

Brief research status on Indirect Evaporative Cooling technologies of China

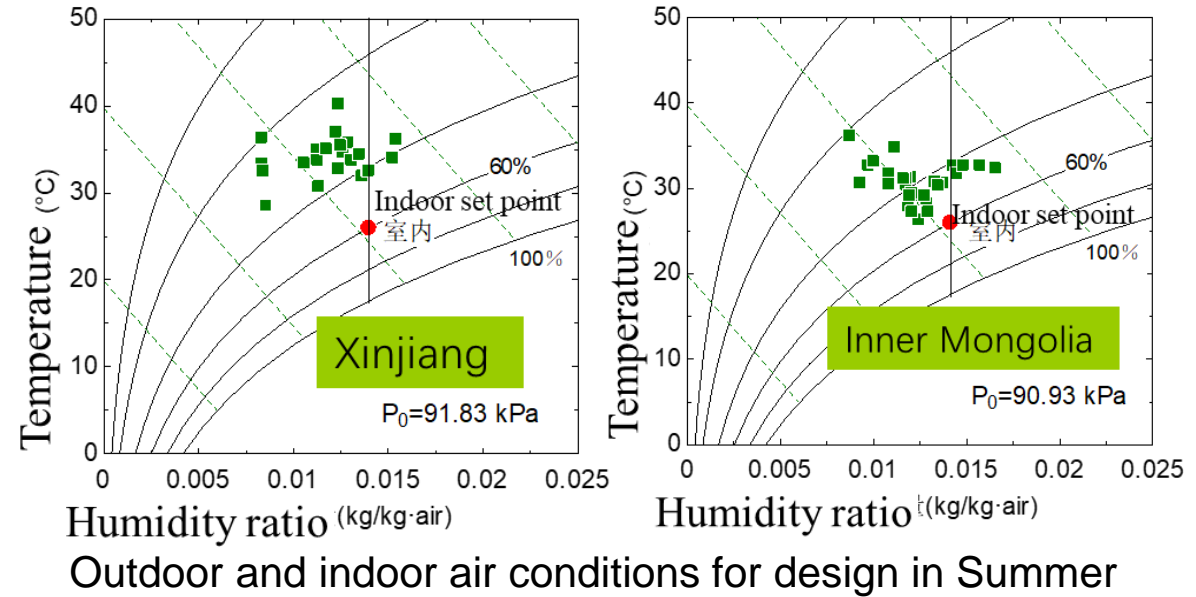
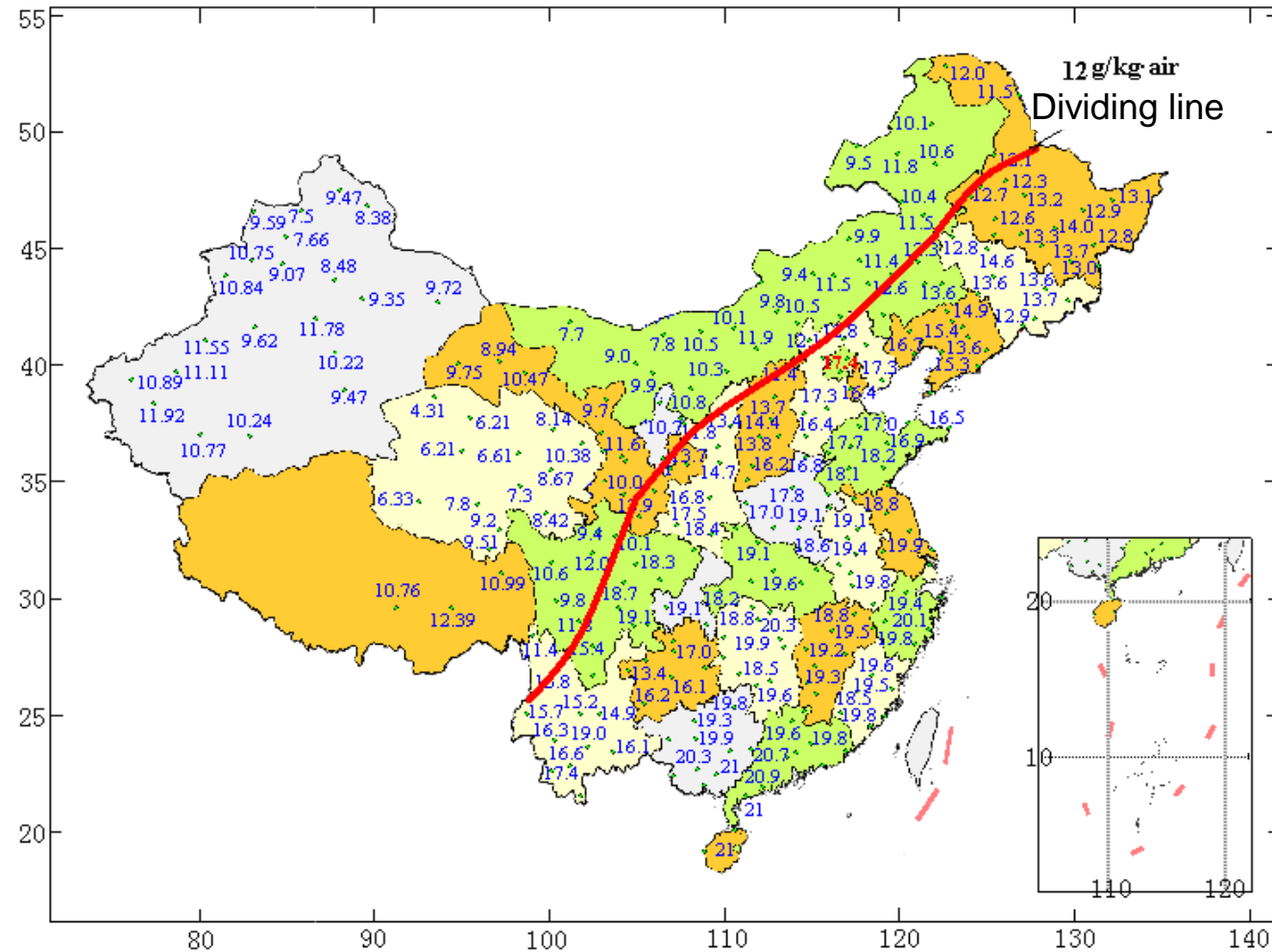
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2020.9.11

