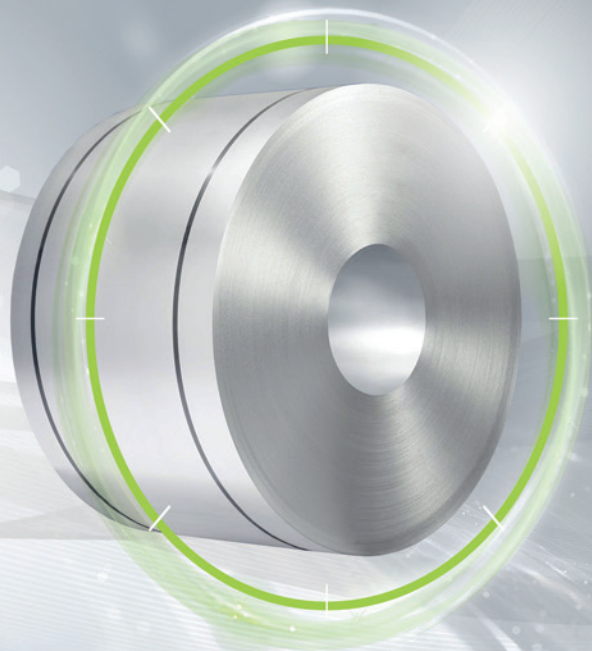


FULLY
PROCESSED

isovac high-perm 290-50 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 290-50 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 290-50 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 290-50 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 290-50 A	1.0807	M290-50A	M290-50A 5	50A290	2413	47F165	M-19	50C290	50W290

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 290-50 A	360	355	490	30	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 290-50 A	1.05	0.60	2.45	1.40	1.62	1.71	1.82	2200

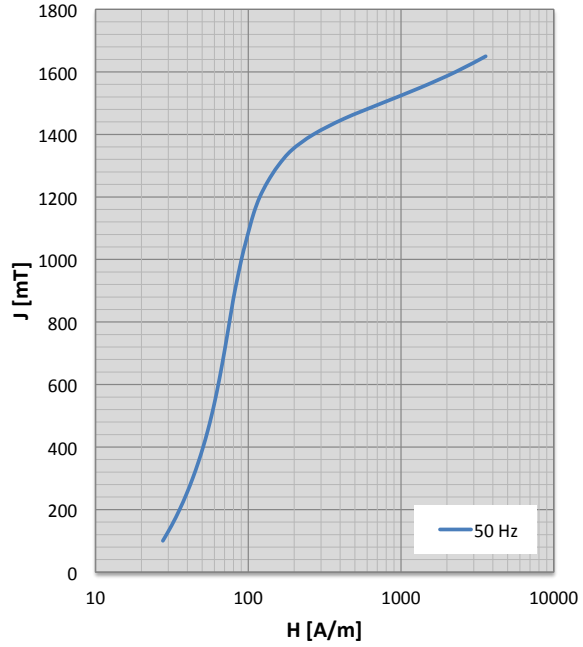
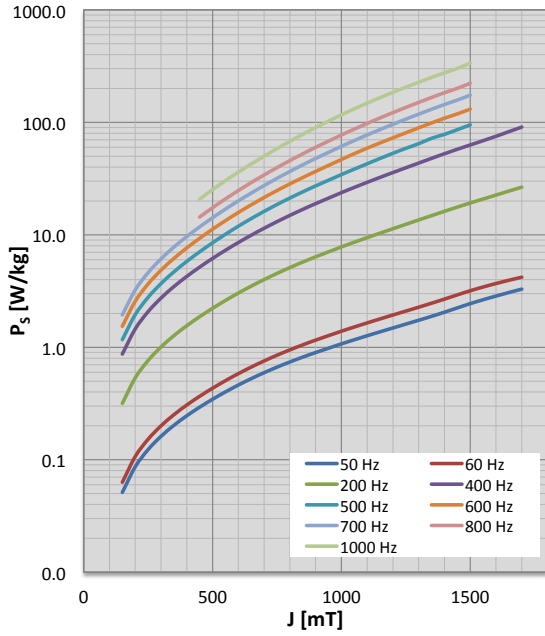
Physical properties:

Typical values

Grade named according to isovac®	Density ρ [g/cm ³]	Specific electrical resistance ρ_s [$\mu\Omega\text{cm}$]	Thermal conductivity λ [W/mK]
isovac HP 290-50 A	7.68	52.0	25

