

Fact Sheet

LOW TEMPERATURE HOT WATER HEAT DISTRIBUTION SYSTEMS

BACKGROUND

Currently, most DoD facilities are heated with central heat distribution systems that use either high temperature water or steam to convey the heat. Approximately 6000 miles of these systems are in place on DoD facilities. They have proven to be problematic and in some cases very inefficient. It is estimated that heat losses from these systems cost the Army well over \$100 million per year. The FY 93 "Redbook" gave annual maintenance costs of about \$24 million for the Army alone.

Low temperature hot water (LTHW) systems have been widely used in Europe for many years and are gaining acceptance in the United States by the private sector. The low temperature materials and procedures have reduced the cost of these systems such that a cost advantage may be possible when replacing deteriorated steam and high temperature water systems. Many of the improved materials and methods used in the low temperature systems are not suitable for high temperature water or steam systems.

BENEFITS

Benefits of the low temperature systems include increased efficiency of heat distribution, reduced maintenance due to lower temperature and pressure, and improved materials that can be used only at these lower temperatures. Low temperatures and pressures also result in increased safety for service personnel and building occupants, and better system control. Heat loss can be reduced from twenty percent or more for older systems to under five percent of system capacity. Field measurements by CRREL on new high temperature hot water and LTHW systems have shown that the LTHW system lost only 35% as much heat. In addition, mass losses due to leakage can be reduced almost to zero, compared to makeup rates of fifteen percent or more for good steam systems. For example, a CRREL study has shown that the Hawthorne AAP steam system has a makeup rate of over 50% and a net thermal efficiency of less than 50%.

POTENTIAL APPLICATIONS

Nearly all DoD bases have some systems that would be candidates for retrofit to LTHW. For new construction or major rehabilitation projects, LTHW systems will offer reduced first cost as well as reduced operation and maintenance costs. As replacements of systems are needed, conversion to LTHW should be considered. Once our designers are comfortable with the technology, we should be able to retrofit high temperature hot water systems to LTHW for no additional cost.

It is expected that for steam systems that use hydronics in the buildings, the retrofit cost will also be comparable to replacement in kind. For steam systems that use steam within the buildings as well, conversions can be more costly, particularly when the building heating system is a one-pipe steam system. However, retrofits have been made to such buildings in the private sector in a cost-effective manner.

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