



HOURLY ANALYSIS PROGRAM 6.00 NEW FEATURES GUIDE

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Overview

This New Features Guide summarizes enhancements in HAP v6.0.

HAP v6 is a major update to the HAP family of software. It provides:

- Enhanced productivity for building modeling and analysis
 - New graphical input scheme for building floor plans.
 - Automatic generation of spaces, surface areas and orientations.
 - Grid format input of space data with spreadsheet-like features.
 - Radically streamlines take-off phase of work for model creation.
- Enhanced accuracy for building modeling and analysis.
 - Introduction of Heat Balance load calculation methodology.
 - More detailed representation of building physics.
 - Greater accuracy across a wider range of applications.
 - Use of US DOE EnergyPlus™ engine for load and air-side calculations.
- Many other feature updates and adjustments.

In addition to this New Features Guide, further information on these new features can be found in HAP documentation and at www.carrier.com/hap

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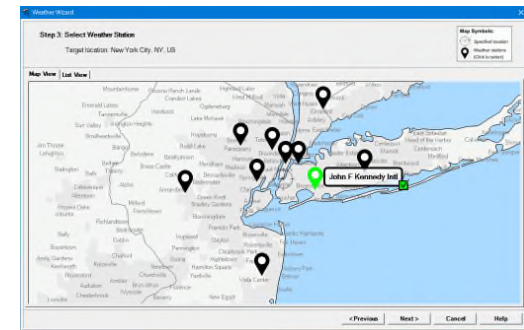
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Main Project Data

Weather Data

- New design weather data for 7,400 stations worldwide, from ASHRAE Handbook – Fundamentals
- Updated simulation weather data over 7000 stations worldwide.
- New Graphical method of choosing site for weather data.
- Automatic loading of paired design and simulation weather data
 - ▶ No longer need to select simulation weather separately.
- Ability to independently choose design level for comfort cooling (0.4%, 1%, 2%) or dehumidification design (0.4%, 1%, 2%), and heating (99.6%, 99%).
- Updated clear sky solar calculation from latest ASHRAE Handbook – Fundamentals
- Updated Solar tab to show Maximum Solar Fluxes instead of Maximum Solar Heat Gains
- Added input for site CO2 concentration (moved from air systems)
- Minor revisions to design weather reports.
- Removed of Atmospheric Clearness Number (obsolete).



New Graphical Method for Choosing Weather Station

Weather Station

Step 3. Select Weather Station

Target location: New York City, NY, US

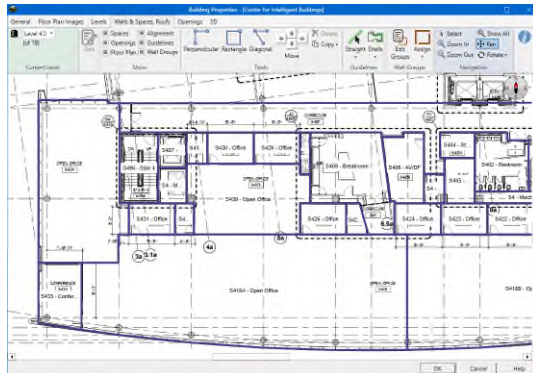
Map View List View

Weather Station	Distance (mi)	Summer WB (F)	Summer WB (F)	Winter WB (F)	Elevation (ft)	Climate Zone	Latitude (N)	Longitude (W)
New York Central Park, NY, USA	4.3	81.0	72.7	53.5	102	4A - Mixed-Humid	40° 78'	-73° 57'
LaGuardia, NY, NY, USA	8.0	80.1	72.9	56.3	11	4A - Mixed-Humid	40° 49'	-73° 55'
Staten Island, NY, NY, USA	9.5	80.3	76.4	52.9	29	4A - Mixed-Humid	40° 32'	-74° 17'
Brooklyn, NY, NY, USA	10.6	80.8	76.8	52.8	10	4A - Mixed-Humid	40° 33'	-73° 59'
Long Beach, NY, NY, USA	11.1	81.1	77.5	51.5	118	4A - Mixed-Humid	40° 59'	-73° 51'
Union County, NY, NY, USA	11.5	80.9	75.9	51.5	109	4A - Mixed-Humid	40° 59'	-73° 51'
Westchester County, NY, NY, USA	20.9	80.6	75.4	52	375	5A - Cold-Humid	41° 07'	-73° 71'
Rockland, NY, NY, USA	22.9	80.9	73.9	52.4	41	4A - Mixed-Humid	40° 71'	-73° 42'
Saratoga, NY, NY, USA	23.9	81.1	76.3	51.6	105	4A - Mixed-Humid	40° 52'	-73° 17'
Westwood, NJ, NY, USA	27.9	81.5	75.9	51.6	109	4A - Mixed-Humid	40° 13'	-76° 13'

