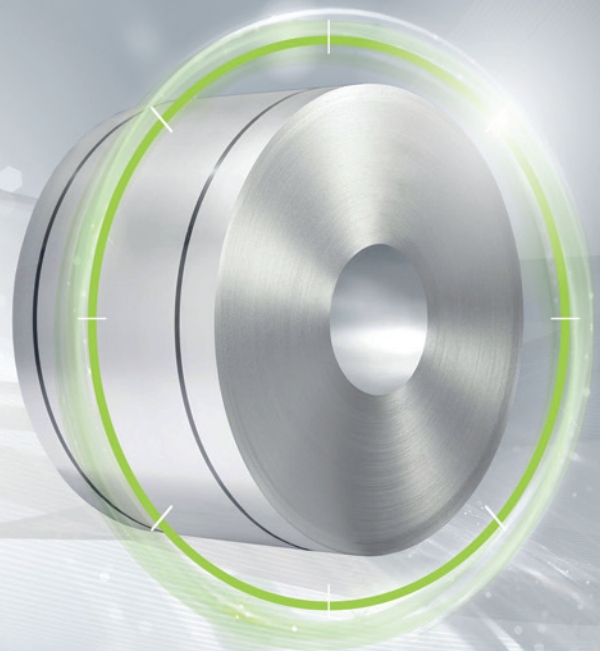


FULLY
PROCESSED

isovac high-perm 310-50 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 310-50 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 310-50 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 310-50 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 310-50 A	1.0808	M310-50A	M310-50A 5	50A310	2412	47F180	M-22	50C310	50W310

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 310-50 A	370	355	500	31	180

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 310-50 A	1.10	0.63	2.65	1.51	1.63	1.72	1.83	2300

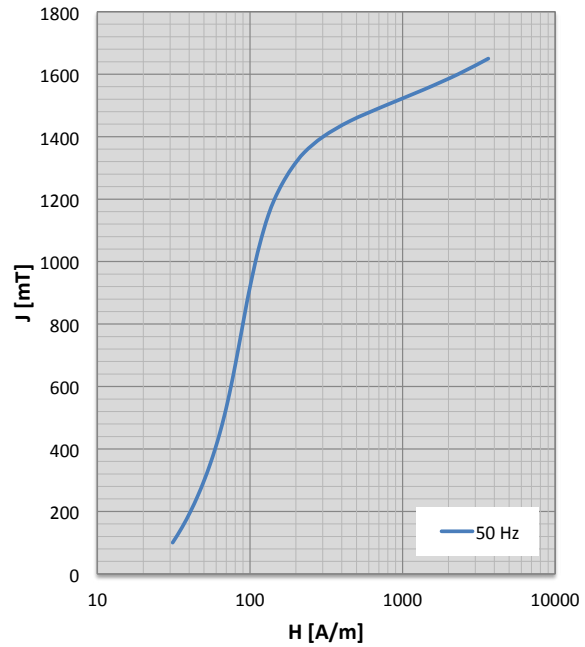
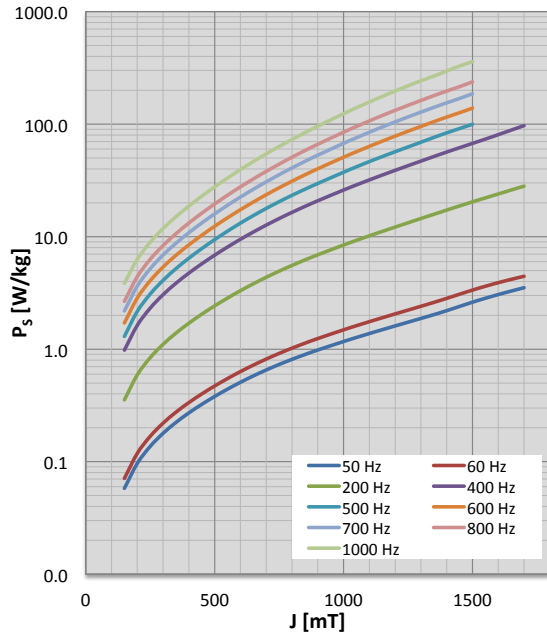
Physical properties:

