CER
Monitoring Report for 1st Verification

(Version 1)

25.3MW WHR[1] Project of Zhejiang Leomax Group

(Registration reference No. 1874)

Monitoring Period

2009-03-16~2009-11-30

Emission Reductions

118,137 tCO_2e

Zhejiang Leomax Group Co., Ltd

2010-02-23

[1] Waste Heat Recovery

CONTENTS

SECTION A The general information of project activity

A.1 The title of the project activity

25.3MW WHR Project of Zhejiang Leomax Group (Registration reference No. 1874)

A.2 Summary of the crediting period

25.3MW WHR Project of Zhejiang Leomax Group was registered on 16/03/2009 with a fixed crediting period from 16th March 2009 to 15th March 2019. The monitoring period of this report is from 16th March 2009 to 30 November 2009.

A.3 The description of the project activity

The project activity involves installation of 3 sets of WHR systems for the four clinker production lines of Zhejiang Leomax Group Co., Ltd (hereafter referred to the "project entity"). The clinker production lines of the project activity include two 2,500 t/d lines located in Tonglu County, Zhejiang Province, and two 5,000 t/d lines (one in Jiande City, Zhejiang Province, the other in Guangde County, Anhui Province). The total annual power demand of the four clinker production lines amounts to 354GWh, which was imported from East China Power Grid in absence of the project activity.

The project activity includes installation of eight WHR boilers (four AQC boilers and four SP boilers), three steam turbines and three generators. The total power capacity of steam turbine generator is 25.3MW. A schematic of the key equipment fitted as part of the project activity is demonstrated in Fig. A.3.1, and the parameters of major equipments installed in the WHR power station are shown in Table A.3.1.

