isovac®

isovac high-perm 400-50 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 400-50 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 400-50 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 400-50 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	JIS	GOST	ASTM	AISI	IS648	GB/T2521.1
	Material No.	Abbreviation	60404-8-4	C2552	21427.2	A677			
isovac HP 400-50 A	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 HP 400-50 A	290	275	440	34	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

	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
Grade named according to isovac®	50 Hz [W/kg]	60 Hz [W/lb]	50 Hz [W/kg]	60 Hz [W/lb]	[T]	[T]	[T]	[-]
isovac HP 400-50 A	1.40	0.80	3.25	1.85	1.68	1.76	1.87	4400

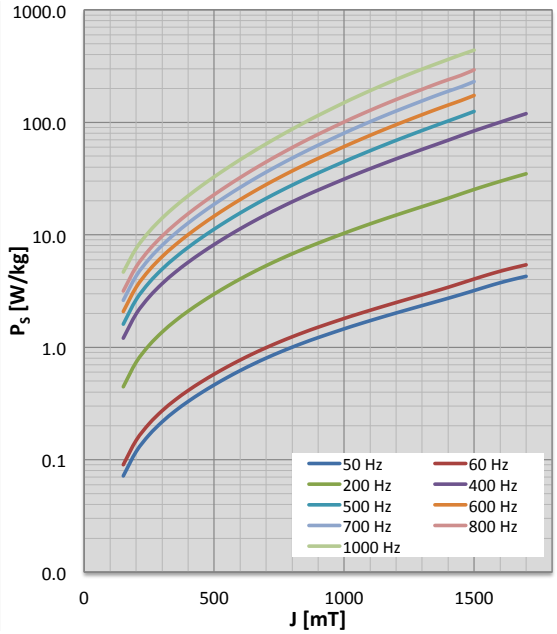
Physical properties:

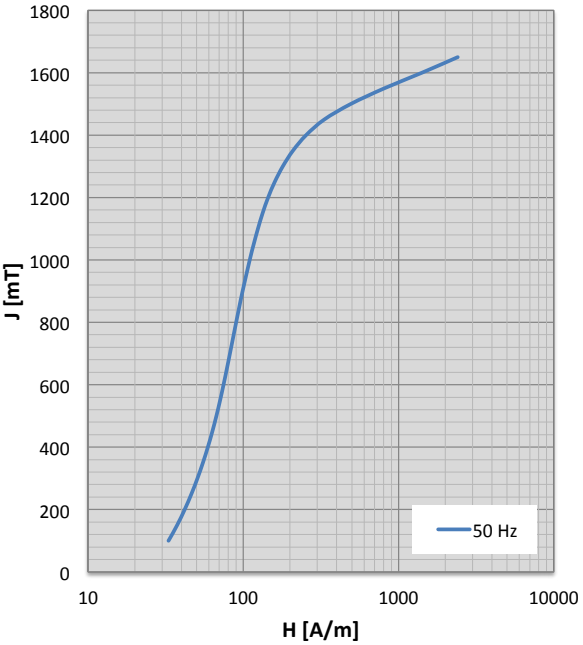
Typical values

Grade named according to isovac®	Density ρ [g/cm³]	Specific electrical resistance ρ_s [µΩcm]	Thermal conductivity λ [W/mK]
isovac HP 400-50 A	7.76	35.8	33

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

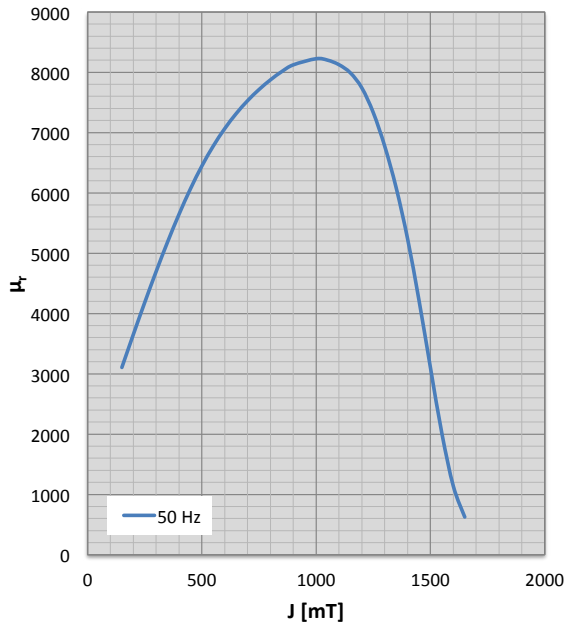
Test direction: Mean value from longitudinal and transverse measurements at indicated frequencies, single-sheet test