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 310-50 A	7.68	52.0	25

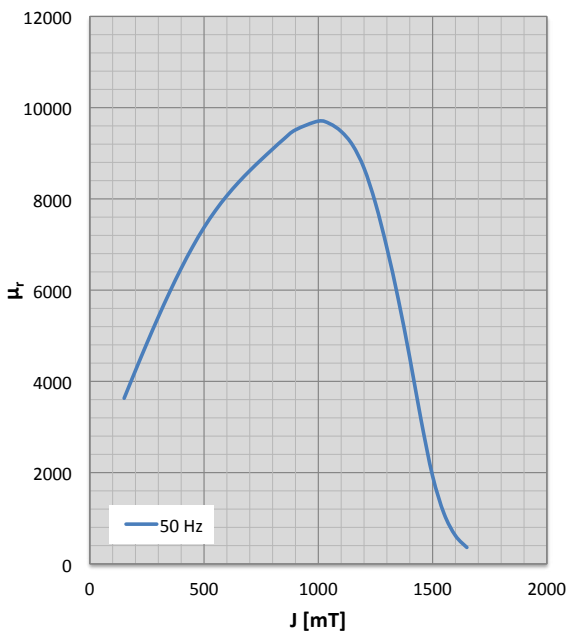
Characteristics P_s/J loss curve and characteristics J/H magnetization curve

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



Characteristics 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	0.02	3010	100	31	0.02	3009	100	33	0.12	2723
150	36	0.06	3629	150	36	0.07	3599	150	39	0.35	3119
200	41	0.10	4240	200	40	0.12	4183	200	46	0.59	3510
250	45	0.14	4838	250	45	0.17	4755	250	52	0.84	3892
300	50	0.18	5415	300	50	0.22	5310	300	58	1.10	4259
350	55	0.22	5964	350	54	0.28	5843	350	64	1.39	4606
400	59	0.27	6479	400	59	0.34	6346	400	70	1.70	4930
450	63	0.32	6951	450	63	0.40	6815	450	76	2.05	5225
500	67	0.38	7375	500	67	0.47	7244	500	81	2.43	5486
550	71	0.44	7746	550	70	0.55	7628	550	87	2.85	5709
600	75	0.51	8071	600	74	0.63	7970	600	92	3.31	5896
650	79	0.58	8359	650	78	0.72	8272	650	96	3.81	6046
700	82	0.65	8619	700	81	0.82	8537	700	101	4.35	6162
750	86	0.73	8861	750	85	0.92	8769	750	107	4.93	6245
800	90	0.81	9093	800	89	1.02	8971	800	112	5.55	6295
850	94	0.90	9318	850	93	1.13	9144	850	118	6.20	6316
900	98	0.98	9514	900	97	1.24	9284	900	124	6.90	6310
1000	109	1.17	9705	1000	107	1.49	9442	1000	138	8.43	6235
1050	115	1.27	9649	1050	114	1.62	9446	1050	145	9.27	6172
1100	123	1.38	9478	1100	121	1.76	9375	1100	153	10.17	6095
1150	132	1.49	9179	1150	129	1.90	9185	1150	162	11.13	5996
1200	145	1.61	8674	1200	141	2.06	8755	1200	174	12.16	5836
1250	163	1.74	7906	1250	159	2.22	7992	1250	191	13.28	5593
1300	188	1.88	6927	1300	185	2.41	6981	1300	210	14.49	5335
1350	228	2.03	5798	1350	224	2.60	5828	1350	237	15.80	5063
1400	302	2.20	4522	1400	299	2.83	4539	1400	301	17.22	4438
1450	452	2.40	3143	1450	450	3.08	3153	1450	450	18.75	3222
1500	773	2.62	1925	1500	772	3.35	1928	1500	774	20.39	1922
1550	1367	2.84	1102	1550	1366	3.62	1101	1550	1367	22.10	1074
1600	2313	3.06	618	1600	2310	3.90	618	1600	2309	23.95	619
1650	3648	3.28	360	1650	3640	4.17	361	1650	3637	25.96	377
1700	5263	3.52	247	1700	5252	4.44	248	1700	5244	28.10	260

