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**MINUTES**

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| **MEETING** | **DAY & DATE** | **TIME** | **VENUE** |
| **Forty-third meeting of Refrigeration and Air Conditioning Sectional Committee, MED 03** | **Monday**  **02 December 2024** | **1030 -1210 hrs** | **VC through WEBEX** |

**CHAIRPERSON:** Prof (Dr) Ravi Kumar,Department of Mechanical & Industrial Engineering, Indian Institute of Technology (IIT), Roorkee, Uttarakhand.

**MEMBER SECRETARY**: Miss Neha Thakur, Scientist ‘C’/Deputy Director (MED), BIS, New Delhi.

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| **Sl No.** | **Organisation Name** | **Name of The Member** | **Email** | **Mobile** |
|  | Indian Institute of Technology, Roorkee | Prof Ravi Kumar (C*hairperson*) | ravi@me.iitr.ac.in | 9458158967 |
|  | Blue Star Limited, Mumbai | Shri Sunil Kumar Jain | suniljain@bluestarindia.com | 9930966872 |
|  | [Bureau of Energy Efficiency, New Delhi](javascript:;) | Shri Dheeraj Pandey | dheeraj.pandey96@beeindia.gov.in | 8700653055 |
|  | [Carrier Air Conditioning and Refrigeration Limited, Gurugram](javascript:;) | Shri Sanjay Sharma | Sanjay.sharma@carrier.com | - |
|  | [CEPT University, Ahmedabad](javascript:;) | Shri Yash Shukla | yash.shukla@cept.ac.in | 9913318333 |
|  | [Copeland India Private Limited, Pune](javascript:;) | Shri S. Chethan Tholpady | chetan.tholpady@copeland.com | 9850602426 |
|  | [Daikin Air Conditioning India Private Limited, Gurugram](javascript:;) | Shri Gaurav Mehtani | gaurav.daikifn@gmail.com | 9711058337 |
|  | [Electrical Research and Development Association, Vadodara](javascript:;) | Shri Rakesh Patel | rakesh.patel@erda.org | 9512036788 |
|  | [Frigoglass India Private Limited, Gurugram](javascript:;) | Ms. Ritu Chouhan | rchauhan@frigoglass.com | 9818199499 |
|  | [Frigoglass India Private Limited, Gurugram](javascript:;) | Ms. Khushbu Sinha | ksinha@frigoglass.com | - |
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|  | [Indian Institute of Technology Roorkee, Roorkee](javascript:;) | Prof Ravi Kumar | ravi@me.iitr.ac.in | 9458158967 |
|  | [Indian Society of Heating, Refrigerating and Air Conditioning Engineers, New Delhi](javascript:;) | Shri Ashish Rakheja | ashish.rakheja@aeonconsultants.in | 9810055344 |
|  | [Intertek India Private Limited, Gurugram](javascript:;) R&D | Shri C. M. Pathak | pathakcm1@hotmail.com | 9818462001 |
|  | [Indian Institute of Technology Madras, Chennai](javascript:;) | Dr. G. Venkatarathnam | gvenkat@iitm.ac.in | 9176485950 |
|  | [International Copper Association India, Mumbai](javascript:;) | Shri Shankar Sapaliga | shankar.sapaliga@internationalcopper.org | 9769036943 |
|  | [In Personal Capacity](javascript:;) | Shri P K Mukherjee | pkmukherjee09@yahoo.com | 9910013204 |
|  | [Johnson Controls-Hitachi Air Conditioning India Limited, Mehsana](javascript:;) | Shri Rahul Ramtekkar | rahul.ramtekkar@jci-hitachi.com | 9833846640 |
|  | [Johnson Controls-Hitachi Air Conditioning India Limited, Mehsana](javascript:;) | Ms. Heena Ramsinghani | heena.ramsinghani@jci-hitachi.com | 6355254231 |
|  | [LG Electronics India Private Limited, New Delhi](javascript:;) | Shri Aditya Anil | aditya.anil@lge.com | 9953555106 |
|  | [Malaviya National Institute of Technology, Jaipur](javascript:;) | Dr. Jyotirmay Mathur | jmathur.mech@mnit.ac.in | 9414250329 |
|  | [Refrigeration and Air Conditioning Manufacturers Association, New Delhi](javascript:;) | Shri Rama | rama@rama.org | - |
|  | [Samsung India Electronics Private Limited, New Delhi](javascript:;) | Shri Amit Kumar Jha | jha.amit@samsung.com | 8800967800 |
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|  | [UL India Private Limited, Bengaluru](javascript:;) | Shri V. Manjunath | manjunath.v@ul.org | 9902088120 |
|  | [UL India Private Limited, Bengaluru](javascript:;) | Shri Deepak Khurma | Deepak.khurma@ul.com | - |
|  | [Voltas Limited, Mumbai](javascript:;) | Shri A.D. Kumbhar | akumbhar@voltas.com | 9820761589 |
|  | [Voltas Limited, Mumbai](javascript:;) | Shri Srinivasu Moturi | vasu@voltas.com | 9899872440 |
|  | [Voltas Limited, Mumbai](javascript:;) | Ms. Priya Singh | priyasingh@voltas.com | - |
|  | [Voluntary Organisation in Interest of Consumer Education (VOICE), New Delhi](javascript:;) | Shri Harbans Wadhwa | hswadhwa@gmail.com | 9873478225 |

**BIS Directorate:**

1. Ms Neha Thakur, Sc.C/ Deputy Director, MED

**Item 0 WELCOME AND OPENING REMARKS**

* 1. MS welcomed the Chairperson and members on behalf of Shri K V Rao, Head (MED), BIS.
  2. Prof Ravi Kumar,Chairperson MED 03 welcomed all the members present. He apprised the members of the important discussions during the meeting. With this, he hoped for fruitful deliberation during the meeting.

**Item 1 CONFIRMATION OF THE MINUTES OF THE LAST MEETING**

The Committee confirmed the minutes of 42nd meeting of Refrigeration and Air Conditioning Sectional Committee, MED 03 held on 26 September 2024 in New Delhi was circulated vide email bearing reference MED 03/A-2.42 dated 01 October 2024.

**Item 2 SCOPE AND COMPOSITION OF COMMITTEE**

**2.1 SCOPE**

The Committee noted the present scope and liaison with ISO and IEC Committees.

**2.1.1 DRAFT REVISED SCOPE**

The Committee reviewed the proposal by P K Mukherjee and MS. The Committee considering the present work status of MED 03 decided to submit the following modified draft scope for MEDC approval.

*‘Standardization in the fields of refrigeration and air-conditioning, including terminology; mechanical and electrical safety; designation and handling of refrigerants; methods of testing and rating equipment; measurement of sound levels; and sustainability.*

*The scope also includes:*

* + *Refrigeration and similar appliances for household and commercial use;*
  + *Factory-assembled air-conditioners (cooling), heat pumps, dehumidifiers, humidifiers, refrigerant reclaiming and recycling equipment as well as other devices such as ventilation equipment, line components, and refrigerating controls used in air-conditioning and refrigeration systems;*
  + *Automotive air conditioning; and*
  + *Selection, installation, commissioning and maintenance of Heating Ventilation and Air Conditioning (HVAC) System considering the environment, safety, and human health.’ ”*

**2.2 COMPOSITION OF THE SECTIONAL COMMITTEE AND ITS SUB-COMMITEES**

**2.2.1** The Committee noted the information. Annual Review of Contribution by the Committee members will be reviewed in the next meeting.

**2.2.2** The Committee noted the information.

**2.2.3** The Committee noted the information.

**2.2.4** The Committee noted the information.

**2.2.5** The Committee noted the information.

**2.2.6 Gender Responsive Standards Initiative**

The Committee noted the information.

**2.2.7 List of Technical Experts**

The Committee noted the information.

**2.2.8 Requests for Nomination to Committee/ Sub-Committee/ Panel/ Working group**

i) The Committee requested MS to inform the responses of the following organizations for co-option to various panels under MED 03 in its next meeting:

a) Shri Sajal Bhardwaj, HOD-R&D, Starion India Pvt Ltd, Greater Noida;

b) Shri Sumit Shivaji Umbarje, in personal capacity;

c) Shri Japneet Singh Juneja, Chief Technology Officer/Partner, Ace Test Labs;

d) Shri Shekh Tazimul Haque Faridi, Manager, Dyson Technology India Pvt Ltd, Gurugram, Haryana;

e) Shri Dalip Singh, in personal capacity;

f) Shri Kannan G R, Professor PSNA College of Engineering and Technology;

g) Shri Muralidharan K, Professor PSNA College of Engineering and Technology;

h) Shri Anbarasan B, Assistant Professor, PSNA College of Engineering and Technology; and

j) Shri S Murugapoopathi, in personal capacity.

ii) The Committee co-opted SML Isuzu Limited in the panel MED 03: P28 Automotive Air Conditioning and Mobile Air-Conditioning.

iii) The Committee co-opted Voltas Limited in the panel MED 03: P19 Chiller.

**Item 3** **ANNUAL CALENDAR AND** **PROCESS OF STANDARDISATION**

1. **Annual calendar** for Technical Committee meetings

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| --- | --- | --- | --- | --- |
| **Technical Committee** | **1st Quarter** | **2nd Quarter** | **3rd Quarter** | **4th Quarter** |
| **MED 03** | **24 Jun 2024** | **26 Sep 2024** | **02 Dec 2024** | **xx\* Feb 2025** |

\*Exact date will be decided in consultation with the Chairperson.

1. The Committee noted the information.
2. The Committee noted the information
3. The Committee noted the information.
4. The Committee noted the information.
5. The Committee noted the information.
6. The Committee noted the information.