Research situations of Indirect Evaporative Cooling (IEC) technologies in China

- Suitable regions to use IEC technology in China

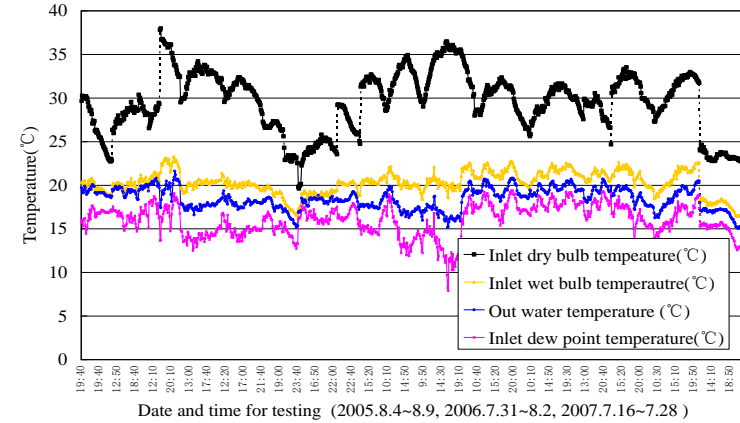
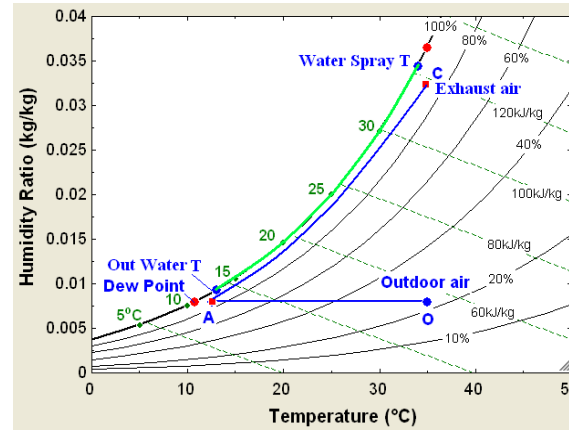
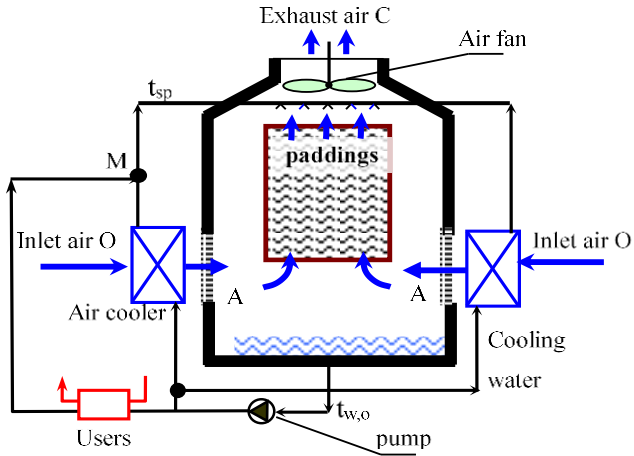


