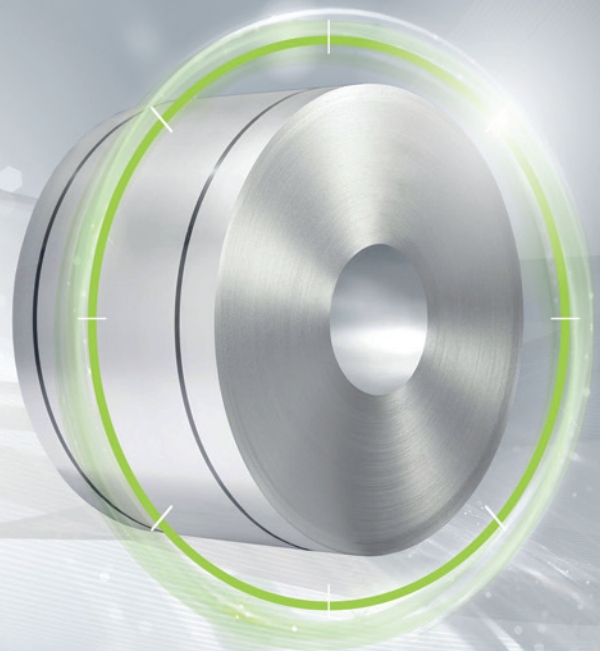


FULLY
PROCESSED

isovac 400-50 A HC

The specialist 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.

The high thermal conductivity of isovac 400-50 A HC (high conductivity) ensures rapid heat dissipation in combination with higher polarization while maintaining low specific total losses. This makes innovative design strategies possible for electrical machinery.

Upon request, isovac 400-50 A HC can be supplied with an electrical steel insulation system and can be used directly in as-delivered condition.

Convincing advantages:

- » Potential cost savings in electric machinery based on lower component sizes and thus lower material usage based on higher polarization than that in standard isovac® grades
- » Lower cooling power necessary through higher thermal conductivity than that of standard isovac® grades (conductivity increased by up to 20%)
- » 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 400-50 A HC, an electrical steel of the highest quality. We offer you a customer-focused over-all 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 400-50 A HC	1.0811	M400-50A	M400-50A 5	50A400	2216	47F240	M-43	50C400	50W400

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 400-50 A HC	310	290	450	33	150

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 μ _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 400-50 A HC	1,45	0,83	3,35	1,91	1,61	1,70	1,82	2000

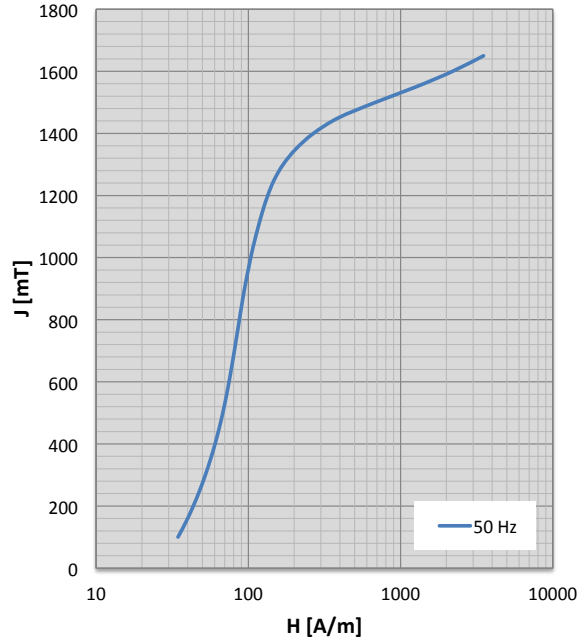
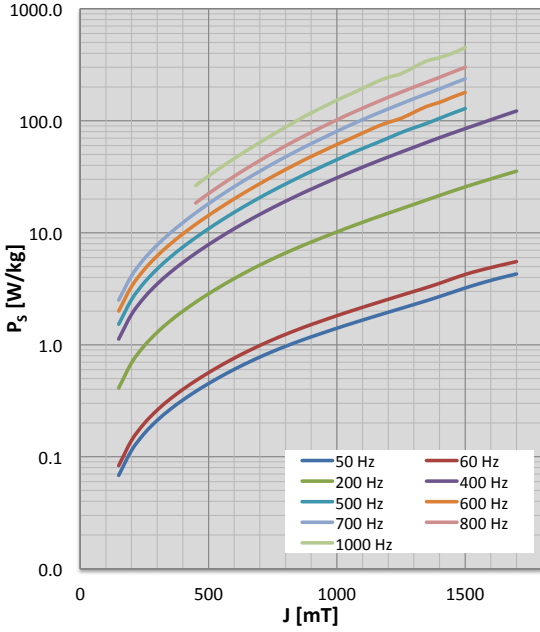
Physical properties:

Typical values

Grade named according to isovac®	Density ρ [g/cm³]	Specific electrical resistance ρ _s [μΩcm]	Thermal conductivity λ [W/mK]
isovac 400-50 A HC	7,76	35,8	33

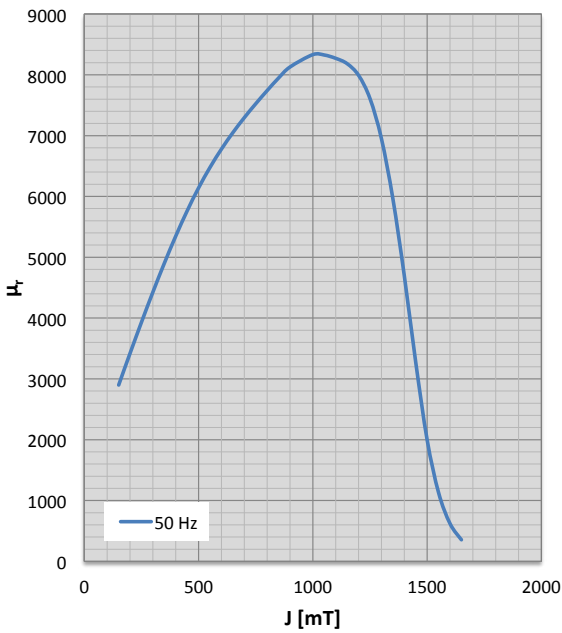
Characteristics P_s/J loss curve and characteristics J/H magnetization curve

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



Characteristics 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 [-]
100	35	0.02	2372	100	35	0.03	2395	100	37	0.14	2247
150	39	0.07	2900	150	40	0.08	2880	150	44	0.41	2589
200	43	0.11	3421	200	45	0.14	3362	200	50	0.69	2928
250	48	0.16	3933	250	50	0.20	3834	250	57	0.98	3258
300	52	0.21	4428	300	54	0.26	4294	300	64	1.29	3577
350	56	0.26	4902	350	59	0.33	4738	350	70	1.63	3879
400	60	0.32	5349	400	63	0.40	5160	400	77	1.99	4162
450	64	0.38	5764	450	67	0.48	5557	450	83	2.40	4420
500	68	0.45	6142	500	71	0.56	5925	500	88	2.85	4651
550	71	0.52	6479	550	75	0.66	6261	550	94	3.35	4850
600	75	0.60	6779	600	78	0.76	6564	600	99	3.90	5018
650	78	0.69	7049	650	81	0.87	6838	650	105	4.50	5156
700	81	0.78	7296	700	84	0.99	7083	700	110	5.15	5264
750	84	0.87	7524	750	88	1.11	7301	750	116	5.85	5343
800	87	0.97	7741	800	91	1.24	7495	800	122	6.60	5395
850	91	1.07	7948	850	95	1.37	7663	850	129	7.40	5421
900	94	1.18	8128	900	99	1.51	7805	900	136	8.26	5423
1000	104	1.40	8332	1000	109	1.82	7990	1000	152	10.17	5370
1050	109	1.53	8325	1050	114	1.98	8027	1050	160	11.24	5324
1100	116	1.66	8271	1100	121	2.16	8030	1100	169	12.39	5273
1150	124	1.80	8183	1150	128	2.35	7987	1150	178	13.62	5220
1200	134	1.95	7991	1200	138	2.55	7819	1200	188	14.94	5139
1250	148	2.11	7608	1250	152	2.76	7436	1250	200	16.36	5008
1300	169	2.29	6950	1300	174	2.99	6782	1300	217	17.91	4832
1350	205	2.48	5964	1350	210	3.24	5823	1350	243	19.63	4580
1400	268	2.69	4698	1400	273	3.54	4598	1400	294	21.51	4034
1450	390	2.94	3275	1450	398	3.88	3213	1450	408	23.54	3050
1500	684	3.21	1998	1500	696	4.24	1962	1500	698	25.67	1960
1550	1265	3.48	1131	1550	1285	4.57	1111	1550	1286	27.89	1132
1600	2200	3.76	622	1600	2237	4.89	612	1600	2256	30.24	606
1650	3509	4.02	355	1650	3578	5.20	350	1650	3650	32.77	328
1700	5087	4.29	244	1700	5199	5.53	239	1700	5349	35.43	221

