0Cr20Al6RE

GB/T 1234-2012

Rare-earth modified Fe-Cr-Al alloy: an oxide scale that stays put, grains that refuse to coarsen, and 1.5–2× the oxidation life of standard 0Cr25Al5.

1300 °C	1.40 μΩ·m	7.2 g/cm³	≥80 h
MAX. WORKING TEMPERATURE	RESISTIVITY AT 20 °C	DENSITY	ACCELERATED LIFE AT 1300 °C

PRODUCT OVERVIEW

0Cr20Al6RE is one of the most technically ambitious grades in the GB/T 1234-2012 Fe-Cr-Al series. A trace rare-earth addition attacks the three chronic weaknesses of conventional Fe-Cr-Al material: scale spalling, grain coarsening and short thermal-cycling life. Creep resistance is a little below that of 0Cr21Al6Nb, but oxidation and thermal-fatigue behaviour are clearly better.

The rare earths produce the reactive-element effect. Fine oxide particles pin the grain boundaries, so the scale that forms at 1200–1300 °C adheres tightly and expands and contracts with the substrate instead of flaking off; between 1200 and 1300 °C the oxidation life is typically 1.5 to 2 times that of standard 0Cr25Al5. Grain growth is held back the same way, so the alloy keeps more of its toughness and strength after long high-temperature service and is far less likely to fracture through coarse grains.

These properties suit duty with frequent start-stop cycles and wide temperature swings — batch furnaces and laboratory muffle furnaces in particular, where standard alloys lose scale on every cycle. Material cost runs roughly 10–20 % above 0Cr25Al5, which longer life and fewer replacements normally repay.

CLASSIFICATION

Fe-Cr-Al heating alloy · GB/T 1234-2012 · rare-earth modified grade for thermal-cycling duty

CHEMICAL COMPOSITION

C	P	S	Mn	Si	Cr	Ni	Al	Fe	RE
≤0.04	≤0.025	≤0.02	≤0.5	≤0.4	19.0–21.0	≤0.6	5.0–6.0	Bal.	0.04–1.0

Values in weight %. Balance (Bal.) is iron. Composition based on GB/T 1234-2012.

TYPICAL APPLICATIONS

- Batch-type industrial furnaces
- Laboratory muffle furnaces
- Large temperature fluctuations
- Long-life elements at 1200–1300 °C

— Frequent start-stop (thermal cycling) duty

PHYSICAL & MECHANICAL PROPERTIES

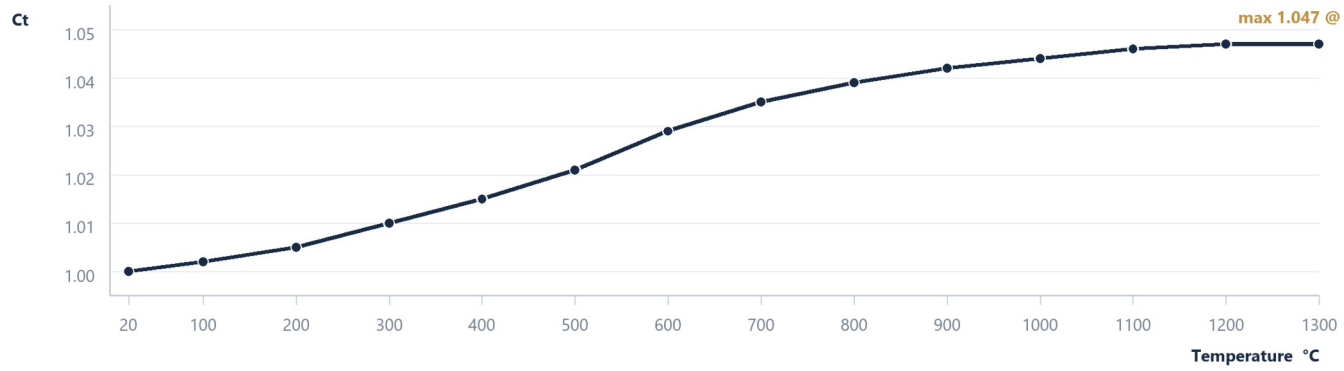
Property	Value	Property	Value
Max. working temperature	1300 °C	Resistivity at 20 °C (μΩ·m)	1.40 ± 0.07
Density	7.2 g/cm³	Thermal conductivity (20 °C)	13 W/(m·K)
Mean linear expansion 20–1000 °C	14.0 × 10^{-6} /K	Specific heat capacity	0.48 J/(g·K)
Approx. melting point	1500 °C	Elongation after fracture A/%	≤3.0 mm: ≥12 % >3.0 mm: ≥15 %
Tensile strength Rm	≥600 MPa	Accelerated life test	≥80 h at 1300 °C
Micrographic structure	Ferrite	Magnetic properties	Magnetic

