

Metal and Quality, LLC
CERTIFICATE OF ANALYSIS
CRM C042a
Low Alloy Steel



INFORMATION

Certified Reference Material C042a is intended for calibration of measuring instruments 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)

C042a	C	Mn	Si	P	S	Cr	Ni	Cu	W	V	Mo	Ti	Al	Co	Nb	Sn	B	As	Ca	N
Mass fraction in % by weight	0.132	0.488	0.286	0.0091	0.0062	0.995	0.195	0.137	0.006	0.189	0.31	0.0029	0.018	0.009	0.0025	0.0079	0.0005	0.0069	0.001	0.01
Uncertainty	0.003	0.005	0.004	0.0005	0.0004	0.012	0.003	0.004	-	0.003	0.01	0.0003	0.001	0.001	0.0006	0.0005	-	0.0009	-	-

Italics - approximate value

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

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 according ISO Guide 35:2017 - Reference materials - Guidance for characterization and assessment of homogeneity and stability. To evaluate of homogeneity was used OES method.

TRACEABILITY

The traceability of C042a 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

RM VALIDITY

Shelf life of RM: 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

September 2021

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 %

1	C	Mn	Si	P	S	Cr	Ni	Cu	W	V	Mo	Ti	Al	Co	Nb	Sn	B	As	Ca	N
2	0.1250	0.4726	0.2770	0.0083	0.0057	0.972	0.1843	0.1300	0.0030	0.1810	0.2697	0.0020	0.0153	0.0050	0.0018	0.0071	0.0003	0.0058	0.0010	0.0082
3	0.1256	0.4795	0.2796	0.0084	0.0059	0.981	0.1888	0.1310	0.0035	0.1818	0.2893	0.0026	0.0166	0.0082	0.0020	0.0073	0.0003	0.0061	0.0010	0.0089
4	0.1277	0.4810	0.2800	0.0085	0.0059	0.984	0.1920	0.1330	0.0048	0.1860	0.3070	0.0026	0.0170	0.0083	0.0024	0.0073	0.0004	0.0062	0.0012	0.0120
5	0.1290	0.4830	0.2820	0.0086	0.0059	0.985	0.1935	0.1347	0.0070	0.1870	0.3094	0.0027	0.0170	0.0086	0.0025	0.0076	0.0006	0.0067	0.0015	
6	0.1317	0.4850	0.2838	0.0087	0.0060	0.986	0.1950	0.1350	0.0074	0.1870	0.3142	0.0029	0.0172	0.0091	0.0027	0.0077	0.0009	0.0068		
7	0.1340	0.4870	0.2845	0.0089	0.0060	0.986	0.1950	0.1360	0.0090	0.1877	0.3170	0.0030	0.0180	0.0092	0.0034	0.0078		0.0070		
8	0.1340	0.4915	0.2880	0.0090	0.0061	0.992	0.1950	0.1360		0.1880	0.3180	0.0030	0.0180	0.0095		0.0079		0.0073		
9	0.1345	0.4920	0.2880	0.0092	0.0067	0.992	0.1952	0.1360		0.1898	0.3210	0.0033	0.0184	0.0095		0.0080		0.0095		
10	0.1350	0.4929	0.2890	0.0094	0.0076	0.998	0.1980	0.1380		0.1905	0.3230	0.0033	0.0190	0.0096		0.0083				
11	0.1350	0.4970	0.2915	0.0095		1.000	0.1980	0.1410		0.1927	0.3232	0.0035	0.0194	0.0103		0.0098				
12	0.1370	0.4980	0.2945	0.0103		1.025	0.1984	0.1470		0.1933	0.3260		0.0195							
13			0.2970	0.0110		1.037	0.2005	0.1472		0.1970	0.3280		0.0220							
M(M)	0.1317	0.4876	0.2862	0.0091	0.0062	0.995	0.1945	0.1370	0.0058	0.1885	0.3122	0.0029	0.0181	0.0087	0.0025	0.0079	0.0005	0.0069	0.0012	0.0097
s(M)	0.0042	0.0076	0.0062	0.0008	0.0006	0.019	0.0045	0.0055	0.0024	0.0046	0.0170	0.0004	0.0017	0.0015	0.0006	0.0008	0.0003	0.0012	0.0002	0.0020

M(M) - Mean of intralaboratory means

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

PARTICIPATING LABORATORIES (Ukraine)

ArcelorMittal Krivy Rig PJSC
 Azovstal Iron & Steel Works
 Dneprospetsstal (DSS) PJSC
 Dneprometiz PJSC
 Dnipropetrovsk Railway Switch Plant
 Energomashspetsstal PJSC
 Ferroxx LLC
 Ilyich Iron and Steel Works of Mariupol PJSC
 Metal & Quality LLC
 Zaporozhye Steel Works Ltd.

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