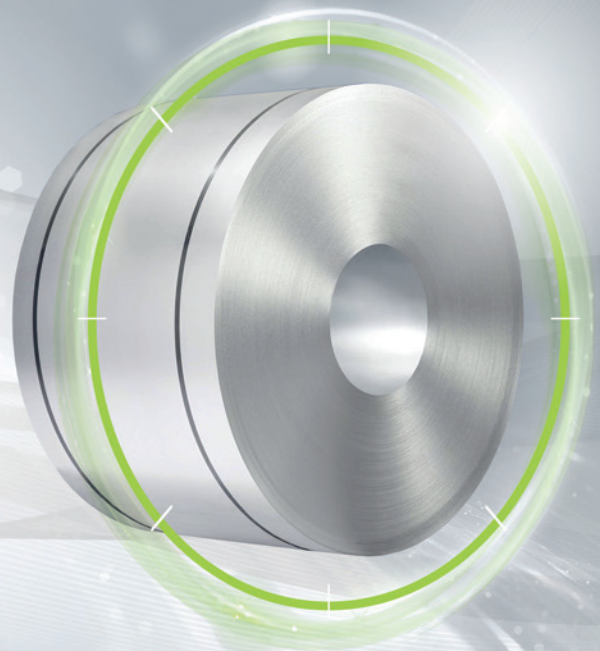


FULLY  
PROCESSED

## isovac high-perm 470-65 A

### The specialist with the highest permeability

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 optimum adjustment of texture increases magnetizability and reduces core losses of isovac HP 470-65 A. This increase in efficiency makes it possible to maintain the same level of performance while reducing component size and saving material, weight and costs. This also means that a higher level of performance can be achieved with the same component size.

Upon request, isovac HP 470-65 A can be supplied with an electrical steel insulation system and can be used directly in as-delivered condition.

#### **Convincing advantages:**

- » Increased performance achieved by increasing torque based on higher magnetizability (improvement by up to 0.05 T at J25, J50, J100)
- » Possible cost optimization through less material usage, less weight and less space requirement resulting from downsizing while maintaining the same level of performance
- » 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 HP 470-65 A, 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 HP 470-65 A	1.0823	M470-65A	M470-65A 5	65A470	-	64F275	M-43	65C470	65W470

**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 $R_{eH}$ [MPa]	0.2 %-Yield strength $R_{p0.2}$ [MPa]	Tensile strength $R_m$ [MPa]	Elongation $A_{80}$ [%]	Hardness HV5 [-]
isovac HP 470-65 A	300	280	445	35	155

**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 $\mu_r$
	50 Hz [W/kg]	60 Hz [W/lb]	50 Hz [W/kg]	60 Hz [W/lb]	[T]	[T]	[T]	[-]
isovac HP 470-65 A	1.70	1.00	3.80	2.24	1.68	1.76	1.86	4300

