## Technical data sheet - Shielding paints

**2020/06**

<table>
<thead>
<tr>
<th>Brief description</th>
<th>HSF54</th>
<th>HSF64</th>
<th>MAX54</th>
<th>PROS54</th>
<th>TEC54</th>
<th>NSF54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening HF / LF</td>
<td>HF / LF</td>
<td>HF / LF</td>
<td>HF / LF</td>
<td>HF / LF</td>
<td>HF / LF</td>
<td>HF / LF</td>
</tr>
<tr>
<td>Screening 1 layer</td>
<td>39 dB</td>
<td>32 dB</td>
<td>43 dB</td>
<td>32 dB</td>
<td>39 dB</td>
<td>40 dB</td>
</tr>
<tr>
<td>Screening 2 layers</td>
<td>49 dB</td>
<td>40 dB</td>
<td>53 dB</td>
<td>40 dB</td>
<td>49 dB</td>
<td>46 dB</td>
</tr>
<tr>
<td>Screening 3 layers</td>
<td>59 dB</td>
<td>48 dB</td>
<td>63 dB</td>
<td>48 dB</td>
<td>59 dB</td>
<td>46 dB</td>
</tr>
<tr>
<td>Coverage</td>
<td>5 - 7.5 m²/l</td>
<td>5 - 7.5 m²/l</td>
<td>5 - 7.5 m²/l</td>
<td>5 - 7.5 m²/l</td>
<td>7.5 - 10 m²/l</td>
<td>5 - 7.5 m²/l</td>
</tr>
<tr>
<td>Scope of application</td>
<td>Interior, exterior</td>
<td>Interior, exterior</td>
<td>Interior, exterior</td>
<td>Interior, exterior</td>
<td>Interior, exterior</td>
<td>Interior, exterior</td>
</tr>
<tr>
<td>Substrates</td>
<td>Almost all</td>
<td>All absorbent</td>
<td>Almost all</td>
<td>Almost all</td>
<td>Almost all</td>
<td>Almost all</td>
</tr>
<tr>
<td>Moisture-resistance</td>
<td>High</td>
<td>Normal</td>
<td>High</td>
<td>Very high</td>
<td>High</td>
<td>0.1 m</td>
</tr>
<tr>
<td>Sd-value</td>
<td>0.1 m</td>
<td>0.05 m</td>
<td>0.1 m</td>
<td>0.05 m</td>
<td>0.1 m</td>
<td>0.1 m</td>
</tr>
<tr>
<td>Applicable with</td>
<td>Paint roller, airless (&gt; 0.2 mm)</td>
<td>Paint roller, airless (&gt; 0.2 mm)</td>
<td>Paint roller, airless (&gt; 0.2 mm)</td>
<td>Paint roller, airless (&gt; 0.4 mm)</td>
<td>Paint roller, airless (&gt; 0.2 mm)</td>
<td>Paint roller, airless (&gt; 0.1 mm)</td>
</tr>
<tr>
<td><strong>As shielding paint to shield electromagnetic fields</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thickness 200 μm</td>
<td>~ 1.5 Ω/Ω</td>
<td>~ 2.7 Ω/Ω</td>
<td>~ 0.8 Ω/Ω</td>
<td>~ 2.7 Ω/Ω</td>
<td>~ 2.5 Ω/Ω</td>
<td>~ 30 Ω/Ω</td>
</tr>
<tr>
<td>Thickness 150 μm</td>
<td>~ 2.5 Ω/Ω</td>
<td>~ 2.5 Ω/Ω</td>
<td>~ 2.5 Ω/Ω</td>
<td>~ 2.5 Ω/Ω</td>
<td>~ 2.5 Ω/Ω</td>
<td>~ 35 Ω/Ω</td>
</tr>
<tr>
<td>Thickness 100 μm</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 70 Ω/Ω</td>
</tr>
<tr>
<td><strong>Ecology and certifications</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thickness 200 μm</td>
<td>~ 1.5 Ω/Ω</td>
<td>~ 2.7 Ω/Ω</td>
<td>~ 0.8 Ω/Ω</td>
<td>~ 2.7 Ω/Ω</td>
<td>~ 2.5 Ω/Ω</td>
<td>~ 30 Ω/Ω</td>
</tr>
<tr>
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<td>~ 2.5 Ω/Ω</td>
<td>~ 2.5 Ω/Ω</td>
<td>~ 35 Ω/Ω</td>
</tr>
<tr>
<td>Thickness 100 μm</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 4.0 Ω/Ω</td>
<td>~ 70 Ω/Ω</td>
</tr>
<tr>
<td><strong>Ecology</strong></td>
<td>High</td>
<td>Very high</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>Dispersion typical, after drying free of odor</td>
<td>Very low, after drying free of odor</td>
<td>Normal, Sweetish, after drying free of odor</td>
<td>Normal, Sweetish, after drying free of odor</td>
<td>Normal, Sweetish, after drying free of odor</td>
<td>Normal, Dispersion typical, after drying free of odor</td>
</tr>
<tr>
<td><strong>VOC content</strong></td>
<td>0.18 g/l</td>
<td>0.17 g/l</td>
<td>0.19 g/l</td>
<td>0.19 g/l</td>
<td>0.18 g/l</td>
<td>0.20 g/l</td>
</tr>
<tr>
<td><strong>Full declaration</strong></td>
<td>64 ppm BIT</td>
<td>0 ppm BIT</td>
<td>64 ppm BIT</td>
<td>58 ppm BIT</td>
<td>64 ppm BIT</td>
<td>69 ppm BIT</td>
</tr>
<tr>
<td><strong>Certification</strong></td>
<td>TÜV-SÜD</td>
<td>TÜV-SÜD</td>
<td>TÜV-SÜD</td>
<td>TÜV-SÜD</td>
<td>TÜV-SÜD</td>
<td>TÜV-SÜD</td>
</tr>
<tr>
<td><strong>Fire behaviour</strong></td>
<td>DIN EN 13501-1</td>
<td>DIN 4102-1</td>
<td>DIN 4102-1</td>
<td>DIN 4102-1</td>
<td>DIN 4102-1</td>
<td>DIN 4102-1</td>
</tr>
</tbody>
</table>

### Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>HSF54</th>
<th>HSF64</th>
<th>MAX54</th>
<th>PROS54</th>
<th>TEC54</th>
<th>NSF54</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Color</strong></td>
<td>Black</td>
<td>Gray</td>
<td>Black</td>
<td>Black</td>
<td>Gray</td>
<td>Black</td>
</tr>
<tr>
<td><strong>Binder</strong></td>
<td>Acrylate</td>
<td>Silicate, acrylate</td>
<td>Acrylate</td>
<td>Acrylate</td>
<td>Acrylate</td>
<td>Acrylate</td>
</tr>
<tr>
<td><strong>Pigmentation d90</strong></td>
<td>50 μm</td>
<td>50 μm</td>
<td>100 μm</td>
<td>100 μm</td>
<td>5 μm</td>
<td>5 μm</td>
</tr>
<tr>
<td><strong>Adhesive strength</strong></td>
<td>5.7 N/mm²</td>
<td>3.6 N/mm²</td>
<td>3.5 N/mm²</td>
<td>8.4 N/mm²</td>
<td>8.4 N/mm²</td>
<td>12.2 N/mm²</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
<td>~ 2800 mPas</td>
<td>~ 2000 mPas</td>
<td>~ 2600 mPas</td>
<td>~ 2600 mPas</td>
<td>~ 2600 mPas</td>
<td>~ 1200 mPas</td>
</tr>
<tr>
<td><strong>Temperature max.</strong></td>
<td>~ 70°C</td>
<td>~ 50°C</td>
<td>~ 60°C</td>
<td>~ 60°C</td>
<td>~ 60°C</td>
<td>~ 60°C</td>
</tr>
<tr>
<td><strong>pH value</strong></td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td>1.22 kg/l</td>
<td>1.26 kg/l</td>
<td>1.21 kg/l</td>
<td>1.31 kg/l</td>
<td>1.11 kg/l</td>
<td>1.06 kg/l</td>
</tr>
<tr>
<td><strong>MFFT</strong></td>
<td>5°C</td>
<td>5°C</td>
<td>5°C</td>
<td>5°C</td>
<td>5°C</td>
<td>5°C</td>
</tr>
<tr>
<td><strong>Frost-thaw resistance</strong></td>
<td>5 cycles</td>
<td>5 cycles</td>
<td>5 cycles</td>
<td>5 cycles</td>
<td>5 cycles</td>
<td>5 cycles</td>
</tr>
<tr>
<td><strong>Delivery sizes</strong></td>
<td>1 / 5 liter</td>
<td>1 / 5 liter</td>
<td>1 / 5 liter</td>
<td>1 / 5 liter</td>
<td>1 / 5 liter</td>
<td>1 / 5 liter</td>
</tr>
<tr>
<td><strong>Shelf life</strong></td>
<td>12 months</td>
<td>12 months</td>
<td>12 months</td>
<td>12 months</td>
<td>12 months</td>
<td>12 months</td>
</tr>
</tbody>
</table>

