

K-12 KITCHEN EXHAUST & MAKEUP AIR SYSTEM PROJECT USING INTEGRATED PROJECT DELIVERY

This month's B2B will focus on an existing K-12 school building that is receiving a new, energy-efficient kitchen hood exhaust system along with a new gas-fired makeup air unit.

The kitchen hood will be a medium-duty, high-efficiency, three-sided kitchen hood with fire suppression system. The kitchen-cafeteria building is a one-story building serving 1,200 students. The project is receiving an energy initiative from the local utility company to save gas energy.

Project delivery method shall be integrated project delivery (IPD) based on *2015 ASHRAE Handbook — HVAC Applications*, chapter 58 (Integrated Building Design). The IPD team shall include the city's building facility manager, school department representative, 3rd-party owner representative, H&V consultant engineer (as the design team leader), electrical and plumbing consulting engineers, a local utility company representative, H&V contractor project manager as the lead contractor, and fire protection consulting engineer. A 3rd-party commissioning and testing, adjusting, and balancing (CxTAB) engineering firm will be included as part of the IPD team. The school department's O&M staff will also participate in the IPD process, beginning at the conceptual phase and following the project through to the school accepting the completed installation.

The facility manager shall have her O&M personnel review the documents throughout the design phase and receive introduction training of the new equipment. This staff shall observe equipment startup, IPD H&V contractor and subcontractors' punchlist, and the commissioning system demonstration. When the system is ready, the 3rd-party CxTAB consultants shall observe the heating system performance using functional performance test (FPT) narratives.

The makeup air unit shall be a heating-only unit providing makeup air at the perimeter of the new high-efficient hood. The air-handler will have 4-in MERV 13 pleated filters downstream of 2-in pre-filters. Fan shall be adjustable belt-driven centrifugal fan with premium efficiency motor and starter. Fan shall have air proving switch interlocked with gas controls to prevent gas heat operation when the fan is not operational. Burner shall be 91% efficiency natural gas heater, sized at 350MBH with four stages of control. Unit shall be equipped with factory-installed contactors, relays, sensor, switches to perform DDC with discharge air control and space temperature reset control, and BACnet control interface.

The makeup air unit shall be furnished with automatic controls that include a computerized system utilizing wireless technology integrated with the building's control system. This system will also interface with the building's fire alarm system managed by the school facility management.

Electrical shall be 480/3/60 for .5 hp and larger and 120/1/60 for motors less than .5 hp. The H&V subcontractor's ATC subcontractor

and electrical subcontractor shall work together to interface the new H&V controls with the building's automation system.

The exhaust system shall be an upblast, power roof ventilator in compliance with UL Standard 762 and includes a grease drain, grease collector device, and integral hinge kit to permit access for duct cleaning.

The IPD team is directed to *2015 ASHRAE Handbook — HVAC Applications*, chapter 33 (Kitchen Ventilation) pertaining to system design, commissioning and air balancing, as well as energy considerations, commercial exhaust hoods, cooking effluent, and fire safety. The team is also directed to chapters 36 through 43 (Building Operations and Management) in the *2015 Handbook*.

The IPD team shall begin to come together at Phase 2 Project Initiative and include the town's building facility manager, school department representative, owner representative, design team leader (H&V consultant engineer), IPD H&V contractor, and the associated consultants and sub-contractors. The remaining IPD team members will be brought on board at Phase 3 Concept Development

The IPD team shall produce Concept Documents and Design Documents (drawings and specifications). The Phase 5 Construction Preparation, Phase 6 Construction, Phase 7 Owner Acceptance, and Phase 8 Use, Operate, and Maintain shall follow. The O&M personnel will review the documents, beginning with the Concept Development Phase, and observe equipment startup in the Construction Phase. There will be an air balancing and commissioning system demonstration at the initial dry run of this makeup air and hood exhaust system, electrical, and fire protection system IPD project.

The IPD team's H&V contractor shall include the following during the shop drawing submittal phase:

- Equipment submittals - Fan curves - Startup sheets - Troubleshooting sheets - O&M manuals, parts, and lubricants - ATC and sequence of operation - Operating and maintenance instruction brochure - Kitchen hood fire suppression system

The school's owner representative shall provide 3rd-party commissioning and testing, adjusting, and balancing (CxTAB) services as following:

- TAB system flow diagram of makeup air and exhaust air, airflow readings around the entire perimeter and face area of the kitchen hood, and exhaust discharge velocity;
- Commissioning functional performance test of H&V system (makeup air, exhaust air system, and the equipment itself).

Refer to The Facility Files for additional information pertaining to completing the B2B test. **ES**



The design engineer shall check off the boxes from the list of company's standardized field observation checklists below that he will need to upload on to his tablet computer prior to heading out to the construction site to complete his final H&V inspection and punchlist. These checklists will be touchscreen type. When the engineer returns to the office or he sends the completed checklists

via the internet to the office, the completed checklists shall be automatically downloaded to the company's computer server and placed in the job folder's "Project Closeout" section of the folder. The completed checklists, along with associated digital photographs taken at the time of the field visit, will automatically be electronically sent to the following individuals and departments.

TEAM CORRESPONDENCE DIRECTORY CHECKLIST

(Check the appropriate boxes)

- Owner Owner Representative IPD Lead Engineer
- Construction Manager General Contractor Design-Build Contractor School Department Manager H&V Lead IPD Contractor ATC Subcontractor Electrical Subcontractor
- Plumbing Subcontractor Fire Protection Subcontractor
- Telecommunication Subcontractor Architect State Energy Department Utility Energy Engineer Piping Subcontractor
- Sheet Metal Subcontractor 3rd-Party CxTAB Consultant
- 3rd-Party TAB Consultant Building Inspector
- Others: (insert list) _____

HVAC CONTRACT SPECIFICATION CHECKLIST

- Division 1 Project Closeout Telecommunication Equipment
- Owner Equipment Structural Electrical Plumbing Fire Protection H&V Infection Control ATC Pumps Kitchen Hood Fans Air Handlers Terminal Units Piping System
- Sheet Metal System TAB Commissioning
- Others: _____

HVAC CONTRACT DRAWING INSTALLATION CHECKLIST

- Owner Equipment Structural Electrical Plumbing Fire Protection H&V Infection Control ATC Pumps Kitchen Hood Fans Air Handlers Terminal Units Piping System
- Sheet Metal System TAB Commissioning
- Others: _____

HVAC STARTUP CHECKLIST

- Owner Equipment Structural Electrical Plumbing Fire Protection H&V Infection Control ATC Pumps Kitchen Hood Fans Air Handlers Terminal Units Piping System
- Sheet Metal System TAB Commissioning
- Others: _____

COMMISSIONING FPT (Functional Performance Test)

- Structural Electrical Plumbing Fire Protection H&V System Infection Control System ATC System Heating System Chilled Water System Condenser Water System
- Pumps Chillers Fans Air Handlers Terminal Units
- Piping System Sheet Metal System Equipment Room
- Others: _____