

Talum Inštitut, raziskava materialov in varstvo okolja d. o. o. Kidričevo, Tovarniška cesta 10, 2325 Kidričevo

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Reg. sodišče: Okrožno sodišče Ptuj, št. vpisa: 2010/37620, osnovni kapital: 63.000,00 EUR, davčna številka: 20310676, TRR NKBM SI 56 0420 2000 1750 496

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PROFICIENCY TESTING PROGRAMM FOR AIR EMISSION

on exhaust from Riedhammer furnace

Kidričevo, May 2013

Title: Proficiency testing programm for air emission on exhaust from Riedhammer furnace

Organizer: TALUM INŠTITUT d.o.o
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Accredited by Slovenian Accreditation **LP-045**: www.slo-akreditacija.si and
Authorised by Slovenian EPA No. 35421-1/2013-2: www.arso.gov.si

Location: Talum d.d.
Tovarniška 10
2325 KIDRIČEVO
SLOVENIA

Organizers: Head of laboratory:
Majda ROLA

Associates:
Milorad LAZIČ
Robert MIHELAK

Participants: For each proficiency test in a given period, only 5 teams consisted of two to three participants may participate at the same time.

Prepared by: Marjan Pilinger

TALUM • INŠTITUT d.o.o.
KIDRIČEVO

Director:


Marko Homšak, Ph.D.

1. PURPOSE OF THE TASK

The program covers the implementation of the proficiency testing measurements of emissions to air in accordance with ISO 17043 and ISO 13528, on the exhaust AM2 Talum Aluminium d.o.o. Parameters that are the subject of proficiency testing of air emissions are typical for the production of anode blocks (AM2) in aluminium production.

1. Gas temperature
2. Gas velocity
3. Humidity
4. Total dust
5. Gas fluorides*
6. Sulphure dioxide
7. Nitrogen oxides
8. Carbon monoxide
9. Oxygen
10. TOC

* - analytics of the sample solution can be done by Talum Institute as an option

2. MEASUREMENT LOCATION

Address: Tovarniška 10, 2325 KIDRIČEVO, SLOVENIA

Exhaust mark with AM2 is shown on picture 1.

Construction: metal with two platforms with a total of 5 flanges

Parameter	Technological process	Source description	Source mark	Coordinates Gauss-Krueger		Diameter dimensions (m)	Source height (m)
				Y	X		
1 – 10	Anode blocks production	Riedhamer furnace	AM 2	560877	139127	1,5	40,7

Energy source: natural gas



Figure 1: Exhaust with measuring point AM2

2.1 Description of the device in Talum Aluminij d.o.o. – Anode production with the exhaust of AM2

In the production of prebaked anode blocks are produced, and they represent positive carbon anode in the process of electrolysis. The basic raw materials for the production of anodes are petroleum coke, coal tar pitch as a binder, and a certain proportion of recycled anode from the process of electrolysis. Total homogeneous mass is prepared by grinding on the series of mills and separations with sieves and cyclones, where the central dust extraction is regulated. Green anode blocks are calcinated in a closed furnace - Riedhammer. Gas discharge is regulated through electrostatic precipitators and waste gas treatment plants for dry cleaning, where the gas dedusting takes place in bag filter and fluoride adsorption on alumina. Fluorinated alumina as a by-product of waste gas treatment is added to the electrolytic cells in electrolysis.

The device is operating continuously 8760 h per year, without major disruptions.

3. MEASUREMENT LEVEL

The monitoring site meets the requirements for the measurement according to DIN EN 15259. Dimensions of flanges are given in Figure 2.

Height of measurement level (platform): two of them, one on the 11 m and one on 19 m
 Internal diameter: AM2 - 1.5 m

The number of measuring points is 5: 1st platform with three measuring points (at 90 °) and 2nd platform with two measuring points.

Maximum number of performers: 10-15 (2-3 from each of the participating teams).

Information about the homogeneity of the flow at the measurement level will be given before the measurements.

Meteorological conditions (T, humidity, wind speed and direction), will be given by the organizer at the end of the measurement, as a half-hourly average values, while the P - air pressure is measured by every participant by themselves.

