

# **QUALITY ASSURANCE**

Sanjeev K. Kanchan Programme Manager- Environment Governance (Industry) Centre for Science and Environment, 41, Tughlakabad Institutional Area, New Delhi – 110062 Tel: 011-40616000, Extn.- 266 Mobile: +91-0-8800855090 Fax: 011-29955879 www.cseindia.org



## **Quality assurance of equipment**

- Precision/ accuracy
- Durability
- Suitability
- Established working principle

**Ongoing Quality assurance/control** is needed during operation as adverse conditions affect the equipment performance with time.

# **Quality** ?



# **Quality assurance of CEMS: aspects**

- Manufactured product
- Standardized process of manufacturing the product
- Periodical check of product and manufacturing process.
- During installation
- Ongoing during operation

# **Quality Assurance?**



### **Three Levels of Quality Assurance**

(QAL 1-3, Quality Assurance Level)

- QAL1: Certification of measuring devices
- QAL2: Proper installation, functional testing and calibration
- QAL3: quality assurance during operation
- AST: annual surveillance test



## **Quality assurance in Europe**







- Ensures that the product manufactured is reliable and works as per the relevant national or international standard.
- Carried out by a competent authority/agency authorized to evaluate and approve the quality and functioning of the product
- Gives the recognition and quality assurance across different markets
- Europe has a system of CEMS certification while USA has system of CEMS performance check during installation.

## **Certification: Why do we need?**

Country	Certification scheme	Mandatory	Start	Salient features
England	The Environment Agency of England's (EA) Monitoring Certification Scheme (MCERTS)	<b>Yes</b> (a condition in permits)	1998	<ul> <li>Verifies CEMS compliance with EN performance standards and audits the production process</li> <li>Administered by SIRA and independent certification body on behalf of the EA</li> <li>Initially UK focused. 2003 onwards EN standards adopted</li> </ul>
Germany	<b>UBA</b> Type approval scheme	Yes (a condition of all permits)	1975	<ul> <li>Verifies device performance, harmonised with EU requirements.</li> <li>Sometimes referred as TUV scheme since most tests is performed by TUV. Other test institutes can also carry tests.</li> <li>2003 onwards uses EN-15267-3) to MCERTS</li> </ul>
Europe (including UK, Germany)	<b>CEN</b> (European Committee for Standardization)	<b>Yes</b> (conditions in EU Directives)	2004	<ul> <li>According to EN-15267-3. Mandatory in all processes requiring CEMs in all EU</li> <li>The MCERTS and UBA (TUV) schemes are the two European certification schemes, either of which may be applied in other EU</li> </ul>

## **Certification Systems in Europe**



## **CEMS devices are certified** only if

✓ Certification is performed according to EN 15267-1
 ✓ Manufacturer adheres to the requirements of EN 15267-2
 ✓ Tests carried as per EN 15267 – 3

**EN 15267 Part 1 : general principles** for the product certification of CEMS for monitoring emissions from stationary sources and ambient air quality.

- ✓ Performance testing of a CEMS
- ✓ Initial assessment of the CEMS manufacturer's quality
- ✓ Certification and Surveillance

## **European Certification System**



## BS EN 15267 Part 2 specifies

- ✓ QM system of manufacturer
- ✓ Post certification surveillance for manufacturing process

CEMS may undergo design changes during product life, it is important to ensure the changes don't alter its performance beyond standards.

- ✓ Type O No measurable influence on CEMS's
- ✓ Type 1 possible influence but not significant
- ✓ Type 2 significant influence to the CEMS

### BS EN 15267 Part 3 specifies

- Performance standards and test procedures for CEMS for gases, PM and gas-flow from stationary sources.
- ✓ Detailed procedures that cover QAL1 requirements EN 14181.

