

C. A. Dunham Company

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dunham
differential
heating

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Over eighty sales offices in the United States, Canada and the United Kingdom bring Dunham Heating Service as close to you as your telephone. These representatives are available for engineering counsel in correct selection of Dunham Systems and Appliances for any type of building. The accumulated experience of the entire Dunham Organization is put at the disposal of the Heating and Ventilating Engineer. This cooperation is available for *Modernization Work*, as well as for new construction in industrial, commercial and other projects.

The **Dunham Differential Vacuum Heating System** is a two-pipe steam heating system which *continuously* distributes steam at a variable rate equal to the heat loss from the building. It provides control of building temperature without resorting to "on" and "off" circulation of steam.

It governs the heat output by variation of both the steam temperature and steam volume within the radiator. *The variation in steam temperature governs the heat output from supply piping as well as radiation.* Since supply piping output ranges from 10 per cent to 25 per cent of the entire output of the heating system, this added control not only adds to the precision of building temperature regulation but also to the economical operation of an installation, particularly where supply piping alone is used to heat bathrooms, kitchens and other space making intermittent heating undesirable.

When the rate of heat output from a Differential System has been reduced to its practical minimum by a reduction in steam temperature and mild weather calls for a further reduction in heat supply, the system automatically reduces the volume entering the radiators establishing a condition of partial filling.

The Dunham Differential System is adapted broadly for all classes of buildings in which human comfort, efficiency and health, and low operating costs are to be given consideration. In its engineering design it is adaptable to the diversity of building requirements including the sub-division of larger buildings into a plurality of heating zones.

The system is suitable for use with all types of radiation or combinations of various types including unit ventilators. It is likewise adaptable for installations having air conditioning or ventilation services and may be advantageously used to govern the heat input to such services.

Applications include existing as well as new buildings. In older buildings which are unsatisfactorily heated, engineering standards are modified to give maximum improvement in heating service in relation to investment. The Differential System may be economically applied to existing two-pipe steam heating installations and to one-pipe steam systems. The cost of "change-over" installations varies with the type of heating system already in service.

The primary function of Differential Heating is to maintain, within buildings, healthful heat-comfort and satisfactory winter air conditions not obtainable with other steam

heating systems. Success in this function, however, has eliminated the waste of mild weather overheating (which is inevitable with uncontrolled installations). This results in substantial steam and fuel economies.

We will gladly cooperate with architects, consulting engineers and contractors in supplying data as the basis for the surveys upon which modernizing recommendations can be made to clients.

DUNHAM DIFFERENTIAL VACUUM HEATING

- 1. The Dunham Differential Vacuum Heating System for High Duty**—This is a two-pipe system giving excellent room temperature control and winter air conditioning. The pressure, the temperature and the volume of steam in circulation are varied under a control which is a normal function of system operation. The wide range over which the vacuum and quality of steam in the radiators is regulated (from atmosphere to 25 in.) establishes correct rates of heat emission with radiators either complete or partially filled as required. A continuous valuation of heat requirements under positive temperature control may be secured through nine thermostats in a building, or zone of a building. The High Duty Differential System is a functioning part of the Dunham Average Temperature Control System.
- 2. The Dunham Differential Vacuum Heating System for Low Duty**—The design of this system embraces equipment of the same general type as used in the High Duty System. Its fuel economy closely approaches that system but it does not claim the same preciseness of temperature control as characterizes the High Duty System. However, the principle of control is the same as in that system; the radiator temperatures are varied and radiators may be either completely or partially filled according to the heat loss requirements. The vacuum, however, is limited to fifteen inches. The Low Duty System can be very effectively related to existing buildings in changing over ordinary vacuum return line systems to Differential operation. One or more thermostats coupled with Dunham Heat Balancer may be used with a Low Duty System.
- 3. The Dunham One-Pipe Vacuum Heating System with Sub-Atmospheric Steam**—In this system the range of steam temperatures and pressures is ample to give great flexibility of operation in the lower range of vacuums. This system is designed primarily to enable owners of existing one-pipe systems to obtain the benefits of the Dunham Differential Vacuum principle of operation by rearranging the system to operate on that principle. The change-over can be made without extensive cutting of floors or walls. Systems having air line will usually require no such cutting.

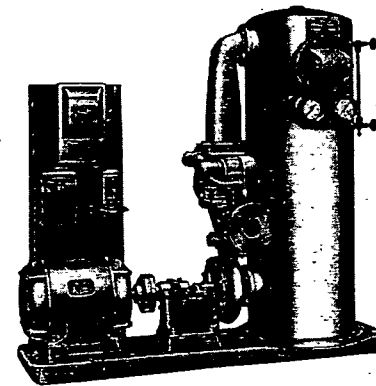
Dunham Line of Pumps for Differential Vacuum Heating Systems and for Vacuum Return Line Heating Service

The operation of these pumps is characterized by a quietness which is outstanding. Their use contributes to this essential of satisfactory heating—quietness. They provide a vacuum-producing means of great effectiveness which is proved in its ability to perform consistently over long periods with minimum of attention and maintenance.

The unit combines added refinements of construction including ball bearing centrifugal pump of improved design and discharge valves operated by a powerful mechanism.

The pumps are built in eleven sizes ranging from capacity of 2,500 to 150,000 sq ft of radiation inclusive.

These pumps fulfill the adopted standard for the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS and likewise the requirements of the Vacuum Return Line Heating Pump Manufacturer's Section of the *Hydraulic Institute*. Pumps to meet special requirements will be supplied.



"DV" Series Pump for Dunham Differential Vacuum Heating System
"VR" Series Pump for Dunham Vacuum Return Line Heating Service