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1. dB = screening attenuation: 10 dB = 90 %; 20 dB = 99 %; 30 dB = 99.9 %; 40 dB = 99.99 %, 50 dB = 99.999 %; ...
2. Film thickness given as wet film; Measured with Schütz-Messtechnik MR-1 and 4-point-probe.
3. Values taken from the inspection report YSHIELD-191203 from TÜV-SÜD.
4. ppm = parts per million (millionth percentages); Permitted value according to TÜV-SÜD from 2020 are 500 ppm.
Product features

**Intended use**

Electro-conductive base coatings to shield high-frequency electromagnetic fields and/or low-frequency electric fields. Low-frequency magnetic fields are not shielded.

**Area of application**

Walls and ceilings: Unlimited possible. You will find the suitability for interior or exterior application in the table on the first page.

Floor areas:
- Loose or floating floor coverings (carpets, laminate, etc.) can be laid directly onto the shielding paints. Pay attention, that the shielding paints are not damaged!
- In case of glued floor coverings (carpets, cork, laminate, etc.) the shielding paints have to be aftertreated with our primer GK5 to improve the adhesion.
- We advise against bonding e.g. real-wood parquets.

Under plaster: Due to high adhesive tensile strenghts applicable directly under pure organic plasters.

Corrosion resistance

All shielding paints don’t contain metal particles. Based on carbons they are long-term durable and not oxidizing.

Ready for 5G

Our shielding paints have an almost linear screening attenuation for a very large frequency range including both 5G frequency spectrums FR1 (600 MHz - 6 GHz) and FR2 (24 GHz - 40 GHz).

Safety up to 40 GHz

We have a professional EMC-laboratory according to various standards up to 40 GHz on site. You’ll find the measuring curves and reports from 40/600 MHz - 40 GHz in the internet on the corresponding product pages.

No nanotechnology

Our shielding paints are developed in accordance with strict ecological criteria. We use the carbon black with the lowest emission possible on the market and untreated natural graphite. We consciously do not use graphene, a nanomaterial where the hazard potential is still completely unknown.

TÜV-SÜD certification

We have our shielding paints HSF54, HSF64, PRO54 and NSF34 monitored by TÜV-Süd. The production process including quality control, emission behaviour and economical use of preserving agents is subject to monitoring.

Safe material handling

Safety notes

All paints have a high coloring capability, so please proceed with care. Wipe off stains immediately with damp cloth. Do not let stains dry up. Do not inhale spray mist! Absolutely make sure, that all areas are well ventilated during use and drying time. Do not eat, drink or smoke during painting! Rinse thoroughly immediately after skin or eye contact!

VOC-content

Please refer to the table on the first page. The EU limit value for cat. A/a is 30g/l (by 2010).