## **European Certification system**



### **TUV Certification process, Germany**



#### A complete AMS consists of:

- Heated or unheated probe, including all necessary filters
- Heated or unheated line from the probe to the cooler or direct to the analyzer
- Pump (extern or intern)
- Cooler (if necessary)
- Analyzer
- Measurement output, mA, bus etc.
- Manuals
- Reference Standards for QAL 3 if required,
- without certified test gases
- Type approval report for CE or other tests

# Complete CEMS device/AMS needs to be tested

#### The main performance characteristics for a AMS are:

- responce time
- repeatability standard deviation at zero and span point
- lack of fit under laboratory and field conditions
- zero and span drift under laboratory and field conditions
- influence of ambient temperature
- influence of sample gas pressure
- influence of sample gas flow (extractive AMS)
- influence of voltage variations
- influence of vibration
- cross-sensitivity
- excursion of measurement beam (in-situ AMS)
- converter efficiency (NO<sub>X</sub> AMS)
- responce factors (FID AMS)
- performance and accurancy of the AMS against a SRM method under field conditions
- maintanace interval under field conditions
- reproducibility under field conditions

#### Laboratory test:

- 2 specified AMS with all its parts listed
- CE test mark
- secured against unauthorized adjust
- info about full scale
- Iocation of the zero point
- additional reading outputs
- display of status signals
- display of errors
- avoidance or compensation for soiling of optical interfaces
- IP number of protective housing
- manual
- reference Standards for QAL 3

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#### Field test:

# Both laboratory and Field tests are carried.

# Certification may take ½ - 2 ½ years

- 2 specified AMS with all its parts listed
- Calibration function
- Response time
- Lack-of-fit (Linearity)
- Maintenance interval
- Zero and Span drift
- Availability
- Reproducibility
- Contamination check of in-situ AMS



## **TUV certificate**

CERTIFICAT ٠ CERTIFICADO CEPTNONKAT • 휇 • CERTIFICATE ZERTIFIKAT

Umwelt Bundes Amt @



Zertifikatsnummer: 1629370-ts

1370-fs Industrie Se

### ZERTIFIKAT

Über Produktkonformität (QAL 1)

Zertifikatsnummer: 1629370-ts

Mosseinrichtung

Gerätehensteller Sen Häu 658-

Me6s MY47 für Temperaturmessung in Verbrennungsgasen Sensortherm GmbH Hauptstraße 123 65843 Sulzbach/Ts Deutschland

Profination

TÜV SÜD Industrie Service GmbH

Hiermit wird bescheinigt, dass die AMS die Anforderungen der Normen DIN EN 15257-1: 2009, DIN EN 15267-2: 2009, DIN EN 15267-3: 2008 und DIN EN 14181: 2004 erfühlt.



Zertifikat Nr. 1529370-ts

Eignungsbeikanntgabe im Bundesanzeiger vom 05.03.2013

Unweitbundesamt Dessau, den 27.03.2013

i. A. Dr. Marcel Langner

Gültigkeit des Zertifikates bis 04.03.2018

TUV SUD Industrie Service GmbH Proflaboratorium Emissionsmeseung/Kalibrierung Monchen, den 26.03.2013

Dr. Michael Weeber



## **MCERTS** certificate





#### PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

PCME QAL 181 Particulate Analyser (previously LMS 181) Including PCME QAL 181 SEN Sensor

manufactured by:

PCME Ltd Edison Road St Ives Cambridgeshire PE27 3GH UK

has been assessed by Sira Certification Service and for the conditions stated on this certificate compiles with:

MCERTS Performance Standards for Continuous Emission Monitoring Systems, Version 3.1 dated July 2005, EN15267-3:2007, & QAL 1 as defined in EN 14101: 2004

Certification Ranges :

Particulate Concentration

0 to 15 mg/m<sup>3</sup> 0 to 100mg/m<sup>3</sup>

Froject No: Certificate No: Initial Certification: This Certificate Issued Renewal Date 674/0263 Sira M0090162/00 17 August 2009 17 August 2009 16 August 2014

