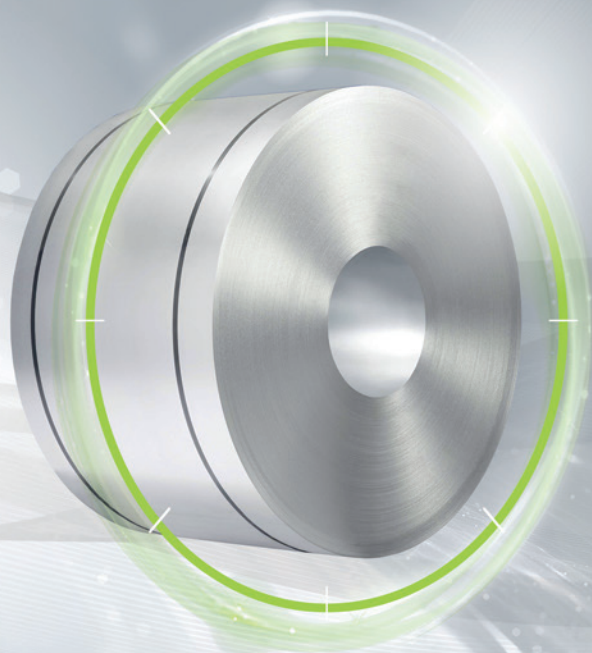


FULLY
PROCESSED

isovac high-perm 350-50 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 350-50 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 350-50 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 350-50 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 60404-8-4	JIS C2552	GOST 21427.2	ASTM A677	AISI	IS648	GB/T2521.1
	Material No.	Abbreviation							
isovac HP 350-50 A	1.0810	M350-50A	M350-50A 5	50A350	2411	47F200	M-36	50C350	50W350

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 350-50 A	280	270	430	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 HP 350-50 A	1.35	0.77	3.00	1.71	1.67	1.76	1.86	4400

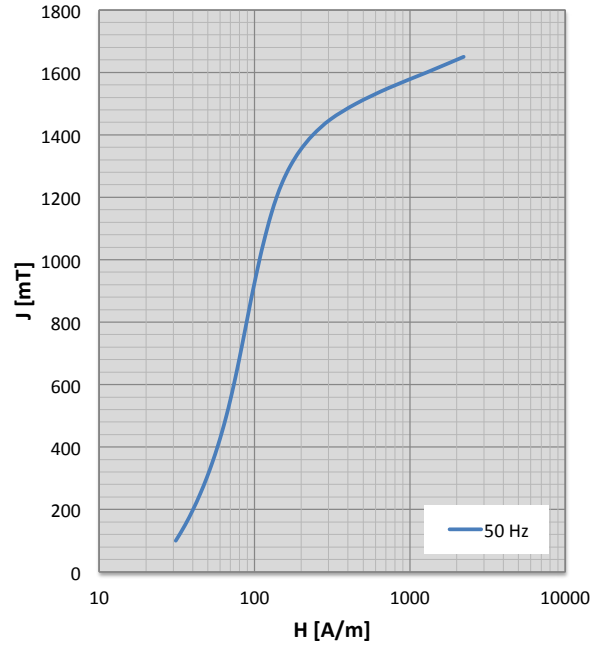
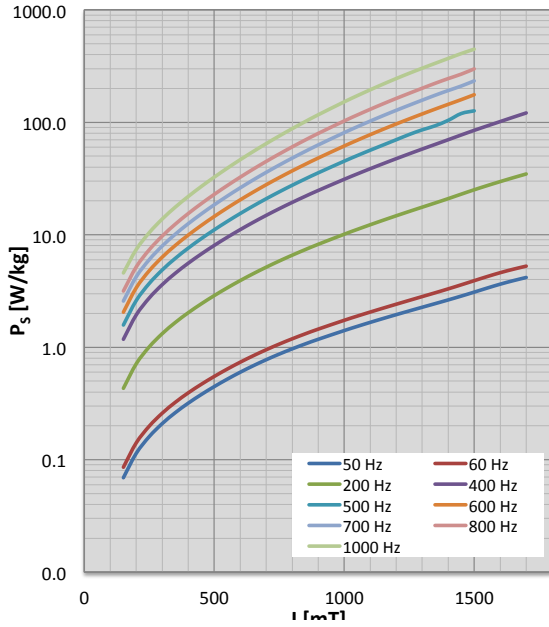
Physical properties:

Typical values

Grade named according to isovac®	Density ρ [g/cm³]	Specific electrical resistance ρ_s [$\mu\Omega\text{cm}$]	Thermal conductivity λ [W/mK]
isovac HP 350-50 A	7.76	35.8	33

