MUNTERS MRE VALIDATION PROJECT

BY ISSUING STANDARD 920 IN 2015, THE AIR CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI) RECOGNIZED DX-BASED DEDICATED OUTDOOR AIR SYSTEMS (DOAS) AS A SPECIFIC HVAC EQUIPMENT CATEGORY AND ESTABLISHED DEFINITIONS AND GUIDELINES FOR TESTING AND RATING PERFORMANCE. MOISTURE REMOVAL EFFICIENCY (MRE) BECAME THE MEASURE FOR RATING DOAS AND IS DEFINED AS POUNDS OF MOISTURE REMOVED PER KWH OF POWER USED (LB/KWH).

Because MRE represents efficiency at a specific operating point, AHRI Standard 920 further suggested rating DOAS units by Integrated Seasonal Moisture Removal Efficiency (ISMRE) which combines the value of four MRE ratings at specific outdoor air and return air conditions. The four MRE values are weighted to better represent efficiency over a year of operation.

In 2016, minimum ISMRE values for DOAS with and without exhaust air energy recovery components were adopted into ASHRAE Standard 90.1– Energy Standard for Buildings Except Low Rise Residential Buildings.

ISMRE = (MREA x 0.12) + (MREB x 0.28) + (MREC x 0.36) + (MRED x 0.24)

WHERE:

MREA =	MRE at 95°F DB/78°F WB	RA is 75°F DB/62.5°F WB
MREB =	MRE at 80°F DB/73°F WB	RA is 75°F DB/62.5°F WB
MREC =	MRE at 68°F DB/66°F WB	RA is 75°F DB/62.5°F WB
MRED =	MRE at 60°F DB/58°F WB	RA is 75°F DB/59.5°F WB

Until a formal certification program is introduced, ISMRE calculations are provided by equipment manufacturers and Munters' values are double the minimums!

In an effort to address validity questions, Munters is monitoring the following sites with plans for more: a supermarket in Texas with a DryCool® Standard unit installed and a school in Georgia, with a DryCool® ERV installed. Monitoring began in September 2017. Although the web page designs are different, the reported data from both sites is similar.

ASHRAE Minimum ISMRE vs Munters ISMRE

DX DOAS w/o energy		DX DOAS w/energy	
Minimum	Munters	Minimum	Munters
4.0	7.9 - 9.2	5.2	9.2 - 10.8

For the purpose of this MRE validation project, Munters' primary objective is to monitor MRE with respect to OA conditions. In the future, Munters' Internet of Things (IoT) team will ultimately offer live monitoring which will not only provide real time performance reports, but bring remote troubleshooting capability to save time and expense for customers. For example, while monitoring performance at the school site during commissioning, Munters' engineers determined one of the four available compressors was malfunctioning and were able to modify programming to lock out the identified compressor, enabling continuous operation until a replacement compressor was installed.

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MONITORING OF THE VALIDATION SITES DID NOT COMMENCE UNTIL AFTER SUMMER. THE DATA COLLECTED HAS BEEN QUITE IMPRESSIVE.

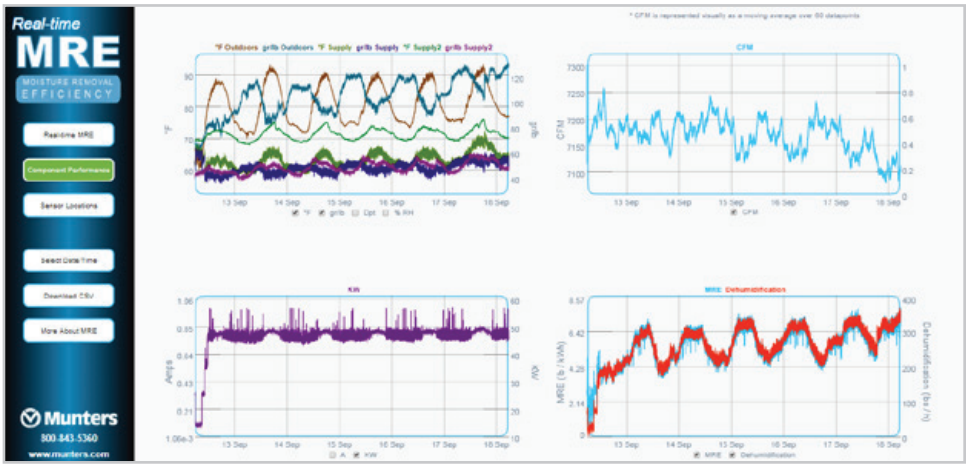
During a mid-September week, the outside air conditions at the location of the Texas supermarket fluctuated between 63°F and 93°F and 60 gr/lb and 130 gr/lb. During this particular week, the MRE ranged from 0.94 to 7.92.

During the month of October at the site of the elementary school in Georgia, the outside air conditions ranged from below 40°F to over 90°F and 20-100 gr/lb and MREs nearing 15! Because the school is served by a DryCool® ERV and therefore has a total energy recovery wheel, negative MREs occasionally result. This is because the enthalpy wheel provides humidification when the return air is more humid than the incoming outside air.

These results not only fall within our expectations, they are impressive because unit operation is controlled by the customer without influence from Munters and represent "real-world" performance.

In time, more sites will be monitored, not only to collect and analyze data, but to provide valuable insight regarding system and building operation enabling Munters to continue product design innovation.

Texas Supermarket



Elementary School in Georgia

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BR0055-01 01/19