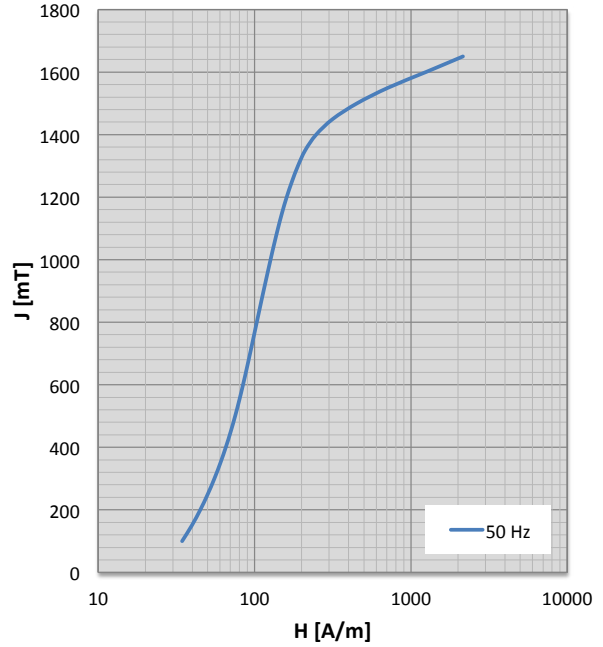
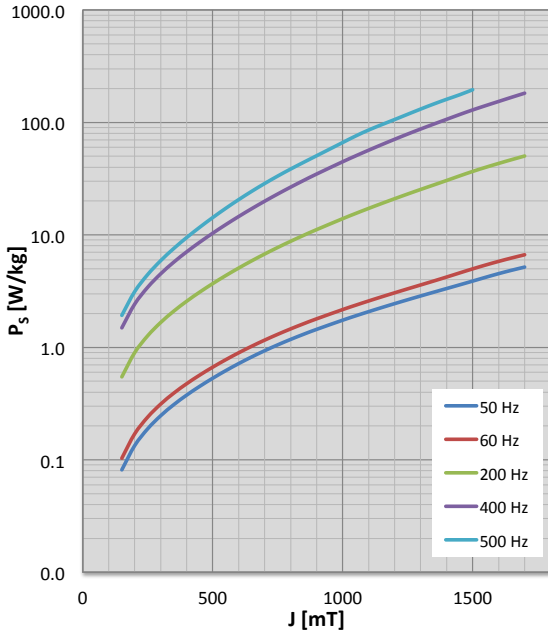
**Physical properties:**

Typical values

Grade named according to isovac®	Density $\rho$ [g/cm <sup>3</sup> ]	Specific electrical resistance $\rho_s$ [ $\mu\Omega\text{cm}$ ]	Thermal conductivity $\lambda$ [W/mK]
isovac HP 470-65 A	7.76	35.8	33

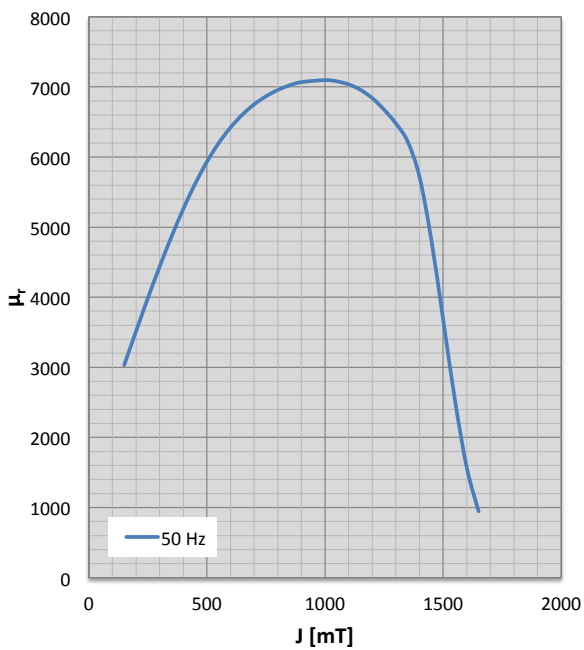
**Characteristics  $P_s/J$  loss curve and characteristics  $J/H$  magnetization curve**