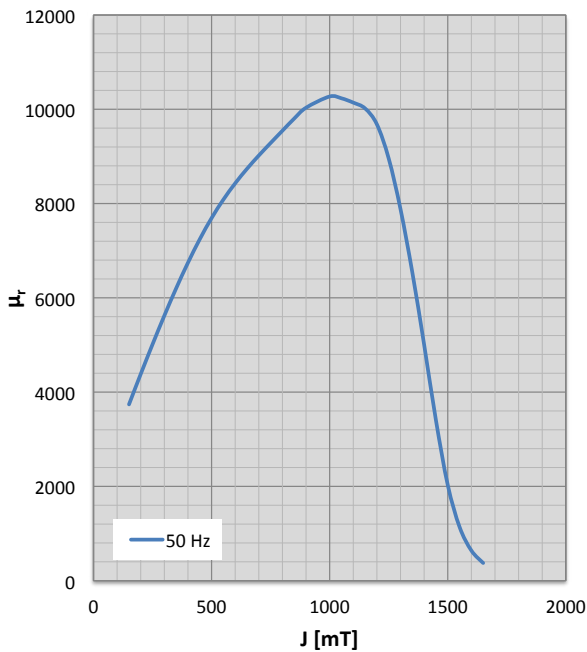
Characteristics P_s/J loss curve and characteristics J/H magnetization curve

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	28	0.02	3088	100	28	0.02	3112				
150	32	0.05	3740	150	33	0.06	3700	150	36	0.32	3293
200	36	0.09	4385	200	37	0.11	4284	200	42	0.53	3697
250	39	0.12	5016	250	41	0.15	4857	250	47	0.76	4092
300	43	0.16	5624	300	45	0.20	5416	300	53	1.01	4473
350	47	0.20	6203	350	49	0.25	5955	350	58	1.27	4838
400	51	0.25	6746	400	53	0.31	6469	400	64	1.55	5180
450	54	0.29	7245	450	57	0.37	6954	450	69	1.87	5496
500	57	0.34	7693	500	60	0.43	7403	500	74	2.22	5781
550	61	0.40	8085	550	64	0.50	7815	550	78	2.61	6033
600	64	0.46	8431	600	67	0.58	8188	600	83	3.03	6249
650	67	0.53	8739	650	69	0.67	8525	650	87	3.50	6430
700	70	0.59	9020	700	72	0.76	8827	700	91	4.00	6576
750	72	0.67	9286	750	75	0.85	9095	750	96	4.54	6688
800	75	0.74	9546	800	78	0.95	9332	800	100	5.11	6765
850	78	0.82	9804	850	81	1.05	9539	850	105	5.72	6808
900	82	0.90	10034	900	85	1.16	9712	900	111	6.37	6820
1000	90	1.07	10272	1000	93	1.39	9947	1000	123	7.80	6773
1050	96	1.17	10233	1050	98	1.51	10001	1050	130	8.59	6723
1100	102	1.27	10142	1100	104	1.65	9990	1100	137	9.44	6659
1150	109	1.37	10018	1150	111	1.79	9870	1150	144	10.34	6575
1200	119	1.48	9680	1200	121	1.94	9490	1200	154	11.32	6421
1250	134	1.61	8956	1250	137	2.10	8729	1250	168	12.39	6164
1300	157	1.74	7881	1300	159	2.27	7653	1300	185	13.55	5857
1350	193	1.88	6540	1350	195	2.46	6363	1350	209	14.81	5494
1400	267	2.05	5007	1400	270	2.68	4900	1400	274	16.17	4752
1450	422	2.24	3403	1450	429	2.92	3349	1450	428	17.64	3412
1500	749	2.44	2030	1500	759	3.18	2005	1500	759	19.19	2010
1550	1344	2.65	1140	1550	1357	3.44	1128	1550	1360	20.81	1108
1600	2279	2.85	639	1600	2304	3.69	634	1600	2310	22.56	633
1650	3587	3.07	375	1650	3638	3.94	371	1650	3651	24.48	381
1700	5163	3.29	257	1700	5253	4.20	253	1700	5275	26.53	261