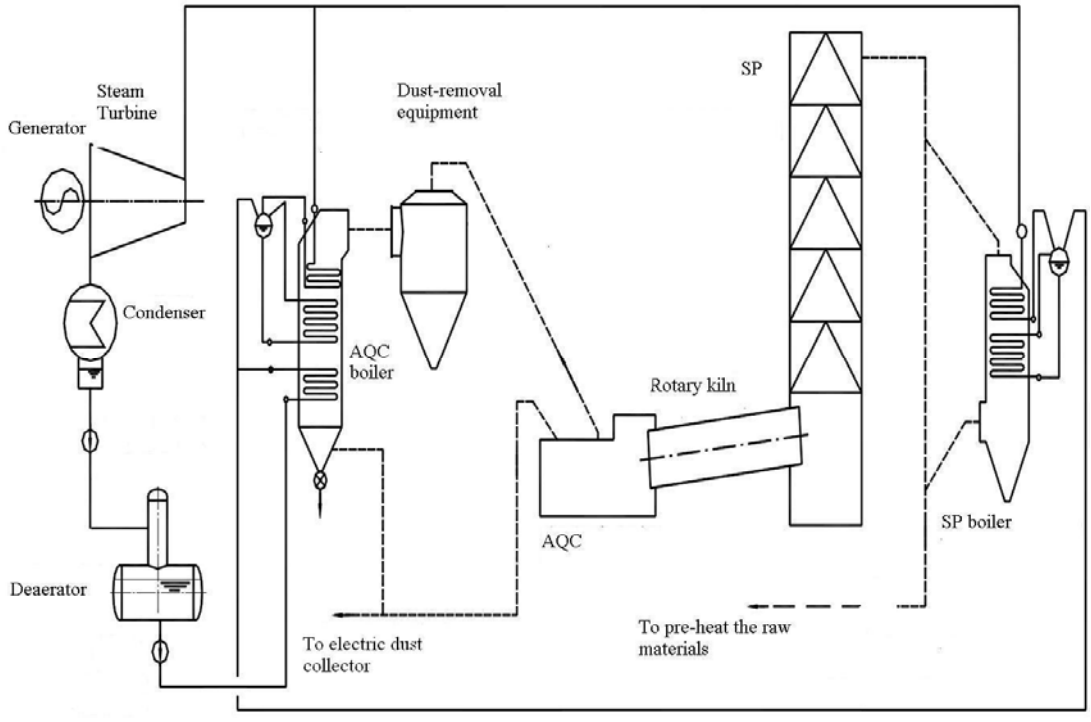


Fig. A.3.1 Schematic of key technology employed by the project activity

Table A.3.1 Parameters of major equipments installed in the WHR power station

Device Name	Technical parameter	Quantity
Tonglu cement clinker line		
9MW Generator	Model: QF9-2 Rated Power: 9MW Rated rotate speed: 3000rpm	1
9MW Steam turbine	Model: N9-1.25/325 Rated Power: 9MW Rated rotate speed: 3000rpm Main steam pressure: 1.25MPa Main steam temperature: 325℃ Exhaust steam pressure: 0.008MPa	1
SP boiler	Steam parameter: 6.5t/h-1.35MPa-340℃（1#） 6.8t/h-1.35MPa-340℃（2#）	2
AQC boiler	Steam parameter: 14.3t/h-1.35MPa-340℃（1#） 12.8t/h-1.35MPa-320℃（2#）	2
Jiande cement clinker line		
7.5MW Generator	Model: N7.5-2 Rated Power: 7.5MW Rated rotate speed: 3000rpm Output voltage: 10500V	1
7.5MW Steam turbine	Model: N7.5-0.98 Rated Power: 7.5MW Rated rotate speed: 3000rpm Main steam pressure: 0.98MPa Main steam temperature: 325℃ Exhaust steam pressure: 0.008MPa	1
SP boiler	Steam parameter: 23t/h-1.1MPa-320℃	1
AQC boiler	Steam parameter: 23.5t/h-1.1MPa-340℃	1
Guangde cement clinker line		
9MW Generator	Model: QFj9-2 Rated Power: 9MW Rated rotate speed: 3000rpm Output voltage: 10500V	1
8.8MW Steam turbine	Model: N9-0.88 Rated Power: 8.8MW Rated rotate speed: 3000rpm Main steam pressure: 0.9MPa	1

	Main steam temperature: 310℃ Exhaust steam pressure: 0.008MPa Rated steam rate: ≤5.92kg/KWh	
SP boiler	Steam parameter: 340000Nm^3/h-350℃ 190℃ 27.6t/h-1.0MPa-32℃（overheat）	1
AQC boiler	Steam parameter: 23.5t/h-1.0MPa-320℃	1

A.4 The methodology applied by the project activity

The methodology applied:
The Approved consolidated and monitoring methodology version 01 of AM0024 “Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants”.
The methodology referred:
Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable source- ACM0002 (version 06) and Tool for the Demonstration and Assessment of Additionality-version 03.

For more information regarding the proposals and their consideration by the Executive Board please refer to http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

A.5 History of revision to Monitoring Plan
Due to the ambiguity of the registered monitoring plan, the monitoring plan was revised to clarify the ambiguity and to include additional monitoring parameters which were omitted before. The revision to monitoring plan was approved by EB on 24th October 2009. For more information please refer to http://cdm.unfccc.int/Projects/DB/DNV-CUK1213687702.85/view.

A.6 ER calculation methodology
(1) Calculation of **Baseline Emissions:**

$$BE_y = EF_y \times EG_{CP,y}$$

Where:

BE_y Is the baseline emission due to electricity generation of the project during the year *y* in tCO_2e,

$EG_{CP,y}$ Is the net quantity of electricity supplied by the project activity during the year *y* in MWh,

EF_y Is the CO_2 baseline emission factor for East China Power Grid during the year *y* in tCO_2e/MWh.

(2) Calculation of **Leakage**:
According to the methodology (AM0024), the project activity could lead to the following leakages:

Construction and fuel handling: the main indirect emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation (for hydroelectric projects).