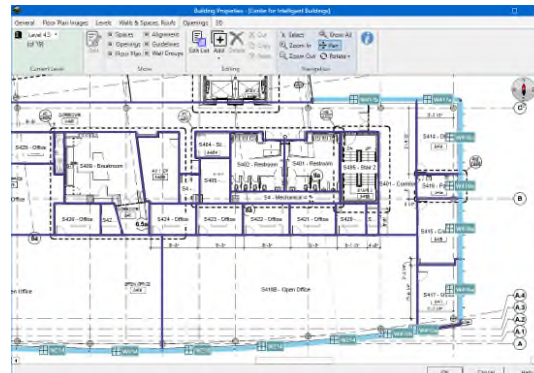
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Building Floor Plans

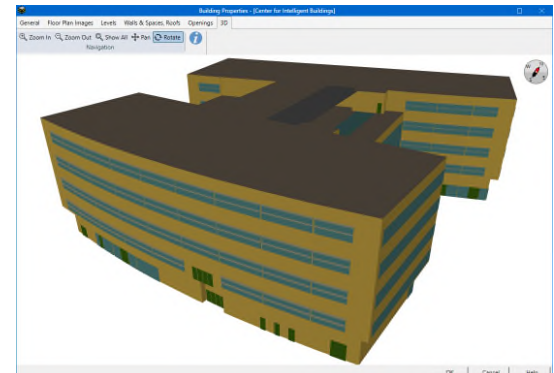
- New graphical method for inputting building floor plan (spaces) data:
 - Sketch over floor plans to automatically create spaces, surface areas, orientations.
 - Ability to graphically place windows and doors in envelope.
 - Ability to configure flat, shed, gabled, or hipped roofs.
 - Ability to create attics and ceiling spaces
- 3D rendering of building envelope for visualization and checking.
- Ability to identify sections of wall, roof, ceiling, floor surfaces that have unique assembly constructions.
- Ability to group window, door, skylight openings that have unique assembly construction and performance.



Sketch over floor plans to automatically create spaces.



Graphically place windows in envelope.

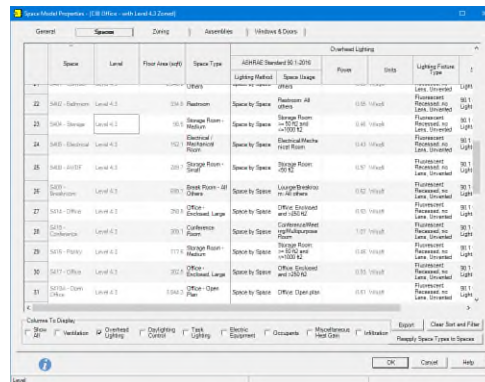


Render building in 3D for visualization and checking.

Space Models

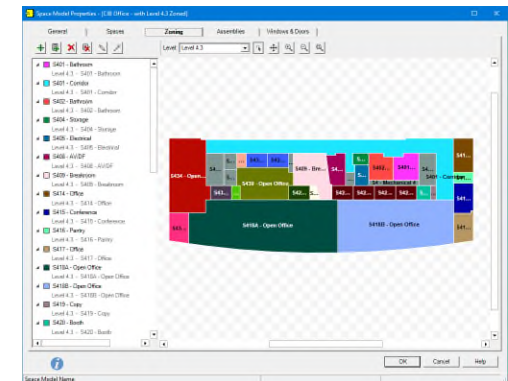
- New concept:
 - ▶ Space Model = Collection of spaces in one building representing one design scenario.
- New grid-style input method of entering space data:
 - ▶ Space data side by side for rapid input and checking
 - ▶ “Space Type” feature for defining common characteristics and rapid defaulting.
 - ▶ Sort and filter space data to group similar spaces for quick data entry and checking.
 - ▶ Copy and paste data from space to space for rapid data entry
 - ▶ Ability to export data to spreadsheet for checking.
 - ▶ Ability to paste data from external sources (such as a spreadsheet) into spaces grid
 - ▶ Default ventilation requirements per ASHRAE Standard 62.1
 - ▶ Default lighting power density per ASHRAE Standard 90.1.
- Ability to rapidly group spaces into thermal zones using a visual floor-plan-based graphical approach.

