

The People's Republic of China Certificate of Analysis

YSBC 41340a—2011
YSBC 41340b—2011
YSBC 41129—2011
YSBC 41130—2011

**Certified Reference Material
of O and N in Steel**

Supplied By:
SHIJIAZHUANG TRUMP SCIENTIFIC LTD,

Certification date: September, 2011
Valid till: August, 2020

**Authorized by: Ministry of Industry and Information Technology
of the People's Republic of China**

These certified reference materials are used for analyzing O and N in steel. Their shape is spherical with diameter of 6.18mm and they are nickel-plated outside for long-term preservation. They apply to instrument calibration and evaluating test method, and also can be used as the basis in quantity transmission, control of product quality and arbitration analysis.

Brief introduction of production procedure

Composition design → material selection → wire drawing → segregation check → forming → burnish → rinse → electroplating → homogenization check → component analysis → data statistics → certified values

Certified values and Expanded uncertainty

(W/W, %)								
Grade	YSBC 41340a-2011		YSBC 41340b-2011		YSBC 41129-2011		YSBC 41130-2011	
Elements Items	[O]	[N]	[O]	[N]	[O]	[N]	[O]	[N]
Certified	0.00087	0.0084	0.00080	0.0084	0.0108	0.0027	0.0029	0.0037
STDEV	0.00004	0.0002	0.00005	0.0003	0.0004	0.0002	0.0002	0.0002
Uncertainty	0.00004	0.0002	0.00004	0.0003	0.0003	0.0002	0.0002	0.0002
n	9	9	9	9	9	9	9	9

The certified values are the mean values of the results submitted by qualified analytical qualified laboratories, and the expanded uncertainties are calculated by the following formulas,

$$U = k \sqrt{u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{sts}^2} \quad u_{char} = \frac{S}{\sqrt{n}}$$

Where:

The component of uncertainty, u_{bb} is the standard uncertainty caused by the inhomogeneity among bottles.

The long-term stability standard uncertainty u_{lts} and short-term stability standard uncertainty u_{sts} can be canceled out because of the good stability of the materials.

S is the standard deviation of the results from qualified analytical laboratory.

n is the group number of results.

u_{char} is standard uncertainty caused by the measurement. k is coverage factor and equals 2 when the confidence interval is at 95%.

Analytical method

Oxygen: Infrared Absorption method after fusion in a current of inert gas

Nitrogen: thermal conductimetric method after fusion in a current of inert gas

Homogenization test

First chose 20 bottles randomly from the all samples of each grade, second select 3 balls randomly from every bottle, and then analyze samples to obtain the O and N values. Use the analysis of variance model to process the analysis data in order to check the homogenization. And the result of analysis of variance model shows that the samples of each grade have good homogenization.

Stability study

According to the stability study of the similar type certified reference materials, the stability of these materials are good. Their valid period is more than ten years.

Traceability

The following measures are adopted to assure the traceability of these certified reference materials.

- (1). The certified values reflect analysis results submitted by qualified analytical laboratories who have the qualification of CNAS (China National Accreditation Service for Conformity Assessment) and CMA (China Metrology Accreditation)
- (2). The instrumentation used in the laboratories have passed through the metrological verification and were calibrated by CRMs.

Pack and storage

The shape of these certified reference materials is spherical. They were nickel-plated and hermetic package in plastic bottles which have labels outside. Please clean them with anther, acetone or other organic reagent then dry before using. Please keep them in dry and shade environment.

The laboratories participating in certification of this materials are as follows:

- 1) Baosteel Research institute;
- 2) Shangdong Metallurgical Science Research Institute
- 3) Technology center of TAIYUAN IRON& STEEL (GROUP) CO., LTD
- 4) Daye Special Steel Co., Ltd
- 5) Wuhan Iron and Steel (Group) Corporation
- 6) Chongqing Special Steel Co., Ltd
- 7) Maanshan Iron & Steel Company Limited
- 8) Meishan Iron and Steel Co., Ltd.

Development organization

SHIJIAZHUANG TRUMP SCIENTIFIC LTD,
NO. 88 HUAIAN WEST ROAD, 510 ROOM D PEDESTAL ZHUODA-ZHONGYUAN BUSINESE MANSION, SHIJIAZHUANG,
HEBEI 050091, CHINA
TEL: +86-311-83028511
ATTN: MR. ZHANG ZENGKUN