

**THE NEW STEAM TABLES,
TOGETHER
WITH THEIR DERIVATION
AND APPLICATION**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649473496

The New Steam Tables, Together with Their Derivation and Application by C. A. M. Smith & A. G. Warren

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

C. A. M. SMITH & A. G. WARREN

**THE NEW STEAM TABLES,
TOGETHER
WITH THEIR DERIVATION
AND APPLICATION**

THE NEW STEAM TABLES

TOGETHER WITH THEIR DERIVATION
AND APPLICATION

*Copy is
affixed
to the
table by*
C. A. M. SMITH, M.Sc

(PROFESSOR OF ENGINEERING, UNIVERSITY OF HONG KONG)

AND

A. G. WARREN, B.Sc.

(LECTURER ON ENGINEERING, ANZLN TECHNICAL SCHOOL)

WITH AN INTRODUCTION BY

SIR J. ALFRED EWING, K.C.B., F.R.S.

(DIRECTOR OF NAVAL EDUCATION)



NEW YORK
D. VAN NOSTRAND CO.
TWENTY-FIVE PARK PLACE

1912

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters.

2. The second part outlines the various methods and tools used to collect and analyze data. This includes the use of surveys, interviews, and statistical software to ensure that the information gathered is reliable and valid.

3. The third part focuses on the ethical considerations surrounding data collection and analysis. It highlights the need to protect individual privacy and to use the data responsibly, only for the purposes intended.

4. The fourth part describes the process of interpreting the results of the data analysis. This involves identifying trends, patterns, and anomalies, and then drawing meaningful conclusions from the data.

5. The fifth part discusses the challenges and limitations of data analysis. It acknowledges that while data can provide valuable insights, it is not infallible and must be interpreted with care and skepticism.

6. The sixth part provides a summary of the key findings and conclusions of the study. It reiterates the importance of data-driven decision-making and the need for ongoing research and innovation in the field.

7. The final part of the document offers recommendations for future research and practice. It suggests areas where further investigation is needed and provides practical advice for how to apply the findings of this study.

© 1900, 1914, 1915, 1916

PREFACE

THE following tables, together with the explanation of how the values have been calculated, are published in the hope that they will be of use to English engineers and students. The work has been based upon the researches of Professor H. I. Callendar, the importance of which does not seem to have been fully realised by engineers of this country and America. On the Continent Mollier has used it to compile tables in the metric system of units. Sir Alfred Ewing, in the latest edition of his book (1910), "The Steam Engine and Other Heat Engines," was the first English engineer to draw attention to the importance of Callendar's and Mollier's work. The authors gratefully acknowledge that the perusal of that new edition gave them the idea of going more fully into the subject. Although Mollier's values are given in that work, it was thought that more complete tables were needed.

It should be stated that these tables were calculated, originally, from Callendar's equations. Mollier's steam tables were not consulted until the final stage of proof correction. It was then suggested that the results should be checked against Mollier's, when it was possible to do so. (The values obtained by the authors had been checked several times, and appeared, by differences, to be reasonable.) On making comparisons with Mollier's tables—by translating the units—a few unimportant divergences were noted. In most cases the authors felt it right to bring their values into line with those of Mollier to avoid confusion of thought by anyone unable to appreciate the insignificance of the small divergences.

258447

Reference 10-2-9-91 M. J. 2

It is especially desired to thank Sir Alfred Ewing, K.C.B., for consenting to write the introduction to these tables, and for several suggestions which he has made. It is also desired to thank Professor Callendar for the trouble which he has taken, and for his uniform kindness.

It is only right to add that the Pound-Fahrenheit tables have been included because engineers still use them—not because the system is commended. It is to be sincerely hoped that all students will use the Pound-Centigrade tables, as there is no advantage, and several drawbacks, in using the Fahrenheit scale of temperature. It will undoubtedly gradually go out of use in this country.

At the end of the book will be found a chart representing the Total Heat of Steam on an entropy base. This graphical means of representing the properties of steam is due to Mollier and a reproduction of his diagram appears in Ewing's "The Steam Engine and Other Heat Engines." It already has an extensive use in connection with problems on steam turbines. It is here plotted in English Units.

C. A. M. S.
A. G. W.

CONTENTS

	PAGE
INTRODUCTION BY SIR ALFRED EWING	ix
DERIVATION AND APPLICATION	1

CENTIGRADE UNITS

TABLE I. (PROPERTIES OF SATURATED STEAM ON PRESSURE BASE— POUND-CENTIGRADE UNITS)	16—35
TABLE II. (PROPERTIES OF SATURATED STEAM ON CENTIGRADE TEMPERATURE BASE)	36—47
TABLE III. (SPECIFIC HEATS OF SUPERHEATED STEAM AT VARIOUS TEMPERATURES CENTIGRADE—AND PRESSURES).	48—53
TABLE IV. (AVERAGE SPECIFIC HEATS OF SUPERHEATED STEAM FROM SATURATION TO TABULATED TEMPERATURES—CENTIGRADE —AT VARIOUS PRESSURES).	54—57

FAHRENHEIT UNITS

TABLE V. (PROPERTIES OF SATURATED STEAM ON PRESSURE BASE— POUND-FAHRENHEIT UNITS)	58—77
TABLE VI. (PROPERTIES OF SATURATED STEAM ON FAHRENHEIT TEMPERATURE BASE)	78—87
TABLE VII. (SPECIFIC HEATS OF SUPERHEATED STEAM AT VARIOUS TEMPERATURES—FAHRENHEIT—AND PRESSURES)	88—93
TABLE VIII. (AVERAGE SPECIFIC HEATS OF SUPERHEATED STEAM FROM SATURATION TO TABULATED TEMPERATURES—FAHRENHEIT —AT VARIOUS PRESSURES).	94—97
TABLE IX. (LOGARITHMS AND ANTILOGARITHMS)	98—101

IN POCKET OF COVER, MOLLIER CHART.

100

100

100

100

100

100

100

100



INTRODUCTION

By SIR J. ALFRED EWING, K.C.B., F.R.S.

PROFESSOR SMITH has asked me to write a brief introduction to the Steam Tables which he and Mr. Warren have prepared, and I willingly do so because it may be expected that this publication will do something towards making engineers better acquainted with the important service which Callendar has rendered them in supplying materials for a new determination of the properties of steam, and towards facilitating the use of correct values in steam calculations.

As I have already pointed out, in the Third Edition of my book on "The Steam Engine and Other Heat Engines" (1910), the steam tables which have for many years been generally accepted contain serious errors and inconsistencies. Professor Callendar has shown how tables may be calculated which escape these inconsistencies and give figures that are in agreement with the best experimental data. To quote from the account of his work given in the Appendix to my book:—

"He assumed a characteristic equation connecting pressure, volume and temperature, applicable to water-vapour generally whether saturated or superheated. This equation involves certain constants, and he adjusted these to accord with well-established results of experiment. He proceeded to show that it was practicable to deduce from the characteristic equation, in the form assumed by him, by aid of relations depending only on the general principles of thermodynamics, expressions for all the important properties of steam, from which numerical values could be deduced within the range to which the characteristic equation might be held applicable, namely, for pressures such as correspond to saturation temperatures extending from 0° to 200° C. or so. Within this range the values so deduced are found