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	33	0.30	2578	100	33	0.41	2547				
150	40	0.87	2881	150	40	1.17	2821	150	43	1.54	2655
200	48	1.46	3179	200	48	1.95	3090	200	51	2.56	2898
250	55	2.07	3468	250	56	2.78	3347	250	60	3.66	3130
300	62	2.74	3741	300	64	3.68	3586	300	69	4.84	3345
350	70	3.46	3995	350	72	4.68	3803	350	78	6.16	3538
400	77	4.27	4223	400	80	5.80	3992	400	87	7.64	3703
450	84	5.16	4423	450	89	7.06	4146	450	96	9.31	3836
500	91	6.16	4587	500	97	8.49	4260	500	105	11.21	3930
550	98	7.29	4713	550	105	10.11	4330	550	115	13.35	3981
600	105	8.53	4803	600	114	11.92	4362	600	125	15.77	3995
650	112	9.91	4858	650	123	13.93	4361	650	135	18.47	3978
700	120	11.43	4884	700	133	16.15	4334	700	146	21.45	3936
750	127	13.08	4881	750	143	18.58	4288	750	158	24.74	3876
800	136	14.88	4854	800	153	21.22	4230	800	170	28.34	3804
850	145	16.82	4806	850	165	24.08	4164	850	184	32.27	3726
900	155	18.93	4741	900	177	27.20	4092	900	199	36.60	3642
1000	177	23.69	4582	1000	204	34.30	3930	1000	232	46.73	3459
1050	188	26.38	4497	1050	219	38.35	3840	1050	250	52.64	3361
1100	201	29.28	4409	1100	235	42.81	3747	1100	269	58.95	3267
1150	214	32.41	4318	1150	252	47.74	3650	1150	289	65.59	3182
1200	227	35.78	4230	1200	270	53.07	3546	1200	309	72.77	3101
1250	242	39.43	4147	1250	290	58.71	3441	1250	330	80.72	3019
1300	257	43.44	4035	1300	307	64.58	3372	1300	354	89.35	2929
1350	279	47.84	3838	1350	377	72.11	2869	1350	368	98.80	2887
1400	330	52.59	3455	1400	358	78.18	3119	1400	404	108.79	2762
1450	453	57.60	2817	1450	158	86.05	5190	1450	532	118.92	2332
1500	758	62.93	2032	1500	827	95.07	1819	1500	774	131.03	1883
1550	1357	68.70	1252								
1600	2319	75.19	636								
1650	3668	82.64	306								
1700	5299	90.79	201								

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	36	0.69	2288								
150	45	1.94	2516								
200	54	3.23	2739								
250	63	4.61	2951								
300	73	6.11	3146								
350	82	7.77	3319								
400	92	9.64	3465	400	100	11.51	3283	400	113	16.48	2883
450	102	11.77	3577	450	110	14.35	3364	450	125	20.69	2912
500	112	14.18	3651	500	120	17.40	3422	500	139	25.21	2926
550	123	16.92	3683	550	131	20.83	3441	550	153	30.29	2916
600	135	20.02	3677	600	144	24.72	3422	600	168	36.06	2882
650	147	23.50	3641	650	157	29.11	3374	650	185	42.61	2829
700	160	27.40	3582	700	172	34.04	3304	700	204	50.02	2762
750	174	31.75	3507	750	188	39.55	3220	750	224	58.37	2684
800	189	36.56	3423	800	206	45.67	3130	800	247	67.77	2600
850	205	41.88	3335	850	225	52.46	3038	850	271	78.27	2513
900	223	47.73	3245	900	245	59.95	2948	900	297	89.91	2427
1000	261	61.19	3066	1000	288	77.17	2774	1000	352	116.62	2267
1050	282	68.87	2978	1050	312	87.00	2690	1050	381	131.74	2197
1100	304	77.22	2892	1100	337	97.73	2609	1100	412	148.10	2131
1150	327	86.28	2809	1150	363	109.43	2531	1150	443	165.79	2068
1200	351	96.10	2728	1200	390	122.05	2456	1200	476	184.82	2008
1250	376	106.75	2649	1250	417	135.58	2387	1250	510	205.24	1952
1300	403	118.23	2572	1300	447	150.27	2315	1300	546	227.11	1897
1350	422	130.73	2533	1350	474	166.42	2268	1350	580	250.93	1858
1400	459	144.01	2428	1400	511	183.34	2182	1400	620	275.85	1798
1450	574	157.77	2093	1450	605	200.73	1928	1450	696	301.52	1649
1500	803	174.41	1717	1500	825	222.51	1603	1500	892	336.37	1414

Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac HP 290-50 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 290-50 A	✔	✔	☰	✔	✔

✔ Available ☰ On request

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