Labmix24 GmbH
Industriestraße 18A
D-46499 Hamminkeln
Germany

Metal and Quality, PJSC

CERTIFICATE OF ANALYSIS

Certified Reference Materials C070 – C082

Set for Spectral Analysis of Powdered Tool Steels

INFORMATION

Certified Reference Materials of powdered tool steels C070 – C082 (DSZU 083.35-2014) - Set for Spectral Analysis, produced in conformity to the Approval Certificate No.1926, authorized by State Committee of Ukraine for Technical Regulation and Consumer Policy

APPLICABILITY

The CRMs C070-C082 are intended for verification, calibration of measuring instruments, for metrological certification and control of measurements methods at definition of chemical composition of powdered tool steels by using of Optical Emission and X-ray Spectrometry methods

CERTIFIED VALUES (BOLD) AND UNCERTAINTIES

Mass fraction in % by weight

CRM	C	W	Mo	Co	V	Cr	Si	Mn	S	P	Ni	Cu
C070	**2.43**	**0.29**	**1.28**	**0.053**	**9.39**	**5.57**	**0.79**	**0.38**	**0.054**	**0.021**	**0.153**	**0.130**
	0.04	0.02	0.04	0.011	0.10	0.07	0.03	0.01	0.004	0.002	0.010	0.006
C071	**1.06**	**1.74**	**9.67**	**8.10**	**1.07**	**3.77**	**0.38**	**0.20**	**0.028**	**0.020**	**0.149**	**0.162**
	0.02	0.05	0.10	0.07	0.03	0.02	0.01	0.01	0.004	0.003	0.011	0.015
C072	**1.30**	**6.33**	**5.39**	**0.011**	**3.59**	**4.25**	**0.55**	**0.29**	**0.019**	**0.024**	**0.192**	**0.106**
	0.04	0.12	0.07	0.002	0.05	0.04	0.02	0.01	0.004	0.002	0.009	0.007
C073	**1.32**	**6.40**	**4.97**	**8.31**	**2.82**	**3.97**	**0.27**	**0.23**	**0.013**	**0.019**	**0.198**	**0.112**
	0.03	0.08	0.03	0.08	0.06	0.04	0.01	0.01	0.002	0.002	0.009	0.007
C074	**1.10**	**6.47**	**5.21**	**5.08**	**1.94**	**3.93**	**0.16**	**0.16**	**0.020**	**0.023**	**0.158**	**0.141**
	0.02	0.07	0.06	0.03	0.04	0.04	0.01	0.01	0.003	0.003	0.008	0.006
C075	**1.16**	**9.27**	**4.06**	**8.03**	**2.10**	**3.10**	**0.47**	**0.16**	**0.015**	**0.021**	**0.202**	**0.120**
	0.02	0.09	0.05	0.05	0.05	0.05	0.02	0.01	0.002	0.003	0.010	0.005
C076	**0.69**	**9.81**	**4.29**	**13.88**	**2.03**	**5.75**	**0.58**	**0.18**	**0.022**	**0.024**	**0.213**	**0.120**
	0.02	0.11	0.06	0.14	0.05	0.05	0.03	0.01	0.002	0.004	0.020	0.005
C077	**1.16**	**12.17**	**3.05**	**7.73**	**2.04**	**4.07**	**0.40**	**0.19**	**0.024**	**0.030**	**0.271**	**0.142**
	0.03	0.10	0.06	0.07	0.04	0.05	0.01	0.01	0.003	0.003	0.012	0.006
C078	**0.67**	**18.30**	**0.14**	**0.022**	**1.04**	**3.98**	**0.117**	**0.22**	**0.019**	**0.022**	**0.121**	**0.116**
	0.02	0.11	0.01	0.004	0.03	0.03	0.006	0.01	0.002	0.001	0.010	0.007
C079	**0.59**	**0.06**	**4.10**	**0.039**	**0.90**	**4.00**	**0.43**	**0.38**	**0.012**	**0.024**	**0.541**	**0.154**
	0.02	0.01	0.06	0.006	0.03	0.04	0.01	0.01	0.003	0.003	0.023	0.003
C080	**1.68**	**3.40**	**0.39**	**0.028**	**5.12**	**5.06**	**1.89**	**0.31**	**0.020**	**0.025**	**0.162**	**0.120**
	0.04	0.07	0.01	0.007	0.11	0.08	0.03	0.01	0.003	0.001	0.012	0.003
C081	**1.01**	**0.05**	**2.13**	**0.029**	**0.25**	**7.78**	**1.10**	**0.32**	**0.011**	**0.017**	**0.207**	**0.124**
	0.02	0.02	0.05	0.004	0.01	0.05	0.03	0.01	0.002	0.001	0.011	0.010
C082	**2.32**	**0.17**	**1.11**	**0.035**	**4.02**	**12.24**	**0.36**	**0.33**	**0.014**	**0.029**	**0.239**	**0.118**
	0.03	0.01	0.04	0.010	0.06	0.15	0.018	0.01	0.003	0.002	0.009	0.007

Uncertainty estimated as the half width confidence interval C (95%) of Student's t-distribution

SPECIFICATION

Reference materials are made of hot-rolled bars powdered steels in the form of cylinders diameter of 40 - 42 mm (except C081 of diameter 35 mm), height 15 - 25 mm for OES and 6mm for XRF methods

HOMOGENEITY

The homogeneity was evaluated according to ISO Guide 35:2006 (7.7. Evaluating a homogeneity study) and DSTU GOST 8.531:2002 "Reference materials of composition of solid and disperse materials. Ways of homogeneity assessment"

TRACEABILITY

The traceability of CRMs C070 - C082 established in accordance with ISO Guide 30-35

The characterisation of CRMs achieved by means inter-laboratory experiment

At analyses applied standardized and certified methods of analysis, certified reference materials were used

CRM VALIDITY

Reference material will remain stable provided that it is not subjected to excessive heat, for example during preparation of the working surface

The working surface of the sample should be purified before use

SAFETY

The reference material and packing does not contain explosives, radioactive substances and substances which might influence health and the environment

PARTICIPATING LABORATORIES

Dneprospetsstal, Ukraine
Institute for Ferrous Metallurgy (IMZ), Poland
ENVIFORM, Czech Republic
ZDAS, Zdar nad Sazavou, Czech Republic
HILGER Ostrava, Czech Republic
Institute for Certified Reference Materials (ICRM), Russia
Salut FSUE, Russia
Ukrainian Special Steel Institute, Ukraine
Motor Sich, Ukraine
Ivchenko Progress, Ukraine

METHOD USED

Carbon	- Combustion infrared absorption, Combustion coulometric, OES
Tungsten	- ICP-OES, Photometric, OES, XRF
Molybdenum	- ICP-OES, Photometric, OES, XRF
Cobalt	- ICP-OES, FAAS, OES, XRF
Vanadium	- ICP-OES, Potentiometric, OES, XRF
Chromium	- ICP-OES, Titrimetric, OES, XRF
Silicon	- Gravimetric, Photometric, OES
Manganese	- OES, XRF
Sulfur	- Combustion infrared absorption, Combustion coulometric, OES
Phosphorous	- Photometric, OES
Nickel	- OES, XRF
Copper	- OES, XRF

CONTACTS

mix24 Lab chemical solutions

Supplied by:
Labmix24 GmbH
Industriestraße 18A
D-46499 Hamminkeln
Germany

Tel: +49 (0) 2852 96064 00
FAX: +49 (0) 2852 96064 24
Web: www.labmix24.com
E-Mail: info@labmix24.com

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