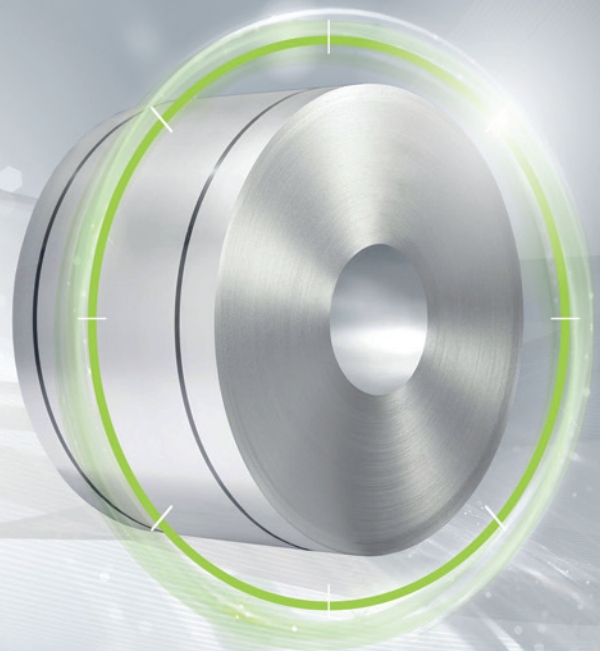


FULLY  
PROCESSED

## isovac high-perm 600-50 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 600-50 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 600-50 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 600-50 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 600-50 A	1.0814	M600-50A	M600-50A 5	50A600	2112	-	-	50C600	50W600

**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 600-50 A	250	230	370	26	115

**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 $\mu_r$ [-]
	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 600-50 A	2.25	1.28	4.70	2.68	1.70	1.78	1.88	3400

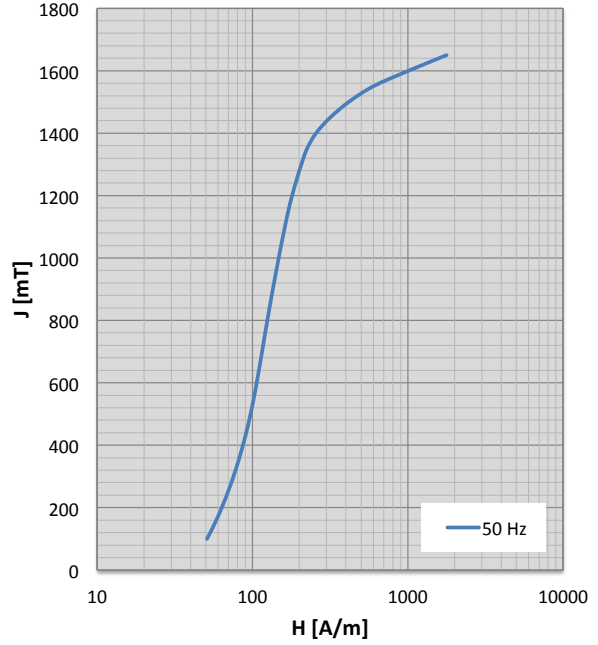
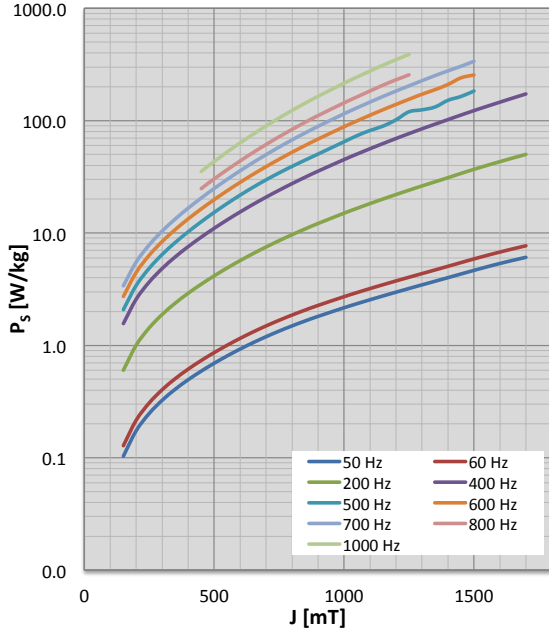
**Physical properties:**

Typical values

Grade named according to isovac®	Density $\rho$ [g/cm³]	Specific electrical resistance $\rho_s$ [ $\mu\Omega\text{cm}$ ]	Thermal conductivity $\lambda$ [W/mK]
isovac HP 600-50 A	7.80	28.2	42

