## Appendix F – Dedicated Outdoor Air System Unit Selection

This appendix contains the cut sheets and other data for the Semco dedicated outdoor air system units used as a part of the design process.

Please see the all the dedicated outdoor air system unit information on the following pages.

AIR TECTONICS inc.
The Offices At Oxford Crossing • Suite 401
333 North Oxford Valley Rd. • Fairless Hills, PA 19030
Phone 215/945-2600 • Fax 215/945-2602

**LANCASTER OFFICE – 717-665-3971 FAX – 717-665-3976**

MARCH 29, 2006

TO: Nathan Patrick

FROM: RITCHIE HALL

RE: Hilton Hotel - BWI location

# Budget Quotation

**PVS-13 (Unit Tag - ERU-1)**

Unit Width - 98"
Unit Height - 86"_____
Unit Length - 295"_____
Max Module Weight - 13,700_____
Number Of Modules - 1_____

- SEMCO standard panels consisting of 2" thick dual wall 18 ga. Galvanized solid exterior skins and 22 ga. Galvanized steel solid interior skins enclosing 2" thick 3 pcf mineral wool insulation with a u-factor of 0.10 BTU/(hr-sq.ft.-deg). An all-welded painted structural base will support the housing. The base includes a welded floor with 3 pcf mineral wool insulation. The base is self-flashing when set on a properly sized curb. Floor openings have perimeter lip and are covered by protective grate. Lifting lugs will be welded to the base.
- Outdoor construction including 22 gauge galvanized steel standing seam sheet metal roof, door gutters and hoods on intake and exhaust openings.
- Self-flashing base is designed for curb mounting. Curb must provide support at all field joints. Contact SEMCO for more detail.
- Automated Logic Corporation DDC control package.
- Variable speed enthalpy recovery wheel with 3A molecular sieve desiccant and acid-resistant coating, variable speed drive motor , 480/3 inverter and 24 volt temperature controller.
- Variable speed aluminum dehumidification energy recovery wheel which is coated to prohibit corrosion, media surfaces coated with a non-migrating solid adsorbent layer, variable speed drive motor , 460/3/60 inverter and 24 volt temperature controller.
- 20 hp, EPACT compliant, ODP supply fan motor in centrifugal plenum type fan.
- 20 hp, EPACT compliant, ODP exhaust fan motor in centrifugal plenum type fan.
- Chilled water cooling coil consisting of round seamless 5/8 inch O.D. by .020 inch thick copper tube on 1.5 inch centers, secondary surface of .006 inch rippled aluminum plate fins, casings of galvanized steel, headers of seamless copper, and galvanized steel holding racks mounted in an insulated pitched 304 stainless steel condensate pan.
- Hot water coil consisting of primary surface of round seamless 5/8 inch O.D. by .020 inch thick copper tube on 1.5 inch centers, secondary surface of .0075 inch rippled aluminum plate fins, casings of galvanized steel, headers of seamless copper, and galvanized steel holding racks.

- Single point control panel, 480/3/60, including motor starters, motor short circuit and overload protection, low voltage transformer, damper interlocks and local HOA switch.
- Vapor tight lights wired to a single switch on the unit exterior and GFI receptacle mounted next to the light switch with separate 120 volt power connection at the GFI receptacle to provide power for the lights and receptacle.
- 30%, Class 2, 4-inch pleated filters in outdoor airstream.
- 65%, Class 2, 12-inch high efficiency pleated filters.
- 30%, Class 2, 2-inch pleated filters in return airstream.
- Outside air damper, galvanized steel frames and blades and two position electric actuators.
- Exhaust air damper, gravity back draft, aluminum frames and blades.

**Price (Freight Allowed)..... $90,193.00 (2nd Half-06)**

## PVS-18 (Unit Tag - ERU-2)

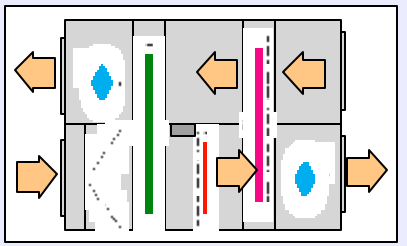
Unit Width - 122"
Unit Height - 98"_____
Unit Length - 308"_____
Max Module Weight - 10,000_____
Number Of Modules - 2____

- SEMCO standard panels consisting of 2" thick dual wall 18 ga. Galvanized solid exterior skins and 22 ga. Galvanized steel solid interior skins enclosing 2" thick 3 pcf mineral wool insulation with a u-factor of 0.10 BTU/(hr-sq.ft.-deg). An all-welded painted structural base will support the housing. The base includes a welded floor with 3 pcf mineral wool insulation. The base is self-flashing when set on a properly sized curb. Floor openings have perimeter lip and are covered by protective grate. Lifting lugs will be welded to the base.
- Outdoor construction including 22 gauge galvanized steel standing seam sheet metal roof, door gutters and hoods on intake and exhaust openings.
- Self-flashing base is designed for curb mounting. Curb must provide support at all field joints. Contact SEMCO for more detail.
- Automated Logic Corporation DDC control package.
- Variable speed enthalpy recovery wheel with 3A molecular sieve desiccant and acid-resistant coating, variable speed drive motor , 480/3 inverter and 24 volt temperature controller.
- Variable speed aluminum dehumidification energy recovery wheel which is coated to prohibit corrosion, media surfaces coated with a non-migrating solid adsorbent layer, variable speed drive motor , 460/3/60 inverter and 24 volt temperature controller.
- 25 hp, EPACT compliant, ODP supply fan motor in centrifugal plenum type fan.
- 20 hp, EPACT compliant, ODP exhaust fan motor in centrifugal plenum type fan.
- Chilled water cooling coil consisting of round seamless 5/8 inch O.D. by .020 inch thick copper tube on 1.5 inch centers, secondary surface of .006 inch rippled aluminum plate fins, casings of galvanized steel, headers of seamless copper, and galvanized steel holding racks mounted in an insulated pitched 304 stainless steel condensate pan.
- Hot water coil consisting of primary surface of round seamless 5/8 inch O.D. by .020 inch thick copper tube on 1.5 inch centers, secondary surface of .0075 inch rippled aluminum plate fins, casings of galvanized steel, headers of seamless copper, and galvanized steel holding racks.
- Single point control panel, 480/3/60, including motor starters, motor short circuit and overload protection, low voltage transformer, damper interlocks and local HOA switch.
- Vapor tight lights wired to a single switch on the unit exterior and GFI receptacle mounted next to the light switch with separate 120 volt power connection at the GFI receptacle to provide power for the lights and receptacle.
- 30%, Class 2, 4-inch pleated filters in outdoor airstream.
- 65%, Class 2, 12-inch high efficiency pleated filters.
- 30%, Class 2, 2-inch pleated filters in return airstream.
- Outside air damper, galvanized steel frames and blades and two position electric actuators.
- Exhaust air damper, gravity back draft, aluminum frames and blades.

