



# AshMeIT methods performance in Round Robin Testing

Josef Rathbauer

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**13.** **industrieforum** **PELLETS**



# Round Robin Test Definitions (ISO 5725-1)

*Repeatability:* Precision under repeatability conditions.  $r$

*Repeatability conditions:* Conditions where independent test results are obtained with the same method on identical test items in the same laboratory by the same operator using the same equipment within short intervals of time.

*Repeatability:* minimum variability in results



## Round Robin Test Definitions (ISO 5725-1)

*Reproducibility:* Precision under reproducibility conditions.  $R$

*Reproducibility conditions:* Conditions where independent test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment.

*Reproducibility:* maximum variability in results



## Round Robin – “Standardized Determination Method”

- A satisfactory standard has to be available for the measurement method. (ISO 5725-1)
- Description Slag Analyser
- Guideline for the PASSA (Pellet Ash and Slag Sieving Assessing) Test Method



# Round Robin – Organisation

## Selected test fuels

- Identification of interested labs, guideline, template for the results
- Preparation of the samples, crucibles – Shipment
- Data processing

No.	Test pellet fuels (materials)	Ash content [% <sub>d</sub> ]
F02	Stem wood without bark (spruce and pine mixture)	0,42
F08	Willow 60 % with Spruce 40 %	0,76
F18	Wheat straw pellets	5,06



# Round Robin – Participating Laboratories, Template PASSA

Part. Labs	Slag anal.	PASSA
Number	2	DE, DK
Countries	11	AT, BE, DE, DK, ES, IT

Participant / Name / ID			
The yellow cells shall be filled!			
	Number	Description	
Sample ID			
Repetition	1st	2nd	3rd
Date [dd:mm:yyyy]			
Empty Crucible [g]			
Crucible with sample [g]			
Amount of pellets sample [g]	0,00	0,00	0,00
Crucible with ash/slag [g]			
Amount of ash/slag [g]	0,00	0,00	0,00
Crucible with sticking particles only [g]			
Sintered slag in the crucible [g]	0,00	0,00	0,00
<b>SIEVING</b>			
empty petri dish (#1) for >2mm fraction [g]			
empty petri dish (#2) for >1mm fraction [g]			
empty petri dish (#3) for material from collection bin [g]			
petri dish (#1) with ash/slag particles >2mm [g]			
Amount of particles > 2mm [g]	0,000	0,000	0,000
petri dish (#2) with ash/slag particles >1mm [g]			
Amount of particles > 1 mm [g]	0,000	0,000	0,000
petri dish (#3) with material from the collection bin [g]			
Amount of particles < 1 mm [g]	0,000	0,000	0,000
<b>Moisture determination</b>			
EN 14774-2			
Repetition	1st	2nd	
Empty drying conainer [g]			
Drying conainer with pellets [g]			
Drying conainer with pellets after drying [g]			
Moisture content on wet basis [%]	#DIV/0!	#DIV/0!	





# RR – Results Slag Analyzer f02

Parameter	mean	r	r [%]	R	R [%]
M1 [g/kg]	0,322	0,111	34,5	0,699	217,1
d80 [mm]	0,923	0,262	28,4	0,897	97,2
Slag [g/kg]	0,228	0,057	25,0	0,047	20,6
Slag Index [Sev]	0,552	0,291	52,7	1,166	211,2



# RR – Results Slag Analyzer f08

Parameter	mean	r	r [%]	R	R [%]
M1 [g/kg]	1,412	1,128	79,9	3,879	274,7
d80 [mm]	1,292	0,222	17,2	1,811	140,2
Slag [g/kg]	0,378	0,179	47,4	0,942	249,2
Slag Index [Sev]	2,867	2,330	81,3	9,537	332,6





