Properties and characteristics of various metal

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Metal type	Code	Electrical Resistivity (μΩm)		Average TCR (x10-6/℃)	Thermal Expansion Coefficient (x10-6/℃)	Melting Point (℃)	Density (g•cm3)	Max Operating Temperature (℃)
Nickel Chrome	NCH1	1.08	±0.05	＊80	17.0	1400	8.41	1100
	NCH2	1.12	±0.05	＊180	17.0	1400	8.25	1000
	Nikrothal 80	1.09				1400	8.30	1200
	Nikrothal 60	1.11				1390	8.20	1125
Fe-Chrome	FCH1	1.42	±0.06	＊-20	13.0	1520	7.20	1250
	FCH2	1.23	±0.06	＊90	12.5	1500	7.35	1100
	No.30	1.42	±0.06		13.0	1520	7.20	1300
Kanthal Fe-Cr Alloy	Kanthal A-1	1.45			15.0	1500	7.10	1400
	Kanthal AF	1.39			15.0	1500	7.15	1300
	Kanthal D	1.35			15.0	1500	7.25	1300
Precision resistance wire	Nikrothal LX	＊1.33		±5,±10		1390	8.30	250
K thermocouple strands	Alumel KN(-)	0.28		2200	12.0	1399	8.60	Depends on wire diameter
	Chromel KP(+)	0.69		350	13.1	1427	8.73	Depends on wire diameter
Copper Nickel Resistance Wire	CN49 (CuNi44)	0.49	±0.03	＊±40	13.5	1240	8.90	400
	CN30 (CuNi23)	0.30	±0.024	＊180	17.5	1150	8.90	300
	CN15 (CuNi10)	0.15	±0.015	＊490	17.5	1100	8.90	250
	CN10 (CuNi6)	0.10	±0.012	＊710	17.5	1090	8.90	220
	CN5 (CuNi2)	0.05	±0.0075	＊1300	17.5	1080	8.90	200
	Monel 400	0.50			13.9	1350	8.80	400
Manganin 44μ	CM44	0.44	±0.03	＊±50	18.0	＊1020	8.44	150
Pure Nickel	Ni(NW2200)	＊0.095	±0.015	＊4500	15.0	1400	8.90	400
	Ni(NW2201)	＊0.095	±0.015	＊4500	15.0	1400	8.90	400
	Ni99.6	＊0.095	±0.015	＊4500	15.0	1400	8.90	400
Manganese nickel	2%MnNi	＊0.11		＊4300	14.0	1360	8.90	400
Fe-Nickel	42%NiFe	＊0.65		＊2360	＊4.0～7.4		8.10	
	52%NiFe	＊0.37		＊3900	＊9.7～10.5		8.35	
Iron-nickel-cobalt	Kovar KOV	0.49		＊3500	4.9～6.2	1450	8.24	
Stainless steel	SUS 304	0.72		1100	17.3	1400	7.93	
	SUS 310S	0.78			14.4	1400	7.98	
	SUS 316L	0.77			16.0	1370	7.98	
phosphor bronze	PBW2(C5191)	0.115			18.0	1050	8.83	
	PBW3(C5212)	0.140			18.2	1040	8.80	
iron wire 60C	SWRH62A	0.204					7.8～7.9	
Inconel 600	INCONEL 600	1.03					8.47(8.415)	

（＊）Reference value

※Kanthal A-1, AF, D and Nikrothal LX are registered trademarks of Sandvik AB.