**Item 4 ACTION ARISING OUT OF THE PREVIOUS MEETING(s)**

**4.1** The summary of actions taken on the minutes of the last meeting and present status are given below:

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| --- | --- | --- | --- | --- |
| **Sl No.** | **Item no.** | **Decision of 42nd meeting** | **Present Status** | **Decision of 43rd meeting** |
|  | 4.1 (7) | **MED 03 (26474) Amendment no. 1 to IS 17773 : 2022 Closed-Circuit Ammonia Refrigeration System — Code of Practice for Design and Installation (ANSI/IIAR 2 : 2014, NEQ)**    The Committee noted the last date of comments. If no comment is received, the Committee approved the draft for printing.  The comment if received shall be disposed by the panel. | The last date for comments was 19 October 2024.  No comment has been received on the draft.  The Committee may **FINALIZE** and **APPROVE** the draft for printing. | The Committee approved the draft for printing. |
|  | 4.1 (8) | **MED 03 (26463) / IS 2167 (ISO 22044 : 2021, MOD) Commercial Beverage Coolers (fourth revision)**  The Committee noted the information and the last date of comments. If no comment is received, the Committee approved the draft for printing.  The comment if received shall be disposed by the panel. | The last date for comments was 20 November 2024.  No comment has been received on the draft.  The Committee may **FINALIZE** and **APPROVE** the draft for printing. | The Committee approved the draft for printing. |
|  | 4.1 (9) | **MED 03 (26440) / ISO 16890-2:2022 ‘Air filters for general ventilation — Part 2: Measurement of fractional efficiency and air flow resistance’**  The Committee noted the last date of comments. If no comment is received, the Committee approved the draft for printing.  The comment if received shall be disposed by the panel. | Last date for comments was 19 October 2024.  No comment has been received on the draft.  The Committee may **FINALIZE** and **APPROVE** the draft for printing. | The Committee approved the draft for printing. |
|  | 4.1 (10) | **MED 03 (19252)/ IS 1474:1959 Commercial Refrigerators (ISO 23953-2 : 2015, MOD)**  The Committee noted the information.  **Background**  MED 03 (19252) ‘Refrigerated display cabinets Part 2 Classification requirements and test conditions’ document was finalized during 37th meeting. The draft is under preparation as per Panel & Committee recommendation for printing.  The final draft (19252) was circulated to the Panel and comment has been received from Shri Vishal Nichite of M/s Western Refrigeration Private Limited on 30th March 2023.    The Committee decided that the comments of M/s Western Refrigeration Private Limited will be taken in the amendment and decided to send the final draft for printing. | The draft is under printing.  The Committee may **NOTE**. | The Committee noted the information. |
|  | 4.1 (11) | **IS 3615 Glossary of terms used in refrigeration and air conditioning**  The Committee noted the information. | The standard has been published.  The Committee may **NOTE**. | The Committee noted the information. |
|  | 4.1 (12) | **MED 03 (25074)/ ISO 16890-4:2022 Air filters for general ventilation — Part 4: Conditioning method**  The Committee noted the information. | The draft is under printing.  The Committee may **NOTE**. | The Committee noted the information. |
|  | 4.1 (13) | **IS 18932 : 2024 Electronic Expansion Valve — Specification**  The Committee noted the information. | The standard has been published.  The Committee may **NOTE**. | The Committee noted the information. |
|  | 4.1 (14) | i) **IS/IEC 60335-2-40: 2018 Household and similar electrical appliances – Safety : Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers**  Shri Satish Kumar and Shri V Manjunath informed that the working draft is almost ready and few clauses are being reviewed by them to avoid ambiguity. The Committee requested them to expedite and they also agreed to provide the final working draft. The Committee approved the draft so received for wide circulation for two months time. If no comment is received, the Committee approved the draft for printing.  The comment if received shall be disposed by the panel.  **Background**  The Committee also agreed that once the standard is published the same will be referred to in IS 1391 (Part 1) and (Part 2). | The Draft National deviation to IEC 60335-2-40: 2022 is under preparation for wide circulation.  The Committee may **NOTE**. | The Committee requested MS expedite the preparation of wide circulation draft (wc) document. |
|  | 4.1 (15) | **Selection, operation and maintenance of room AC – Code of Practice**    Shri Shankar Sapaliga briefed the discussions and recommendations of the panel during its 6th meeting. The Committee approved the recommendation of the panel.  Shri P K Mukherjee informed the panel that IS 10596 (Part 1 to 4):1983 under MED 20, may be referred for the structure of the working draft.  The Committee requested the panel to provide update in the next meeting. | The recommendation from the panel is awaited.  The Committee may **NOTE**. | The Committee requested the panel to provide update in the next meeting. |
|  | 4.1 (17) | **Panel on Compressors**  The Committee requested panel to provide its latest recommendation on compressors. | The recommendation from the panel is awaited.  The Committee may **NOTE**. | The Committee requested the panel to provide update in the next meeting. |
|  | 4.1 (18) | The Committee noted the MoM of 1st meeting of the panel. The Committee approved the recommendation of the panel.  The Committee approved the new subject ‘Identification, Storage, Transportation and Handling of Refrigerants / Cylinders’ for standard formulation under MED 03.  The Committee also deliberated that the safety pertaining to refilled AC gas and during the refilling of AC gas, may be addressed in the upcoming draft standard which is being formulated under Selection, operation and Maintenance of HVAC panel. It requested the panel to address the above aspects in the draft standard.  The Committee approved the recommendation of the panel. The Committee agreed to rename the panel to ‘Identification, Storage, Transportation and Handling of Refrigerants / Cylinders’ Panel. | The recommendation from the panel is awaited.  MED 16 has formulated standards for storage cylinders like IS 8198 (Part 8) : 2024 ‘Steel Cylinders for Compressed Gases - Code of Practice Part 8 Common Organic Refrigerant Gases (for R12, R13, R22, R115, R500)’ and IS 3196 (Part 2) : 2006 ‘Welded low carbon steel cylinders exceeding 5 litre water capacity for low pressure liquefiable gases: Part 2 cylinders for liquefiable non - Toxic gases other than LPG’.  CHD 06 has formulated standards for handling gases like IS 13490 : 2024 ‘Handling of speciality gases - code of practice (First Revision)’ and IS 15578 : 2005 ‘Code of Practice for Handling and Usage of Gas Mixtures’  The Committee may **NOTE**. | The Committee requested the panel to consider the published standards of MED 16 and CHD 06; and provide update in the next meeting.  MS apprised the members that participation form PESO in the panel is important as the storage/handling/transportation of refrigerant gases is under regulation of PESO. The Committee decided to co-opt PESO in the panel P-31. |
|  | 4.1 (19) | The Committee requested the panel for Room AC and Heat pumps to provide its recommendation.  **Background**  Query onProduct Manual referred in IS 1391 (Part 1& 2) :2023 and IS 8148:2018, has been received from Shri Rahul Ramtekkar of JCI Hitachi vide email dated 03 April 2023:  The Committee deliberated that basic product manual should be in hard format.  Shri P K Mukherjee suggested to include consumer organizations to the panel.  The Committee requested the panel to discuss the above and provide recommendation in the next meeting. | The recommendation from the panel is awaited.  The Committee may **NOTE**. | The Committee requested the panel to provide update in the next meeting. |
|  | 4.1 (20) | **Comment on IS 14618:2022 'Automotive vehicles Air-conditioning and heating systems thermal performance Method of measurement (Second Revision)'**  The Committee approved the recommendation of the panel except the comment at Sl no.14 of 9th meeting of the panel. The Committee in detail, reviewed the comment has been received from M/s TATA Motors along with its justification document provided. The Committee following observations and discussions:   1. Solar Load is limited to available climatic test chambers which 1000 W/m2 at present. 2. The graphs in the justification document, are becoming flat when cabin temperature near to 50°C is achieved.   Considering the notification of MoRTH, the Committee requested the following Working Group to resolve the above comment:   1. Shri V Manjunath (Convener); 2. Shri Chethan Tholpady of Copeland; 3. Shri Srinivasu Moturi of Voltas; and 4. The Convener and all the members of panel MED03:P28.   The Committee requested the above WG to expedite and provide the revised draft amendment no.1 to IS 14618:2022 within 15 days. The Committee approved the draft so received for wide circulation for one month time. If no comment is received, the Committee approved the draft for printing.  The comment if received shall be disposed by the panel.  The Committee reviewed the past 3 attendance of the panel MED 03:P28 and revised the panel composition as follows:   1. Shri A A Badusha of Automotive Research Association of India, Pune (Convener) 2. Ashok Leyland Limited, Chennai 3. Automotive Research Association of India, Pune 4. Calsonic Kansei Motherson Auto Products Private Limited, Kanchipuram 5. Carrier Air Conditioning and Refrigeration Limited, Gurugram 6. Denso International India Private Limited, Gurugram 7. Hanon Automotive Systems India Pvt Ltd 8. Honda Cars India Research and Development Limited, Noida 9. Honeywell International India Private Limited, Gurugram 10. Indian Institute of Technology Delhi, New Delhi 11. Ingersoll Rand India Limited, Bengaluru 12. International Centre of Automotive Technology, Manesar 13. MAHLE ANAND Thermal Systems Private Limited, Pune 14. MG Motor India Private Limited , Gurugram 15. Mahindra and Mahindra Limited, Mumbai 16. Maruti Suzuki India Limited, Gurugram 17. Refrigeration and Air Conditioning Manufacturers Association, New Delhi 18. Renault India Private Limited, Mumbai 19. Sanden Vikas (India) Private Limited, Faridabad 20. Subros Limites, New Delhi; and 21. Tata Motors Limited, Pune. | WG had its two consecutive meetings held on 07 October 2024 and 15 October 2024.    Also, the WG had provided the draft for Amendment no. 1 to IS 14618:2022. Subsequently, the draft was put up for wide circulation for one month time with last date of comments on 17 November 2024.    No comment on the draft had been received.    Accordingly, the above draft has been sent for printing on 20 November 2024 with the approval of Chairperson. | The Committee approved the recommendation of WG and noted the approval of the draft for printing. |
|  | 4.1 (21) | **Amendment no.4 to IS 11329 : 2018 Finned type heat exchanger for room air conditioner (First Revision)**  The Committee requested MS to prepare the draft amendment no. 4 to IS 11329: 2018 in consultation with the Panel Convener. The Committee decided to wide circulate the draft for two months time. If no comment is received, the Committee approved the draft for printing.  The comment if received shall be disposed by the panel. | The draft amendment no.4 is under preparation. | The Committee requested MS to expedite for preparation of the draft amendment no.4. |
|  | 3 (ii) | The Committee approved the following three projects under MED 03 for R&D project:  a) Study and Collection of Data for Bin temperature distribution and bin hours for heating though heat-pump - Dr Jyotirmay Mathur will prepare draft terms of reference (ToR)  b) Study and Collection of data for Smart refrigeration and Air-conditioning including DR (Demand Response) technologies - Shri P K Mukherjee will prepare draft ToR.  c) Study and collection of data to find out potential sources of leakage of refrigerant gases from ACs and their prevention methods - Shri Srinivasu Moturi in collaboration with Shri Shankar Sapaliga, will prepare draft ToR. | Draft ToR has been received from Shri P K Mukherjee which is attached here.      The committee may **CONSIDER** and **DECIDE**. | The Committee discussed on the draft ToR submitted by P K Mukherjee. It requested P K Mukherjee, Prof Jyotirmay Mathur and MS to refine the draft and resubmit it MED 03 for comments/feedback within 15 days.  If no comment/ feedback is received, the Committee approved the draft ToR for R&D project under BIS.  The Committee decided to discuss Sl No. a) and c) projects and their ToRs in the next meeting. |
|  | - | - | Following comment on IS 3315: 2024 from CMD 3 has been received dated 07 October 2024:  “Following observations have been made in the Standard:  1. Cl. 14, Storage- Testing procedure and time for which the cooler has to be kept at specified high and low temperature, has not been given.  2. Cl. 8.2, Table 2, Sound test- Unit in which measurement of sound level has to be done , has not been given.  Above comments may please be looked in to for necessary actions and Amendment to Standard may be expedited, as the product is under compulsory BIS Certification.”  The committee may **CONSIDER** and **DECIDE**. | The Committee requested the panel to dispose of the comments of CMD3 and provide its recommendation by the next meeting. |
|  | 5.7 | **IS 3315:2024 Direct Evaporative Air Cooler ― Specification (Fourth Revision)**  The Committee in detail discussed each comments of VOICE.    It made following observations and discussions:  a) Sl no.1- It agreed for the editorial correction.  b) Sl no.2- Proper definition for clarity of the consumer may be given  c) Sl no.3- It discussed that the effect of TDS of water used for testing of desert cooler for grant of licence as per BIS certification, on Cooling efficiency and EER is negligible. However, the water to be used for normal running of desert cooler may become another subject for discussion. The Committee also discussed the compliance of desert coolers as per BEE labeling program during the cooler’s lifetime in terms of its efficiency/EER/star rating. It also discussed the possibility of referring IS 10500 for water used in testing of the coolers. As per one of the SDGs, water consumption of air cooler is being studied by the panel for incorporating limits of the same in the standard.  d) Sl no.4- clause 7.7 may be deleted as limits are specified in the standard Cooling efficiency/air delivery/power input/EER.  e) Sl no.- the value given is minimum EER requirement.  The Committee requested the panel to dispose of the comments of VOICE and provide update in the next meeting. | The recommendation from the panel is awaited.  The Committee may **NOTE**. | The Committee requested the panel to dispose of the comments of VOICE and provide its recommendation by the next meeting. |
|  | 5.2 | **IS 2370: 2014 ‘Walk-in Cold Rooms — Specification’**  The Committee approved the recommendation of the panel. The Committee requested the panel to provide update in the next meeting. | The WG formed under Walk-in Cold Room panel, had its meetings on 04 and 14 October 2024. The minutes are as follows.    The committee may **CONSIDER** and **DECIDE**. | The Committee approved the recommendations of WG and requested the panel to provide update in the next meeting. |
|  | 5.3 | **IS 1391 (Part 1) : 2023 Room Air Conditioners Specification Part 1 Unitary Air Conditioners (Fourth Revision) and IS 1391 (Part 2) : 2023 Room Air Conditioners Specification Part 2 Split Air Conditioners (Fourth Revision)**  The Committee approved the recommendation of the panel. The Committee requested the panel to provide update in the next meeting. | The recommendation from the panel is awaited.  The Committee may **NOTE**. | The Committee requested the panel to provide update in the next meeting. |
|  | 8.4 (5) | **IS 5111 : 1993/ ISO 917:1989 Testing of refrigerant compressors (First Revision)** | This standard was last reviewed and reaffirmed in May, 2022.  However, the standard ISO 917:1989 has been withdrawn.  The Committee may **CONSIDER** and **DECIDE**. | Shri Chethan Tholpady informed that the ISO 917:1989 has been withdrawn and will be superseded by a new standard. He agreed to provide the ISO Committee number which is formulating the new standard. |
|  | - | **-** | Request to clarify whether the product falls under the scope of IS 17570 (Part 1) : 2021/ISO 16890-1 : 2016 has been received vide email dated 30 August 2024 and 09 September 2024.  As per Air Cooler and Air Filters (Quality Control) Order, 2023, Air Filter as per 17570 (Part 1): 2021/ ISO 16890-2: 2016 is under compulsory certification.    The Committee may **DISCUSS**. | MS apprised the members of the QCO on Air Filters which is effective from 5th September 2024. |
|  | 4.1 (16) | Experts informed that there is no update. So, the Committee decided to drop this item now and may be discussed when there is an update, informed by the nominated experts. | **ISO/ TC 86/ SC6/ WG15 Advanced performance standards :**  **Testing and calculating methods for seasonal performance factors of air-cooled air conditioners and air-to-air heat pumps: Part 1 Cooling seasonal performance factor**  Experts informed that no meeting of WG15 has happened since the last meeting.  **Background**  The Committee decided to ‘Approve’ the ballot on document ISO/NP 21280 'Testing and rating including seasonal performance of air-to-air air-conditioners and heat pumps considering the effect of native control' and nominate Dr. Jyotirmay Mathur of ISHRAE, Shri V Manjunath, and Shri Srinivasu M of Voltas in the development of this project. It decided to give additional comments once the outline of the draft is more elaborate. | The Committee decided to form a panel which will work on the subject “'Testing and rating including seasonal performance of air-to-air air-conditioners and heat pumps considering the effect of native control”. The panel has been constituted as follows:   1. Shri Jyotirmay Mathur; 2. Shri V Manjunath; 3. Shri Srinivasu Moturi; 4. Shri P K Mukherjee; 5. Shri Yash Shukla; and 6. Shri Rahul Ramtekkar.   The Committee requested panel to first draft scope of work of the panel on the subject. |
|  | - | - | **-** | The Committee discussed on the QCO issued by DPIIT on 17th September 2024 for safety of household, commercial and similar electrical appliances. It discussed that the following safety standards for AC and refrigerators has been published under MED 03:  a) IS 18689 : 2024 Household and Similar Electrical Appliances - Safety - Particular  Requirements for Commercial Refrigerating Appliances and Ice- Makers with an Incorporated or Remote Refrigerant Unit or Motor- Compressor (IEC 60335-2-89 : 2019, MOD)  b) 302 (Part 2/Sec 24) : 1994 Safety of household and similar electrical appliances: Part 2 particular requirements: Sec 24 refrigerators, food - Freezers and  ice – Makers  c) IS 60335 (Part 2/Sec 34) : 2021/IEC 60335-2-34: 2021 Household and similar electrical appliances Safety Part 2-34: Particular requirements for motor compressors  4) IS/IEC 60335-2-40 : 2018 Household and similar electrical appliances safety : Particular requirements for electrical heat  pumps air-conditioners and dehumidifiers  5) IS 16678 (Part 1 to 4): 2018 Refrigerating systems and heat pumps  So, to avoid ambiguity among RAC stakeholders, it decided to discuss on the applicability of RAC products under the QCO and formed the following WG to provide recommendation:  a) Shri P K Mukherjee (*Convener*);  b) Representative of Bluestar;  c) Representative of Daikin;  d) Representative of Frigoglass;  e) Representative of Intertek;  f) Representative of JCI Hitachi; and  g) Representative of Voltas.  It decided the recommendation of panel to be circulated among MED 03 members for one week. If no comment/feedback is received, it will submit its recommendation to relevant dept. of BIS/DPIIT. |