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	37	0.35	2361	100	36	0.46	2404	100	37	0.60	2272
150	45	0.98	2650	150	45	1.30	2655	150	47	1.71	2496
200	54	1.63	2933	200	53	2.17	2902	200	57	2.85	2715
250	62	2.32	3206	250	62	3.09	3137	250	66	4.06	2924
300	71	3.05	3464	300	71	4.09	3356	300	76	5.37	3117
350	79	3.86	3701	350	80	5.20	3553	350	86	6.83	3290
400	87	4.74	3913	400	89	6.43	3723	400	96	8.45	3436
450	95	5.74	4094	450	98	7.83	3860	450	106	10.29	3552
500	103	6.85	4239	500	108	9.41	3959	500	116	12.36	3631
550	111	8.09	4345	550	117	11.19	4017	550	127	14.71	3672
600	119	9.47	4414	600	127	13.19	4038	600	138	17.36	3677
650	127	11.00	4452	650	137	15.39	4029	650	149	20.30	3654
700	135	12.66	4461	700	147	17.81	3999	700	161	23.57	3610
750	144	14.48	4448	750	158	20.45	3953	750	174	27.17	3551
800	153	16.44	4416	800	169	23.29	3900	800	188	31.11	3484
850	163	18.55	4369	850	181	26.37	3843	850	202	35.42	3414
900	174	20.84	4311	900	194	29.70	3782	900	218	40.11	3342
1000	197	25.96	4176	1000	222	37.36	3638	1000	252	50.81	3192
1050	209	28.84	4104	1050	238	41.76	3552	1050	271	56.87	3114
1100	222	31.93	4030	1100	255	46.47	3468	1100	290	63.45	3038
1150	236	35.26	3952	1150	271	51.47	3396	1150	309	70.55	2967
1200	250	38.84	3878	1200	289	56.83	3326	1200	332	78.21	2888
1250	264	42.71	3807	1250	310	62.65	3247	1250	359	86.45	2797
1300	281	46.92	3706	1300	328	69.08	3164	1300	378	95.39	2742
1350	309	51.52	3524	1350	344	76.17	3058	1350	385	105.08	2736
1400	363	56.48	3178	1400	403	83.64	2826	1400	429	115.41	2599
1450	480	61.74	2615	1450	544	91.35	2416	1450	562	126.36	2202
1500	778	67.41	1911	1500	784	99.73	1891	1500	792	138.67	1803
1550	1376	73.62	1189								
1600	2337	80.58	610								
1650	3678	88.44	299								
1700	5291	96.95	199								

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	39	0.78	2147	100	41	0.96	2038	100	48	1.49	1714
150	50	2.19	2343	150	52	2.66	2219	150	60	3.85	1893
200	60	3.64	2533	200	63	4.41	2395	200	72	6.30	2068
250	71	5.19	2714	250	74	6.29	2561	250	85	8.92	2232
300	82	6.87	2881	300	86	8.34	2713	300	97	11.80	2382
350	93	8.74	3028	350	97	10.63	2846	350	110	15.04	2513
400	104	10.85	3151	400	109	13.22	2956	400	124	18.70	2618
450	115	13.23	3244	450	122	16.16	3036	450	138	22.89	2694
500	127	15.93	3305	500	135	19.52	3084	500	153	27.69	2736
550	139	19.01	3328	550	148	23.35	3096	550	168	33.18	2741
600	152	22.48	3319	600	163	27.69	3077	600	185	39.43	2713
650	166	26.37	3284	650	178	32.57	3033	650	203	46.48	2662
700	180	30.70	3230	700	194	38.03	2971	700	222	54.40	2594
750	195	35.50	3163	750	211	44.09	2899	750	243	63.25	2518
800	211	40.80	3090	800	229	50.79	2822	800	265	73.07	2440
850	229	46.62	3015	850	249	58.16	2746	850	288	83.94	2367
900	247	52.99	2941	900	271	66.25	2673	900	314	95.95	2298
1000	288	67.52	2792	1000	317	84.79	2529	1000	369	123.79	2167
1050	310	75.74	2718	1050	342	95.34	2459	1050	400	139.81	2100
1100	333	84.65	2648	1100	368	106.81	2392	1100	431	157.23	2036
1150	356	94.29	2582	1150	394	119.24	2328	1150	465	176.10	1974
1200	382	104.67	2511	1200	423	132.57	2263	1200	500	196.68	1913
1250	412	115.81	2433	1250	455	146.83	2193	1250	537	219.09	1851
1300	435	127.83	2383	1300	483	162.26	2144	1300	576	242.66	1798
1350	451	140.79	2369	1350	507	179.04	2119	1350	617	267.27	1756
1400	493	154.53	2263	1400	549	196.70	2032	1400	659	295.57	1693
1450	607	169.17	1968	1450	643	215.27	1810	1450	722	328.69	1568
1500	831	186.14	1641	1500	854	237.49	1527	1500	929	358.50	1347

Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac HP 310-50 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 310-50 A	✔	✔	☰	✔	✔

✔ Available ☰ On request

The information and product properties contained in this printed material are non-binding and serve the sole purpose of technical orientation. They do not replace individual advisory services provided by our sales and customer service teams. The product information and characteristics set forth herein shall not be considered as guaranteed properties unless explicitly stipulated in a separate contractual agreement. For this reason, voestalpine shall not grant any warranty nor be held liable for properties and/or specifications other than those subject to explicit agreement. This also applies to the suitability and applicability of products for certain applications as well as to the further processing of materials into final products. All application risks and suitability risks shall be borne by the customer. The General Terms of Sale for Goods and Services of the voestalpine Steel Division shall apply to all materials supplied by the voestalpine Steel Division and can be accessed using the following link: www.voestalpine.com/stahl/en/The-Steel-Division/General-Terms-of-Sale

Technical changes are reserved. Errors and misprints are excepted. No part of this publication may be reprinted without explicit written permission by voestalpine Stahl GmbH.

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

