



NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
Centre for Quality Management, Standards and Calibration Services

CERTIFICATE OF ANALYSIS
COAL STANDARD
CRM-1031A

Date: 30th September 2015
Certificate No.: Coal/1031A/

The Certified Reference Material **CRM-1031A** has been developed by National Council for Cement and Building Materials (NCB), India, for calibration of bomb calorimeter, evaluating proficiency of analysts and evaluating/comparing various test methods. This **CRM-1031A** is packed in 3 sealed vials, each containing approximately 13g of powdered coal. The coal has been tested on air-dried material and results reported on dry basis.

Traceability, Certified Value and Uncertainty: The **CRM-1031A** is metrologically traceable to SI units of measurement. The parameters have been analysed as g/g of the total material, as per national and international test methods (details given overleaf in the appendix) and reported in percent. Calorific value has been reported as cal/g. The certified value and expanded uncertainty of CRM, estimated with known sources of bias, are given below:

CONSTITUENT	CERTIFIED VALUE (DRY BASIS)	EXPANDED UNCERTAINTY (Coverage Factor k=2)
Ash (%)	38.75	±0.13
Volatile Matter (%)	21.25	±0.29
Sulphur (%)	0.53	±0.02
Gross Calorific Value (cal/g)	4788	±19

The nominal value of moisture on air-dried basis is 1.62%.

The expanded uncertainty of the certified value for a constituent is estimated according to the Guide to the expression of Uncertainty in Measurement (GUM) at 95% confidence level. The uncertainty includes the measurement variability among the participating laboratories and material inhomogeneity, latter controlled through statistical means. The value listed for a constituent is the best estimate of true value based on the inter-laboratory comparison (ILC) results of 34 laboratories. Details of test methods followed by the laboratories are given overleaf (**Appendix**).

Instructions for Use:

1. CRM should be used in controlled conditions, using calibrated equipment, by trained personnel.
2. The analysis should be conducted on **air-dried basis**, after equilibrating the sample with humidity conditions prevailing in the laboratory.
3. Leftover portion of a vial, if any, should not be used at a later date.
4. NCB has provided only one set of material against the above Certificate No. mentioned at the top.
5. The material should be stored under non-humid conditions to avoid any ingress of moisture.
6. Record of usage of CRM and the results must be maintained.

Nature of Material: Non-hazardous

Expiry Date of CRM: This **CRM-1031A** with all its values and uncertainty is developed in **September 2015** and valid upto **30th September 2020** in sealed condition. The CRM will be **monitored** over the period of its certification.

Certification: NCB has provided only one set of material against the Certificate No. mentioned at the top.

Sd/-

Dr. S K Breja
Joint Director & Head
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Date of release:

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Appendix

Of the total 34 laboratories involved in intercomparison study, 22 laboratories are having accreditation as per ISO 17025:2005 and 6 are applicant laboratories. The laboratories carried out analysis by IS/ASTM/ISO method. Details of test method followed by the laboratories are as under:

Parameter	N	Method		
		IS	ASTM	ISO
Moisture	33	23	9	1
Volatile Matter	32	22	9	1
Ash	34	24	9	1
Sulphur (Total)	25	10	14	1
Gross Calorific Value	33	17	15	1

Note: 1. N represents total number of results. Method-wise number of results is given in respective column.
2. Sulphur represents total sulphur; it includes all kinds of sulphur-sulphate, pyritic and organic.

Laboratories using IS methods for proximate analysis (ash and volatile matter), calorific value and sulphur have tested as per IS 1350 (Part-I): 1984, IS 1350 (Part-II): 1970 and IS 1350 (Part-III): 1969, respectively. Regarding international methods, laboratories have used ASTM D5142, ASTM D7582 and ASTM D3173 (all methods are for total moisture) for moisture determination. For determining volatile matter, ASTM D3175 and ASTM D7582 have been used. For ash content determination, ASTM D4239, ASTM D7582 and ASTM D3174 have been used. For sulphur (total) determination, ASTM D3177 and ASTM D4239 have been used. For gross calorific value determination, ASTM D5865 has been used.

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