**Price (Freight Allowed)..... $102,993.00 (2nd Half-06)**

Version 2002.1

# SEMCO PVS System Modeling Program



## Input Parameters:

Unit #: ERU-1

| | | |
|---|---|---|
| Project Name: | Hilton Hotel | |
| Location: | Baltimore, Md | Choose System from below: |
| PVS Model Selected: | PVS-13 | PVS-13 |

## Airflow Conditions

| | |
|---|---|
| Supply Air (SCFM): | 7,680 |
| Return Air (SCFM): | 6,400 |

## External Static Pressures:

| | |
|---|---|
| Supply Air (inwg): | 5 |
| Return Air (inwg): | 5 |

## ESA Weather Data:

Austin, TX
Baltimore, MD
Billings, MT
Birmingham, AL
Bismarck, ND

## Supply Air Conditions:

| | Cooling Season | Heating Season | Suggestions |
|---|---|---|---|
| Dry Bulb Temp (DegF): | 51.5 | 75.0 | Input minimum grain level required for peak |
| Humidity (Grains): | 46.0 | 20.0 | indoor latent load when sizing cooling capacity |

## Outdoor Air Design Conditions:

| | Cooling Season | Heating Season | Suggestions |
|---|---|---|---|
| Dry Bulb Temp (DegF): | 95.0 | 10.0 | For Accurate Design Data for City Selected: |
| Humidity (Grains): | 130.0 | 0.5 | |

## Space Design Conditions:

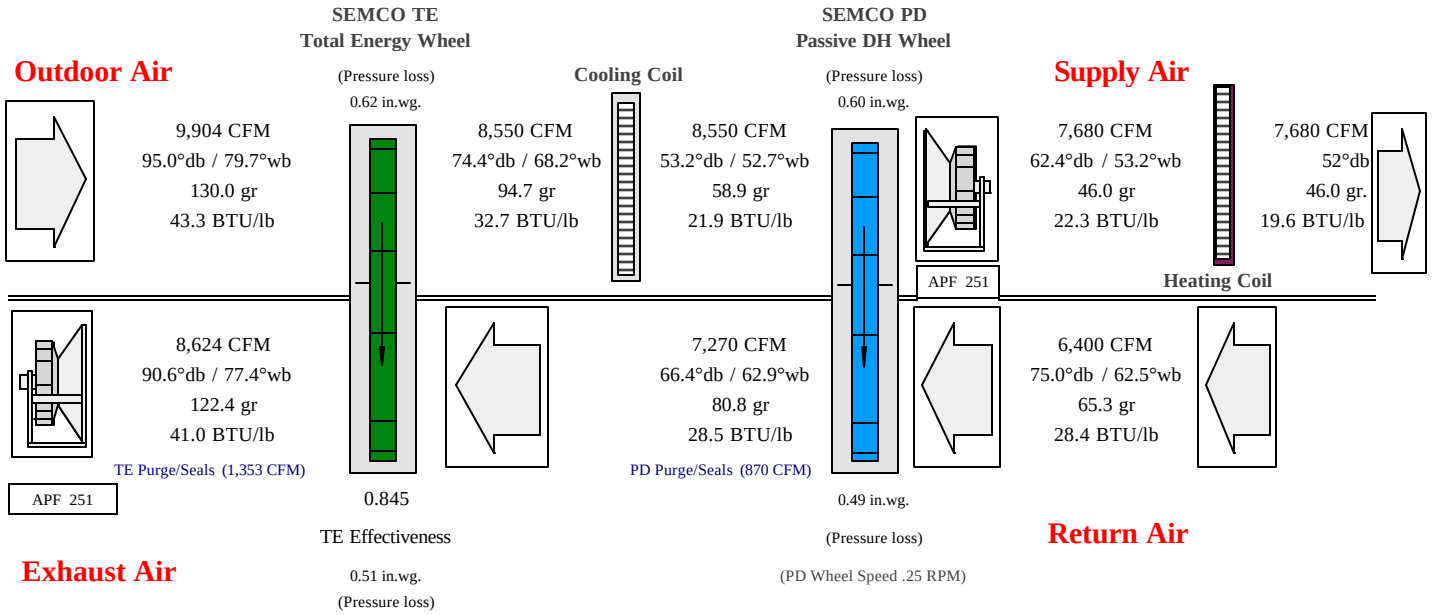
| | Cooling Season | Heating Season | Suggestions |
|---|---|---|---|
| Dry Bulb Temp (DegF): | 75.0 | 72.0 | Input space temperature and relative humidity |
| Humidity Level (%RH): | 50% | 30% | desired. (50% RH maximum recommended for |
| Humidity (Grains): | 65.3 | 35.2 | cooling season design) |

(calculated Value)

