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ALERT

Burn Hazards Related to Heated Surfaces in Long Term Care Facilities

Facility Duty

In nursing homes, it is possible that residents with limited mobility and/or decreased sensation may be burned by falling against or otherwise being in prolonged contact with baseboard or wall heaters in resident rooms or exposed hot water pipes in baths, closets, etc. A facility has the duty to protect its residents from foreseeable hazards under F-Tag 323 and 324 which provides:

“The facility must ensure that (1) the resident environment remains as free of accident hazards as is possible; and (2) each resident receives adequate supervision and assistance devices to prevent accidents.”

Enforcement

Beginning December 1, 2004, if surveyors encounter surfaces suspected to be too hot, they will use an infrared temperature measuring device to determine if the surface temperature is **125 degrees Fahrenheit or above**. If it is at or above 125 degrees F., the surveyor will evaluate the risk based on the condition and abilities of the resident(s) in that room, the facility's assessment of the resident(s), documentation of action previously taken to reduce the hazard, and facility policy and procedures. The surveyor will also consider the design and placement of the potential burn hazard. A heating unit located high on the wall or at the ceiling may not be a hazard, if it is located so that it is difficult for the resident to reach it. Alternatively, a unit could be designed so that a resident could not possibly remain in contact with the unit for sufficient time to sustain an injury.

If the measured temperature is at or above 140 degrees F., and the surface is accessible to the resident, the facility will be cited. The 140 degrees F. temperature corresponds to 60 degrees C. . At this temperature, a first-degree burn will occur in approximately 3 seconds. This temperature corresponds to the threshold between maximum pain and numbness, as well as the threshold between reversible injury and possible irreversible injury.

We urge facilities to survey their own physical plant for such dangers and to contact the Health Facilities Engineering Section of the Division of Health Facilities and Services at (517) 335-1980 in advance of discovery of the problem in a survey.

Background

There are no current state or federal regulations that specify the maximum allowable temperature of heated surfaces. Underwriter's Laboratory specifies that electrical baseboard heater surface temperatures not exceed 185 degrees F. The standard temperature for hot water boilers for fin tube radiation is 180 degrees F. However, these are the temperatures of the heating elements, not the covers of the radiators.

A paper published in 1946 by Moritz and Henriques, from the Harvard Medical School, reported the results of testing on human and porcine subjects to determine "The Relative Importance of Time and Surface Temperature in the Causation of Cutaneous Burns". While this research investigated subjects less fragile than geriatric patients, it does indicate that it took approximately 8 minutes of continuous exposure to 120 degree water to cause a first-degree burn.

In May 1999, the Department issued an alert to nursing care facilities that electrical, hot water and steam baseboard and radiator heating units are a potential hazard to residents, and required facilities to eliminate or modify units with excessively hot surface temperatures. Due to the lack of adequate equipment to measure surface temperatures, it was recommended that a hand test, conducted by holding the palm of one's hand on the cover of a heating unit, be used to determine if a surface temperature was acceptable. If the hand could not be comfortably held on the surface for at least 30 seconds, the surface temperature was too hot and was considered to be a hazard. In an actual test conducted at a facility in 1999, the surface temperature was measured at 125 degrees F. and 126 degrees F. The surveyor was able to hold his hand on the surface for over a minute with no discomfort, and no evidence of burning.

During recent surveys, some facilities have expressed concern about use of the "hand test," that has been in effect since 1999, to determine excessive surface temperatures. Technology has progressed to the point where accurate infrared temperature measuring devices are now available at a reasonable cost.

Based on research by our Health Facilities Engineering Section, it has been determined that **a temperature of 125 degrees Fahrenheit** is normally acceptable on the surface of a heating unit in a nursing home or long term care facility. This temperature was determined from information found in ASTM International Standard C1055-03, titled *Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries*. American Society for Testing and Materials (ASTM) Standard C 1055 -03 is largely based on the work of Moritz and Henriques. This maximum acceptable temperature is based on a maximum acceptable injury level of a first degree burn, which is reversible, and causes no permanent tissue damage, and a maximum contact time with the heated surface of 60 seconds, to reflect the slower reaction times of the elderly or the infirm. At this temperature, one must recognize that there is some risk. While those who can react should have sufficient time to remove themselves from contact with the heated surface without sustaining permanent damage, it is incumbent upon the facilities to identify those residents who may be unable to recognize the danger or pull away from the heat source and provide extra protective measures for those residents as needed.

Abatement Steps

If a heated surface is determined to be a potential burn hazard, it is the facility's responsibility to abate the condition. This may include correction of any system malfunction causing the condition, or if the system is operating as designed, by installing protective shielding to reduce the temperature of exposed surfaces. Where the system is operating as designed and physical changes cannot completely abate the danger, staff training and resident care policies to minimize the chance of exposure is appropriate. Installation of central ventilation systems to supplement baseboard or wall heaters may also be an appropriate abatement strategy.

Engineers in the Health Facilities Engineering Section of the Division of Health Facilities and Services are available to assist in abatement strategies and to review and accept proposed abatement plans.