IEA Heat Pumping Technologies (HPT) Annex 54

Minutes of Kick-off Meeting

Location: 100 CNN CENTER, ATLANTA, GEORGIA, USA
Time: 8:00 am – 12:00 pm on Saturday, January 12, 2019

The meeting was called to order by Yunho Hwang at 8:00 am.

1. Attendee

There were 20 persons attending in person as listed below.

Attending in person:
- Yunho Hwang, University of Maryland, Operating agent, USA
- Reinhard Radermacher, University of Maryland, co-operating agent, USA
- Van Baxter, Oak Ridge National Laboratory (ORNL), co-operating agent, USA
- Joshua Hughes, Chemours, USA
- Gustavo Pottker, Honeywell, USA
- Bill Goetzler, Navigant Consulting, USA
- Xudong Wang, AHRI, USA
- Shaobo Jia, Heatcraft, Inc., USA
- Jiro Inoue, AGC Inc., USA
- Chao Ding, LBNL, USA
- Ross Lazzara, Watchtower JW, USA
- Aaron Branoon, Watchtower JW, USA
- Eiji Hihara, University of Tokyo, Japan
- Shigeharu Taira, Daikin, Japan
- Luca Molinaroli, Politecnico di Milano, Italy
- Yoon Jei Hwang, LGE, South Korea
- Felix Flohr, Daikin, Germany
- Rainer Jakobs, IZWe. V., Germany
- Martin Dieryckx, Daikin, Belgium
- Paul de Laminat, JCI, France

2. IEA HPT ANNEX 54 Introduction

After self-introductions of all attendees, Dr. Hwang provided a short introductory presentation for Annex 54 (Attachment 1). Countries currently committed to participating are Italy, Japan, South Korea, Sweden, and the US.

The primary motivation of forming HPT Annex 54 is to promote the application of low-GWP refrigerants for air-conditioning application to accelerate phase down of high-GWP HFCs. Annex
will develop design guidelines of optimized components and systems for low-GWP refrigerants to achieve this goal.

3. Presentation by Low-GWP Refrigerants Professionals

3.1 Mr. Joshua Hughes from Chemours presented for “Low GWP Refrigerant Solutions for Heat Pumps” (Attachment 2)

3.2 Dr. Gustavo Pottker from Honeywell presented for “Reduced GWP Refrigerants for Heat Pump Systems” (Attachment 3)

3.3 Dr. Piotr A. Domanski from National Institute of Standards and Technology planned to make a presentation on “Review of Refrigerants Evolution” but was not able to join the meeting due to US federal government shut down.

4. Discussion

Mr. Dieryckx noted that target values for low GWP refrigerant is lower than 300 for UNEP, and lower than 750 for EU and California, US; annual refrigerant leakage rate in EU is 1% only; new heat pump technologies control discharge side superheating; In EU, I (iodine) is classified as toxic and has non-zero ODP value so that there is some regulation in EU. He recommended to use word “Lower” rather than “Low”; clearly define target applications of heat pumps (ex: to include HPWH or not); and compare refrigerants under same capacity and COP conditions.

Mr. Jakobs noted that most of industrial heat pumps are for high temperature heat pumps (typically $T_{\text{cond}} = 100 \sim 150^\circ\text{C}$) and ORC (typically $T_{\text{evap}} = 100 \sim 250^\circ\text{C}$); avoiding 0.5°C warming claim is political issue. He also recommended to use LCCP rather than GWP threshold value; and for new refrigerants we need to understand issues in terms of flammability and charge.

Mr. Laminat suggested to use LCCP ($\text{CO}_2$ emission).

Dr. Radermacher suggested to draft more specific objectives, focus on LCCP and show benefits of heat pumps.

5. Business Meeting

A brief business meeting was held to discuss the Annex task structure (see slide 9 in attachment 1). Volunteers are being solicited for tasks as summarized in following table.

<table>
<thead>
<tr>
<th>Volunteer</th>
<th>Task</th>
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<tbody>
<tr>
<td>Xudong Wang, AHRI, USA</td>
<td>1, 3</td>
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<tr>
<td>Joshua Hughes, Chemours, USA</td>
<td>1, 3</td>
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<tr>
<td>Gustavo Pottker, Honeywell, USA</td>
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<td>Bill Goetzler, Navigant Consulting, USA</td>
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<td>Chao Ding, LBNL, USA</td>
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<tr>
<td>Eiji Hihara, University of Tokyo, Japan</td>
<td>1, 3</td>
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</tbody>
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Action items arising from the presentations and discussions:

- Operating agent will update an Annex 54 web site at https://heatpumpingtechnologies.org/annex54/.
- Presentations from the meeting to be posted on the Annex web site and distributed with these minutes (Accessible to members only)

Future meeting possibilities were discussed:

- Next meeting: One possibility is August 2019 in conjunction with the ICR 2019 in Montreal, Canada

Respectfully submitted by Yunho Hwang (Operating Agent)

**Attachments:**

1. Annex 54 Introduction presentation
2. “Low GWP Refrigerant Solutions for Heat Pumps” by Mr. Joshua Hughes from Chemours
3. “Reduced GWP Refrigerants for Heat Pump Systems” by Mr. Gustavo Pottker from Honeywell
4. Meeting Pictures (next pages)