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Approved by State Bureau of Technical Supervision
The People's Republic of China
GBW01131—GBW01137

Certificate of Certified Reference Material
Cast Low Alloy Iron
(for Spectral Analysis)

Sample Number

Date of Certification

Central Iron & Steel Research Institute Beijing China
Shanghai Huizong Automotive Manufacturing Company Limited
Shanghai China The Twelfth Institute

This set of certified reference materials used by Spectrographs Analysis consist of seven kinds of cast low alloy iron materials. They can be used for ductile iron ,vermicular cast iron, forgeable cast iron-grey cast iron and some cast alloy iron to calibrate the instruments, evaluate analytical methods and coordinate the data when testing the quality of product. They can also be used for production control and quality supervision in product analysis.

1. Preparation Method

A intermediat-frequency induction furnace is used for the smelting. The intrinsic quality of these reference materials is ensured by taking special preparation technics. Finally they are processed into solid sample with dimension of Φ033 × 30mm.

2. Certified Value and Uncertainty

The certified values and uncertainty were listed in table 1.

3. Analytical Methods

Element	Analytical Method
C	Combustion-gas volumetric method;Combustion-Infrared absorption method
Si	Silicon molybdenum blue photometric; Gravimetric method after dehydration with perchloric acid;ICP-AES method
Mn	Periodate oxidation photometric method; ICP-AES method; Atomic Absorption Spectrometry
P	Diantipyrylmethane-Phosphomolybdic acid gravimetric method; Ammonium phosphomolybdic acid titrimetric method;Sodium fluoride and tin protochloride photometric method; Bismuth pholphomolybdimum blue photometric method; ICP-AES method
S	Alumina chromatographic separation-barium sulfate gravimetric method; Combustion-Infrared absorption method
Cr	Ammonnium persulfate oxidation titrimetric method; ICP-AES method; AAS method;Sodium carbonate separation diphenylcarbazide photometric method
Ni	Dimethylglyoxime photometric method; Dimethylyoxime extraction photometric method;ICP—AES method;AAS method
Cu	Sodium thiosulfate separation iodimetric method; BCO photometric method; Neocuproine extration photometric method;ICP-AES method;AAS method
W	Thiocyanate photometric method; Tetraphenylarsonium xhloride-thiocyanate chloroform extraction method; Chlorhydric acid chlorpromazin-thiocyanate photometric method; ICP-AES method; AAS method
Mo	Butyl acetate extraction photometric method; ICP-AES method; Thiocyanate photometric method;ICP-MS methods;AAS method
V	BPHA extraction photometric method; Diantipyryl methane-tin protochloride extraction photometric method; ICP-AES method; AAS method; ICP-MS method
B	Distillation separation-curcumin photometric method; Curcumin direct photometric method; Ion selective electrode method; Methylene blue-dichloroethane extraction photometric method ;ICP-MS method
Mg	Dimethylbenzidine blue photometric method;AAS method;ICP-AES method
La	ICP-AES method;ICP-MS method;Chlorophosphonazo mA Photometric method
Ce	Chlorophosphonazo mA photometric method; Patassium permanganate oxidization o-hydrazo photometric method; ICP-MS method; ICP-AES method

Sn	Phenylflurone photometric method after extraction separation by iodite;Catechol violet-bromohexadecyltrimethylamine photometric method; Graphitic atomic absorption spectrometry; ICP-AES method

4. Homogeneity Detection

We random select samples to inspect their homogeneity and analyze them by extreme difference statistics,which shows that they have good homogeneity. When we use some kinds of instruments for those items which have assured value to take linear detection, good linearity will be drawn.

5. Package and Storage

This set of CRMs contain 7 kinds of reference materials. There is serial number on every kind of sample. They are packed in the box where the certificate of certified reference material is also enclosed. Each time after they are used, put them back to the box and store them carefully. These set of CRMs have good stability, develop unit will check them periodically at followed time and will inform users on time if the values have obviously varied.

