

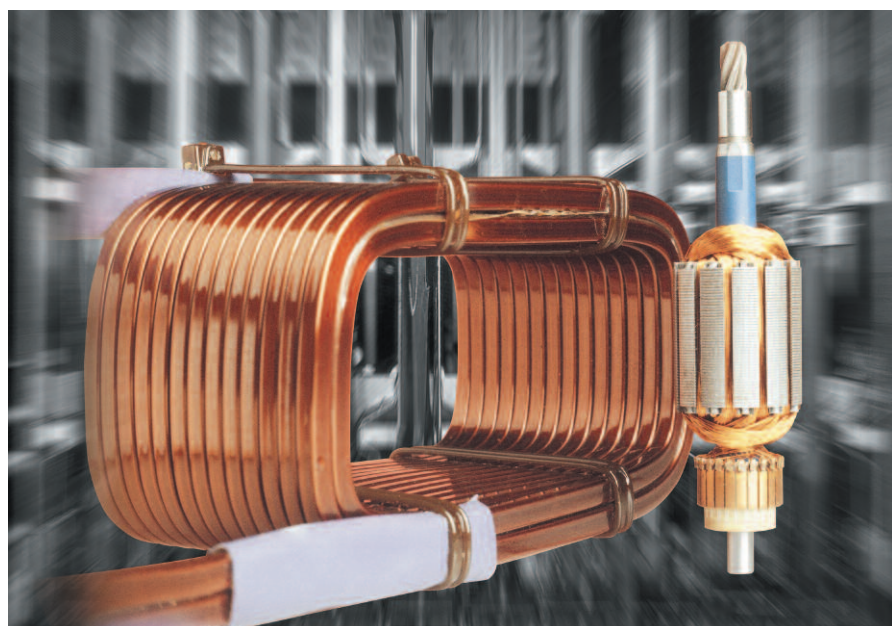
Flat enamelled copper wire product range

| Product designation | MAGNEFORM F-120 | MAGNETEMP C-180 | MAGNETEMP CA-200 |
|--|--|---|---|
| PROPERTIES | High resistance to abrasion. Excellent flexibility and adherence. Very resistant against hydrolysis. | Very good thermal resistance. Excellent resistance against solvents and other chemicals. Very good flexibility. | Excellent thermal characteristics. Outstanding chemical resistance. Very good resistance to abrasion. |
| STANDARDS | IEC 60317-18 | IEC 60317-28 | IEC 60317-29 |
| INSULATION | Polyvinylacetal | THEIC-modified polyesterimide | THEIC-modified polyesterimide + polyamide imide |
| THERMAL CLASS (IEC) | 120 | 180 | 200 |
| STANDARDS | IEC 60317-0-2 | IEC 60317-0-2 | IEC 60317-0-2 |
| SIZE RANGE WIDTH THICKNESS | - - | - - | - - |
| INSULATION INCREASE Grade 1 Grade 2 | 0,060 - 0,110 mm 0,120 - 0,170 mm | 0,060 - 0,110 mm 0,120 - 0,170 mm | 0,060 - 0,110 mm 0,120 - 0,170 mm |
| UL-LISTING | - | File E 67139 | File E 67139 |
| APPLICATION | Distribution and power transformers, supply meters, electrical equipment. | Control systems, electrical equipment, air-cooled and cast resin dry type transformers, welding transformers. | AC and DC motors up to class H, oil immersed and dry type transformers, hermetic motors, magnet coils. |
| Technical data According to IEC 60851 | | | |
| Mechanical properties | | | |
| FLEXIBILITY AND ADHERENCE | | | |
| - elongation | > 32 % | > 32 % | > 32 % |
| - bending edgewise b ₁ ≤ 10 mm b ₁ > 10 mm | 2 x b ₁ 3 x b ₁ | 4 x b ₁ 5 x b ₁ | 4 x b ₁ 5 x b ₁ |
| - bending flatwise, all dimensions | 2 x s ₁ | 4 x s ₁ | 4 x s ₁ |
| PENCIL HARDNESS* | 5 H | 3 H | 4 H |
| Electrical properties | | | |
| BREAKDOWN VOLTAGE | | | |
| - at room temperature Grade 1 Grade 2 | > 1 500 V > 2 500 V | > 1 500 V > 2 500 V | > 1 500 V > 2 500 V |
| - at nominal temperature Grade 1 Grade 2 | > 750 V > 1 500 V | > 750 V > 1 500 V | > 750 V > 1 500 V |
| DIELECTRIC LOSS TANGENT | ≥ 120 °C | ≥ 180 °C | ≥ 200 °C |
| Thermal properties | | | |
| TEMPERATURE INDEX* (IEC 60172) | ≥ 120 °C | ≥ 180 °C | ≥ 200 °C |
| HEAT SHOCK | 155 °C | 200 °C | 220 °C |
| CUT THROUGH TEMPERATURE* | ≥ 230 °C | ≥ 350 °C | ≥ 350 °C |
| Chemical properties | | | |
| RESISTANCE AGAINST | | | |
| - Solvents | 2 H | 3 H | 4 H |
| - Impregnating resins | 2 H | 3 H | 4 H |
| - Transformer oil | excellent | very good | very good |
| - Refrigerants | - | good | very good |
| * Measured on round enamelled wires | b ₁ = Nominal conductor width s ₁ = Nominal conductor thickness | | |

