HOURLY ANALYSIS PROGRAM v6.3
NEW FEATURES GUIDE

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Syracuse, New York

Rev. September, 2025

Overview

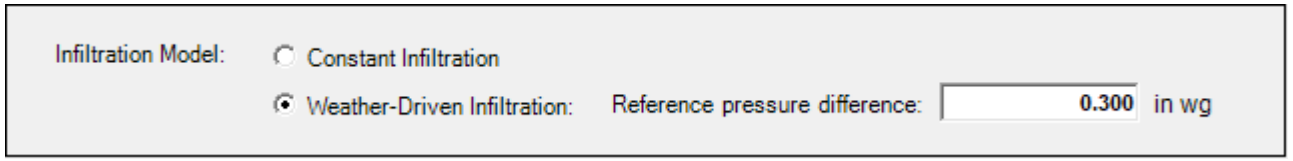
This New Features Guide summarizes enhancements in HAP v6.3 which include:

1. **Building Modeling**
    - Added features for modeling weather-driven infiltration in buildings.
2. **Equipment Modeling**
    - Added features for modeling air-to water (A2W) heat pumps in cascade with WSHP loop systems.
3. **Installation**
    - Added features for remotely deploying license keys to employees' computers to support IT departments in larger engineering firms. Also improved support for computers using ARM chips.
4. **Other Enhancements and Problem Fixes**
    - Made other enhancements involving air systems, utility prices, space models, and weather modeling.
    - Corrected problems identified in HAP v6.2

Contents

Weather Driven Infiltration

Added features for modeling weather-driven infiltration. The General tab for Space Models now contains inputs to declare if the space model will use weather-driven infiltration or constant (fixed) infiltration.



1. Weather-driven infiltration models infiltration airflow changing hour by hour based on wind speed, outdoor-indoor air dry-bulb temperature difference, and HVAC system operation.

2. Constant infiltration uses the infiltration rates specified on the Spaces tab for all infiltration hours.

When weather-driven infiltration is selected, you must also specify the reference indoor-outdoor pressure difference for infiltration rates. This pressure difference is determined by rating conventions (for example 75 Pa or 0.30 in wg) or blower door testing for existing buildings. The infiltration rates specified on the Spaces tab are associated with this reference pressure difference. During design load and energy modeling calculations, the operating pressure difference will be determined based on wind speed and outdoor-indoor temperature difference, and the infiltration rate will be adjusted for those operating conditions. The option to specify whether infiltration only occurs during unoccupied (fan off) hours is still offered. This aids modeling applications where the building is pressurized during fan-on hours so no infiltration occurs, but is not pressurized during fan-off hours so that infiltration occurs during those hours.

Further information on these inputs is found in program Help in sections 11.2 and 11.3. Weather driven infiltration calculation procedures are described in Help section 31.3. Help can be displayed by pressing F1 or pressing the Help button on the main window tool bar.

A2W Heat Pumps in Cascade with WSHP Loops

Added features for modeling a WSHP Loop system in which the cooling tower and auxiliary boiler are replaced with air-to-water (A2W) heat pumps. Figure 1 below shows a conventional WSHP Loop system in which a cooling tower rejects excess loop heat and an auxiliary boiler serves as the heat adder. Figure 2 shows a cascade system in which A2W heat pumps replace the tower and boiler.

In a cascade system, when the water loop has excess heat, the A2W heat pumps operate in cooling mode to cool the water and reject heat to the atmosphere. When the water loop has a heat deficit, the A2W heat pumps operate in heating mode to heat the water, extracting heat from ambient air. This cascade scheme supports decarbonization objectives in certain WSHP Loop applications.

For air systems the Equipment Tab, Miscellaneous Components input screen provides a new option to specify whether the WSHP Loop uses a cooling tower and auxiliary boiler, or uses A2W heat pumps for heat addition and rejection. When the A2W heat pump option is selected, the WSHP Loop air system must be linked to a changeover plant which contains the A2W heat pump units serving the loop heat rejection and addition load profiles. Multiple A2W heat pumps in parallel can be configured for this changeover plant.

