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Evaluation #

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Safety & Buildings Division
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Wisconsin Building Products Evaluation

Material

Electric Thermal Storage &
Steffes Comfort Plus Heating Systems

Manufacturer

Steffes Corporation
3050 Hwy 22 North
Dickinson, ND 58601

SCOPE OF EVALUATION

GENERAL: The Comfort Plus Heating Systems and Electric Thermal Storage (ETS) heating equipment is manufactured by Steffes Corporation. This review is for the proposed concept for both off-peak storage only and heat pump with storage to qualify electrically heated homes for the non-electric insulation standards.

The following **Comm** requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1- and 2-family dwellings** were considered:

- **Envelope Requirements:** The Steffes Comfort Plus Heating Systems and Electric Thermal Storage (ETS) heating equipment was reviewed for qualification of electrically heated homes for non-electric insulation standards of **s. Comm 22.21(2)**.
- **Supplementary Heater For Heat Pumps:** The Steffes Comfort Plus Heating Systems heating equipment was reviewed for control standards of **s. Comm 22.13** for backup heating for heat pumps.

DESCRIPTION AND USE

Off-Peak Heating With Electric Thermal Storage (ETS)

ETS systems use utility electrical power at night and other off-peak times when the demand for electricity is low. The efficiency of power production, distribution and transmission is substantially better during off-peak times and the associated costs are lower. ETS systems help conserve generation capacity and reduce transmission losses associated with peak power transmission. They also defer the need to build new generation, distribution and transmission facilities.

The heat is stored in high-density ceramic bricks located inside the unit. Comfortable heating is provided 24 hours a day from the stored heat. Because all of the electricity is purchased at off-peak rates, consumers can save generally 40-70% on their energy bills.

Steffes Comfort Plus Heating Systems (Forced Air & Hydronic)

The Steffes Comfort Plus Heating Systems are a type of Electric Thermal Storage (ETS) heating equipment that utilize low cost, off-peak electricity to provide efficient, economical and comfortable heating. The Comfort Plus Heating (ETS) Systems distribute heat through ductwork or hydronically. They are designed to take care of the entire home's heating load. Generally these units are interfaced with an Air Source Heat Pump which provides even greater efficiency, substantially lower energy consumption and further reductions of the homeowners operating cost and system carbon emissions.

Air Source Heat Pumps are efficient, even at very cool outdoor temperatures, however, as outdoor temperatures decrease, so does the heating ability of the heat pump. As the outdoor temperature approaches the balance point of the heat pump (point where output capacity of the heat pump equals the heat loss rate of the home, generally 25 – 30 degrees), the heat pump starts to deliver cool and uncomfortable air temperature into the home and also needs supplemental heat to satisfy the heating requirements. Because of this, it is common practice to turn off the heat pump at about 25 – 30 degrees. At that point, the secondary, less efficient heating source takes over. Air source heat pumps are very efficient even at much cooler temperatures but alone cannot deliver comfort and satisfy the entire heating requirement.

When paired with a Steffes Comfort Plus System, the heat pump can operate to very cool temperatures and thereby the full efficiency of the system is utilized.

The Steffes Comfort Plus System monitors the discharge air temperature from the heat pump, as well as the outdoor temperature. It very precisely modulates the right amount of heat into the duct stream to ensure warm, comfortable air temperatures are delivered to the home at all times. This allows the heat pump to operate the majority of the heating season hours and captures the efficiency of the heat pump at even colder outdoor temperatures.

TESTS AND RESULTS

Steffes Corporation submitted a Space Heating Cost Comparison – based on common 2007 Wisconsin Energy Rates and Bin Hour information for Eau Claire as a worst case scenario. They showed that the energy consumption and heating cost for a home with electric heat storage was less than that for a home heated with natural gas, heating oil or propane.

LIMITATIONS OF APPROVAL

Electric Thermal Storage is approved as follows:

- Dwellings that have more than 3 kilowatt installed space heating are not required to comply with the stricter electric heat building envelope insulation standards if they have Electric Thermal Storage with a storage capacity of at least 50kWh (170,000 btu's). Dwellings that have air source heat pumps are not required to comply with the stricter electric heat building envelope insulation standards if they have Electric Thermal Storage with a storage capacity of at least 86kWh (290,000 btu's). kWh storage is determined by taking nominal unit input times (x) a factor of 5.5.

Steffes Comfort Plus Systems are approved for compliance with s. **Comm 22.13** for control of backup heating for heat pump heating systems.

This approval will be valid through December 31, 2012, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made

under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: May 9, 2007

By: _____

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Integrated Services Bureau

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