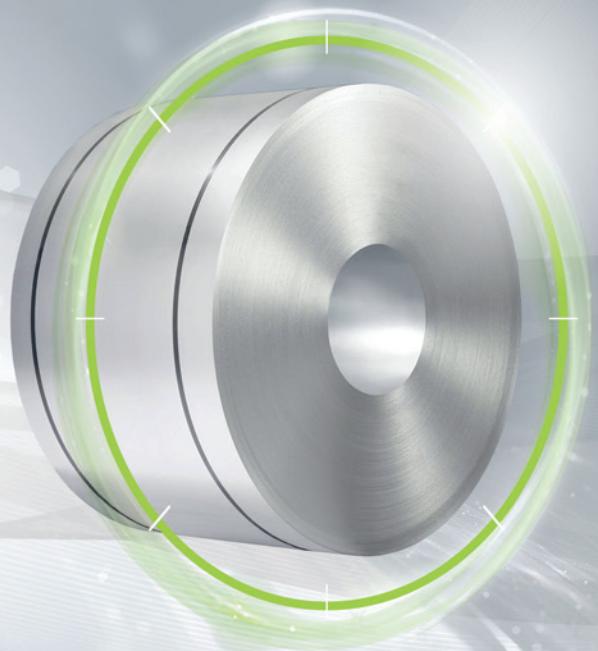


FULLY  
PROCESSED

## isovac 310-65 A

### The perfect solution for direct application

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. Upon request, isovac 310-65 A can be supplied with an electrical steel insulation system and can be used directly in as-delivered condition.

#### Convincing advantages:

- » 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 310-65 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 310-65 A	1.0892	M310-65A	M310-65A 5	65A310	-	64F190	-	65C310	-

**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	0.2 %-Yield strength	Tensile strength	Elongation	Hardness
	R <sub>eH</sub> [MPa]	R <sub>p0.2</sub> [MPa]	R <sub>m</sub> [MPa]	A <sub>80</sub> [%]	HV5 [-]
isovac 310-65 A	455	450	580	15	215

**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
	1.0 T P10		1.5 T P15		2500 A/m J25	5000 A/m J50	10000 A/m J100	1.5 T μ <sub>r</sub>
	50 Hz [W/kg]	60 Hz [W/lb]	50 Hz [W/kg]	60 Hz [W/lb]	[T]	[T]	[T]	[-]
isovac 310-65 A	1.10	0.65	2.65	1.56	1.55	1.64	1.76	900

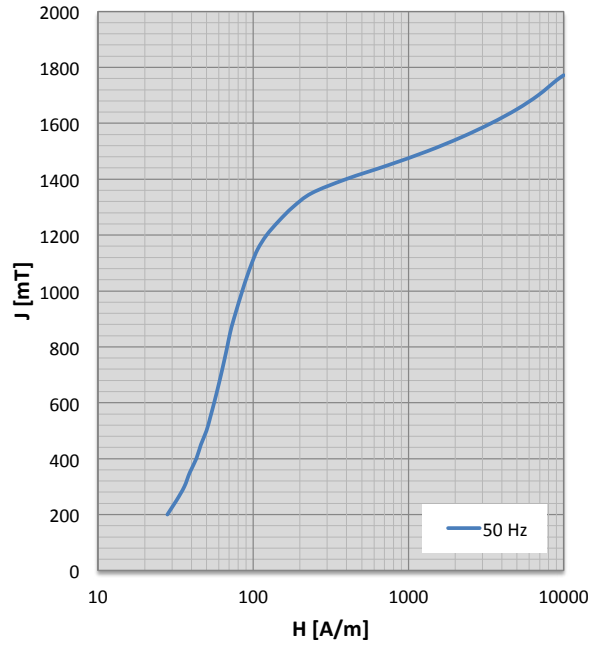
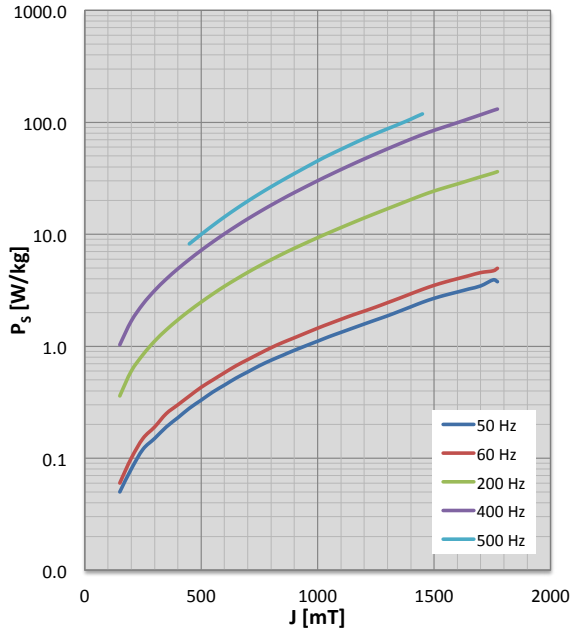
**Physical properties:**

