

Al:

1. Chrome azurol S photometric method.
2. Chrome azurol S photometric method after cupferron separation.
3. ICP - AES Method.
4. Atomic absorption spectrometric method.

B:

1. Curcumin photometric method after methanol distillation.
2. Methylene blue-1,2,-Dichloroethane extraction photometric method.
3. HPTA photometric method.
4. Ion selective electrode method.

Mo:

1. Thiocyanate photometric method.
2. Thiocyanate-N-Butyl acetate extraction photometric method.
3. Atomic absorption spectrometric method.

V:

1. Permanganate oxidation volumetric method.
2. N-Benzoyl phenylhydroxylamine photometric method.
3. Sodium diphenylamine-sulfonate photometric method.
4. Phosphotungstate photometric method.

Ti:

1. Diantipyrylmethane photometric method.
2. Chromotropic acid photometric method.

Certificate of Certified Reference Material

NCS HC 13201 — NCS HC 13212

Low Alloy Steel

Reissued in 2005

Approved by China National Analysis Center for Iron and Steel

(Beijing China)



Professor Wang Haizhou, Chief

China National Analysis Center for Iron and Steel

Certified Values and Uncertainty

(%)										
No.		C	Si	Mn	P	S	Ni	Cr	Cu	Als
NCS HC	Certified Value	0.91	0.056	2.09	0.054	0.030	0.076	0.105	0.20	0.015
13201	Standard Deviation	0.01	0.002	0.02	0.001	0.001	0.003	0.004	0.01	0.002
NCS HC	Certified Value	0.056	1.07	1.20	0.127	0.093	0.66	2.88	0.073	0.405
13202	Standard Deviation	0.002	0.02	0.01	0.003	0.002	0.01	0.02	0.001	0.010
NCS HC	Certified Value	0.70	0.041	0.28	0.083	0.064	0.93	1.45	0.12	(0.0007)
13203	Standard Deviation	0.01	0.002	0.01	0.002	0.002	0.01	0.02	0.01	
NCS HC	Certified Value	0.097	0.29	0.87	0.011	0.096	0.29	0.76	0.034	0.073
13204	Standard Deviation	0.006	0.01	0.01	0.001	0.002	0.01	0.01	0.001	0.002
NCS HC	Certified Value	0.035	0.59	1.79	0.089	0.009	0.020	1.03	0.46	0.59
13205	Standard Deviation	0.002	0.01	0.02	0.001	0.001	0.001	0.01	0.01	0.02
NCS HC	Certified Value	0.81	0.29	0.19	0.060	0.047	0.11	0.53	0.295	0.065
13206	Standard Deviation	0.01	0.01	0.01	0.002	0.001	0.01	0.01	0.004	0.002

(%)														
No.		C	Si	Mn	P	S	Ni	Cr	Cu	Als	V	Ti	Mo	Bs
NCS HC	Certified Value	0.294	0.070	1.48	0.036	0.009	0.019	0.037	0.035	0.029	0.025	0.023	0.038	0.011
13207	Standard Deviation	0.005	0.002	0.01	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.001
NCS HC	Certified Value	1.085	1.42	0.308	0.013	0.004	0.021	0.045	0.036	0.115	0.50	0.30	0.89	0.016
13208	Standard Deviation	0.005	0.01	0.004	0.001	0.001	0.001	0.002	0.001	0.006	0.01	0.01	0.02	0.002
NCS HC	Certified Value	0.042	1.11	0.309	0.012	0.006	0.021	0.013	0.035	0.186	0.25	0.70	0.485	0.010
13209	Standard Deviation	0.002	0.01	0.004	0.001	0.001	0.001	0.001	0.002	0.008	0.01	0.01	0.014	0.001
NCS HC	Certified Value	0.78	0.88	0.675	0.013	0.122*	0.021	0.019	0.036	0.10	0.33	0.39	0.65	0.0058
13210	Standard Deviation	0.01	0.01	0.005	0.001	0.002	0.001	0.002	0.002	0.01	0.01	0.01	0.01	0.0004
NCS HC	Certified Value	0.43	0.685	0.18	0.018	0.036	0.020	0.020	0.035	0.036	0.081	0.087	0.28	0.0028
13211	Standard Deviation	0.01	0.005	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.003	0.01	0.0003
NCS HC	Certified Value	0.045	0.46	0.396	0.054	0.069	0.016	(0.0095)	0.030	0.028	0.051	0.041	0.11	0.028
13212	Standard Deviation	0.002	0.01	0.007	0.001	0.002	0.001		0.001	0.001	0.002	0.001	0.01	0.002

Note:

- 1.The value in () is for reference only.
- 2.The value with * is given by gravimetric method.
- 3.Each certified value is the mean of analytical results of 19 independent laboratories.
- 4.The sample is packed in glass bottle. The minimum package is 100 grams.

Analytical Methods

C:

1. Combustion-gravimetric method
2. Combustion-gas volumetric method.
3. Combustion-coulometric method.
4. Combustion-infrared absorption method.
5. Combustion-non aqueous titrimetric method.

Si:

1. Gravimetric method after dehydration with perchloric acid.
2. Molybdenum blue photometric method.

Mn:

1. Periodate oxidation photometric method.
2. Persulfate oxidation arsenite-nitrite titrimetric method.
3. Persulfate oxidation photometric method.
4. Atomic absorption spectrometric method.

P:

1. Diantiprylmethane-phosphotomolybdic acid gravimetric method.
2. Quinoline-phosphomolybdate gravimetric method.
3. Ammonium phosphomolybdate volumetric method.
4. N-Butyl alcohol - chloroform extraction molybdenum blue photometric method.
5. N-Butyl acetate extraction molybdenum blue photometric method.
6. Antimony-molybdenum blue photometric method.

S:

1. Chromatographic gravimetric method.
2. Methylene blue photometric method after distillation.
3. Evolution-potentiometric method.
4. Sulphur ion selective electrode potentiometric method after distillation.
5. Combustion-iodate titrimetric method.
6. Combustion-infrared absorption method.
7. Evolution-ultraviolet spectrophotometric method.

Cr:

1. Persulfate oxidation titrimetric method.
2. Diphenylcarbazide photometric method.
3. Atomic absorption method.

Ni:

1. Dimethylglyoxime - chloroform extraction photometric method.
2. Dimethylglyoxime photometric method.
3. Atomic absorption spectrometric method.

Cu:

1. Neocuproine photometric method.
2. Bis-cyclohexanone oxalyldihydrazone photometric method.
3. Diethyldithiocarbamate photometric method.
4. Atomic absorption spectrometric method.