

For BIS use only.



भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

MINUTES

| Meeting | Date and Day | Time |
|--|----------------------------------|-----------|
| 28 th Meeting of Renewable Energy Sources Sectional Committee, MED 04 | 25 September 2024 (Wednesday) | 11:00 hrs |
| Chairperson/Convener: Mr A. K. Tripathi, Scientist 'G', Ministry of New and Renewable Energy, New Delhi | | |
| Member Secretary: Ms Ankita Vidhyarthi, Scientist 'D'/Joint Director, Bureau of Indian Standards, New Delhi | | |
| Meeting Link: https://bismanak.webex.com/bismanak/j.php?MTID=maa2f07dfd80fc1596a36a38095644be6 Meeting number: 2516 664 8551 Password: MED@123 | | |

The attendance in the meeting of Renewable Energy Sources Sectional Committee MED 04 is given at **Annex A**.

ITEM 0 WELCOME AND OPENING REMARKS

- 0.1** Chairperson Shri A. K. Tripathi, Scientist-G, MNRE, welcomed the committee members in this meeting. He requested the committee to work on the gap areas of Standardization in this Sector, such as- specifications of the Tanks for Solar water heater for Solar flat plate collectors and Bio CNG related standards. He conveyed optimism for a productive and fruitful deliberation, anticipating that the committee's collective efforts would contribute meaningfully to the advancement of renewable energy goals in the nation.
- 0.2** Head, Mechanical Engineering Department, extended a cordial welcome to Shri A. K. Tripathi, Scientist-G, MNRE and Chairperson, MED 04, as well as the distinguished members attending the 27th meeting of the Renewable Energy Sources Committee.

ITEM 1 CONFIRMATION OF THE MINUTES OF THE LAST MEETING

The Committee confirmed the Minutes of the last meeting.

ITEM 2 SCOPE AND COMPOSITION OF THE SECTIONAL COMMITTEE

2.1 Scope

The Committee proposed the scope to remain as-

Formulation of standards in the field of Renewable energy sources such as solar energy, bio-gas energy, bio-mass energy etc.

2.2 Composition of the Committee

2.2.1 The committee noted the information.

2.2.2 The committee noted the information.

2.2.3 The committee noted the information.

2.3 Co-options & the Revised Nominations - No New Co-option requests received. The committee noted the information.

2.4 Programme of Work

The present programme of work of the Renewable Energy Sources Sectional Committee, MED 04 is attached below. (No. of Published Standards is **28**)

[POW_MED04](#)

The committee noted the information.

2.4.1 Standards under Certification

As of date, the following standards prepared by MED 04 are under certification:

| SI No. | IS Number | IS Title | No. of Licences |
|--------|--------------------------|--|-----------------|
| 1) | IS 12933 (Part 1) : 2003 | Solar flat plate collector - Specification: Part 1 requirements (<i>Second Revision</i>) | 23 |
| 2) | IS 16544 : 2016 | All glass evacuated tubes solar water heating system | 14 |

| | | | |
|----|------------------------------|---|----|
| 3) | IS 13152 (Part 1) : 2013 | Portable solid bio - Mass cookstove (Chulha) - Specification (<i>First Revision</i>) | 01 |
|----|------------------------------|---|----|

The committee noted the information.

ITEM 3 ROLLING ANNUAL ACTION PLAN FOR THE YEAR 2024-25

3.1 Proposed meeting Calendar for FY 2024-25 is as follows:

| Committee | Q1 2024-25 | Q2 2024-25 | Q3 2024-25 | Q4 2024-25 |
|-----------|-----------------------------|----------------------------------|------------------------------|-----------------------------|
| | | June | September | November |
| MED 04 | 26 June Wednesday | 25 September Wednesday | 29 November Friday | 7 February Friday |

The Committee noted the information. The committee decided that the next Committee meeting of MED 04 may be carried out in the Physical mode at IIT-BHU.

3.2 Standards National Action Plan (SNAP) 2022-2027

[SNAP BOOK 2022-2027](#)

The Committee noted the information.

