MODULAR INTEGRATED TERMINAL COMMISSIONING PLAN
PLENUM BASED AIR DELIVERY

This commissioning plan includes a test and documentation process that should be identified as a requirement prior to project bidding, etc. to assure adequate resources are allocated.

PREREQUISITES

Prior to commissioning the MIT system, several previous tasks must be completed:

1. Prior to carpet installation, the air handling system must have been made fully operational and commissioned to provide air to the floor at the correct and stable pressure/temperature.
2. The building envelope must be intact, including the access floor plenum, outside walls, interior partitions, and ceilings. Any temporary holes must be sealed. For example, if wire is being pulled and access floor panels are removed testing must be delayed or this work halted during testing.
3. The temperature controls external to the MIT system must be complete and functional. (It is assumed in this document that the MIT controls are furnished by YORK.) This implies all control sequences are enabled such as pressure and temperature control of the supply air.
4. All required accessories like toilet exhausts, exhaust fans, booster fans, etc. must have power and be operational. Zoning dampers, relief dampers, fire/smoke dampers, etc. must be in place and operational.

REQUIRED SERVICES/EQUIPMENT

There are a limited number of services and tools required to verify performance of the system:

1. An accurate hood set-up for this configuration. For example, a recently calibrated, low flow range Alnor Balometer 500 cfm hood. Other hood configurations should have a similar accuracy at the low cfm levels of the test.
2. A YORK thermostat tester, Part # 32-04004-053.
3. An accurate, recently calibrated thermometer.
4. Services and equipment from certified air balance personnel to measure fan volume.
5. A hand held differential pressure gauge may be used to verify you have 0.05" differential between space and plenum.

REQUIRED DOCUMENTATION

The following documentation is required for commissioning:

1. A drawing showing the location, type and wiring of each thermostat, MIT and MFT in the floor that can be annotated during testing.
2. Project drawings that indicate the design air flow volume, and temperatures for each zone.

TASKS

1. Air Leakage Test - Each Fan System

The purpose of this test is the determination of how much air is lost to leakage by the duct and plenum system. Too much leakage can cause loss of temperature control and poor performance. A typical good system will leak no more than 10-15% of total volume and a marginal system may leak up to 20-25%. If leakage is beyond that which was specified as the minimum VAV flow through the air handler, then the system should be repaired to yield leakage no greater than this level.

To determine plenum/duct leakage, all MIT's are to be covered or sealed. (This test could be performed with blank panels, also.) This can be accomplished by using the optional self-adhesive protective sheets, if this has not been done previously to protect the MIT from construction debris. All panels and closures must be in place. Check access doors for good fit and closure. **Verify all penetrations at duct/drywall transitions sealed airtight.**

With the plenum and MIT sealed, the system is brought to normal working pressure with the controls (typically .05 inches w.g. in the plenum). The airflow of the supply fan system is measured by the air balance personnel and compared to maximum delivery volumes. *The test volumes are recorded in the commissioning report.* ***Correct and retest any systems that demonstrate leakage/uncontrolled flow in excess of design maximum.***

2. MIT/MFT Function Test and Zoning Verification

The purpose of this test is the assurance that the MIT's are correctly installed and functional. Each MIT is checked to be sure that it is installed properly and secured to the floor. Refer to the appropriate installation instructions (form 130.15-N2._). The trim ring should be tight to the floor with no gaps or rocking motion. The grilles should be open (no casting flash or debris), and correctly oriented as required on the drawings. ***Identify any damaged grilles, trim rings, scratched finishes, bent chassis, excessive dirt etc. and correct as necessary.***

Using the project documents, each zone is tested to verify the MIT units with automatic dampers are correctly wired to a thermostat, and the dampers within the MIT's are operating correctly. Using the YORK thermostat tester, each thermostat location has its connected MIT's driven fully open and closed with the drawing marked up indicating pass/fail of each unit. MIT-G units connected to MFT's should demonstrate little or no airflow in the heating position with the fan off and the damper in the full heating position. ***If substantial airflow is indicated in this mode then the ductwork under the floor may have excessive leakage or be disconnected. Correct as necessary!***

Incorrect operation or zoning is to be corrected and the test repeated. Manually operated MIT's (MIT-A, MIT-H) are to be verified as correctly located and installed. Verify MFT's have filters installed if required and all stages operate correctly. Refer to MFT installation instruction form 130.15-N2.8. Correct as necessary!

