



INSTITUT INTERNATIONAL DU FROID
INTERNATIONAL INSTITUTE OF REFRIGERATION

Dehumidification in Air Conditioning Working Group of IIR Commission E1

TERMS OF REFERENCE

INTRODUCTION

In accordance with Article XIX of the International Agreement concerning the IIR and articles 15 to 18 of the Internal Regulations of the Scientific Council of the IIR, the creation of a Commission E1 Working Group (WG) is proposed. The following terms of Reference (ToR) further define the role of the WG.

BACKGROUND

Air conditioning is one of the main contributors to energy consumption in buildings. Decreasing the power consumed during air conditioning has become a vital way of reducing a building's energy consumption and subsequent impact on the climate. Other than temperature, humidity is the most important parameter of air conditioning, affecting both product quality and personal thermal comfort. The humidification process is quite simple, and optimising it to decrease the energy consumption during humidification is relatively limited. But things are quite different for dehumidification.

In industry, an air conditioning system and the refrigeration dehumidifying + reheat method are commonly used for dehumidification, which neutralises certain amounts of cold and heat but results in a high energy consumption. Hence why reheating in air conditioning system for human comfort is prohibited by many countries' national standards and the control range of humidity may be broadened. Being able to control humidity precisely while consuming minimal energy has become an important goal of air conditioning research. At the same time, the demand for precise dehumidifying control in residential buildings is increasing, which massively challenged the small capacity direct expansion air conditioner's ability to control humidity.

Different technologies have in fact been researched and developed for years, including temperature/humidity independent control. In addition, several groups in the world have contributed valuable work to this field. There is, however, no platform for

them to share the progress. A working group on dehumidification in air conditioning is therefore proposed, in order to promote cooperation in this field and accelerate technical developments.

OBJECTIVES

The objectives of the Working Group are:

- to share research progress on dehumidification in air conditioning – including chemical dehumidification, refrigeration dehumidification, desiccant dehumidification, etc – and summarise the current research state;
- to clarify the technical road map for dehumidification in central air conditioning systems for industrial applications and human comfort applications;
- to clarify the technical road map for humidity control in residential buildings.

WORKING GROUP WORK PLAN

The dehumidification methods in industrial air conditioning, central air conditioning for humans, and rooms' air conditioners are different. Different applications will be assigned to the research parties involved in this working group, who will summarise the current state of research and conduct investigations on the road map. Dr. Baolong Wang will be in charge of the research on industrial applications. Prof. Yunho Hwang will be responsible for the research on residential buildings. Prof. Xu Zhang will be responsible for the research on central air conditioning for humans. Relative specialists are welcome and invited to join the WG at any time.

WORKING GROUP OUTPUT

The annual and final reports on dehumidification and independent temperature/humidity control will be submitted to IIR. A review paper will be submitted to the International Journal of Refrigeration. An Informatory Note will be written for the IIR after the final report.

IIR COMMISSIONS INVOLVED

Lead Commission: Commission E1

MEMBERSHIP

WG members are expected to be either private members or representatives of corporate members of the IIR with technical expertise that permits them to contribute to the work of the WG.

WORKING GROUP LEADERSHIP (temporary)

Chair: Dr. Baolong Wang (Tsinghua University, China) and Prof. Xu Zhang (Tongji University, China)

Vice-Chair: Prof. Yunho Hwang (Maryland University, USA), Prof. Lazzarin Renato (University of Padova, Italy), Prof. Shiming Deng (The Hong Kong Polytechnic University, Hong Kong), etc.

Secretary: Dr. Zuo Cheng

The Working Group will designate its officers at its first meeting.

STRUCTURE (optional)

The working party shall include 3 subgroups:

- Subgroup A: Dehumidification in industrial air conditioning systems (Dr. Baolong Wang)
- Subgroup B: Dehumidification in Air Conditioning for human comfort (Prof. Xu Zhang) –
- Subgroup C: Humidity control in residential buildings (Prof. Yunho Hwang)

WORKING GROUP FUNDING

- Technical activities: Technical activities will be supported by funding individually secured by the WG participants
- WG management: Project management costs will be covered by the team of Dr. Baolong Wang

MEETINGS

The Chair and the Vice-Chair of the Working Group will organise meetings, preferably once a year. The first meeting will be held in **July of 2018 in Purdue, USA**. Minutes of the meetings shall be prepared by the Secretary and copies shall be sent to the IIR head office, the President of the Science and Technology Council and

the President of Commission E1. If the meeting is enlarged to a workshop, the organisers will prepare proceedings of the papers presented.

WEB PAGE

A web page, hosted by the IIR, will be set up in order to disseminate relevant information and to promote the activities of the Working Group and of the IIR. It will be periodically updated under the responsibility of the Chair and of the Vice-Chair. It will be linked to the Commission E1 web page on the IIR website.