Ingredients

HSF54: Water, natural graphite, pure acrylics dispersion, carbon black, additives, preservative (BIT, INN, MIT).

HSF64: Water, potassium silicate, natural graphite, carbon black, pure acrylics dispersion, additives, NO preservation agent.

MAX54: Water, natural graphite, pure acrylics dispersion, carbon black, additives, preservative (BIT, INN, MIT).

PRO54: Water, pure acrylics dispersion, carbon fibers, natural graphite, carbon black, additives, preservative (BIT, INN, MIT).

TEC54: Water, natural graphite, pure acrylics dispersion, carbon black, additives, preservative (BIT, INN, MIT).

NSF34: Water, pure acrylics dispersion, carbon black, natural graphite, additives, preservative (BIT, INN, MIT).

Preservative

If stated above, the shielding paint contains BIT (1,2-Benzisothiazolin-3-on), INN (Zink-Pyrithion) and MIT (2-Methyl-4-isothiazolin-3-on) for preservation. Zink-Pyrithion (INN) is a safe replacement for MIT, that is by legislature subject to labeling from 2020 over 15 ppm. Advisory service for allergic persons under telephone number 0049-(0)8531-31713-0.
Grounding

**Grounding regulation**

Large area shieldings executed with shielding materials are no electrical equipment but “new conductive parts” according to IEV 826-03-03 or IEV 195-06-11 and thereby a new method of DIN VDE 0100-100:2009-06. By connecting the material(s) to the potential equalization they are an inherent part of the electrical system. Generally accepted rules of technology have to be respected.

**According to the latest state of technology it is important to distinguish between protective equipotential bonding and functional equipotential bonding (FEB).** The protective equipotential bonding (green/yellow cable) is a protective measure and ensures, in the event of contact voltage, the immediate action of safety devices (e.g. line safety switch). The function of the functional equipotential bonding (transparent cable) is the reduction of emission of low frequency electrical fields on large area shieldings (i.e. prevention of leaking electrical field).

**Grounding accessories**

To obtain an accurate grounding, we exclusively recommend our grounding accessories. For interior use: Grounding plate GW or GB in combination with grounding strap EB2. For exterior use: Grounding plate GE. **Please find more information in our “Technical data sheet - Grounding”**.

**Processing**

**Interior approach**

- Prepare the underground with our primer GK5.
- Drill holes for the grounding plate.
- The grounding strap has to be applied uninterrupted in one piece through all surfaces to be painted, as stated in our grounding instructions sheet.
- Apply the shielding paint in one or two layers, depending on the favored shielding attenuation. Apply second coat of shielding paint to the area where the grounding plate will be mounted.
- Allow the paint 24 hours to dry.
- Fix the grounding plate.
- For further procedure references please follow up at subitem „Final coat“.

**Exterior approach**

- Prepare the underground with our primer GK5.
- Level out the mounting surface for the grounding plate.
- Drill holes for the grounding plate.
- Apply the shielding paint in one or two layers, depending on the favored shielding attenuation. Apply second coat of shielding paint to the area where the grounding plate will be mounted.
- Allow the paint 24 hours to dry.
- Fix the grounding plate and glue the top cover.
- For further procedure references please follow up at subitem „Final coat“.

**Application**

Minimum application temperature: 5°C / 41°F. This temperature also counts for the drying time!

**Underground**

HSF54, MAX54, PRO54, TEC54, NSF34: Excellent adhesion on almost all undergrounds like emulsion paints, dry construction boards, wallpaper, cement, plaster, masonry, wood, many plastics, etc.

HSF64: Good adhesion on all absorbent undergrounds. Important: With potassium silicate as ingredient not applicable on gypsum based undergrounds.

Common: The underground needs to be solid, clean, degreased and dry. Absorbent or porous surfaces must be prepared with a primer. Old coats of paint or old wallpapers which can be etched with water, should be removed.

