



1537 Webster Street
Oakland, California

Compliance Report

Minimum Indoor Air Quality Performance LEED-EB v2009 IEQp1

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IEQ Prerequisite 1: Minimum Indoor Air Quality Performance

REQUIREMENTS

1. Modify or maintain existing building outside-air (OA) ventilation distribution system to supply at least the outdoor air ventilation rate required by ASHRAE 62.1-2007. If this is not feasible due to the physical constraints of the existing ventilation system, modify or maintain the system to supply at least 10 CFM per person.
2. Test and maintain the operation for all building exhaust systems, including bathroom, and shower.

SUBMITTAL

1. Provide a letter and backup tabular information from a mechanical engineer or HVAC system specialist demonstrating that the existing building outside-air (OA) ventilation distribution system supplies at least the outdoor air ventilation rate required by ASHRAE 62.1-2007. If this is not feasible due to the physical constraints of the existing ventilation system, modify or maintain the system to supply at least 10 cfm/person.
2. Provide a letter and backup tabular information from a mechanical engineer or HVAC system specialist demonstrating that the exhaust air HVAC systems serving the building are operating as designed.

COMPLIANCE (Option A)

The requirements for this prerequisite have been met.

1. The existing building outside-air (OA) ventilation distribution system meets the outdoor air ventilation rate required by ASHRAE 62.1-2007. See a detailed report in Section 1.0: Outside Air Ventilation System.


Enovity Signature

09/06/2013
Date

2. The exhaust air system serving the building is operating as designed. See a detailed report in Section 2.0: Exhaust Air System.


Enovity Signature

09/06/2013
Date

3. Quarterly building OA/exhaust air system inspections have been performed and measurement data is presented in Section 1.0 & 2.0.

1.0 Outside Air Ventilation System

1.1 Air Handler Unit

Air Handler Unit

AC-1, AC-2, AC-3 and AC-4 are AAON packaged DX systems located on the roof and provide ventilation air to their respective areas in the building. Figure 1.1.1 shows a typical packaged DX rooftop unit at the building. Three of the four AC units contain variable speed supply fans. The speed of the supply fan varies to maintain the duct static pressure setpoint.

Figure 1.1.1: AC 2 Board/Training Room Unit



1.2 Outside Air Ventilation Rates

The required total OA CFM for AC-1, AC-2, AC-3 and AC-4 has been calculated according to space type, occupancy, and floor area as shown in Table 6-1 of ASHRAE 62.1-2007. The critical zones have also been taken into account for this calculation; critical zones are zones that have a high concentration of outdoor air when compared to the total airflow to the zone such as conference rooms, break rooms, etc. The critical zones selected are shown in the calculations in Appendix A.

The measurements from AC-1, AC-2, AC-3 and AC-4 were taken when the dampers were at the minimum outside air position, which was accomplished by overriding the outside air switchover setpoint below the outside air temperature at the unit. The measurements were taken on August 23, 2013 between 7:00 am to 9:00 am in the morning while the building was mostly unoccupied to test the AHU without effecting comfort.

The AC units serve primarily variable air volume Therma-Fuser serving areas throughout the building. The OSA dampers positions were adjusted by the American Mechanical service technician to exceed the ASHRAE 62.1 minimum OSA requirements. The worst-case condition for AC-1 analyzed was when the AC unit was at minimum discharge air flow resulting AC-1 supply fan operating at it's the minimum flow. This worst-case condition will generally occur when the AC units are in heating mode and OA damper is at minimum position.

All airflow measurements were taken with the CPS AM50 Velocitor, which has a range of 0-8800 FPM and an accuracy of $\pm 3\%$. This device was used to measure the velocity of air (FPM) through the outdoor air intakes on AC-1, AC-2, AC-3 and AC-4. Ten to fifteen readings were taken uniformly across the outdoor air intake for all the AC units.. By averaging and multiplying these values by the area of the outdoor air intake, a corresponding airflow (CFM) was determined. **Error! Reference source not found.** shows the OA ventilation measurement summary results at the analyzed worst-case condition. The detailed required ventilation calculation for AC-1, AC-2, AC-3 and AC-4 is attached as Appendix A.

The Building contracts American Mechanical Inc. to periodically inspect and maintain the AHU units. The AHU units are controlled by Reliable controls building automation system.

Table 1.2.1: OA Ventilation Measurement Summary Results

Air Handler	Location Served	Area Served (ft ²)	Minimum OSA Damper Position (%)	Measured Min Outside Air Flow (CFM)	Design OA Flow (CFM)	Calculated OA Flow based on ASHRAE 62.1 (CFM)	Is IEQp1 met?
AC-1	2 nd Floor Exterior	5,106	18%	742	1100	659	Yes
AC-2	1 st Floor Board/Training Room	2,717	36%	565	470	561	Yes
AC-3	1 st Floor Exterior	1,600	18%	274	290	174	Yes
AC-4	1 st Floor Meeting Room and 2 nd Floor Interior	741	18%	190	130	127	Yes

2.0 Exhaust Air System

The building has three exhaust fans, two on the roof and one (EF-3) in the shower room. EF-1 serves as general exhaust for the building and EF-2 serves the elevator machine room.

