Metal and Quality, LLC

CERTIFICATE OF ANALYSIS

CRM C050

Low Alloy Steel

INFORMATION

Certified Reference Material of low alloy steel C050 for Spectral Analysis is intended for verification, calibration of measuring instruments, for metrological certification and control of measurements methods at definition of chemical composition of low alloy steels by using of Optical Emission and X-ray Spectrometry methods

DEVELOPER AND MANUFACTURER

Metal and Quality, LLC

CERTIFIED VALUES (bold)

C050	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	V	Ti	Al	Sn	B	As
Mass fraction in % by weight	**0.082**	**1.208**	**0.286**	**0.040**	**0.065**	**0.076**	**0.118**	**0.304**	**0.479**	**0.007**	*0.002*	*0.008*	*0.004*	*0.002*	*0.002*
Uncertainty	**0.003**	**0.014**	**0.006**	**0.002**	**0.002**	**0.002**	**0.002**	**0.006**	**0.008**	**0.002**	-	-	**-**	-	**-**

Italics - approximate value

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

SPECIFICATION

Reference material is made of forged steel vacuum melting in the form of cylinders diameter of 40 mm, height 25 mm.

HOMOGENEITY

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". To evaluate of homogeneity was used OES method.

TRACEABILITY

The traceability of CRM C050 established in accordance with ISO Guide 30-35. The characterization of CRMs achieved by means inter-laboratory experiment. At analyses applied standardized and certified methods of analysis, certified reference materials were used

CRM VALIDITY

Shelf life of CRM: 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

December 2015

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 content in %

	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	V
1	0.0740	1.170	0.269	0.0357	0.0613	0.0657	0.114	0.293	0.459	0.0048
2	0.0777	1.193	0.270	0.0370	0.0620	0.0699	0.115	0.294	0.470	0.0050
3	0.0797	1.196	0.278	0.0380	0.0626	0.0733	0.115	0.294	0.473	0.0051
4	0.0798	1.196	0.285	0.0388	0.0630	0.0740	0.115	0.296	0.474	0.0060
5	0.0799	1.204	0.286	0.0398	0.0630	0.0750	0.117	0.298	0.475	0.0080
6	0.0800	1.205	0.287	0.0400	0.0637	0.0750	0.119	0.303	0.476	0.0080
7	0.0816	1.206	0.287	0.0410	0.0648	0.0760	0.119	0.306	0.477	0.0090
8	0.0817	1.210	0.289	0.0413	0.0667	0.0765	0.119	0.307	0.480	
9	0.0834	1.210	0.290	0.0413	0.0670	0.0768	0.122	0.310	0.492	
10	0.0840	1.210	0.298	0.0430	0.0671	0.0774	0.123	0.310	0.495	
11	0.0868	1.221	0.299		0.0680	0.0810	0.123	0.314	0.497	
12	0.0871	1.240	0.300		0.0695			0.319		
13	0.0877	1.260			0.0710					
14	0.0895									
M(M)	0.0824	1.209	0.286	0.0396	0.0654	0.0755	0.118	0.304	0.479	0.0066
s(M)	0.0043	0.022	0.010	0.0022	0.0031	0.0029	0.003	0.009	0.011	0.0017

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

PARTICIPATING LABORATORIES (Ukraine)

ArcelorMittal Krivy Rig PJSC
Dneprospetsstal PJSC
Dnieper Metallurgical Combine DMK PJSC
Dnipropetrovsk Switches (DnSZ) PJSC
Ilyich Iron and Steel Works of Mariupol PJSC
Metal & Quality PJSC
Metpromservice, Ltd.
Zaporizhstal PJSC
Zaporozhye Steel Works Ltd.
Ukrainian Special Steels Institute, SE

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Revised: December 2020