Copolymers with the subsequent release of water. The second the formation of a tough char which

is recognised and some cable specifications reflect this by defining cable heat release (MJ/m) as a

as heat of combustion and toxicity indices cannot be ignored. The importance of heat release is

recognised that the fuel loading, potential size and nature of the fire as defined by parameters such

In any fire, numerous aspects of the combustion process are important – propagation, heat release,

Casico™ – Halogen-free flame retardant

Our PE cellular compounds are optimised to generate uniform and evenly distributed cells which

enhance the transmission properties. In addition, improved flow properties, melt elasticity and purity

allow high speeds in combination with minimised capacitance variations.

Typical applications for the various PE insulation compounds include:

• Multipair telephone cables, smaller coaxial cables, such as Community

Antenna Television Cables (CATV) and data cables produced with chemical

foaming having expansion degrees of up to 50%.

• High expansion (up to 80%) physically foamed insulation typically used for large 30 ohm

antenna cables.

Casico™ – Halogen-free flame retardant

In any fire, numerous aspects of the combustion process are important – propagation, heat release,

combustion flame, toxicity and smoke. Although flame spread remains a key concern, it is now

recognised that the fuel loading, potential size and nature of the fire as defined by parameters such as

heat of combustion and toxicity indices cannot be ignored. The importance of heat release is

recognised that the fuel loading, potential size and nature of the fire as defined by parameters such

In any fire, numerous aspects of the combustion process are important – propagation, heat release,

combustion flame, toxicity and smoke. Although flame spread remains a key concern, it is now

recognised that the fuel loading, potential size and nature of the fire as defined by parameters such

heat of combustion and toxicity indices cannot be ignored. The importance of heat release is

recognised that the fuel loading, potential size and nature of the fire as defined by parameters such

In any fire, numerous aspects of the combustion process are important – propagation, heat release,

combustion flame, toxicity and smoke. Although flame spread remains a key concern, it is now

recognised that the fuel loading, potential size and nature of the fire as defined by parameters such

heat of combustion and toxicity indices cannot be ignored. The importance of heat release is

recognised that the fuel loading, potential size and nature of the fire as defined by parameters such

In any fire, numerous aspects of the combustion process are important – propagation, heat release,

combustion flame, toxicity and smoke. Although flame spread remains a key concern, it is now

recognised that the fuel loading, potential size and nature of the fire as defined by parameters such
Solutions for Wire & Cable communication cables

The selection of the correct insulation and sheath is a key to producing optimum cables. Borouge and Borouge have communication cable covers many applications and each application has specific needs. Borouge has developed a large range of products tailored to meeting these needs. This document is intended to give a quick and easy overview of the available Borouge and Borouge solutions for communication applications. In case of in-depth questions, always contact a local technical service engineer. Specific needs require specific solutions and Borouge and Borouge have the expertise to advise on tailor-made solutions for your cables.

**Chemically and physically foamed insulation compounds**

To meet the growing need for enhanced electrical properties in telephone, TV and data cables, Borouge and Borouge have further developed their cellular polyolefin compounds. Borouge and Borouge have an extensive range of chemically and physically foamed polyethylene (PE) compounds offering improved transmission properties and processability. Your PE cellular compounds are optimised to generate uniform and evenly distributed cells which enhance the transmission properties. In addition, improved flow properties, melt elasticity and purity allow high speeds in combination with minimised capacitance variations. Typical applications for the various PE insulation compounds include:

- Multipair telephone cables, smaller coaxial cables, such as Community Antenna Television Cables (CATV) and data cables produced with chemical foaming having expansion degrees of up to 50%.
- High expansion (up to 80%) physically foamed insulation typically used for large 50 ohm antenna cables.

**Casico™ – Halogen-free flame retardant**

In any fire, numerous aspects of the combustion process are important – propagation, heat release, combustion fumes, toxicity and smoke. Although flame spread remains a key concern, it is now recognised that the fuel loading, potential size and nature of the fire as defined by parameters such as heat of combustion and toxicity indices cannot be ignored. The importance of heat release is recognised and some cable specifications reflect this by defining cable heat release (MJ/m) as a design parameter. The concept of ‘low-rising’ to minimise heat and toxic gas release will become more and more accepted in performance-based cable design codes.

Casico retardant has two phases. The first involves the water pyrolysis of the acrylic copolymer with the subsequent release of water. The second the formation of a gel that starves the fire of oxygen thus inhibiting the propagation. Compared with hydro filled Flame retardant compounds the fire content is modest with a consequent minor increase in electrical permittivity and low water permeability.