Each exhaust fan was inspected and proper operation was verified. Velocity measurements were taken on each exhaust fan and velocities less than 60 FPM were recorded. Table 2.1 is the air flow measurement summary results for each exhaust fan. Velocity measurements were taken for each type of fan to verify proper operation, see Table 2.2, Table 2.3 and Table 2.4 below. EF-1 operates based on the AC unit operating occupied schedule. EF-2 operates via a thermostat to maintain a elevator machine room temperature setpoint of 75°F. EF-3 operation is interlocked with the shower room manually operated light switch.

Table 2.1: Exhaust Fan Measurement Summary Results

Equip. ID	Equip. Location	Area/System Served	Manufacturer	Flow Control Type	Measured Air Flow (cfm)	Fan Power (Hp)
EF-1	Roof	General Building Exhaust	Greenheck	Constant	1681	1/2
EF-2	Roof	Elevator Machine Room	Greenheck	Constant	871	1/16
EF-3	Ceiling	Shower Room	Greenheck	Constant	26	1/20

Table 2.2: EF-1 Flow Measurements

Equip. ID	Exhaust Fan Air Velocity Measurement Number	Exhaust Fan Air Velocity Measurements (FPM)
		Outlet
EF-1	1	1,580
	2	1,210
	3	1,360
Average Flow Rate (FPM)		1,383
Exhaust Air Area (sq.ft.)		1.215
Exhaust Air Flow (CFM)		1,680

Figure 2.1: EF-1 General Exhaust



Table 2.3: EF-2 Flow Measurements

Equip. ID	Exhaust Fan Air Velocity Measurement Number	Exhaust Fan Air Velocity Measurements (FPM)
		Outlet
EF-2	1	270
	2	1,850
	3	1,500
Average Flow Rate (FPM)		1,207
Exhaust Air Area (sq.ft.)		0.722
Exhaust Air Flow (CFM)		871

Figure 2.2: EF-2 Elevator Machine Room



Table 2.4: EF-3 Flow Measurements

Equip. ID	Exhaust Fan Air Velocity Measurement Number	Exhaust Fan Air Velocity Measurements (FPM)
		Outlet
EF-3	1	60
	2	30
	3	30
Average Flow Rate (FPM)		40
Exhaust Air Area (sq.ft.)		0.656
Exhaust Air Flow (CFM)		26

3.0 HVAC System Maintenance Program

In accordance with LEED-EB Out-side Air Introduction and Exhaust Systems (EQp1) this section addresses the requirement for addressing maintenance associated with indoor air quality. The intent is to “implement an operations and maintenance plan to maintain an uncontaminated HVAC system.”

3.1 HVAC Filter Maintenance

Frequency: Change filters based on physical inspection and manufacturers recommendation that the pressure drop not exceed 1.0 inches water column.

There are two air filters in parallel for each AC unit the pre-filter has a MERV rating of 8 and the next filter has a MERV rating of 14.

3.2 Mold Prevention

While the building does not reside in a humid climatic zone, presence of water can lead toward mold development. Prevention of water infiltration is critical to maintaining a mold-free facility.

Recognizing areas where water accumulates is a key element to mold prevention. The following are areas of a facility that would need to be inspected on an annual basis at a minimum or as noted.

- Landscape watering: inspect surrounding building areas noting areas of water accumulation and time period to dry (make special note of the building’s northern exposure; monitor flow of water run-off.
- Rain: visually inspect all areas of the facility during rain and after rain to identify any problem areas with water penetration into the building, improper run-off flow or clogged drains, and excessive water accumulation.
- HVAC Condensate Drains: Condensate drains should be inspected during normal rounds.
- Plumbing Fixtures: Cleaning staff should notify building maintenance if water leaks or water accumulation is found anywhere in the facility.

3.2.1 Response Guidelines

Upon detection of water accumulation, leaking plumbing fixtures, areas that maintain moisture, clogged drains, and improper water flow should contact building maintenance so that the problem can be investigated. Building maintenance shall perform the following upon receiving notification of a potential problem:

- Document when the problem was reported
- Inspect the problem area to identify the problem source
- Take measures to resolve the problem or limit the damage until a solution can be provided.
- Remove all water within 24 hours
- Dry all building materials within 24-48 hours; discard/replace all building materials that cannot be dried.
- Document resolution or note if the problem requires continual monitoring
- Bring in a third party company to inspect if mold is suspected

3.3 Particulate Accumulation

3.3.1 General Housekeeping

Outside Air Intakes

All outside air intake areas of the facility shall be kept clear of debris and clear of any products that produce any level of odor.

Chemical Storage

Chemicals shall be stored in a clearly marked chemical storage closet with adequate ventilation to outside air that does not expose any building occupants.

