

Metal and Quality, LLC
CERTIFICATE OF ANALYSIS
DSZU C01a
Pure Iron



INFORMATION Reference Material DSZU C01a is intended for calibration of measuring instruments at definition of chemical composition of commercially pure iron using of Optical Emission Spectrometry methods

MANUFACTURER Metal and Quality, LLC

CERTIFIED VALUES (Mass fraction, %)

	C	Mn	Si	S	P	Cr	Ni	Cu	Al	W	Mo	Fe
M(M)	0.0046	0.0012	0.0035	0.0049	0.0011	0.0034	0.0038	0.0063	0.0054	0.0008	0.0003	99.92
S(M)	0.0007	0.0006	0.0010	0.0016	0.0004	0.0003	0.0006	0.0006	0.0006	0.0003	0.0001	0.01

M(M) - Mean of intralaboratory means

S(M) - Uncertainty is estimated as the standard deviation of the mean values of laboratories

Iron content and its uncertainty are calculated as the difference between 100% and the total impurity content, taking into account the uncertainties of the impurity content

APPROXIMATE VALUES

Co	Ti	Nb	B	Sn	Pb	As	Ca	Sb	Zn	V	N	O
0.0005	0.0001	0.0006	0.0002	0.0003	0.0003	0.0002	0.0002	0.00008	0.00002	0.0007	0.03	0.01

SPECIFICATION The reference material is made of forged steel in the form of a cylinder with a diameter of 38-40 mm and a height of 30 mm

HOMOGENEITY The homogeneity was evaluated according to ISO Guide 35:2017. To evaluate of homogeneity was used OES method and the homogeneity was found to be acceptable

TRACEABILITY The traceability of RM C01a established in accordance with ISO Guide 30-35. The characterization of RM was achieved by means inter-laboratory experiment. At analyses applied standardized methods of analysis

CRM VALIDITY The shelf life of RM C01a is 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). Surface milling is recommended

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SAFETY A Safety Data Sheet (SDS) is not required for RM C01a. Material C01a 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 % by weight

n	C	Mn	Si	S	P	Cr	Ni	Cu	Al	W	Mo	V
1	0.0040	0.00057	0.0022	0.0034	0.0013	0.0029	0.0030	0.0056	0.0047	0.00060	0.00021	0.00004
2	0.0040	0.00070	0.0030	0.0037	0.00035	0.0034	0.0031	0.0060	0.0050	0.00070	0.00023	0.00098
3	0.0049	0.00120	0.0033	0.0040	0.0010	0.0036	0.0037	0.0062	0.0053	0.00073	0.00040	0.00100
4	0.0055	0.00140	0.0040	0.0050	0.0010	0.0036	0.0038	0.0068	0.0058	0.00120	0.00040	
5		0.00210	0.0049	0.0060	0.0013	0.0036	0.0039	0.0070	0.0061			
6				0.0075	0.0014		0.0040					
7							0.0049					
M(M)	0.0046	0.0012	0.0035	0.0049	0.0011	0.0034	0.0038	0.0063	0.0054	0.00081	0.00031	0.0007
s(M)	0.0007	0.0006	0.0010	0.0016	0.0004	0.0003	0.0006	0.0006	0.0006	0.00027	0.00010	0.0005

n	Nb	B	Sn	Pb	As	Ca	Ti	Co	Sb	Zn	N	O
1	0.00001	0.00004	0.00008	0.000003	0.00015	0.00014	0.00009	0.00053	0.00008	0.00002	0.025	0.014
2	0.00002	0.00010	0.00008	0.00030	0.00020	0.00020	0.00011					
3	0.00190	0.00050	0.00070	0.00060	0.00030	0.00020						
M(M)	0.00064	0.00021	0.00029	0.00030	0.00022	0.00018	0.00010	0.00053	0.00008	0.00002	0.025	0.014
s(M)	0.00110	0.00030	0.00040	0.00030	0.00008	0.00003	0.00001					

PARTICIPATING LABORATORIES

ALS Scandinavia, Sweden

Azovsteel, Ukraine

Dneprospetsstal (DSS), Ukraine

Institute of Ferrous Metallurgy, Poland

Luvak Inc., USA

Oy NAREMA, Finland

METHODS USED

Infrared absorption (C, S)

Inert gas fusion (O, N)

OES

ICP-OES

Direct current plasma emission spectroscopy (DCP OES)

ICP-MS with dissolved in nitric acid and dissolved in aqua regia

Double-focusing ICP (ICP-SFMS) with Ar + HF digestion

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