***\**** *The Item number refers to the proceedings of the last meeting of MED 03.*

**ITEM 5** **COMMENTS ON PUBLISHED STANDARDS**

**5.1 IS 7872: 2020 Deep Freezers ― Specification**

The Committee requested the panel to provide its recommendation on the comment so received and previous comments of UL and additional comments of Voltas, by the next meeting.

**5.2 IS 17550 (Part 1) : 2021 Household Refrigerating Appliances Characteristics and Test Methods Part 1 General Requirements**

The Committee requested the panel to dispose of the comments from Shri P K Mukherjee and Shri Satish Kumar and provide recommendation by the next meeting.

**5.3 IS 17693: 2022 Non-Electric Cooling Cabinet Made of Clay**

The Committee requested Shri V Manjunath of UL to provide draft amendment no. 2 and decided to wide circulate it for 1 month.

**5.4 IS 18848 : 2024 Non-Ducted Portable Air-Cooled Air Conditioners and Air-to-Air Heat Pumps having a Single Exhaust Duct - Testing and Rating for Performance**

The Committee requested the panel to dispose of the comment of Shri Chethan Tholpady and provide update in the next meeting.

**ITEM 6 PANELS AND WGs HELD SINCE THE LAST MEETING**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl No.** | **Name of the Panel** | **Panel Recommendation** | **Decision of 43rd meeting** |
|  | Service Valves | 2nd meeting was held on 29 November 2024. The minutes is as follows: | The Committee approved the recommendation of the panel. The Committee requested the panel to provide update in the next meeting. |
|  | WG under Automotive Air-Conditioning and Mobile Air-Conditioning | WG had its two consecutive meetings held on 07 October 2024 and 15 October 2024.    Also vide Item 4.1 Sl No.13. | Vide Item 4.1 Sl No.13. |
|  | WG under Walk-in Cold Room panel | The WG formed under Walk-in Cold Room panel, had its meetings on 04 and 14 October 2024. The minutes are as follows.    Also vide Item 4.1 Sl No.18. | Vide Item 4.1 Sl No.13. |
|  | WG for scope under Heat Pump Water Heat panel | WG for scope under Heat Pump Water Heat panel, had its meetings on 07 October 2024. The minutes are as follows. | The Committee approved the recommendation of the WG. The Committee requested the panel to provide update in the next meeting. |

**ITEM 7 PROGRAMME OF WORK**

The Committee noted the information.

