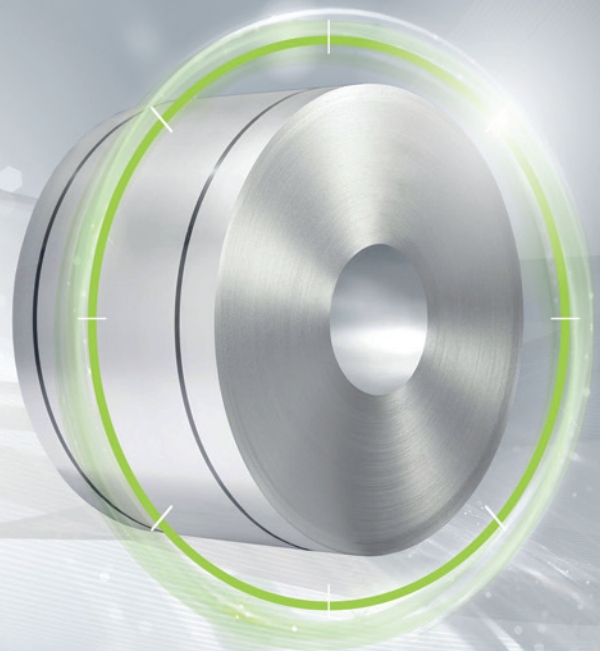


FULLY
PROCESSED

isovac 530-65 A HF

The specialist for high frequencies

Manufactured in the most modern production lines, this fully processed isovac® grade exhibits highly homogeneous properties across the width and length of the entire strip. The result is excellent and consistent processability in the manufacture of highly efficient electrical components. The use of isovac 530-65 A HF (high-frequency) guarantees optimum utilization of the machinery at higher frequencies. High-precision adjustment of the microstructure and adaptation of the alloy content make it possible to keep losses low in the high-frequency range. isovac 530-65 A HF is additionally characterized by slightly higher strengths. Upon request, isovac 530-65 A HF can be supplied with an electrical steel insulation system and can be used directly in as-delivered condition.

Convincing advantages:

- » Use in high-speed motors because of low losses at high frequencies (up to 10% at 1.5 T and 400/1000 Hz)
- » Larger freedom of design and component size optimization resulting from higher strengths as compared to standard isovac® grades
- » Best processability through consistent mechanical properties and homogeneous, clean surfaces
- » Excellent stackability resulting from high dimensional accuracy in rolling direction and perpendicular to rolling direction (thickness tolerance)
- » Innovative electrical steel insulation systems upon request

voestalpine supplies isovac 530-65 A HF, an electrical steel of the highest quality. We offer you a customer-focused overall package of products, service and logistics in addition to all the advantages of our integrated metallurgical facility and Steel Service Centers.

Grade named according to conventional international standards:

| Grade named according to isovac® | DIN EN 10106 | | IEC 60404-8-4 | JIS C2552 | GOST 21427.2 | ASTM A677 | AISI | IS648 | GB/T2521.1 |
|----------------------------------|--------------|--------------|------------------|--------------|-----------------|--------------|------|--------|------------|
| | Material No. | Abbreviation | | | | | | | |
| isovac 530-65 A HF | 1.0824 | M530-65A | M530-65A 5 | 65A530 | 2312 | 64F320 | - | 65C530 | 65W530 |

Mechanical properties:

Tensile test according to DIN EN ISO 6892-1 and hardness according to DIN EN ISO 6507-1 (Typical values);
Test direction: Transverse

| Grade named according to isovac® | Yield strength | 0.2 %-Yield strength | Tensile strength | Elongation | Hardness |
|----------------------------------|--------------------------|----------------------------|-------------------------|------------------------|------------|
| | R _{eH} [MPa] | R _{p0.2} [MPa] | R _m [MPa] | A ₈₀ [%] | HV5 [-] |
| isovac 530-65 A HF | 365 | 345 | 500 | 33 | 170 |

Magnetic properties:

in as-delivered condition (Typical values)

Test direction: Mean value from longitudinal and transverse measurements at 50 Hz (60 Hz), single-sheet test

| Grade named according to isovac® | Specific total loss | | | | Magnetic polarization | | | Relative permeability |
|----------------------------------|---------------------|-----------------|-----------------|-----------------|-----------------------|-----------------|-------------------|-------------------------|
| | 1.0 T P10 | | 1.5 T P15 | | 2500 A/m J25 | 5000 A/m J50 | 10000 A/m J100 | 1.5 T μ _r |
| | 50 Hz [W/kg] | 60 Hz [W/lb] | 50 Hz [W/kg] | 60 Hz [W/lb] | [T] | [T] | [T] | [-] |
| isovac 530-65 A HF | 1.65 | 0.97 | 4.00 | 2.36 | 1.60 | 1.69 | 1.80 | 1700 |