Typical values

Grade named according to isovac®	Density ρ [g/cm³]	Specific electrical resistance ρ <sub>s</sub> [μΩcm]	Thermal conductivity λ [W/mK]
isovac 310-65 A	7.60	64.5	22

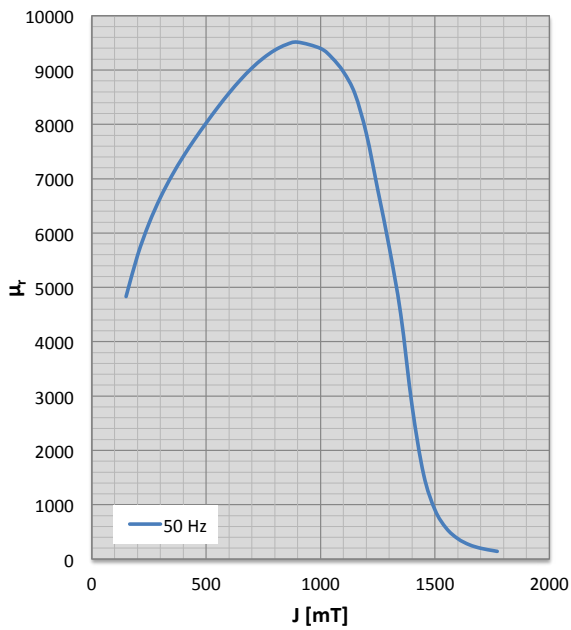
**Characteristics  $P_s/J$  loss curve and characteristics  $J/H$  magnetization curve**