**ITEM 8 ROLLING ANNUAL ACTION PLAN OF 2024-2025**

**8.1 New Work Item Proposal – Carried Forward**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No.** | **Subject / IS** | **Decision of 42nd meeting** | **Present Status** | **Decision of 43rd meeting** |
|  | Heat pump water heaters - Testing and rating for performance Part 1 Heat pump water heater for hot water supply based on ISO 19967-1:2019 | Vide Item 6, Sl no. 2 | Vide Item 6, Sl no. 4 | Vide Item 6, Sl no. 4 |
|  | NWIP proposal on Service Valves related to HVAC | Vide Item 6, Sl no. 8 | Vide Item 6, Sl no. 1 | Vide Item 6, Sl no. 1 |
|  | NWIP proposal on highly energy efficient deep freezer products such as combination product in deep freezer : Cooler & freezer and vertical models, also PCM /Eutectic based freezers by Shri Srinivasu Moturi | Shri Srinivasu apprised the members of the current market of combination products for cooling as well as freezing. He informed that IS 7872:2020 does not include the combination products and also the freezers on wheels which are eutectic based freezers.  So, the Committee deliberated and requested the panel on deep freezers to review the NWIP and provide recommendation by the next meeting. | The Panel recommendation is awaited.  The committee may **NOTE**. | The Committee requested the panel to provide its recommendation in the next meeting. |
|  | NWIP proposal on Room ACs for commercial & industrial applications by Shri Srinivasu Moturi | - | Following is the comment by Shri Srinivasu on email dated 15 July 2024  :  ‘Regarding 1391 part1 & 2 : the scope of standard is for Residencial , Commercial & Industrial application,  However each application requirements are different  the current standard is not satisfy exactly for commercial & industrial applications .  also, dehumidification effect also need to be defined appropriately in the current standard.  regarding industrial the requirements are like high ambient , applications can be in Industrial chemical  fumes etc. , which require the unit construction totally changes.’  The committee may **CONSIDER** and **DECIDE**. | The Committee requested the panel to provide its recommendation in the next meeting. |

**8.2 Standard under Five year Review– Carried Forward**

As on on-going activity, Sectional Committee reviews the Indian Standards formulated by it at an interval of five years from the date of publication. Following is the list of standards reviewed during the last year but pending for publication.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No.** | **Subject / IS** | **Decision of 42nd meeting** | **Present Status** | **Decision of 43rd meeting** |
|  | MED/03/19252/ IS 16672 (Part 2) ‘Refrigerated Display Cabinets Part 2 Classification, Requirements and Test Conditions’ | Vide Item 4.1 Sl No.10 | The document is under printing.  The Committee may **NOTE**. | The Committee noted the information. |
|  | MED/03/25074/ IS 17570 (Part 4) ‘Air Filters for General Ventilation Part 4 Conditioning Method to Determine the Minimum Fractional Test Efficiency First Revision’ | Vide Item 4.1 Sl No.12 | The document is under printing.  The Committee may **NOTE**. | The Committee noted the information. |
|  | MED/03/22237/ IS 17550 (Part 3) Household Refrigerating Appliances - Characteristics and Test Methods Part 3 Energy Consumption and Volume ( First Revision ) | Vide Item 8.2 | The document is under printing.  The Committee may **NOTE**. | The Committee noted the information. |

**8.3 Standard under Five year Review – due for 2024-2025**

As on on-going activity, Sectional Committee reviews the Indian Standards formulated by it at an interval of five years from the date of publication. Following is the list of standards pending to be reviewed for this year.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl No.** | **Subject / IS** | **Decision of 42nd meeting** | **Present Status** | **Decision of 43rd meeting** |
|  | IS 2370 : 2014 Walk - In cold rooms - Specification (First Revision) | The Committee decided to reaffirm the standard. | The standard has been reaffirmed in June 2024.  The Committee may **NOTE**. | The Committee noted the information. |
|  | IS 7872 : 2020 Deep Freezers - Specification ( Second Revision ) | The Committee decided to reaffirm the standard. | The standard has been reaffirmed in June 2024.  The Committee may **NOTE**. | The Committee noted the information. |
|  | IS 302 (Part 2/Sec 24) : 1994/ IEC 60335-2-24 Safety of household and similar electrical appliances: Part 2 particular requirements: Sec 24 refrigerators, food - Freezers and ice - Makers | The Committee decided to reaffirm the standard. | The standard has been reaffirmed in June 2024.  The Committee may **NOTE**. | The Committee noted the information. |

**8.4 Review of Pre-2000 Standards**

The BIS management has decided to revise the old standards which are A5 or pre-2000 and requested the relevant technical committees to take up the revision of the standard. In this regard, the member secretary of the committee is also directed to review the standards at their level and prepare comments in the proforma provided by the management. Further, the proforma along with its details will be put up to the committee for its review and further decision.

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl No.** | **Subject / IS** | **Present Status** | **Decision of 43rd meeting** |
|  |
|  | IS/ISO 11650 : 1999 Performance of refrigerant recovery and/or recycling equipment | This standard was last reviewed and reaffirmed in September, 2022.  1999 version is the latest valid version. Accordingly, the standard may be reaffirmed.  The Committee may **CONSIDER** and **DECIDE**. | The Committee noted the information. |
|  | IS/ISO 13261-1 : 1998 Sound power rating of air - Conditioning and air - Source heat pump equipment: Part 1 non - Ducted outdoor equipment | This standard was last reviewed and reaffirmed in August, 2021.  1998 version is the latest valid version. Accordingly, the standard may be reaffirmed.  The Committee may **CONSIDER** and **DECIDE**. | The Committee noted the information. |
|  | IS/ISO 13261-2 : 1998 Sound power rating of air Conditioning and air - Source heat pump equipment: Part 2 non - Ducted indoor equipment | This standard was last reviewed and reaffirmed in September, 2022.  1998 version is the latest valid version. Accordingly, the standard may be reaffirmed.  The Committee may **CONSIDER** and **DECIDE**. | The Committee noted the information. |
|  | IS 1474 : 1959 Specification for commercial refrigerators | The standard is being superseded by upcoming standard MED/03/19252/ IS 16672 (Part 2) ‘Refrigerated Display Cabinets Part 2 Classification, Requirements and Test Conditions’.  The Committee may **NOTE.** | The Committee noted the information. |
|  | IS 5111 : 1993/ ISO 917:1989 Testing of refrigerant compressors (First Revision) | This standard was last reviewed and reaffirmed in May, 2022.  However, the standard ISO 917:1989 has been withdrawn.  The Committee may **CONSIDER** and **DECIDE**. | The Committee noted the information. |
|  | IS 302 (Part 2/Sec 24) : 1994 Safety of household and similar electrical appliances: Part 2 particular requirements: Sec 24 refrigerators, food - Freezers and ice - Makers | The standard has been reaffirmed in June 2024.  The Committee may **NOTE**. | The Committee noted the information. |

**ITEM 9 NEW SUBJECT PROPOSAL RECEIVED**

**a)** The Committee accepted the NWIP proposal ‘Heat recovery ventilators and energy recovery ventilators Testing and calculating methods for seasonal performance factor Part 1: Sensible heating recovery seasonal performance factors of heat recovery ventilators (HRV)’ based on ISO 5222-1:2023, and formulated the following new panel to provide its recommendation on the working draft for the above standard:

1. Dr Jyotirmay Mathur (Convener);

2. Shri V. Manjunath;

3. Shri Vikas Mehta;

4. Shri Shankar Sapaliga; and

5. Shri Rahul Ramtekkar.

The Committee requested the panel to provide update in the next meeting.

**b)** The Committee discussed the special purpose commercial/industrial refrigerators like IS 17547 : 2021 ‘Specification for vaccine freezer or combined vaccine freezer and water-pack freezer: compression cycle — general requirements and testing methods’. The Committee after detailed deliberation agreed to formulate a standard on the refrigerators which are not yet formulated under MED 03 and formulated the following new panel to provide its recommendation in the next meeting:

1. Shri Chethan Thopady (Convener);
2. Shri Srinivasu Moturi of Voltas;
3. Shri Shankar Sapaliga;
4. Representative of Godrej;
5. Representative of Western Refrigeration;
6. Representative of Rockwell;
7. Representative of UL; and
8. Representative of Frigoglass.

**ITEM 10 NEW SUBJECTS**

**10.1** The Committee noted the information.

**10.2** The Committee noted the information.

**10.3** **Assistance for framing Relevant National Standards**

The Committee noted the information.

**ITEM 11 STATUS OF INDIAN STANDARDS**

**11.1 Quality Control Order**

The Committee noted the information.

**11.2 Proposed Quality Control Orders**

The Committee noted the information.

**11.3 BIS Domestic Licences**

The Committee noted the information.

**11.4 Quality Control Order for Machinery and Electrical Equipment Safety**

The Committee noted the information.