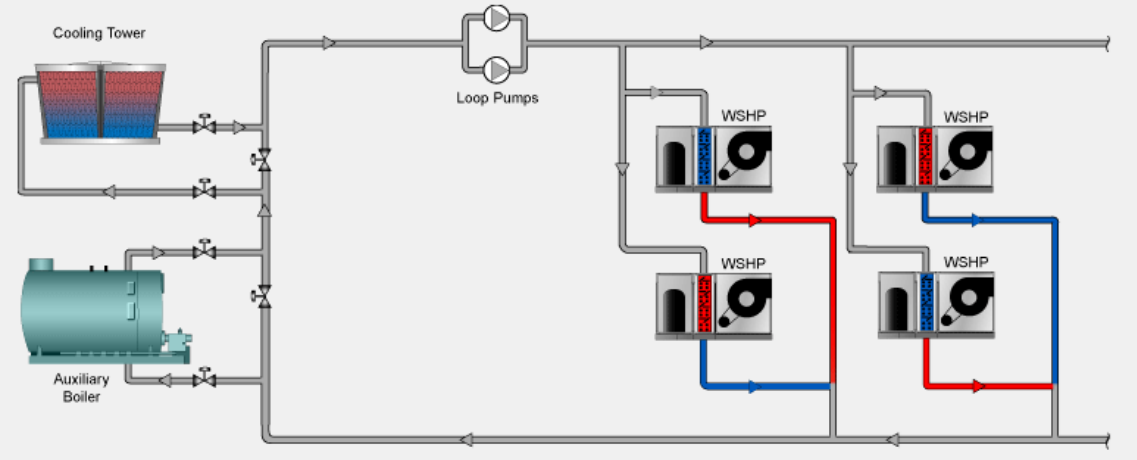


Figure 1. Conventional WSHP Loop System with Aux Boiler and Cooling Tower

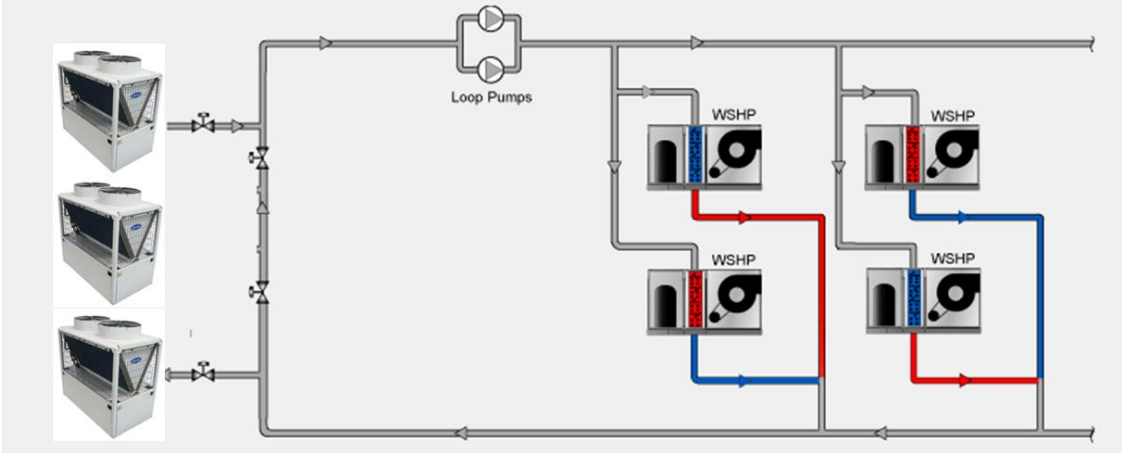


Figure 2. WSHP Loop System with A2W Heat Pumps as Heat Adder/Rejector

New Installation Features

Automated License Key Deployment. Added features to allow IT departments to automate deployment of license keys to employees' computers. Procedures for doing this are found in the July 2025 revision of the *Advanced Installation Guide*, available for download from the www.carrier.com/commercial web site on the eDesign software download page.