**Technical Director** 

IACERTS is operated on behalf of the Environment Agency by

Sira Certification Service

12 Acom Industrial Park, Crayford Road, Crayford Dartford, Kent, UK, DA1 4AL Tel: 01322 520500 Fail: 01322 520501

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## India doesn't have certification system for CEMS

## False certificate (Wrong)



#### CERTIFICATE



Manufacturer	
Product :	DCEM 2100 In-situ Cross Duct Opacity/Dust densit Monitor
Measured Components: & Measured ranges	0-100% Opacity, 0-999 mg/m3, 0-999 mg/Nm3, 0- 3.0 Extinction & 0-5 Ringlemann.
Measuring Principle :	Dual beam high intensity LED transmission & Absorption
Calibration Method used:	Check Cell filters of known opacity (%)

Parameter	Filter (%) opacity	Analyser Reading	Remark
Opacity	0	0	Within accuracy of +/-2 %
Opacity	17.2	17.1	Within accuracy of +/-2 %
Opacity	0	0	Within accuracy of +/-2 %
Opacity	59.0	59.4	Within accuracy of +/-2 %
Opacity Opacity	0 59.0	0 59.4	Within +/-2 % Within +/-2 %

The measuring equipment calibration & performance verification (lack of fit) was suitably tested & certified in accordance with EN 15267.

This certificate issued on May 26th 2015

Performed by

Ms. Awanti Shidhore

Issued by

Mr. Pradeep Halbhavi (TUV India Pvt.Ltd.)



# Doesn't have Certification system No laboratory authorized to certify any product.





Industries regulated by market programs like Acid Rain Program and Clean Air Interstate Rule (CAIR) to improve air quality under US EPAs Clean Air Markets Division (CAMD)

Such industries are required to follow monitoring regulations 40 CFR Part 75 that mandates CEMS

CEMS equipments are certified on performance check during installation at site.

## **CEMS Certification in USA**



## **USA- Monitoring Requirements**





#### abbreviations

CAMD – Clean Air Markets Division

ECMPS - Emissions Collection and Monitoring Plan System

## **Certification process- USA**

Soft copy to EPAs, CAMD (in ECMPS Client Tool) Hard copy to State and EPA

Source gives written notices to EPA, the State and CAMD, 21 days before testing begins

Certification tests and their procedures are conducted as per 40 CFR Part 75

Certification test results are submitted within 45 days after completing certification tests to CAMD

Within 120 days, notice is issued stating approval or disapproval. If notice not issued the device is approved by default



	INDIA	GERMANY	UK/EU	US	
Specific guidelines for CEMS testing and calibration laboratories	Nil	Yes	Yes	Yes	
Suitability of CEMS	Nil	VDI 4203-1	QAL- 1 EN14181	USEPA	
Certifying body for CEMS device	Nil	German Federal Environment Agency (UBA)	MCERTS, TUV		

## India?



Relevant standards, procedure for obtaining certification, required documents & financial obligations

- Duly signed and completed application form along with fees is submitted
- These requisites are to be completely satisfied before grant of certification
- Lays down system of checks and controls to be exercised during various stages of production
- Determined by Bureau & published for each product/process
- Mark has a monogram & reference to standard used; copies are given to licensee during grant of license.
- Done by officers with knowledge in same area & prior experience in evaluating similar products
- During grant & operation of license samples are taken from the applicant's factory that are tested by BIS or recognized labs

After completion of steps 4 – 8, grant of license is issued; surveillance tests are carried out at least twice in a year

## **Example- BIS product certification (India)**



An indigenous system of analyzer and other accessories certification needs to be developed.

Need suitable and competent agency /organization for developing certification system – BIS, TUV etc. to carry range of tests and calibration of CEMS following international standards.

Competent agency to develop a set of guidelines & protocols, operating procedures, infrastructure and skills etc.

Performance standards needs to be developed for certification against which the CEMS will be tested, in the same line as in Europe, US etc.

Setting-up a certification system may require considerable time and effort, therefore non-certified devices, should be tested by competent laboratories against their performance standards during installation, in the same line as happens in USA.