Corresponding emissions are negligible and can therefore be ignored. Hence $LE_y = 0$

(3) Calculation of **Project Emission**:

Project emission (PE_y) is the difference of CO_2 emissions from use of fossil fuel in the clinker making process in cement manufacturing unit, where the project is being implemented, before and after the project implementation.

PE_y is determined as follows:

$$PE_y = (EI_{p,y} - EI_B) * O_{clin\,ker,y} * COEF_{fuel,y}$$

Where:

EI_B Is the pre-project energy consumption per unit output of clinker in TJ/ton of clinker produced (i.e. measured before the Project activity goes into operation).

$EI_{P,y}$ Is the ex-post energy consumption per unit output of clinker for given year y, in TJ/ton of clinker produced.

$COEF_{clin\,ker,y}$ Is the carbon coefficient (tCO_2/TJ of input fuel) of the fuel used in the cement works in year y to raise the necessary heat for clinker production.

$O_{clin\,ker,y}$ Is the clinker output of the cement works in a given year y.

The following formula will be used to calculate PE_y as there're four production lines in this project activity:

$$PE_y = \sum \Delta EI_i * [O_{clin\,ker,i}] * COEF_{fuel,i}$$

Where:

i is the index for each clinker production line in the cement plant where the project activity is being implemented;

ΔEI_i is the change in the energy consumption of each clinker kiln in TJ / ton Clinker, due to project implementation.

(4) Estimate of **Emission Reductions:**

Emission reductions due to the project activity during year y are calculated as follows:

$$ER_y = BE_y - PE_y$$

ER_y is the emission reduction by the project activity in year *y*, expressed in tCO_2.

BE_y is the baseline emissions in year y, expressed in tCO_2.

PE_y is the project emissions due to possible fuel consumption changes in the cement kilns, of the cement works where the proposed project is located, as a result of the project activity in year *y*, expressed in tCO_2.

SECTION B The monitoring activities

B.1 The Data and parameters monitored:

In line with the monitoring methodology and the approved monitoring plan, the following parameters are monitored:

Data / Parameter:	$NCV_{fuel,y}$
Data unit:	TJ/ton
Description:	Calorific Value of fuel used in Clinker Production lines in year y
Source of data to be used:	Monitoring record
Value of data applied for the purpose of calculating expected emission reduction in section B.5	Refer to PDD Annex 3
Description of measurement methods and procedures to be applied:	Direct measurement
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$F_{P,y}$
Data unit:	TJ
Description:	Average annual energy (fuel) consumption of clinker making process after project implementation
Source of data to be used:	Monitoring record
Value of data applied for the purpose of calculating expected emission reduction in section B.5	Refer to PDD Annex 3
Description of measurement methods and procedures to be applied:	Direct measurement and calculation
QA/QC procedures to be	

applied:	
Any comment:	The Quantity of fuel consumption ($Q_{fuel,y}$) and Calorific Value of fuel ($NCV_{fuel,y}$) will be measured and used to calculate $F_{P,y}$ as below: $F_{P,y} = Q_{fuel,y} \times NCV_{fuel,y}$

Data / Parameter:	$O_{clinker,y}$
Data unit:	ton
Description:	Average annual production of clinker after project implementation
Source of data to be used:	Monitoring record
Value of data applied for the purpose of calculating expected emission reduction in section B.5	Refer to PDD Annex 3
Description of measurement methods and procedures to be applied:	Direct measurement
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$EG_{CP,y}$
Data unit:	MWh
Description:	Quantity of electricity supplied to cement plant
Source of data to be used:	Monitoring record
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Tonglu County: 61,929 MWh Jiande City: 59,880 MWh Guangde County: 57,540 MWh
Description of measurement methods and procedures to be applied:	Direct measurement
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$OXID_{fuel,y}$