SEMCO INCORPORATED

**Project: Hilton Hotel**
**Location: Baltimore, Md**
**Model: PVS-13**

**Operating Mode:**
**Peak Space Latent Load**
**Unit #: ERU-1**




| Operating Season: **Cooling** | Operating Mode: **Peak Latent Load** |
|---|---|
| **SEMCO PVS Performance Analysis:** | |
| Total Cooling Load Delivered: | **60.60** Tons of Total cooling provided |
| Latent Cooling Load Delivered: | **36.56** Tons of Latent cooling provided |
| Cooling Capacity Input Required: | **34.54** Tons of cooling Input required |
| Dewpoint Delivered to Space: | **45.9** Degree F dewpoint |
| Dewpoint Leaving Coil: | **52.2** Degree F dewpoint |
| **Comparison with Conventional Approach:** | |
| Cooling Capacity Required: | **69.47** Tons of cooling Input required |
| Reheat Energy Required: | **24,551** BTU/Hr. Reheat required |
| Dewpoint Delivered to Space: | **Not Met** Degree F dewpoint |
| Dewpoint Leaving Coil: | **48.0** Degree F dewpoint |

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1800 East Pointe Drive, Columbia, Missouri 65201-3508

**Project: Hilton Hotel**

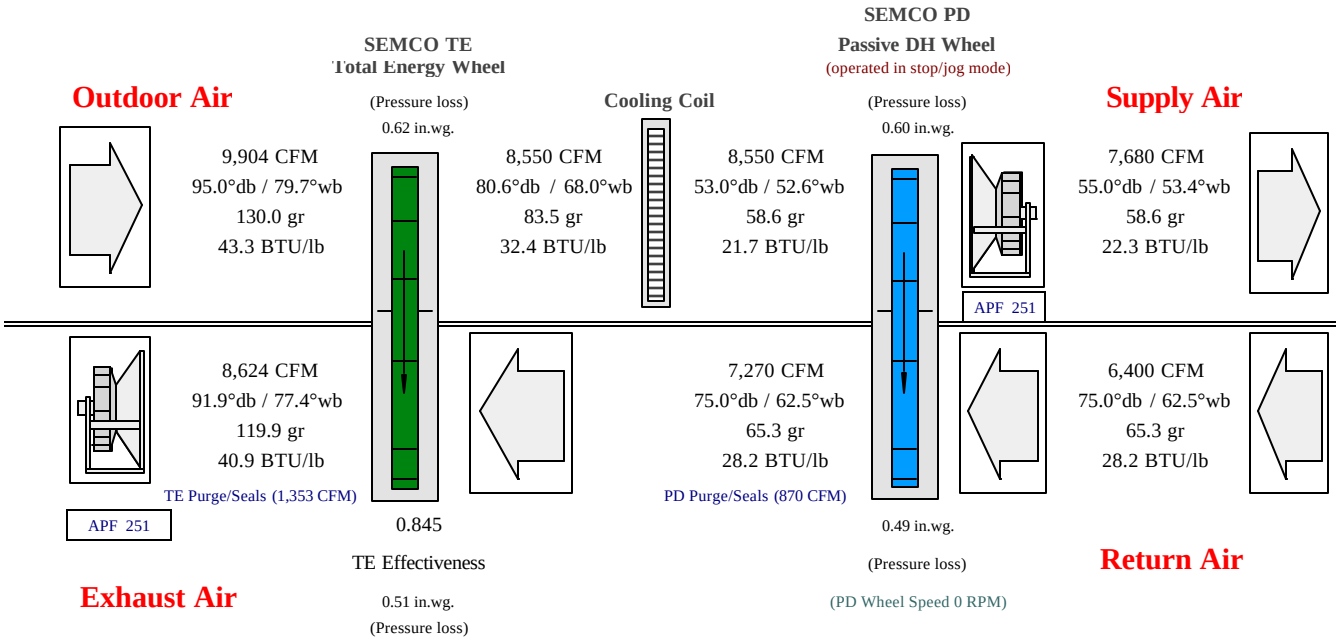
**Location: Baltimore, Md**

**Model: PVS-13**

**Operating Mode:**

**Peak Space Sensible Load**

**Unit #: ERU-1**




| Operating Season: **Cooling** | Operating Mode: **Peak Sensible Load** |
|---|---|
| **SEMCO PVS Performance Analysis:** | |
| Total Cooling Load Delivered: | **60.49** Tons of Total cooling provided |
| Latent Cooling Load Delivered: | **31.08** Tons of Latent cooling provided |
| Cooling Capacity Input Required: | **34.54** Tons of cooling Input required |
| Dewpoint Delivered to Space: | **52.1** Degree F dewpoint |
| Dewpoint Leaving Coil: | **52.1** Degree F dewpoint |
| **Comparison with Conventional Approach:** | |
| Cooling Capacity Required: | **60.49** Tons of cooling Input required |
| Reheat Energy Required: | **N/A** BTU/Hr. Reheat required |
| Dewpoint Delivered to Space: | **52.1** Degree F dewpoint |
| Dewpoint Leaving Coil: | **52.1** Degree F dewpoint |



