



**OREVAC®**

**TERPOLYMER ETHYLENE – VINYL ACETATE – MALEIC ANHYDRIDE**



*Let's progress together*

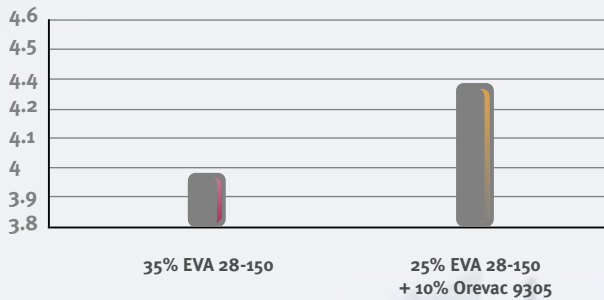
## Hot Melt Formulation

To optimise cost/performance, **OREVAC® Terpolymers** are combined with **EVATANE®**. Adhesion tests have been performed in a classical Hot melt formulation to reinforce the improved adhesion properties of **OREVAC® Terpolymers** on non-porous substrates.

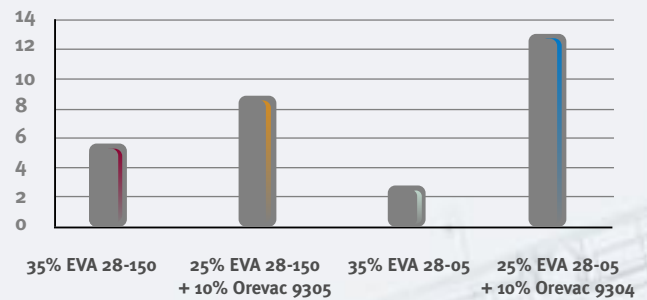
Formula: Polymer / tackifying resin / wax / antioxidant: 35/50/15/0.2

**Recommended grades: Orevac T® 9304, 9305**

Peel Strength (N/25mm) Alu/Alu



Peel Adhesion 90° Alu/Glass N/25mm



Bonding Aluminium to Aluminium: T Peel Test



Bonding Aluminium to glass: 90° peel



## Hot Melt PU

The functional group Maleic Anhydride in the backbone of **OREVAC® Terpolymers** react with isocyanates. For this reason they are the polymer of choice to improve green strength and global adhesion performances of Polyurethane Hot Melts (HMPU).

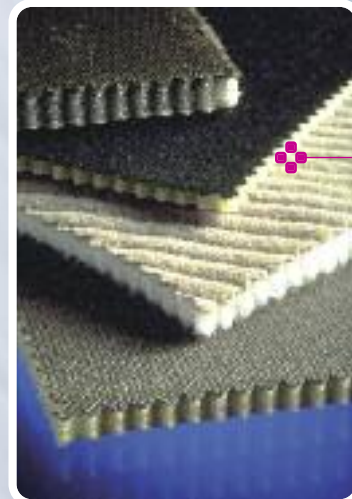
**Recommended grades: Orevac T® 9304, 9305**

## Thermo Adhesive Films

**OREVAC® Terpolymer** is a material of choice to produce adhesive films used to bond different types of solid substrates such as PA, PET & PU films, metal foils, textiles, fibreglass fabrics, artificial leather, wood and natural fibres products, non woven and foams.

**OREVAC® Terpolymer** films (monolayer or multilayers) extruded by blown or cast film technology, are applied in a second step, under pressure and heat activation.

Electrically heated transfer calenders, infra red roll calender, flame bonding machines, flatbed calenders, compression moulding and laminating machines are possible application processes.



Furniture

## End-use applications

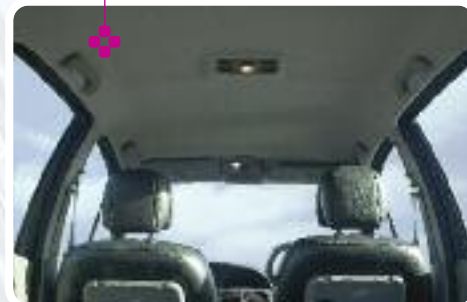
**OREVAC® Terpolymer** films find applications in:

- **Automotive Industry:** assembling of door panels, seats and roofing (bonding of textile substrates in seats covers and headliners), carpets, sound proofing and heat insulation materials.
- **Sports & Leisure:** skis, sails, shoes (textile uppers, liners).
- **Furniture:** decorative films, mattresses, seats, wall covering (bonding of foams on woven and non woven).