New grid-style method of entering space data.



Space	Level	Floor Area (sqft)	Space Type	Lighting Method	Power	Units	Lighting Fixture
22	Level 4.5	134.0	Room - All Office	ASHRAE Standard 90.1-2010	0.00	Watt/sqft	Lighting Fixture
23	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture
24	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture
25	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture
26	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture
27	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture
28	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture
29	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture
30	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture
31	Level 4.5	100.0	Storage Room	ASHRAE Standard 90.1-2010	0.40	Watt/sqft	Lighting Fixture

Ability to rapidly group spaces into HVAC zones using floor plan based graphical approach.



Space Models (continued)

- Wall, roof, floor, ceiling assemblies applied to surface groups defined in the Building
 - ▶ Reduces input effort for associating assemblies with spaces.
 - ▶ No longer need to define assemblies space by space, exposure by exposure.
 - ▶ Automatically associates assemblies with spaces based on adjacent surfaces.
- Window, door, skylight assemblies applied to groups of openings defined in the Building
 - ▶ Reduces input effort for associating assemblies with spaces
 - ▶ No longer need to define assemblies space by space, exposure by exposure
 - ▶ Automatically associates assemblies with spaces based on adjacent openings.
- Added modeling features for daylighting controls
 - ▶ Daylight harvesting from side lighting, clerestory windows, skylights
 - ▶ Continuous and stepped dimming controls
- Ability to model both conditioned and unconditioned spaces:
 - ▶ Heat transfer to and from unconditioned spaces automatically calculated
 - ▶ Includes ceiling spaces, plenums, attics, and unconditioned rooms.
 - ▶ Removed the “Partition adjacent to unconditioned spaces” feature. (obsolete).

Air Systems

Rooftop Units, DX AHUs

- Added refrigeration system options and part-load performance models:
 - ▶ 2-stage compression, single circuit
 - ▶ 3-stage compression, tandem compressors, single circuit
 - ▶ 3-stage compression, 3 compressors
 - ▶ 4-stage, 5-stage, 6-stage, 8-stage compression
- Updated existing part-load performance models
- Integrated head pressure control into performance models.
- Added 3-speed supply fan control.



Added new refrigeration system options and part-load models for rooftop equipment.

VAV

- Added “VAV/RH Single Maximum” and “VAV/RH Dual Maximum” as terminal type options

Chilled Water AHUs

- Added sizing inputs for chilled water and hot water supply temperature to coils.

Air Systems (continued)

VRF

- Updated part load performance models for variable speed scroll and variable speed rotary equipment
- Added hot water and electric heating options for primary heat and auxiliary heat.
- Expanded estimated maximum load information.
- Removed Digital Scroll VRF option. Obsolete equipment type.

WSHP, GSHP, GWSHP Systems

- Updated existing part-load performance models.
- Added new 2-stage compression option and part-load performance model.
- Added variable flow / variable speed pumping control with 2-position control valves for WSHP terminals.

Hydronic Fan Coils

- Added 2-speed, 3-speed supply fan control options.
- Added sizing inputs for chilled water and hot water supply temperature to coils.



Updated part-load performance models for VRF equipment.

Air Systems (continued)

DOAS

- Added option to deliver DOAS supply air directly to space rather than to inlet of terminal HVAC unit.
- Expanded DOAS equipment types paired with terminal types:
 - ▶ Added chilled water and hot water options for DOAS used with VRF, WSHP, GSHP, GWSHP, DX FCU terminals.
 - ▶ Added air-cooled DX cooling, and electric or combustion heat for DOAS used with hydronic FCUs, Chilled Beam, Induction Beam, 4-Pipe Induction.

4-Pipe Induction System

- Moved 4-Pipe Induction system to Terminal Units classification.
- Upgraded system configuration and component features.

