

Metal and Quality LLC
CERTIFICATE OF ANALYSIS
DSZU C041b
Low Alloy Steel



INFORMATION Certified Reference Material C041b is intended for calibration of measuring instruments at definition of chemical composition of low alloy steels by using of Optical Emission Spectrometry method

MANUFACTURER Metal and Quality, LLC

CERTIFIED	C	Mn	Si	P	S	Cr	Ni	Cu	W	V	Mo	Ti	Al	Co	Nb	Sn	B	As	Ca	N
M(M) Mass fraction in %	0.084	1.44	0.76	0.0176	0.0272	0.049	0.049	0.092	<i>0.003</i>	0.0034	0.005	0.0070	0.006	<i>0.004</i>	<i>0.002</i>	0.004	0.0006	0.004	<i>0.0007</i>	0.0073
Uncertainty C(95%)	0.001	0.01	0.01	0.0006	0.0014	0.002	0.002	0.002	-	0.0006	0.001	0.0002	0.001	-	-	0.001	0.0001	0.001	-	0.0007

Italics - approximate value

Uncertainty C(95%) estimated as the half-width confidence interval of Student's t-distribution, when n is the number of laboratory means (see next page)

$$C(95\%) = \frac{t \cdot s(M)}{\sqrt{n}}$$

SPECIFICATION Reference material is made of hot rolled steel in the form of cylinders diameter of 42 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. This reference material was tested for homogeneity using OES method and found acceptable

TRACEABILITY The traceability of C041b established in accordance with ISO Guide 30-35. The metrological characteristics of C041b were obtained on the basis of multiple comparative measurements with the CRM C041 and CRM C041a by optical emission method in two laboratories followed by an inter-laboratory experiment. At analyses applied standardized and certified methods of analysis, certified reference materials were used

RM 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)

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DELIVERY CRM, packed into a box and certificate

SAFETY A Safety Data Sheet (SDS) is not required for C041b. Reference Material C041b and packing does not contain hazardous chemical, explosives and radioactive substances and substances which might influence health and the environment

LABORATORY MEANS, mass fraction in %

n	C	Mn	Si	P	S	Cr	Ni	Cu	W	V	Mo	Ti	Al	Co	Nb	Sn	B	As	Ca	N
1	0.0810	1.4200	0.7425	0.0165	0.0252	0.0456	0.0453	0.0874	0.0020	0.0026	0.0034	0.0066	0.0035	0.0026	0.0015	0.0024	0.00040	0.0027	0.00060	0.0064
2	0.0818	1.4260	0.7500	0.0167	0.0257	0.0470	0.0466	0.0905	0.0030	0.0026	0.0040	0.0067	0.0040	0.0037	0.0018	0.0029	0.00050	0.0030	0.00085	0.0069
3	0.0835	1.4270	0.7532	0.0167	0.0257	0.0482	0.0468	0.0907	0.0038	0.0027	0.0040	0.0068	0.0049	0.0040	0.0020	0.0033	0.00053	0.0030	≤0.0005	0.0072
4	0.0835	1.4295	0.7577	0.0170	0.0260	0.0500	0.0477	0.0910	0.0038	0.0030	0.0043	0.0069	0.0063	0.0040	0.0023	0.0049	0.00060	0.0032		0.0073
5	0.0840	1.4400	0.7613	0.0172	0.0265	0.0500	0.0489	0.0910	0.0039	0.0037	0.0048	0.0070	0.0063	<0.005	0.0030	0.0050	0.00060	0.0034		0.0073
6	0.0842	1.4400	0.7630	0.0174	0.0281	0.0500	0.0493	0.0920	0.0039	0.0040	0.0050	0.0070	0.0070		<0.005	0.0050	0.00067	0.0042		0.0084
7	0.0848	1.4470	0.7650	0.0180	0.0285	0.0502	0.0500	0.0930	<0.004	0.0040	0.0061	0.0070	0.0070		<0.005	0.0050		0.0053		
8	0.0850	1.4480	0.7800	0.0185	0.0290	0.0505	0.0510	0.0940	<0.005	0.0043	0.0070	0.0071	0.0080							
9	0.0856	1.4550	0.7800	0.0187	0.0303	0.0510	0.0520	0.0945			0.0070	0.0076								
10	0.0857	1.4644		0.0190																
11	0.0860																			
12	0.0866																			
M(M)	0.0843	1.4397	0.7614	0.0176	0.0272	0.0492	0.0486	0.0916	<i>0.0034</i>	0.0034	0.0051	0.0070	0.0059	<i>0.0036</i>	0.0021	0.0041	0.00055	0.0035	<i>0.00073</i>	0.0073
s(M)	0.0017	0.0142	0.0126	0.0009	0.0018	0.0018	0.0022	0.0021	<i>0.0008</i>	0.0007	0.00134	0.0003	0.0016	<i>0.0007</i>	0.0006	0.0012	0.00009	0.0009	<i>0.00018</i>	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

Dneprospetsstal (DSS) PJSC

Dneproress Steel LTD

Dnipropetrovsk Railway Switch Plant PJSC

Dniprovsky metallurgical plant (DMZ) PJSC

Interpipe Steel (Dniprostal) LTD

Metal and Quality LLC

Zaporozhye Steel Works LTD

Zaporozhstal PJSC

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