

DESIGNING HEATING AND VENTILATING SYSTEMS

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Designing heating and ventilating systems by Charles A. Fuller

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CHARLES A. FULLER

**DESIGNING HEATING
AND VENTILATING
SYSTEMS**

Designing Heating and Ventilating Systems

The practical application of the engineering rules and formulas in every day use, in laying out steam, hot water, furnace and ventilating equipment for buildings of all kinds, presented in a simple and easily understandable manner. Adopted from lecture courses given by the author before Y. M. C. A. and other classes.

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PREFACE

This book has been developed from a series of evening lecture courses given at several institutions, before audiences of varying experience and education in the heating line. It enters into the detailed use of exactly the same methods that the most proficient engineer uses in determining the sizes and proportions of equipment for everyday work and the problems that confront him for the first time. This basic engineering has been made so simple that salesmen and practical steamfitters have gained a sufficient grasp at the lectures without the careful study the reader must give to understand how to approach the solution of the problems that are presented by the many kinds of work involved in heating and ventilation.

In all explanations the heat unit, foot pound and such measures of the engineer are so used that those who attended the lectures and gave their attention showed a marked proficiency in their use. The reader who will apply the information to work of which he knows something is expected to be equally benefitted and more experience and more frequent reference to the work will be sure to increase his proficiency. Its origin was inspired by the necessity of an up-to-date text book which would involve both the theoretical, as well as the practical side of the subject and one which would be really understood by the less technical mind.

The theory of both heating and ventilating is handled in such a manner as to eliminate as far as possible, the most difficult mathematical computations and expressions, and at the same time, is handled in a thorough and exhaustive manner.

The book is well adapted for colleges, technical schools, vocational and trade schools and as a text book for lecture courses on this subject. It is also very suitable as a reference book for consulting engineers, architects and contractors, as it is developed along the lines of the most recent practice in all

classes of buildings from actual experience of the author in one of the largest consulting engineering offices in New York.

The author expresses his appreciation of the kindness of those manufacturers who furnished illustrations of their apparatus to make the work more complete.

C. A. FULLER

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DESIGNING HEATING AND VENTILATING SYSTEMS

CHAPTER I

THE HEAT UNIT

THE thermometer is an instrument for measuring the intensity of heat. There are several different standards adopted in various countries, the two most common of which are the Fahrenheit, or the F. scale, and the Centigrade, or the C. scale. The unit generally adopted in this country for the measurement of the quantity of heat is known as the British thermal unit and designated by the letters B. t. u.

One B. t. u. is the amount of heat necessary to raise the temperature of 1 lb. of water 1 deg. on the Fahrenheit scale. The temperature at which this is given is from 39 deg. to 40 deg. Some authorities differ slightly on this point and give the temperature at which this should be taken as 63 deg. F. to 64 deg. F. The difference in the amount of heat at these two points, however, is so slight that for practical purposes the temperature need not be considered and the adopted standard for the heat unit may be given as simply the quantity of heat necessary to raise 1 lb. of water 1 deg. F.

The reason for selecting the temperature of 39 deg. is that at this point water reaches its maximum density. As the temperature increases above this point the volume also increases proportionately. At 39 deg. F. the weight of water per cubic foot is 62.424 lb. At 212 deg. F. its weight per cubic foot is 59.76 lb.

The heat unit which corresponds to the B. t. u. on the Centigrade scale or the French unit is designated as one Calorie.