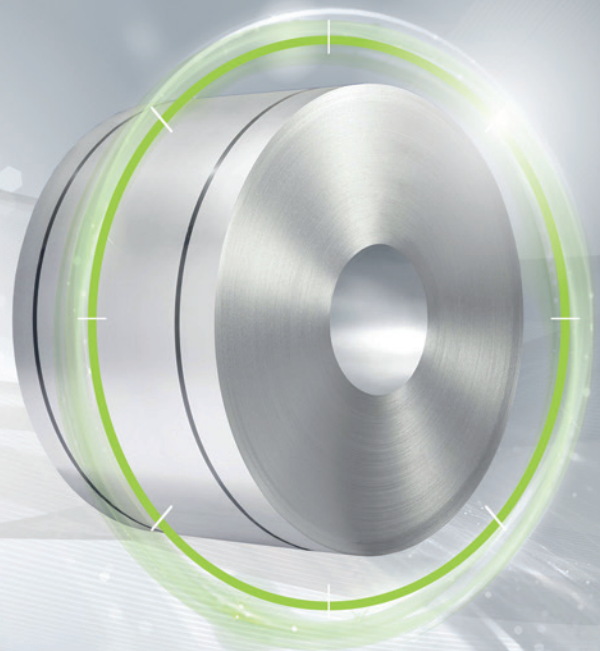


FULLY  
PROCESSED

## isovac high-perm 235-35 A HC

### The specialist for high permeability with high thermal conductivity

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. Its high thermal conductivity and optimized texture make isovac HP 235-35 A HC (high-perm/high-conductivity) ensure rapid heat dissipation in combination with increased magnetizability and low specific total loss. This makes innovative design strategies possible for electrical machinery.

Upon request, isovac HP 235-35 A HC can be supplied with an electrical steel insulation system and can be used directly in as-delivered condition.

#### Convincing advantages:

- » Lower cooling power necessary through higher thermal conductivity than that of standard isovac® grades (conductivity increased by up to 20%)
- » Increased performance achieved by increasing torque based on higher magnetizability (improvement by up to 0.05 T at J25, J50, J100)
- » 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 235-35 A HC, 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 235-35 A HC	1.0890	M235-35A	M235-35A 5	35A230	-	-	-	-	35W230

**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 235-35 A HC	350	340	460	18	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 1.5 T $\mu_r$ [-]
	1.0 T P10		1.5 T P15		2500 A/m J25	5000 A/m J50	10000 A/m J100	
	50 Hz [W/kg]	60 Hz [W/lb]	50 Hz [W/kg]	60 Hz [W/lb]	[T]	[T]	[T]	
isovac HP 235-35 A HC	0.80	0.45	2.00	1.12	1.60	1.69	1.81	1700

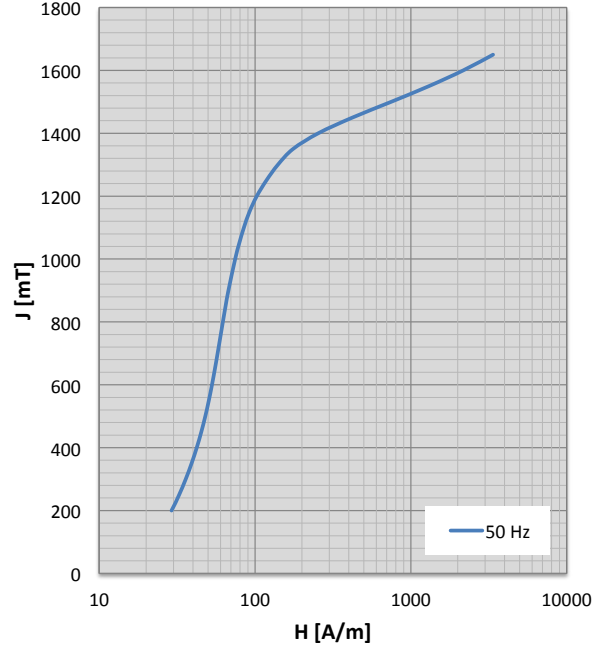
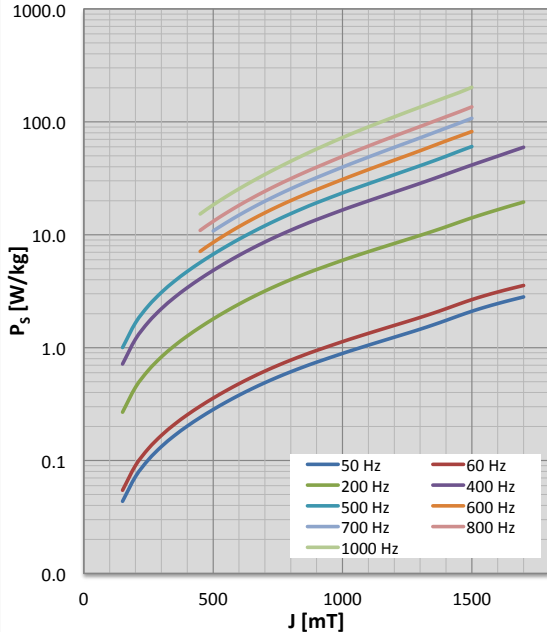
**Physical properties:**