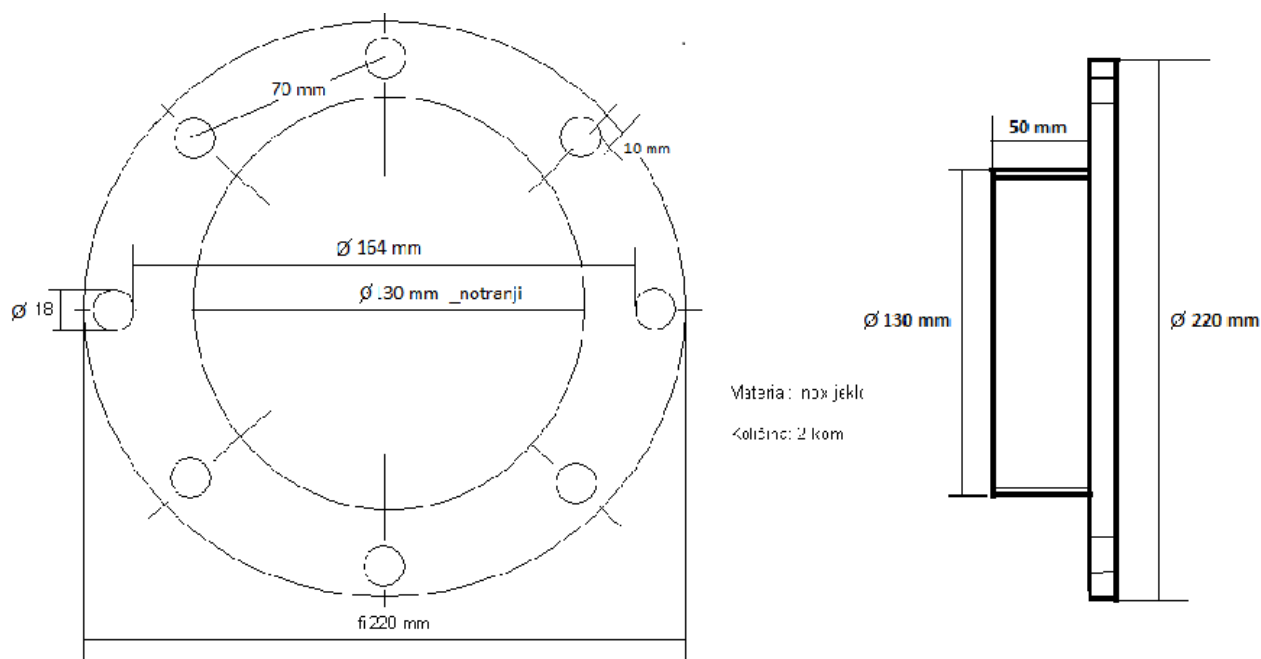


Figure 2: Flange for measurements of emissions on the exhaust AM2

4. PARAMETERS MEASURED

The following table shows the parameters for the conduct of proficiency testing with basic guidance values. Measurements of emission parameters is carried out in accordance with accredited test methods or other appropriate test method (automatic or reference). For the calibration of automated measurement, each participant should use their calibration gas mixtures.

Parameter	Expressed as	Unit	Expected value	Measuring method proposed
Temperature	/	°C	60 - 80	ISO, DIN, VDI, Int. method,...
Gas velocity	/	m/s	5 - 9	ISO 10780
Oxygen share	O ₂	%(v/v)	15 - 18	ISO 12039
Humidity	H ₂ O	g/m ³	20 - 40	EN 14790
Total dust	/	mg/m ³	3 – 50	EN 13284-1
Gas fluorides	HF	mg/m ³	0,5 – 1,1	ISO 15713
Sulphure dioxide	SO ₂	mg/m ³	80 – 130	ISO 12039
Nitrogen oxides	NO ₂	mg/m ³	40 - 100	ISO 12039
Carbon monoxide	CO	mg/m ³	200 - 500	ISO 12039
TOC	TOC	mg/m ³	20 - 60	EN 13526

For each emission parameter, three half-hourly measurements shall be made. Beginning, duration and the end of the measurement shall be determined by the organizer on the location of the monitoring sites.

5. RESULTS EVALUATION

Evaluation of the results of proficiency testing and evaluation of the performance of participants, and statistical presentation of the results is carried out in accordance with ISO 13528:2005 and is based on the criterion of "z" value that specifies the limit of performance.

5.1 Determination of default value

Since the true value of the measured parameter is not known, the default value will be calculated from measurements of accredited participants in proficiency testing (ISO 13528, pt. 5.6; guide 43-1, A 1.1E) with known values of the uncertainty of the participant. The default value of X is determined with a robust average value of the participants, as calculated by the algorithm A in Section 11.1.

