

PTC Ni-Fe alloy

1: subject content and trial scope

Dimensions, shapes, weights, technical requirements, test methods, inspection rules, etc., suitable for drawing and rolling Ni-Fe alloy wire, strip, bar and wire rod with electric heating element and general resistance.

2: quoted standard

GB223 methods for chemical analysis of iron, steel and alloys

GB228 metal tensile test method

GB6146 precision resistance alloy resistivity test method

Test method for temperature coefficient of GB/T6148-2005 precision resistance alloy
3: dimension, diameter tolerance, chemical composition, elongation, temperature coefficient, meter resistance tolerance

3.1 Dimensions to be in accordance with Table 1

NO:1

Type	Diameter mm		
	Wire material	bar	steel wire rod
NF13	0.025-8.0	12-45	8-14
NF15	0.025-8.0	12-45	8-14
NF20	0.025-8.0	12-45	8-14
NF23	0.025-8.0	12-45	8-14
NF25	0.025-8.0	12-45	8-14
NF32	0.025-8.0	12-45	8-14
NF36	0.025-8.0	12-45	8-14
NF38	0.025-8.0	12-45	8-14
NF40	0.025-8.0	12-45	8-14
NF43	0.025-8.0	12-45	8-14
NF46	0.025-8.0	12-45	8-14
NF52	0.025-8.0	12-45	8-14
NF60	0.025-8.0	12-45	8-14

3.2 Diameter dimensions of wire should be in accordance with the promised deviation

NO:3

NO:3

classification	Diameter range mm	Promise deviation ± mm
Cold drawing wire	>0.025-0.1	±0.007
	>0.1-0.3	±0.01
	>0.3-0.5	±0.015
	>0.5-1.0	±0.02

	>1.0-3	± 0.03
	>3-6	± 0.04
	>6-8	± 0.05

4:technical requirement

4.1 chemical composition

Type	chemical element		
	Ni%	Fe%	
NF13	85-95	Rest	
NF15	75-85	Rest	
NF20	70-75	Rest	
NF23	60-65	Rest	
NF25	60-65	Rest	
NF32	50-55	Rest	
NF36	50-55	Rest	
NF38	50-55	Rest	
NF40	50-55	Rest	
NF43	45-50	Rest	
NF46	45-50	Rest	
NF52	45-50	Rest	
NF60	45-50	Rest	

4.2 resistivity

Type	20°C resistivity	limits of tolerance
NF13	0.13	± 0.02
NF15	0.15	± 0.02
NF20	0.20	± 0.02
NF23	0.23	± 0.02
NF25	0.25	± 0.02
NF32	0.32	± 0.02
NF36	0.36	± 0.02
NF38	0.38	± 0.02
NF40	0.40	± 0.02
NF43	0.43	± 0.02
NF46	0.46	± 0.02
NF52	0.52	± 0.02
NF60	0.60	± 0.02

4.4 temperature coefficient

The resistance R25 is measured at 20 °C , then the resistance R125 at 120 °C , and then the temperature coefficient is $R_{120}-R_{20} / R_{20} / 100000$ in ppm/ °C.

Type	120 °C temperature coefficient PPM	limits of tolerance PPM
NF13	3600	± 300
NF15	3500	± 300
NF20	4500	± 300
NF23	4800	± 300
NF25	4600	± 300
NF32	4200	± 300
NF36	3800	± 300
NF38	4000	± 300
NF40	3800	± 300
NF43	3400	± 300
NF46	3200	± 300
NF52	3000	± 300
NF60	2500	± 300

4.3 Alloy wire meter resistance

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dia metre mm	resistance per meter Ω/m											
	NF20			NF32			NF43			NF52		
	mid-v alue	SCO pe	Dev iatio n %	mid-v alue	SCO pe	Dev iatio n	mid-v alue	SCO pe	Dev iatio n	mid-v alue	SCO pe	Dev iatio n
0.05	101.85		± 10	162.97		± 10	218.99		± 10	264.83		± 10
0.06	70.73		± 10	113.17		± 10	152.08		± 10	183.91		± 10
0.07	51.96		± 8	83.15		± 8	11.73		± 8	135.11		± 8
0.08	39.78		± 8	39.78		± 8	85.54		± 8	103.45		± 8
0.09	31.43		± 8	50.30		± 8	67.58		± 8	81.73		± 8
0.10	25.46		± 8	40.74		± 8	54.74		± 8	66.20		± 8