For dry regions,

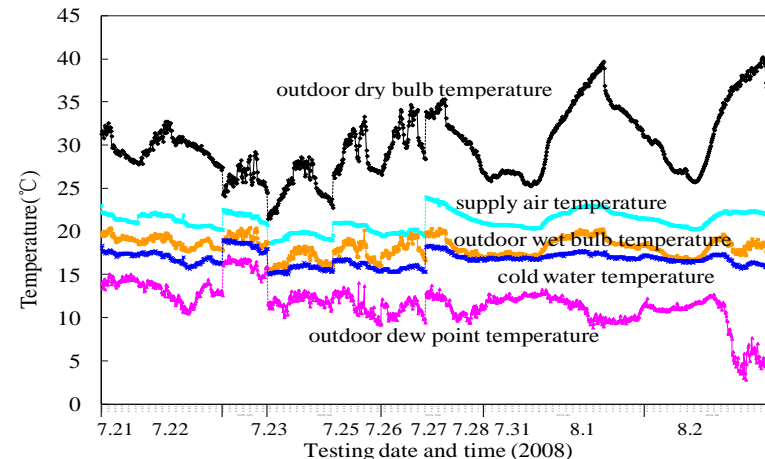
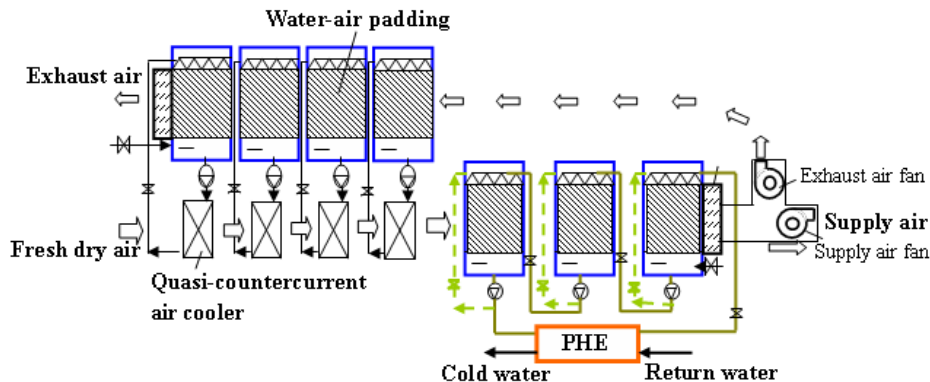
- Out door air could be used to remove indoor humidity directly;
- Using IEC technology to produce cooling energy to remove indoor sensible heat;

Research on IEC processes

- Present the innovative indirect evaporative cooling concept and the technology to produce cold water, developed the first indirect evaporative chiller in 2005. Produces cold water with temperature lower than outdoor wet bulb temperature and limit to outdoor dew point temperature.