**ITEM 12 INTERNATIONAL ACTIVITIES**

**12.1** The Committee noted the information.

**12.2** The Committee noted the information.

**12.3 List of experts in various ISO/IEC**

The Committee updated the expert list as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **ISO/TC 86** **Refrigeration and air-conditioning** | | | **Interest Level** |
| ISO/TC 86/SC 1 | Safety of Refrigeration Systems | Shri Sunil Jain of Blue Star,  Shri Vikas Mehta of Chemours  Shri Bimal Tandon of Carrier  Shri Avinash Kumar of M/s Honeywell  Miss Neha Thakur, BIS | M |
| ISO/TC 86/SC 1/WG 1 | Safety and environmental requirements for refrigerating systems and heat pumps | Shri Srinivasu of Voltas,  Shri Vikas Mehta of Chemours  Miss Neha Thakur, BIS | H |
| ISO/TC 86/SC 4 | Testing and rating of Refrigerant Compressors | Shri Chetan Tholpady of Copeland  Miss Neha Thakur, BIS | M |
| ISO/TC 86/SC 4/WG 1 | Testing and rating of refrigerant compressors | Shri Chetan Tholpady of Copeland  Miss Neha Thakur, BIS | M |
| ISO/TC 86/SC 4/WG 2 | Positive displacement refrigerant compressor | Shri Chetan Tholpady of Copeland | M |
| ISO/TC 86/SC 6 | Testing and rating of Air-Conditioners and Heat Pump | Dr. Jyotirmay Mathur of ISHRAE  Miss Neha Thakur, BIS | M |
| ISO/TC 86/SC 6/WG 1 | Air-source air-conditioners and heat pumps | Miss Neha Thakur, BIS | M |
| ISO/TC 86/SC 6/WG 3 | Water and brine source heat pumps and air-conditioners | Miss Neha Thakur, BIS | L |
| ISO/TC 86/SC 6/WG 10 | Energy recovery ventilators | Dr. Jyotirmay Mathur of ISHRAE | L |
| ISO/TC 86/SC 6/WG 12 | Heat pump water heaters | Dr. Jyotirmay Mathur of ISHRAE | M |
| ISO/ TC 86/ SC6/ WG15 | Advanced performance standards | Dr. Jyotirmay Mathur of ISHRAE  Shri Srinivasu M of Voltas  Dr. Yash Shukla  Shri V Manjunath of UL | M |
| ISO/TC 86/SC 7 | Testing and rating of Commercial Refrigerated Display Cabinets | - | L |
| ISO/TC 86/SC 7/WG 1 | Refrigerated, blast cabinets and ice makers for professional use | - | L |
| ISO/TC 86/SC 7/WG 2 | Commercial beverage coolers and ice cream freezers | - | L |
| ISO/TC 86/SC 8 | Refrigerants and Refrigeration Lubricants | Shri Sunil Jain of Blue Star,  Shri Vikas Mehta of Chemours, and  Miss Neha Thakur, BIS | L |
| ISO/TC 86/SC 8/MA | ISO 817 Maintenance agency | - |  |
| ISO/TC 86/SC 8/WG 5 | Refrigerants - Designation and safety classification | Shri Sunil Jain of Blue Star  Shri Vikas Mehta of Chemours, and  Miss Neha Thakur, BIS | H |
| ISO/TC 86/SC 8/WG 7 | Refrigerant properties | Miss Neha Thakur, BIS | L |
| ISO/TC 86/SC 8/WG 8 | Burning Velocity Test Methods | - | L |
| ISO/TC 86/SC 8/TF 3 | Refrigerant stability classification | Shri Vikas Mehta of M/s The Chemours | M |
| **IEC/TC 59/ SC 59M ‘Performance of electrical household and similar cooling and freezing appliances’** | | |  |
| WG 4 | Electrical household and similar cooling and freezing appliances, food preservation and storage | Miss Neha Thakur, BIS | M |
| WG 5 | TC 59/WG 2 - Acoustical noise of household appliances | - | L |
| MT 2 | Electrical household and similar cooling and freezing appliances, maintenance of performance standard | Miss Neha Thakur, BIS | M |
| **IEC/TC 61/SC 61 C ‘Safety of refrigeration appliances for household and commercial use’** | | |  |
| WG 4 | IEC 60335-2-89-A2/Ed2: Household and similar electrical appliances - Safety - Part 2-89: Particular requirements for commercial refrigerating appliances with an incorporated or remote refrigerant unit or compressor | Shri Vikas Mehta of Chemours,  Miss Neha Thakur, BIS | H |
| WG 5 | Review the fire safety of products covered by IEC 60335-2-24 | - |  |
| MT 1 | Safety of motor-compressors | Copeland  Miss Neha Thakur, BIS | M |
| MT 7 | Maintenance Team for IEC 60335-2-118 - Particular requirements for professional ice-cream makers | - | L |
| JWG 3 | Resistance to refrigerants of winding wires | - | L |
| EG 6 | Editing Committee | - | L |
| **IEC/TC 61/SC 61 D ‘Appliances for air-conditioning for household and similar purposes’** | | |  |
| WG21 | WG 21 Address A2L, A2 and A3 refrigerants and maintenance of 60335-2-40 | Shri V Manjunath of UL,  Shri Vikas Mehta of Chemours Miss Neha Thakur, BIS | H |
| MT 19 | Revision of 60335-2-104 work | - | L |
| MT 28 | Maintenance of IEC 60335-2-40 | Shri Vikas Mehta of Chemours | H |
| MT 29 | Maintenance of requirements for detection of leaked refrigerant | Shri Vikas Mehta of Chemours | L |
| Ad hoc Group 30 | Alignment of requirements for flammable refrigerant systems in appliances | Shri Vikas Mehta of Chemours | L |
| WG 27 | Air conditioners for cooling driver and passenger compartments when the vehicle is stationary | Shri Vikas Mehta of Chemours  Ms Shweta Kulkarni of Trane Technologies | M |

NOTE: As per the latest directions from CA of BIS, A provision has been introduced to identify each project/ballot of ISO/IEC under High (H) /Medium (M) /Low (L) interest levels.

For project/ballot of ISO/IEC at H level, one or two designated experts shall be nominated by the respective Sectional Committees. The designated expert shall be responsible for providing detailed feedback on drafts and documents from ISO/IEC, assisting the Sectional Committee in developing the rationale for proposing NWIPs, finalizing proposals for leadership positions and secretariats and briefing the Sectional Committee on discussions at the ISO/IEC level.

**12.4 Participation in ISO/IEC meetings**

**12.4.1 Upcoming meetings of ISO/IEC**

| **Date** | **Month** | **Location** | **TC/SC** | **Approved Nomination** |
| --- | --- | --- | --- | --- |
| 02-06 | December 2024 | London (United Kingdom) | IEC/ TC 61/SC 61D Plenary meeting and its WG meetings | Shri Vikas Mehta of Chemours |
| 09-13 | December 2024 | London (United Kingdom) | IEC/ TC 61/SC 61C Plenary meeting and its WG meetings | Shri Vikas Mehta of Chemours |

**12.4.2** The Committee noted the information.

**12.4.3 ISO/IEC meetings participated**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Month** | **Location** | **TC/SC** | **Nomination Received** | **Status** | **Decision of 43rd meeting** |
| 28 | November 2024 | Virtual | IEC/ TC 59/SC 59M Plenary meeting | Ms Neha Thakur, MED, BIS | Report of the meeting is attached here.    The Committee may **NOTE**. | The Committee noted the information. |
| 06-09 | September 2024 | Eschborn (Germany) | IEC/TC 61/SC 61C/WG 4 Household and similar electrical appliances - Safety - Part 2-89 | Shri Vikas Mehta of Chemours | Report of the meeting is attached here.    The Committee may **NOTE**. | The Committee noted the information. |
| 10-13 | September 2024 | Copenhagen (Denmark) | SC61D, MT 28 & 29 | Shri Vikas Mehta of Chemours | Report of the meeting is attached here.    The Committee may **NOTE**. | The Committee noted the information. |
| 11 | September 2024 | Virtual | ISO TC 86 SC 8 TF 3 ‘Reactivity classification of refrigerants’ | Shri Vikas Mehta of Chemours | Report of the meeting is awaited. | The Committee requested Shri Vikas Mehta of Chemours to provide the meeting report of ISO TC 86 SC 8 TF 3. |

**12.4.4 New subject proposal to ISO/ IEC**

The Committee noted the information and requested MS to provide update in the next meeting.

**ITEM 13** **PRIORITY LIST**

The Committee noted the information.

**ITEM 14 RECOMMENDATION OF THE PLANNING AND DEVELOPMENT ADVISORY COMMITTEE (PDAC) OF BUREAU OF INDIAN STANDARDS**

The Committee noted the information.

**ITEM 15 TRANSLATION OF INDIAN STANDARDS FROM ENGLISH TO HINDI**

The Committee noted the information.

**ITEM 16 E-SALE OF INDIAN STANDARDS**

The Committee noted the information.

**ITEM 17 DATE AND PLACE FOR THE NEXT MEETING**

Vide Annual Calendar of MED 03 at Item 3.

**ITEM 18 ANY OTHER BUSINESS**

There being no other business, the meeting ended with a hearty vote of thanks to the Chair and all the members present during the meeting.

**Annex 1**

(Item**2.2.1**)

