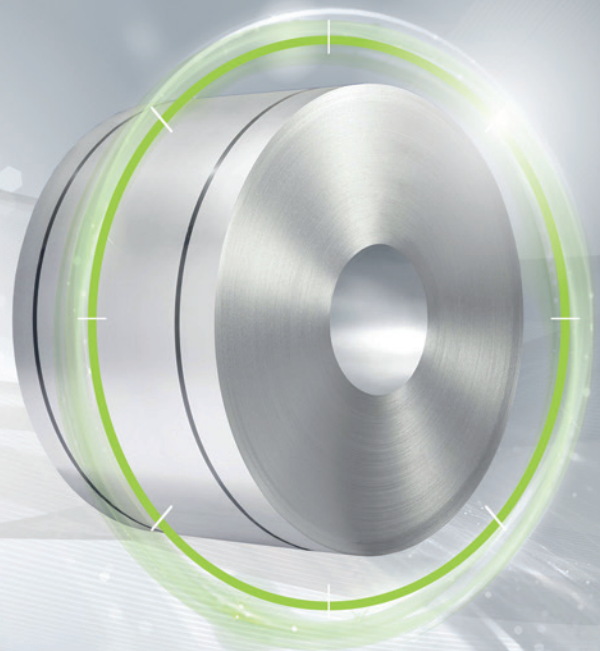


FULLY  
PROCESSED

## isovac 330-35 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 330-35 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 330-35 A HF is additionally characterized by slightly higher strengths. Upon request, isovac 330-35 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 330-35 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 330-35 A HF	1.0804	M330-35A	M330-35A 5	35A330	-	36F185	M-36	35C330	35W330

**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 <sub>eH</sub> [MPa]	R <sub>p0.2</sub> [MPa]	R <sub>m</sub> [MPa]	A <sub>80</sub> [%]	HV5 [-]
isovac 330-35 A HF	400	370	520	30	165

**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 <sub>r</sub>
	50 Hz [W/kg]	60 Hz [W/lb]	50 Hz [W/kg]	60 Hz [W/lb]	[T]	[T]	[T]	[-]
isovac 330-35 A HF	1.20	0.67	2.80	1.57	1.56	1.65	1.77	1000

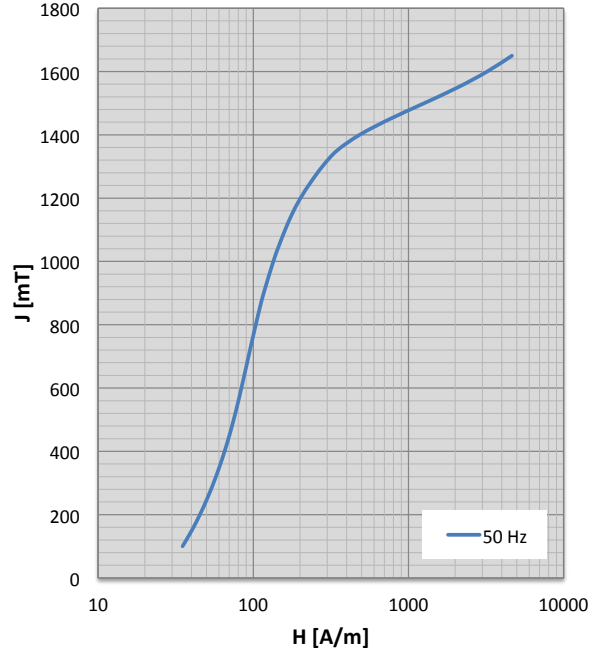
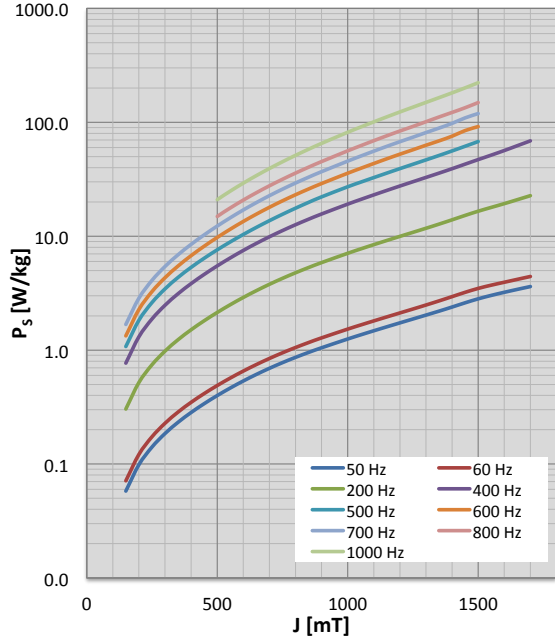
**Physical properties:**

