

## Summary

### Introduction

Purpose of the visit to Wholesale Battery in Kansas City, KS was to address comfort complaints throughout the space. The HVAC systems consist of (2) RTU's with VVT's/Bypass dampers and plenum returns. There is also a furnace unit that serves the first floor sales floor of the building which was outside of the scope. Each RTU serves both the first and second floor. RTU-1 serves the east side of the building and RTU-2 serves the west side of the building. The installed diffusers closely match the original mechanical drawings from 2012 except that there is one diffuser missing from each RTU. Each RTU has it's own independent ZoneX controller.

Randy with Wholesale Battery stated they have had continuous issues and their preventative maintenance company had made frequent service calls to try and diagnose. Recently, he stated that they disconnected the controls from all VVT stats except for one on each unit. He stated that one RTU was controlled by a thermostat on the first floor while the other unit is controlled by a thermostat on another floor. It did appear this is how the RTU's were responding but it could not be confirmed while on site.

### Findings

#### RTU-1:

RTU-1 is shown on the mechanical drawings as a 7.5 ton York unit. The model number shown on the drawing specifies a VFD. But what is actually installed is a 7.5 ton Lennox unit. It is a belt drive constant volume unit.

After gathering initial data on the unit, it was discovered that the bypass damper actuator was not functional and was failing open. This was causing a large amount of supply air to dump into the ceiling. The TML technician replaced the actuator while on site and it is functional again.

Prior to testing the airflow, the unit was commanded into test mode at the ZoneX controller. This opens all of the VVT dampers to the fully open position. The total airflow was measured and was found to be 22% above design (3180 CFM out of 2600 CFM design). The pulley was reduced 1-1/2 turns and the airflow is now within design.

Diffusers in the offices and other enclosed areas were balanced as close to design as possible. Other areas were balanced for comfort only. There was a missing damper which prevented all areas from being balanced.

The outside air damper was initially not responding to adjustment and was closed. The damper shaft had come loose from the actuator. This was reattached and the outside was successfully set to the original design.

The bypass damper was set to approximately 0.3" on the controller even though the measured static pressure in the duct was 0.17". The damper started to open when the setpoint was below 0.3".

RTU-2:

RTU-2 is shown on the mechanical drawings as a 7.5 ton York unit but what is actually installed is a 1 year old Trane unit. It is direct drive unit with Symbio controller.

The airflow for this unit was initially 2508 CFM and set to 63%. The fan speed was increased to 66% and final airflow remained in design.

Similar to RTU-1, the diffusers in the offices and other enclosed areas were balanced to design where possible. A missing damper on one of the diffusers prevented all areas from being balanced however.

Outside air was initially closed and was successfully balanced to design.

The bypass damper was set to approximately 0.25" on the dial which is close to the measured pressure in the duct.

**Conclusion and Recommendations**

Fixing the failing bypass damper on RTU-1 should have a significant impact on the comfort for the areas that unit serves. There was a significant amount of air that was dumping into the ceiling and not getting to the offices below. In general, some of the offices were very unbalanced and getting those airflows closer to design should now improve comfort in those areas. Also, setting the minimum ventilation rates at the RTU's should help improve perceived comfort.

Getting the ZoneX controls set back up properly per the original design should be a priority. Until this is corrected, there will still probably be comfort issues.

See the following issue pages for specific next steps and recommendations.