MICAFIL RIS Transformer Bushings
EasyDry / DMB-OA 24–170 kV

- MICAFIL EasyDry bushings feature a moisture resistant construction which is oil- and paper-free. That ensures the long lifetime, safety and reliability essential to maximize the availability of transformer assets.
- Building on over 100 years experience in bushings, ABB has focused on creating an innovative technology for fast delivery to suit a wide range of customer applications.
ABB, the world leader in high voltage bushing technology
Global experience and resources

The ABB group has more than 100 years of experience in different bushing technologies. This experience includes comprehensive Research and Development (R&D) and testing resources, especially in the areas of high voltage, engineering, materials research and applied physics. We produce quality bushings in seven locations all over the world.

The first MICAFIL Resin Impregnated Paper (RIP) bushings were developed in the 1960s, and since then the factory in Zurich, Switzerland has specialized in dry type bushing technologies. For more than 40 years we have successfully produced tailor-made, high quality dry bushings. ABB is characterized by its outstanding technical performance and experience. During the long history of developing and producing dry bushings, ABB has always been well known for its innovation by setting new standards for dry bushings.

ABB is continuously striving for new, innovative solutions to meet our customers’ application needs. The continuous and determined work on research and development, involving the profound knowledge of the unique ABB R&D global network, enables us to provide you with state-of-the-art dry bushing technology: EasyDry high voltage transformer oil-air bushings. This modern RIS (Resin Impregnated Synthetics) bushing technology sets new standards regarding quality, reliability, safety and lead time.

The EasyDry bushing family ideally fits into ABB’s product portfolio of environmental friendly and high quality components for the transmission and distribution of electrical energy. In general, the aim of electric utilities is to continuously increase efficiency and performance of their assets in addition to the ambitious targets of improved availability, higher safety standards and cost reduction. ABB’s EasyDry bushing provides a valuable contribution to achieving better overall performance figures.

The EasyDry standard line will be the right choice when equipping your next transformer. In this brochure we will tell you why.

ABB manufacturing locations for bushings:
- Alamo, TN, USA
- Guarulhos, Brazil
- Hefei, China
- Khokhov, Russia
- Ludvika, Sweden
- Vadodara, India
- Beijing, China
- Raleigh, USA
- Hefei, China
- Bangalore, India
- Beijing, China
- Ladenburg, Germany

OIP = Oil Impregnated Paper bushings
RIP = Resin Impregnated Paper bushings
RIS = Resin Impregnated Synthetics bushings

ABB R&D centers:
- Baden-Dättwil, Switzerland
- Bangalore, India
- Beijing, China
- Krakow, Poland
- Ladenburg, Germany
- Raleigh, USA
- Västerås, Sweden
State of the art bushing technology
Compact and reliable design

The EasyDry transformer bushing is a resin molded polymeric fiber RIS technology bushing with a silicone rubber insulator. This means that the condenser core is molded in its final shape (picture 1) and the silicone rubber insulator is directly molded as one piece on the core (picture 2). In this way, the insulator and the condenser core become tightly bound to one another. The optimized process and high quality materials make the bushing partial-discharge free and ensure low dielectric losses. The bushing design is completely oil- and paper-free and does not contain water-absorbent materials.

EasyDry common specifications

<table>
<thead>
<tr>
<th>Common specifications</th>
<th>Oil-air transformer bushing for mineral oil, other oils on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Dry, fine capacitive graded, resin molded bushing</td>
</tr>
<tr>
<td>Classification</td>
<td>Dry, fine capacitive graded, resin molded bushing</td>
</tr>
<tr>
<td>Min. ambient temperature</td>
<td>-40°C</td>
</tr>
<tr>
<td>Altitude of Installation</td>
<td>&lt;1000m, higher level of altitude on request</td>
</tr>
<tr>
<td>Pollution level</td>
<td>Very heavy</td>
</tr>
<tr>
<td>Mounting angle</td>
<td>Vertical to horizontal</td>
</tr>
<tr>
<td>Measuring tap</td>
<td>3 kV</td>
</tr>
<tr>
<td>Standards</td>
<td>IEC 60137 (2017) and IEEE C57.10.00 (2004) and C57.19.01 (2000)</td>
</tr>
</tbody>
</table>

The EasyDry bushing consists of a resin molded condenser core, main flange and silicone rubber insulator. The condenser core is manufactured using aluminium tube or copper conductor and then wound with a fiber condenser core utilizing aluminum foils for electrical field control. The condenser core is then molded under vacuum with a high temperature epoxy resin into its final shape. Therefore the condenser core needs no machining. The molding is performed under vacuum, in a controlled and hermetically sealed environment. The aluminium flange is directly assembled on the condenser core with a multiple O-ring system creating an oil- and gas-tight sealing system. In contrast to some traditional designs, the bushing’s terminals are made of one piece. Both, the cable bolt and removable solid rod conductor, are fitted with a clamp at the top of the bushing.

We are proud of our leading position in high voltage bushings by providing our customers with profound expertise in this state-of-the-art technology. This new bushing technology combines the best advantages of both OIP and RIP technologies.
Benefits of EasyDry
Safe, reliable and easy

The EasyDry transformer bushing combines the benefits of RIP and OIP bushings into one compact product. The EasyDry bushings share the OIP performance having an excellent resistance to moisture absorption during storage and transportation, and at the same time provide the same excellent overload characteristics and thermal values and reliability you expect from an RIP bushing. Furthermore, the bushings are constructed of fire-resistant materials. This makes the bushing extremely safe for both personnel and systems.