1800 East Pointe Drive, Columbia, Missouri 65201-3508

## Project: Hilton Hotel

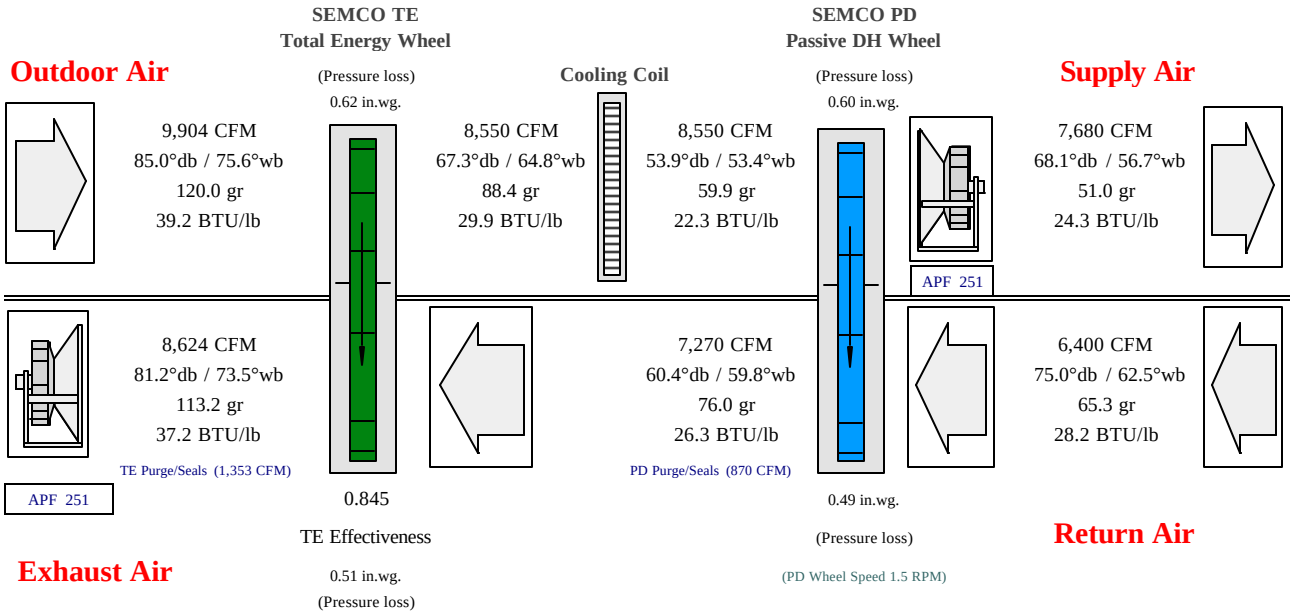
**Location:** Baltimore, Md

**Model:** PVS-13

**Operating Mode:**

**Typical Part Load Condition ***

**Unit #:** ERU-1




| Operating Season: **Cooling** | Operating Mode: **Part Load Condition** |
|---|---|
| **SEMCO PVS Performance Analysis:** | |
| Total Cooling Load Delivered: | **43.08** Tons of Total cooling provided |
| Latent Cooling Load Delivered: | **30.03** Tons of Latent cooling provided |
| Cooling Capacity Input Required: | **24.51** Tons of cooling Input required |
| Dewpoint Delivered to Space: | **48.6** Degree F dewpoint |
| Dewpoint Leaving Coil: | **52.9** Degree F dewpoint |
| **Comparison with Conventional Approach:** | |
| Cooling Capacity Required: | **56.86** Tons of cooling Input required |
| Reheat Energy Required: | **161,389** BTU/Hr. Reheat required |
| Dewpoint Delivered to Space: | **48.6** Degree F dewpoint |
| Dewpoint Leaving Coil: | **48.6** Degree F dewpoint |

| **Part Load Conditions:** | Temperature | Humidity Content |
|---|---|---|
| Outdoor Air | **85°db** | **120.0 Grains** |

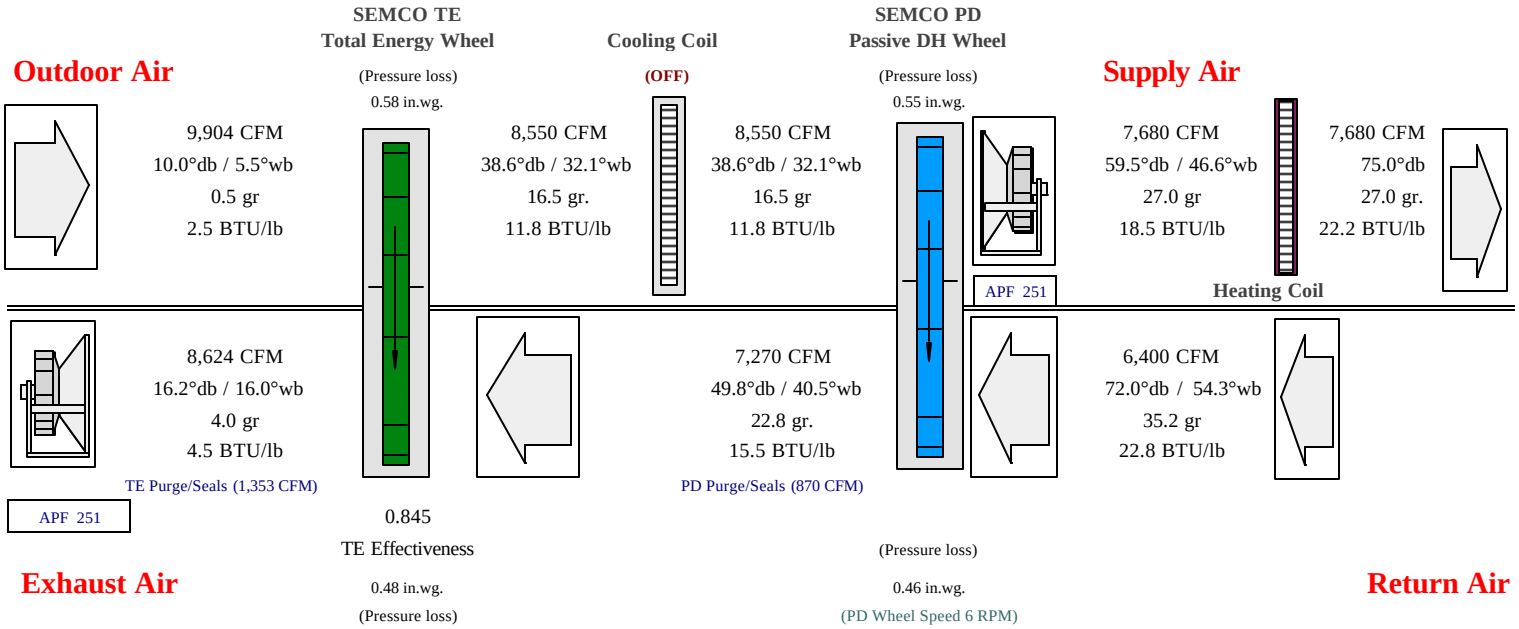
**(Manual Input!)**



1800 East Pointe Drive, Columbia, Missouri 65201-3508

**Project: Hilton Hotel**
**Location: Baltimore, Md**
**Model: PVS-13**

**Operating Mode:**
**Peak Heating Load**
**Unit #: ERU-1**




| Operating Season: **Heating** | Operating Mode: **Peak Heating Load** |
|---|---|
| **SEMCO PVS Performance Analysis:** | |
| Total Heating/Humid. Delivered: | **682,492** BTU/Hr provided |
| Humidification Load Delivered: | **131** Pounds of Humidification/Hr. |
| Heating and/or Humid. Capacity Rqd: | **128,920** BTU/Hr required |
| **Comparison with Conventional Approach:** | |
| Heating/Humid. Capacity Required: | **644,624** BTU/Hr required |

