

Metal and Quality, LLC
CERTIFICATE OF ANALYSIS
CRM MQ C049
Carbon Steel



INFORMATION

Certified Reference Material of carbon steel MQ C049 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 carbon steels using Optical Emission and X-ray Spectrometry methods

DEVELOPER AND MANUFACTURER

Metal and Quality, Private Joint-Stock Company

CERTIFIED VALUES (bold)

MQ C049	C	Mn	Si	P	S	Cr	Ni	Cu	V	Mo	Ti	Al	Co	Sn	B	As	Ca	N
Mass fraction in % by weight	1.17	0.237	0.227	0.0166	0.0147	0.131	0.044	0.069	<i>0.003</i>	<i>0.002</i>	<i>0.003</i>	<i>0.005</i>	<i>0.003</i>	<i>0.004</i>	<i>0.0002</i>	<i>0.004</i>	<i>0.003</i>	<i>0.007</i>
Uncertainty	0.02	0.003	0.008	0.0006	0.0007	0.004	0.003	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 wrought 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 C049 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

July, 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 fraction in %

	C	Mn	Si	P	S	Cr	Ni	Cu	V	Mo	Ti	Al	Co	Sn	B	As	Ca	N
1	1.108	0.220	0.197	0.0148	0.0123	0.118	0.034	0.060	0.002	0.0020	0.0026	0.0023	0.0026	0.0030	0.0001	0.0030	0.0020	0.0070
2	1.129	0.232	0.215	0.0150	0.0126	0.120	0.040	0.063	0.003	0.0030	0.0030	0.0040	0.0030	0.0037	0.0003	0.0030	0.0030	0.0079
3	1.130	0.234	0.218	0.0152	0.0139	0.122	0.040	0.064		≤0.003		0.0045	0.0037	0.0040		0.0031		
4	1.140	0.234	0.218	0.0157	0.0140	0.126	0.041	0.065		≤0.003		0.0050	0.0040	0.0040		0.0040		
5	1.145	0.235	0.220	0.0160	0.0144	0.126	0.041	0.067				0.0053				0.0057		
6	1.155	0.236	0.220	0.0160	0.0146	0.127	0.042	0.067				0.0068						
7	1.170	0.238	0.220	0.0160	0.0148	0.127	0.043	0.069										
8	1.175	0.239	0.220	0.0167	0.0150	0.127	0.043	0.069										
9	1.177	0.239	0.221	0.0170	0.0150	0.131	0.044	0.070										
10	1.184	0.239	0.225	0.0170	0.0150	0.132	0.044	0.070										
11	1.185	0.240	0.226	0.0170	0.0157	0.135	0.044	0.070										
12	1.194	0.240	0.231	0.0174	0.0160	0.136	0.045	0.071										
13	1.200	0.241	0.231	0.0175	0.0160	0.137	0.045	0.073										
14	1.237	0.242	0.234	0.0179	0.0170	0.140	0.049	0.073										
15	1.253	0.243	0.250	0.0180		0.145	0.059	0.077										
16		0.246	0.253	0.0182		0.146												
17			0.255															
M(M)	1.172	0.237	0.227	0.0166	0.0147	0.131	0.044	0.069	0.0025	0.0025	0.0028	0.0047	0.0033	0.0037	0.0002	0.0038	0.0025	0.0075
s(M)	0.040	0.006	0.015	0.0011	0.0013	0.008	0.005	0.004	0.001	0.001	0.0007	0.0015	0.0006	0.0005	0.0001	0.0012	0.0007	0.0006

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

Dneprospetsstal 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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