Typical values

Grade named according to isovac®	Density	Specific electrical resistance	Thermal conductivity
	ρ [g/cm³]	ρ <sub>s</sub> [μΩcm]	λ [W/mK]
isovac 330-35 A HF	7.68	52.0	25

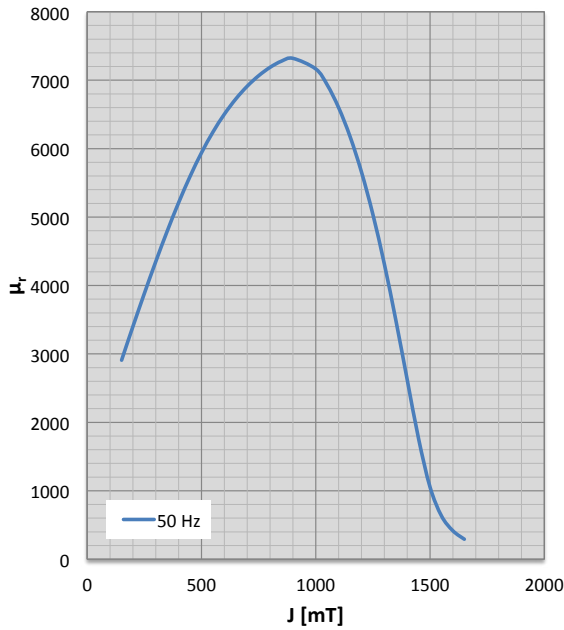
**Characteristics  $P_s/J$  loss curve and characteristics  $J/H$  magnetization curve**

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	35	0.02	2410					100	38	0.09	2294
150	40	0.06	2909	150	43	0.07	2803	150	44	0.30	2711
200	45	0.10	3403	200	48	0.12	3290	200	50	0.52	3125
250	50	0.14	3886	250	53	0.17	3770	250	56	0.74	3531
300	55	0.19	4352	300	58	0.23	4239	300	62	0.98	3925
350	60	0.23	4796	350	63	0.29	4693	350	67	1.23	4305
400	65	0.28	5212	400	68	0.35	5129	400	73	1.51	4665
450	70	0.34	5596	450	73	0.42	5542	450	78	1.81	5002
500	75	0.40	5941	500	77	0.49	5930	500	83	2.14	5312
550	79	0.46	6243	550	82	0.57	6288	550	88	2.50	5593
600	84	0.54	6504	600	86	0.65	6615	600	92	2.90	5843
650	88	0.61	6726	650	90	0.75	6911	650	97	3.33	6065
700	93	0.69	6913	700	94	0.84	7174	700	101	3.78	6258
750	98	0.78	7066	750	98	0.95	7402	750	106	4.27	6422
800	104	0.86	7189	800	103	1.05	7596	800	111	4.77	6560
850	110	0.95	7279	850	108	1.17	7750	850	117	5.31	6670
900	117	1.05	7320	900	114	1.28	7849	900	123	5.87	6752
1000	135	1.25	7164	1000	130	1.53	7811	1000	138	7.08	6817
1050	146	1.36	6932	1050	139	1.66	7637	1050	147	7.74	6797
1100	160	1.48	6599	1100	151	1.81	7340	1100	157	8.43	6744
1150	178	1.60	6176	1150	166	1.96	6911	1150	169	9.18	6634
1200	201	1.73	5658	1200	187	2.12	6342	1200	187	9.97	6321
1250	234	1.88	5037	1250	217	2.30	5631	1250	216	10.82	5686
1300	279	2.03	4314	1300	259	2.49	4781	1300	257	11.74	4811
1350	346	2.20	3498	1350	323	2.70	3811	1350	322	12.77	3820
1400	484	2.39	2624	1400	464	2.95	2789	1400	464	13.93	2791
1450	759	2.60	1758	1450	755	3.22	1812	1450	755	15.23	1811
1500	1264	2.82	1053	1500	1287	3.48	1044	1500	1290	16.58	1042
1550	2082	3.02	632	1550	2147	3.72	607	1550	2155	17.90	605
1600	3218	3.22	415	1600	3357	3.94	398	1600	3370	19.32	397
1650	4647	3.41	292	1650	4904	4.18	282	1650	4921	20.93	281
1700	6279	3.61	221	1700	6689	4.43	211	1700	6710	22.70	211