**COMPOSITION OF REFRIGERATION AND AIR CONDITIONING SECTIONAL COMMITTE, MED 03**

|  |  |  |
| --- | --- | --- |
| **Meeting** | **Date** | **Place** |
| 39th | 13 Dec 2023 | WebEx |
| 40th | 21 Mar 2024 | WebEx |
| 41st | 24 Jun 2024 | WebEx |
| 42nd | 26 Sep 2024 | BIS HQ, New Delhi |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl No** | **Organisation Represented** | **Principal Member/**  **Alternate Member** | **39th** | **40th** | **41st** | **42nd** | **Total** |
|  | Indian Institute of Technology, Roorkee | Prof..(Dr.) Ravi Kumar  (*Chairman*) | Y | Y | Y | Y | 4/4 |
|  | BSH Household Appliances Manufacturing Pvt Ltd., Chennai | Shri V.K. Loganathan  Shri A. Balasubramanian (Alt) | Y | Y | Y | Y | 4/4 |
|  | Blue Star Limited, Mumbai | Shri Jitendra Bhambure  Shri Sunil Kumar Jain (Alt)  Ms. Sneha Harsora (YP) | Y | Y | Y | Y | 4/4 |
|  | Bureau of Energy Efficiency, New Delhi | Ms P. Samal  Shri Kamran Shaikh (Alt)  Ms D. Wadhwa (Alt)  Shri Dheeraj Pandey | Y | Y | Y | Y | 4/4 |
|  | CEPT University | Dr Yash Shukla | Y | Y | Y | Y | 4/4 |
|  | [Carrier Air Conditioning and Refrigeration Limited, Gurugram](javascript:;) | Shri Bimal Tandon  Shri Manmohan Kulashri (Alt)  Shri Jatinder Sharma (Alt) | Y | N | Y | Y | 3/4 |
|  | Central Power Research  Institute, Bengaluru | Dr P. Chandra Sekhar  Shri Gujjala B.Balaraja (Alt) | N | Y | N | N | 1/4 |
|  | Central Public Works Department, New Delhi | Shri Ram Raj Meena  Shri Ramayan Prasad Gupta (Alt) | NA | NA | Y | N | 1/2 |
|  | Copeland India Private Limited, Pune | Shri Chetan Tholpady | Y | Y | Y | Y | 4/4 |
|  | Daikin Air Conditioning India Private Limited, Gurugram | Shri Gaurav Mehtani | Y | Y | Y | Y | 4/4 |
|  | Danfoss Industries Pvt Ltd, Gurugram | Shri Madhur Sehgal  Shri K.L. Nagahari (Alt)  Shri M.N.S.V Kiran Kumar (Alt) | N | Y | Y | N | 2/4 |
|  | Directorate General of Quality Assurance, Ministry of Defence, New Delhi | Lt. Col. Deepak Sharma  Shri S.S. Nikam (Alt) | N | Y | Y | N | 2/4 |
|  | Electrical Research and Development Association., Vadodara | Shri Guatam Brahmbhatt  Shri Rakesh Patel (Alt) | Y | Y | Y | Y | 4/4 |
|  | [Frigoglass India Private Limited, Gurugram](javascript:;) | Shri Mahesh Kumar Mawai  Shri Mandeep Singh (Alt)  Ms. Ritu Chouhan (Alt) | N | Y | Y | N | 2/4 |
|  | Godrej & Boyce Mfg. Co. Ltd (Appliance Division) | Shri Burzin J. Wadia  Shri Jasvir Singh (Alt)  Shri Narendra Shedge (Alt) | N | Y | Y | Y | 3/4 |
|  | Honeywell International India Pvt Ltd | Shri Aaditya Pegallapati  Shri Avinash Kumar (Alt) | Y | N | Y | Y | 3/4 |
|  | Indian Institute of Chemical Engineering, Kolkata | Dr D Sathiyamoorthy  Prof Sudip K Das (Alt) | N | Y | Y | N | 2/4 |
|  | Indian Institute of Technology Madras | Dr. G. Venkatarathnam | Y | Y | Y | N | 3/4 |
|  | Indian Society of Heating, Refrigerating And Air Conditioning Engineers (ISHRAE) | Dr Jyotirmay Mathur  Shri Ashish Rakheja (Alt)  Shri V. Manjunath (Alt) | Y | Y | N | Y | 3/4 |
|  | International Copper Association India, Mumbai | Shri Mayur Karmakar  Shri Shankar Sapaliga (Alt) | Y | Y | Y | Y | 4/4 |
|  | Intertek India Pvt Ltd, New Delhi | Shri C.M. Pathak | N | Y | Y | Y | 3/4 |
|  | Johnson Controls-Hitachi, Ahmedabad | Shri Rahul Ramtekkar  Ms. Heena Ramsinghani (YP) | Y | Y | Y | Y | 4/4 |
|  | LG Electronics India Pvt Ltd , New Delhi | Shri Aditya Anil | Y | Y | Y | N | 3/4 |
|  | Ministry of Environment Forest and Climate Change, New Delhi | Shri Aditya Narayan Singh  Dr Mahendra Phulwaria(Alt) | NA | NA | Y | N | 1/2 |
|  | Refrigeration & Air-conditioning Manufacturers Association , New Delhi | Shri Kanwaljeet Jawa  Shri Harsh Vardhan Pant (Alt) | Y | Y | Y | Y | 4/4 |
|  | Samsung India Electronics Ltd., Noida | Shri Kalicharan Sahu  Shri Amit Kumar Jha (Alt) | Y | Y | Y | Y | 4/4 |
|  | Sierra Aircon Pvt Ltd | Shri D.K. Mudgal  Shri S. Dhiman (Alt) | N | Y | Y | Y | 3/4 |
|  | The Chemours India Pvt Ltd., Gurgaon | Shri Vikas Mehta  Shri Nishit Shah (Alt) | Y | Y | Y | Y | 4/4 |
|  | Trane Technologies India Private Limited, Bengaluru | Shri M. Venkanna   Shri J. Gurusamy (Alt)  Ms Shweta Kulkarni (Alt 2) | Y | N | Y | Y | 3/4 |
|  | UL India Pvt Ltd, Bengaluru | Shri V. Manjunath  Shri Satish Kumar (Alt) | Y | Y | Y | Y | 4/4 |
|  | Voltas Ltd, Mumbai | Shri Srinivasu Moturi  Shri A.D. Kumbhar (Alt) | Y | Y | Y | Y | 4/4 |
|  | Voluntary Orgn In Interest of Cons Education New Delhi | Shri H. S. Wadhwa  Shri B.K. Mukhopadhyay (Alt) | Y | Y | Y | Y | 4/4 |
|  | In Personal Capacity | Shri J. K. Agrawal | Y | Y | Y | Y | 4/4 |
|  | In Personal Capacity | Shri P.K. Mukherjee | Y | Y | Y | Y | 4/4 |

**ANNEX 2**

(Item **2.2.4**)

**EXTRACTS ON GUIDELINES FOR PARTICIPATION IN THE TECHNICAL COMMITTEE WORK OF BIS**

|  |
| --- |
| * Where an organization offered representation in BIS work feels that it has limited interests in the scope of activity of a committee it shall communicate so to the committee secretary before accepting the representation. * All organizations represented in a technical work of BIS I shall be conscious of the national role they play in the preparation of standards. They shall nominate the best available ta1.ent for this work and ensure that their nominees are fully briefed, and utilize all opportunity to express their organization’s view point in the Bureau forums. For continuity of participation, it shall be ensured that representatives once nominated are continued as long as possible and changes where inevitable are proceeded smoothly and shall be communicated to Secretary without delay. * Organizations participating in the technical work of the Bureau may also consider initiating wherever possible formal standardization activity within the organization that would amongst other things aid participation and act as permanent liaison with Bureau on all standardization matters and shall coordinate adoption and implementation of national standards. * Organizations 'representing the interests of a group/association/federation may ensure that all constituent members (whose interest he/she represent) are consulted/kept informed of the committee work. * All expenses related to the nominees for participating in this activity are to be borne by the participating organizations. * Authorities nominating representatives as members of Sectional Committee of the Bureau, if they so choose, may nominate two representatives one to be known as the principal and the other as the alternate, subject to the following:   + Generally, one representative shall attend the meeting but if this department or body so desired both the principal and alternate may attend the meeting.   + Only the principal representative shall have the right to vote.   + In the absence of the principal representative, the alternate may exercise the right to vote.   + All documents concerned with the work of the technical committee shall ordinarily be sent to the Principal representative, if both principal and alternate representatives are located at the same station. However, if principal and alternate representatives are from different stations, all documents shall be sent to both the representatives.   + Organizations may, if they so choose, nominate experts by designation instead of by name.   + In exceptional circumstances where a case in made out on the basis of regional representation or representation of special interests within any organization, more than one alternative may be accepted by the officer-in charge of the Division.   + Only the designated Principal/Alternate members can attend Sectional Committee meetings. In case of their absence, their representatives can attend the meetings. However, BIS should be given prior intimation in such cases. In any case, no more than two representatives from one organization can attend the committee meetings. * Comments on documents at any stage, as well as on printed Indian Standards, though are welcome at all times, members are requested to send them well in advance for inclusion in the agenda in order to consider them in the meeting. Comments received very late or brought along for tabling during the meeting will be liable not to be considered as other members have not had the opportunity to deliberate within their organization on these comments and form their viewpoint and are unable to put forth their views at a short notice. * In case there is continual failure to contribute either through correspondence or by attending meetings for a period of three years/three technical Committee meetings by the members, the membership of such organizations will be recommended for withdrawal. |

**ANNEX 3**

(Item **2.2.7**)

**MED 03: P1 Room Air Conditioners and Heat Pumps**

1. Shri P. K. Mukherjee, In Personal capacity (Convener)
2. Bureau of Energy Efficiency
3. Blue Star Limited, Mumbai
4. Carrier Air Conditioning and Refrigeration Limited,
5. CEPT University, Ahmedabad
6. Daikin Air Conditioning India Private Limited
7. Emerson Climate Technologies (India) Private Limited
8. Godrej & Boyce Manufacturing Company Limited
9. International Copper Association India
10. Intertek India Private Limited
11. Johnson Controls-Hitachi Air Conditioning India Limited
12. LG Electronics India Private Limited
13. Refrigeration and Air Conditioning Manufacturers Association
14. Sierra Aircon Private Limited
15. Trane Technologies
16. UL India Private Limited
17. Voltas Limited
18. Whirlpool India Limited
19. Dr. G. Venkatarathnam, IIT Madras
20. Shri H. S. Wadhwa of VOICE Society
21. Dr Subrata Mondal in individual capacity
22. Prof Akhilesh Arora, Delhi Technological University, Delhi

**MED 03: P2 Household refrigerator**

1. Shri P K Mukherjee (Convener),
2. Ms. P Samal, BEE
3. Dr. P Chandrashekhar, CPRI
4. Representative of VOICE
5. Shri C M Pathak, Intertek
6. Shri Satish Kumar, UL
7. Shri Rakesh Patel, ERDA
8. Shri Vijay Kumar, BSH
9. Shri Kali Charan Sahu, Samsung
10. Shri Mohinder Singh BC, M/s Whirlpool of India Limited
11. Shri Sunderamoorthy, M/s Panasonic India Pvt. Ltd.
12. Dr. J Mathur of ISHRAE,
13. Representative of CEAMA, and
14. Shri Mr. Viral Shah of M/s Voltas Beko
15. Shri Aditya Anil of M/s LG.
16. Dr Subrata Mondal in individual capacity
17. Prof Akhilesh Arora, Delhi Technological University, Delhi
18. Shri Gaurav Choudhary, Haier Appliances India Pvt Ltd

**MED 03: P3 Refrigerating systems and heat pumps - Safety and environmental requirements**

1. Sh Nagahari Krishna L of M/s Danfoss Ltd (Convener)
2. Sh Chetan Tholpady from M/s Emmerson Ltd
3. Sh. Vikas Malhotra of M/s Carrier Ltd
4. Sh. Satish Kumar of M/s UL Ltd.
5. Representative from M/s Ingersol Rand
6. Representative from Ministry of Environment & Forest (MoEF)
7. Representative from Ministry of Labour & Employment
8. Shri S Devetto of ISHRAE
9. Representative from RAMA.
10. Representative from CSE