### Automotive Industry



### Thermo Adhesive Films



## Benefits and Features

→ The Vinyl Acetate content allows softness, flexibility and polarity of **OREVAC® Terpolymer** to be adjusted. They have a low melting temperature, crystallinity and crystallisation rate, leading to very good mechanical adhesion on porous or fibrous substrates. **OREVAC® Terpolymers** can be laminated at low temperatures, with no risk of thermal degradation of the substrates.

| OREVAC® Terpolymer | Minimum Lamination Temperature (°C) |
|--------------------|-------------------------------------|
| 9304               | 95                                  |
| 9307 Y             | 105                                 |
| 9318               | 100                                 |

→ Maleic Anhydride gives reactivity, leading to versatile adhesive properties to polar and non polar substrates in lamination and to molten polymers. Adhesive properties are far better than EVA copolymers.

→ As an ethylene copolymer, **OREVAC® Terpolymers** are fully compatible with PE, and virtually all other ethylene copolymers. **OREVAC® Terpolymers** can be dry blended with other polyolefins (EVA, PE, grafted polyolefins) or used pure.

→ **OREVAC® Terpolymers** have low smell (key point for automotive applications).

→ **OREVAC® Terpolymer** films also bring barrier properties to protect one substrate from other layers (water, water vapour, chemicals, for example blowing agents and plasticizers...).

## Films

**OREVAC® Terpolymer** is a high clarity tie-layer based on EVA and MAH for multilayer structures such as Polyethylene and Polyamide.

It is particularly adapted for the production of shrinkable bags, lids for trays and tubular films when outstanding optical properties combined with good adhesion are required.

**OREVAC® Terpolymer** provides a high cohesion to barrier films for PE/PA structures produced with different processes such as mono and double bubble blown film as well as cast film.

**Recommended grades: OREVAC® T 9318, 9304**



Films

## Wire and Cable compounds

**OREVAC® Terpolymers** are effective coupling agents for EVA and/or Elastomers based HFFR compounds.

The ease of processing is one of the great qualities of **OREVAC® Terpolymers**. All types of mixing technologies are suitable to convert **OREVAC® Terpolymers**. The best results are achieved with internal mixers where, thanks to its low melting point, a good dispersion and a complete melting of the product at low process temperatures are achieved. Due to the excellent compatibility with other polyolefins, in particular with EVA, adhesion to the tools is reduced.

**OREVAC® Terpolymers** increase the tensile strength and elongation a break of HFFR wires and cables due to a better homogeneity of the initial compound. The homogeneity is achieved by a chemical reaction between the anhydride group of the **OREVAC® Terpolymer** product and the OH group of the mineral filler ATH (Aluminium Tri-Hydrate) or MDH (Magnesium Di-Hydroxyde). Due to its chemical nature, **OREVAC® Terpolymers** have the same high filler acceptance as an EVA.

For specific cable applications **OREVAC® Terpolymers** are used in combination with other coupling agents such as **LOTADER®** or grafted Polyolefins to adjust the final characteristics of the cable.

**Recommended grades: Orevac T®9304, 9318**



Wire and Cable



## Tubes

Co-extruded tubes are currently used for conveying beverages such as beer. In such tubing, Polyamide is used as the inner layer for food contact and Polyethylene or Ethylene Vinyl Acetate Copolymers as the external layer. **OREVAC® Terpolymers** give the best properties to combine these materials. Reactivity of **OREVAC® Terpolymer** towards PA provides good adhesion. **OREVAC® Terpolymers** improve the flexibility of EVA based structures.

**Recommended grade: OREVAC® T 9314, 9318**



Tubes

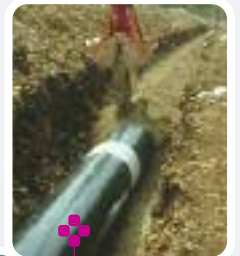
## Pipe Coatings - Shrink Sleeves and Tapes

Adhesive modifier for shrink sleeves – tapes – 2 layer PE coatings - for corrosion protection of pipeline and welded joints.

Thanks to their fluidity, polarity, and outstanding reactivity with a variety of substrates, **OREVAC® Terpolymers** are ideal modifiers to improve adhesion, viscosity and processing of adhesive layers of tapes and shrink sleeves. **OREVAC® Terpolymers** are powerful compatibilizers between mineral fillers and olefinic resins.