## PD Wheel Analyzer

| PD Wheel Reheat Effectiveness (automatic=1, manual=0) | 0 Mode | Manual Input Value 55 % Max PD Wheel Eff. 36% |
|---|---|---|

Note: Keep in mode 1 for automatic modulation of PD wheel
Use mode 0 for manual override to reheat beyond setpoint



1800 East Pointe Drive, Columbia, Missouri 65201-3508

# Performance Schedule: PVS System

| | | | | |
|---|---|---|---|---|
| **Project:** | Hilton Hotel | | **SEMCO Model:** | PVS-13 |
| **Location:** | Baltimore, Md | | **Supply Fan:** | APF 251 |
| **Unit #:** | ERU-1 | | **Exhaust Fan:** | APF 251 |

## Fan Data

| Airstream | Airflow Quantity (SCFM) | Airflow+Purge/Seal (SCFM) | External Static Pressure (inwg) | Fan Horsepower (Installed) |
|---|---|---|---|---|
| Supply | 7680 | 7680 | 5 | |
| Return | 6400 | 8624 | 5 | |

## Design Data

| | Outdoor Air Design (Cooling) | Return Air Design (Cooling) | Outdoor Air Design (Heating) | Return Air Design (Heating) |
|---|---|---|---|---|
| Temperature (DB) | 95.0 | 75.0 | 10.0 | 72.0 |
| Temperature (WB) | 79.7 | 62.5 | 5.5 | 54.3 |
| Humidity (Gr.) | 130.0 | 65.3 | 0.5 | 35.2 |
| Enthalpy (btu/lb) | 43.3 | 28.4 | 2.5 | 22.8 |

## Delivered Conditions

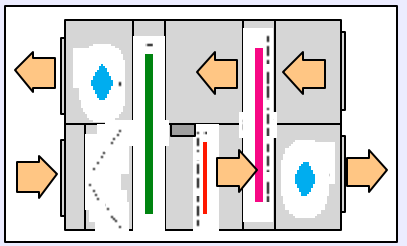
| | TE Energy Wheel (Cooling) | PD DH Wheel (Cooling) | TE Energy Wheel (Heating) | PD DH Wheel (Heating) |
|---|---|---|---|---|
| Temperature (DB) | 74.4 | 62.4 | 25.6 | 61.9 |
| Humidity (Gr.) | 94.7 | 46.0 | 9.2 | 28.3 |
| Enthalpy (btu/lb) | 32.7 | 22.3 | 7.6 | 19.3 |
| Pressure Loss | | | | |
| Supply Side | 0.62 | 0.60 | 0.58 | 0.55 |
| Return Side | 0.51 | 0.49 | 0.48 | 0.46 |
| TE Effectiveness | 0.84 | | 0.84 | |

## Coil Data

| | Cooling Coil (Entering) | Cooling Coil (Leaving) | Heating Coil (Entering) | Heating Coil (Leaving) |
|---|---|---|---|---|
| Temperature (DB) | 74.4 | 53.2 | 61.9 | 75.0 |
| Humidity (Gr.) | 94.7 | 58.9 | 28.3 | 20.0 |
| Enthalpy (btu/lb) | 32.7 | 21.9 | 19.3 | 21.1 |
| Air Pressure Loss | | | | |
| Capacity MBH | 414,435 | | 109,053 | |
| Fluid Temperature | | | | |
| GPM Fluid Flow | | | | |
| Fluid Pressure Loss | | | | |

Version 2002.1

# SEMCO PVS System Modeling Program



## Input Parameters:

Unit #: ERU-2

| | | |
|---|---|---|
| Project Name: | Hilton Hotel | |
| Location: | Baltimore, Md | Choose System from below: |
| PVS Model Selected: | PVS-18 | PVS-18 |

## Airflow Conditions

| | |
|---|---|
| Supply Air (SCFM): | 9,600 |
| Return Air (SCFM): | 8,000 |

## External Static Pressures:

| | |
|---|---|
| Supply Air (inwg): | 5 |
| Return Air (inwg): | 5 |

## ESA Weather Data:

Austin, TX
Baltimore, MD
Billings, MT
Birmingham, AL
Bismarck, ND

## Supply Air Conditions:

| | Cooling Season | Heating Season | Suggestions |
|---|---|---|---|
| Dry Bulb Temp (DegF): | 51.5 | 75.0 | Input minimum grain level required for peak |
| Humidity (Grains): | 46.0 | 20.0 | indoor latent load when sizing cooling capacity |

## Outdoor Air Design Conditions:

| | Cooling Season | Heating Season | Suggestions |
|---|---|---|---|
| Dry Bulb Temp (DegF): | 95.0 | 10.0 | For Accurate Design Data for City Selected: |
| Humidity (Grains): | 130.0 | 0.5 | |

