



## Certificate of Certified Reference Material

### Ferro—Tungsten



Sample Number

Date of Certification



Jilin Ferroalloy Works

Jilin China

This CRM is suitable for calibration of analytical instruments and for verification of analytical methods, and also can be used as a basis for quality control and arbitration analysis.

### 1. Preparation

Raw materials (tungsten concentrate ores, asphalt coke, steel cuttings, ferrosilicon, silica, fluorspar) dosing → smelting → taking out → sizing → sampling → crushing → screening → crushing → screening → grinding → screening → mixing → preliminary inspection → packing → homogeneity inspection → data treatment → constant value evalution.

### 2. Certified Values and Standard Deviation

Certified Value and Standard Deviation	Chemical Composition (Weight Percent)						
	W	Si	P	Mn	Cu	C	S
Certified Value	76.66	0.34	(0.028)	0.12	0.043	0.055	0.048
Standard Deviation (S)	0.17	0.03		0.01	0.002	0.002	0.005

### 3. Analytical Methods

Element	Methods
W	Cinchonine gravimetric method,, Ammonium Nitridate gravimetric method
Si	Volumetric method. Gravimetric method. Molybdenumblue photometric method
P	Hydrazine Photometric, Vanadomolybdochosphoric acid complex yellow, Molybdenumblue photometric
Mn	Sodium Arsenite—Sodium Nitrite volumetric method, Photometric method
Cu	BCO method, Polarography method. Atomic Absorption Spectrophotometry method, Cupral spectrophotometry method
C	Infrared, No Hydration neutralization method. Gas volumetric method, Coulometric method
S	Infrared,Combustion-iodate volumetric method. Ionic chosing electrode potentiometric titration method, Nentralization method.

### 4. Homogeneity Inspection

2% of the sample is taken in random for analysis. Results are checked by using F distribution method. The smallest amount of weight is 0.2 g

### 5. Packing

The smallest package of the standard is a bottle of 50g in paper case

### 6. Co-operating Institutions

Beijing Central Iron & Steel Research Institute

Shanghai Ferroalloy Works

Shanghai Iron & Steel Plant No. 1

Shanghai Iron & Steel Plant No. 5

Emei Ferroalloy Works

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