Each thermostat should be verified as being the correct style and type for the location. If thermostats are connected on an E-bus, then each thermostat should be observed as communicating correctly. The drawings should identify where each thermostat is located **by address.**

3. Air Delivery Test and Adjustment

The purpose of this test is the determination that the fan system can provide adequate air to all of the MIT devices as installed. If diversity is included in the design, the maximum number of MIT devices should be opened fully on a distributed basis throughout the floor plates. For example, if the air handler is designed to supply 15,000 CFM, and there are 120 installed MIT boxes @ 150 CFM nominal; then diversity is present, since all of the MIT boxes fully open would require a total of 18,000 CFM nominal. In this case, the maximum number of MIT boxes to open at one time would be found from dividing the design airflow from the air handler (15,000 CFM) by the design airflow of each MIT box (typically 100 CFM or 150 CFM) – equal to 100 MIT boxes of the 120 total installed MIT boxes.

After the leakage test has been passed successfully, the sealing material from the MIT's is removed and all the required MIT's are opened fully by means of the thermostat tester. The fan system should be under automatic control delivering a nominal .05 inches w.g. to the floor. Random testing of MIT's on each floor plate or area should indicate an airflow from the fully open MIT of design (100 or 150 CFM depending on model). Generally, test one MIT per 10,000 square feet minimum. If the MIT's are generally above or below design, the pressure control should be adjusted (for example, using the knob on MIT-I-1 and MIT-I-3, or program setpoint with MIT-I-2 and FlexFloor) to provide the correct design volume. ***If the system fails because the fan can not lower/raise the pressure, it should be identified and corrected. The commissioning report should identify correct and incorrect operation along with the value of required settings to achieve design airflow. Fan volume (VFD speed) should be noted on the drawings.***

4. Load Balancing

The floor plate that has multiple injection points should be observed to assure that the load is being equally divided between systems. For example, one fan may be operating at 100% and another at 25%. The floor pressure controls may need to be adjusted to cause the fan running at 100% to be lowered to 62.5% (lower the pressure setpoint) and the fan running at 25% to be raised to 62.5% (raise the pressure setpoint). These adjustments may require very small adjustments to the pressure controls and should be observed over time to assure correct effect is achieved.

It is recommended that thermostat settings be increased 2°F to 3°F above the typical, occupied zone temperature. For example, if the typical, occupied cooling setpoint is 75°F, then raise the thermostat in a FlexSys system to be 77°F or 78°F. Refer to "Underfloor Air Distribution: Thermal Stratification" Ashrae Journal 44 (5) : 28-36. The position of MIT dampers should be observed to assure that the MIT system controls are functioning. Generally the dampers should be found in a modulating position, neither fully closed nor open. If the dampers are always fully open or closed and the space is not within range of the setpoint, it may be advisable to consider relocating the MIT's by adding or subtracting units in a zone until modulation is observed or the space temperature stays within setpoint range. This testing presumes some load is available within the space and limited to full occupancy. This testing may not be possible on many projects during commissioning.

If using a Honeywell thermostat, verify that the limiting clips have been installed to prevent the user from raising or lowering the setpoint past 70-80 degrees. This will prevent neighboring zones from competing with each other.

P.O. Box 1592, York, Pennsylvania USA 17405-1592
Tele. 800-861-1001
www.york.com

Form 130.15-COM1 (203)
New Release