The UNIPETROL group is the biggest refinery and petrochemical company in the Czech Republic, where it is also the only processor of crude oil. Thanks to this specialisation, UNIPETROL has a unique position on the market and has become an indispensable part of Czech industry.

The UNIPETROL group is a significant producer and distributor of fuels, plastics, oils, lubricants, fertilisers and other products. It is also the operator of Benzina, the biggest network of filling stations in the Czech Republic. UNIPETROL has been part of the multinational PKN Orlen refinery and petrochemical group since 2005.
Unipetrol RPA, the producer of CHEZACARB® AC, has successfully expanded its portfolio with cost-effective electroconductive concentrates under the brand name MAKROPLUS® CC.

CHEZACARB® AC’s competitive advantage, which makes it superior to other materials on the market today, are its particularly high electroconductive properties.

MAKROPLUS® CC products are available in all commonly used thermoplastics such as PP, LDPE, HDPE, EVA, PA6, PS, PC and POM. They are designed to either be diluted by suitable plastics or directly processed using typical plastic processing technologies such as injection moulding, extrusion, foil, container blow-moulding and foam moulding.
CHEZACARB® AC electroconductive carbon blacks originate as a by-product of what is referred to as “partial oxidation” where oil residues split off as a result of mixing oxygen and water steam at high temperatures around 1500°C.

The produced carbon blacks consist of elementary carbon, have a spherical shape and are oriented in aggregates and agglomerates. The purity and composition of these carbon blacks is virtually free of any inorganic impurities and extractable organic substances, with the content of amorphous carbon exceeding 97%. It is produced in the shape of spherical pellets sized 0.5 – 2.5 mm, with the basic size of particles being around 20 nm.

Their extremely large specific surface area and highly developed porous structure determine the main field of their application. When they are added in a relatively small amount, the electrical conductivity of polymer materials is modified to provide versions of the materials ranging from antistatic to conductive.

TYPICAL APPLICATIONS
- pipes, piping
- cables
- containers, jerrycans, car mats
- transport boxes, pallets
- flooring
- geomembranes