**Priming coat**

Absorbent or porous surfaces necessarily must be prepared with our primer GK5. In case of not using a primer, the binding agent will infiltrate together with the water in the substrate. In addition, this will lead to an aggravation of the physical characteristics of the shielding paints. **Optical control**: Paint a small test area and let dry. When the surface is silver shimmering, the underground is too absorbent. When the surface is pure black, the underground is adequately primed.

**Preparation**

The conductive particles deposit on the bottom of the paint container. **Shake the paint container well and mix it thoroughly after opening with an electrical paint stirrer for at least one minute**. For our 1-liter bins please use our stirrer AR42.

**Compatibility**

All shielding paints are ready for use. **Never mix with water or other coating materials.**

**Application**

- Use a first-class paint roller with a pile height of 10-13 mm. To achieve a constant high attenuation, it is essential to apply the shielding paint with equal thickness, do not skip areas! Always soak the paint roller with the equal amount of paint and try to coat equal large surfaces with this amount!
- Limited usable are lacquer-rollers, foam-rollers or brushes, as the coating often gets applied too thin for a good attenuation!
- Airless spraying is possible, please find the minimum hole sizes in the table on the first page.
- Application methods in technical coatings: Knife coating, dip-coating, roll-application, etc.
**Drying time**

- Allow to dry for 24–48 hours before overcoating.
- Protect from rain at least for 24 hours.
- The coating is entirely cured after 7 days.

**Final coat**

To protect the soft, viscoplastic surfaces of the shielding paints against mechanical damage and humidity, we recommend to apply 2 top coats. Worldwide variably paints are available, therefore we never can give a guarantee for specific combinations. In addition many pure mineral paints and ecologic paints often adhere bad on the graphite surface of the shielding paints. **We always recommend to apply a paint coat on a test area before processing.**

**Interior:** With high-quality, good covering, plastic bonded dispersion emulsion paints or dispersion silicate paints. Alternatively paste over with wallpapers, glass fabrics, etc.

**Exterior:** With high-quality, good covering, highly hydrophobic dispersion emulsion paints or silicon resin paints.

**Under plaster (MAX54, HSF54, PRO54, NSF34):**
Due to the high adhesive tensile strenghts of the shielding paints, these are applicable (in conformity with ETAG 004 for EIFS-systems, minimum 0.08 N/mm²) after prior priming under plastic bonded plaster. Never use mineral plasters, no adhesion!

**Consumption**

The consumption depends on the character and absorbency of the underground. **Typical coverage 5 - 7.5 m²/l.** Referring to customer feedbacks we know, that our shielding paints are often applied to thin. For a good levelling, our paints are of low viscosity and that’s why our customers tend to a thin coating. The problem is, that a coverage of more than 7.5 m²/l leads to a decrease in attenuation! We advise to paint always quite thick.

**Further information**

**Storage**

Store cool and frost free. Keep safe from children. Once the paint container has been opened, close tightly after usage and store cool.

**Period of storage**

At least 12 months, see the batch sticker on the paint container.

**Disposal**

Utensils have to be cleaned immediately after use with water and soap. Containers must be absolutely empty for recycling. Dried up paint remainders may be disposed of with the household garbage. Do not let remains escape into sewerage, water bodies or ground.

**Identification marks**

Produktcode: M-DF01 (GISCODE)
Water hazard class: 1 (VwVwS)
Waste code: 08 01 12 (AVV)
Hazardous ingredients: –
ADR: –
UN-number: –
Transport hazard class: –
Environmental dangers: –

**Safety data sheet**

The safety data sheet is available upon request under telephone number 0049-(0)8531-31713-0.

**Disclaimer**

Preceding information has been assorted to the latest state of processing and application technology. As we dont have any influence on processing and application, no liabilitay can be accepted out of the contents of this information sheet. Processors are in either case bounded to a skilled evaluation of the processing, in consideration of the product attributes and fitness. Details and notwithstanding details, transcending the content of this information sheet, require our confirmation in writing. Our general terms and conditons are valid as mentioned. With this newest edition of our technical data sheet all previous versions loose their validity.