ton (200kVA) with C-Profile foundation fixing

- Pad Dimensions:
  i. 2 pads 1784 x 50 x 30mm. Each pad is a butt glued through two pieces 892 x 50 x 30mm
  ii. 2 pads 356 x 50 x 30mm.

- Weight: 6,25ton
- Number of pads: 4

- Stress= 0,29MPa
- Transmissibility at 100 Hz (at 30mm) = -26,4dB
- Isolation = 95%
- Shape Factor = 0,73 – 0,81
CASE V – Exterior Control – VC5200 @ 12,5mm

Wind Power Transformer 2,8ton (1000kVA) with U-Profile and anti vibration vibration collar

- Pad Dimensions: 480mm x 180mm x 12,5mm
- Weight: 2,8ton + 8xM16 bolts @ 30N.m torque
- Number of pads: 2
- Number of collars: 8

- Stress = 0,16 – 0,4MPa
- Material = Pad - VC5200; Collars – VC6400
- Transmissibility at 100 Hz (at 12,5mm) = -22dB
- Isolation = 94%
CASE VI – Exterior Control – VC6400 @ 40mm

Power Transformer 32ton (10MVA) – Substitute profiled rubber pads

- Pad Dimensions: 230mm x 230mm x 40mm
- Weight: 32ton
- Number of pads: 10

- Stress = 0.6MPa
- Transmissibility at 100 Hz (at 40mm) = -30dB
- Isolation = 98%
- Shape Factor = 1.44
EXTERNAL PADS APPLICATIONS – Flexible Construction and Assembly

122ton Transformer wheel pads
Vibration attenuation: -32dB

Shunt Reactor
34ton, 30MVA

Shunt Reactor
235ton, 150 MVA

Transformer
51ton, 25MVA

*Amorim T&D* solutions for Transmission and Distribution applications
EXTERNAL PADS APPLICATIONS – Flexible Construction and Assembly

Vibration attenuation on busbar supports for transformer cabling

On Site Substation Concrete Foundation for Transformers with Rotary Mass Motor

*Amorim T&D* solutions for Transmission and Distribution applications