General Exhaust Fans

Annually, since the general exhaust fan handles toilet exhaust the general exhaust fan shall be opened and wiped clean of dirt and tested for proper operation. The fan motor should run smoothly and balanced.

Facility Entry Areas

Facility entry areas (lobby, side, and back entry areas) shall maintain a method to minimize dirt from outside entering the facility. Entry mats shall be washed down on a monthly basis. Mats shall also be provided to absorb moisture on rainy days to maintain safety and minimize moisture from tracking into the facility.

3.4 Smoking Policy

The building has been designated non-smoking. Smoking is not allowed within 25 feet of the walking paths or building entry.



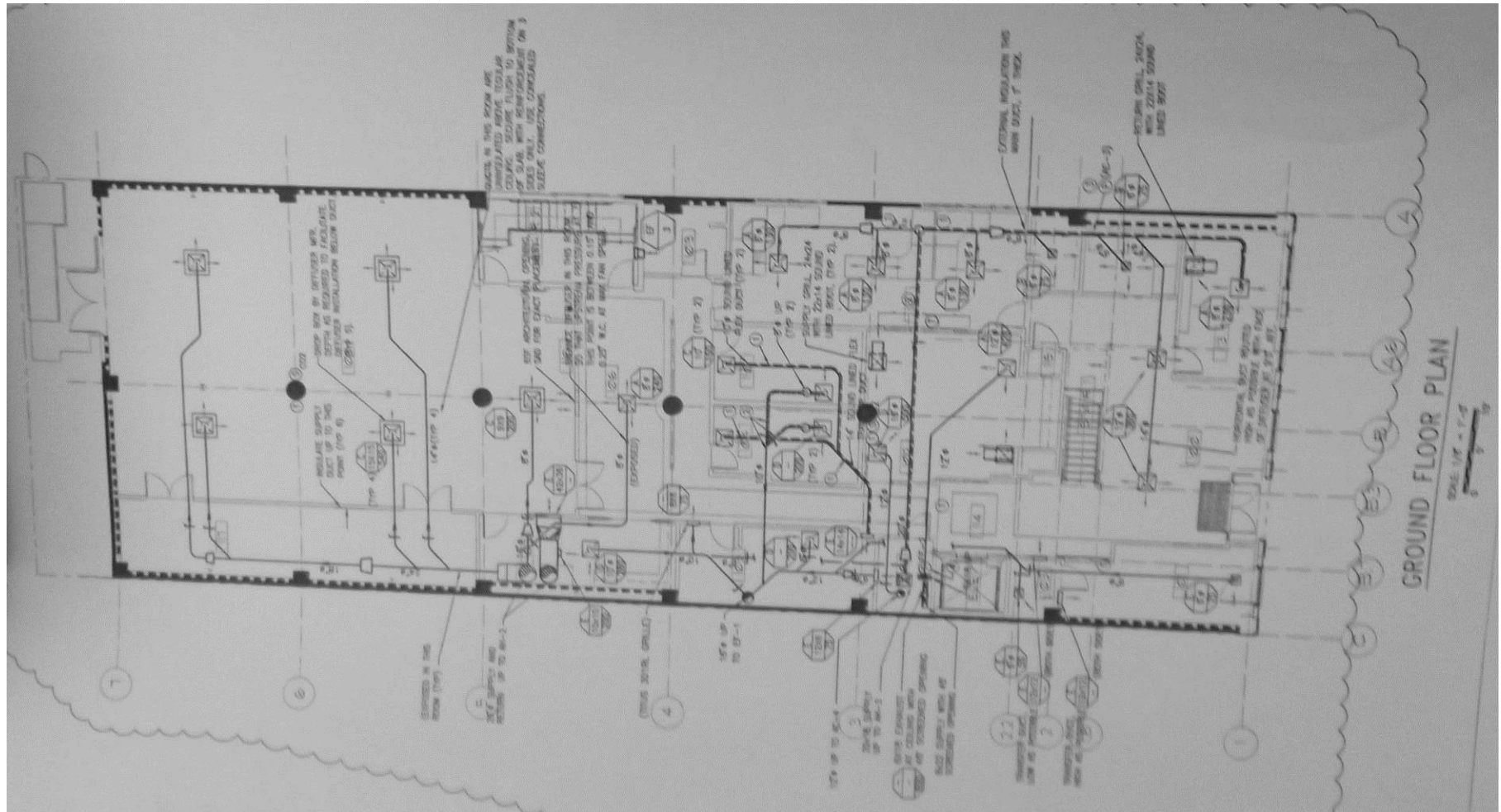
APPENDIX A: Ventilation Rate Calculation For Each AC Unit

The Ez value for all the zones was determined to be 0.8 to simulate the worst-case operating condition.

Design Population Zone (Pz) is based ASHRAE 62.1 Code Requirements listed in Table 6-1 of Calculator.

APPENDIX B: Floor Plans

Ground Floor Plan



2nd Floor Plan