Data unit:	%
Description:	Oxidation ratio of fuel used in Clinker Production
Source of data to be used:	2006 IPCC Guidelines: page 1.23
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100%
Description of measurement methods and procedures to be applied:	Deriving from official statistical data
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$EF_{CO_2,fuel,y}$
Data unit:	tCO_2/ton
Description:	Emission factor of fuel used in Clinker production
Source of data to be used:	Monitoring record
Value of data applied for the purpose of calculating expected emission reduction in section B.5	Refer to PDD Annex 3
Description of measurement methods and procedures to be applied:	Direct measurement and calculation
QA/QC procedures to be applied:	The carbon content of fuel ($EF_{C,fuel,y}$) will be measured and used to calculate $EF_{CO_2,fuel,y}$ as below: $EF_{CO_2,fuel,y} = EF_{C,fuel,y} \times 44/12$
Any comment:	

B.2 The monitoring system

The baseline scenario of the project activity has been identified in accordance with AM0024 as to continue import the equivalent amount of electricity from ECPG. Therefore, the monitoring plan was designed as required by AM0024.

B.2.1 Guideline

Monitoring plan is a guide on the arrangement of monitoring tasks and schedules. Monitoring personnel should carry out monitoring activities in accordance with the monitoring plan and ensure effective monitoring. The monitoring plan should ensure that monitoring information is real and measurable so as to provide DOE with real, reliable and transparent emission reduction calculation data. The monitoring planning should also ensure that the emission reductions are real

and solid to CERs buyers.

B.2.2 Monitoring

The main contents of the monitoring:

- $EG_{CP,y}$ Quantity of electricity supplied to cement plant by the project activity in year y;
- $O_{clin\,ker,y}$ Annual production of clinker after project implementation;
- $F_{P,y}$ Annual energy (fuel) consumption of clinker making process after project implementation;
- $NCV_{fuel,y}$ Calorific Value of fuel used in Clinker Production lines in year y;
- $EF_{CO2,fuel,y}$ Emission factor of fuel used in Clinker production in year y.

The Quantity of fuel consumption ($Q_{fuel,y}$) and Calorific Value of fuel ($NCV_{fuel,y}$) will be measured and used to calculate $F_{p,y}$ as below:

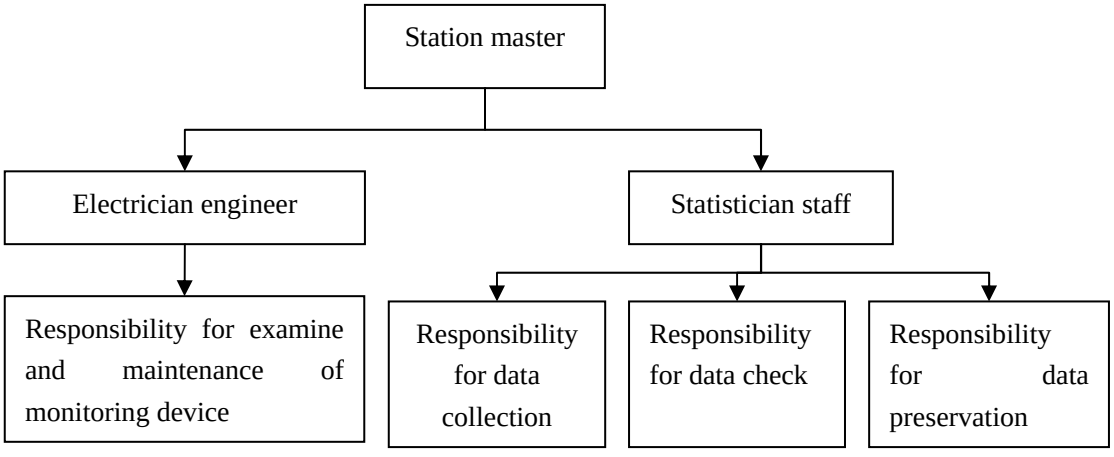
$$F_{p,y} = Q_{fuel,y} \times NCV_{fuel,y}$$