SPECIAL APPLICATIONS
- 3D print
- fibres
- glues
- paints
<table>
<thead>
<tr>
<th>Specification</th>
<th>Unit</th>
<th>Test method</th>
<th>CHEZACARB® AC10</th>
<th>CHEZACARB® AC20</th>
<th>CHEZACARB® AC30</th>
<th>CHEZACARB® AC50</th>
<th>CHEZACARB® AC60</th>
<th>CHEZACARB® AC70</th>
<th>CHEZACARB® AC80</th>
<th>CHEZACARB® AC90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen surface area</td>
<td>m²/g</td>
<td>ASTM D 6556</td>
<td>850 - 1050</td>
<td>min. 800</td>
<td>min. 800</td>
<td>min. 800</td>
<td>min. 800</td>
<td>min. 800</td>
<td>min. 800</td>
<td>min. 800</td>
</tr>
<tr>
<td>Isooole adsorption number</td>
<td>mg/g</td>
<td>ASTM D 1510</td>
<td>1050 - 1400</td>
<td>min. 900</td>
<td>min. 900</td>
<td>min. 900</td>
<td>min. 900</td>
<td>min. 900</td>
<td>min. 900</td>
<td>min. 900</td>
</tr>
<tr>
<td>Oil absorption number</td>
<td>m³/100g</td>
<td>ASTM D 2414 - ¹¹А</td>
<td>350 - 400</td>
<td>max. 340</td>
<td>max. 340</td>
<td>max. 340</td>
<td>max. 340</td>
<td>max. 340</td>
<td>max. 340</td>
<td>max. 340</td>
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<tr>
<td>Toluene extractables</td>
<td>% wt.</td>
<td>DIN 53353</td>
<td>&lt; 0,1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH value</td>
<td></td>
<td>EN ISO 788-9</td>
<td>7,0 - 9,5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Volatile matter (105 °C)</td>
<td>% wt.</td>
<td>EN ISO 702-7</td>
<td>max. 0,30</td>
<td>max. 0,50</td>
<td>max. 0,80</td>
<td>max. 0,80</td>
<td>max. 0,80</td>
<td>max. 0,80</td>
<td>max. 0,80</td>
<td>max. 0,80</td>
</tr>
<tr>
<td>Ash content</td>
<td>% set.</td>
<td>DIN11356</td>
<td>max. 0,38</td>
<td>max. 0,4</td>
<td>max. 0,9</td>
<td>max. 1,6</td>
<td>max. 1,7</td>
<td>max. 1,8</td>
<td>max. 2</td>
<td>max. 5</td>
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<tr>
<td>Sulphur content</td>
<td>% set.</td>
<td>ASTM D 1991</td>
<td>max. 0,23</td>
<td>max. 0,3</td>
<td>max. 0,5</td>
<td>max. 0,6</td>
<td>max. 0,6</td>
<td>max. 0,7</td>
<td>max. 0,8</td>
<td>max. 0,9</td>
</tr>
<tr>
<td>Fixation content</td>
<td>% set.</td>
<td>ISO 13122-2</td>
<td>max. 5</td>
<td>max. 8</td>
<td>max. 15</td>
<td>max. 10</td>
<td>max. 10</td>
<td>max. 20</td>
<td>max. 20</td>
<td>max. 20</td>
</tr>
<tr>
<td>Silvinnolater c. as cm²/mm³</td>
<td>ppm/vol.</td>
<td>ASTM D 5594</td>
<td>max. 50</td>
<td>max. 50</td>
<td>max. 500</td>
<td>max. 50</td>
<td>max. 500</td>
<td>max. 500</td>
<td>max. 500</td>
<td>max. 500</td>
</tr>
<tr>
<td>Bulk density</td>
<td>g/l</td>
<td>ISO 13106</td>
<td>min. 78</td>
<td>min. 75</td>
<td>min. 75</td>
<td>min. 75</td>
<td>min. 72</td>
<td>min. 72</td>
<td>min. 72</td>
<td>min. 72</td>
</tr>
<tr>
<td>Appr. density after tapping</td>
<td>g/l</td>
<td>EN ISO 788-11</td>
<td>140 - 160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pellets hardness avg.</td>
<td>g</td>
<td>ASTM D 3103</td>
<td>max. 10</td>
<td>max. 10</td>
<td>max. 10</td>
<td>max. 10</td>
<td>max. 10</td>
<td>max. 10</td>
<td>max. 10</td>
<td>max. 10</td>
</tr>
<tr>
<td>Pellets hardness hardest</td>
<td>g</td>
<td>ASTM D 3103</td>
<td>max. 20</td>
<td>max. 20</td>
<td>max. 20</td>
<td>max. 20</td>
<td>max. 20</td>
<td>max. 20</td>
<td>max. 20</td>
<td>max. 20</td>
</tr>
<tr>
<td>Specific electrical resistance</td>
<td>Ohm.cm</td>
<td>Ph.Bps method</td>
<td>max. 50</td>
<td>max. 50</td>
<td>max. 80</td>
<td>max. 80</td>
<td>max. 80</td>
<td>max. 80</td>
<td>max. 80</td>
<td>max. 80</td>
</tr>
<tr>
<td>Vanadium content</td>
<td>ppm</td>
<td>RTG</td>
<td>max. 1200</td>
<td>max. 2000</td>
<td>max. 3000</td>
<td>max. 5000</td>
<td>max. 6000</td>
<td>&lt;8000</td>
<td>&lt;8500</td>
<td>--</td>
</tr>
<tr>
<td>Nickel content</td>
<td>ppm</td>
<td>RTG</td>
<td>max. 500</td>
<td>max. 1000</td>
<td>max. 9000</td>
<td>max. 3000</td>
<td>max. 3000</td>
<td>max. 3000</td>
<td>max. 3000</td>
<td>--</td>
</tr>
<tr>
<td>Iron content</td>
<td>ppm</td>
<td>RTG</td>
<td>max. 300</td>
<td>max. 500</td>
<td>max. 1000</td>
<td>max. 1600</td>
<td>max. 2500</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

¹ Informative value, the exact value is not guaranteed.
Unipetrol RPA produces highly electroconductive carbon black CHEZACARB® AC using an Integrated Management System (IMS), which includes Quality, Environment, Safety and Energy Management Systems.

The IMS has been certified by Lloyd’s Register Quality Assurance Limited (LRQA), according to the following standards:
- ISO 9001:2015 (Quality Management System - QMS)
- ISO 14001:2015 (Environmental Management System - EMS)
- OHSAS 18001:2007 (Safety Management System - SMS)

ALL CB GRADES ARE IN COMPLIANCE WITH:
- Regulation (EC) 1907/2006 REACH
- Directive 94/62/EC (PPW)
- Directive 2011/65/EU (EEE) (RoHS 2),
- Directive 2015/863/EU (RoHS 3)
5 kg PACK:
- 3 sacks per layer
- 14 layers
- 210 kg pallet
- Pallet size: 790 x 1190 mm

180 kg PACK:
- 180 kg pallet
- Pallet size: 790 x 1190 mm

150 kg PACK:
- 300 kg pallet
- Pallet size: 1000 x 1100 mm

CHEZACARB® PACKAGING, STORAGE AND TRANSPORT

PACKAGING:
CHEZACARB® AC can be delivered in PE sacks or PP big bags laid on thermally treated wooden pallets and fixed with a stretch hood foil.

