

THE METRIC SYSTEM OF WEIGHTS AND MEASURES

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The metric system of weights and measures by The Hartford Steam Boiler Inspection and Insurance Company

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**THE HARTFORD STEAM BOILER
INSPECTION AND INSURANCE COMPANY**

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OF
WEIGHTS AND MEASURES.



ISSUED BY
THE HARTFORD STEAM BOILER INSPECTION
AND INSURANCE COMPANY.

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HARTFORD, CONN., U. S. A.
1898.

PREFACE.

THE Metric System of Weights and Measures is used so universally in foreign books and periodicals, that much time is consumed and no little annoyance incurred by the American reader, in translating these units into their English and American equivalents, by the aid of any of the reduction tables that have yet been published. It therefore occurred to the undersigned that a handy pocket volume, for facilitating comparisons of this kind, might be acceptable to engineers and scientific workers generally. This is the *raison d'être* of the present little book. The work of calculating the tables and reading the proof has been done by Mr. A. D. Risteen, Associate Editor of THE LOCOMOTIVE, whose experience in the computing division of the United States Coast and Geodetic Survey should be a sufficient guarantee of the care and accuracy with which his task has been done. Mr. Risteen has also prepared a brief account of the inception and adoption of the Metric System in France, which adds materially to the

interest and value of the volume. The Metric System is now in common use in France, Germany, Austria-Hungary, Italy, Spain, Portugal, Sweden, Norway, Belgium, The Netherlands, Roumania, Servia, Egypt, Mexico, Costa Rica, Guatemala, Nicaragua, Salvador, Brazil, Colombia, Bolivia, Chile, The Argentine Republic, Haiti, and Santo Domingo. It has also been adopted officially by Venezuela, Uruguay, Turkey, and British India, although in these four countries it can hardly yet be said to be in common use. Japan, too, has announced her intention of adopting a modified form of it, and even China has a *decimal* system of weights and measures, although it is not the French Metric System. England, Russia, and the United States are the only great nations that still refuse to adopt the Metric System. Its advantages are many, and the only really serious objection appears to be, that the change from our present units to the new ones would be more or less confusing and annoying for the first few years. Much of this annoyance and confusion could be prevented by providing school children with cheap sets of metric measures and weights, and requiring each child to measure and weigh a certain number of objects every week. In this way the units and their

names would become tolerably familiar to the next generation, and the transition would be far easier. The formidable decimals that the metric system suggests to the average citizen (and which are here very much in evidence) constitute no part of the system itself, and they could be gratefully dismissed, the moment the metric system came into use. They owe their existence to the fact that the foot, pound, and quart are not commensurable with the meter, gramme, and liter; and, when we cease to use our present units, we should also cease to use the long numbers that express their values in metric units.

J. M. ALLEN, *President.*

Hartford, Conn., May 2, 1898.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES.

DIVERSITY OF SYSTEMS IN USE.

From the earliest days of civilization men have measured and weighed things, and hence they have had to have at least the rudiments of a system of weights and measures. At first, however, there was no attempt at precision in the standards used. A "foot" meant something of substantially the same length as the king's foot; and an "inch" was sometimes considered to be the twelfth part of a foot, and at other times it was defined as the space covered by three good, plump kernels of barley, placed end to end. Each community had its own units, which, in most cases, bore no relation whatever to the units employed in other communities. As wealth increased and commerce grew, it became necessary to provide for a greater degree of precision in standards, and for a comparison of those used in different localities. Undoubtedly, the innate dishonesty of man also had something to

do with the establishment of more definite standards, because in the absence of these there was nothing to prevent a person who was so inclined from buying by a long measure and selling by a short one. At all events, at the present time the units used in weighing and measuring have been defined by law in all civilized countries. This has secured, for each country, a certain degree of uniformity throughout its own territory; but among the standards of *different* countries there is a diversity almost as great as ever.

Even in the United States there are an enormous number of units in vogue. For example, for measuring lengths we have the inch, ell, nail, link, foot, yard, fathom, rod, chain, furlong, mile, knot, and doubtless many others; and the units in use for area, capacity, and weight are even more numerous. Many of these units have different values, too, according to the nature of the substance to be measured or weighed. Thus we have several kinds of ounces and pounds, and at least two kinds of quarts. There is no regularity whatever in the number of units of one kind that make one unit of the next higher kind; and some of the tables that the schoolboy has to learn are extremely distressing. We well remember what a stickler it was, in our day,

that it should take $30\frac{1}{4}$ square yards to make one square rod. If we had a simpler method of mensuration, the children in our schools could be spared a great part of this troublesome lumber, and the time saved in this way could be devoted to some far more profitable subject. Taking everything into consideration, it is certainly humiliating to reflect upon the heterogeneous "system" of weights and measures in use at the present day in a country as proud, as civilized, and as advanced (in other respects) as our own United States of America. We are not unique in this respect, it is true, for many other nations have "systems" of measurement that are fully as confusing as our own; but this is mighty cold comfort.

HISTORY OF THE METER.

To France belongs the honor of making the first systematic attempt to break through the customs of antiquity, and to substitute a new metrology for the old. Until the latter part of the eighteenth century there was the same condition of affairs in that country that prevails to-day in the United States; and in Méchain and Delambre's *Base du Système métrique décimal* (Paris, 1806), we read of "le système incohérent de nos mesures," "l'étonnante