ITEM 4 ACTION TAKEN ON MINUTES OF THE LAST MEETING

4.1 The actions taken on decision of last meeting of Renewable Energy Sources Sectional Committee, are as follows:

| SI No. | Background | Action Taken/Status since the last Meeting | Decision of the committee |
|--------|--|--|--|
| 1) | Comments were received regarding Amd 2 to IS 16544 from CMD 1 and Manak Manthan held by Bangalore Branch Office. Email_20 sep 2023.pdf Report on Manak Manthan .xlsx | Panel Meeting reminder was sent to the members by MS vide email dated 08.08.2024. EMAIL_08-08-2024_PANEL_MEETING_MED04_REMINDER.pdf | As recommended by MS, the present panel members decided to hold the panel meeting on 01.10.2024. The committee |

| | | | |
|-----------|---|---|---|
| | <p>Email for panel meeting IS 16544 04 OCT 2023.pdf</p> <p>Email AMD IS 16544 19 DEC 20 23.pdf</p> <p>Email AMD IS 16544 20 FEB 20 24.pdf</p> <p>Discussion of the panel during the meeting held on 10 October, 2023 could not be done as majority of the members were not present during the meeting.</p> <p>The Committee discussed the issue at length.</p> <p>Recommendations on comments in Amd 2 to IS 16544 were to be provided by the panel.</p> <p>The constitution of the panel is as-</p> <p>a) Dr Avadhesh Yadav, DDG NISE (<i>Convenor</i>)</p> <p>b) Prof. Santanu Bandopadhyay of IIT Mumbai(New nomination received in place of Prof Kedare)</p> <p>c) Prof Anagha Pathak of RTC Pune</p> <p>d) Shri Vikrant Yadav from NISE.</p> <p>e) Shri Asim Kumar Joshi, SPRERI</p> <p>f) Shri Vikram Dhaka, MNRE</p> <p>g) Prof K. Srinivas Reddy, IIT Chennai.</p> | <p>The Panel meeting was organised by Shri Vikrant Yadav, NISE on 14.08.2024.</p> <p>EMAIL_VIKRANT_YADAV_PANEL_MEETING_16-08-2024.pdf</p> <p>However, no actions could be taken in the meeting due to absence of the other members.</p> <p>Subsequently, comments from the members were invited by Shri Vikrant Yadav. Comments were received from Shri Asim Joshi via email dated 22.08.2024.</p> <p>Email Asim Joshi 22-08-2024.pdf</p> <p>Draft is awaited from the panel.</p> | <p><i>agreed on it.</i></p> |
| <p>2)</p> | <p>Suggestions/Comments of Panel regarding revision draft of IS 12933 (Part - 1, 2 & 5) ‘solar flat plate</p> | <p>In the last meeting, Prof Anagha Pathak informed the committee that the</p> | <p><i>As recommended by MS, the present panel</i></p> |

| | | |
|---|--|--|
| <p>collectors' were incorporated by MS and circulated to the committee. However, no comments have been received from the committee.</p> <p>IS 12933 (Part 1) changes identified.docx</p> <p>IS 12933 (Part 2) changes identified (1).docx</p> <p>IS 12933 (Part 5) changes identified.docx</p> <p>Comments by Member Secretary sent to members vide email dt.- 09-05-2023(enclosed here for reference).</p> <p>Email IS 12933_9_5_2023.pdf</p> <p>Terminologies pending in the ISS were to be incorporated. Comparison between withdrawn IS 12934: 1990 and IS/ISO 9488: 2023 done by MS and missing definitions were identified.</p> <p>Solar MissingDefinition 20022024.xlsx</p> <p>Comments were received from Shri Manjunath Ullur of M/s Emmvee Photovoltaic Power Private Limited.</p> <p>IS 12933 (Part 2) changes identified (002).docx</p> <p>Email IS 12933.pdf</p> | <p>recommendations on these IS (IS 12933 part 1, 2 and 5) have already been finalized by the same panel as mentioned in Sl.No.1. with the following members-</p> <p>a) Dr Avadhesh Yadav, DDG NISE (<i>Convenor</i>)</p> <p>b) Prof. Santanu Bandopadhyay of IIT Mumbai</p> <p>c) Prof Anagha Pathak of RTC Pune</p> <p>d) Shri Vikrant Yadav from NISE.</p> <p>e) Shri Asim Kumar Joshi, SPRERI</p> <p>f) Shri Vikram Dhaka, MNRE</p> <p>g) Prof K. Srinivas Reddy, IIT Chennai.</p> <p>Prof. Pathak informed the committee that they will hold Panel meetings and submit the final working draft on all the IS within one month.</p> <p>The committee agreed to it and decided that the panel will also incorporate the terminologies pending in all the three IS due to withdrawal of IS 12934.</p> <p>Reminder email for conducting the panel meeting was sent on 08th August 2024.</p> <p>EMAIL IS 12933-08-08-2024.pdf</p> | <p><i>members decided to hold the panel meeting on 01.10.2024. The committee agreed on it.</i></p> |
|---|--|--|