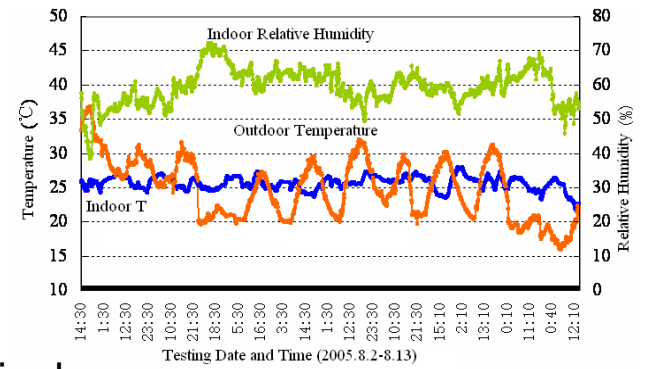
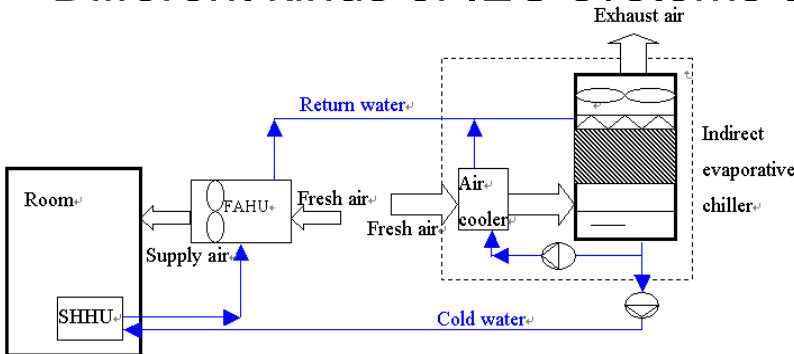


- Present the IEC water chiller combined air cooler processes, and developed the first device in 2008, produces cold water with temperature lower than outdoor wet bulb temperature and cooling air with temperature more or less at wet bulb temperature.

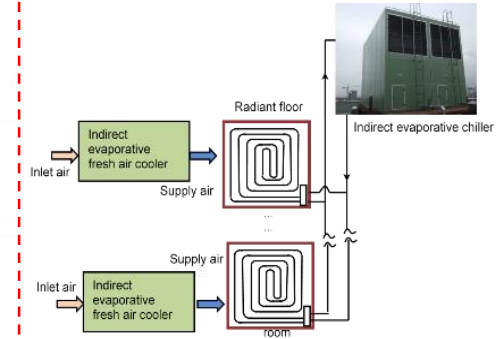
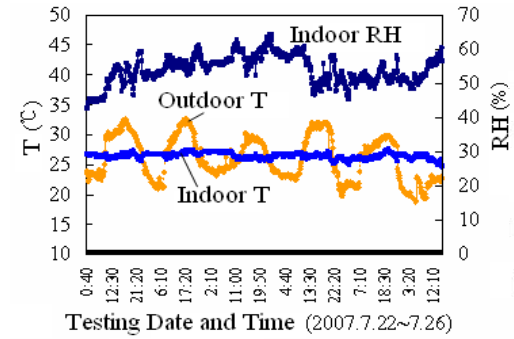
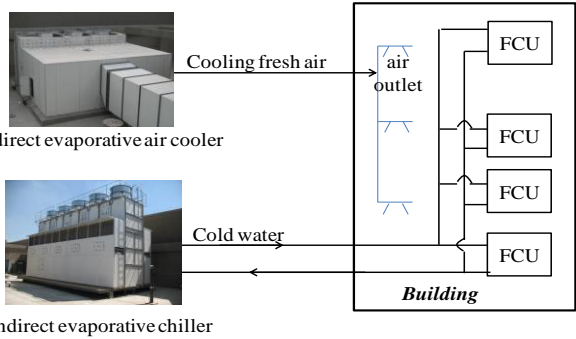


Research on IEC systems

- Different kinds of IEC systems design and optimization and final realized in real applications.

