Metal and Quality LLC

CERTIFICATE OF ANALYSIS

Certified Reference Material

DSZU C051

Carbon Steel

INFORMATION

Certified Reference Material of carbon steel DSZU C051 is intended for verification, calibration of measuring instruments, for metrological certification and control of measurements methods at definition of chemical composition of carbon steels by using of Optical Emission and X-ray Spectrometry methods

CERTIFIED

	C	Si	Mn	P	S	Cr	Ni	Cu
Mass fraction in %	**0.443**	**0.293**	**0.795**	**0.0162**	**0.029**	**0.048**	**0.041**	**0.140**
Uncertainty C (95%)	**0.005**	**0.004**	**0.006**	**0.0005**	**0.001**	**0.002**	**0.003**	**0.004**

Uncertainty estimated as the half width confidence interval C (95%) of Student's t-distribution

Approximate value, mass fraction in %

V	*Ti*	*Al*	*Co*	*Nb*	*Sn*	*As*
0.002	*0.001*	*0.010*	*0.003*	*0.001*	*0.004*	*0.002*

SPECIFICATION

Reference material is made of hot-rolled steel in the form of cylinders diameter of 40 mm, height 25 mm.

HOMOGENEITY

The homogeneity was evaluated in accordance with ISO Guide 35. To evaluate of homogeneity was used OES method.

TRACEABILITY

The traceability of CRM DSZU C051 established in accordance with ISO Guide 30-35. The characterization of CRMs was achieved by means inter-laboratory experiment. At analyses applied standardized and certified methods of analysis, certified reference materials were used

CRM VALIDITY

CRM shelf life unlimited. The working surface of the sample should be purified before use. Reference material will remain stable provided that it is not subjected to excessive heat (e.g. during preparation of the working surface)

DATE OF ISSUE

August 2018

DELIVERY

CRM, packed into a box and Certificate

SAFETY

The reference material and packing does not contain explosives and radioactive substances and substances which might influence health and the environment

LABORATORY MEANS, mass fraction in %

	C	Si	Mn	P	S	Cr	Ni	Cu
1	0.4300	0.2870	0.7830	0.0151	0.0250	0.0450	0.0320	0.1320
2	0.4300	0.2880	0.7859	0.0154	0.0270	0.0458	0.0330	0.1340
3	0.4310	0.2880	0.7870	0.0155	0.0277	0.0460	0.0390	0.1350
4	0.4360	0.2910	0.7880	0.0160	0.0280	0.0466	0.0390	0.1360
5	0.4360	0.2910	0.7903	0.0160	0.0280	0.0480	0.0410	0.1370
6	0.4410	0.2920	0.7910	0.0160	0.0280	0.0480	0.0422	0.1400
7	0.4430	0.2920	0.7940	0.0160	0.0280	0.0480	0.0430	0.1410
8	0.4440	0.2940	0.7950	0.0160	0.0288	0.0481	0.0440	0.1423
9	0.4475	0.2950	0.7980	0.0165	0.0307	0.0520	0.0462	0.1439
10	0.4490	0.2964	0.8056	0.0169	0.0309	0.0520	0.0470	0.1450
11	0.4500	0.2990	0.8100	0.0170	0.0310	0.0530	0.0474	0.1510
12	0.4510	0.3070	0.8100	0.0173	0.0311			
13	0.4538			0.0174	0.0320			
14	0.4570							
M(M)	0.443	0.293	0.795	0.0162	0.0289	0.048	0.041	0.140
s(M)	0.009	0.006	0.009	0.0007	0.0020	0.003	0.005	0.006

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

PARTICIPATING LABORATORIES (Ukraine)

ArcelorMittal Kryvyi Rih PJSC
AZOVSTAL IRON & STEEL WORKS PJSC
Dneprometiz PJSC
Dneprospetsstal (DSS) PJSC
Dnipropetrovsk Switches (DnSZ) PJSC
ILYICH IRON AND STEEL WORKS PJSC
Metal & Quality LLC
Zaporizhstal PJSC

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