| | | | |
|----|--|--|--|
| | | Draft is awaited from the panel. | |
| 3) | <p>Shri Asim Kumar Joshi, SPRERI informed that comparative study between test methods specified in Literature (new) and test methods specified by MNRE (old) is in progress. However, Shri Joshi was not available in the last two meetings.</p> <p>As directed by the committee, reminder emails were sent on 16.10.2023, 20.02.2024 & 25.04.2024.</p> <p>Email Dish Solar Cooker 16 OCT 2023.pdf</p> <p>Email Dish Solar Cooker 20 FEB 2024.pdf</p> <p>Email Dish Solar Cooker 25 APR 2024.pdf.</p> <p>Also, a proposal regarding COR of solar cookers was received for a NWIP from Dr S. K. Samdarshi, Professor and Head, Department of Energy Engineering, Central University of Jharkhand, Ranchi.</p> <p>The proposal was circulated to the committee in the 09th meeting and also vide email dated 05.02.2024.</p> <p>Email cor of solar cooker 05 feb 2024.pdf</p> <p>A meeting was also organized on 28.05.2024 by MS between Shri Asim Joshi and Dr Samdarshi for discussion regarding the applicability of COR in the draft to be prepared by Shri Joshi.</p> <p>The issue was discussed and</p> | <p>Reminder email for submission of the draft was sent to Shri Joshi on 07.08.2024.</p> <p>EMAIL SOLAR COOKER 07-08-2024.pdf</p> <p>Also, Shri Joshi was provided the indigenous template for Standards via the same email.</p> <p>Draft is awaited.</p> | <p><i>The Committee decided to formulate the following panel on Solar Cookers.</i></p> <p>a) Prof S.K Samdarshi, Central University of Jharkhand, Ranchi.</p> <p>b) Shri Vikrant Yadav, NISE</p> <p>c) Prof. Anish Modi, IIT Mumbai</p> <p>d) Prof. S.K Shukla, IIT-BHU</p> <p>e) Shri Asim Joshi, SPRERI.</p> <p>Convenor of the panel Prof. S.K Samdarshi decided to hold the panel meeting on 16th October at 11 am. The committee agreed to it.</p> |

| | | | |
|-----------|--|---|---|
| | <p>Information was exchanged during the meeting, however, no definite conclusion was reached.</p> | | |
| <p>4)</p> | <p>During its 24th Meeting, The Committee decided that a Panel may go through the draft on ‘Performance Guidance for Solar Air Heating for Industrial Process Heat Applications/Solar Dryer’ and provide their comment or suggestions within 01 month:</p> <p>draft standard provided by Shri Palaniappan.pdf</p> <p>The committee reconstituted the panel as follows in the last meeting-</p> <p>a) Prof Anagha Pathak of RTC Pune (Convener)</p> <p>b) Dr Avadhesh Yadav, DDG NISE</p> <p>c) Shri Vikrant Yadav from NISE.</p> <p>d) Shri Vikram Dhaka, MNRE</p> <p>e) Prof. Anish Modi, IIT Mumbai</p> <p>f) Shri Asim Kumar Joshi, SPRERI.</p> <p>Shri Vikrant Yadav and Dr. Avadhesh Yadav, MNRE were nominated as core members of the Panel. Shri Vikrant Yadav informed the committee that they will submit the draft within one month.</p> <p>Committee requested that MS may remind the panel to conduct the meeting at the earliest.</p> | <p>Reminder for Panel meeting send vide email dated- 24.05.2023, 19.12.2023 20.02.2024, and 08.08.2024.</p> <p>EMAIL DRAFT SOLAR DRYER_08-08-2024.pdf</p> <p>Email Reminder 1 24 may 2023.pdf</p> <p>Email reminder 2 amd 19 dec 2023.pdf</p> <p>Email reminder 2 16544 amd 19 dec 2023.pdf</p> <p>Email reminder 3 IS 16544 20 FEB 2024.pdf</p> <p>Draft Awaited from the Panel.</p> | <p>The committee decided to reconstituted the panel as follows -</p> <p>a) Prof. Anish Modi, IIT Mumbai (Convener)</p> <p>b) Prof Anagha Pathak of RTC Pune</p> <p>c) Dr Avadhesh Yadav, DDG NISE</p> <p>d) Shri Vikrant Yadav from NISE.</p> <p>e) Shri Vikram Dhaka, MNRE</p> <p>f) Shri Asim Kumar Joshi, SPRERI.</p> <p>Shri Vikrant Yadav informed that initial draft will be provided by him around the middle of October and the panel meeting will be organized after that.</p> |