Air Systems (continued)

General

- Removed the limit of 100 zones per air system. Air systems may serve an unlimited number of zones now.
- Streamlined procedure for assigning zones to systems.
 - Zones are graphically configured in the Space Model; you simply link zones to the system now.
- Restored modeling of separate dehumidification reheat coil. No longer combined in single coil with space heating duty.
- Added hot gas dehumidification reheat option.
- Modified defaulting behavior so zone selections and thermostat inputs are always preserved when changing system types.
- Modified defaulting behavior so all applicable system inputs preserved when changing between certain pairs of similar system types (e.g., 2-pipe fan coil to 4-pipe fan coil, WSHP to GSHP, etc..)
- Changed “Ventilation Reclaim” captions to “Air-to-Air Energy Recovery” and “Energy Recovery”
- Re-ordered items on System Components tab so that Dehumidification and Humidification are below Supply Fan and before Supply Duct.

Air Systems (continued)

Removals – The following features were removed:

- CAV/RH as option for CAV Single Zone systems. Use CAV/RH system type instead.
- “2-speed cooling, 2-speed heating” supply fan control. Not used.
- “Variable Speed Drive (“Modudrive”) supply fan option. Obsolete.
- “Controlled Pitch Axial” supply fan option. Obsolete.
- Legacy system types: Dual Duct CAV, 2-Deck Multizone, 3-Deck Multizone, 1-Fan Dual Duct VAV, 2-Fan Dual Duct VAV. Dual Duct VAV systems to be restored in a later version.
- VVT system option with CHW AHUs and Vertical Packaged Unit equipment types.
- For VVT, removed preheat coil option for rooftop units. Not used.
- For VVT, removed “changeover time” and “% bypass” inputs.
- “Outdoor CO2” input. It was moved to Weather data.
- “Minimum Ventilation” input. Not used.
- Precool coil option for RTUs, Vertical Packaged Units, Split DX AHUs. Not used.
- Humidification options for “direct steam injection”, “heated pan HX – steam”, “heated pan HX – hot water”.
- “% wall load to plenum” and “% roof load to plenum”. Exact heat flow to and from ceiling spaces, attics, and plenums is now automatically calculated by program.
- “Duct Heat Gain” inputs.
- “Direct Exhaust” airflow input. It was moved to Space Model.
- Zone heating unit options for “Baseboard – OAT Control” and “Fan Coil – OAT Control”.

Plants

- Minor changes in HAP v6

Alternatives

- New terminology:
 - ▶ “Alternative” collects all the plants, systems, space model for a single design scenario.
 - ▶ In HAP v5.1 this was referred to as “Building”
 - ▶ Input features similar to HAP v5.1

Calculations and Reports

- Updated load calculations to use Heat Balance Method, as documented in latest ASHRAE Handbook – Fundamentals
- Updated DX equipment part-load performance models.
- Added ability to automatically model self-shading of building
 - ▶ Example: shading of one wing by another wing
 - ▶ Accounts for shading of opaque surfaces (walls, roofs) as well as fenestration.
- Ability to automatically calculate heat flow and air temperature for unconditioned spaces.
 - ▶ Includes ceiling spaces, attics, unconditioned spaces.
- All calculation reports selected from the Alternative level now.
 - ▶ Simultaneous selection of Alternative, Plant, and System reports in one batch.
- Preserved the familiar system design report formats.
- Added Heat Balance Summary reports.
- Added Unconditioned Space Peak Temperatures report
- Preserved the familiar system, plant and alternative simulation reports.
- Disabled the option for LEED reports. Will be added back in a subsequent release.

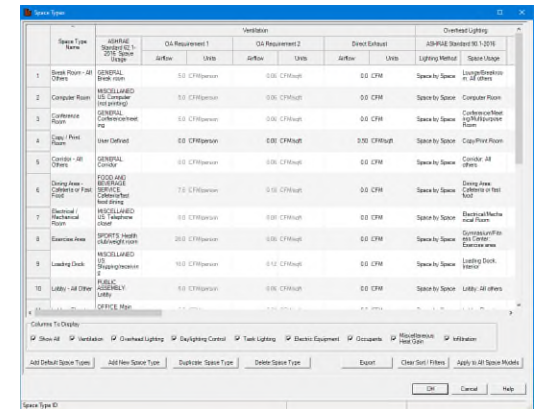
Libraries

Space Types

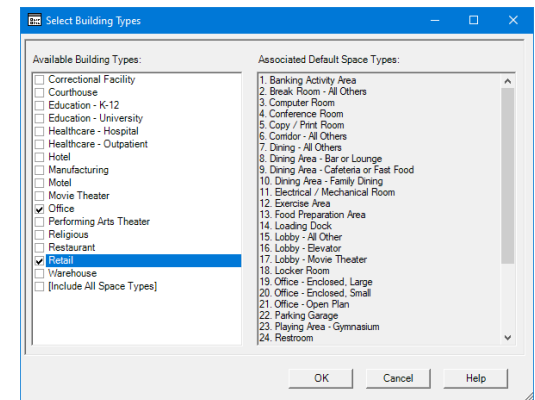
- New library entity for defining space information by space type.
- Ability to generate default spaces types based on building type(s)
- Later used in Space Model inputs to rapidly default data for projects.