Characteristics 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	33	0.03	2555	100	35	0.03	2440	100	38	0.16	2268
150	37	0.07	3106	150	40	0.09	2978	150	45	0.44	2634
200	42	0.12	3651	200	45	0.15	3511	200	51	0.74	2995
250	46	0.17	4183	250	49	0.21	4034	250	58	1.04	3347
300	51	0.22	4697	300	54	0.27	4542	300	65	1.37	3685
350	55	0.27	5187	350	58	0.34	5030	350	71	1.71	4005
400	59	0.33	5645	400	62	0.41	5494	400	77	2.09	4302
450	63	0.39	6067	450	66	0.49	5928	450	83	2.51	4572
500	67	0.46	6446	500	70	0.58	6327	500	89	2.97	4809
550	71	0.54	6778	550	73	0.67	6687	550	95	3.48	5011
600	75	0.62	7066	600	77	0.77	7009	600	100	4.04	5178
650	78	0.71	7315	650	80	0.88	7295	650	106	4.65	5311
700	82	0.80	7529	700	83	0.99	7546	700	111	5.31	5412
750	86	0.90	7714	750	87	1.11	7764	750	117	6.02	5482
800	90	1.00	7875	800	90	1.24	7951	800	123	6.77	5523
850	94	1.11	8013	850	94	1.37	8107	850	130	7.57	5537
900	99	1.22	8123	900	98	1.51	8233	900	137	8.43	5528
1000	110	1.46	8225	1000	108	1.80	8391	1000	152	10.33	5467
1050	117	1.59	8201	1050	113	1.96	8422	1050	160	11.38	5423
1100	124	1.72	8125	1100	119	2.13	8416	1100	168	12.50	5372
1150	133	1.87	7989	1150	126	2.31	8374	1150	177	13.69	5311
1200	145	2.02	7739	1200	135	2.50	8301	1200	186	14.97	5246
1250	159	2.18	7329	1250	146	2.70	8176	1250	196	16.33	5170
1300	180	2.35	6773	1300	161	2.92	7857	1300	211	17.79	5005
1350	209	2.53	6084	1350	186	3.15	7199	1350	236	19.37	4696
1400	254	2.73	5237	1400	229	3.41	6163	1400	272	21.13	4321
1450	332	2.95	4215	1450	311	3.71	4793	1450	333	23.13	3921
1500	493	3.19	3100	1500	484	4.04	3334	1500	486	25.30	3258
1550	809	3.47	2010	1550	825	4.39	2055	1550	821	27.53	2176
1600	1415	3.75	1137	1600	1473	4.74	1111	1600	1474	29.87	1109
1650	2407	4.01	626	1650	2527	5.08	579	1650	2540	32.32	503
1700	3684	4.27	390	1700	3884	5.41	352	1700	3915	34.86	291