| | | | |
|----|---|--|--|
| | | | |
| 5) | <p>The Committee decided to send Draft MED 04 (21276) for Manifold Type Storage Water Tank for All Glass Evacuated Tubes Solar Collector Systems — Specification for printing.</p> <p>doc. 21276.pdf</p> <p>The committee decided that detailed discussion needs to be done related to material and hence the same may be sent for comments by email and will be discussed during the next committee meeting.</p> | <p>The draft is in the publication stage. 1 comment has been received. please see Item 5.</p> <p>The committee decided to accept the comments, however, the grades/varieties of "aluminum/stainless steel/FRP are to be provided by the committee.</p> <p>An email reminder dated 08.08.2024 was sent to the committee for the same EMAIL REMINDER 21276 08-08-2024.pdf</p> | <p><i>The committee decided that Panel as per Sl. No. 1 may provide their recommendation on it.</i></p> |
| 6) | <p>Panel was constituted for providing draft revision of IS 13152 (Part 1): 2013 as follows:</p> <p>a) Dr A.R Shukla of Biogas Forum (Convener)</p> <p>b) Dr S.K Tyagi of IIT Delhi</p> <p>c) Ms Svati Bhogale of M/s TIDE</p> <p>d) Shri Asim Kumar Joshi SPRERI</p> <p>e) A representative of CSIR-IMMT</p> <p>f) Shri Ankit Gupta CSIR - NEERI, Nagpur</p> <p>g) Ms. Poonam Prasad CSIR - NEERI, Nagpur</p> <p>Convenor of the Panel Dr A. R. Shukla informed that the Panel will submit the draft within 1 month.</p> | <p>Reminders for the panel meeting were sent via e-mail dated 14.09.2023 and 21.02.2024 and 08.08.2024.</p> <p>EMAIL IS 13152_08-08-2024.pdf</p> <p>Email is 13152_14-09-2023.pdf</p> <p>Email is 13152_21-02-2024.pdf</p> <p>Dr Shanmugam to provide the contact details for nomination of member from IMMT</p> <p>Draft is awaited from the panel.</p> | <p><i>Dr A. R. Shukla, Biogas forum recommended to add Dr S. K. Khuntia (In personal capacity) to be added in the panel. The committee agreed to it.</i></p> <p><i>As recommended by MS, the present panel members decided to hold the panel meeting on 17.10.2024 at 11 am. The committee agreed on it.</i></p> |
| 7) | <p>Chairman suggested for formulation</p> | <p>Reminder for the panel meeting</p> | <p><i>The committee</i></p> |