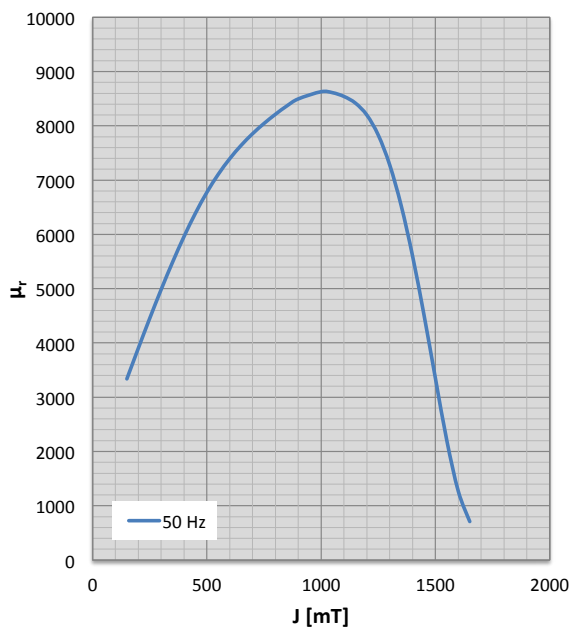
Characteristics P_s/J loss curve and characteristics J/H magnetization curve

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	31	0.03	2764								
150	36	0.07	3336	150	39	0.09	3184	150	43	0.43	2756
200	40	0.11	3901	200	44	0.14	3727	200	50	0.71	3107
250	45	0.16	4452	250	48	0.20	4258	250	57	1.01	3449
300	49	0.21	4984	300	53	0.26	4774	300	64	1.32	3777
350	53	0.26	5488	350	57	0.32	5270	350	71	1.66	4088
400	58	0.32	5960	400	62	0.39	5739	400	77	2.03	4375
450	62	0.38	6391	450	66	0.47	6177	450	83	2.43	4636
500	66	0.45	6775	500	70	0.55	6578	500	89	2.88	4865
550	70	0.52	7107	550	73	0.64	6940	550	95	3.37	5059
600	74	0.60	7394	600	77	0.74	7261	600	100	3.92	5217
650	77	0.68	7641	650	80	0.84	7546	650	106	4.51	5342
700	81	0.77	7855	700	84	0.95	7795	700	111	5.15	5434
750	85	0.87	8043	750	87	1.07	8012	750	117	5.84	5495
800	89	0.97	8213	800	90	1.19	8199	800	124	6.59	5525
850	93	1.07	8367	850	94	1.32	8357	850	131	7.38	5527
900	97	1.18	8496	900	98	1.45	8484	900	138	8.23	5506
1000	108	1.41	8628	1000	107	1.74	8643	1000	154	10.12	5420
1050	114	1.53	8610	1050	113	1.89	8670	1050	162	11.16	5367
1100	121	1.66	8540	1100	119	2.06	8661	1100	171	12.28	5304
1150	129	1.80	8418	1150	125	2.23	8618	1150	180	13.48	5229
1200	139	1.95	8197	1200	133	2.41	8551	1200	190	14.76	5160
1250	152	2.10	7827	1250	143	2.61	8445	1250	199	16.13	5102
1300	170	2.27	7277	1300	157	2.82	8184	1300	212	17.60	4979
1350	196	2.44	6530	1350	178	3.05	7630	1350	233	19.19	4728
1400	238	2.64	5598	1400	215	3.30	6675	1400	264	20.96	4407
1450	309	2.85	4512	1450	285	3.59	5290	1450	317	22.97	4037
1500	451	3.09	3343	1500	429	3.91	3745	1500	442	25.14	3398
1550	729	3.36	2195	1550	713	4.25	2352	1550	716	27.38	2350
1600	1285	3.64	1265	1600	1283	4.60	1299	1600	1284	29.71	1301
1650	2220	3.91	709	1650	2249	4.94	691	1650	2254	32.17	671
1700	3438	4.17	439	1700	3514	5.26	414	1700	3527	34.73	398