These values are for information only.

| MAGNETEMP A-220 | MAGNEBOND FX-120 | MAGNEBOND FX2-120 | MAGNEBOND AB-220 |
|--|---|--|---|
| Excellent thermal characteristics and ageing resistance. Very good resistance to abrasion | Optimum curing is achieved between 120 °C and 130 °C. The bond coat hardens during the usual vapour phase process for drying of the coil. | Optimum curing is achieved between 110 °C and 120 °C. The bond coat hardens during the usual vapour phase process or hot air drying of the coil. | The temperature range between 160 °C and 230 °C is ideal for curing. Pressing of the coil during bonding increases the bond strength. |
| - Polyamide imide 220 | - Polyvinyl acetale with epoxy bond coat 120 (base coat) | - Polyvinyl acetale with epoxy bond coat 120 (base coat) | - Polyamid imide with aromatic polyamide bond coat 220 (base coat) |
| IEC 60317-0-2 - - 0,060 - 0,110 mm 0,120 - 0,170 mm | IEC 60317-0-2 2,80 mm - 12,50 mm 1,00 mm - 3,15 mm 0,060 - 0,110 mm 0,120 - 0,170 mm | IEC 60317-0-2 2,80 mm - 12,50 mm 1,00 mm - 3,15 mm 0,060 - 0,110 mm 0,120 - 0,170 mm | IEC 60317-0-2 5,00 mm - 11,00 mm 1,20 mm - 3,55 mm 0,060 - 0,110 mm 0,120 - 0,170 mm |
| File E 67139 | - | | |
| AC and DC motors up to class H, oil immersed and dry type transformers, magnet coils and other electromagnetic applications. | Oil immersed transformers up to operating temperature 130 °C. | Oil immersed transformers up to operating temperature 130 °C. | Dry type transformers and generators up to class F. |
| | | | |
| > 32 % 4 x b ₁ 5 x b ₁ 4 x s ₁ 4 H | > 32 % 2 x b ₁ 3 x b ₁ 2 x s ₁ 5 H | > 32 % 2 x b ₁ 3 x b ₁ 2 x s ₁ 5 H | > 32 % 4 x b ₁ 5 x b ₁ 4 x s ₁ 4 H |
| > 1 500 V > 2 500 V > 750 V > 1 500 V ≥ 220 °C | > 1 500 V > 2 500 V > 750 V > 1 500 V ≥ 120 °C | > 1 500 V > 2 500 V > 750 V > 1 500 V ≥ 120 °C | > 1 500 V > 2 500 V > 750 V > 1 500 V ≥ 220 °C |
| ≥ 225 °C 240 °C ≥ 400 °C | ≥ 120 °C 155 °C ≥ 230 °C | ≥ 120 °C 155 °C ≥ 230 °C | ≥ 225 °C 240 °C ≥ 400 °C |
| 4 H 4 H very good very good | 2 H - excellent - | 2 H - excellent - | 4 H - - - |
| b ₁ = Nominal conductor width s ₁ = Nominal conductor thickness | | | |

These values are for information only.



Flat enamelled copper wires

Dimensions and cross sections

Other cross sections on request.