## Space Design Conditions:

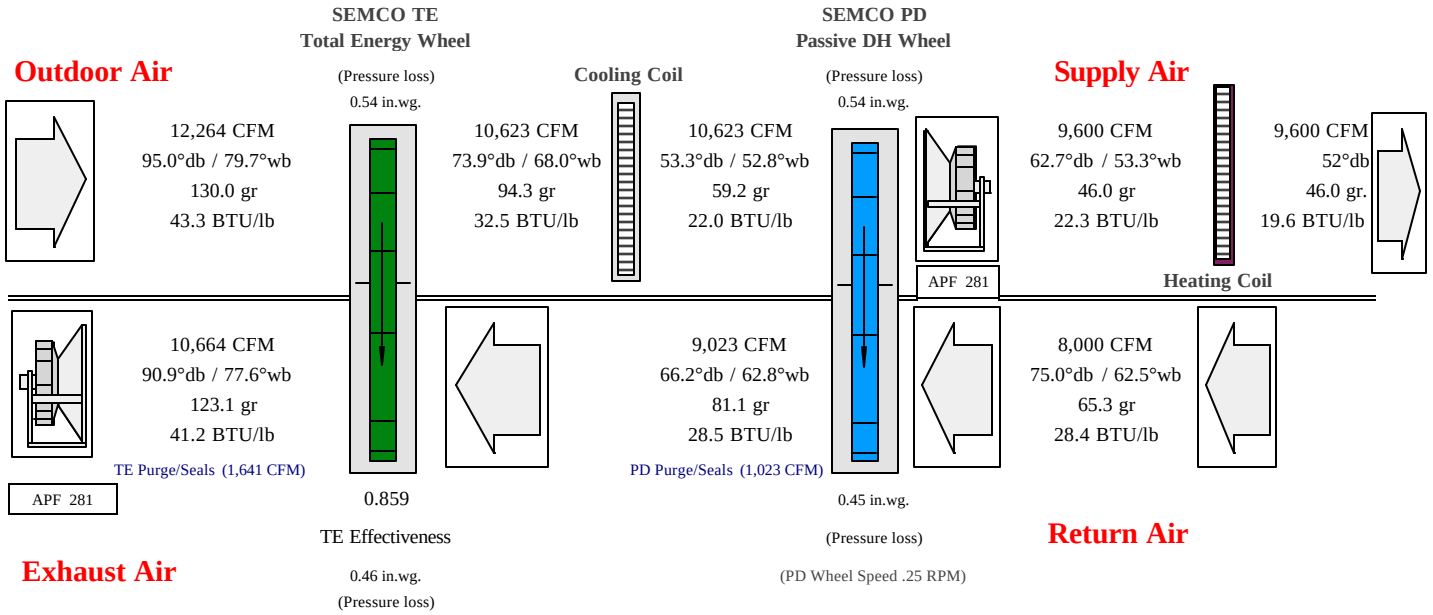
| | Cooling Season | Heating Season | Suggestions |
|---|---|---|---|
| Dry Bulb Temp (DegF): | 75.0 | 72.0 | Input space temperature and relative humidity |
| Humidity Level (%RH): | 50% | 30% | desired. (50% RH maximum recommended for |
| Humidity (Grains): | 65.3 | 35.2 | cooling season design) |

(calculated Value)

SEMCO INCORPORATED

**Project: Hilton Hotel**
**Location: Baltimore, Md**
**Model: PVS-18**

**Operating Mode:**
**Peak Space Latent Load**
**Unit #: ERU-2**




| Operating Season: **Cooling** | Operating Mode: **Peak Latent Load** |
|---|---|
| **SEMCO PVS Performance Analysis:** | |
| Total Cooling Load Delivered: | **75.48** Tons of Total cooling provided |
| Latent Cooling Load Delivered: | **45.70** Tons of Latent cooling provided |
| Cooling Capacity Input Required: | **41.93** Tons of cooling Input required |
| Dewpoint Delivered to Space: | **45.9** Degree F dewpoint |
| Dewpoint Leaving Coil: | **52.3** Degree F dewpoint |
| **Comparison with Conventional Approach:** | |
| Cooling Capacity Required: | **86.84** Tons of cooling Input required |
| Reheat Energy Required: | **30,689** BTU/Hr. Reheat required |
| Dewpoint Delivered to Space: | **Not Met** Degree F dewpoint |
| Dewpoint Leaving Coil: | **48.0** Degree F dewpoint |