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	41	0.43	2079	100	42	0.58	2025	100	44	0.76	1913
150	50	1.18	2337	150	51	1.58	2258	150	54	2.05	2122
200	60	1.94	2591	200	61	2.60	2485	200	65	3.38	2326
250	69	2.74	2834	250	71	3.69	2702	250	75	4.79	2520
300	78	3.61	3063	300	81	4.87	2903	300	86	6.33	2698
350	87	4.55	3271	350	91	6.17	3083	350	97	8.03	2855
400	97	5.59	3455	400	101	7.61	3235	400	109	9.94	2986
450	106	6.75	3608	450	112	9.24	3356	450	121	12.10	3087
500	115	8.04	3726	500	122	11.07	3440	500	133	14.55	3151
550	124	9.50	3805	550	133	13.14	3483	550	145	17.32	3175
600	134	11.12	3849	600	145	15.46	3490	600	159	20.45	3165
650	143	12.91	3863	650	157	18.05	3469	650	173	23.97	3128
700	153	14.89	3852	700	170	20.92	3425	700	188	27.88	3070
750	164	17.05	3820	750	183	24.09	3366	750	204	32.23	3000
800	176	19.42	3773	800	198	27.57	3299	800	222	37.04	2923
850	188	21.99	3715	850	214	31.39	3229	850	241	42.33	2847
900	202	24.79	3649	900	230	35.57	3157	900	261	48.15	2771
1000	232	31.15	3502	1000	267	45.15	3008	1000	306	61.58	2622
1050	248	34.76	3426	1050	288	50.61	2931	1050	330	69.28	2548
1100	265	38.67	3349	1100	309	56.51	2853	1100	356	77.69	2474
1150	283	42.92	3272	1150	331	62.89	2777	1150	383	86.82	2401
1200	302	47.51	3194	1200	355	70.02	2700	1200	411	96.67	2334
1250	322	52.49	3112	1250	381	77.95	2622	1250	438	107.27	2273
1300	343	57.85	3038	1300	406	85.74	2556	1300	471	118.73	2203
1350	364	63.65	2975	1350	432	93.20	2504	1350	511	131.16	2119
1400	389	70.06	2878	1400	462	104.16	2415	1400	537	144.55	2079
1450	430	77.20	2691	1450	505	119.71	2258	1450	544	159.10	2094
1500	530	84.87	2348	1500	574	126.50	2105	1500	614	175.98	1947
1550	766	92.91	1824								
1600	1302	101.56	1275								
1650	2267	111.05	855								
1700	3557	121.17	548								

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	46	0.97	1816	100	48	1.19	1722				
150	57	2.57	2004	150	60	3.15	1888	150	70	4.57	1627
200	69	4.24	2187	200	72	5.18	2049	200	83	7.40	1783
250	80	6.01	2360	250	85	7.36	2200	250	97	10.45	1929
300	92	7.95	2517	300	98	9.75	2338	300	111	13.82	2061
350	104	10.11	2655	350	111	12.42	2458	350	126	17.60	2174
400	117	12.55	2767	400	125	15.45	2554	400	141	21.92	2264
450	130	15.32	2849	450	140	18.91	2622	450	158	26.86	2326
500	144	18.48	2896	500	155	22.87	2657	500	176	32.54	2354
550	159	22.08	2905	550	172	27.39	2658	550	196	39.07	2347
600	174	26.16	2880	600	189	32.54	2628	600	216	46.53	2311
650	191	30.76	2830	650	208	38.37	2575	650	239	55.04	2252
700	209	35.92	2762	700	229	44.94	2506	700	264	64.70	2178
750	228	41.68	2684	750	251	52.30	2428	750	290	75.59	2096
800	249	48.07	2603	800	274	60.50	2348	800	319	87.84	2016
850	271	55.14	2524	850	300	69.61	2272	850	350	101.52	1941
900	295	62.95	2449	900	328	79.68	2200	900	383	116.74	1873
1000	348	80.97	2306	1000	387	102.89	2065	1000	457	152.11	1748
1050	376	91.29	2236	1050	419	116.14	2001	1050	497	172.44	1687
1100	406	102.54	2168	1100	453	130.58	1939	1100	539	194.67	1629
1150	437	114.74	2103	1150	488	146.24	1881	1150	582	218.87	1575
1200	470	127.87	2041	1200	524	163.09	1825	1200	628	244.98	1523
1250	503	142.00	1982	1250	562	181.18	1772	1250	676	272.94	1474
1300	539	157.41	1925	1300	602	200.92	1721	1300	725	302.79	1429
1350	576	174.24	1870	1350	643	222.49	1672	1350	775	334.79	1387
1400	614	191.78	1816	1400	686	244.82	1625	1400	828	370.02	1346
1450	656	210.15	1763	1450	731	268.12	1579	1450	887	408.74	1302
1500	701	233.59	1704	1500	784	298.73	1524	1500	947	447.08	1262

Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac HP 350-50 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 350-50 A	✔	✔	☰	✔	✔

✔ Available ☰ On request

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