0.11	21.04		±8	33.67		±8	45.24		±8	54.71		±8
0.12	17.68		±8	28.29		±8	38.02		±8	45.97		±8
0.13	15.06		±7	24.10		±7	32.39		±7	39.17		±7
0.14	12.99		±7	20.78		±7	27.93		±7	33.77		±7
0.15	11.31		±7	18.10		±7	24.33		±7	29.42		±7
0.16	9.94		±7	15.91		±7	21.38		±7	25.86		±7
0.17	8.81		±7	14.09		±7	18.94		±7	22.90		±7
0.18	7.85		±6	12.57		±6	16.89		±6	20.43		±6
0.19	7.05		±6	11.28		±6	15.16		±6	18.34		±6
0.20	10.18		±6	10.18		±6	13.68		±6	16.55		±6
0.21	2.77		±6	9.23		±6	12.41		±6	15.01		±6
0.22	5.26		±6	8.41		±6	11.31		±6	13.67		±6
0.23	4.81		±6	7.70		±6	10.34		±6	12.51		±6
0.24	4.42		±6	4.42		±6	9.50		±6	11.49		±6
0.25	4.07		±6	6.51		±6	8.75		±6	10.59		±6
0.26	3.76		±6	6.02		±6	8.09		±6	9.79		±6
0.27	3.49		±6	5.58		±6	7.51		±6	9.08		±6
0.28	3.24		±6	5.19		±6	6.98		±6	8.44		±6
0.29	3.02		±6	4.84		±6	6.51		±6	7.87		±6

0.30	2.82		±6	4.52		±6	6.08		±6	7.35		±6
0.31	2.64		±6	4.23		±6	5.69		±6	6.88		±6
0.32	2.48		±6	3.97		±6	5.34		±6	6.46		±6
0.33	2.33		±5	3.74		±5	5.02		±5	6.07		±5
0.34	2.20		±5	3.52		±5	4.73		±5	5.72		±5
0.35	2.07		±5	3.32		±5	4.46		±5	5.40		±5
0.36	1.96		±5	3.14		±5	4.22		±5	5.10		±5
0.37	1.86		±5	2.97		±5	3.99		±5	4.83		±5
0.38	1.76		±5	2.82		±5	3.79		±5	4.58		±5
0.39	1.67		±5	2.67		±5	3.59		±5	4.35		±5
0.40	1.59		±5	2.54		±5	3.42		±5	4.13		±5

2

Dia mete r mm	resistance per meter Ω/m											
	NF23			NF25			NF46			NF60		
	mid-v alue	Sco pe	Dev iatio n %	mid-v alue	Sco pe	Dev iatio n	mid-v alue	Sco pe	Dev iatio n	mid-v alue	Sco pe	Dev iatio n
0.05	117.13		± 10	127.32		± 10			± 10			± 10
0.06	81.34		± 10	88.41		± 10			± 10			± 10
0.07	59.76		±8	64.96		±8			±8			±8
0.08	45.75		±8	49.73		±8			±8			±8

0.09	36.15		±8	39.29		±8			±8			±8
0.10	29.28		±8	31.83		±8			±8			±8
0.11	24.20		±8	26.30		±8			±8			±8
0.12	20.33		±8	22.1		±8			±8			±8
0.13	17.32		±7	18.83		±7			±7			±7
0.14	14.94		±7	16.24		±7			±7			±7
0.15	13.01		±7	14.14		±7			±7			±7
0.16	11.43		±7	12.43		±7			±7			±7
0.17	10.13		±7	11.01		±7			±7			±7
0.18	9.03		±6	9.82		±6			±6			±6
0.19	8.11		±6	8.81		±6			±6			±6
0.20	7.32		±6	7.95		±6			±6			±6
0.21	6.64		±6	7.21		±6			±6			±6
0.22	6.05		±6	6.57		±6			±6			±6
0.23	5.53		±6	6.01		±6			±6			±6
0.24	5.08		±6	5.52		±6			±6			±6
0.25	4.68		±6	5.09		±6			±6			±6
0.26	4.33		±6	4.70		±6			±6			±6
0.27	4.01		±6	4.36		±6			±6			±6

0.28	3.73		±6	4.06		±6			±6			±6
0.29	3.48		±6	3.78		±6			±6			±6
0.30	3.25		±6	3.53		±6			±6			±6
0.31	3.04		±6	3.31		±6			±6			±6
0.32	2.85		±6	3.10		±6			±6			±6
0.33	2.68		±5	2.92		±5			±5			±5
0.34	2.53		±5	2.75		±5			±5			±5
0.35	2.39		±5	2.59		±5			±5			±5
0.36	2.25		±5	2.45		±5			±5			±5
0.37	2.13		±5	2.32		±5			±5			±5
0.38	2.02		±5	2.20		±5			±5			±5
0.39	1.92		±5	2.09		±5			±5			±5
0.40	1.83		±5	1.98		±5			±5			±5

4.5 Alloy wire elongation

classification	Diameter range mm	Elongation \geq %
Cold drawing wire	0.025 > d < 0.1	≥ 18
	0.1 > d < 0.3	≥ 20
	0.3 > d < 0.5	≥ 20
	0.5 > d < 1.0	≥ 20