6. Data Supplier

Metallurgical Research Institute of Capital Steel Company
Analytical Center of Beijing University of Science
The Iron & Steel Institute of benxi Iron & Steel Company
The Technique Center of Fushun Special Steel Company Limited
The Institute of Daye Steel Factory
The Special Steel Institute of Chongqing Special Steel Company
The Iron &Steel Institute of Chongqing Iron & Steel Company
Pan Zhihua Iron & Steel Research Institute Company
The Technique Center of Wuhan Iron &Steel Company
Central Iron & Steel Research Institute

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Tabel 1. **Certified Value and Uncertainty**

GBW No.	Sample No.	Items	Chemical Composition (Weight Percent)																
			C	Si	Mn	P	S	Cr	Ni	Cu	W	Mo	V	Ti	B	Mg	Sn	La	Ce
GBW01131	Z_1	CV	4.22	0.27	0.916	0.031	0.018	1.42	0.164	1.69	0.009	0.010	0.051	0.008	0.	0.049	0.013	0.010	0.031
		SD	0.02	0.01	0.004	0.002	0.001	0.02	0.003	0.02	0.001	0.001	0.002	0.001	0.	0.003	0.001	0.001	0.003
		N	7	8	8	8	7	8	8	8	8	8	8	8	8	8	8	7	8
GBW01132	Z_2	CV	3.74	1.21	0.403	0.139	0.013	1.88	0.455	1.49	0.008	0.097	0.147	0.024	0.030	0.012	0. 0011	0.095	0. 0013
		SD	0.03	0.01	0.003	0.004	0.002	0.02	0.008	0.02	0.001	0.003	0.002	0.001	0.004	0.001	0. 0001	0.003	0. 0005
		N	7	8	8	8	8	8	8	7	8	8	7	7	8	8	8	7	7
GBW01133	Z_3	CV	3.38	1.86	0.644	0.232	0.015	0.912	0.179	0.821	0.210	0.217	0.029	0.250	0.059	0.032	0. 0045	0.047	0.012
		SD	0.03	0.02	0.006	0.005	0.002	0.006	0.003	0.005	0.009	0.009	0.002	0.005	0.001	0.001	0. 0005	0.003	0.002
		N	8	8	8	8	8	8	8	8	8	8	8	8	7	8	8	7	8
GBW01134	Z_4	CV	3.24	2.02	0.867	0.316	0.038	1.60	0.542	1.15	0.633	0.281	0.050	0. 182	0.112	0.008	0. 0022	0. 0064	0.0004*
		SD	0.01	0.03	0.005	0.005	0.002	0.01	0.006	0.01	0.007	0.006	0.002	0.004	0.003	0.001	0. 0003	0. 0005	
		N	8	8	8	8	8	8	8	8	8	8	8	8	7	8	8	6	
GBW01135	Z_s	CV	2.90	2.31	0.244	0.342	0.062	0.613	0. 927	0.558	0.354	0.416	0. 103	0.142	0.197	0.0004*	0. 0036	0.0003"	0.0003*
		SD	0.03	0.02	0.004	0.007	0.004	0.007	0.010	0.005	0.005	0.006	0.003	0.005	0.006		0. 0004		
		N	8	8	8	8	8	8	8	8	8	8	7	8	8		8		
GBW01136	Z_6	CV	2.69	3.03	1.37	0. 613	0.082	0.302	0.143	0.349	0.524	0.524	0.239	0.052	0.0012	0.0003	0. 0049	0.0003	0.0003*
		SD	0.03	0.03	0.01	0.006	0.004	0.006	0.005	0.005	0.007	0.008	0.004	0.001	0.		0. 0006		
		N	8	8	8	7	8	8	8	8	8	8	7	8	8		8		
GBW01137	Z_7	CV	1.90	3.66	1.67	0.78	0. 114	0.037	0.106	0.126	0.696	0.626	0.304	0.153	0.	0.0006	0.011	0.0003	0.0002*
		SD	0.02	0.02	0.02	0.01	0.005	0.004	0.004	0.004	0.010	0.006	0.005	0.004	0.		0.001		
		N	8	8	8	7	8	8	8	8	8	8	8	8	8		8		

Note. :CV —Certified Value;SD —Standard Deviation; N — Number of Measurement; * Non —Certified Value of Constituent Elements.

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