1800 East Pointe Drive, Columbia, Missouri 65201-3508

**Project: Hilton Hotel**

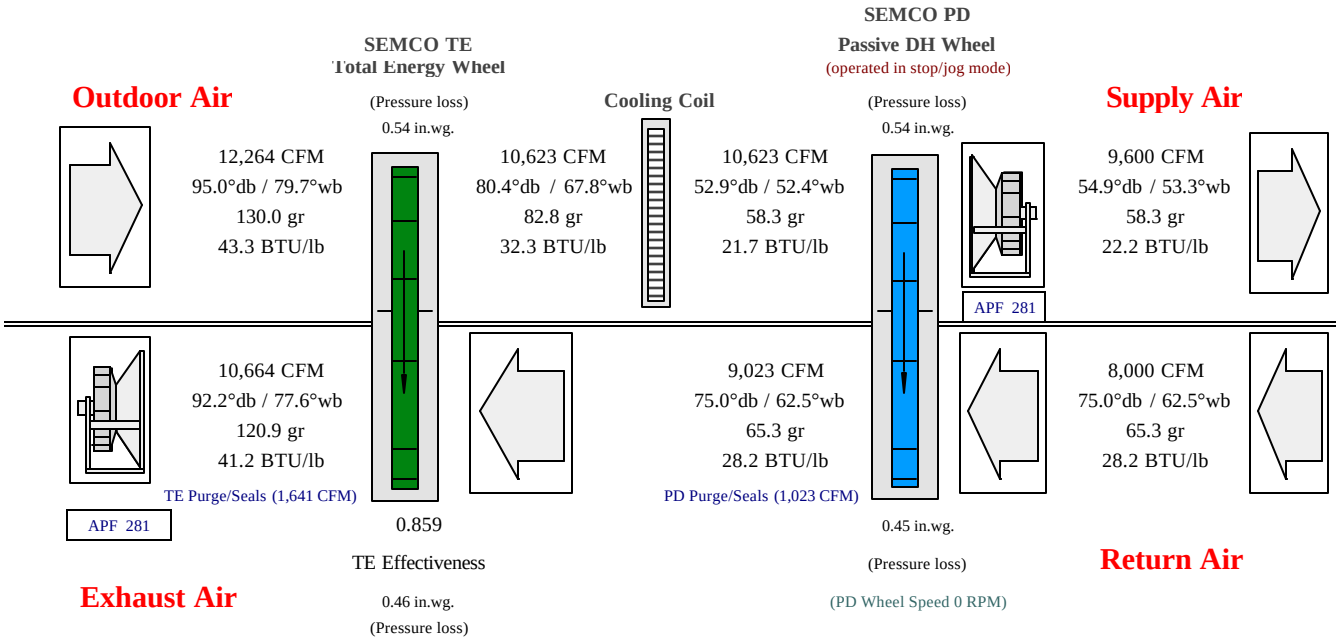
**Location: Baltimore, Md**

**Model: PVS-18**

**Operating Mode:**

**Peak Space Sensible Load**

**Unit #: ERU-2**




| Operating Season: **Cooling** | Operating Mode: **Peak Sensible Load** |
|---|---|
| **SEMCO PVS Performance Analysis:** | |
| Total Cooling Load Delivered: | **75.86** Tons of Total cooling provided |
| Latent Cooling Load Delivered: | **38.99** Tons of Latent cooling provided |
| Cooling Capacity Input Required: | **41.93** Tons of cooling Input required |
| Dewpoint Delivered to Space: | **51.9** Degree F dewpoint |
| Dewpoint Leaving Coil: | **51.9** Degree F dewpoint |
| **Comparison with Conventional Approach:** | |
| Cooling Capacity Required: | **75.86** Tons of cooling Input required |
| Reheat Energy Required: | **N/A** BTU/Hr. Reheat required |
| Dewpoint Delivered to Space: | **51.9** Degree F dewpoint |
| Dewpoint Leaving Coil: | **51.9** Degree F dewpoint |



1800 East Pointe Drive, Columbia, Missouri 65201-3508

# Project: Hilton Hotel

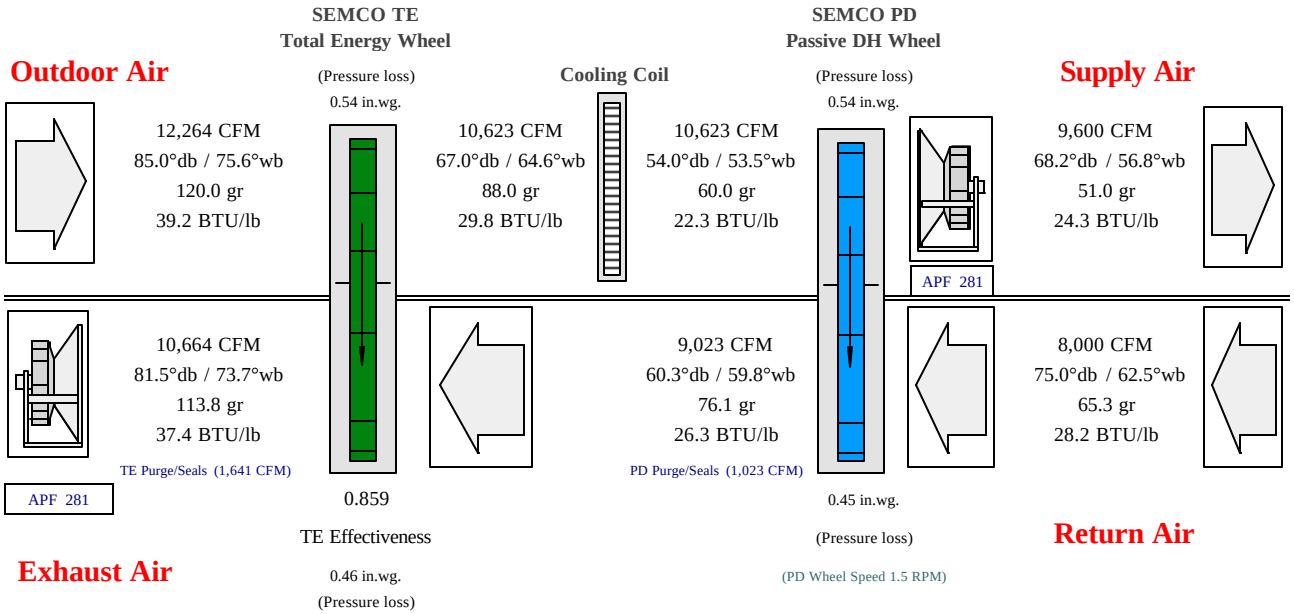
**Location:** Baltimore, Md

**Model:** PVS-18

**Operating Mode:**

**Typical Part Load Condition ***

**Unit #:** ERU-2




| Operating Season: **Cooling** | Operating Mode: **Part Load Condition** |
|---|---|
| **SEMCO PVS Performance Analysis:** | |
| Total Cooling Load Delivered: | **53.70** Tons of Total cooling provided |
| Latent Cooling Load Delivered: | **37.54** Tons of Latent cooling provided |
| Cooling Capacity Input Required: | **29.68** Tons of cooling Input required |
| Dewpoint Delivered to Space: | **48.6** Degree F dewpoint |
| Dewpoint Leaving Coil: | **53.0** Degree F dewpoint |
| **Comparison with Conventional Approach:** | |
| Cooling Capacity Required: | **71.07** Tons of cooling Input required |
| Reheat Energy Required: | **203,458** BTU/Hr. Reheat required |
| Dewpoint Delivered to Space: | **48.6** Degree F dewpoint |
| Dewpoint Leaving Coil: | **48.6** Degree F dewpoint |

| **Part Load Conditions:** | Temperature | Humidity Content |
|---|---|---|
| Outdoor Air | **85°db** | **120.0 Grains** |