**Solutions for Wire & Cable communication cables**

Borouge and Borouge are in the world’s leading provider of innovative, value-creating solutions to the wire and cable industry. Our solutions are customised and designed to satisfy the industry’s continuously evolving demands for higher transmission efficiency. Consequently, they can be found in the most challenging EHV and HV cable applications, as well as MV and LV systems for transmission and distribution cables, building wires, and car audio cables.

An answer to the need for production, installation and cable systems of higher performance, our Casico retardant line that ensures worldwide, top change solutions and meets the world standard of cable retardation.

Borouge have a well-established track record in serving customers’ needs with the considerably high quality products expected of global leaders. We are committed to extending that leadership position and our own value proposition for long-term – a scope of product that is supported for our forward thinking in innovative solutions, but also confirmed by ongoing investments for our customers’ cardard and success.

Putting customers’ needs at the centre of our planning is reflecting Borouge’s target investment in Europe to date, the new 380,000 t/y high-density PE plant in Stenungsund, Sweden, was inaugurated in June 2010, further strengthening Borouge’ capabilities to meet the needs of the growing wire and cable markets.

Building on more than 50 years experience, Borouge and Borouge have a well-established track record in serving customers’ needs with the considerably high quality products expected of global leaders. We are committed to extending that leadership position and our own value proposition for long-term – a scope of product that is supported for our forward thinking in innovative solutions, but also confirmed by ongoing investments for our customers’ cardard and success.

For more information contact:
info@borealisgroup.com
www.borealisgroup.com
www.borogroupe.com
### Solutions for Wire & Cable communication cables

