

**Metal and Quality LLC**  
**Certified Reference Material**  
**Certificate of Chemical Analysis**  
**CA01a**  
**Bearing Steel**



**APPLICABILITY**

Certified Reference Material CA01a is intended for verification of analytical methods, for calibration of analytical instruments based on inert gas fusion methods

**MEAN VALUES OF LABORATORIES**

| Lab. No. | Mass fraction in % |         |
|----------|--------------------|---------|
|          | O                  | N       |
| 1        | 0.00027            | 0.00250 |
| 2        | 0.00028            | 0.00256 |
| 3        | 0.00030            | 0.00274 |
| 4        | 0.00032            | 0.00290 |
| 5        | 0.00033            | 0.00298 |
| 6        | 0.00033            | 0.00300 |
| 7        | 0.00033            | 0.00300 |
| 8        | 0.00036            | 0.00300 |
| 9        | 0.00037            | 0.00310 |
| 10       | 0.00038            | 0.00323 |
| 11       | 0.00043            | -       |
| 12       | 0.00045            | -       |
| M(M)     | 0.00035            | 0.00290 |
| s(M)     | 0.00006            | 0.00023 |

M(M) - Mean of intralaboratory means

s(M) - Standard deviation of the mean values of laboratories

**CERTIFIED VALUES (mass fraction in %)**

| Element                   | O              | N             |
|---------------------------|----------------|---------------|
| <b>Certified</b>          | <b>0.00035</b> | <b>0.0029</b> |
| <b>Uncertainty C(95%)</b> | <b>0.00004</b> | <b>0.0002</b> |

*Indicative content of hydrogen is about 0.000085%*

*Uncertainty C(95%) estimated as the half-width confidence interval of Student's t-distribution, when n is the number of laboratory means*

$$C(95\%) = \frac{t \cdot s(M)}{\sqrt{n}}$$

|                      |                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SPECIFICATION</b> | Reference material made of vacuum smelting bearing steel as prepared for analysis pins diameter of 4.5 mm weighing about 0.9 gram with protective coated                                                                                                                                                                                               |
| <b>TRACEABILITY</b>  | The characterization of material has been achieved by means interlaboratory experiment in accordance to ISO Guide 35:2006. In each laboratory applied the methods of analysis of their choice                                                                                                                                                          |
| <b>HOMOGENEITY</b>   | The homogeneity was evaluated according to ISO Guide 35:2006 (7.7.Evaluating a homogeneity study) and DSTU GOST 8.531:2002 "Reference materials of composition of solid and disperse materials. Ways of homogeneity assessment"                                                                                                                        |
| <b>DELIVERY</b>      | Packing - 50 pins in glass bottle and Certificate                                                                                                                                                                                                                                                                                                      |
| <b>DATE OF ISSUE</b> | October 2014                                                                                                                                                                                                                                                                                                                                           |
| <b>VALID</b>         | October 2032                                                                                                                                                                                                                                                                                                                                           |
| <b>SAFETY</b>        | CRM CA01a and packing does not contain explosives and radioactive substances and substances which might influence health and the environment                                                                                                                                                                                                           |
| <b>NOTE</b>          | <p>This reference material should be stored in a tightly closed bottle in a dry place. When the bottle is opened for analysis, it should be stoppered immediately after use</p> <p><b><u>Samples extracted from the bottle using clean metallic tweezers and placed directly into a carefully cleaned weigher and boat devices of analyzer</u></b></p> |

#### **PARTICIPATING LABORATORIES**

Asoval Iron & Steel Works, Ukraine  
 Azovelectrostal PJSC, Ukraine  
 Dnepropetsstal (DSS) OJSC, Ukraine  
 E.O. Paton Electric Welding Institute, Ukraine  
 Metpromservis LTD, Ukraine  
 OSCAR Production Group, Ukraine  
 Ukrainian Special Steels Institute (USSI) SE  
 Institute for Certified Reference Materials (ICRM), RU  
 Institute for Ferrous Metallurgy (IMZ), Poland  
 ENVIFORM a.s., Czech Republic  
 LECO European Technical Centre Prague, Czech Republic  
 ŽDAS a.s., Czech Republic

#### **THE METHODS USED**

Inert gas fusion: chromatography with thermal conductivity (USSI), calibration using potassium nitrate (ICRM),  
 infrared absorption - remaining laboratories

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#### **CONTACTS**

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