| | | | |
|--|---|---|---|
| | <p>of standard on ‘Terminologies for Renewable Energies’. Committee also suggested including Calculations in the draft standard. Pre standardization document to be provided by MNRE.</p> <p>The committee constituted the Panel as follows-</p> <p>a) Shri Hiren Chandra Bohra, MNRE</p> <p>b) Shri Vikram Dhaka, MNRE</p> <p>c) Dr Adinath Funde, RTC, Pune</p> <p>d) Prof. SK Shukla from IIT BHU</p> <p>e) Prof. Santanu Bandopadhyay of IIT Mumbai (New nomination received in place of Prof Kedare) .</p> <p>f) Sh. K. Ravi Kumar from IIT Delhi</p> <p>g) Dr. Chandan Bannerjee from NISE</p> <p>h) Smt. Poonam Prasad from CSIR-NEERI</p> <p>i) Shri Asim Kumar Joshi of SPERI</p> <p>j) Representative from IIT Roorkee</p> <p>k) Representative from SIBE</p> <p>Shri Hiren Chandra Bohra, Convenor, informed that he will contact NIWE for the nomination and the panel will submit their report within one month.</p> | <p>was sent on 08.08.2024.</p> <p>EMAIL Terminologies for Renewable 08-08-2024.pdf</p> <p>Draft awaited from the panel.</p> | <p><i>decided to reconstitute the panel as follows –</i></p> <p>a) <i>Prof SK Shukla , IIT BHU (Convenor)</i></p> <p>b) <i>Shri Vikram Dhaka, MNRE</i></p> <p>c) <i>Dr Adinath Funde, RTC, Pune</i></p> <p>d) <i>Shri Hiren Chandra Bohra, MNRE</i></p> <p>e) <i>Prof. Santanu Bandopadhyay of IIT Mumbai</i></p> <p>f) <i>Sh. K. Ravi Kumar from IIT Delhi</i></p> <p>g) <i>Dr Chandan Bannerjee from NISE</i></p> <p>h) <i>Smt Poonam Prasad from CSIR-NEERI</i></p> |
|--|---|---|---|

| | | | |
|--|--|--|--|
| | | | <p>i) <i>Shri Asim Kumar Joshi of SPERI</i></p> <p>j) <i>Representative from IIT Roorkee</i></p> <p>k) <i>Representative from SIBE</i></p> <p><i>As recommended by MS, the present panel members decided to hold the panel meeting on 18.10.2024 at 11 am. The committee agreed on it.</i></p> |
|--|--|--|--|

4.2 Standards under development

| Sl No. | IS No. | Title | Status | Decision of the committee |
|--------|--|---|---------------------------|---|
| 1) | MED/04/25025 (IS 16648: Part 5: 2017) | Concentrated solar thermal - Specification: Part 5 test methods Amendment - 2 | In Wide Circulation stage | <p>Pending for approval for WC stage.</p> <p>Approval request sent to chairperson via email.</p> <p><i>The committee noted the information.</i></p> |

The Committee noted the information.

4.3 Standards under publication

| Sl No. | IS No. | Title | Status | Remarks | Decision of the committee |
|--------|---|---|-------------|--|--------------------------------------|
| 1) | MED/04/21276 | Manifold Type Storage Water Tank For All Glass Evacuated Tubes Solar Collector Systems Specification | In Printing | MEDC Approval sent to the publication department. | Please see Item 4.1 Sl. No. 5 |
| 2) | MED/04/21413 (IS 16544 : 2016) | All glass evacuated tubes solar water heating system Amendment - 2 | In Printing | Ready for Gazette. Comment from CMD-III received. pl see Sl No. 1 of Item 4. | Please see Item 4.1 Sl. No. 1 |
| 3) | MED/04/21160 IS 13129 (Part 3): 1991 | Solar Heating Domestic Water Heating Systems Part 3 Procedures For System Component Characterization And Prediction For Yearly Performance Using Component Performance Data | In Printing | Publication in process. | The committee noted the information. |

ITEM 5 COMMENTS ON PUBLISHED/DRAFT INDIAN STANDARD

1) MED 04 (21276)- MANIFOLD TYPE STORAGE WATER TANK FOR ALL GLASS EVACUATED TUBES SOLAR COLLECTOR SYSTEMS SPECIFICATION

| S No. | Clause / Sub Clause No. | Paragraph No./Figure No./Table No. | Type of Comment | Attachment |
|---|-------------------------|------------------------------------|--|------------|
| 1 | Cl. 5.2 | 1 | Editorial | N/A |
| <p>Comments/Suggestions along with Justification for the Proposed Change</p> | | | <p>1. When It is mentioned that "The material of outer cladding shall be pre-painted galvanized steel conforming to IS 14246", Then the clause should not provide an Alternative arrangement in the second line.</p> <p>2. If we are providing alternative arrangements with Either-Or requirement (Either both Shall or Both May), we</p> | |

| | | |
|--------------------------|------------------------|--|
| | | <i>should also fix the grades/varieties of "aluminum/stainless steel/FRP" otherwise it would be an open ended non-verifiable clause.</i> |
| Proposed Wordings | Change/Modified | <i>Wordings may be suitably modified if the comments are accepted.</i> |