HAP v6 software requires a valid license key to activate the software. For a new license, the license key is entered on first startup after the software is installed. When the software license is annually renewed a new license key must be entered to extend operation of the software. Normally this license key is manually entered by each user on their computer. In large companies, IT departments sometimes wish to automate this process to quickly deploy software to multiple employees' computers. Features for remote, silent installation of HAP v6 already existed. New installation features have now been added to allow automated installation of the license key. The license key can be installed at the same time the software is installed, or can be installed separately, as would occur for software renewals.

Installation on Computers using ARM Processors. For HAP v6.0 through v6.2 a special version of the installation file was required for computers using Advanced RISC Machine (ARM) processors. This was because the installation software could not detect whether an ARM computer was using a 64-bit or 32-bit operating system. Starting with HAP v6.3 that is no longer necessary. The standard HAP installer is now able to detect bitness of the operating system on any computer regardless of its processor technology.

Other Enhancements

Air Systems

1. **WSHP Loop Sizing Data.** Updated the Zone Sizing Summary report for WSHP Loop systems to include data for sizing heat rejection and heat addition equipment for the water loop (sample below). This data is applicable both for WSHP Loop systems using a cooling tower and auxiliary boiler, and for those cases where A2W heat pumps are used for heat addition and rejection (see page 5). Further information on this new sizing table is provided in section 15.2.2 of the Help system.

Circulation Water Loop Sizing Data

Cooling [MBH]			Heating [MBH]	
Peak Time	August 16:00		Peak Time	Design Heating
Coincident Peak Cooling Coil Load	885.0		Coincident Peak Heating Coil Load	518.5
Estimated Cooling Compressor Work	190.8		Estimated Heating Compressor Work	-100.6
Heating Coil Load	0.0		Cooling Coil Load	0.0
Estimated Heating Compressor Work	0.0		Estimated Cooling Compressor Work	0.0
Estimated Peak Heat Rejection	**1075.7**		**Estimated Peak Heat Addition**	**417.9**

2. **Terminal Reheat Coil Sizing.** Updated sizing procedures for terminal reheat coils in VAV and CAV/RH systems. Previously these coil heating capacities were sized based on peak space and zone heating ("stage 1") load calculation results. Capacities are now determined in the air system simulation for design conditions ("stage 2"), similar to how cooling coil and central heating coil capacities are determined. In certain applications this can enhance the sizing results. For example, in a VAV system in a cold climate where a preheat coil has been omitted, the primary supply air temperature at terminal reheat coil inlet can be colder than assumed in the previous stage 1 calculation approach. Considering that situation allows the coil capacity to be upsized. Or, for projects in mild winter climates, the heating coil capacity sized by stage 1 can be significantly oversized versus peak duty conditions. Considering that situation allows the coil capacity to be adjusted to reduce the amount of oversizing. As a result of this change, when comparing sizing results between v6.2 and v6.3 for the same project, differences in reheat coil and zone heating coil capacities may be observed.

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Other Enhancements (continued)

Air Systems

3. **SEER to EER and HSFP to COP Conversions** – For energy modeling applications, when unitary equipment performance is defined in terms of seasonal ratings like SEER or HSPF, those ratings must be converted to equivalent full load ratings to derive compressor and outdoor fan power at design conditions. In HAP v6.3, the correlations for converting from seasonal to equivalent full load ratings were updated. As explained in section 34.12 of the Help system, seasonal ratings such as SEER and HSPF cannot be directly used in hour-by-hour energy modeling. For SEER, an equivalent EER must be derived and then decompiled to determine compressor and outdoor fan input power at the AHRI cooling rating condition. That becomes the anchor for the hourly simulation in which the unit COP changes with hourly operating conditions. Similarly, for air-to-air heat pumps rated in HSPF an equivalent full load COP must be derived and then decompiled to determine compressor and outdoor fan input power at the AHRI heating rating condition as the anchor point for heating performance calculations. The correlation used to convert SEER to EER and HSPF to COP was updated in HAP 6.3 using product catalog data for current small capacity rooftop equipment offered by multiple manufacturers.