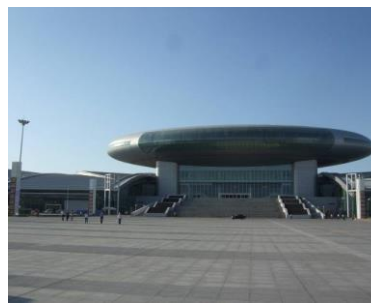
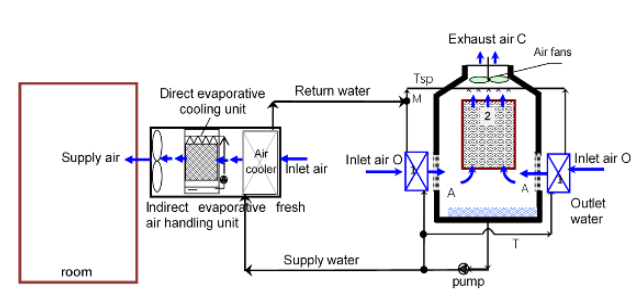
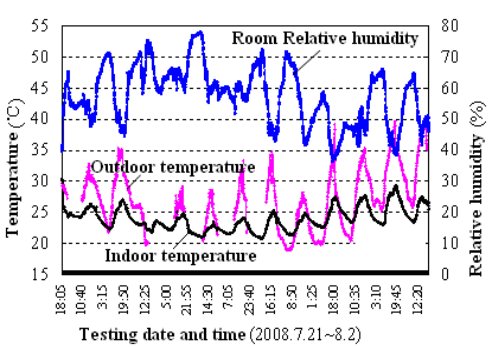
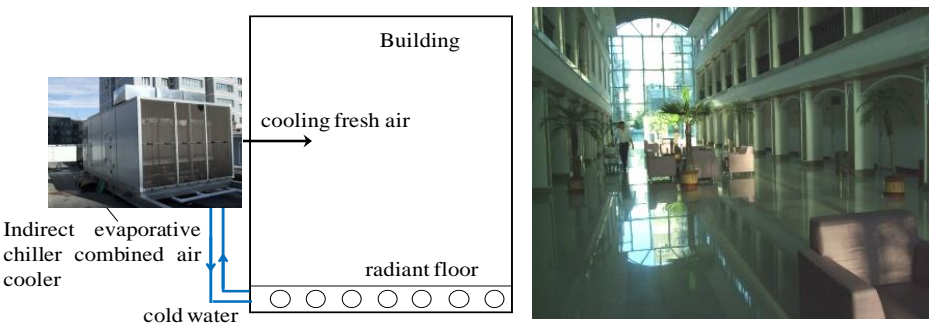


Serial water cycle system using IEC water chiller, with FCUs as terminals.



Parallel water cycle system using IEC water chiller, with FCUs as terminals.

