

Metal and Quality, LLC
CERTIFICATE OF ANALYSIS
CRM DSZU C040a
Low Alloy Steel



INFORMATION

Certified Reference Material C040a is intended for calibration of measuring instruments at definition of chemical composition of low alloy steels by using of Optical Emission Spectrometry method

DEVELOPER AND MANUFACTURER

Metal and Quality, LLC

CERTIFIED VALUES (bold)

C040a	C	Mn	P	S	Si	Cr	Ni	Cu	Al	W	V	Mo	Ti	Co	Nb	Sn	B	As	Ca	N
Mass fraction in %	0.013	0.012	0.0023	0.0029	0.060	0.007	0.005	0.007	0.039	<i>0.002</i>	<i>0.001</i>	<i>0.001</i>	0.0010	<i>0.002</i>	<i>0.0002</i>	<i>0.0002</i>	0.00032	<i>0.0002</i>	0.0021	0.0068
Uncertainty	0.001	0.001	0.0003	0.0007	0.002	0.001	0.001	0.001	0.002	-	-	-	0.0002	-	-	-	0.00004	-	0.0003	0.0007

Italic - approximate values

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 characterization of CRMs was achieved by means inter-laboratory experiment. Chemical analyses were carried out by the participants in the certification tests both on monolithic samples and on chips taken from monolithic samples. The participating laboratories followed the requirements of ISO 17025 and used standardized analytical methods - national standards DSTU GOST 18895-97, DSTU GOST 12345:2004, DSTU GOST 12344:2005, DSTU GOST 8920:2019 and the following certified reference materials for verification of analytical data: CRM DSZU C040, CRM DSZU CX01, CRM DSZU C03, CRM ICRM UNL1/2, CRM ICRM C2/4, CRM ICRM C9/4, CRM ICRM 5-1/1, CRM ICRM U11, CRM ICRM C9/4, CRM ICRM U18/1, CRM BS 2931B, CRM BS 180B, ECRM 057-2, ECRM 096-2, ECRM 194-1

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

January 2022

DELIVERY

RM, 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 %

C040a	C	Mn	P	S	Si	Cr	Ni	Cu	Al	W	V	Mo	Ti	Co	Nb	Sn	B	As	Ca	N
1	0.0110	0.0103	0.0018	0.00150	0.0570	0.0050	0.0030	0.0050	0.0360	0.0010	0.0010	0.0010	0.00056	0.0009	0.00004	0.00012	0.00026	0.00010	0.0017	0.0061
2	0.0114	0.0104	0.0018	0.00246	0.0570	0.0051	0.0034	0.0058	0.0370	0.0020	0.0010	0.0010	0.00089	0.0014	0.00018	0.00019	0.00030	0.00013	0.0020	0.0061
3	0.0116	0.0106	0.0020	0.00252	0.0578	0.0059	0.0043	0.0063	0.0370	0.0022	0.0012	0.0010	0.00093	0.0017	0.00030	0.00020	0.00030	0.00014	0.0022	0.0065
4	0.0120	0.0107	0.0023	0.00290	0.0598	0.0063	0.0047	0.0066	0.0370	0.0024	0.0014	0.0011	0.00097	0.0020		0.00028	0.00030	0.00019	0.0023	0.0068
5	0.0135	0.0110	0.0025	0.00293	0.0600	0.0065	0.0052	0.0067	0.0377		0.0016	0.0014	0.00100	0.0021			0.00032	0.00030	0.0023	0.0073
6	0.0136	0.0119	0.0025	0.00300	0.0606	0.0070	0.0052	0.0078	0.0384				0.00110				0.00039		0.0024	0.0080
7	0.0140	0.0122	0.0025	0.00310	0.0620	0.0075	0.0060	0.0080	0.0404				0.00120				0.00039			
8	0.0140	0.0122	0.0026	0.00350	0.0620	0.0075	0.0063	0.0088	0.0410				0.00130							
9	0.0146	0.0130	0.0030	0.00430	0.0622	0.0082	0.0070		0.0418											
10		0.0130			0.0631	0.0090			0.0426											
11					0.0638															
M(M)	0.0129	0.0115	0.0023	0.00291	0.0605	0.0068	0.0050	0.0069	0.0389	0.0019	0.0012	0.0011	0.0010	0.0016	0.0002	0.00020	0.00032	0.00017	0.0021	0.0068
s(M)	0.0013	0.0011	0.0004	0.00076	0.0024	0.0013	0.0013	0.0012	0.0023	0.0006	0.0003	0.0002	0.0002	0.0005	0.0001	0.00007	0.00005	0.00008	0.0003	0.0007

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
 Azov Steel-Casting Company LLC
 Dneprospetsstal (DSS) PJSC
 Dneprometiz PJSC
 Dnipropetrovsk Railway Switch Plant
 Kryvyi Rih Mechanical Repair Plant LLC
 Ilyich Iron and Steel Works of Mariupol PJSC
 Metal & Quality LLC
 Zaporozhstal PJSC

CONTACTS

37 Nezalezhnoi Ukrain Street,
 Zaporozhye city 69019, Ukraine
 Tel/fax: +380 61 717 1800

rm@rm.co.ua
<https://rm.co.ua>