The carbon content of fuel ($EF_{C,fuel,y}$) will be measured and used to calculate $EF_{CO_2,fuel,y}$ as below:

$$EF_{CO_2,fuel,y} = EF_{C,fuel,y} \times 44/12$$

B.3 Management Structure

The power station set up a complete data management system, and the structure is demonstrated in the following graph:



B.4 Monitoring device and installation

The meter(s) used to measure the Electricity Generated, Auxiliary Electricity by the project and Electricity supplied to cement plant will be in accordance with the National Guidelines （DL/T448-2000 version） for accuracy and reliability. The meters accuracy rate is 1.0. The

meters will be maintained by the project entity according the National Guidelines（DL/T448-2000 version）.

The quantity of fuel consumption and clinker production will be measured by the electric balance; the data of fuel's calorific Value will be measured by the heat measuring equipment; the Emission factor of fuel will be measured according the National Guidelines (GB483-87). The electric balance and heat measuring equipment will be installed and maintained according the Operation Explanation.

B.5 Data collection and calculation

- The calculation of expected emission reductions will accord to quantity of electricity supplied to cement plant.
- The quantity of fuel consumption and clinker production from the monitoring record of project entity will be used to calculate.
- The data of fuel's calorific Value and emission factor from the record of lab will be used to calculate.
- The monitoring records of project entity will used for verification by DOE.

B.6 Calibration

Calibration has been carried out according the National standard (JJG596-1999) the independent and authoritative organizations, Bureau of Quality and Technical Supervision in Tonglu County, Bureau of Quality and Technical Supervision in Jiande County and Bureau of Quality and Technical Supervision in Guangde County after which the meters are sealed. The frequency of the calibration is once a year at least.

The relevant instruments should be calibrated, repaired and replaced if the reading error of instruments exceeds the permitted error range. And meter inspections are carried out with all parties to the meter reading being present to witness the reading.

The electric balance and heat measuring equipment is calibrated according to the Operation Explanation. The equipments used to measure the Emission factor of fuel will be calibrated by the local Bureau of Quality and Technical Supervision.

Monitoring Devices used in the project activities and their calibration information please refers to Annex 1.

B.7 Recording and preservation of relevant data

The monitoring data was daily recorded, and then saved in the video disc. The writing of monitoring data are standard and can not be optionally altered. When the monitoring data assuredly need be corrected, it was modified after being approved by the vice power station master. The person who modified the monitoring data made a signature in the place where monitoring data was modified. In reference column, the reason why the monitoring data are modified and modifying data has been written, and also did the signature.

The authenticity, veracity, timeliness and standardization of the monitoring data were checked by the vice power station master. If something wrong is found, it will be corrected immediately. Based on daily monitoring report, the menstrual monitoring report was formed, and was submitted to the power station master, who verifies this menstrual monitoring report.

All monitoring data will be preserved at least two years after the whole crediting period.

Necessary back-up of monitoring data will be done at regular intervals.

B.8 Quality control system for monitoring data

Once the reading error of instruments exceeds the permitted error range or the instrument is found to be malfunctioning, the project entity should inform the related bureau of quality and technical supervision, and the following action should be taken under the local bureau of quality and technical supervision: (1) the measurement data of the meter that need be repaired, calibrated or replaced should be copied; (2) the project entity was responsible for examining for the meters, and the local bureau of quality and technical supervision was responsible for detection, calibration and lead sealing of the meters.

Under normal condition, the project entity was responsible for operation and maintenance of the meters in the WHR captive power stations.

During the crediting period of this monitoring report, the WHR power stations and all monitoring devices worked well, and no abnormity happened.