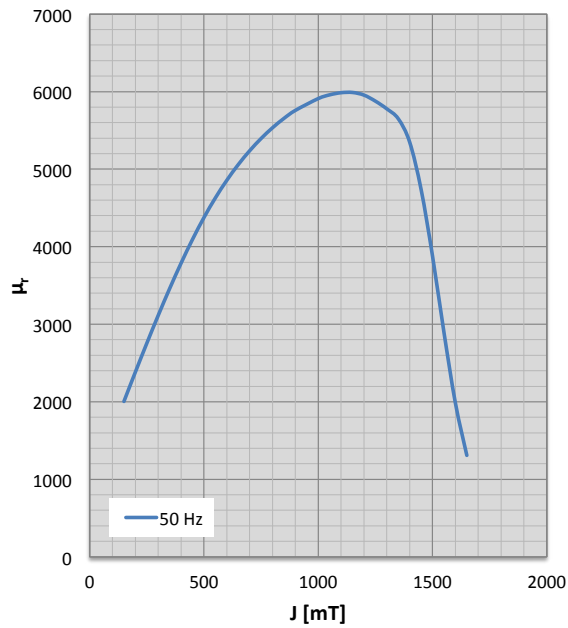
**Characteristics  $P_s/J$  loss curve and characteristics  $J/H$  magnetization curve**

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	51	0.03	1624					100	54	0.20	1538
150	57	0.10	2005	150	57	0.13	2000	150	62	0.60	1811
200	63	0.17	2383	200	63	0.22	2367	200	71	1.01	2080
250	69	0.25	2754	250	70	0.31	2728	250	80	1.43	2341
300	75	0.32	3114	300	76	0.40	3077	300	89	1.89	2590
350	81	0.41	3460	350	82	0.51	3412	350	97	2.38	2823
400	87	0.49	3788	400	87	0.61	3728	400	106	2.91	3035
450	92	0.59	4094	450	93	0.73	4023	450	114	3.50	3223
500	97	0.69	4376	500	98	0.86	4292	500	123	4.16	3382
550	102	0.81	4629	550	103	1.00	4533	550	131	4.88	3510
600	106	0.93	4856	600	108	1.15	4747	600	139	5.68	3608
650	111	1.06	5058	650	112	1.32	4935	650	148	6.56	3679
700	115	1.20	5237	700	117	1.49	5101	700	156	7.51	3726
750	120	1.34	5395	750	121	1.67	5245	750	166	8.55	3752
800	125	1.49	5534	800	126	1.86	5370	800	175	9.67	3760
850	130	1.65	5655	850	132	2.06	5478	850	186	10.86	3753
900	135	1.81	5758	900	137	2.27	5568	900	197	12.15	3733
1000	147	2.16	5910	1000	150	2.71	5694	1000	222	15.01	3668
1050	154	2.35	5959	1050	157	2.95	5729	1050	235	16.59	3628
1100	162	2.55	5986	1100	165	3.20	5742	1100	248	18.27	3586
1150	170	2.75	5989	1150	174	3.47	5726	1150	262	20.07	3543
1200	180	2.97	5955	1200	184	3.74	5680	1200	276	21.99	3494
1250	192	3.21	5877	1250	196	4.04	5599	1250	293	24.04	3438
1300	206	3.46	5778	1300	211	4.35	5488	1300	307	26.21	3396
1350	224	3.72	5650	1350	230	4.69	5336	1350	318	28.53	3368
1400	256	4.00	5348	1400	262	5.05	5062	1400	345	31.06	3248
1450	316	4.32	4737	1450	320	5.45	4579	1450	406	33.87	2956
1500	417	4.65	3878	1500	418	5.88	3850	1500	496	36.87	2602
1550	599	5.00	2894	1550	600	6.32	2902	1550	642	39.93	2297
1600	1011	5.35	1983	1600	1012	6.77	1974	1600	1017	43.12	1969
1650	1776	5.71	1309	1650	1774	7.23	1291	1650	1769	46.52	1533
1700	2810	6.07	826	1700	2803	7.69	814	1700	2810	50.06	1008