**(Manual Input!)**

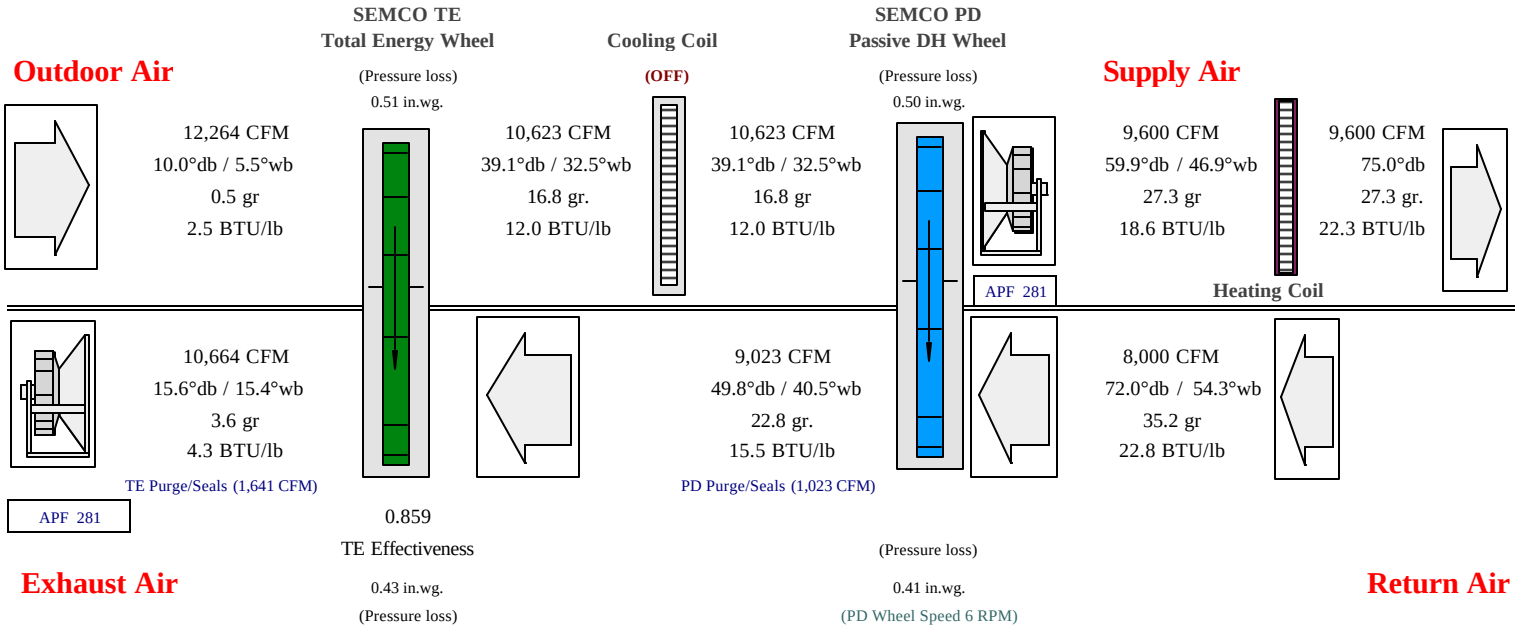
SEMCO INCORPORATED



1800 East Pointe Drive, Columbia, Missouri 65201-3508

**Project: Hilton Hotel**
**Location: Baltimore, Md**
**Model: PVS-18**

**Operating Mode:**
**Peak Heating Load**
**Unit #: ERU-2**




| Operating Season: **Heating** | Operating Mode: **Peak Heating Load** |
|---|---|
| **SEMCO PVS Performance Analysis:** | |
| Total Heating/Humid. Delivered: | **854,848** BTU/Hr provided |
| Humidification Load Delivered: | **165** Pounds of Humidification/Hr. |
| Heating and/or Humid. Capacity Rqd: | **156,481** BTU/Hr required |
| **Comparison with Conventional Approach:** | |
| Heating/Humid. Capacity Required: | **805,780** BTU/Hr required |

## PD Wheel Analyzer

| PD Wheel Reheat Effectiveness (automatic=1, manual=0) | 0 Mode | Manual Input Value 55 % Max PD Wheel Eff. 36% |
|---|---|---|

Note: Keep in mode 1 for automatic modulation of PD wheel
Use mode 0 for manual override to reheat beyond setpoint



1800 East Pointe Drive, Columbia, Missouri 65201-3508

# Performance Schedule: PVS System

| | | | | |
|---|---|---|---|---|
| **Project:** | Hilton Hotel | | **SEMCO Model:** | PVS-18 |
| **Location:** | Baltimore, Md | | **Supply Fan:** | APF 281 |
| **Unit #:** | ERU-2 | | **Exhaust Fan:** | APF 281 |

## Fan Data

| Airstream | Airflow Quantity (SCFM) | Airflow+Purge/Seal (SCFM) | External Static Pressure (inwg) | Fan Horsepower (Installed) |
|---|---|---|---|---|
| Supply | 9600 | 9600 | 5 | |
| Return | 8000 | 10664 | 5 | |

## Design Data

| | Outdoor Air Design (Cooling) | Return Air Design (Cooling) | Outdoor Air Design (Heating) | Return Air Design (Heating) |
|---|---|---|---|---|
| Temperature (DB) | 95.0 | 75.0 | 10.0 | 72.0 |
| Temperature (WB) | 79.7 | 62.5 | 5.5 | 54.3 |
| Humidity (Gr.) | 130.0 | 65.3 | 0.5 | 35.2 |
| Enthalpy (btu/lb) | 43.3 | 28.4 | 2.5 | 22.8 |

## Delivered Conditions

| | TE Energy Wheel (Cooling) | PD DH Wheel (Cooling) | TE Energy Wheel (Heating) | PD DH Wheel (Heating) |
|---|---|---|---|---|
| Temperature (DB) | 73.9 | 62.7 | 39.1 | 59.9 |
| Humidity (Gr.) | 94.3 | 46.0 | 16.8 | 27.3 |
| Enthalpy (btu/lb) | 32.5 | 22.3 | 12.0 | 18.6 |
| Pressure Loss | | | | |
| Supply Side | 0.54 | 0.54 | 0.51 | 0.50 |
| Return Side | 0.46 | 0.45 | 0.43 | 0.41 |
| TE Effectiveness | 0.86 | | 0.86 | |

## Coil Data

| | Cooling Coil (Entering) | Cooling Coil (Leaving) | Heating Coil (Entering) | Heating Coil (Leaving) |
|---|---|---|---|---|
| Temperature (DB) | 73.9 | 53.3 | 59.9 | 75.0 |
| Humidity (Gr.) | 94.3 | 59.2 | 27.3 | 20.0 |
| Enthalpy (btu/lb) | 32.5 | 22.0 | 18.6 | 21.1 |
| Air Pressure Loss | | | | |
| Capacity MBH | 503,182 | | 156,481 | |
| Fluid Temperature | | | | |
| GPM Fluid Flow | | | | |
| Fluid Pressure Loss | | | | |