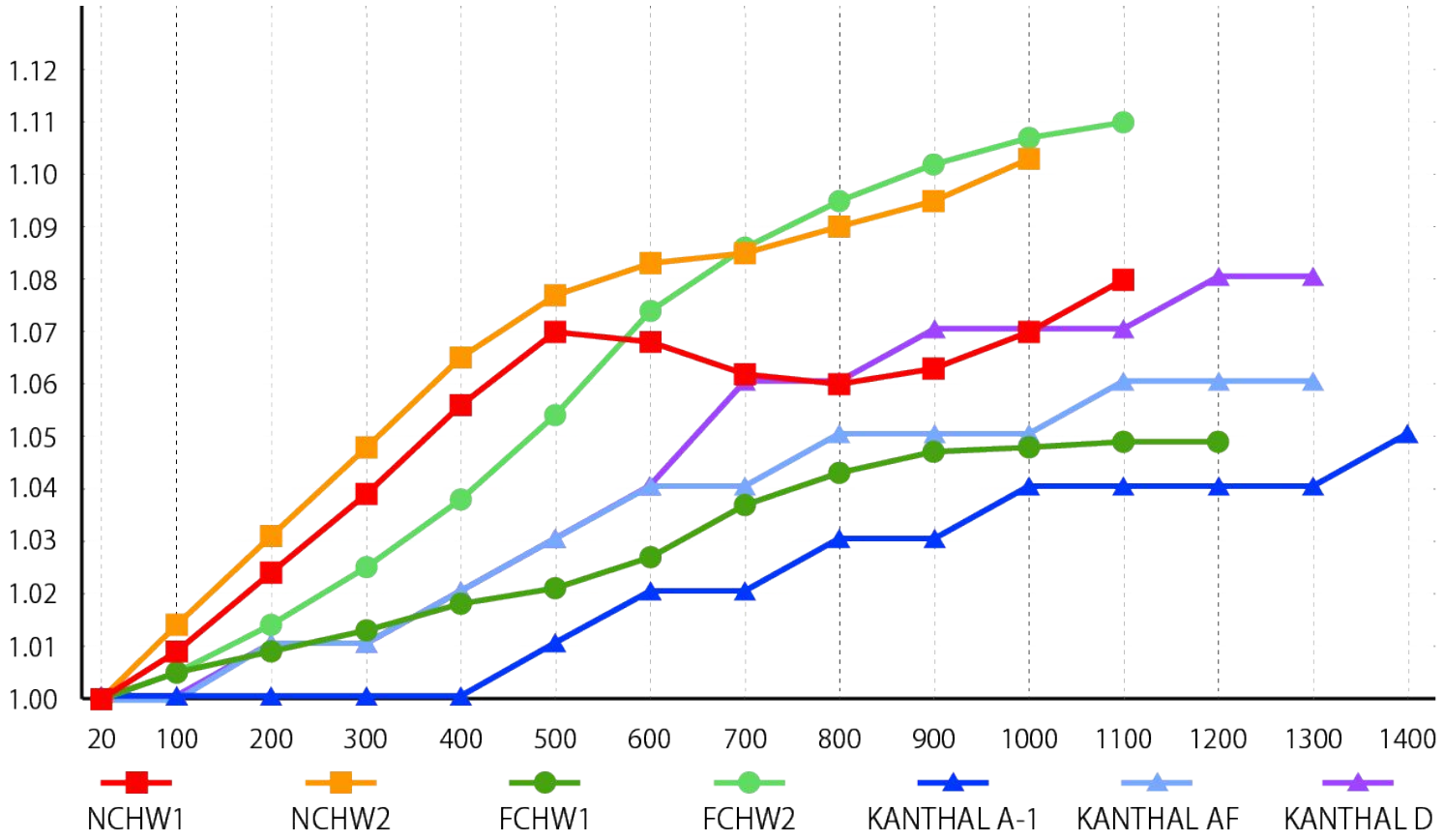
Temperature characteristics chart

Temperature characteristics chart

Coefficient of increase in resistance with temperature (nickel-chromium electric heating wire, iron-chromium resistance wire)

Temperature (℃)	20	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400
NCHW1	1.000	1.009	1.024	1.039	1.056	1.070	1.068	1.062	1.060	1.063	1.070	1.080	–	–	–
NCHW2	1.000	1.014	1.031	1.048	1.065	1.077	1.083	1.085	1.090	1.095	1.103	–	–	–	–
FCHW1	1.000	1.005	1.009	1.013	1.018	1.021	1.027	1.037	1.043	1.047	1.048	1.049	1.049	–	–
FCHW2	1.000	1.005	1.014	1.025	1.038	1.054	1.074	1.086	1.095	1.102	1.107	1.110	–	–	–
Kanthal A-1	1.000	1.000	1.000	1.000	1.000	10.10	1.020	1.030	1.030	1.030	1.040	1.040	1.040	1.040	1.050
Kanthal AF	1.000	1.000	1.010	1.010	1.020	1.030	1.040	1.040	1.050	1.050	1.050	1.060	1.060	1.060	–
Kanthal D	1.000	1.000	1.010	1.010	1.020	1.030	1.040	1.060	1.060	1.070	1.070	1.070	1.080	1.080	–

Graph (coefficient of resistance increase with temperature)



※Kanthal A-1, AF, D are registered trademarks of Sandvik AB.

[WEBSITE] http://main.tokyo-resistance-wire.com/ [TEL] +81-3-3736-5201

Products manufactured and sold

Products manufactured and sold

Materials for electricity Alloys for electric heating Wire, strip and foil

Metal type	Code	Type	Dimension (mm)	
Nickel Chrome Type 1	NCHW1	Wire	φ6.00～0.020	
	NCHR1	Ribbon	t=2.90~0.05	w=40~0.2 (Varies depending on thickness)
	NCH1P	Plate	Pls consult	
	NCH1	Coil / Foil	Pls consult	
Nickel Chrome Type 2	NCHW2	Wire	φ6.00～0.030	
	NCHR2	Ribbon	t=2.90~0.08	w=40~0.4 (Varies depending on thickness)
	NCH2P	Plate	Pls consult	
	NCH2	Coil / Foil	Pls consult	
Fe-Chrome Type 1	FCHW1	Wire	φ6.00～0.16	
	No.30	Wire	Φ1.00～0.08	
	No.30	Ribbon	Pls consult	
	FCHR1	Ribbon	t=2.90~0.08	w=40~0.4 (Varies depending on thickness)
Fe-Chrome Type 2	FCHW2	Wire	φ6.00～0.12	
	FCHR2	Ribbon	t=2.90~0.08	w=40~0.4 (Varies depending on thickness)
Kanthal Fe-Cr Alloy	Kanthal A-1	Wire	φ10.0～1.00	
	Kanthal A-1	Ribbon	t=2.0、2.5、3.0	w=20、25、30
	Kanthal AF	Wire	φ10.00～0.30	
	Kanthal AF	Ribbon	t=1.0、1.2、1.5、2.0、2.5、3.0	w=10、15、20、25、30
	Kanthal D	Wire	φ6.50～0.13	