The committee decided to accept the comments, however, the grades/varieties of aluminium/stainless steel/FRP are yet to be finalized. The committee decided that Panel as per Sl. No.1 of Item 4.1 of Agenda may provide their recommendation on it.

ITEM 6 REVIEW OF PUBLISHED INDIAN STANDARD

6.1 Status of review/re-affirmation of standards in 2024-25.

| Sl No. | IS No. | IS Title | Remarks | Decision taken |
|--------|--------------------------|--|---|---|
| 1) | IS 12933 (Part 1) : 2003 | Solar flat plate collector — Specification: Part 1 Requirements (<i>second revision</i>) | Committee finalised the revision draft for WC | Pl see Sl. No 2 of Item 4. |
| 2) | IS 12933 (Part 2) : 2003 | Solar flat plate collector — Specification: Part 2 Components (<i>second revision</i>) | Committee finalised the revision draft for WC | Pl see Sl. No 2 of Item 4. |
| 3) | IS 12933 (Part 3) : 2003 | Solar flat plate collector — Specification: Part 3 Measuring instruments (<i>first revision</i>) | Reviewed In : 2019 <u>ToR</u> | Dr SK Shukla from IIT BHU has provided a modified ToR vide email. <u>IS 12933-3_ToR.docx</u> Committee agreed to the same and agreed that the project may be awarded to Dr S. K. Shukla from IIT BHU. |

| | | | | |
|----|-------------------------|--|------------|--|
| | | | | ToR approval in process. Email approved tor 01 dec 2023.pdf |
| 4) | IS 13429 (Part 2): 2018 | Solar cooker — Box type — Specification: Part 2 Components (<i>second revision</i>) | <u>ToR</u> | The committee agreed and finalised the modified ToR. <u>IS 13429-2 ToR .docx</u> <u>IS 13429-3 ToR .docx</u> |
| 5) | IS 13429 (Part 3): 2018 | Solar cooker — Box type — Specification: Part 3 Test method (<i>second revision</i>) | <u>ToR</u> | Committee agreed that the project may be awarded to Dr S K Samdarshi, Central University of Jharkhand, Ranchi. ToR approval in process. Email approved tor 01 dec 2023.pdf |

ITEM 7 DATE AND PLACE FOR THE NEXT MEETING

The Committee noted the information as per Item no. 3.1.

ITEM 8 ANY OTHER BUSINESS WITH PERMISSION OF CHAIR

- a) The committee decided that as recommended by the Chairperson a working Panel may be formed to explore the possibilities of formulation of standards Bio-CNG, Bio- Hydrogen, Biohythane and for Biogas to Methane. Following members were nominated to be the part of the panel-
- i) Dr. A.R Shukla, In-person Capacity
 - ii) Dr Shanmugam, CLRI
 - iii) Dr Asim Joshi, SPRERI
 - iv) Dr. S.K Shukla, IIT-BHU
 - v) Dr. S. R. Meena , MNRE
 - vi) Shri Chanchal Loha , CSIR-CMERI, Nagpur

The members from the panel decided to hold the first meeting of the panel on 01.10.2024 at 11 am.

- b) The committee again opined that all the Biogas requirement standards should be a part of the

renewable Energy committee of BIS and asked the Member Secretary to explore the options of getting all the Biogas related standards under one umbrella in MED.

There being no other business, the meeting ended with a vote of thanks to the Chair and the committee members.