IEC water chiller system using radiant floor as terminals

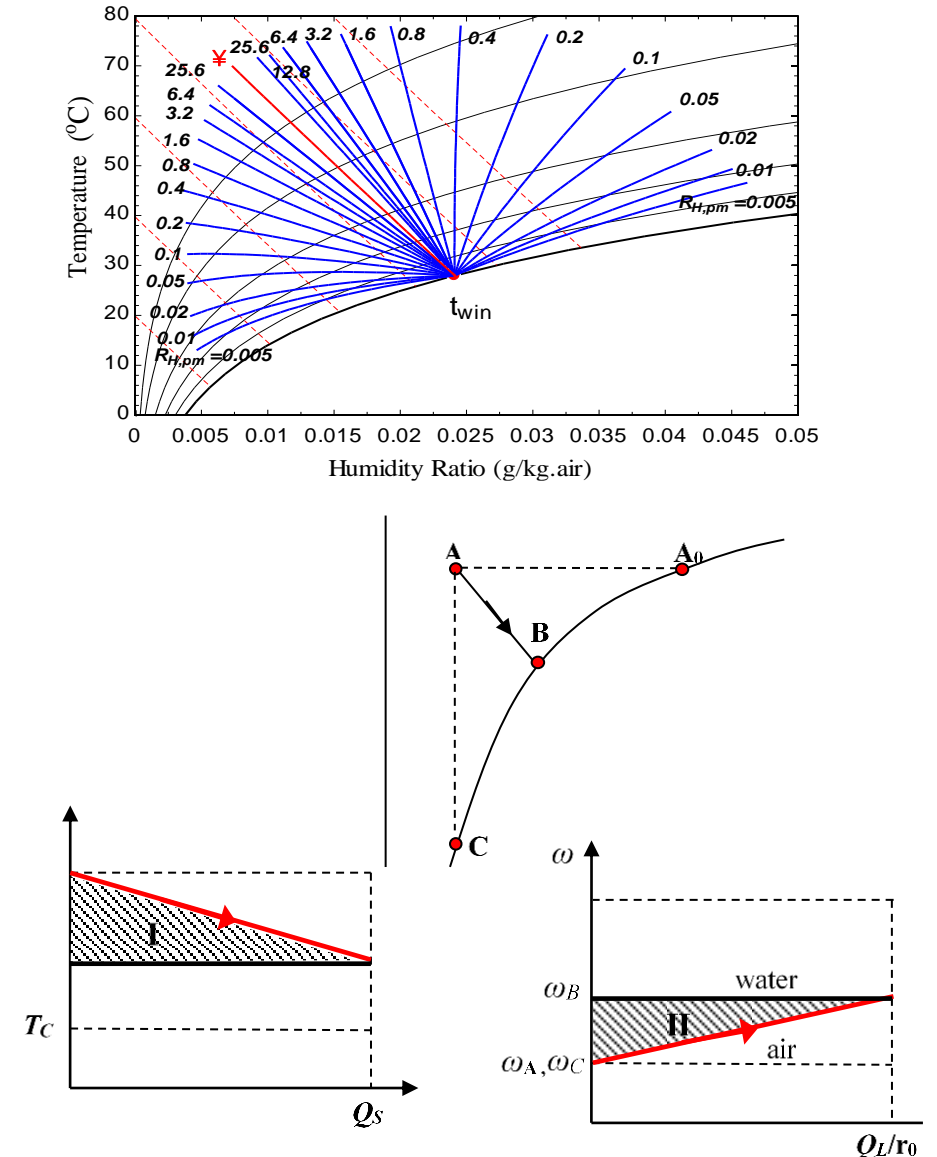


IEC water chiller combined air cooler system

All fresh air system using IEC water chiller

IEC processes optimization

- Through the dissipation analysis of each internal process, the basic optimization rules of the indirect evaporative chillers are obtained:
 - the final performance of the chiller depends on how close to the saturation state of the air inlet into the padding tower, which can be cooled down through the air-cooler;
 - to do that, the air cooling has to be designed as a countercurrent process with matched flow rates of the air stream and the cooling water;
 - the relation between the entransy dissipation of the air cooling process at the air cooler and evaporating process at the padding tower should be balanced at the optimization point.



Applications

- IEC water chillers, mainly applied in northwest of China, totally more than 2,000,000m², as the cooling source for large public buildings, instead of mechanical chillers.



Shihezi Kairui Hotel, 2005, 3000m²;



Hospital, 2007, 46093 m²



International exhibition center, 2008~2010, 110767m²



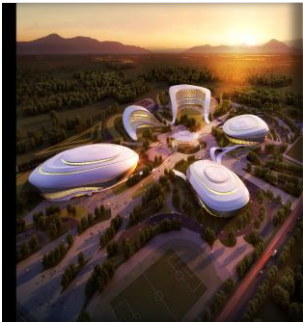
Hospital, 2009, 25195.6 m²



Hospital, 2012, 49200 m²



Office building, 2014, 7668 m²



Sports field, 2014, 75146 m²



Theater, 2015, 28654m²



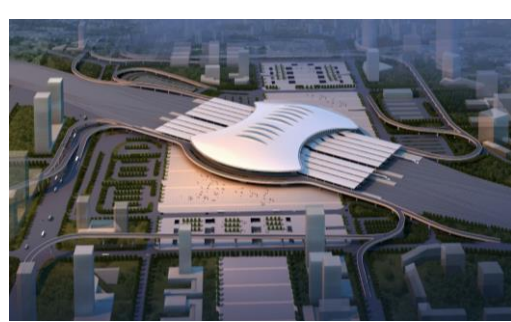
Art Center, 2017, 78219m²



Office Building, 2015, 190000m²



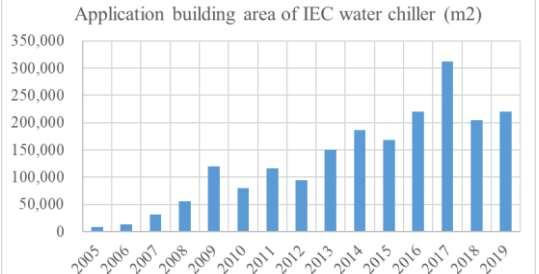
Detection Building, 2018, 452000m²



High Speed railway station, 2015, 99982 m²



Industry cooling system



Thank you very much for
your attestation.