SECTION C Calculation of GHG emissions reduction

Energy intensity (EI_B)

Project site	Monitoring period	Clinker production $O_{clinker}$ [tonnes]	Coal consumption (energy value) [GJ]	Energy Intensity, Production EI_P [GJ/tClinker]	Energy Intensity, Baseline EI_B [GJ/tClinker]
Tonglu	2009.03.16-2009.11.30	1,335,150	4,553,369	3.41	3.75
Jiande	2009.03.16-2009.11.30	1,340,493	4,577,340	3.41	3.64
Guangde	2009.03.16-2009.11.30	1,447,559	4,974,351	3.44	3.69

$COEF_{fuel,y}$ of Coal used in Tonglu Clinker Production line

Project Site	**Monitoring period**	**A**	**B**	**C**
		***OXID**fuel*	**$EF_{CO2,fuel,y}$**	**$COEF_{fuel,y}$**
		%	tCO_2e/t	tCO_2e/GJ
Tonglu	2009.03.16-2009.11.30	100.00%	1.6405	**0.071**
Jiande	2009.03.16-2009.11.30	100.00%	1.6769	**0.071**
Guangde	2009.03.16-2009.11.30	100.00%	1.7539	**0.078**

Project emissions (PEy)

Project site	Monitoring period	Clinker $O_{clinker}$ [tonnes]	Diff. in Energy int. ΔEI [GJ/tClinker]	Project Emissions PE [tCO2]
Tonglu	2009.03.16-2009.11.30	1,335,150	0.00	0
Jiande	2009.03.16-2009.11.30	1,340,493	0.00	0
Guangde	2009.03.16-2009.11.30	1,447,559	0.00	0
Total	**2009.03.16-2009.11.30**			**0**

Baseline emissions (BEy)

Project site	Monitoring period	Net Electricity supply EG [MWh]	Emission Factor EF [tCO2/MWh]	Baseline Emission BE [tCO2]
Tonglu	2009.03.16-2009.11.30	43695.80	0.9047	39,531.6
Jiande	2009.03.16-2009.11.30	43906.80	0.9047	39,722.5
Guangde	2009.03.16-2009.11.30	42979.59	0.9047	38,883.6
Total	**2009.03.16-2009.11.30**	**130582.19**	**0.9047**	**118,137**

Emission Reductions (ERy)

Project site	Monitoring period	Baseline Emission BE [tCO2]	Project Emissions PE [tCO2]	Emission Reduction ER [tCO2]
Tonglu	2009.03.16-2009.11.30	39,531.6	0	39,531.6
Jiande	2009.03.16-2009.11.30	39,722.5	0	39,722.5
Guangde	2009.03.16-2009.11.30	38,883.6	0	38,883.6
Total	**2009.03.16-2009.11.30**	**118,137**	**0**	**118,137**

The detailed information about emission reduction calculation please refers to emission reduction calculation spreadsheet.

The expected annual emission reduction of the project activity is 162,257tCO_2e, so the expected emission reduction in this monitoring period is 114,932tCO_2e. The actual emission reduction of the project activity in this monitoring period is 2.789% larger than the expected one, which is reasonable.

Annex 1 Parameters of devices used in the project activity and Calibration information

Jiande Site:

Device	Model No.	S.N.	Accuracy	Calibration Date	Calibration Standard	Comment
Kilowatt meter	DTSD5(A)	3070132916	Class 0.5S	2008-05-12 2009-05-08	JJG596-1999	Installed at the general transformer station to monitor the net electricity supplied to the cement plant
	DSSD535	070813148732	Class 1.0	2008-12-17		Installed at 1# transformer station to monitor the electricity consumed by auxiliary equipments of WHR power station
	DSSD535	070813148734	Class 1.0	2008-12-17		Installed at the generator to monitor the electricity generated by the WHR power station
	DSSD535	070813148735	Class 1.0	2008-12-17		Installed at 2# transformer station to monitor the electricity consumed by auxiliary equipments of WHR power station
Weighbridge	SCS150	E6000657	Class 3	2008-12-18	JJG539-1997	Monitoring $O_{clinker,y}$ and $Q_{fuel,y}$
	SCS80	/	Class 3	2008-05-09 2009-05-07		
Analytical Balance	TG328A	68676	Class ①$_3$	2008-06-02 2009-06-02	JJG 98-2006	Monitoring Carbon content and NCV of Coal used in the clinker production line
	TG328A	62816	Class ①$_3$			
	TG328A	71411	Class ①$_3$			
Muffle Furnace	TDW-2001	001	±2.5%F.S	2008-06-02 2009-06-02	JJG617-1996	
	TDW-2001	002	±2.5%F.S			
	TDW-2001	003	±2.5%F.S			
	TDW-2001	004	±2.5%F.S			