| NOMINAL CROSS SECTIONS (mm²) | | | | | | | | | | | | | | | | | | |
|---|---|-------|---------------------|-------|-------|-------|------------------------|-------|-------|-------------------------|-------|-------|-------|-------|---------------------|-------|-------|-------|
| Bare wire nominal width b ₁ (mm) | Bare wire nominal thickness s ₁ (mm) | | | | | | | | | | | | | | | | | |
| | Up to 1 mm | | > 1 mm up to 1,6 mm | | | | > 1,6 mm up to 2,24 mm | | | > 2,24 mm up to 3,55 mm | | | | | > 3,55 mm | | | |
| | Edge radius r = $\frac{s_1}{2}$ | | Edge radius r = 0,5 | | | | Edge radius r = 0,65 | | | Edge radius r = 0,8 | | | | | Edge radius r = 1,0 | | | |
| | 0,80 | 0,90 | 1,00 | 1,12 | 1,25 | 1,40 | 1,60 | 1,80 | 2,00 | 2,24 | 2,50 | 2,80 | 3,00 | 3,15 | 3,55 | 4,00 | 4,50 | 5,00 |
| 2,00 | | | | 2.025 | 2.265 | 2.585 | | | | | | | | | | | | |
| 2,12 | | | | 2.160 | 2.435 | 2.753 | | | | | | | | | | | | |
| 2,24 | | | 2.025 | 2.294 | 2.585 | 2.921 | 3.369 | | | | | | | | | | | |
| 2,36 | | | 2.145 | 2.429 | 2.735 | 3.089 | 3.561 | | | | | | | | | | | |
| 2,50 | | 2.076 | 2.285 | 2.585 | 2.910 | 3.285 | 3.785 | 4.137 | | | | | | | | | | |
| 2,65 | | 2.211 | 2.435 | 2.753 | 3.098 | 3.495 | 4.025 | 4.407 | | | | | | | | | | |
| 2,80 | | 2.346 | 2.585 | 2.921 | 3.285 | 3.705 | 4.265 | 4.677 | 5.237 | | | | | | | | | |
| 3,00 | 2.263 | 2.526 | 2.785 | 3.145 | 3.535 | 3.985 | 4.585 | 5.038 | 5.638 | | | | | | | | | |
| 3,15 | 2.383 | 2.661 | 2.935 | 3.313 | 3.723 | 4.195 | 4.825 | 5.307 | 5.937 | 6.693 | | | | | | | | |
| 3,35 | 2.543 | 2.841 | 3.135 | 3.537 | 3.973 | 4.475 | 5.145 | 5.667 | 6.337 | 7.141 | | | | | | | | |
| 3,55 | 2.703 | 3.021 | 3.335 | 3.761 | 4.223 | 4.755 | 5.465 | 6.027 | 6.737 | 7.589 | 8.326 | | | | | | | |
| 3,75 | 2.863 | 3.201 | 3.535 | 3.985 | 4.473 | 5.035 | 5.785 | 6.387 | 7.137 | 8.037 | 8.826 | | | | | | | |
| 4,00 | 3.063 | 3.426 | 3.785 | 4.265 | 4.785 | 5.385 | 6.185 | 6.837 | 7.637 | 8.597 | 9.451 | 10.65 | | | | | | |
| 4,25 | 3.263 | 3.651 | 4.035 | 4.545 | 5.098 | 5.735 | 6.585 | 7.287 | 8.137 | 9.15 | 10.08 | 11.35 | — | | | | | |
| 4,50 | 3.163 | 3.867 | 4.285 | 4.825 | 5.410 | 6.085 | 6.985 | 7.737 | 8.637 | 9.717 | 10.70 | 12.05 | 12.95 | 13.63 | | | | |
| 4,75 | 3.663 | 4.101 | 4.535 | 5.105 | 5.723 | 6.435 | 7.385 | 8.188 | 9.137 | 10.28 | 11.33 | 12.75 | — | 14.41 | | | | |
| 5,00 | 3.863 | 4.325 | 4.785 | 5.385 | 6.035 | 6.785 | 7.785 | 8.637 | 9.637 | 10.84 | 11.95 | 13.45 | 14.45 | 15.20 | 17.20 | | | |
| 5,30 | 4.103 | 4.596 | 5.085 | 5.771 | 6.410 | 7.205 | 8.265 | 9.177 | 10.24 | 11.51 | 12.70 | 14.29 | — | 16.15 | 18.27 | | | |
| 5,60 | 4.343 | 4.866 | 5.385 | 6.057 | 6.785 | 7.625 | 8.745 | 9.717 | 10.84 | 12.18 | 13.45 | 15.13 | 16.25 | 17.09 | 19.33 | 21.54 | | |
| 6,00 | 4.663 | 5.226 | 5.785 | 6.505 | 7.285 | 8.185 | 9.385 | 10.44 | 11.64 | 13.08 | 14.45 | 16.25 | — | 18.35 | 20.75 | 23.14 | | |