Utility Rate Wizard

1. **Updated EIA Prices** - Updated the default US state average prices for electricity and natural gas which appear in the Utility Rate Wizard to use the most recently published data from the US Energy Information Administration (EIA). Data represents state averages for calendar year 2023.

Other Enhancements (continued)

Space Model

1. **Miscellaneous Sensible Heat Gain.** Increased the maximum limit for miscellaneous sensible heat gain from 1,000,000 BTU/hr (293,071 W) to 60,000,000 BTU/hr (17,584,266 W). This is an initial measure to support modeling of data halls in data centers

Weather Modeling

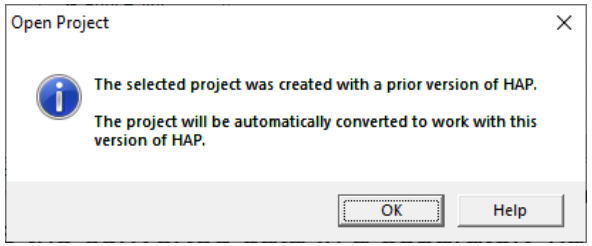
1. **Daylight Savings Time** - Revised the defaulting of the start and end days for daylight savings time to better stay synchronized with the "January 1 Day of Week" input for energy modeling. For example, in most countries using daylight savings time, the time change starts and ends on a Sunday. When a weather station is selected, daylight savings time start and end days defaults are set to the proper Sunday dates according to the calendar currently in effect. When the "January 1 Day of Week" value is changed to alter the calendar, the daylight savings start and end dates are now revised to remain on the proper day of the week.

Problems Fixes

1. Corrected problems identified in HAP v6.2. A detailed list of problem fixes can be found in section 1.2 of the HAP help system in the “What’s New in HAP” topic. To display program help, press F1 or press the Help button on the main window tool bar.

About Data Conversion & Calculation Results

1. **Project Conversion.** When you open a project created by v6.2 or an earlier v6 version it will be converted to 6.3 format automatically. An informational message appears to make you aware this is happening (image at right). All input data is converted. Calculations must be rerun so they incorporate any changes to calculations made in 6.3.



2. **Saving Converted Projects** - The word "(converted)" is inserted into the project name when it is converted. This is done so you don't inadvertently overwrite the original project file. When you save the converted project for the first time you can choose to save it as a separate file with a different name, or you can choose to overwrite the original project with the original file name.

   Note that once you convert a project to 6.3 format, it cannot be opened thereafter in 6.2. Therefore, if you will need to inspect the original project data in 6.2 later, don't overwrite the original file when you save. Save it as a separately-named file.

3. **Will calculation results in 6.3 be different than 6.2 for a converted project?** Yes, due to the following:

   a. **Wind Speed.** The wind speed for design cooling and design heating load calculations was corrected in v6.3. This tends to have a small effect on peak space loads (usually 3% or less). However, since space loads affect equipment sizing, which in turn affects system performance and building energy performance, all other calculation results will change by a small amount.

   b. **Terminal Reheat Coil Sizing.** Due to the enhancement in how terminal reheat coil capacities are determined (see page 7), this change could affect system performance for design conditions and energy modeling calculations when VAV or CAV Reheat systems are used in an alternative.

   c. **Other.** If your 6.2 project was affected by one of the problems corrected in 6.3, that correction could also cause changes in results. In the help system, the "What's New in HAP" topic in section 1.2 provides a detailed list of problem fixes. While running HAP the help system can be displayed by pressing F1 or pressing the Help button on the main window tool bar.

QUESTIONS?

Please contact Carrier Software Systems at

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Thank you!