**MED 03: P4 Multiple Split Systems (Variable Refrigerant Flow)**

1. Ms. P Samal, BEE (**Convener**);
2. Shri P K Mukherjee (**Co-Convener**);
3. Shri Harshvardhan Pant from RAMA;
4. Shri Gaurav Mehtani from Daikin;
5. Shri Srinivasu M from Voltas;
6. Shri Chandra Pathak from Intertek;
7. Shri Jeyaprakash Gurusamy from Ingersoll Rand;
8. Dr. Jyotirmay Mathur from ISHRAE;
9. Shri V Manjunath from UL;
10. Shri Shankar Sapaliga from Copper Association;
11. Representative from M/s Honeywell;
12. Representative from M/s Infeneon;
13. Shri Sunil Jain from Blue Star;
14. Representative from Carrier Toshiba;
15. Shri Rahul Ramtekkar from Johnson Controls –Hitachi;
16. Shri Davesh Mudgal from Sierra Aircon; and
17. Shri Manmohan K, M/s Carrier Airconditioning & Refrigeration Limited.
18. Prof Akhilesh Arora, Delhi Technological University, Delhi

**MED 03: P5 Bottle/ Beverage Coolers**

1. Shri Satish Kumar of UL (Convener)
2. Dr. Jyotirmay Mathur, ISHRAE
3. Shri Sunil Jain, Blue Star
4. Shri Srinivasu M, Voltas
5. Shri Mohinder Singh, Whirlpool India
6. Shri Vishal Nichite, Western Equipment
7. Shri Mr. Mahesh Mawai, Frigoglass
8. Shri Chethan Tholpady, Emerson
9. Shri P K Mukherjee, Personal Capacity.
10. Shri Gaurav Choudhary, Haier Appliances India Pvt Ltd

**MED 03: P6 Household and similar electrical appliances - Safety of electrical heat pumps, air-conditioners and dehumidifiers**

1. Shri Nagahari Krishna L, M/s Danfoss Ltd (Convener)
2. Shri Sunil Jain, M/s Blue Star
3. Shri Bimal Tandon, M/s Carrier Airconditioning & Refrigeration Limited
4. Shri Manmohan K, M/s Carrier Airconditioning & Refrigeration Limited,
5. Shri Vikas Mehta, M/s Chemours India Pvt Limited
6. Shri Gaurav Mehtani, M/s Daikin
7. Shri Chetan Tholpady, M/s Emerson Ltd.
8. Shri Burzin Wadia, M/s Godrej & Boyce Mfg. Co. Ltd.
9. Shri Narendra Shedge, M/s Godrej & Boyce Mfg. Co. Ltd.
10. Shri Rahul Ramtekkar, M/s Johnson Controls Hitachi-Air Conditioning India
11. Dr. Nitin Karwa, M/s Honeywell
12. Dr. Krishnakant Agarwal, IIT Delhi
13. Shri Shankar Sapaliga, International Copper Association India
14. Dr. Jyotirmay Mathur, ISHRAE
15. Representative from Ministry of Environment & Forest (MoEFCC)
16. Shri Harsh Pant, RAMA
17. Shri J M Bhambure,
18. Shri Jeyapraksh Gurusamy, M/s Trane India Pvt. Ltd
19. Shri V Manjunath, UL
20. Shri Satish Kumar, UL
21. Shri Srinivasu M, Voltas

**MED 03: P7 Ducted and Package Air Conditioners and Heat Pumps**

1. Mr Bimal Tandon of M/s Carrier (convener)
2. Representative from Bluestar
3. Representative from Voltas
4. Representative from Daikin
5. Representative from Intertek
6. Representative from BEE
7. Representative from M/s Danfoss

**MED 03: P8 Ammonia Refrigeration**

1. National Centre for Cold Chain Development, Ministry of Agriculture (Convener),
2. Shri Kiran Kumar, Danfoss India (Co-convener)
3. Ministry of Environment, Forest and Climate Change (MoEFCC),
4. Association of Ammonia Refrigeration, Mumbai
5. International Institute of Ammonia Refrigeration
6. Shri MSNV Kiran, Danfoss India
7. Shri H. Wadhwa, Voluntary Organization in Interest of Consumer Voice, New Delhi
8. Shri Harsh Vardhan Pant, Refrigeration and Air Conditioning Manufacturers Association (RAMA)
9. Shri Ramesh Paranjpey, Personal Capacity, and
10. Johnsons Control

**MED 03: P9 Compressors**

1. Shri Manjunath V, UL (Convener)
2. Shri Chethan Tholpady, Emerson
3. Himanshu Mahallik, Tecumseh
4. Shri Rahul Ramtekkar, JC Hitachi
5. Shri Aditya Anil, LG Electronics
6. Shri Sunil Jain, Blue Star
7. Shri Gaurav Mehtani, Daikin
8. Shri Vijay Roy, Danfoss
9. Representative of Godrej,
10. Representative of HIGHLY
11. Representative of GMCC Compressor
12. Shri P K Mukherjee, Personal Capacity
13. Shri Srinivasu M of Voltas
14. Shri Manmohan K of M/s Carrier
15. Shri Gurusamy of M/s Ingersol Rand
16. Representative from M/s Kirloskar
17. Representative from M/s Bitzer
18. Representative from M/s Swegon
19. Representative from AAR.
20. Dr Subrata Mondal in individual capacity.

**MED 03: P10 Deep Freezer**

1. Shri P. K. Mukherjee, In personal capacity (***Convener***)
2. Shri Srinivasu Moturi, Voltas Ltd (***Co-Convener***)
3. Bureau of Energy Efficiency
4. Blue Star Ltd.
5. Frigoglass India Pvt Ltd.
6. Godrej & Boyce Mfg. Co Ltd
7. Panasonic India Pvt Ltd
8. Refrigeration & Airconditioning Manufacturers Association,
9. UL India Pvt Ltd
10. Western Refrigeration Private Limited
11. Prof Akhilesh Arora, Delhi Technological University, Delhi
12. Shri Gaurav Choudhary, Haier Appliances India Pvt Ltd

**MED 03: P11 Air Handling Unit**

1. Representative from UL (Convener),
2. Shri Bimal Tandon from Carrier
3. Representative from ISHRAE,
4. Representative from RAMA,
5. Representative from Blue Star,
6. Representative from Voltas,
7. Representative from Sierra Aircon
8. Shri Manmohan K, M/s Carrier Airconditioning & Refrigeration Limited
9. Representative of VTS Group;
10. Representative of Edge Tech;
11. Representative of Carry Air; and
12. Representative of Wave Aircon.

**MED 03: P12 Air Filters**

1. Shri V Manjunath (Convener)
2. Representative of M/s Ingersoll Rand
3. Shri Shankar Sapaliga from ICAI.
4. Shri Anil Chopra, from Camfil Air Filtration India Pvt. Ltd
5. Representative of ISHRAE
6. Representative of RAMA

**MED 03: P13 Finned Type Heat Exchanger**

1. Shri Shankar Sapaliga (Convener)
2. Representative from UL
3. Representative from Blue Star
4. Representative from Panasonic
5. Representative from LG
6. Representative from Carrier
7. Representative from RAMA
8. Representative from Amber
9. Representative from Prijai
10. Representative from Voltas
11. Representative from Daikin
12. Representative from JCI-Hitachi

**MED 03: P14 Self-Contained Ice Making Machine**

1. Shri Satish Kumar, UL India Pvt Ltd (Convener)
2. Blue Star Ltd
3. Frigoglass India Pvt Ltd
4. Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE)
5. Panasonic India
6. Voltas Ltd
7. Western Refrigeration Private Limited
8. Whirlpool India

**MED 03: P15 Household Evaporative Air Cooler and its Pumpset**

1. Shri Srinivasu, Voltas (Convener);
2. Representative from Usha;
3. Shri PK Mukherjee;
4. Representative from BEE;
5. Representative from Blue Star;
6. Representative from UL;
7. Representative from Intertek;
8. Representative from Havel;
9. Representative from Panasonic;
10. Dr. Yash Shukla, CEPT University;
11. Representative of M/s Bajaj Electrical,
12. Representative of M/s Godrej,
13. Representative of M/s Symphony Ltd.,
14. Representative of M/s V-Guard,
15. Representative of M/s Orient,
16. Representative of M/s Crompton,
17. Representative of M/s Hindware,
18. Representative of M/s Kenstar.

**MED 03: P16 Commercial Refrigerator**

1. Representative of UL (Convener)
2. Representative from ISHRAE
3. Representative from Blue Star
4. Representative from Voltas
5. Representative from Panasonic
6. Representative from Western Equipment
7. Representative from Frigoglass
8. Representative from Whirpool
9. Shri Gaurav Choudhary, Haier Appliances India Pvt Ltd

**MED 03: P17 Electronic Expansion Valves**

1. Representative from ISHRAE (Convener)
2. Representative from Danfoss
3. Representative from RAMA
4. Representative from Emerson
5. Representative from Sanhua
6. Representative from Fujikoki India Private Limited and
7. Representative from UL.

**MED 03: P18 Bottled water dispenser and Drinking water cooler**

1. Shri Srinivasu Voltas (**Convener**);
2. Shri Sheshadri H G, Voltas;
3. Shri Sunil Jain, Blue Star;
4. Shri Sushil Kumar, Blue Star;
5. Shri Pramod Trivedi, Usha Pvt. Ltd.;
6. Shri Vikas Dua, Usha Pvt. Ltd.;
7. Shri Prashant Hanwante, Veeline Media Limited;
8. Shri Satish Kumar, UL;
9. Shri C M Pathak, Intertek;
10. Shri P K Mukherjee, Personal Capacity; and
11. Representative from Carrier Midea.

**MED 03: P19 Chiller**

1. BEE(Convener);
2. Representative from ISHRAE (Co-convener)
3. Representative from RAMA;
4. Representative from Carrier;
5. Representative from ICA;
6. Representative from Blue Star;
7. Representative from Emerson;
8. Representative from UL;
9. Shri PK Mukherjee;
10. Representative from VOICE;
11. Shri Manmohan K, M/s Carrier Airconditioning & Refrigeration Limited.

**MED 03: P20 Selection, operation and maintenance of Air Conditioners and Heat Pumps**

1. Shri Shankar Sapaliga, Convener
2. Shri PK Mukherjee
3. Representative from Voltas
4. Representative from LG
5. Representative from
6. Representative from JC Hitachi- IN
7. Representative from RAMA
8. Representative from Panasonic
9. Representative from UL
10. Representative from Intertek
11. Representative from VOICE
12. Shri Ajaj Kazi, M/s Reliance World
13. Shri Shankar Chatterjee, Individual capacity
14. Shri Ravi Kumar Gondkar, M/s LEAD Consultancy and Engg Services
15. Shri Ajit Panicker, Individual capacity,
16. Shri Dharmen Dixit, Refrigeration and Air Conditioning Trade Association (RATA),
17. Shri PK Goel, and
18. Shri Bhavesh Mehta, Reliance Retail Limited.

