

Metal and Quality, LLC
CERTIFICATE OF ANALYSIS
CRM MQ C048
Low Alloy Steel



INFORMATION

Certified Reference Material of low alloy steel MQ C048 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, Private Joint-Stock Company

CERTIFIED VALUES (bold)

	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	Al	Co	Sn	As	Ca	N
Mass fraction in % by weight	0.212	0.467	0.273	0.0102	0.0059	0.175	0.105	0.262	0.016	0.0293	0.015	0.016	0.0085	<i>0.0017</i>	<i>0.011</i>
Uncertainty	0.005	0.003	0.005	0.0005	0.0005	0.004	0.003	0.006	0.002	0.0014	0.003	0.001	0.0010	-	-

Italics - approximate value

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

SPECIFICATION

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

HOMOGENEITY

The homogeneity was evaluated according to ISO Guide 35:2006. To evaluate of homogeneity was used OES method

TRACEABILITY

The traceability of CRM C048 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

April, 2017

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 %

No.	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	Al	Co	Sn	As	Ca	N
1	0.190	0.456	0.260	0.0083	0.0047	0.160	0.099	0.240	0.0126	0.0270	0.0090	0.0150	0.0070	0.0010	0.0100
2	0.195	0.458	0.260	0.0090	0.0050	0.163	0.100	0.240	0.0130	0.0270	0.0102	0.0157	0.0070	0.0010	0.0117
3	0.198	0.460	0.262	0.0090	0.0050	0.164	0.100	0.250	0.0140	0.0270	0.0110	0.0160	0.0080	0.0015	0.0125
4	0.200	0.460	0.262	0.0090	0.0050	0.167	0.100	0.254	0.0170	0.0280	0.0150	0.0160	0.0080	0.0015	
5	0.202	0.461	0.263	0.0092	0.0050	0.170	0.100	0.260	0.0180	0.0290	0.0150	0.0162	0.0080	0.0020	
6	0.210	0.464	0.267	0.0095	0.0054	0.171	0.101	0.260	0.0183	0.0300	0.0175	0.0180	0.0082	0.0030	
7	0.210	0.465	0.268	0.0100	0.0060	0.172	0.102	0.260	0.0190	0.0300	0.0187	0.0180	0.0100		
8	0.211	0.467	0.268	0.0100	0.0060	0.172	0.103	0.260	0.0190	0.0310	0.0200		0.0100		
9	0.211	0.467	0.270	0.0100	0.0060	0.176	0.104	0.260		0.0320			0.0105		
10	0.214	0.469	0.271	0.0100	0.0060	0.177	0.105	0.268		0.0320					
11	0.215	0.470	0.271	0.0100	0.0064	0.177	0.106	0.270							
12	0.217	0.470	0.275	0.0100	0.0064	0.177	0.106	0.270							
13	0.220	0.470	0.275	0.0102	0.0070	0.177	0.107	0.270							
14	0.220	0.474	0.276	0.0108	0.0070	0.179	0.107	0.272							
15	0.220	0.475	0.278	0.0110	0.0077	0.180	0.109	0.272							
16	0.221	0.477	0.280	0.0116		0.180	0.110	0.286							
17	0.225	0.478	0.280	0.0120		0.182	0.111								
18	0.230		0.284	0.0120		0.183	0.120								
19			0.284	0.0122		0.197									
20			0.300												
M(M)	0.212	0.467	0.273	0.0102	0.0059	0.175	0.105	0.262	0.0164	0.0293	0.0146	0.0164	0.0085	0.0017	0.0114
s(M)	0.011	0.007	0.010	0.0011	0.0009	0.008	0.005	0.012	0.0027	0.0020	0.0041	0.0011	0.0013	0.0010	0.0013

M(M) - Mean of intralaboratory means

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

PARTICIPATING LABORATORIES (Ukraine)

ArcelorMittal Krivy Rig PJSC
 Azovstal PJSC
 Dnepropetsstal PJSC
 Dnipropetrovsk Switches (DnSZ) PJSC
 Dnieper Metallurgical Combine DMKD PJSC
 Ilyich Iron and Steel Works of Mariupol PJSC
 Metal & Quality PJSC
 Metpromservice, Ltd.
 Zaporozhye Steel Works Ltd.
 Zaporizhstal PJSC

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