- 5 kg sacks
  (3 sacks per layer, a total of 14 layers) – 210 kg pallet (pallet size: 790 × 1190 mm)
- BB 180 kg
  180 kg pallet (pallet size: 790 × 1190 mm)
- BB 150 kg
  300 kg pallet (pallet size: 1000 × 1100 mm)

Handling and Storage Instructions
For safe handling and storage, it is necessary to comply with all the fire-protection regulations (no smoking, no work with open flame, removal of all possible ignition sources) and to make sure that a person does not come into contact with the product (use of personal protective equipment is required). The product needs to be stored in a dry and well-ventilated place with effective air extraction and away from heat sources. We recommend storage in roofed areas protected from the direct effects of sunlight and we recommend refraining from storing the product together with oils, other inflammable substances or oxidising agents. In intact packaging, the product can be stored for the service life of the packaging, provided that the ambient temperature does not exceed 65 °C. In a dry environment, the product can be stored for 12 months without the packaging, provided that temperature does not exceed 50 °C; the product needs to be protected from contact with water, oils or oxidising agents and it is recommended that the product should be processed as a priority so that fire initiation does not occur when a large quantity is stored. The goods cannot be stacked.
CONTACT INFORMATION

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www.chezacarbcarbonblack.com
Commodity plastics (polyolefins and PS) are the most used polymers in the plastics industry and offer a wide range of processing and application possibilities. Blending them with CHEZACARB® AC increases the number of potential applications thanks to improved product conductivity. Possible applications include sheets, films, pipes, ESD boxes and trays, ESD shielding products and many others.

CHEZACARB® AC decreases the surface and volume resistivity of the final product and can be used in different matrices (LDPE, LLDPE, HDPE, PP and others) to achieve antistatic, static dissipative or conductive properties. You can find examples in the figures below.

The electrical and mechanical properties of the final products are determined by CHEZACARB® AC concentration, polymer type, processing technology and, to a lesser extent, by additives that affect the quality of carbon black dispersion.

Percolation curves describe the dependence of volume resistivity on carbon black concentration and are the first guides for selecting an appropriate amount of carbon black to achieve desired compound conductivity.

Using percolation curves in combination with mechanical property dependences or the surface and volume resistivity of CHEZACARB® AC helps estimate the effect of plastic converters on a compound’s final mechanical parameters. The graphs shown below are recommended only as a guide for designing compounds in various plastic types.

Since compound electrical properties strongly depend on mixing quality and processing technique, Unipetrol recommends performing all tests in accordance with the technical standards applicable to the product before making a final decision about the product’s composition.
**CHEZACARB® AC COMMODITY PLASTICS**

**PP (MFR = 25 g/10 min @230 °C/2.16 kg)**

- **Volume Resistivity [Ω.cm]**
  - 1.E+00
  - 1.E+02
  - 1.E+04
  - 1.E+06
  - 1.E+08
  - 1.E+10
  - 1.E+12
  - 1.E+14
  - 1.E+16

- **Surface Resistivity [Ω]**
  - 0
  - 1.E+00
  - 1.E+01
  - 1.E+02
  - 1.E+03
  - 1.E+04
  - 1.E+05
  - 1.E+06
  - 1.E+07
  - 1.E+08
  - 1.E+09
  - 1.E+10
  - 1.E+11
  - 1.E+12
  - 1.E+13
  - 1.E+14
  - 1.E+15
  - 1.E+16

**CHEZACARB® AC Content [wt. %]**

- Measured on extruded sheets, thickness 1 mm

**Flexural Modulus [MPa]**

- Measured on injection moulded specimens

**PS (MFR = 4 g/10 min @200 °C/5 kg)**

- **Volume Resistivity [Ω.cm]**
  - 1.E+00
  - 1.E+02
  - 1.E+04
  - 1.E+06
  - 1.E+08
  - 1.E+10
  - 1.E+12
  - 1.E+14
  - 1.E+16

- **Surface Resistivity [Ω]**
  - 0
  - 1.E+00
  - 1.E+01
  - 1.E+02
  - 1.E+03
  - 1.E+04
  - 1.E+05
  - 1.E+06
  - 1.E+07
  - 1.E+08
  - 1.E+09
  - 1.E+10
  - 1.E+11
  - 1.E+12
  - 1.E+13
  - 1.E+14
  - 1.E+15
  - 1.E+16

**CHEZACARB® AC Content [wt. %]**

- Measured on extruded sheets, thickness 1 mm

**Flexural Modulus [MPa]**

- Measured on injection moulded specimens

**Charpy Notched Impact Strength @23 °C [kJ/m²]**
Engineering plastics are used as high-end and technical plastics for special technical, construction and other solutions.

