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सीबीएम मूल्यांकन के लिए प्रयोगशाला  
उपकरण — रीति संहिता

भाग 2 मार्श फनल और अंशांकित कप

**Lab Instruments for CBM  
Evaluation — Code of Practice  
Part 2 Marsh Funnel and Graduated Cup**

ICS 73.020

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September 2024

Price Group 4

## FOREWORD

This Indian Standard (Part 2) was adopted by the Bureau of Indian Standards, after the draft finalized by the Method and Equipments for Underground Coal Gasification and Coal Bed Methane Sectional Committee had been approved by the Mechanical Engineering Divisional Council.

Coal bed methane is the form of natural gas that is adsorbed into the solid matrix of coal. It is different from the conventional gas reservoirs as the methane is stored within the coal seams through the process of adsorption. The natural fractures in the coal seams (known as cleats) are responsible for the flow behaviour and provide the major channels for gas flow.

Several laboratory studies are carried out for CBM exploration/extraction as well as at the time of CBM operations. The laboratory studies include with various geological and geochemical data collection, data analysis, quality check and quality control of operation fluid while drilling, hydro-fracturing etc. The lab studies are essential to evaluate the gas reserve as well as for strategy finalization for exploration methodologies. One of the most challenging tasks in CBM evaluation are effluent (produced water) handling.

The code of practices for lab instruments for CBM evaluation is in four parts. This standard (Part 2) covers the marsh funnel and graduated cup. Other parts in this series under the general title are as follows:

Part 1 Mud balance

Part 3 Turbidity meter

Part 4 Rotational viscometer

The composition of the Committee responsible for the formulation of this standard is given in [Annex B](#).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded-off value should be the same as that of the specified value in this standard.

*Indian Standard***LAB INSTRUMENTS FOR CBM EVALUATION — CODE OF PRACTICE****PART 2 MARSH FUNNEL AND GRADUATED CUP****1 SCOPE**

A marsh funnel is a marsh cone with a particular orifice and diameter and with a fixed capacity. The graduated cup is also a fixed volume cup for measurement of funnel viscosity. It is a simple device for measurement of indicating viscosity of drilling fluid/or any viscous liquid for quality check, laboratory analysis and design purpose. Marsh funnel is a useful and utility device in drilling operation for quick quality analysis of drilling fluid. Funnel viscosity is the indicating viscosity of a fluid and it is measured by observing the time it takes a known volume of liquid to flow from a cone through a short tube.

**2 MARSH FUNNEL AND GRADUATED CUP****2.1 Design and Requirement****2.1.1 Marsh Funnel**

- a) Material — It should be made of rugged break/crack resistant plastic or equivalent material to resist temperature change deformation;
- b) Funnel diameter — 6" (152 mm) at the top;
- c) Length — 12" (305 mm);
- d) Capacity of the cone or funnel to bottom of screen — 1500 cc; and
- e) Plastic handle on cone/funnel to protect hands during testing.

**2.1.2 Screen**

- a) A 12 mesh half circle screen designed for removing any foreign material and drill cutting; and
- b) Screens should be fixed at a level 0.748" (19 mm) below edge top of the funnel.

**2.1.3 Orifice**

- a) Material — Copper or brass;
- b) Length — 2.0" (50.8 mm); and
- c) Diameter — (Inner diameter) 0.185" (4.7 mm).

**2.1.4 Measuring Cup**

Graduated in cc/ounce. Capacity 1 000 ml with moulded mark at 350 ml and at 946 ml.

**2.1.5 Material**

It should be made of rugged break/crack resistant plastic or equivalent material to resist temperature change deformation.

**2.1.6 Accuracy**

26 s  $\pm$  0.5 s at a temperature of 70 °F  $\pm$  5 °F (21°C  $\pm$  3 °C) that is, time required to drain one quart (946 ml) by measuring the viscosity of fresh water.

**2.1.7 Other Accessories**

- a) Digital stop watch for time recording;
- b) Digital thermometer (Fahrenheit and centigrade) as (0 °C to 105 °C)/(32 °F to 220 °F); and
- c) T-handle reamer 4.7 mm.

**3 CALIBRATION**

The device should frequently be checked with fresh water. Fresh water should give the reading of 26 s  $\pm$  0.5 s at a temperature of 70 °F  $\pm$  5 °F (21°C  $\pm$  3°C) that is, time required to drain one quart (946 ml).