TEMPERATURE FACTOR OF RESISTIVITY

Ct is applied to the 20 °C resistivity to obtain the value at working temperature:

R (T) = R (20 °C) × Ct

Temp. °C	20	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300
Ct	1.000	1.002	1.005	1.010	1.015	1.021	1.029	1.035	1.039	1.042	1.044	1.046	1.047	1.047



AVAILABLE FORMS & SUPPLY RANGE

Form	Surface / finish	Size range
Wire	Bright, soft annealed	0.05 – 1.6 mm
Wire	Acid-pickled	1.0 – 12.0 mm
Rod	Oxidized, acid-pickled or bright finish	6.0 – 150.0 mm
Flat wire	Bright & soft annealed	width 0.2 – 6.0 mm · thickness 0.08 – 1.0 mm
Heating ribbon	Oxidized, acid-pickled or bright finish	width 5.0 – 300 mm · thickness 0.05 – 4.0 mm

TECHNICAL PARAMETERS

Standard diameters 0.05 – 9.0 mm: resistance, yield length and weight per metre. Calculated to GB/T 1234-2012.

Ø mm	Ω/m at 20 °C	m/kg	g/m	Ø mm	Ω/m at 20 °C	m/kg	g/m
0.05	713.015	70735.59	0.01414	1.1	1.4732	146.15	6.84238
0.06	495.149	49121.94	0.02036	1.2	1.2379	122.80	8.14300
0.07	363.783	36089.59	0.02771	1.3	1.0548	104.64	9.55672
0.08	278.521	27631.09	0.03619	1.4	0.9095	90.22	11.08353
0.09	220.066	21831.97	0.04580	1.5	0.7922	78.60	12.72344
0.1	178.254	17683.90	0.05655	1.6	0.6963	69.08	14.47645
0.11	147.317	14614.79	0.06842	1.7	0.6168	61.19	16.34255
0.12	123.787	12280.48	0.08143	1.8	0.5502	54.58	18.32175
0.13	105.476	10463.84	0.09557	1.9	0.4938	48.99	20.41405
0.15	79.224	7859.51	0.12723	2.0	0.4456	44.21	22.61945
0.17	61.679	6119.00	0.16343	2.2	0.3683	36.54	27.36953
0.19	49.378	4898.59	0.20414	2.4	0.3095	30.70	32.57201
0.21	40.420	4009.95	0.24938	2.6	0.2637	26.16	38.22687
0.25	28.521	2829.42	0.35343	2.8	0.2274	22.56	44.33412
0.27	24.452	2425.77	0.41224	3.0	0.1981	19.65	50.89376
0.29	21.195	2102.72	0.47557	3.2	0.1741	17.27	57.90579
0.31	18.549	1840.16	0.54343	3.4	0.1542	15.30	65.37020
0.35	14.551	1443.58	0.69272	3.6	0.1375	13.64	73.28701
0.40	11.141	1105.24	0.90478	3.8	0.1234	12.25	81.65621
0.45	8.803	873.28	1.14511	4.0	0.1114	11.05	90.47779
0.50	7.130	707.36	1.41372	4.5	0.0880	8.73	114.51096
0.55	5.893	584.59	1.71060	5.0	0.0713	7.07	141.37155
0.60	4.951	491.22	2.03575	5.5	0.0589	5.85	171.05958
0.65	4.219	418.55	2.38918	6.0	0.0495	4.91	203.57503
0.70	3.638	360.90	2.77088	6.5	0.0422	4.19	238.91792
0.80	2.785	276.31	3.61911	7.0	0.0364	3.61	277.08824
0.85	2.467	244.76	4.08564	7.5	0.0317	3.14	318.08599
0.90	2.201	218.32	4.58044	8.0	0.0279	2.76	361.91117
0.95	1.975	195.94	5.10351	8.5	0.0247	2.45	408.56378
1.00	1.783	176.84	5.65486	9.0	0.0220	2.18	458.04382

TOLERANCE OF RESISTANCE PER METRE

0.03 – 0.06 mm ±10 % · 0.07 – 0.12 mm ±8 % · 0.13 – 0.17 mm ±7 % · 0.18 – 0.32 mm ±6 % · above 0.32 mm ±5 %

Applies to the resistance values listed in the technical parameter table above.

NOTICE

Recommendations are given for guidance only. Suitability of the material can only be confirmed once the actual service conditions are known. Continuous technical development may lead to changes in these data without notice. Some of the common names listed are registered trademarks of their respective owners. Issued October 2026.