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	0.44	1986	100	43	0.59	1931	100	45	0.77	1866
150	51	1.20	2260	150	53	1.60	2178	150	55	2.07	2086
200	60	1.98	2528	200	62	2.65	2420	200	65	3.42	2302
250	69	2.80	2786	250	72	3.76	2650	250	76	4.85	2507
300	78	3.68	3029	300	82	4.95	2865	300	86	6.40	2695
350	87	4.64	3250	350	92	6.27	3057	350	97	8.11	2863
400	96	5.70	3446	400	102	7.73	3223	400	109	10.03	3003
450	105	6.87	3611	450	112	9.37	3355	450	120	12.20	3112
500	114	8.19	3739	500	122	11.22	3450	500	132	14.65	3183
550	123	9.66	3827	550	133	13.30	3503	550	144	17.43	3213
600	132	11.30	3878	600	144	15.62	3520	600	157	20.56	3208
650	142	13.11	3898	650	156	18.21	3507	650	171	24.05	3175
700	152	15.10	3893	700	168	21.06	3471	700	186	27.93	3121
750	162	17.27	3866	750	181	24.20	3418	750	201	32.22	3053
800	173	19.64	3823	800	195	27.63	3356	800	218	36.94	2979
850	186	22.20	3770	850	210	31.36	3290	850	236	42.10	2905
900	199	24.99	3708	900	226	35.44	3222	900	256	47.77	2832
1000	227	31.29	3566	1000	262	44.77	3076	1000	299	60.85	2683
1050	243	34.84	3491	1050	281	50.09	2999	1050	323	68.37	2608
1100	259	38.69	3416	1100	302	55.91	2921	1100	348	76.59	2532
1150	277	42.85	3341	1150	324	62.25	2843	1150	374	85.53	2458
1200	295	47.34	3262	1200	347	69.13	2764	1200	402	95.19	2387
1250	315	52.19	3177	1250	372	76.56	2683	1250	429	105.60	2320
1300	335	57.41	3105	1300	397	84.60	2612	1300	461	116.92	2251
1350	354	63.05	3051	1350	423	93.31	2553	1350	498	129.23	2176
1400	380	69.31	2941	1400	453	102.78	2462	1400	527	142.31	2119
1450	434	76.35	2692	1450	501	113.16	2293	1450	548	156.34	2069
1500	568	83.93	2267	1500	610	125.01	2022	1500	646	173.47	1865
1550	864	91.82	1680								
1600	1479	100.28	1104								
1650	2531	109.54	703								
1700	3912	119.40	449								

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 [-]
100	47	0.98	1765	100	49	1.19	1679	100	57	1.86	1444
150	58	2.61	1963	150	61	3.16	1861	150	70	4.66	1612
200	70	4.30	2157	200	73	5.19	2038	200	84	7.56	1775
250	81	6.10	2340	250	85	7.36	2205	250	97	10.66	1928
300	93	8.07	2507	300	97	9.74	2357	300	111	14.07	2067
350	105	10.25	2653	350	110	12.39	2490	350	126	17.88	2187
400	117	12.71	2774	400	123	15.40	2597	400	141	22.19	2283
450	130	15.50	2863	450	138	18.82	2674	450	158	27.12	2351
500	144	18.68	2916	500	153	22.73	2716	500	175	32.75	2384
550	158	22.29	2930	550	168	27.20	2721	550	194	39.18	2382
600	173	26.37	2910	600	185	32.27	2693	600	214	46.53	2348
650	189	30.96	2863	650	204	38.00	2640	650	236	54.88	2292
700	207	36.08	2798	700	223	44.43	2570	700	259	64.33	2220
750	225	41.76	2722	750	245	51.62	2490	750	285	74.98	2141
800	245	48.05	2643	800	268	59.62	2409	800	312	86.92	2061
850	267	54.96	2567	850	292	68.47	2331	850	342	100.27	1987
900	290	62.58	2494	900	319	78.24	2258	900	375	115.10	1919
1000	341	80.17	2354	1000	377	100.79	2122	1000	446	149.64	1792
1050	368	90.27	2285	1050	408	113.68	2056	1050	485	169.53	1731
1100	397	101.27	2216	1100	441	127.75	1993	1100	526	191.25	1670
1150	428	113.19	2148	1150	475	143.02	1932	1150	568	214.83	1614
1200	460	126.05	2086	1200	511	159.46	1874	1200	613	240.35	1560
1250	490	139.92	2031	1250	548	177.11	1819	1250	660	267.84	1510
1300	528	155.07	1966	1300	587	196.41	1765	1300	708	297.14	1463
1350	575	171.61	1887	1350	628	217.54	1714	1350	757	328.28	1420
1400	602	188.90	1854	1400	670	239.31	1665	1400	810	362.24	1377
1450	604	207.11	1879	1450	714	261.98	1616	1450	867	399.60	1332
1500	691	230.32	1730	1500	768	292.84	1556	1500	928	438.22	1288

Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac HP 400-50 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 400-50 A	✓	✓	○	✓	✓

✓ Available ○ On request

Please find further information and downloadable files at www.voestalpine.com/isovac

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ONE STEP AHEAD.