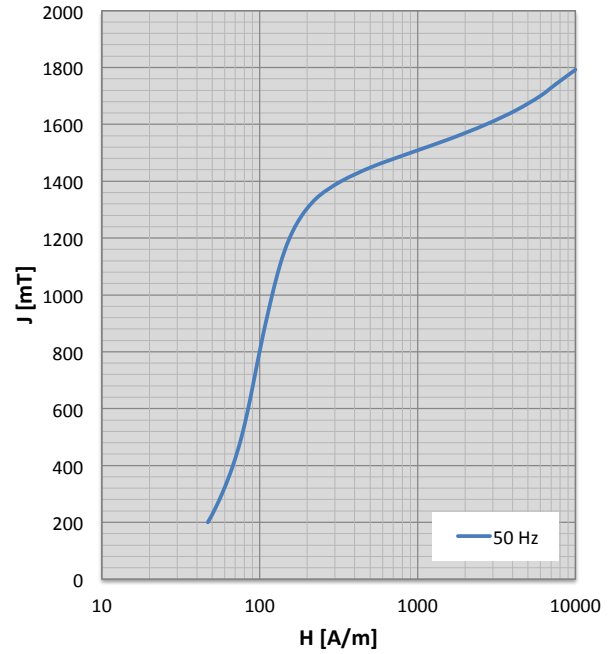
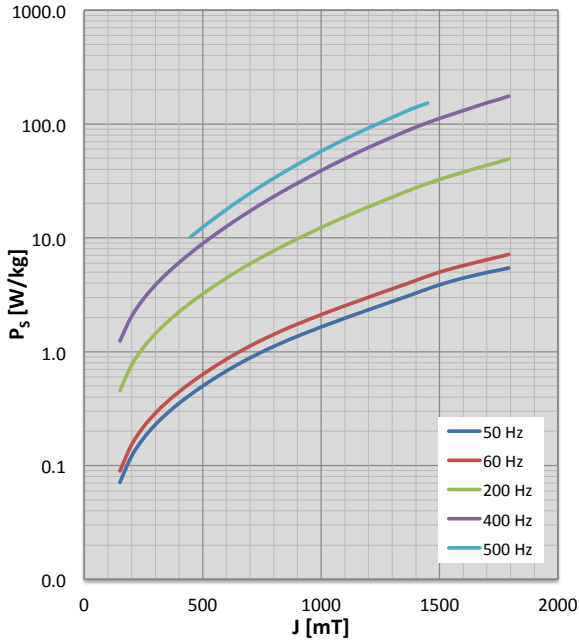
Physical properties:

Typical values

| Grade named according to isovac® | Density ρ [g/cm³] | Specific electrical resistance ρ _s [μΩcm] | Thermal conductivity λ [W/mK] |
|----------------------------------|-------------------------|--|-------------------------------------|
| isovac 530-65 A HF | 7.71 | 45.0 | 28 |

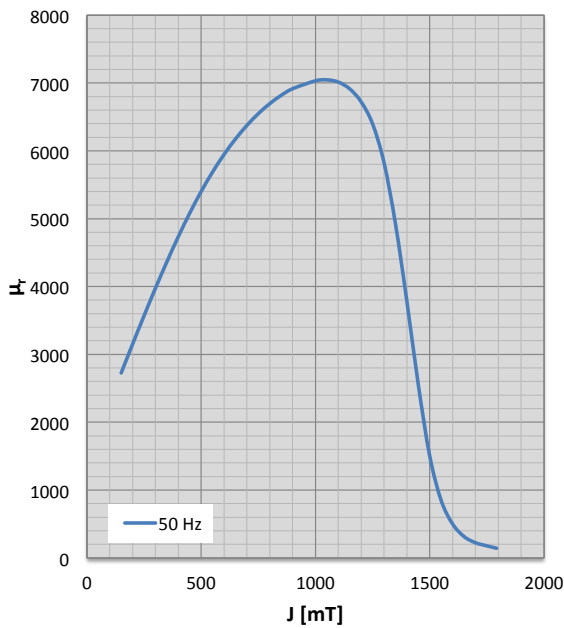
Characteristics P_s/J loss curve and characteristics J/H magnetization curve

Test direction: Mean value from longitudinal and transverse measurements at indicated frequencies, single-sheet test



Characteristics μ_r/J permeability curve

Test direction: Mean value from longitudinal and transverse measurements at 50 Hz, single-sheet test