Easy to use, maintenance-free
• No maintenance or constant monitoring necessary
• Installation, storage and transportation is possible at any angle

Excellent electrical and thermal properties
• Partial-discharge free up to double service voltage
• High thermal endurance (class E, 120 °C)
• Low dielectric losses (tan δ ≤ 0.40 %)

Superb design, reliable performance
• EasyDry bushings utilize only materials which are moisture resistant, making bushing storage and transportation much easier and practical
• Easy handling and installation of the bushing thanks to the reduced number of components
• Single-piece terminal without joints guarantees low resistance current path
• One-piece, direct-molded silicone insulator provides superior moisture and contamination resistance

Oil- and paper-free bushing, highest operational safety
• The EasyDry design effectively prevents explosions since they are oil- and pressure-free
• The EasyDry bushing’s core material makes it fire-resistant
• Hydrophobic, non-shattering silicone insulator with outstanding contamination performance

Environmental friendly
• The materials are selected to provide the lowest possible environmental impact over the whole product life cycle
• Lower carbon footprint than other bushing technologies

Standard bushing with better than standard performance
EasyDry transformer bushings are specified and tested according to the IEC 60137 (2017) and IEEE C57.19.00 (2004) and C57.19.01 (2000) Standards. The bushings not only meet, but exceed the requirements in the relevant standards due to the low dielectric dissipation factor (tanδ) and partial discharge performance. The minimum allowed ambient temperature of –40 °C enables EasyDry to perform even in the most demanding conditions.

Please consult ABB Switzerland for conditions that are outside of the standard specification above.
Dimensions and installation

Bushing dimensions

Fig. 1

Fig. 2

Fig. 3

cable bolt, machined by customer

copper bare

copper bare

Bottom detail – End shield

Fig. 20

Fig. 21

Flange dimensions

Fig. 10

Fig. 11

Fig. 12

Flange detail

Fig. 22

Legend

1 Test tap
2 De-aeration
3 Earthing screws 2 × M12/180°
4 Sealing area

Types of rod conductor

Split solid rod conductor for 24–72 kV

The removable conductors for 24, 36, 52 and 72 kV are split. The divided point of the rod conductor have the following characteristics:

<table>
<thead>
<tr>
<th>Rated Voltage</th>
<th>CT Extension</th>
<th>Fig</th>
<th>L9</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>0–100</td>
<td>24</td>
<td>85</td>
</tr>
<tr>
<td>36</td>
<td>0–100</td>
<td>24</td>
<td>85</td>
</tr>
<tr>
<td>52</td>
<td>0–100</td>
<td>24</td>
<td>85</td>
</tr>
<tr>
<td>72.5</td>
<td>0–100</td>
<td>24</td>
<td>85</td>
</tr>
</tbody>
</table>

One-piece solid rod conductor for 123–170 kV

For 123–170 kV the solid rod conductor are unseparated by standard. Split conductors are available on request.

Recommendation for bushing installation

The distance from the bushing’s lower part to the earthed parts depends on the shape of the surrounding parts as well as on the quality and condition of the transformer oil. The recommended minimum distances A (mm) to be used under standard conditions are shown in Fig. 16 and the table below.

<table>
<thead>
<tr>
<th>DMB-DA</th>
<th>øD (mm)</th>
<th>Up (kV)*</th>
<th>A (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24, 36, 52</td>
<td>109</td>
<td>50–105</td>
<td>80</td>
</tr>
<tr>
<td>72.5</td>
<td>109</td>
<td>140</td>
<td>90</td>
</tr>
<tr>
<td>123</td>
<td>134</td>
<td>185</td>
<td>115</td>
</tr>
<tr>
<td>145</td>
<td>134</td>
<td>275</td>
<td>145</td>
</tr>
<tr>
<td>170</td>
<td>134</td>
<td>325</td>
<td>170</td>
</tr>
</tbody>
</table>

*transformer test voltage
## Technical data for bushing selection

<table>
<thead>
<tr>
<th>Type of transformer</th>
<th>Electrical characteristics</th>
<th>Technical characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICAFIL RIS TRANSFORMER BUSHINGS</td>
<td>EasyDry / DMB-OA 24–170 kV</td>
<td></td>
</tr>
</tbody>
</table>
Enquiry data sheet

When making your enquiry please specify the following:

- **Type:**
- **Drawing no:** 1ZCD
- **Quantity:**

### Voltage and Current

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 kV</td>
<td>800 A</td>
</tr>
<tr>
<td>36 kV</td>
<td>1,000 A</td>
</tr>
<tr>
<td>52 kV</td>
<td>1,250 A</td>
</tr>
<tr>
<td>72.5 kV</td>
<td>1,600 A</td>
</tr>
<tr>
<td>123 kV</td>
<td>2,000 A</td>
</tr>
<tr>
<td>145 kV</td>
<td>2,500 A</td>
</tr>
</tbody>
</table>

### Company Details

- **Company name:**
- **Name / First name:**
- **Phone:**
- **Email:**
- **Country of Installation:**
- **End customer name:**
- **Project name:**

Our order confirmation includes drawings of the bushing and a detailed bushing data sheet.

### Custom modifications

On request, ABB can make custom modifications in areas such as flange dimensions, terminal variants, other lower part lengths and applications for other oils than mineral oil. We are happy to provide information on feasibility, price and delivery time of such custom modifications.

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