Schedules

- Ability to default schedules using ASHRAE 90.1 Default Schedules
 - ▶ ASHRAE schedules default when default space types are generated.
 - ▶ Previously data supplied in separate “template” projects that could be imported.



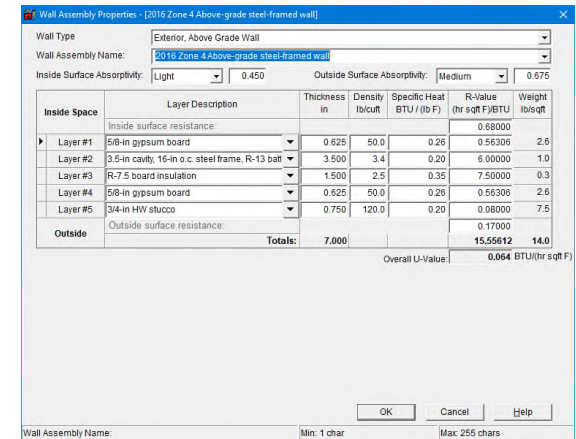
Define space default information by 'space type'.



Generate space types by building type(s).

Opaque Assemblies

- Added ability to define layer by layer constructions for:
 - ▶ Exterior, below grade walls
 - ▶ Interior walls
 - ▶ Slab on grade floors
 - ▶ Slab below grade floors
 - ▶ Floor above conditioned or unconditioned space.
 - ▶ Floor above outdoor air
 - ▶ Ceilings
- Ability to default wall, roof, floor data compliant with ASHRAE 90.1 prescriptive requirements
 - ▶ Previously data was supplied in separate “template” projects that could be imported.
 - ▶ Data is now defaulted based on your selection of default space types.
- Updated material layer defaults
 - ▶ Updated data based on latest ASHRAE Handbook – Fundamentals.
 - ▶ Significantly increased the quantity and dtype of default material layers.



Layer	Layer Description	Thickness in	Density lb/cu ft	Specific Heat BTU / (lb F)	R-Value (hr sqft F)/BTU	Weight lb/sqft
Inside Space						
Inside surface resistance: 0.68000						
Layer #1	5/8-in gypsum board	0.625	50.0	0.25	0.56306	2.6
Layer #2	3.5-in cavity, 16-in o.c. steel frame, R-13 batt	3.500	3.4	0.20	6.00000	1.0
Layer #3	R-7.5 board insulation	1.500	2.5	0.35	7.50000	0.3
Layer #4	5/8-in gypsum board	0.625	50.0	0.25	0.56306	2.6
Layer #5	3/4-in HW stucco	0.750	120.0	0.20	0.08000	7.5
Outside						
Outside surface resistance: 0.17000						
Totals:		7.000			15.55612	14.0
Overall U-Value:						0.064 BTU/(hr sqft F)

Default assemblies compliant with ASHRAE 90.1 prescriptive requirements.

Window Assemblies

- Ability to default window performance data from common window types.
- Ability to default window performance data compliant with ASHRAE 90.1 prescriptive requirements
 - ▶ Previously data was supplied in separate “template” projects that could be imported.
 - ▶ It is now integral with the program.
- Replaced Shade Coefficient input with SHGC (Solar Heat Gain Coefficient)
- Added input for VT (Visible Light Transmittance)
- For Detailed window assembly input:
 - ▶ Ability to directly input glazing optical and thermal properties.
- For Simple window assembly input:
 - ▶ Ability to specify interior shading (blinds, drapes, shades)

Window Properties - [2016 Zone 4 Metal framing, fixed]

Input Method: ☒ Simple ☐ Detailed

Name: 2016 Zone 4 Metal framing, fixed

Window Performance:

Overall U-Value:	0.380 BTU/(hr sqft F)
Overall SHGC:	0.360
Overall VT:	0.396

Internal Shade:

Type: Venetian Blinds - Light

OK Cancel Help

Window Name Min: 1 char Max: 255 chars

Default window assemblies compliant with ASHRAE 90.1 prescriptive requirements.