**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 <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	61	0.57	1341	100	64	0.79	1267	100	66	1.04	1223
150	72	1.56	1557	150	75	2.08	1470	150	78	2.72	1406
200	83	2.58	1768	200	86	3.42	1667	200	90	4.47	1584
250	94	3.66	1970	250	98	4.86	1855	250	103	6.34	1753
300	106	4.83	2157	300	110	6.45	2027	300	117	8.40	1906
350	117	6.12	2326	350	123	8.23	2178	350	131	10.72	2041
400	129	7.56	2471	400	136	10.26	2304	400	146	13.35	2151
450	142	9.18	2588	450	151	12.58	2399	450	162	16.35	2231
500	155	11.01	2672	500	167	15.24	2459	500	180	19.80	2278
550	169	13.08	2719	550	184	18.29	2480	550	199	23.74	2287
600	183	15.39	2735	600	202	21.73	2469	600	219	28.23	2265
650	198	17.98	2726	650	221	25.54	2434	650	241	33.29	2220
700	214	20.86	2696	700	241	29.73	2384	700	265	38.96	2160
750	231	24.03	2652	750	263	34.28	2325	750	290	45.28	2092
800	250	27.52	2601	800	285	39.19	2266	800	317	52.29	2025
850	270	31.34	2546	850	308	44.51	2213	850	346	60.03	1964
900	292	35.51	2490	900	332	50.41	2163	900	376	68.54	1909
1000	338	45.02	2379	1000	389	64.84	2055	1000	443	88.19	1806
1050	363	50.40	2324	1050	422	73.48	1994	1050	478	99.44	1754
1100	389	56.22	2270	1100	452	81.73	1946	1100	516	111.71	1702
1150	416	62.52	2215	1150	477	89.38	1915	1150	556	125.03	1652
1200	444	69.32	2164	1200	520	101.65	1840	1200	597	139.38	1605
1250	472	76.65	2115	1250	589	119.89	1706	1250	639	154.81	1560
1300	504	84.52	2062	1300	595	124.72	1743	1300	684	171.74	1515
1350	539	92.94	2003	1350	609	132.10	1765	1350	729	188.47	1476
1400	569	102.09	1964	1400	677	151.64	1648	1400	781	209.63	1429
1450	590	112.08	1948	1450	714	163.97	1616	1450	852	240.18	1355
1500	643	122.76	1861	1500	768	183.24	1556	1500	890	254.65	1343
1550	795	133.97	1620								
1600	1181	145.96	1298								
1650	1908	158.94	991								
1700	2896	172.67	708								

### 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 <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	69	1.31	1174								
150	82	3.38	1339								
200	95	5.52	1499								
250	109	7.84	1650								
300	123	10.41	1787								
350	139	13.31	1906								
400	156	16.64	2002	400	165	19.80	1978	400	186	27.98	1753
450	174	20.46	2069	450	185	24.82	1982	450	210	35.27	1736
500	194	24.88	2104	500	206	30.27	1976	500	236	43.26	1711
550	215	29.97	2104	550	229	36.55	1951	550	266	52.56	1675
600	239	35.78	2075	600	255	43.77	1910	600	298	63.35	1628
650	264	42.37	2024	650	284	52.01	1858	650	334	75.73	1574
700	292	49.80	1959	700	315	61.34	1798	700	372	89.78	1515
750	321	58.12	1888	750	348	71.83	1735	750	413	105.59	1456
800	353	67.39	1819	800	383	83.54	1673	800	457	123.25	1399
850	386	77.65	1758	850	421	96.55	1616	850	504	142.87	1347
900	421	88.98	1703	900	460	110.90	1563	900	552	164.60	1299
1000	498	115.07	1604	1000	545	143.87	1466	1000	658	215.09	1213
1050	539	129.97	1555	1050	591	162.69	1419	1050	714	244.22	1172
1100	582	146.26	1508	1100	639	183.60	1373	1100	775	276.28	1132
1150	628	164.04	1461	1150	692	206.78	1328	1150	840	311.38	1092
1200	675	183.24	1418	1200	743	230.87	1288	1200	908	348.74	1053
1250	724	203.86	1376	1250	794	255.64	1255	1250	978	388.56	1018
1300	776	226.53	1335	1300	858	286.92	1208	1300	1059	435.59	978
1350	831	251.32	1295								
1400	888	277.14	1257								
1450	950	304.32	1216								
1500	1023	337.25	1169								

### Available Dimensions

Grade named according to isovac®	Delivery form	Width [mm]	Length [mm]
isovac HP 600-50 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 600-50 A	✔	✔	☰	✔	✔

✔ Available ☰ On request

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