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



**Characteristics  $\mu_r/J$  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 <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]	J [mT]	H [A/m]	P <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]	J [mT]	H [A/m]	P <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]
100	34	0.03	2546	100	37	0.04	2471				
150	40	0.08	3034	150	43	0.10	2931	150	51	0.55	2403
200	45	0.13	3516	200	49	0.17	3385	200	59	0.90	2689
250	50	0.19	3986	250	54	0.24	3830	250	68	1.27	2964
300	55	0.25	4437	300	60	0.31	4260	300	76	1.67	3222
350	60	0.31	4864	350	65	0.39	4671	350	85	2.10	3458
400	65	0.38	5259	400	70	0.48	5057	400	94	2.57	3666
450	70	0.45	5617	450	75	0.57	5414	450	102	3.10	3840
500	75	0.53	5932	500	80	0.67	5737	500	111	3.69	3975
550	80	0.62	6199	550	84	0.78	6022	550	119	4.34	4067
600	84	0.72	6421	600	89	0.89	6269	600	128	5.07	4120
650	89	0.82	6604	650	93	1.02	6479	650	137	5.88	4141
700	94	0.93	6750	700	97	1.16	6654	700	146	6.76	4135
750	98	1.05	6866	750	101	1.31	6795	750	155	7.73	4110
800	103	1.18	6955	800	106	1.46	6903	800	166	8.78	4070
850	109	1.31	7022	850	110	1.62	6980	850	176	9.92	4022
900	114	1.45	7068	900	115	1.79	7028	900	188	11.15	3966
1000	126	1.74	7097	1000	127	2.17	7053	1000	214	13.94	3834
1050	133	1.91	7080	1050	133	2.37	7034	1050	228	15.51	3759
1100	141	2.08	7035	1100	140	2.59	6994	1100	242	17.20	3685
1150	150	2.26	6958	1150	147	2.81	6926	1150	257	19.02	3615
1200	160	2.45	6839	1200	156	3.06	6820	1200	273	20.98	3539
1250	173	2.65	6675	1250	168	3.31	6665	1250	291	23.10	3454
1300	189	2.87	6477	1300	182	3.59	6449	1300	307	25.36	3392
1350	211	3.09	6219	1350	203	3.89	6156	1350	319	27.79	3363
1400	248	3.34	5714	1400	237	4.22	5761	1400	346	30.47	3238
1450	316	3.60	4817	1450	299	4.59	5202	1450	409	33.48	2907
1500	452	3.88	3684	1500	431	4.99	4286	1500	531	36.67	2466
1550	715	4.20	2532	1550	702	5.40	2930	1550	765	39.90	2035
1600	1247	4.52	1570	1600	1254	5.82	1618	1600	1277	43.21	1618
1650	2152	4.85	946	1650	2197	6.24	825	1650	2205	46.69	1195
1700	3337	5.17	580	1700	3433	6.66	471	1700	3449	50.28	766

**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 <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]	J [mT]	H [A/m]	P <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]
100	50	0.58	1724				
150	61	1.49	1930	150	62	1.93	1835
200	72	2.43	2131	200	74	3.13	2005
250	84	3.42	2321	250	87	4.44	2164
300	96	4.51	2495	300	100	5.90	2307
350	108	5.72	2647	350	113	7.56	2430
400	120	7.07	2773	400	128	9.47	2527
450	133	8.61	2866	450	143	11.69	2593
500	146	10.35	2921	500	159	14.25	2623
550	161	12.33	2936	550	177	17.21	2613
600	175	14.57	2916	600	196	20.59	2571
650	191	17.10	2869	650	217	24.40	2505
700	208	19.93	2803	700	239	28.64	2425
750	227	23.09	2725	750	262	33.35	2337
800	247	26.61	2644	800	287	38.52	2253
850	268	30.50	2567	850	313	44.21	2177
900	291	34.79	2493	900	342	50.59	2108
1000	342	44.72	2351	1000	408	66.26	1964
1050	369	50.42	2281	1050	446	75.76	1883
1100	398	56.65	2212	1100	484	85.63	1814
1150	429	63.45	2144	1150	519	95.50	1766
1200	461	70.84	2081	1200	556	106.13	1723
1250	493	78.83	2022	1250	597	118.17	1670
1300	529	87.41	1960	1300	641	131.49	1616
1350	571	96.59	1895	1350	685	145.77	1570
1400	603	106.60	1850	1400	731	160.61	1527
1450	620	117.58	1833	1450	779	176.21	1483
1500	687	129.17	1739	1500	833	195.33	1435
1550	898	141.08	1485				
1600	1403	153.70	1155				
1650	2311	167.42	851				
1700	3523	181.98	579				

### Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac HP 470-65 A	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 HP 470-65 A	✔	✔	☰	✔	✔

✔ Available ☰ On request

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