Carbonyl iron powder for microwave absorption in EMI shielding and radar applications
ADVANTAGES OF CIP BY BASF

- Excellent absorption from 1 GHz and higher
- Broadband absorption characteristics
- Easily compoundable
- Compatible with most polymer matrices

CIP HARD GRADE

BASF produces carbonyl iron powders (CIP) since almost 90 years. The unique microstructures and chemical design give our powders its outstanding magnetization behavior. The onion-skin structure of hard CIP grades suppresses eddy currents and keeps the magnetic hysteresis stable in the GHz range. This leads to a strong interaction of our powders with the magnetic field vector of microwaves. It makes CIP an excellent absorber of microwave frequencies enabling technologies – from civil to military shielding applications. Our powders are easily incorporated in plastic or elastomeric materials or in varnish systems.

CIP EW

BASF offers a range of hard grades for microwave absorption applications. CIP EW offers an excellent broadband application over a wide frequency range. The low average particle size of 3.5 microns covers the microwave skin depth of 1–2 microns and makes CIP EW an economic choice. CIP EW-I is the insulated alternative to CIP EW. The grade offers enhanced electric resistivity and eddy current suppression. CIP ER also shows excellent absorption characteristics. Its narrow particle size distribution makes CIP ER suitable for various compounding applications especially in formulations for coatings. CIP ES shows a more pronounced onion-skin microstructure. The iron carbide rings are stronger developed. This different morphology shifts the absorption values of CIP ES to lower frequency ranges.

Typical Properties

<table>
<thead>
<tr>
<th>Grade</th>
<th>Fe min. (%)</th>
<th>C max. (%)</th>
<th>d50 (mic.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIP ER</td>
<td>≥7</td>
<td>≤1</td>
<td>4.5</td>
</tr>
<tr>
<td>CIP ES</td>
<td>≥7.4</td>
<td>≤1.1</td>
<td>4</td>
</tr>
<tr>
<td>CIP EW</td>
<td>≥7</td>
<td>≤0.9</td>
<td>3.5</td>
</tr>
<tr>
<td>CIP EW-I</td>
<td>≥7</td>
<td>≤0.9</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Our CIP grades - overview of selected chemical and physical parameters

Thanks to their outstanding particle design our CIP grades show superior absorption characteristics. BASF’s excellent batch-to-batch consistency help our customers to efficiently run their production processes.

Microwave particle size distribution

Inductive Electronic Components

Metal Injection Molding and Powder Metallurgy

Diamond Tools

Microwave and Radar Absorption

Our CIP grades for Microwave Absorption

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- CIP ER in melamine matrix (20 Vol. %)
- CIP ER in melamine matrix (30 Vol. %)
- CIP ES in melamine matrix (20 Vol. %)
- CIP ES in melamine matrix (30 Vol. %)

The graphs show the absorption properties at different frequencies and thicknesses for each formulation.
Please contact us to discuss the requirements of your CIP application.

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**Note**

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