Frequency dependence of magnetic properties

Test direction: Mean value longitudinal and transverse at indicated frequencies and polarizations, single-sheet test

| 50 Hz | | | | 60 Hz | | | | 200 Hz | | | |
|--------|---------|-----------------------|--------------------|--------|---------|-----------------------|--------------------|--------|---------|-----------------------|--------------------|
| J [mT] | H [A/m] | P _s [W/kg] | μ _r [-] | J [mT] | H [A/m] | P _s [W/kg] | μ _r [-] | J [mT] | H [A/m] | P _s [W/kg] | μ _r [-] |
| 150 | 42 | 0.07 | 2726 | 150 | 42 | 0.09 | 2703 | 150 | 46 | 0.45 | 2414 |
| 200 | 47 | 0.12 | 3152 | 200 | 47 | 0.15 | 3114 | 200 | 54 | 0.76 | 2709 |
| 250 | 52 | 0.17 | 3570 | 250 | 53 | 0.22 | 3517 | 250 | 61 | 1.09 | 2995 |
| 300 | 58 | 0.23 | 3976 | 300 | 58 | 0.29 | 3908 | 300 | 69 | 1.44 | 3268 |
| 350 | 63 | 0.29 | 4366 | 350 | 64 | 0.36 | 4282 | 350 | 76 | 1.82 | 3521 |
| 400 | 68 | 0.35 | 4736 | 400 | 69 | 0.44 | 4636 | 400 | 84 | 2.23 | 3752 |
| 450 | 72 | 0.42 | 5082 | 450 | 74 | 0.53 | 4966 | 450 | 91 | 2.70 | 3955 |
| 500 | 77 | 0.50 | 5401 | 500 | 78 | 0.63 | 5267 | 500 | 98 | 3.21 | 4125 |
| 550 | 81 | 0.58 | 5689 | 550 | 82 | 0.74 | 5536 | 550 | 105 | 3.79 | 4260 |
| 600 | 85 | 0.68 | 5947 | 600 | 86 | 0.86 | 5775 | 600 | 112 | 4.43 | 4361 |
| 650 | 88 | 0.78 | 6175 | 650 | 90 | 0.98 | 5984 | 650 | 120 | 5.14 | 4430 |
| 700 | 92 | 0.88 | 6375 | 700 | 94 | 1.12 | 6165 | 700 | 127 | 5.92 | 4471 |
| 750 | 96 | 0.99 | 6548 | 750 | 98 | 1.27 | 6321 | 750 | 136 | 6.77 | 4486 |
| 800 | 100 | 1.11 | 6696 | 800 | 103 | 1.42 | 6453 | 800 | 144 | 7.69 | 4478 |
| 850 | 104 | 1.24 | 6818 | 850 | 107 | 1.58 | 6561 | 850 | 154 | 8.70 | 4450 |
| 900 | 109 | 1.37 | 6915 | 900 | 112 | 1.75 | 6644 | 900 | 165 | 9.80 | 4405 |
| 1000 | 120 | 1.65 | 7032 | 1000 | 124 | 2.11 | 6730 | 1000 | 188 | 12.30 | 4275 |
| 1050 | 126 | 1.80 | 7046 | 1050 | 130 | 2.31 | 6725 | 1050 | 201 | 13.73 | 4196 |
| 1100 | 134 | 1.97 | 7013 | 1100 | 138 | 2.53 | 6668 | 1100 | 214 | 15.27 | 4111 |
| 1150 | 143 | 2.14 | 6912 | 1150 | 148 | 2.76 | 6548 | 1150 | 228 | 16.93 | 4026 |
| 1200 | 155 | 2.33 | 6720 | 1200 | 159 | 3.01 | 6403 | 1200 | 243 | 18.71 | 3945 |
| 1250 | 171 | 2.54 | 6394 | 1250 | 174 | 3.27 | 6231 | 1250 | 259 | 20.64 | 3868 |
| 1300 | 197 | 2.76 | 5822 | 1300 | 197 | 3.56 | 5807 | 1300 | 275 | 22.75 | 3766 |
| 1350 | 240 | 3.00 | 4921 | 1350 | 239 | 3.88 | 4938 | 1350 | 299 | 25.06 | 3577 |
| 1400 | 328 | 3.27 | 3776 | 1400 | 328 | 4.22 | 3768 | 1400 | 365 | 27.51 | 3132 |
| 1450 | 511 | 3.56 | 2546 | 1450 | 512 | 4.61 | 2530 | 1450 | 530 | 30.03 | 2334 |
| 1500 | 903 | 3.87 | 1497 | 1500 | 905 | 5.00 | 1489 | 1500 | 915 | 32.57 | 1473 |
| 1550 | 1619 | 4.15 | 845 | 1550 | 1626 | 5.36 | 841 | 1550 | 1642 | 35.11 | 859 |
| 1600 | 2718 | 4.43 | 499 | 1600 | 2728 | 5.70 | 497 | 1600 | 2759 | 37.73 | 490 |
| 1650 | 4213 | 4.70 | 315 | 1650 | 4222 | 6.06 | 313 | 1650 | 4269 | 40.51 | 293 |
| 1700 | 5994 | 4.96 | 224 | 1700 | 5997 | 6.42 | 223 | 1700 | 6059 | 43.41 | 208 |
| 1741 | 7500 | 5.15 | 185 | 1741 | 7500 | 6.74 | 185 | 1739 | 7500 | 45.78 | 185 |
| 1792 | 10000 | 5.43 | 143 | 1793 | 10000 | 7.15 | 143 | 1791 | 10000 | 49.34 | 143 |