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Products manufactured and sold

Electrical materials Wires, strips and plates for electrical resistance

Metal type	Code	Type	Dimension (mm)	
Copper Nickel Resistance Wire Type 49	CN49W (CuNi44)	Wire	φ6.00～0.025	
	CN49R (CuNi44)	Ribbon	t=2.90~0.08	w=40~0.4 (Varies depending on thickness)
	CN49P (CuNi44)	Plate	Pls consult	
	CN49 (CuNi44)	Coil / Foil	Pls consult	
Copper Nickel Resistance Wire Type 30	CN30W (CuNi23)	Wire	φ6.00～0.05	
	CN30R (CuNi23)	Ribbon	t=2.90~0.08	w=40~0.4 (Varies depending on thickness)
	CN30P (CuNi23)	Plate	Pls consult	
	CN30 (CuNi23)	Coil / Foil	Pls consult	
Copper Nickel Resistance Wire Type 15	CN15W (CuNi10)	Wire	φ6.00～0.06	
	CN15R (CuNi10)	Ribbon	t=2.90~0.08	w=40~0.4 (Varies depending on thickness)
	CN15P (CuNi10)	Plate	Pls consult	
	CN15 (CuNi10)	Coil / Foil	Pls consult	
Copper Nickel Resistance Wire Type 10	CN10W (CuNi6)	Wire	φ6.00～0.06	
	CN10R (CuNi6)	Ribbon	t=2.90~0.08	w=40~0.4 (Varies depending on thickness)
	CN10P (CuNi6)	Plate	Pls consult	
	CN10 (CuNi6)	Coil / Foil	Pls consult	
Copper Nickel Resistance Wire Type 5	CN 5W (CuNi2)	Wire	φ6.00～0.06	
	CN 5R (CuNi2)	Ribbon	t=2.90~0.08	w=40~0.4 (Varies depending on thickness)
	CN 5P (CuNi2)	Plate	Pls consult	
	CN 5 (CuNi2)	Coil / Foil	Pls consult	
Monel	Monel400	Wire	φ5.00～0.03	
	Monel400	Ribbon	Pls consult	
Manganin 44μ	CM44W	Wire	φ6.00～0.04	
	CM44R	Ribbon	Pls consult	
	CM44P	Plate	(Standard) 1.0t×180w×1200L	
	CM44	Coil / Foil	Pls consult	
Kanthal Precision resistance wire	NIKROTHAL LX	Wire	φ0.5～0.02	

※Nikrothal LX is registered trademarks of Sandvik AB.

Products manufactured and sold

Category	Metal type		Code	Type	Dimension (mm)
Nickel and Nickel Alloys	Pure nickel (NW2200,NW2201)		NiW	Wire	φ6.00～0.02
			NiR	Ribbon	Pls consult
			NiP	Ribbon	Pls consult
			Ni	Coil / Foil	Pls consult
Manganese Nickel Alloy	Manganese nickel		2%MnNi	Wire	φ5.00～0.03
			2%MnNi	Ribbon	Pls consult
Iron-nickel-cobalt	Kovar		KOV	Wire	φ5.00～0.03
			KOV	Ribbon	Pls consult
Stainless steel wire	**Stainless steel**		SUS 304	wire/ ribbon	Pls consult
			SUS 305J-1	wire/ ribbon	Pls consult
			SUS 310S	wire/ ribbon	Pls consult
			SUS 316L	wire/ ribbon	Pls consult
Copper alloy products	phosphor bronze		PBW2	wire/ ribbon	Pls consult
			PBW3	wire/ ribbon	Pls consult
Iron-nickel alloy	iron-nickel		52%NiFe	Wire	φ5.00～0.03
			52%NiFe	Ribbon	Pls consult
			42%NiFe	Wire	φ5.00～0.03
			42%NiFe	Ribbon	Pls consult
Category	**+side**	**−side**	**Code**	**Type**	**Dimension (mm)**
Thermocouple compensation conductor	Nickel Chromium Alloy	Nickel Alloy	K	Wire	Pls consult
			KX	Wire	Pls consult
	Iron	Copper nickel alloy	KCB	Wire	Pls consult
	Nickel Chromium Alloy	Copper nickel alloy	E	Wire	Pls consult
			EX	Wire	Pls consult
	Iron	Copper nickel alloy	J	Wire	Pls consult
			JX	Wire	Pls consult
Category	**others**		**Processing Type**		**Dimension (mm)**
Others	Processing method		(resin, silk, glass) film resistance wire		Pls consult
			Spiral Process		Pls consult
			Wire Drawing Technology		Pls consult
			Rolling Process		Pls consult