**Frequency dependence of magnetic properties**

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

400 Hz				500 Hz				600 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	39	0.34	2150				
150	45	0.77	2554	150	47	1.07	2457	150	46	1.33	2546
200	53	1.31	2893	200	55	1.83	2761	200	54	2.27	2830
250	60	1.87	3224	250	63	2.61	3059	250	62	3.26	3105
300	67	2.48	3545	300	70	3.45	3347	300	70	4.32	3370
350	73	3.13	3852	350	78	4.35	3622	350	78	5.48	3618
400	80	3.84	4140	400	85	5.33	3881	400	85	6.75	3848
450	86	4.62	4408	450	92	6.40	4120	450	93	8.17	4054
500	92	5.49	4650	500	98	7.59	4337	500	100	9.75	4233
550	97	6.45	4865	550	104	8.91	4528	550	107	11.52	4382
600	103	7.50	5051	600	110	10.36	4691	600	113	13.48	4502
650	108	8.65	5208	650	116	11.95	4826	650	120	15.62	4594
700	113	9.88	5335	700	122	13.69	4929	700	127	17.94	4660
750	119	11.20	5433	750	128	15.57	5000	750	134	20.44	4702
800	125	12.61	5501	800	135	17.62	5037	800	142	23.12	4721
850	132	14.10	5539	850	143	19.82	5040	850	150	25.97	4719
900	139	15.67	5549	900	151	22.16	5019	900	159	29.01	4699
1000	156	19.13	5493	1000	169	27.17	4945	1000	178	35.73	4619
1050	166	21.03	5427	1050	180	29.84	4901	1050	189	39.46	4562
1100	177	23.06	5317	1100	191	32.71	4824	1100	201	43.49	4482
1150	191	25.24	5156	1150	204	35.83	4695	1150	215	47.85	4366
1200	209	27.58	5001	1200	222	39.21	4542	1200	234	52.50	4209
1250	231	30.09	4863	1250	247	42.84	4370	1250	257	57.42	4005
1300	264	32.82	4521	1300	278	46.79	4084	1300	291	62.92	3757
1350	322	35.80	3778	1350	327	51.16	3583	1350	336	68.71	3416
1400	462	39.15	2796	1400	458	56.07	2834	1400	461	75.54	2797
1450	756	42.93	1812	1450	751	61.64	1886	1450	774	84.63	1839
1500	1296	47.07	1033	1500	1290	67.79	1045	1500	1293	91.71	1038
1550	2166	51.51	597	1550	2151	74.54	588				
1600	3387	56.53	394	1600	3361	82.31	400				
1650	4945	62.34	281	1650	4917	91.49	295				
1700	6742	68.75	211	1700	6720	101.73	222				
				1750	8647	112.52	164				



### Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac 330-35 A HF	Wide strip / Slit strip	19 – 1420	-
	Cut-to-length sheets	300 – 1420	300 – 5000

### Deliverable coating systems

Grade named according to isovac®	Uncoated	C-3	Backlack	C-5	C-6
isovac 330-35 A HF	✔	✔	☰	✔	✔

✔ Available ☰ On request

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