**4 INSTALLATION AND TESTING**

- a) Funnel viscosity (that is, indication viscosity) of any fluid is measured by using marsh funnel and graduated cup;
- b) Cover the funnel orifice with a finger and pour freshly sampled drilling fluid/sample fluid through the screen up to the bottom of the screen;
- c) Remove finger and start the stopwatch simultaneously. Record the time of filling of measuring fluid to fill to the 946 ml that is to the mark of the cup; and
- d) Record the temperature of the fluid and report funnel viscosity of the fluid as nearest second of time in that temperature.

**5 DOCUMENTATION**

- a) Past track record of at least last two years for marsh funnel supplied in oil industry for example purchase orders, inspection release notes, user feedback with their communication details etc shall be provided;
- b) Manufacturer's data and descriptive literature for the equipment and materials of construction by ASTM reference and grade, coating(s), etc specifications;
- c) Calibration and test report of manufacturer shall be furnished;
- d) Installation and operation manual in English language shall be provided along with the supply; and
- e) Warranty/Performance guarantee certificate shall be furnished.

## ANNEX A

(Normative)

## MARSH FUNNEL AND GRADUATED CUP— DATA SHEET

| <i>Sl No.</i> | <i>Description</i>                                 | <i>Details</i>  |
|---------------|--|---|
| (1)           | (2)  | (3)   |
| i)            | Marsh cone (dimension)                             | -   |
| ii)           | Marsh funnel capacity                              | 1 500 CC  |
| iii)          | Screen (mesh)                                      | Half circle 12 mesh screen  |
| iv)           | Orifice diameter size)                             | 0.185" (4.7mm), inner diameter  |
| v)            | Graduated cup capacity (ml) and material           | 1 000 ml with moulded mark at 350 ml and at 946 ml                    |
| vi)           | Digital stop watch                                 | -   |
| vii)          | Digital thermometer (Fahrenheit and centigrade)    | -   |
| viii)         | Accuracy   | 26 s $\pm$ 0.5 s at a temperature of 70 °F $\pm$ 5°F (21°C $\pm$ 3°C) |
| ix)           | Conformance to codes and standards (if applicable) | -   |

ANNEX B

*(Foreword)*

COMMITTEE COMPOSITION

Method and Equipments for Underground Coal Gasification and Coal Bed Methane Sectional Committee, MED 37

| <i>Organization</i>   | <i>Representative(s)</i>  |
|---|---|
| Oil and Natural Gas Corporation Limited, New Delhi  | SHRI UDAY PASWAN ( <b>Chairperson</b> )   |
| Atlas Copco Construction and Mining Sales, Pune   | SHRI ANIMESH NANDY  |
| Bharat Heavy Electrical Limited, New Delhi  | SHRI TIRUPATHI NAIDU CHINTALA   |
| Bharat Heavy Electricals Limited, Project Engineering Management, Noida                               | SHRI RAJESH RANJAN<br>SHRI SAUMEN KUMAR BHAUMIK ( <i>Alternate I</i> )<br>SHRI PRADEEP KUMAR SHARMA ( <i>Alternate II</i> ) |
| Central Electricity Authority, New Delhi  | SHRI SUNIT GUPTA<br>SHRI ASIF IQBAL DEPUTY ( <i>Alternate</i> )   |
| Central Mine Planning and Design Institute Limited, Ranchi  | DR AKHILESH SINGH   |
| CSIR - Central Institute for Mining and Fuel Research, Dhanbad  | DR DEBADUTTA MOHANTY<br>SHRI JAYWARDHAN KUMAR ( <i>Alternate</i> )  |
| CSIR - Central Mechanical Engineering Research Institute, Durgapur                                    | DR MALAY KUMAR KARMAKAR ( <i>Alternate</i> )<br>DR CHANCHAL LOHA ( <i>Alternate</i> )                                       |
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| Indian Institute of Technology (ISM), Dhanbad   | SHRI R. M. BHATTACHARJEE<br>SHRI D. P. MISHRA ( <i>Alternate</i> )  |
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HEAD (MECHANICAL ENGINEERING)[REPRESENTING  
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SHRI AMAN DHANAWAT  
SCIENTIST 'C'/DEPUTY DIRECTOR  
(MECHANICAL ENGINEERING), BIS







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This Indian Standard has been developed from Doc No.: MED 37 (20187).

### Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|-----------|---------------|---------------|
|           |               |               |
|           |               |               |
|           |               |               |
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