| 6,30 | 4.903 | 5.496 | 6.085 | 6.841 | 7.660 | 8.605 | 9.865 | 10.98 | 12.24 | 13.75 | 15.20 | 17.09 | 18.35 | 19.30 | 21.82 | 24.34 | 27.49 | |
| 6,70 | | 5.856 | 6.485 | 7.289 | 8.160 | 9.165 | 10.51 | 11.70 | 13.04 | 14.65 | 16.20 | 18.21 | — | 20.56 | 23.24 | 25.94 | 29.29 | |
| 7,10 | | 6.216 | 6.885 | 7.737 | 8.660 | 9.725 | 11.15 | 12.42 | 13.84 | 15.54 | 17.20 | 19.33 | 20.75 | 21.82 | 24.66 | 27.54 | 31.09 | 34.64 |
| 7,50 | | | 7.285 | 8.185 | 9.160 | 10.29 | 11.79 | 13.14 | 14.64 | 16.44 | 18.20 | 20.45 | — | 23.08 | 26.08 | 29.14 | 32.89 | 36.64 |
| 8,00 | | | 7.785 | 8.745 | 9.785 | 10.99 | 12.59 | 14.04 | 15.64 | 17.56 | 19.45 | 21.85 | 23.45 | 24.65 | 27.85 | 31.14 | 35.14 | 39.14 |
| 8,50 | | | | 9.305 | 10.41 | 11.69 | 13.39 | 14.94 | 16.64 | 18.68 | 20.70 | 23.25 | — | 26.23 | 29.63 | 33.14 | 37.39 | 41.64 |
| 9,00 | | | | 9.865 | 11.04 | 12.39 | 14.19 | 15.84 | 17.64 | 19.80 | 21.95 | 24.65 | 26.45 | 27.80 | 31.40 | 35.14 | 39.64 | 44.14 |
| 9,50 | | | | | 11.66 | 13.09 | 14.99 | 16.74 | 18.64 | 20.92 | 23.20 | 26.05 | — | 29.38 | 33.18 | 37.14 | 41.89 | 46.64 |
| 10,00 | | | | | 12.29 | 13.79 | 15.79 | 17.64 | 19.64 | 22.04 | 24.45 | 27.45 | 29.45 | 30.95 | 34.95 | 39.14 | 44.14 | 49.14 |
| 10,60 | | | | | | 14.63 | 16.75 | 18.72 | 20.84 | 23.38 | 25.95 | 29.13 | — | 32.84 | 37.08 | 41.54 | 46.84 | |
| 11,20 | | | | | | 15.47 | 17.71 | 19.80 | 22.04 | 24.73 | 27.45 | 30.81 | 33.05 | 34.73 | 39.21 | 43.94 | 49.54 | |
| 11,80 | | | | | | | 18.67 | 20.88 | 23.24 | 26.07 | 28.95 | 32.49 | — | 36.62 | 41.34 | 46.34 | 52.24 | |
| 12,50 | | | | | | | 19.79 | 22.14 | 24.84 | 27.64 | 30.70 | 34.45 | 39.95 | 36.83 | 43.83 | 49.14 | 55.39 | |
| 13,20 | | | | | | | | 23.40 | 26.04 | 29.21 | 32.45 | 36.41 | — | 41.03 | 46.31 | 51.94 | 58.54 | |
| 14,00 | | | | | | | | 24.84 | 27.64 | 31.00 | 34.45 | 38.65 | 41.45 | 43.55 | 49.15 | 55.14 | 62.14 | |
| 15,00 | | | | | | | | | 29.64 | 33.24 | 36.95 | 41.45 | — | 46.70 | 52.70 | 59.14 | 66.64 | |
| 16,00 | | | | | | | | | 31.64 | 33.48 | 39.45 | 44.25 | 47.45 | 49.85 | 56.25 | 63.14 | 71.14 | |
| 17,00 | | | | | | | | | | 37.72 | 41.95 | 47.05 | — | 53.00 | 59.80 | 67.14 | 75.64 | |
| 18,00 | | | | | | | | | | 39.96 | 44.45 | 49.85 | 53.45 | 56.15 | 63.35 | 71.14 | | |
| 19,00 | | | | | | | | | | 42.20 | 46.95 | 52.65 | — | 59.30 | 66.90 | 75.14 | | |
| 20,00 | | | | | | | | | | 44.44 | 49.45 | 55.45 | 59.45 | 62.45 | 70.45 | 79.14 | | |
| 21,20 | | | | | | | | | | | | 58.81 | — | 66.25 | 74.21 | | | |
| 22,40 | | | | | | | | | | | | 62.17 | 66.65 | 70.01 | 78.97 | | | |
| 23,60 | | | | | | | | | | | | | — | 73.79 | | | | |
| 25,00 | | | | | | | | | | | | | | 78.20 | | | | |

2,285 = sizes acc. to R20 (preferred dimensions)

2,025 = sizes acc. to R40



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