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



**Characteristics  $\mu_r/J$  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 <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]	J [mT]	H [A/m]	P <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]	J [mT]	H [A/m]	P <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]
				100	21	0.02	3765				
150	25	0.05	4828	150	25	0.06	4754	150	32	0.36	3704
200	28	0.08	5586	200	29	0.10	5477	200	38	0.60	4142
250	32	0.12	6175	250	33	0.15	6034	250	45	0.84	4461
300	36	0.15	6653	300	37	0.19	6484	300	51	1.11	4706
350	39	0.19	7056	350	41	0.25	6863	350	57	1.40	4901
400	43	0.23	7409	400	44	0.30	7194	400	63	1.72	5063
450	46	0.28	7728	450	48	0.36	7493	450	69	2.08	5202
500	50	0.33	8025	500	51	0.43	7772	500	75	2.48	5323
550	53	0.39	8309	550	54	0.50	8039	550	81	2.93	5432
600	56	0.45	8576	600	58	0.58	8289	600	86	3.43	5527
650	59	0.52	8820	650	61	0.67	8519	650	92	3.97	5606
700	62	0.59	9037	700	64	0.76	8723	700	98	4.57	5667
750	65	0.67	9220	750	67	0.86	8895	750	105	5.22	5710
800	68	0.75	9366	800	70	0.97	9032	800	111	5.92	5732
850	71	0.83	9468	850	74	1.08	9128	850	118	6.68	5734
900	75	0.92	9513	900	78	1.19	9172	900	125	7.50	5714
1000	85	1.11	9397	1000	88	1.45	9075	1000	142	9.33	5612
1050	91	1.22	9225	1050	94	1.59	8929	1050	151	10.36	5537
1100	98	1.33	8966	1100	100	1.74	8729	1100	160	11.47	5472
1150	107	1.45	8564	1150	109	1.90	8422	1150	169	12.68	5418
1200	122	1.58	7830	1200	123	2.06	7774	1200	181	13.99	5288
1250	146	1.72	6794	1250	147	2.24	6776	1250	197	15.39	5038
1300	180	1.87	5740	1300	181	2.45	5730	1300	217	16.91	4763
1350	238	2.05	4515	1350	238	2.68	4506	1350	254	18.58	4224
1400	396	2.25	2814	1400	396	2.94	2816	1400	394	20.41	2829
1450	739	2.47	1562	1450	736	3.22	1569	1450	728	22.38	1585
1500	1321	2.68	904	1500	1315	3.50	908	1500	1310	24.35	911
1550	2191	2.87	563	1550	2185	3.76	564	1550	2184	26.22	565
1600	3406	3.05	374	1600	3402	4.01	374	1600	3403	28.14	374
1650	4991	3.25	263	1650	4990	4.27	263	1650	4991	30.29	263
1700	6843	3.46	198	1700	6848	4.55	198	1700	6844	32.61	198
1754	9000	3.92	155	1752	9000	4.72	155	1753	9000	35.19	155
1772	10000	3.77	141	1772	10000	4.97	141	1772	10000	36.26	141

**Frequency dependence of magnetic properties**

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

400 Hz				500 Hz			
J [mT]	H [A/m]	P <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]	J [mT]	H [A/m]	P <sub>s</sub> [W/kg]	μ <sub>r</sub> [-]
100	32	0.39	2453				
150	41	1.03	2922				
200	49	1.68	3229				
250	58	2.38	3442				
300	66	3.14	3597				
350	75	3.98	3710				
400	84	4.92	3793	400	90	6.54	3521
450	93	5.98	3853	450	101	8.19	3561
500	102	7.19	3895	500	111	9.97	3577
550	112	8.55	3921	550	123	11.99	3564
600	121	10.09	3932	600	135	14.29	3527
650	132	11.81	3927	650	149	16.88	3474
700	143	13.73	3908	700	163	19.77	3410
750	154	15.85	3874	750	179	22.99	3339
800	166	18.19	3826	800	195	26.55	3264
850	180	20.76	3766	850	212	30.48	3186
900	194	23.58	3695	900	231	34.84	3101
1000	225	30.07	3529	1000	275	45.24	2899
1050	243	33.78	3439	1050	298	51.14	2806
1100	261	37.84	3356	1100	320	57.33	2733
1150	279	42.28	3280	1150	345	64.21	2653
1200	301	47.09	3176	1200	371	71.60	2576
1250	326	52.30	3047	1250	396	79.32	2512
1300	345	57.96	2999	1300	422	87.54	2452
1350	362	64.11	2964	1350	430	96.35	2495
1400	468	70.73	2379	1400	524	106.66	2126
1450	764	77.71	1511	1450	860	118.86	1341
1500	1316	84.79	907	1500	1350	128.78	884
1550	2182	91.81	565				
1600	3406	99.28	374				
1650	5001	107.69	263				
1700	6861	116.84	197				
1753	9000	127.74	155				
1772	10000	131.24	141				

### Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac 310-65 A	Wide strip / Slit strip	19 – 1440	-
	Cut-to-length sheets	300 – 1440	300 – 5000

### Deliverable coating systems

Grade named according to isovac®	Uncoated	C-3	Backlack	C-5	C-6
isovac 310-65 A	✔	✔	☰	✔	✔

✔ Available ☰ On request

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