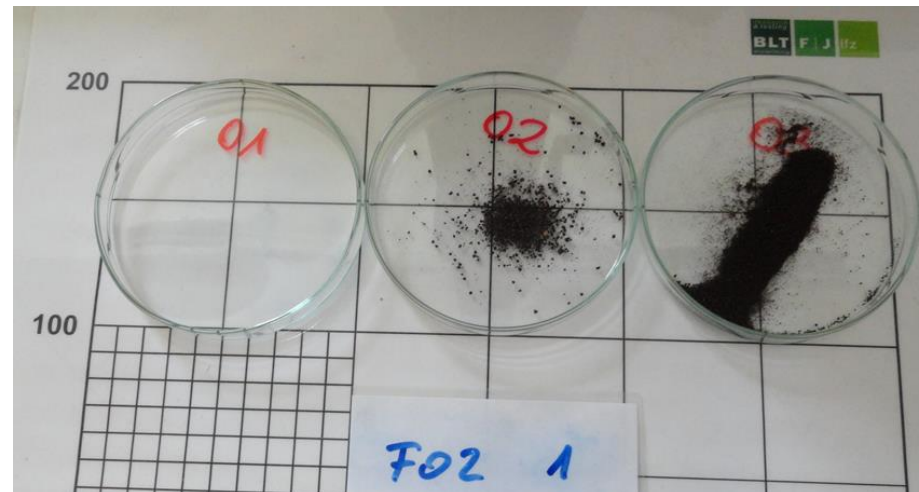
# RR – Results Slag Analyzer f18

Parameter	mean	r	r [%]	R	R [%]
M1 [g/kg]	35,052	6,516	18,6	18,742	53,5
d80 [mm]	4,325	0,11	2,5	0,555	12,8
Slag [g/kg]	0,642	0,521	81,2	0,824	128,3
Slag Index [Sev]	155,033	30,788	19,9	97,436	62,8



# RR – Results PASSA f02

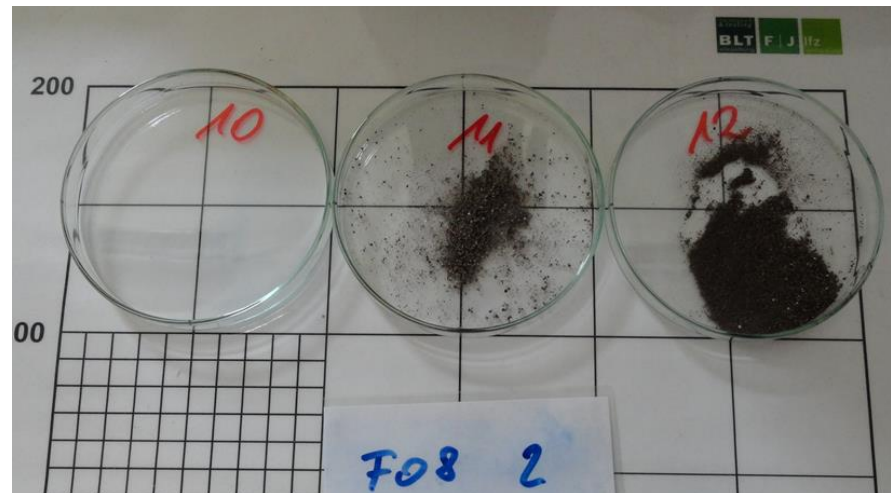
Parameter	mean	r [%-mass]	r [%]	R [%-mass]	R [%]
Ash/Slag amount	0,30	0,06	20,7	0,05	17,9
sintered slag	0,07	0,05	64,9	0,16	229,5
Part > 2mm	0,00	0,00	275,9	0,01	598,3
Part 1<x< 2mm	0,05	0,02	43,7	0,11	213,2
Part < 1mm	0,20	0,03	12,2	0,15	74,5





# RR – Results PASSA f08

Parameter	mean	r [%-mass]	r [%]	R [%-mass]	R [%]
Ash/Slag amount	0,58	0,31	53,4	0,28	48,6
sintered slag	0,12	0,08	64,1	0,14	120,3
Part > 2mm	0,02	0,04	173,1	0,09	373,7
Part 1<x< 2mm	0,06	0,05	85,2	0,12	201,9
Part < 1mm	0,37	0,21	57,9	0,28	77,3



# RR – Results PASSA f18

Parameter	mean	r [%-mass]	r [%]	R [%-mass]	R [%]
Ash/Slag amount	4,84	0,35	7,3	0,87	18,0
sintered slag	3,68	0,94	25,6	5,38	146,1
Part > 2mm	0,84	1,23	146,7	4,25	504,2
Part 1<x< 2mm	0,07	0,17	249,6	0,41	591,2
Part < 1mm	0,25	0,95	379,0	2,02	801,6





## Round Robin – Conclusions

- Preliminary results for the  $r$  and  $R$  of the Slag analyser due to less data.
- PASSA:
  - The guideline for the procedure has to be further developed.
  - Small amount of ash and losses during the sieving process leads to strongly differing results.
  - Discussion needed, which parameter, result will be the right for assessing a pellet sample.