TANK CONSTRUCTION: RELATING PRINCIPALLY TO THE DESIGN, MANUFACTURE AND ERECTION OF TANKS IN MILD STEEL

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649140695

Tank construction: relating principally to the design, manufacture and erection of tanks in mild steel by Ernest G. Beck

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

ERNEST G. BECK

TANK CONSTRUCTION: RELATING PRINCIPALLY TO THE DESIGN, MANUFACTURE AND ERECTION OF TANKS IN MILD STEEL

Trieste

THE "MECHANICAL WORLD" SERIES

TANK CONSTRUCTION

TANK CONSTRUCTION

Relating principally to the Design, Manufacture and Erection of Tanks in Mild Steel

BY

ERNEST G. BECK

WH. EX., ASSOC. M.INST. C.E.

AUTHOR OF "STRUCTURAL STEELWORK," ETC.

MANCHESTER

EMMOTT & CO., LIMITED

65 KING STREET

LONDON: 20 BEDFORD STREET, W.C. 2

1921

NEW YORK

D. VAN NOSTRAND COMPANY

EIGHT WARREN STREET

PREFACE

BESIDES an endeavour to present information likely to be of use in the practical design and construction of tanks, one of the main objects of this volume is to draw attention to the many problems involved in tank construction. Properly regarded, these problems are so full of interesting possibilities that they become absolutely fascinating to the practical engineer; while their commercial importance is at once so real and so great that the field of study which they offer cannot prove aught but profitable.

Present-day requirements, developments and tendencies indicate unquestionably the need for a more soundly reasoned basis of design, and more efficient, rapid and economical methods of construction, than have been commonly employed in the past.

There seems to be an impression in the minds of some that our knowledge concerning the principles involved in the design and construction of tanks is more or less complete; that the only means available for reducing the costs of production is by cutting down the thicknesses of the sheeting or omitting essential parts of the construction; and that anything in the way of practical investigation and research would be mere waste of time and energy.

No impression could be more completely at variance with the facts. Instead of our knowledge with regard to the subject being complete, it is shown in the following pages that, in some of the most commonly employed methods of constructing tanks, we do not even know how the sheeting acts in resisting the pressures of the contained liquid; while it is usual to "design" the sheeting on a basis of assumptions which certainly and obviously cannot be realised in the finished structure. Instead of economy in manufacture being limited to senseless "cutting" of material, it wil be seen by the reader that few branches of engineering can offer such wide and rich fields for the exercise of skill in securing true

economy through the more effective use and disposition of material. And instead of investigation being unnecessary, it is shown that there are several—and these but a few of the most obvious—points on which practical research is urgently needed.

So far as the author is aware, no book has been published previously dealing with the practical design and construction of tanks, and it is hoped that the method of treatment here adopted may prove acceptable, not only to those engaged in the actual design, fabrication and erection of tanks, but also to many concerned with structures of a similar nature. In addition, the book contains much that should prove of interest and assistance to students of structural work generally.

The aim throughout has been to make the treatment broadly suggestive, rather than particular or exhaustive, partly in the hope of stimulating interest in the subject, as well as showing the scope for individuality in providing for local exigencies and meeting special requirements.

Not only has every endeavour been made to describe clearly and faithfully the various methods of design, manufacture and erection in common use; but, in addition, it will be found that a considerable proportion of the book is devoted to suggestions for improving those methods, commercially and scientifically. The practical application of the various principles involved is illustrated by means of numerous examples, typical of ordinary practice, completely worked out.

Among the parts of the work which are believed to be original, attention is particularly invited to: (1) the discussion regarding Economy of Form, in Chapter II—especially with regard to the influence of floors and roofs, of costs differing materially from that of the walls, upon the economical proportions; and also with regard to the latitude available for departure from the proportions giving maximum economy in the area of sheeting; (2) the suggested method for staying the walls of rectangular tanks by means of horizontal rails, in Chapter IV; (3) the investigation concerning the action and design of curbs and rails, in Chapter V; (4) the treatment for trough-bottomed rectangular tanks, in Chapter VI; (5) the suggested methods for simplifying the design, manufacture and erection of the roofs, walls and floors of cylindrical tanks, in

Chapter VII; and (6) the treatment for dished bottoms of elevated cylindrical tanks, in Chapter VIII.

The bulk of the work given in the following pages was published in the form of Articles contributed by the author to the *Mechanical World* during the years 1916–1920; and the author is indebted to the editor of that journal for permission to republish the work in book form. All the work previously published in article form has, however, been carefully and thoroughly revised, while some new matter has been added.

With the object of focussing attention the more clearly upon the matter of actual tank construction, and also to prevent the book from becoming large and costly, no attempt has been made to treat in detail the steelwork or other construction for supporting elevated tanks. Some general considerations regarding such work are given, and particular mention is made of a few important points; but for treatment of the foundations, stanchions, beams and bracings in detail, the reader is referred to the author's book on *Structural Steelwork* (Longmans, Green & Co.).

The author hopes to find, in the near future, an opportunity for presenting a treatment of bunkers, bins and silos, on lines similar to those here adopted for tanks.

ERNEST G. BECK.

London,
October 1920.