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 _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 [-]
100	42	0.40	1962	100	42	0.54	1920	100	45	0.73	1817
150	50	1.12	2219	150	52	1.52	2149	150	55	2.00	2028
200	59	1.87	2472	200	61	2.53	2374	200	65	3.31	2234
250	68	2.65	2715	250	71	3.60	2588	250	75	4.71	2430
300	77	3.49	2945	300	81	4.75	2789	300	86	6.22	2611
350	86	4.41	3156	350	90	6.03	2970	350	97	7.89	2773
400	95	5.43	3345	400	100	7.45	3128	400	108	9.77	2911
450	104	6.56	3505	450	111	9.05	3257	450	119	11.89	3019
500	113	7.83	3634	500	121	10.86	3352	500	131	14.28	3093
550	122	9.26	3728	550	132	12.91	3411	550	143	17.00	3131
600	131	10.86	3788	600	143	15.20	3437	600	156	20.07	3135
650	140	12.63	3819	650	154	17.77	3435	650	170	23.54	3112
700	150	14.59	3824	700	167	20.62	3410	700	185	27.44	3067
750	161	16.74	3808	750	180	23.77	3366	750	201	31.79	3007
800	172	19.11	3772	800	195	27.24	3309	800	219	36.65	2937
850	185	21.69	3722	850	210	31.04	3244	850	238	42.04	2863
900	199	24.50	3660	900	227	35.23	3172	900	259	47.95	2786
1000	229	30.92	3514	1000	265	44.91	3016	1000	303	61.34	2634
1050	245	34.56	3435	1050	286	50.47	2935	1050	327	68.89	2560
1100	263	38.52	3357	1100	308	56.43	2856	1100	354	77.54	2482
1150	281	42.81	3280	1150	330	62.80	2782	1150	383	87.39	2397
1200	300	47.44	3198	1200	355	70.07	2700	1200	409	96.68	2337
1250	320	52.45	3107	1250	382	78.42	2607	1250	430	104.97	2309
1300	342	57.94	3036	1300	408	86.35	2540	1300	469	118.87	2206
1350	365	64.00	2989	1350	429	94.62	2503	1350	513	134.24	2102
1400	390	70.55	2860	1400	465	105.02	2396	1400	540	145.78	2065
1450	449	77.54	2531	1450	546	116.44	2144	1450	598	162.26	1904
1500	697	85.03	1978	1500	734	128.36	1774	1500	771	178.72	1620
1550	1293	93.13	1250								
1600	2278	101.99	601								
1650	3640	111.74	259								
1700	5270	122.12	169								

Frequency dependence of magnetic properties

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

700 Hz				800 Hz				1000 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	58	2.50	1915								
200	69	4.13	2101								
250	80	5.87	2278								
300	91	7.77	2440								
350	103	9.90	2584								
400	115	12.30	2703	400	126	14.76	2569	400	142	21.03	2269
450	128	15.04	2794	450	139	18.42	2619	450	158	26.36	2289
500	142	18.16	2851	500	152	22.36	2653	500	175	32.09	2297
550	156	21.73	2871	550	167	26.82	2658	550	194	38.55	2284
600	171	25.77	2860	600	184	31.91	2635	600	214	45.94	2251
650	187	30.34	2823	650	203	37.68	2590	650	237	54.39	2202
700	205	35.47	2767	700	223	44.18	2530	700	262	64.07	2141
750	224	41.21	2698	750	245	51.48	2459	750	289	75.11	2072
800	244	47.58	2624	800	269	59.63	2384	800	320	87.66	1999
850	267	54.64	2548	850	294	68.69	2308	850	353	101.83	1925
900	291	62.44	2472	900	322	78.70	2235	900	388	117.47	1854
1000	343	80.51	2325	1000	381	101.79	2095	1000	462	152.46	1727
1050	372	90.89	2253	1050	413	114.97	2029	1050	499	171.82	1674
1100	402	102.16	2184	1100	446	129.33	1966	1100	542	194.28	1618
1150	433	114.32	2119	1150	481	144.93	1904	1150	591	220.33	1554
1200	465	127.46	2056	1200	518	161.76	1846	1200	631	243.70	1515
1250	499	141.72	1994	1250	556	179.89	1792	1250	656	262.75	1509
1300	536	157.28	1933	1300	596	199.62	1737	1300	723	300.46	1431
1350	576	174.00	1875	1350	642	220.77	1681	1350	804	341.41	1341
1400	614	192.50	1815	1400	682	244.03	1634	1400	824	366.19	1352
1450	655	213.81	1722	1450	716	270.94	1582	1450	826	399.76	1368
1500	812	236.43	1503	1500	857	300.19	1408	1500	967	450.65	1236

Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac 400-50 A HC	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 400-50 A HC	✔	✔	☰	✔	✔

✔ Available ☰ On request

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