**OREVAC® Terpolymers** provide adhesion in two-layers PE coatings between steel and PE top coat.

**Recommended grades: Orevac T® 9305, 9307 Y**



Pipe coatings

## Hot Melt Adhesives



## Hot Melt Adhesives

**OREVAC® Terpolymers** are used when good adhesion is required. They enhance bonding where classical polyolefin based hot melt adhesives suffer from a lack of adhesion to non-porous and polar surfaces. A significant improvement is achieved on the following substrates:

- glass
- metal foils (aluminium, steel,...)

**OREVAC® Terpolymers** are formulated exactly like EVA copolymers, with waxes, tackifying resins, plasticizers and fillers.

| CHARACTERISTICS     | RANGE OF EVA TERPOLYMERS       |                       | Unit                 | Test Method ISO | 9307 Y      | 9318      | 9304      | 9305        |         |
|---------------------|--------------------------------|-----------------------|----------------------|-----------------|-------------|-----------|-----------|-------------|---------|
|                     |                                | Vinyl Acetate Content | %                    | Arkema          |             | 13 – 15   | 17 – 20   | 23.5 – 26.5 | 26 – 30 |
|                     | Melt Index<br>(190°C – 2.16kg) | g/10 mn               | ASTM D 1238          |                 | 9.5 – 11.5  | 6 – 8     | 5.5 – 9.3 | 150 – 210   |         |
|                     | MAH                            | ppm                   |                      |                 | 1600        | 1600      | 1600      | 6400        |         |
|                     | Density                        | g/cm3                 | ASTM D 1505          |                 | 0.939       | 0.943     | 0.950     | 0.951       |         |
|                     | Melting Point                  | °C                    | D.S.C.               |                 | 93          | 86        | 80        | 68          |         |
|                     | Vicat Softening Point          | °C                    | ASTM D 1525          |                 | 66          | 54        | 49        | <40         |         |
|                     | Ring and Ball Temperature      | °C                    | ARKEMA               |                 | 145         | 158       | 153       | 92          |         |
| PROPERTIES          | Tensile properties             | Strength at yield     | MPa                  | ASTM D 638      | 4.8         | 3.5       | 2.6       | 1.8         |         |
|                     |                                | Strength at break     | MPa                  |                 | 19          | 20        | 26        | 4.5         |         |
|                     |                                | Elongation at break   | %                    |                 | 600 – 900   | 600 – 900 | 600 – 900 | 700 – 900   |         |
|                     | Young Modulus                  | MPa                   | ISO R 527<br>ISO 868 |                 | 69          | 40        | 23        | 12          |         |
|                     | Shore Hardness A               |                       | ASTM D 2240          |                 | 91          | 84        | 82        | 71          |         |
| EXTRUDING CONDITION | Film properties                | Strength at yield     | MPa                  | ASTM D 882      | 5.6         | 4.3       | 4         | -           |         |
|                     |                                | Strength at break     | MPa                  |                 | 26          | 24        | 26        | -           |         |
|                     | Thickness : 50 µm              | Elongation at break   | %                    |                 | 700 – 900   | 600 – 800 | 700 – 900 | -           |         |
|                     | Longitudinal                   | Haze                  | %                    |                 | ASTM D 103  | 3.5       | 2.5       | 4.6         | -       |
|                     |                                | Dart Test             | g                    |                 | ASTM D 1709 | 180       | 250       | 400         | -       |

| RANGE OF EVA TERPOLYMERS |                                | 9307 Y | 9318 | 9304 | 9305 |
|--------------------------|--------------------------------|--------|------|------|------|
| MAIN APPLICATION         | Double Bubble Film Coextrusion |        | ■    | ■    |      |
|                          | Blown Film Coextrusion         |        | ■    | ■    |      |
|                          | Cast Film Coextrusion          |        | ■    |      |      |
|                          | Coextrusion Tube               |        | ■    |      |      |
|                          | Skin Packaging Adhesive        | ■      |      |      |      |
|                          | Thermo-Adhesive Films          | ■      | ■    | ■    | ■    |
|                          | Hot Melt Adhesives             |        |      | ■    | ■    |
|                          | Wires & cables                 |        | ■    | ■    |      |
|                          | Pipe coatings                  | ■      |      |      | ■    |

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