isovac®

isovac high-perm 330-50 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 330-50 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 330-50 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 330-50 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	JIS	GOST	ASTM	AISI	IS648	GB/T2521.1
	Material No.	Abbreviation	60404-8-4	C2552	21427.2	A677			
isovac HP 330-50 A HC	1.0809	M330-50A	M330-50A 5	50A330	-	47F190	M-27	50C330	50W330

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 330-50 A HC	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

	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 330-50 A HC	1.30	0.74	2.85	1.62	1.67	1.76	1.86	4400

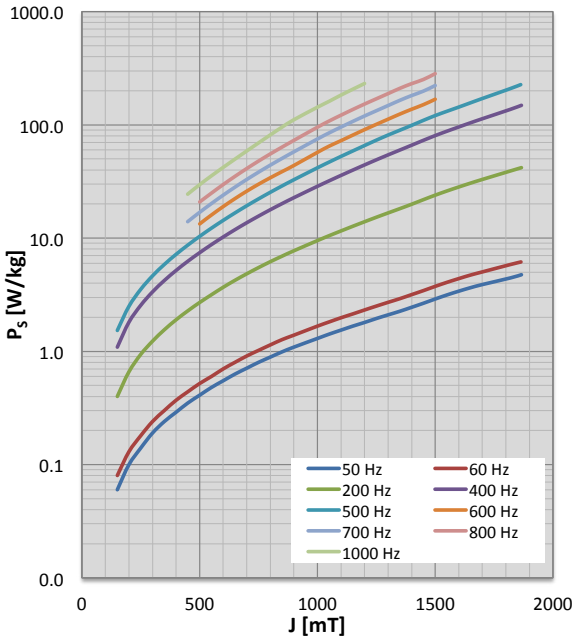
Physical properties:

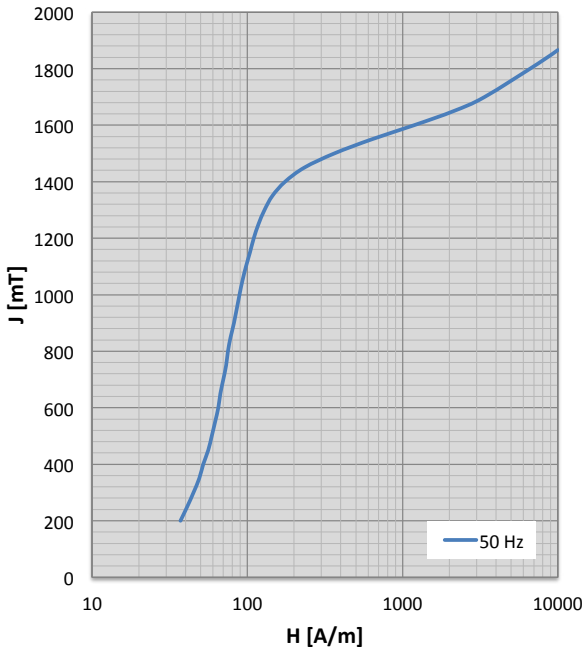
Typical values

Grade named according to isovac®	Density ρ [g/cm³]	Specific electrical resistance ρ_s [μΩcm]	Thermal conductivity λ [W/mK]
isovac HP 330-50 A HC	7.76	35.8	33

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

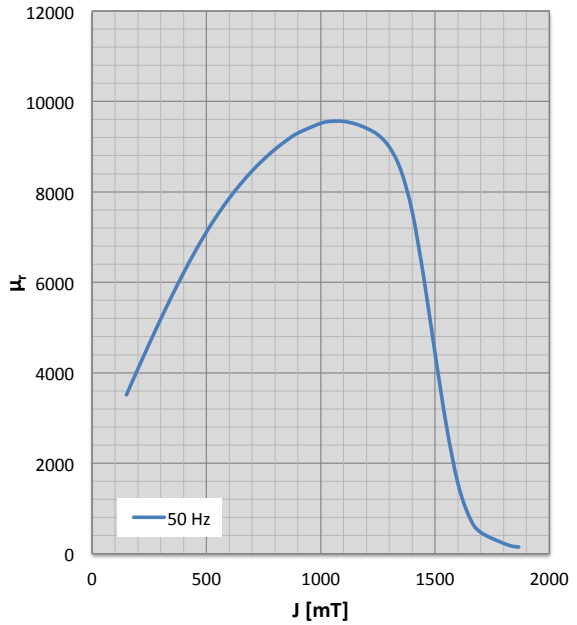
Test direction: Mean value from longitudinal and transverse measurements at indicated frequencies, single-sheet test