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 235-35 A HC	7.68	52.0	25

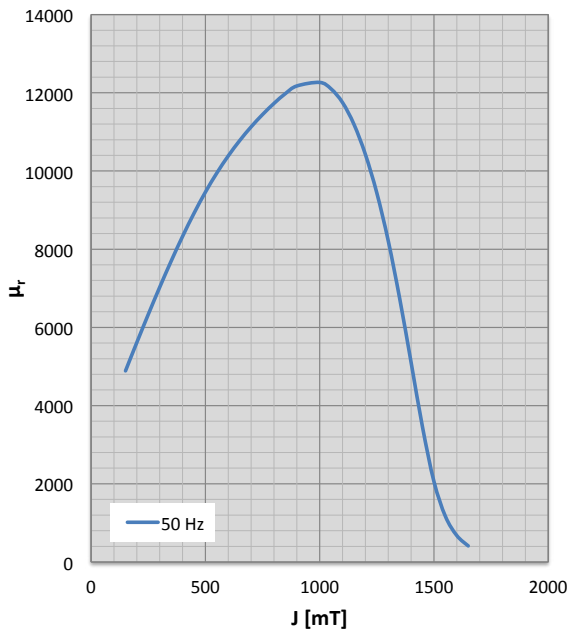
**Characteristics  $P_s/J$  loss curve and characteristics  $J/H$  magnetization curve**

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> [-]
150	26	0.04	4889	150	26	0.05	4822	150	29	0.27	4107
200	29	0.07	5618	200	30	0.09	5517	200	34	0.45	4550
250	33	0.10	6334	250	33	0.13	6198	250	39	0.63	4983
300	36	0.13	7029	300	37	0.17	6860	300	44	0.83	5405
350	39	0.17	7696	350	40	0.21	7495	350	49	1.04	5809
400	42	0.20	8329	400	43	0.25	8096	400	54	1.27	6192
450	45	0.24	8919	450	46	0.30	8658	450	58	1.52	6550
500	48	0.28	9461	500	49	0.36	9173	500	62	1.79	6878
550	50	0.33	9950	550	52	0.42	9637	550	66	2.10	7174
600	53	0.38	10387	600	54	0.48	10053	600	69	2.43	7438
650	55	0.43	10779	650	57	0.55	10426	650	72	2.79	7673
700	57	0.49	11130	700	59	0.62	10761	700	76	3.17	7880
750	60	0.55	11445	750	61	0.70	11065	750	79	3.58	8062
800	62	0.61	11729	800	64	0.78	11341	800	82	4.00	8221
850	65	0.68	11981	850	66	0.86	11590	850	86	4.45	8359
900	67	0.74	12175	900	69	0.94	11793	900	90	4.92	8474
1000	75	0.89	12265	1000	76	1.13	11965	1000	98	5.94	8636
1050	79	0.97	12099	1050	80	1.23	11878	1050	102	6.49	8676
1100	85	1.05	11750	1100	86	1.34	11608	1100	107	7.08	8662
1150	92	1.14	11193	1150	93	1.45	11104	1150	113	7.70	8576
1200	103	1.24	10423	1200	103	1.57	10371	1200	121	8.36	8457
1250	118	1.34	9438	1250	118	1.70	9416	1250	131	9.08	8282
1300	140	1.46	8212	1300	140	1.85	8209	1300	148	9.87	7746
1350	175	1.59	6740	1350	175	2.02	6738	1350	180	10.75	6591
1400	254	1.74	5103	1400	255	2.21	5099	1400	258	11.75	5033
1450	422	1.92	3447	1450	422	2.43	3445	1450	427	12.89	3402
1500	747	2.10	2057	1500	748	2.66	2059	1500	757	14.12	2027
1550	1307	2.28	1168	1550	1310	2.89	1170	1550	1326	15.36	1148
1600	2170	2.46	676	1600	2174	3.11	676	1600	2200	16.66	664
1650	3371	2.63	411	1650	3376	3.33	410	1650	3411	18.04	405
1700	4820	2.81	285	1700	4823	3.55	284	1700	4866	19.47	282

