

# CERTIFICATE OF ANALYSIS

## IMZ 135

### REFERENCE MATERIAL OF LOW ALLOY STEEL

Analysis listed as percent by weight [% m/m]

<b>N</b>	<b>0,0238</b>
<b>Al</b>	<b>0,0274</b>
<b>Ca</b>	<b>0,0008</b>

Certificate Number: IMZ 135-230824

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Analysis	N	Al	Ca
1	0,0231	0,0246	0,00063
2	0,0233	0,0252	0,00064
3	0,0234	0,0256	0,00067
4	0,0237	0,0269	0,00082
5	0,0238	0,0280	0,00087
6	0,0238	0,0280	0,00090
7	0,0238	0,0283	0,00101
8	0,0240	0,0290	0,00110
9	0,0242	0,0293	
10	0,0243	0,0294	
11	0,0243		
12			
Average	0,02378	0,02743	0,00083
SD	0,00040	0,00177	0,00017
Certified Value	<b>0,0238</b>	<b>0,0274</b>	<b>0,0008</b>
C(95%)	0,00027	0,0013	0,00015

$C(95\%) = (t \cdot SD) / \sqrt{n - 1}$  - The half-width confidence interval, calculated for the 95 % confidence level, where  $t$  is the appropriate Student's  $t$  value,  $SD$  is the interlaboratory standard deviation and  $n$  is the number of acceptable mean values. For further information regarding the confidence interval for the certified value see ISO Guide 35:1989 section 4.

Not certified concentrations of other elements listed as percent by weight [% m/m]

C	Si	Mn	P	S	Cr	Ni	Cu
0,65	0,50	1,4	0,016	0,014	0,30	<0,05	0,03

**Certification Process:** Both preparation of this Reference Material and certification process were prepared according to requirements of ISO Guide 31, ISO Guide 34 and ISO Guide 35. This Reference Material is in agreement with ISO Guide 30.

**Chemical Analysis:** Chemical analyses were carried out on chips prepared by milling of the certified portion of the bars. Single values in the table are the means obtained by individual laboratories. The following methods were used for analysis:

- aluminium** – flame AAS, ICP AES, spectrophotometric with aluminon, spectrophotometric with eriochromocyanin R;
- calcium** – flame AAS, ICP AES;
- nitrogen** – high temperature extraction.

**The laboratories participating in the testing of this Reference Material were:**

1. Huta Baildon - Katowice, Poland,
2. Huta Częstochowa - Częstochowa, Poland,
3. Huta Katowice S.A. - Dąbrowa Górnicza, Poland,
4. Huta Łabędy - Gliwice, Poland,
5. Huta Ostrowiec S.A. - Ostrowiec Świętokrzyski, Poland,
6. Huta im. Tadeusza Sendzimira - Kraków, Poland,
7. Mennica Państwowa - Warszawa, Poland,
8. Instytut Metalurgii Żelaza - Gliwice, Poland,
9. Nova hut Ostrava s.p. - Ostrava, Czech Republic,
10. Třinecké Železárny, a.s. - Třinec, Czech Republic,
11. VSŽ Labortest, spol. s r.o. - Košice, Slovakia.

**Homogeneity:** The homogeneity of this Reference Material was evaluated in agreement to ASTM E826-85 (R-1990) and ISO Guide 35 with the use optical emission spectrometry with spark excitation and was found acceptable.

**Traceability:** This Reference Material was tested with the use of optical emission spectrometry with spark excitation and was found compatible to the following CRMs: SS 431-435, SS 50-60, SS 456-460, CKD 162A-171A, CKD 180A-189A, IMŻ 110-119, IMŻ 120-125.

**Production of melt:** This material was produced by Huta Baildon, Katowice. The melt was made in an open induction furnace.

**Available form:** Discs: 40 mm in diameter and 40 mm thick; chips: bottles 100 g.

**Intended use:** This Reference Material is intended for use in optical emission and X-ray spectrometric methods (bulks sample) and also in classical wet methods, UV-Vis spectrometry, AAS, ICP-AES and N- analyzers and other wet methods (chips).

Caution: In optical emission spectrometry with spark excitation the central part of the surface of discs (approximately 5 mm) should be avoided because of possible segregation of the material.

**Validity of certification:** The certification of IMZ 135 is valid indefinitely provided this Reference Material is stored in dry place and in environment free from chemical or other aggressive vapours. Periodic recertification is not required. The certification is nullified if this Reference Material is damaged, contaminated or otherwise modified. Chips: if the contents of the bottle becomes changed (for example oxidized) or contaminated, the whole contents of bottle should be discarded.

**Storage:** This Reference Material should be stored in dry place and in environment free from chemical or other aggressive vapours.

**Safety:** This Reference Material and packing does not contain substances which can directly influence health.

Inquiries regarding this Reference Material should be directed to:  
rm@git.lukasiewicz.gov.pl

Approved by  
Director of the Institute

Prof. Dr. Hab. Eng. Adam Zieliński

Certificate issue date: 23 August 2024

Certificate revision history:

23 August 2024 (editorial changes)

11 December 2020 (change of information regarding validity of certification, editorial changes);

01 October 2009 (editorial changes);

25 February 1999 (original certificate date).