Measurement uncertainty of default value is calculated using the following equation:

$$u_x = 1,25 \times s^* / \sqrt{p}$$

where:

s^* - robust standard deviation is calculated using the algorithm in Appendix A 11.1.

p – number of participants

5.2 Determination of "z" value

Since the value of the measured parameter is not known, the value assigned is determined from measurements of participants of proficiency testing accredited procedures, with known levels of uncertainty of the individual participant.

"z" value represents the distance between the arithmetic mean of the population and the value of specific statistical units in the population, in units of standard deviation. "z" value is negative when the value of the unit is below the average population, and vice versa, when this value is above average.

The "z" values evaluate the performance of the laboratory on the basis of specific performance limits.

$$z = (x - X) / s^* ,$$

where:

z – z - value,

x – result (average value) of the participant,

X – value assigned,

s^* - robust standard deviation.

Performance limits:

- if $|z| \leq 2$, the performance of the participant is satisfactory,
- if $2 < |z| < 3$, the performance of the participant is questionable,
- if $|z| \geq 3$, the performance of the participant is unsatisfactory.

When the measured concentrations of measured parameters are low and close to detection limits, assessment and evaluation of the participants results with respect to the "z" value is inappropriate. In such a case, a modified form of z' value of the performance evaluation of participants is used, according to the following equation:

$$z' = \frac{x - X}{\sqrt{u_x^2 + s^{*2}}}$$

5.3 Scope of data

Scope of data includes the results of proficiency testing of participants who submitted the results to the organizer in received electronic form, until the required date, in specific units and a certain number of decimal places.

5.3.1 Interpretation of results and graphical representation of ratings

Results of a proficiency testing of each measured parameter, and an assessment based on "z - value" will be presented in tables and graphically shown in diagrams.

5.3.2 The identity and confidentiality

To ensure the anonymity of the participating laboratories, each laboratory is assigned an identifying number, known only to the organizer and the participant that carried out the measurements.

5.3.3 Expression and dissemination of results

Results recalculated at normal conditions and dry air, should be delivered by the e-mail in prepared tables, expressed in specific units and with certain number of decimal places. The organizer gives the results of participants in the final report under the identification mark, and issues a certificate showing the performance of each participating laboratory.

The participants must send results to the organizer within 6 weeks after completion of proficiency testing, and the organizer issues the report within 6 weeks after receiving the last of the results of proficiency testing of emissions into the air.

Final issue of the report will be considered by a Technical Committee consisting of five members, namely representatives of Slovenian accreditation body, representative of Environmental Agency, Institute of Public Health representative, the representative of the other participants and the representative of the organizer.

6. Time table of testing implementation

Progress of implementation:

8:00 - 8:30 – participants arrival

8:30 - 9:30 – equipment preparation

9:30 - 11:30 – first set of three measurements (v, T, dust, humidity, automatic measurement - O₂, CO, NO, NO₂, SO₂,)

12:00 - 13:00 - brake/lunch

13:00 - 17:00 – second set of measurements (gas fluorides (HF), TOC)

17:00 - 17:30 – conclusion of the 1st day of proficiency testing

7. Scheduled dates for implementation of proficiency testing of air emissions

- 1st date: 11.09.2013
2nd date: 18.09.2013
3rd date: 25.09.2013
4th date: 2.10.2012 (or as agreed)

In case of pore weather conditions, dates will be rescheduled for one week or as agreed.

8. Participation fees

- 720,00 EUR - application, participation, results evaluation and report
- 70,00 EUR - temperature (T), velocity (v), humidity (H₂O) of gases
- 70,00 EUR - total dust
- 70,00 EUR - O₂, CO, NO_x expressed as NO₂, SO₂
- 70,00 EUR - TOC, gas fluorides*

- Option: *90,00 EUR – analytics HF (ion-selective method as subcontractor Talum Inštitut for 3 parallel + blank specimen)

Prices without VAT.

In case that application is submitted before 15.6.2013 **10% discount** is approved with regard to applicants.

Proficiency testing service includes:

- protection and organization of work on industrial area
- snacks/lunch
- smaller consumables
- reports preparation with statistical data processing
- certificate

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9. Application

All participants should send filled and approved application by mail/fax or e-mail:

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SLOVENIA

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