Door Assemblies

- Ability to default door performance data compliant with ASHRAE 90.1 prescriptive requirements
 - ▶ Previously data was supplied in separate “template” projects that could be imported.
 - ▶ It is now integral with the program.
- Added features to make it faster to enter opaque, glass, and opaque with lites types of doors.
- For glass doors:
 - ▶ Replaced Shade Coefficient input with SHGC (Solar Heat Gain Coefficient).
 - ▶ Added input for VT (Visible Light Transmittance).

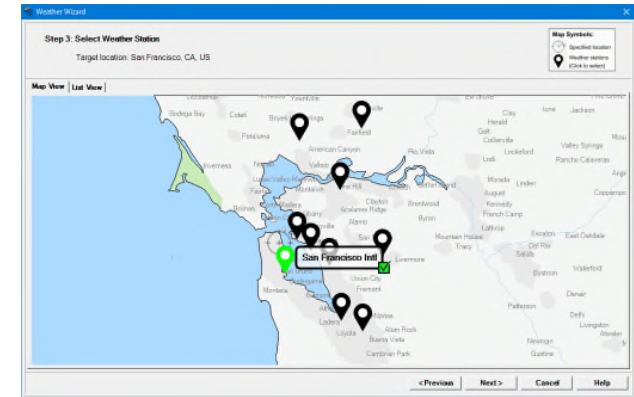
Other

- Changed the category name from “Cooling Towers” to “Heat Rejection”.

Wizards

Weather Wizard

- Revised the user interface to use a new graphical scheme for selecting weather station.
 - ▶ New scheme only requires you begin to type your building site name.
 - ▶ Uses auto-complete to show a list of all sites of similar names.
 - ▶ Map graphic then shows the 10 closest weather stations for selection.



Visual selection of weather station from 10 closest stations to your building site.

Building Wizard

- Updated to include latest libraries of wall, roof, window assemblies
- Automatically generates "building" with 2D floor plans and 3D geometry data
- Automatically generates "space model" with space data defaulted, zoning, assembly and fenestration assignments.

Equipment Wizard

Rooftop Units, DX AHUs

- Added refrigeration system options and part-load performance models:
 - ▶ 2-stage compression, single circuit
 - ▶ 3-stage compression, tandem compressors, single circuit
 - ▶ 3-stage compression, 3 compressors
 - ▶ 4-stage, 5-stage, 6-stage, 8-stage compression
- Added 3-speed supply fan control.

VAV

- Defaults to “VAV/RH Dual Maximum” as terminal type

VRF

- Removed Digital Scroll VRF option. Obsolete equipment type.

WSHP, GSHP, GWSHP Systems

- Added new 2-stage compression option and part-load performance model.

Hydronic Fan Coils

- Added 2-speed, 3-speed supply fan control options.

Equipment Wizard (continued)

DOAS

- Expanded DOAS equipment types paired with terminal types:
 - ▶ Added chilled water and hot water options for DOAS used with VRF, WSHP, GSHP, GWSHP, DX FCU terminals.
 - ▶ Added air-cooled DX cooling, and electric or combustion heat for DOAS used with hydronic FCUs, Chilled Beam, Induction Beam, 4-Pipe Induction.

General

- Removed the limit of 100 zones per air system. Air systems may serve an unlimited number of zones now.
- Changed “Ventilation Reclaim” captions to “Air-to-Air Energy Recovery” and “Energy Recovery”

Utility Rate Wizard

- Updated Energy Information Administration (EIA) default electricity and gas prices for the United States.

Other Features

Project Data Management

- Introduced new project data management scheme.
- All projects are a single, portable .HAP file.
- Project files can be managed like other common document or spreadsheet files.
 - ▶ Save the file wherever you like.
 - ▶ Move the file whenever you like.
- No more requirement that the project be a folder of multiple files that must stay in the same location.
- Project Menu options simplified
 - ▶ The only needed options are New, Open, Save, Delete
 - ▶ Archive, Retrieve, Convert options eliminated.
- Conversion of HAP v5.11 project data. Converts only library categories of data.
 - ▶ Allows you to continue use of custom libraries you've built for prior projects.

Program Installation

- Simpler, streamlined installation to ProgramFiles(x86) folder.
- Ability to run silent installations. Useful for large scale deployment by company IT departments. Refer to new *eDesign Advanced Installation Guide* for details.

QUESTIONS?

Please contact Carrier Software Systems at

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Thank you!