

**Metal and Quality, LLC**  
**Certified Reference Material**  
**Certificate of Chemical Analysis**  
**CA05, CA06, CA07**  
**Steel**



**INFORMATION**

Certified Reference Materials of steel **CA05, CA06 and CA07** are 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 % |                |               |                |                |               |
|----------|--------------------|----------------|---------------|----------------|----------------|---------------|
|          | CA05               |                | CA06          |                | CA07           |               |
|          | O                  | N              | O             | N              | O              | N             |
| 1        | 0.0189             | 0.00407        | 0.0111        | 0.00641        | 0.00472        | 0.0268        |
| 2        | 0.0192             | 0.00413        | 0.0112        | 0.00690        | 0.00488        | 0.0283        |
| 3        | 0.0192             | 0.00418        | 0.0115        | 0.00694        | 0.00504        | 0.0285        |
| 4        | 0.0194             | 0.00420        | 0.0116        | 0.00697        | 0.00510        | 0.0288        |
| 5        | 0.0194             | 0.00421        | 0.0119        | 0.00708        | 0.00522        | 0.0292        |
| 6        | 0.0195             | 0.00428        | 0.0119        | 0.00710        | 0.00535        | 0.0292        |
| 7        | 0.0196             | 0.00428        | 0.0120        | 0.00715        | 0.00549        | 0.0292        |
| 8        | 0.0196             | 0.00430        | 0.0120        | 0.00718        | 0.00557        | 0.0293        |
| 9        | 0.0202             | 0.00441        | 0.0121        | 0.00719        | 0.00567        | 0.0294        |
| 10       | 0.0202             | 0.00448        | 0.0122        | 0.00724        | 0.00570        | 0.0295        |
| 11       | 0.0203             | 0.00448        | 0.0122        | 0.00737        | 0.00601        | 0.0298        |
| 12       | 0.0204             | 0.00454        | 0.0124        | 0.00744        | 0.00602        | 0.0298        |
| 13       | 0.0206             | 0.00456        | 0.0125        | 0.00744        | 0.00617        | 0.0303        |
| 14       | 0.0215             | 0.00487        | 0.0126        | 0.00747        | 0.00658        | 0.0308        |
| 15       | 0.0216             | 0.00493        | 0.0126        | 0.00794        |                |               |
| 16       | 0.0217             |                | 0.0130        |                |                |               |
| 17       | 0.0217             |                |               |                |                |               |
| M(M)     | <b>0.0202</b>      | <b>0.00439</b> | <b>0.0120</b> | <b>0.00719</b> | <b>0.00554</b> | <b>0.0292</b> |
| s(M)     | <b>0.0010</b>      | <b>0.00025</b> | <b>0.0005</b> | <b>0.00034</b> | <b>0.00053</b> | <b>0.0010</b> |

M(M) - Mean of intralaboratory means

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

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

| Ref. No.                  | CA05          |               | CA06          |               | CA07          |               |
|---------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Elements                  | O             | N             | O             | N             | O             | N             |
| <b>Certified</b>          | <b>0.0202</b> | <b>0.0044</b> | <b>0.0120</b> | <b>0.0072</b> | <b>0.0055</b> | <b>0.0292</b> |
| <b>Uncertainty C(95%)</b> | <b>0.0005</b> | <b>0.0002</b> | <b>0.0003</b> | <b>0.0002</b> | <b>0.0003</b> | <b>0.0006</b> |

*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 materials are made from carbon quality steel (CA05), common quality steel (CA06) as polished rods in diameter of 2.8 mm, length of about 80 mm and chromium alloyed steel (CA07) as polished rods in diameter of 1.7 mm and length of about 80 mm                                                 |
| <b>DEVELOPER AND MANUFACTURER</b> | Metal and Quality LLC, Ukraine                                                                                                                                                                                                                                                                              |
| <b>TRACEABILITY</b>               | The characterization of material has been achieved by means interlaboratory experiment in accordance to ISO Guide 35. In each laboratory applied the methods of analysis of their choice                                                                                                                    |
| <b>DELIVERY</b>                   | Packing 100 grams of each sample and the certificate of analysis. Reference Materials CA05, CA06 and CA07 can be supplied separately                                                                                                                                                                        |
| <b>SAFETY</b>                     | Reference materials CA05, CA06, CA07 and packing does not contain explosives and radioactive substances and substances which might influence health and the environment                                                                                                                                     |
| <b>NOTE</b>                       | 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.<br><br><b>Before analysis, it is recommended to clean the sample surface with fine oxides free sandpaper (e.g. of silicon carbide)</b> |

## **PARTICIPATING LABORATORIES**

Alchevsk Iron & Steel Works PJSC, Ukraine  
 Institute for Certified Reference Materials (ICRM), RU  
 Dneprovsky Integrated Iron & Steel Works PJSC, Ukraine  
 Ilyich Iron and Steel Works of Mariupol PJSC, Ukraine  
 NKMZ PJSC, Ukraine  
 Ukrainian Special Steels Institute SE, Ukraine  
 Motor Sich PJSC, Ukraine  
 Paton Electric Welding Institute, Ukraine  
 Yenakievo Metallurgical Works PJSC, Ukraine  
 Metpromservice LTD, Ukraine  
 Dneprospetsstal (DSS) PJSC, Ukraine  
 AzovElectroStal PJSC, Ukraine  
 Energomashspetsstal PJSC, Ukraine  
 Donezkstal - Metallurgical Works JSC, Ukraine  
 Khartsyzsk Tube Works PJAC, Ukraine  
 Zaporizhstal PJSC, Ukraine

## **THE METHODS USED**

Inert gas fusion - all laboratories

## **CONTACTS**

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