Blending these plastics with CHEZACARB® AC increases the number of potential applications as it improves final product conductivity. Possible products include sheets, electrotechnical parts, special ESD trays, filaments and boxes.

CHEZACARB® AC decreases surface and volume resistivity and can be used in different matrices such as PET, PBT, PC, ABS, POM, polyamides and many others. Examples are given in the figures below:

The electrical and mechanical properties of the final products are determined by CHEZACARB® AC concentration, polymer type, processing technology and, to a lesser extent, by additives that affect the quality of carbon black dispersion.

Percolation curves describe the dependence of volume resistivity on carbon black concentration and are the first guides for selecting an appropriate amount of carbon black to achieve desired compound conductivity.

Using percolation curves in combination with the mechanical property dependences or the surface and volume resistivity of CHEZACARB® AC helps estimate the effect of plastic converters on a compound’s final mechanical parameters. The graphs shown below are recommended only as a guide for designing compounds in various plastic types.

Since compound electrical properties strongly depend on mixing quality and processing technique, Unipetrol recommends performing all tests in accordance with the technical standards applicable to the product before making a final decision about the product’s composition.

### PC (MFR = 20 g/10 min @300 °C/1.9 kg)

**Flexural Modulus**

<table>
<thead>
<tr>
<th>CHEZACARB® AC Content [wt. %]</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexural Modulus [MPa]</td>
<td>3000</td>
<td>3500</td>
<td>2500</td>
<td>2000</td>
<td>1500</td>
<td>1000</td>
<td>750</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Charpy Notched Impact Strength @23 °C [kJ/m²]**

<table>
<thead>
<tr>
<th>CHEZACARB® AC Content [wt. %]</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charpy Notched Impact [kJ/m²]</td>
<td>4</td>
<td>5</td>
<td>4.5</td>
<td>3.5</td>
<td>3</td>
<td>2.5</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
<td>0</td>
</tr>
</tbody>
</table>

**Volume Resistivity [Ω.cm] / Surface Resistivity [Ω]**

<table>
<thead>
<tr>
<th>CHEZACARB® AC Content [wt. %]</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume Resistivity [Ω.cm]</td>
<td>1.*10^14</td>
<td>1.*10^13</td>
<td>1.*10^12</td>
<td>1.*10^11</td>
<td>1.*10^10</td>
<td>1.*10^9</td>
<td>1.*10^8</td>
<td>1.*10^7</td>
<td>1.*10^6</td>
<td>1.*10^5</td>
<td>1.*10^4</td>
</tr>
<tr>
<td>Surface Resistivity [Ω]</td>
<td>1.*10^14</td>
<td>1.*10^13</td>
<td>1.*10^12</td>
<td>1.*10^11</td>
<td>1.*10^10</td>
<td>1.*10^9</td>
<td>1.*10^8</td>
<td>1.*10^7</td>
<td>1.*10^6</td>
<td>1.*10^5</td>
<td>1.*10^4</td>
</tr>
</tbody>
</table>

*Measured on extruded sheets, thickness 1 mm"
PVC is used in the plastics industry and offers a wide range of processing and application possibilities. Blending PVC with CHEZACARB® AC increases the number of potential applications as it improves final product conductivity. It can be used in pipes, sheets, flooring, cabling and numerous other applications.

CHEZACARB® AC decreases the surface and volume resistivity of the final product and can be used in different formulations. Application should be closely monitored as CHEZACARB® AC could absorb the plasticizer. Plasticizers also affect the product’s final resistivity. Examples are given in the figures below.

The final product’s electrical and mechanical properties are determined by CHEZACARB® AC concentration, polymer type, processing technology and, to a lesser extent, by additives that affect the quality of carbon black dispersion.

Percolation curves describe the dependence of volume resistivity on carbon black concentration and are the first guides for selecting an appropriate amount of carbon black to achieve desired compound conductivity.

Using percolation in combination with the mechanical property dependences or the surface and volume resistivity of CHEZACARB® AC helps estimate the effect of plastic converters on a compound’s final mechanical parameters. The graphs shown below are recommended only as a guide for designing compounds in various plastic types.

Since compound electrical properties strongly depend on mixing quality and processing technique, Unipetrol recommends performing all tests in accordance with the technical standards applicable to the product before making a final decision about the product’s composition.