**MED 03: P21 Room Air Conditioner efficiency evaluation**

1. Bureau of Energy Efficiency
2. Central Pollution Control Board
3. International Copper Association India
4. Intertek India Private Limited
5. Panasonic India Private Limited
6. Refrigeration and Air Conditioning Manufacturers Association
7. Sierra Aircon Private Limited
8. Voltas Limited
9. Shri P K Mukherjee, in personal capacity

**MED 03: P22 Walk in Cold Rooms**

1. Shri Ashish Fotedar, National Centre for Cold-Chain Development (**Convener**);
2. Shri P K Mukherjee, (**Co-Convener**);
3. Shri Sunil Jain, M/s Blue Star;
4. Shri S Sapaliga, International Copper Association;
5. Shri Srinivasu M, M/s Voltas India Pvt. Ltd;
6. Shri Aditya Narayan Singh, MoEFCC;
7. Shri Vaibhav Chaturvedi, CEEW;
8. Shri Girja Shankar, Energy Efficiency Services Ltd.;
9. Shri Kiran from Danfoss;
10. Shri V K Arora;
11. Shri Bhavesh Mehta, Reliance Retail Limited;
12. Shri Manmohan K of Carrier (New);
13. Shri Vikas Malhotra of Carrier (New);
14. Shri Gaurav Mehtani of Daikin (New);
15. Shri Manoj Singh of Daikin (New);
16. Shri Anil Mehta of Panasonic (New);
17. Representative from ISHRAE (New); and
18. Shri Venkanna from TRANE.

**MED 03: P23 India Cooling Action Plan**

1. Representative of MoEFCC (**Convener**);
2. Shri Pant of RAMA (**Co-Convener**);
3. Shri V Manjunath from UL;
4. Shri Tholpady from Emerson;
5. Shri Manmohan from Carrier;
6. Shri Vikas Mehta from Chemours India;
7. Shri P K Mukherjee in Personal Capacity;
8. Shri Gaurav Mehtani from Daikin;
9. Shri Srinivasu M from Voltas;
10. Shri Avinash from Honeywell;
11. Representative from ISHRAE; and
12. Shri Shankar Sapaliga from ICA.
13. Representative from M/s Honeywell; and
14. Representative from M/s Copeland

**MED 03: P24 Cooling cabinet made of clay**

1. Shri V. Manjunath, UL India Pvt Ltd (***Convener***)
2. Consumer Electronics and Appliances Manufacturers Association
3. Blue Star Ltd.
4. Shri J. K. Agrawal, In personal capacity
5. Shri S. T. H. Faridi, In personal capacity
6. Voltas Ltd
7. VOICE

**MED 03: P25 Non-ducted Portable Air Conditioners and Heat Pumps**

1. Shri Satish Kumar (Convener);
2. Dr. J Mathur, ISHRAE;
3. Shri Srinivasu, M/s Voltas;
4. Shri Davesh Mudgal, Sierra Aircon;
5. Shri Gaurav Mehtani, M/s Daikin;
6. Shri Rahul Ramtekkar, Johnsons Control Hitachi;
7. Shri Shankar Sapaliga of International Copper Association; and
8. Ms. Sneha Harsora of M/s Blue Star.

**MED 03: P26 Smart Technology (IoT) in Refrigeration and Air Conditioning**

1. Shri V Manjunath of UL (Convener)
2. Shri Shankar Sapaliga of International Copper Association India.
3. Shri. Satish Kumar of UL
4. Shri Kiran Kumar of M/s Danfoss
5. Shri Prabhat Goel of ISHRAE
6. Prof. Vishal Garg of ISHRAE
7. Shri Vasant Kale of M/s Blue Star
8. Shri Sachin Shah of M/s Blue Star
9. Shri Vikas Mehta of M/s Chemours
10. Shri Shrinivasu of M/s Voltas
11. Shri Bharath B K of M/s TUV Rheinland (LITD 27)
12. Shri Muhammed Shameem PV of M/s Toshiba Software (India) Pvt. Ltd. (LITD 27)
13. Shri Sanjeev Chopra of M/s Electropreneur Park (LITD 27 )
14. Shri Amit Kumar Jaiswal of M/s Samsung Electronics (LITD 27)
15. Shri Mahesh Babu A K of M/s Samsung Electronics (LITD 27)
16. Shri Praveen Arora of M/s TATA Communications (LITD 27)
17. Shri Sudhakar Mairpadi of M/s Philips India Limited (LITD 27
18. Dr. Kaushik Saha of M/s Samsung Electronics (LITD 27
19. Shri Mahesh Babu A K of M/s Samsung Electronics (LITD 27)
20. Shri Sudhanshu Mittal of M/s Nasscom (LITD 27)
21. Shri Rahul Ramtekkar of M/s Hitachi
22. Shri Chetan Tholpady of M/s Copeland
23. Representative from M/s Carrier.
24. Dr. Yash Shukla, CEPT University; and
25. Representative from M/s Daikin.

**MED 03: P27 Commercial Evaporative Air Cooler**

1. Shri Srinivasu, Voltas (Convener);
2. Representative of M/s Usha;
3. Shri PK Mukherjee in Personal Capacity;
4. Representative of BEE;
5. Representative of M/s Blue Star;
6. Representative of UL;
7. Representative of Intertek;
8. Representative of M/s Havel;
9. Shri Nishant Gupta of ISHRAE;
10. Dr. Yash Shukla, CEPT University;
11. Representative of M/s Bajaj Electrical;
12. Representative of M/s Godrej;
13. Representative of M/s Symphony Ltd.;
14. Representative of M/s V-Guard;
15. Representative of M/s Orient;
16. Representative of M/s Crompton;
17. Representative of M/s Hindware; and
18. Representative of M/s Kenstar.

**MED 03: P28 Automotive Air Conditioning and Mobile Air-Conditioning**

1. Shri Madhusudan Joshi, International Centre for Automotive Technology, Manesar
2. Ashok Leyland Limited, Chennai
3. Automotive Research Association of India, Pune
4. Calsonic Kansei Motherson Auto Products Private Limited, Kanchipuram
5. Carrier Air Conditioning and Refrigeration Limited, Gurugram
6. Denso International India Private Limited, Gurugram
7. Hanon Automotive Systems India Pvt Ltd
8. Honda Cars India Research and Development Limited, Noida
9. Honeywell International India Private Limited, Gurugram
10. Indian Institute of Technology Delhi, New Delhi
11. Ingersoll Rand India Limited, Bengaluru
12. International Centre of Automotive Technology, Manesar
13. MAHLE ANAND Thermal Systems Private Limited, Pune
14. MG Motor India Private Limited , Gurugram
15. Mahindra and Mahindra Limited, Mumbai
16. Maruti Suzuki India Limited, Gurugram
17. Refrigeration and Air Conditioning Manufacturers Association, New Delhi
18. Renault India Private Limited, Mumbai
19. Sanden Vikas (India) Private Limited, Faridabad
20. Subros Limites, New Delhi
21. Tata Motors Limited, Pune
22. The Chemours India Private Limited, Gurugram
23. Volkswagen India Private Limited, Mumbai
24. Shri P K Mukherjee, In Personal Capacity
25. Lt Col Santanu Roy, In Personal Capacity

**MED 03: P29 Heat Pump Water Heater**

1. Shri P K Mukherjee (Convener);
2. Representative from Blue Star;
3. Representative from Copeland;
4. Representative from Daikin;
5. Representative from JCI-Hitachi;
6. Representative from ICAI;
7. Representative from Trane Technologies;
8. Representative from UL; and
9. Representative from Voltas.

**MED 03: P30 Service Valves**

1. Shri Srinivasu of Voltas;
2. Shri Shankar Sapaliga of ICAI; and
3. Shri Santosh Kumar of Daikin.

**MED 03:P31 Identification, Storage, Transportation and Handling of Refrigerants / Cylinders:**

1. Shri Shankar Sapaliga (Convener);
2. Shri V Manjunath of UL;
3. Shri Vikas Mehta of Chemours;
4. Shri Avinash of Honeywell;
5. Shri Chethan Tholpady of Copeland;
6. Shri Jitendra Bhambure of Blue Star;
7. Shri Deepak Baid of Blue Star;
8. Shri Rahul Ramtekkar of JCI Hitachi; and
9. Ms Disha of Daikin.

**MED 03:P32 Cold chain and CO2 trans-critical systems:**

1. Shri Ashish Fotedar of NCCD (**Convener**);
2. Shri Aditya Narayan, MoEFCC;
3. Shri Vikas Malhotra, Carrier India;
4. Shri Chethan Tholpady, Emerson;
5. Shri P K Mukherjee, Personal Capacity;
6. Representative from Tecumseh;
7. Representative from ICE Make Refrigeration Limited, Ahmedabad;
8. Representative from Rinac India Ltd.; and
9. Shri Bhavesh Mehta, Reliance Retail Limited

**MED 03:P33 Testing and calculating methods for seasonal performance factors of air-cooled air conditioners and air-to-air heat pumps**

1. Dr. Jyotirmay Mathur (ISHRAE)
2. Shri Satish Kumar, UL
3. Prof. S. K. Das, Indian Institute of Chemical Engineering
4. Shri Shankar Sapaliga, ICA
5. Shri Harsh Vardhan Pant, RAMA
6. Shri Chethan Tholpady, Emerson and
7. Shri Srinivasu M, M/s Voltas.

**ANNEX 4**

(Item **2.2.7**)

1. Engineers India Limited, New Delhi
2. Mandev Tubes Ltd, Umbergaon, Gujarat
3. Bharat Heavy Electricals Limited, Project Engineering Management, Noida
4. Indian Institute of Technology, Kanpur
5. Usha International Ltd.
6. Climatrol Corporation
7. Gujral Aircon Ltd.
8. Tecumseh Products India Pvt. Ltd.
9. Cool Wings
10. Highly Electrical Appliances India Private Limited