Annex A

Attendance of Renewable Energy Sources Sectional Committee, MED 04

| Sl No. | Organization Name | Member Name | Email ID | Mob. No. |
|--------|--|--|-----------------------------|------------|
| 1. | Ministry of New and Renewable Energy (MNRE), New Delhi | Dr A. K. Tripathi (Scientist-G) (<i>Chairperson</i>) | aktripathi@nic.in | 9810880378 |
| 2. | Bharat Heavy Electrical Limited (BHEL), New Delhi | Shri Saumen Kumar Bhaumik (AGM) | skbhomik@bhel.in | 9818661646 |
| | | Shri Subhashish Gupta (DGM) | subhashishgupta@bhel.in | 9818229078 |
| 3. | Biogas Forum India, New Delhi | Dr A. R. Shukla (Former Adviser & President, IBA) | shuklaar@yahoo.com | 9810585602 |
| 4. | Central Arid Zone Research Institute (CAZRI), Jodhpur | Dr H. L. Kushwaha (Head and Principal Scientist) | hari.kushwaha@icar.gov.in | 8800777399 |
| | | Dr Surendra Poonia (Principal Scientist) | surendra.poonia@icar.gov.in | 9414700864 |
| 5. | CSIR - National Environmental Engineering Research Institute (NEERI), Nagpur | Dr Ankit Gupta (Principal Scientist) | a1_gupta@neeri.res.in | 8928022126 |
| 6. | CSIR - Central Mechanical Engineering Research Institute (CMERI), Durgapur | Dr Chanchal Loha (Principal Scientist) | c_loha@cmeri.res.in | 9474562107 |

| | | | | |
|-----|--|---|--|------------|
| 7. | CSIR - Central Leather Research Institute (CLRI), Chennai | Dr P. Shanmugam (Chief Scientist and Head) | pshanmugham@clri.res.in | 9445568343 |
| 8. | India Meteorological Department (IMD), New Delhi | Shri Harmeet S. Sawhney (Scientist 'E') | harmeets.sawhney@gmail.com | 9650997299 |
| | | Dr Anikender Kumar (Scientist 'C') | anikender.kumar@imd.gov.in; anikender@gmail.com | 8791672778 |
| 9. | Indian Institute of Technology (BHU), Mechanical Engineering Department, Varanasi | Prof Shailendra Kumar Shukla (Professor, Mechanical Engg.Deptt.) | skshukla.mec@itbhu.ac.in | 9450011123 |
| 10. | Indian Institute of Technology Bombay, Mumbai | Prof. Anish Modi (Associate Professor) | anishmodi@ese.iitb.ac.in | 8769932384 |
| | | Shri Santanu Bandyopadhyay | santanub@iitb.ac.in | — |
| 11. | International Copper Association India (ICAI), Mumbai | Shri Jyotish Pande (Advisor) | jyotish.pande@copperalliance.org | 9810023544 |
| 12. | Rajagiri School of Engineering and Technology, Kerala | Dr Joel George (Professor) | joel_p@rajagiritech.edu.in; joelpull@gmail.com | 9446179554 |
| 13. | Sardar Patel Renewable Energy Research Institute (SPRERI), Mechanical Engineering Department, Vallabh Vidyanagar | Shri Asim Kumar Joshi (Senior Scientist) | solar1@spreri.org | 9033509188 |

| 14. | Solar Thermal Federation of India (STFI), Pune | Shri Jaideep N. Malaviya (Secretary General) | info@stfi.org.in | 9890033399 |
|-------------------------------------|---|--|--|---------------------------|
| 15. | BIS, New Delhi | Shri K. V. Rao (HMED) | hmed@bis.gov.in | — |
| 16. | BIS, New Delhi | Ankita Vidhyarthi (Scientist-D) | ankita14v@gmail.com | — |
| INVITEE/GUEST/REPRESENTATIVE | | | | |
| Sl No. | Organization Name | Member Name | Email ID | Mob. No. |
| 17. | Central University of Jharkhand, Ranchi | Prof S. K. Samdarshi (Head) | sanjoy.samdarshi@cuja.ac.in; drsksamdarshi@rediffmail.com | 9431107270; 9471369553 |
| 19. | National Institute of Solar Energy (NISE), Gurugram | Shri Vikrant Yadav [Deputy Director (Technical)] | vikrant.yadav@nise.res.in | 9996559252 |

NOTE — Attendance of member organisations updated in Standards Portal of BIS. Members are requested to check and revert if their attendance is not showing in their profile in the portal.