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 [-]
150	33	0.06	3516	150	33	0.08	3462	150	37	0.40	3021
200	37	0.10	4086	200	37	0.13	4005	200	44	0.66	3373
250	41	0.14	4645	250	42	0.18	4538	250	50	0.94	3717
300	45	0.19	5189	300	46	0.24	5056	300	57	1.23	4049
350	49	0.24	5713	350	50	0.30	5554	350	63	1.55	4365
400	52	0.29	6212	400	54	0.37	6028	400	69	1.90	4661
450	56	0.35	6680	450	57	0.44	6471	450	74	2.28	4933
500	59	0.41	7113	500	61	0.52	6879	500	80	2.70	5177
550	62	0.48	7506	550	64	0.60	7248	550	85	3.16	5390
600	65	0.55	7861	600	67	0.70	7579	600	90	3.68	5570
650	67	0.63	8180	650	69	0.80	7876	650	94	4.24	5718
700	70	0.71	8465	700	72	0.91	8139	700	99	4.84	5833
750	73	0.80	8718	750	75	1.02	8372	750	105	5.49	5915
800	75	0.89	8941	800	78	1.14	8577	800	110	6.19	5963
850	78	0.99	9136	850	81	1.27	8755	850	116	6.93	5978
900	82	1.09	9300	900	85	1.39	8904	900	123	7.73	5967
1000	89	1.30	9516	1000	92	1.67	9095	1000	138	9.51	5899
1050	93	1.42	9561	1050	97	1.82	9130	1050	145	10.51	5853
1100	98	1.54	9558	1100	101	1.98	9130	1100	154	11.57	5783
1150	104	1.67	9504	1150	107	2.14	9091	1150	163	12.72	5677
1200	110	1.80	9407	1200	114	2.32	8983	1200	173	13.95	5557
1250	118	1.95	9262	1250	122	2.51	8782	1250	184	15.28	5449
1300	129	2.10	8990	1300	133	2.71	8525	1300	194	16.69	5363
1350	145	2.26	8483	1350	149	2.92	8192	1350	204	18.21	5275
1400	175	2.45	7561	1400	177	3.17	7454	1400	223	19.91	5039
1450	233	2.66	6122	1450	236	3.44	6061	1450	270	21.86	4512
1500	363	2.90	4429	1500	371	3.75	4347	1500	387	23.95	3676
1550	633	3.15	2817	1550	651	4.07	2748	1550	644	26.09	2601
1600	1187	3.40	1553	1600	1219	4.39	1518	1600	1187	28.29	1595
1650	2134	3.65	814	1650	2181	4.72	799	1650	2128	30.59	935
1700	3377	3.89	471	1700	3442	5.03	464	1700	3370	32.97	561
1819	7500	4.45	193	1817	7500	5.83	193	1819	7500	39.17	193
1866	10000	4.75	148	1864	10000	6.16	148	1866	10000	41.90	148

