

Metal and Quality LLC
CERTIFICATE OF ANALYSIS
DSZU LG55a
High Manganese Steel



INFORMATION Certified Reference Material LG55a is intended for calibration of measuring instruments at definition of chemical composition of high manganese steels by using of Optical Emission Spectrometry method

MANUFACTURER Metal and Quality, LLC

CERTIFIED	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	V	Al	Nb	N
Mass fraction in % M(M)	1.12	1.01	15.54	0.067	0.0044	2.34	1.36	0.414	0.26	0.149	0.009	0.069	<i>0.021</i>
Uncertainty C(95%)	0.02	0.04	0.05	0.003	0.0008	0.03	0.02	0.010	0.01	0.007	0.002	0.005	-

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 forged steel in the form of cylinders diameter of 40 mm, height 20 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 LG55a established in accordance with ISO Guide 30-35. The metrological characteristics of LG55a were obtained using 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)

DATE OF ISSUE August 2024

DELIVERY CRM, packed into a box and certificate

SAFETY A Safety Data Sheet (SDS) is not required for LG55a. Reference Material LG55a 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	Si	Mn	P	S	Cr	Ni	Cu	Mo	V	Al	Nb	N
1	1.051	0.900	15.37	0.0624	0.0030	2.278	1.325	0.387	0.232	0.123	0.0058	0.0636	0.0198
2	1.100	0.946	15.48	0.0645	0.0036	2.313	1.330	0.405	0.239	0.144	0.0073	0.0641	0.0214
3	1.102	0.985	15.49	0.0647	0.0037	2.317	1.340	0.410	0.248	0.146	0.0077	0.0680	
4	1.108	1.014	15.50	0.0650	0.0039	2.340	1.348	0.411	0.250	0.147	0.0080	0.0685	
5	1.115	1.017	15.51	0.0663	0.0040	2.344	1.350	0.412	0.254	0.152	0.0084	0.0730	
6	1.117	1.042	15.51	0.0680	0.0041	2.350	1.360	0.412	0.255	0.153	0.0096	0.0745	
7	1.120	1.043	15.54	0.0683	0.0053	2.350	1.365	0.415	0.260	0.153	0.0114		
8	1.123	1.055	15.54	0.0685	0.0055	2.355	1.380	0.422	0.268	0.157	0.0125		
9	1.132	1.066	15.55	0.0721	0.0065	2.385	1.383	0.433	0.278	0.159			
10	1.132	1.075	15.62	0.0741		2.391	1.402	0.435	0.288	0.159			
11	1.133		15.63										
12	1.138		15.70										
13	1.141												
14	1.156												
M(M)	1.119	1.014	15.54	0.0674	0.0044	2.342	1.358	0.414	0.257	0.149	0.0088	0.0686	0.0206
s(M)	0.025	0.056	0.084	0.0036	0.0011	0.034	0.025	0.014	0.017	0.011	0.0022	0.0045	0.0011

M(M) - Mean of intralaboratory means

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

PARTICIPATING LABORATORIES

ArcelorMittal Krivy Rig PJSC

Dneprospetsstal (DSS) JSC

Dnepropress Steel LTD

Dnieper Railway Switch Plant JSC

Dniprovsky metallurgical plant (DMZ) JSC

Interpipe Steel (Dniprostal) LTD

Metal and Quality LLC

Motor Sich PJSC

Zaporozhye Steel Works LTD

Zaporizhstal PJSC

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