Frequency dependence of magnetic properties

Test direction: Mean value longitudinal and transverse at indicated frequencies and polarizations, single-sheet test

| 400 Hz | | | | 500 Hz | | | |
|--------|---------|-----------------------|--------------------|--------|---------|-----------------------|--------------------|
| J [mT] | H [A/m] | P _s [W/kg] | μ _r [-] | J [mT] | H [A/m] | P _s [W/kg] | μ _r [-] |
| 100 | 45 | 0.46 | 1796 | | | | |
| 150 | 54 | 1.24 | 2026 | | | | |
| 200 | 64 | 2.05 | 2251 | | | | |
| 250 | 74 | 2.91 | 2465 | | | | |
| 300 | 84 | 3.84 | 2663 | | | | |
| 350 | 94 | 4.88 | 2840 | | | | |
| 400 | 104 | 6.06 | 2990 | 400 | 115 | 8.20 | 2806 |
| 450 | 115 | 7.38 | 3108 | 450 | 126 | 10.20 | 2865 |
| 500 | 127 | 8.89 | 3190 | 500 | 139 | 12.37 | 2904 |
| 550 | 139 | 10.61 | 3231 | 550 | 153 | 14.86 | 2908 |
| 600 | 151 | 12.55 | 3236 | 600 | 168 | 17.71 | 2881 |
| 650 | 165 | 14.75 | 3211 | 650 | 185 | 20.96 | 2829 |
| 700 | 179 | 17.21 | 3164 | 700 | 204 | 24.64 | 2760 |
| 750 | 195 | 19.96 | 3100 | 750 | 225 | 28.76 | 2680 |
| 800 | 212 | 23.03 | 3026 | 800 | 246 | 33.37 | 2597 |
| 850 | 231 | 26.44 | 2947 | 850 | 269 | 38.48 | 2516 |
| 900 | 251 | 30.20 | 2866 | 900 | 294 | 44.16 | 2436 |
| 1000 | 296 | 38.96 | 2697 | 1000 | 351 | 57.48 | 2269 |
| 1050 | 321 | 44.02 | 2611 | 1050 | 382 | 65.12 | 2189 |
| 1100 | 347 | 49.55 | 2529 | 1100 | 413 | 73.39 | 2122 |
| 1150 | 374 | 55.59 | 2451 | 1150 | 445 | 82.41 | 2056 |
| 1200 | 403 | 62.10 | 2374 | 1200 | 481 | 92.12 | 1988 |
| 1250 | 433 | 69.08 | 2294 | 1250 | 519 | 102.54 | 1919 |
| 1300 | 464 | 76.67 | 2233 | 1300 | 554 | 114.11 | 1866 |
| 1350 | 496 | 84.98 | 2193 | 1350 | 586 | 127.05 | 1831 |
| 1400 | 532 | 93.75 | 2096 | 1400 | 637 | 140.15 | 1748 |
| 1450 | 611 | 102.72 | 1861 | 1450 | 745 | 152.92 | 1560 |
| 1500 | 920 | 111.83 | 1468 | 1500 | 970 | 168.16 | 1320 |
| 1550 | 1638 | 121.13 | 951 | | | | |
| 1600 | 2781 | 131.03 | 487 | | | | |
| 1650 | 4304 | 141.85 | 238 | | | | |
| 1700 | 6091 | 153.37 | 164 | | | | |
| 1739 | 7500 | 162.25 | 185 | | | | |
| 1791 | 10000 | 175.65 | 143 | | | | |

Available Dimensions

| Grade named according to isovac® | Delivery form | Width [mm] | Length [mm] |
|----------------------------------|-------------------------|------------|-------------|
| isovac 530-65 A HF | Wide strip / Slit strip | 19 – 1590 | - |
| | Cut-to-length sheets | 300 – 1590 | 300 – 5000 |

Deliverable coating systems

| Grade named according to isovac® | Uncoated | C-3 | Backlack | C-5 | C-6 |
|----------------------------------|----------|-----|----------|-----|-----|
| isovac 530-65 A HF | ✔ | ✔ | ☰ | ✔ | ✔ |

✔ Available ☰ On request

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