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	39	0.58	2078				
150	45	1.09	2522	150	48	1.53	2331				
200	53	1.81	2791	200	57	2.50	2578				
250	62	2.55	3049	250	66	3.53	2815				
300	70	3.35	3293	300	75	4.64	3036				
350	78	4.22	3517	350	85	5.85	3237				
400	86	5.18	3716	400	94	7.19	3411				
450	95	6.25	3887	450	103	8.68	3554	450	110	11.04	3349
500	103	7.43	4023	500	113	10.36	3660	500	119	13.35	3429
550	111	8.76	4122	550	122	12.24	3727	550	130	15.99	3462
600	119	10.23	4185	600	132	14.34	3757	600	143	18.99	3451
650	127	11.87	4217	650	142	16.69	3756	650	156	22.32	3408
700	136	13.67	4221	700	154	19.31	3729	700	171	25.97	3343
750	146	15.64	4201	750	166	22.20	3681	750	186	29.91	3266
800	156	17.81	4162	800	179	25.39	3619	800	202	34.12	3189
850	168	20.17	4105	850	193	28.90	3546	850	218	38.66	3117
900	180	22.75	4036	900	209	32.77	3465	900	236	43.79	3041
1000	208	28.67	3865	1000	244	41.77	3283	1000	283	57.19	2822
1050	223	32.07	3769	1050	264	46.96	3186	1050	309	64.92	2710
1100	240	35.79	3669	1100	285	52.65	3088	1100	332	72.52	2642
1150	258	39.85	3567	1150	307	58.83	2991	1150	358	81.18	2563
1200	277	44.29	3463	1200	331	65.68	2895	1200	386	90.78	2478
1250	297	49.12	3359	1250	355	73.26	2798	1250	415	101.04	2400
1300	318	54.33	3262	1300	383	81.32	2704	1300	446	112.24	2326
1350	342	59.95	3173	1350	415	89.74	2615	1350	478	124.58	2253
1400	364	66.15	3066	1400	439	99.05	2544	1400	511	137.44	2184
1450	390	73.07	2902	1450	454	109.66	2479	1450	545	150.87	2118
1500	468	80.42	2605	1500	515	120.81	2310	1500	587	168.35	2037
1550	682	87.95	2132	1550	722	131.87	1946				
1600	1193	95.85	1597	1600	1240	143.58	1488				
1650	2124	104.34	1123	1650	2185	156.69	1063				
1700	3372	113.28	708	1700	3452	170.91	680				
1819	7500	137.09	193	1816	7500	208.10	193				
1866	10000	148.81	148	1863	10000	226.64	148				

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 [-]
400	108	11.26	3027					400	129	19.45	2526
450	118	13.97	3105	450	127	17.15	2875	450	144	24.39	2535
500	129	16.89	3159	500	140	20.80	2905	500	160	29.64	2533
550	142	20.19	3172	550	155	24.95	2900	550	177	35.46	2509
600	156	23.95	3147	600	171	29.71	2863	600	196	42.12	2464
650	171	28.19	3092	650	189	35.09	2803	650	217	49.82	2402
700	188	32.94	3017	700	208	41.14	2726	700	240	58.80	2326
750	206	38.23	2932	750	229	47.89	2641	750	267	69.30	2239
800	226	44.09	2844	800	251	55.38	2555	800	298	81.53	2146
850	246	50.58	2760	850	274	63.67	2473	850	332	95.59	2050
900	268	57.81	2677	900	300	72.95	2392	900	368	110.97	1959
1000	322	75.06	2481	1000	362	95.35	2206	1000	436	143.17	1832
1050	351	85.01	2385	1050	395	108.23	2118	1050	470	161.50	1780
1100	379	95.61	2316	1100	426	121.77	2057	1100	512	183.22	1714
1150	409	107.22	2245	1150	460	136.64	1994	1150	553	206.32	1655
1200	441	119.78	2172	1200	496	152.71	1931	1200	597	231.85	1601
1250	473	133.26	2105	1250	532	169.85	1872	1250	646	260.94	1544
1300	508	148.18	2041	1300	570	188.90	1816				
1350	544	164.75	1977	1350	612	210.23	1760				
1400	582	181.61	1917	1400	652	231.27	1710				
1450	620	198.69	1863	1450	691	251.78	1668				
1500	668	222.61	1790	1500	746	283.39	1601				

Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac HP 330-50 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 HP 330-50 A HC	✓	✓	○	✓	✓

✓ Available ○ On request

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

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ONE STEP AHEAD.