#### Network Segments

<table>
<thead>
<tr>
<th>Network Segments</th>
<th>Cable Type</th>
<th>Application</th>
<th>Type</th>
<th>Compound Name</th>
<th>Description</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trunk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buried Fiber Optic</td>
<td>Sheath</td>
<td>Black</td>
<td></td>
<td>Borstar® LE6017</td>
<td>Bimodal LLDPE</td>
<td>Very low shrink back, good crush resistance (LE6016 natural UV stabilized version).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Borstar® HE6062</td>
<td>Bimodal HDPE</td>
<td>High strength, very good crush resistance, good ESCR (HE6050 natural UV stabilized version).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Borstar® ME6052</td>
<td>Bimodal MDPE</td>
<td>Similar HE6050, slightly less shrink and lower shrinkage (ME6051 natural UV stabilized version).</td>
</tr>
<tr>
<td>Aerial Fiber Optic</td>
<td>Sheath</td>
<td>Black</td>
<td></td>
<td>Borstar® HE6081</td>
<td>Bimodal HDPE</td>
<td>Track resistance, suitable for ADSS cables.</td>
</tr>
<tr>
<td>Submarine Fiber Optic</td>
<td>Sheath</td>
<td>Natural</td>
<td></td>
<td>Borstar® HE6068</td>
<td>Bimodal HDPE</td>
<td>High cleanliness, low shrink back, low extrusion temperature.</td>
</tr>
<tr>
<td><strong>Access</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper Multi-pair</td>
<td>Insulation</td>
<td>Solid</td>
<td></td>
<td>HE6002</td>
<td>Natural highly stabilised MDPE containing MDA</td>
<td>High extrusion line speed, also suitable as conductor skin.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cellular/air</td>
<td></td>
<td>Borstar® HE63066</td>
<td>Natural highly stabilized HDPE containing MDA</td>
<td>Very high extrusion line speed, tough, crush resistant, also suitable as insulation skin.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cellular/air</td>
<td></td>
<td>HE1345</td>
<td>Natural highly stabilized HDPE containing chemical blowing agent and MDA</td>
<td>Very process tolerant, very high extrusion line speed, suitable for expansion 30-50%.</td>
</tr>
<tr>
<td></td>
<td>Sheath</td>
<td>Black</td>
<td></td>
<td>LE6002</td>
<td>Low Density Catenary</td>
<td>Long-established meeting many standards, easy processing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Borstar® LE6017</td>
<td>Bimodal LLDPE</td>
<td>Crush and abrasion resistant, high strength (LE6056 natural UV stabilized version).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cellular/air</td>
<td></td>
<td>HE1123</td>
<td>Stabilised low dielectric loss HDPE for gas injection</td>
<td>Blending component, to be used in combination with LE1120.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cellular/air</td>
<td></td>
<td>LE1120</td>
<td>Unstabilised broad MWD LDPE for gas injection</td>
<td>Blending component that provides melt stiffness. To be used in combination with HE1123.</td>
</tr>
<tr>
<td></td>
<td>Sheath</td>
<td>Black</td>
<td></td>
<td>Borstar® LE6017</td>
<td>Bimodal HDPE</td>
<td>High strength, crush resistance and very good ESCR (HE6016 natural UV stabilized version).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cellular/air</td>
<td></td>
<td>HE1106</td>
<td>Low dielectric loss HDPE containing stabiliser and nucleant for gas injection</td>
<td>High melt strength. Suitable for larger coaxial cables. Can also be used as a conductor or insulation skin.</td>
</tr>
<tr>
<td></td>
<td>Sheath</td>
<td>Black</td>
<td></td>
<td>LE6006</td>
<td>Stabilised low dielectric loss HDPE</td>
<td>Crush and abrasion resistant, high strength (HE6016 natural UV stabilized version).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cellular/air</td>
<td></td>
<td>Borstar® LE6017</td>
<td>Bimodal HDPE</td>
<td>High line speed. Expansion up to 15%.</td>
</tr>
<tr>
<td></td>
<td>Building</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symmetric copper data cable (Cat 5E, 6A,…</td>
<td>Insulation</td>
<td>Solid</td>
<td></td>
<td>HE6072</td>
<td>Natural stabilised modified HDPE containing MDA</td>
<td>High extrusion line speed. Suitable for outer skin of foam-skin constructions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cellular/air</td>
<td></td>
<td>FR6076</td>
<td>Stabilised PP Compound</td>
<td>High extrusion line speed with faster twisting speed and tougher mechanical performance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cellular/air</td>
<td></td>
<td>HE6044</td>
<td>Natural highly stabilised HDPE containing chemical blowing agent and MDA</td>
<td>Very high extrusion line speed. Expansion 40-50% (see HE6034 for lower expansion).</td>
</tr>
<tr>
<td></td>
<td>Sheath</td>
<td>Flame Retardant</td>
<td></td>
<td>HE6023</td>
<td>HDPE containing stabiliser, MDA and nucleant for gas injection</td>
<td>Very high line speed and fine cell structure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Casico™ FR6001</td>
<td>Natural LSZH Flame Retardant</td>
<td>Meets single wire burning EN60332-1-2: Suitable for Category 5 cables.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Casico™ FR6003</td>
<td>Natural LSZH Flame Retardant</td>
<td>Meets single wire burning EN60332-1-2: Suitable for Category 7 (and bigged) cables.</td>
</tr>
<tr>
<td></td>
<td>Building</td>
<td></td>
<td></td>
<td>FR6010</td>
<td>Black LSZH Flame Retardant</td>
<td>Good FR and weatherability. Suitable for campus FOC &amp; telecommunications cables.</td>
</tr>
<tr>
<td>Optical Fiber Data cable</td>
<td>Sheath</td>
<td>Flame Retardant</td>
<td></td>
<td>Casico™ FR6003</td>
<td>Natural LSZH Flame Retardant</td>
<td>Sheath for internal FOC &amp; telecommunications cables. Suitable for campus applications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FR6010</td>
<td>Black LSZH Flame Retardant</td>
<td>Good FR and weatherability. Suitable for campus FOC &amp; telecommunications cables.</td>
</tr>
</tbody>
</table>

**Notes:**
- **MDA** - Metal deactivator
- **UV** - Ultra violet
- **ESCR** - Environmental stress crack resistance
- **ADSS** - All dielectric self supporting
- **FR** - Flame retardant
- **FOC** - Fiber Optic Cable
- **LSZH** - Low smoke zero halogen

---

This document provides detailed information on various wire and cable communication segments, including trunk, access, and building applications. Each segment lists specific cable types, sheath materials, and application details, along with their associated compound names and descriptions. The features section outlines the unique properties of each material, such as low shrinkage, crush resistance, and high strength, tailored for specific applications like ADSS cables, underground installations, and optical fiber data cables.
Solutions for Wire & Cable communication cables

The selection of the correct insulation and sheath is key to producing optimum cables. Borealis and Borouge have communication cable covers many applications and each application has specific needs. Borealis has developed a large range of products tailored to meeting these needs. This document is intended to give a quick and easy overview of the available Borealis and Borouge solutions for communication applications. In case of in-depth questions, always contact a local technical service engineer. Specific needs require specific solutions and Borealis and Borouge have the expertise to advise on tailor-made solutions for your cables.