**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	27	0.25	3193	100	29	0.35	2991				
150	34	0.72	3520	150	36	1.00	3284				
200	40	1.19	3843	200	43	1.66	3574				
250	46	1.69	4160	250	50	2.35	3858				
300	53	2.21	4468	300	57	3.08	4132				
350	59	2.78	4762	350	63	3.87	4395				
400	64	3.39	5040	400	70	4.73	4643	400	73	5.77	4539
450	70	4.07	5299	450	76	5.67	4872	450	78	7.11	4730
500	75	4.83	5535	500	82	6.71	5081	500	84	8.54	4904
550	80	5.66	5745	550	87	7.86	5265	550	90	10.09	5044
600	85	6.57	5930	600	92	9.13	5425	600	96	11.80	5151
650	89	7.56	6090	650	98	10.51	5560	650	102	13.65	5231
700	94	8.62	6225	700	103	12.01	5668	700	108	15.64	5286
750	98	9.76	6336	750	108	13.63	5749	750	115	17.78	5321
800	103	10.97	6423	800	114	15.36	5803	800	122	20.05	5340
850	108	12.25	6485	850	120	17.21	5831	850	129	22.47	5346
900	114	13.60	6525	900	126	19.18	5838	900	136	25.06	5340
1000	125	16.57	6535	1000	140	23.46	5826	1000	152	30.88	5290
1050	132	18.20	6508	1050	147	25.77	5815	1050	161	34.17	5246
1100	138	19.94	6469	1100	154	28.26	5781	1100	170	37.74	5194
1150	145	21.81	6423	1150	162	30.99	5709	1150	180	41.60	5136
1200	153	23.84	6355	1200	172	33.99	5628	1200	190	45.78	5076
1250	163	26.05	6235	1250	182	37.26	5548	1250	201	50.35	5001
1300	176	28.50	5998	1300	194	40.87	5374	1300	215	55.47	4844
1350	200	31.25	5550	1350	216	44.89	4993	1350	237	61.28	4521
1400	268	34.33	4706	1400	283	49.50	4257	1400	298	67.66	3949
1450	427	37.75	3393	1450	443	54.80	3113	1450	442	74.49	3091
1500	750	41.45	2062	1500	766	60.43	1954	1500	749	82.05	2055
1550	1312	45.37	1172	1550	1326	66.19	1151	1550	1354	90.72	1148
1600	2181	49.66	673	1600	2190	72.46	670	1600	2303	100.55	602
1650	3389	54.41	405	1650	3392	79.61	406	1650	3509	111.26	328
1700	4842	59.51	281	1700	4839	87.45	281	1700	4886	122.55	235
				1750	6410	95.63	227				



### Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac HP 235-35 A HC	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 HP 235-35 A HC	✔	✔	☰	✔	✔

✔ Available ☰ On request

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