

**Memo**Beckum, 19.10.2015
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GIZ - Measurement campaign CIMAT Morocco

As part of the GIZ project 81156007 a trial run with RDF over approximately 3 days will be realised at the CIMAT plant Beni Mellal. In order to evaluate the influence of using RDF inside the kiln line of the CIMAT plant the following procedure is planned.

The measurement campaign will be divided in two parts, kiln operation without RDF (baseline) and kiln operation with RDF. The measurements will be done by TKIS¹ personnel.

The measurements will be carried out

- during the operation without RDF about 2 days and
- directly after 2-3 days during the operation with RDF.

Most of the measurement devices will run continuously so that the switching between the operation modes w/o RDF also can be detected. Assembling and disassembling of the measurement equipment and travelling will take 2 days.

The experience of TKIS shows that within a short test period the heavy metal cycles do not build up. Therefore, measurement in gas phase is not sufficient. To show the influence of the fuel on the mercury emission a comparison between the incoming and outgoing material flows relating to mercury will give more reliable information and will be realised during the campaign. **Does this means that we should do a mass balance and take samples of raw meal, clinker, petcoke and RDF. Who will perform the analysis of this material?**

Scope of the measurement campaign

Gas analysis will be carried out at the stack. The measuring devices will nearly run continuously except short interruptions (1-2 per day) for maintenance and calibration. The following gas components will be detected

SO_x, NO_x, CO₂, THC and O₂. **You should add also TOC, HF and HCL as these elements are required by Moroccan regulations.**

Gas temperature measurements will be done at the stack and after preheater in order to cross check the stationary measurements of the plant respectively to measure at points in addition to

¹ TKIS is certified according to DIN EN ISO 9001:2008; see enclosed document

the stationary measuring points. The decision if and where exactly the temperature measuring will be done depends on availability and accessibility of measuring ports and also safety reasons.

*Solids analysis*² will be done primarily for filter dust and fuels. The following table shows the scope of the analysis with corresponding methods.

	Method
Filter dust	
Mercury	DIN EN 1483
Cadmium	DIN EN ISO 17294-2
Thallium	DIN EN ISO 17294-2
Chrome	DIN EN ISO 17294-2
Copper	DIN EN ISO 17294-2
Fuels (Coal, tyre chips, RDF)	
Mercury	DIN EN 1483

The following HM should also be added: Arsenic, Nickel, Cobalt, Selenium, Tellure, Lead, Antimony, Tin, Vanadium, Zinc, Manganese, PCB

According the mercury mass flows additional material samples (e.g. raw material before and after raw mill) will be investigated.

The finally sampling schedule will be fixed in agreement with CIMAT on site. The sampling schedule depends on topics like the time periods for direct and compound operation mode but also the availability of samplings points.

Data evaluation

The results will be available approximately 8 weeks after measuring campaign. A report will be distributed afterwards.

² will be carried out by a laboratory accredited according to DIN EN ISO/IEC 17025

Appendix

Assistance from CIMAT

For an efficient measuring campaign, it is assumed that the following required assistance is provided at the plant

- Setting up of and providing safe access to measuring points, if appropriate **OK**
- Periodic sampling of various solid material flows for the period of measurement according the sampling schedule **OK**
- Access to operation data, e. g. central control room, and laboratory data; data preferably to be provided in an electronic / digital format **OK**
- Provision of qualified personnel for the preparation and performance of measurements. **OK**

Timeline

The earliest date for measurement campaign will be limited by the organization like shipping the measurement equipment and provision of gas bottles for the gas analyser on site. This has to be checked before fixing the date for the measurement campaign.

For the stack measurement will be needed besides power and pressured air

- Nitrogen gas 4.0 or higher
- Hydrogen gas* and
- Test gas* (80 ppm propane in synthetic air).

*10 l gas bottles are sufficient

Measuring devices gas analysis

3 kind of gas analyzer will be used for the stack measurements.

The FID (Flame Ionization Detection) analyzer measures the total concentration of hydrocarbons (THC) in a gas sample.

The FTIR (Fourier Transform Infrared Spectroscopy) gas analyzer detects gaseous compounds by their absorbance of infrared radiation and collects a complete infrared spectrum.

The multi gas analyzer VARIOplus Industrial by MRU combines infrared technology and electrochemical sensors.