Borstar® – Enhanced polyethylene

The Borstar packing product family gives outstanding balance between all important properties for communication cables:
- Low shrinkage
- Good processability
- Excellent ESCR
- Low abrasion resistant surface
- Good barrier properties

Chemically and physically foamed insulation compounds

To meet the growing need for enhanced electrical properties in telephone, TV and data cables, Borealis has further developed its chemical cellular compounds. Borealis and Borouge have an extensive range of chemically and physically foamed polyethylene (PE) compounds offering improved transmission properties and processability.

Our PE cellular compounds are designed to generate uniform and evenly distributed cells which enhance the transmission properties. In addition, improved flow properties, melt elasticity and purity allow high speeds in combination with minimised capacitance variations.

Typical applications for the various PE-insulation compounds include:
- Multipair telephone cables, smaller coaxial cables, such as Community Antenna Television Cables (CATV) end-data cables produced with chemical foaming having expansion degrees of up to 50%.
- High expansion (up to 80%) physically foamed insulation typically used for large 50 ohm antenna cables.

Casico™ – Halogen-free flame retardant

In any fire, numerous aspects of the combustion process are important – propagation, heat release, combustion fume, toxicity and smoke. Although flame spread remains a key concern, it is now recognised that the fuel loading, potential size and nature of the fire as defined by parameters such as combustion fume, toxicity and smoke. In answer to the need for production, installation and cable systems of higher reliability, our Casico technology is the innovation that makes worldwide, step change solutions available for the entire wire and cable value chain. Through the introduction of unique polymer technology, which include Botralin™, Visico™, AntiCrack™, Borstar®, Casico™ and Castino™, we continue to pioneer the development of advanced insulation and jacketing systems for both energy and cable communication cables.

For more information contact:
info@borouge.com
www.borouge.com
Borouge and Borouge are the world leading provider of innovative, value-creating solutions for the wire and cable industry. Our solutions are customised and designed to satisfy the industry’s continuously demanding markets for higher technology performance. Consequently, these can be found in the most challenging B and N cable applications, as well as MV and LV energy transmission and distribution cables, building wires, and car and aviation cables.

Borouge has developed a large range of products tailored to meeting these needs. This document is intended to give a quick and easy overview of the available Borealis and Borouge solutions for communication applications. In case of in-depth questions, always contact a local technical service engineer. Specific needs require specific solutions and Borealis and Borouge have the expertise to advise on tailor-made solutions for your cables.

Borouge and Borouge are dedicated to Wire & Cable solutions

Borouge and Borouge are the world leading provider of innovative, value-creating solutions for the wire and cable industry. Our solutions are customised and designed to satisfy the industry’s continuously demanding markets for higher technology performance. Consequently, these can be found in the most challenging B and N cable applications, as well as MV and LV energy transmission and distribution cables, building wires, and car and aviation cables.

The Borstar® Jacketing product family gives outstanding balance between all important properties for communication cables:
- Low shrinkage
- Good processability
- Excellent ESCR
- Low abrasion resistant surface
- Good barrier properties

Built on more than 50 years of experience, Borouge and Borealis have a well-established track record in serving customers’ needs with the consistently high quality products expected of global leaders. We are committed to extending that leadership position and our wire and cable solutions – a cornerstone that has only expanded for our forward thinking in innovative solutions, but also confirmed by ongoing investments for our customers’ commercial success.

In answer to the need for production, installation and cable systems of higher reliability, our Casico technology is the innovation that makes worldwide, step change solutions available for the entire wire and cable value chain. Through the introduction of unique polymer technology, which include Botralin™, Visico™, AntiCrack™, Borstar®, Casico™ and Castino™, we continue to pioneer the development of advanced insulation and jacketing systems for both energy and cable communication cables.

Built on more than 50 years of experience, Borouge and Borealis have a well-established track record in serving customers’ needs with the consistently high quality products expected of global leaders. We are committed to extending that leadership position and our wire and cable solutions – a cornerstone that has only expanded for our forward thinking in innovative solutions, but also confirmed by ongoing investments for our customers’ commercial success.

In answer to the need for production, installation and cable systems of higher reliability, our Casico technology is the innovation that makes worldwide, step change solutions available for the entire wire and cable value chain. Through the introduction of unique polymer technology, which include Botralin™, Visico™, AntiCrack™, Borstar®, Casico™ and Castino™, we continue to pioneer the development of advanced insulation and jacketing systems for both energy and cable communication cables.

Borouge is a registered trademark of the Borouge Group.
Borealis, Casico and Water for the World are trademarks of the Borealis Group.