Tonglu Site:

Device	Model No.	S.N.	Accuracy	Calibration Date	Calibration Standard	Comment
Kilowatt meter	DSSD31	060500	Class 0.2S	2008-10-28 2009-10-26	JJG596-1999	Installed at the general transformer station to monitor the net electricity supplied to the cement plant
	DSSD25	0800758	Class 0.5	2008-12-29 2009-10-26		Installed at 1# transformer station to monitor the electricity consumed by auxiliary equipments of WHR power station
	DSSD25	0800992	Class 0.5S	2008-10-28 2009-10-26		Installed at the generator to monitor the electricity generated by the WHR power station
	DSSD25	0800756	Class 0.5	2008-12-29 2009-10-26		Installed at 2# transformer station to monitor the electricity consumed by auxiliary equipments of WHR power station
Weighbridge	SCS120	01	Class 3	2008-05-29 2009-05-18	JJG539-1997	Monitoring $O_{clinker,y}$
	SCS120	02	Class 3			
	SCS60	/	Class 3			
Electric Balance	/	51383	Class I	2008-06-25 2009-06-08	JJG 98-1990	Monitoring Carbon content and NCV of Coal used in the clinker production line
	/	5114	Class II			
Muffle Furnace	SX2-6-13	NO.016	/	2008-06-25 2009-06-08	HZC-0049	
	SX2-6-13	NO.021	/			
Rotor Balance	LS-DD	1#	Class 3	2008-10-09 2009-10-08	JJG96-2007	Monitoring $Q_{fuel,y}$
	LS-DD	2#	Class 3			
	DRW	1#	Class 3			
	DRW	2#	Class 3			

Guangde Site:

Device	Model No.	S.N.	Accuracy	Calibration Date	Calibration Standard	Comment
Kilowatt meter	PD194E-9F3	1615089093	Class 0.5S	2008-07-14 2009-06-24	JJG596-1999	Installed at the general transformer station to monitor the net electricity supplied to the cement plant
	PD194-9SY	1615089090	Class 0.5S	2008-07-14 2009-06-24		Installed at 1# transformer station to monitor the electricity consumed by auxiliary equipments of WHR power station
	PD194E-9F3	1615089092	Class 0.5S	2008-07-14 2009-06-24		Installed at the generator to monitor the electricity generated by the WHR power station
	PD194-9SY	1615089091	Class 0.5S	2008-07-14 2009-06-24		Installed at 2# transformer station to monitor the electricity consumed by auxiliary equipments of WHR power station
	DSS607	210-796160	Class 1.0S	2008-09-03 2009-06-26	JJG124-2005	Installed at 3# transformer station to monitor the electricity consumed by auxiliary equipments of WHR power station
Weighbridge	SCS-100	West 1	Class 3	2008-10-21 2009-04-20 2009-10-15	JJG539-1997	Monitoring $O_{clinker,y}$ and $Q_{fuel,y}$
	SCS-100	West 2	Class 3			
	SCS-100	East 1	Class 3			
	SCS-100	East 2	Class 3			
Analytical Balance	FA2004N	53524	Class I	2008-05-12 2009-04-28	JJG 98-2006	Monitoring Carbon content and NCV of Coal used in the clinker production line
Muffle Furnace	4-10	0866	/	2008-05-12 2009-04-28	/	
	4-10	202102	/			