

**ERECTION AND
INSPECTION OF IRON AND
STEEL CONSTRUCTIONS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649575954

Erection and Inspection of Iron and Steel Constructions by L. M. Bernfeld

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

L. M. BERNFELD

**ERECTION AND
INSPECTION OF IRON AND
STEEL CONSTRUCTIONS**

Erection and Inspection of Iron and Steel Constructions

WRITTEN FOR THE USE OF

ARCHITECTS, ENGINEERS AND BUILDERS AND FOR
CIVIL SERVICE CANDIDATES FOR THE POSI-
TION OF INSPECTOR OF IRON AND STEEL

By L. M. BERNFELD, C. E.


Former Inspector of Iron and Steel Construction for the
Bureau of Buildings, New York City.

PRICE, \$2.00

UNIV. OF
CALIFORNIA

PUBLISHED BY
THE CHIEF PUBLISHING COMPANY
NEW YORK
1913

TA 684
B4

Copyright 1913
By L. M. BERNFELD
New York
 122

TO MY
AMBROTIA

To my mother

Bella

to whose untired devotion I largely owe
whatever little I may possess in edu-
cation, kindness and intellectual am-
bition, this book is most affectionately
dedicated.

CONTENTS

PART ONE.

- CHAPTER I.—Definitions and General Introduction.**
Stresses and strains. Elastic limit and ultimate strength. Modulus of elasticity. Factors of safety. Working unit stresses. Coefficient of linear expansion.
- CHAPTER II.—Practical Problems on Stresses and Strains.**
Table of properties of Cast Iron, Wrought Iron and Steel. Thirty-one problems with answers or completely solved.
- CHAPTER III.—The Manufacture of Iron and Steel.**
CAST IRON.—Definition. Manufacture. The blast furnace. Classification. Properties. Fracture of good and poor cast iron. Effects of carbon, manganese, phosphorus, silicon and sulphur. Common defects in cast iron. Blowholes, honeycomb, cavities, shrinkage, warping, cold shuts, surface defects. Inspection of cast iron. Laboratory tests. Shop inspection. Shop inspection of cast iron water pipes. Advantages and disadvantages of cast iron.
WROUGHT IRON.—Definition. Manufacture. The puddling process. Properties. Effects of cold rolling, annealing and impurities. Fractures of good and bad wrought iron. Cold short and red short iron. Common defects in wrought iron. Inspection of wrought iron. Laboratory tests. Advantages and disadvantages of wrought iron.
STEEL.—Definition. Manufacture. The Crucible process. The Open Hearth process. The Bessemer process. Properties. High, medium and low carbon steel. Effects of carbon, manganese, phosphorus, silicon and sulphur. Fracture of good and bad steel. Nickel steel. Cast steel. Common defects in steel. Blow holes, pipes, burns, cracks, laps, seams, stars, cobbles. Inspection of steel. Laboratory tests. Tensile test. Cold bending. Hot bending. Drifting, hardening, forging, welding and quenching tests.
- CHAPTER IV.—Shop and Mill Inspection of Iron and Steel.**
Shop operations. Straightening, punching, reaming, riveting, facing, boring, fitting up, painting. Marking. Special operations and their effects upon iron and steel. Heating. Welding. Forging. Hardening. Tempering. Annealing. Punching and Shearing. Upsetting. Caulking.
- CHAPTER V.—Riveting.**
Definition. Material. Manufacture. Length of rivets. Form of rivets. Fitting connections. Drift pin and drifting. Effects of drifting. Riveters and their output. Tools used in riveting. Dolly bar, snap, buster. Steamboat fitchet. Heating rivets. Rules for good riveting. Hand riveting. Machine riveting. Machine vs. hand riveting. Shop and field rivets. Rivets vs. bolts. Riveting column splices. Specifications. Deceitful work and its detection. Testing rivets. Loose rivets and defective rivets.
- CHAPTER VI.—Specifications.**
General outline. Specifications regulating quality, shopwork, erection and inspection. Manufacturer's standard specifications. Complete specifications for a loft building.
- CHAPTER VII.—Field Inspection of Minor Structures.**
Work of iron inspectors in the field. Inspection of store front alterations. Inspection before setting. Wrought iron beams. Second hand material. Separators. Common defects and their results. Strapping of iron work. Defective strapping. Templates. Size of templates for steel beams. Defective templates. Wall anchors. Store front alterations involving columns. Common defects and violations of the law.
- CHAPTER VIII.—Hoisting Iron Work in the Field.**
Definitions. Cranes and Derricks. Shear-poles. Setting derricks. Power for derricks. Stresses in derricks.

- CHAPTER IX.—Iron in Retaining Walls and Footings.**
Three kinds of retaining walls. Piers for columns. Bearing capacity. Inspection of piers. Piers in caissons. Grillage. Bolting grillage beams. Setting and grouting.
- CHAPTER X.—Cast Iron Bases and Their Inspection.**
Method of testing in the field. Repeated inspections. Setting cast iron bases.
- CHAPTER XI.—Cast Iron and Steel Columns.**
CAST IRON COLUMNS. Eccentricity. Cracked columns. Deceitful work. Correct remedies. Honeycomb and sand holes. Their detection. Milling. Use of shims. Painting. Bolting. Plumbing up.
STEEL COLUMNS.—Lengths. Temporary bolting. Erection and temporary bracing. Riveting. Milling. Incorrect lengths and remedies for same.
- CHAPTER XII.—Beams and Girders.**
Their uses. Wall beams. Floor beams. Tie beams. Struts. Connections. Connections of beams to steel columns. Connections of beams to cast iron columns.
- CHAPTER XIII.—Sidewalk Beams.**
Uses. Loading. Framing. Defective work. Incorrect elevation. Slope. Wrong setting. Anchors and plates. Vault framing. Old vaults. Requirements of City ordinances. Hoist guides.
- CHAPTER XIV.—Stairways and Fire Escapes.**
Erection and inspection of stairways. Definitions. Outside fire escapes. Buildings requiring fire escapes. Supervision by the Bureau of Buildings. Regulations of the Bureau of Fire Prevention for construction of fire escapes. Location. Balconies. Railings. Stairways. Brackets. Drop ladders. Goose neck ladders. Scuttle ladders. Painting.
- CHAPTER XV.—Roof Tanks.**
Uses. House tanks. Gravity tanks. Pressure tanks. Location. Beams supporting tanks. Capacity of tanks. Tank towers and bolting. Wind braces and anchorage. Saddles.

PART TWO.

- CHAPTER XVI.—Permit to Build.**
How to obtain a permit. Plans and specifications. Permits for new buildings. Permits for alterations. Slip applications. Approval of plans. Complete application for erection of brick buildings with over sixty questions fully answered.
- CHAPTER XVII.—The Building Code.**
List of sections relating to iron work. Full text of sections of the Code relating to iron and steel specifications, erection and inspection.
- CHAPTER XVIII.—Building Code Index.**
For a quick reference to sections relating to iron work.
- CHAPTER XIX.—Special Regulations of the Bureau of Buildings.**
Projections beyond building line. Ornamental columns, steps, moldings, rustications, marquises and awnings. Electric signs. Moving picture booths.
- CHAPTER XX.—Extracts From the State Labor Laws and the Sanitary Code.**
Relating to construction of iron and steel work. Inspection of scaffolding, ropes, blocks, pulleys and tackles. Accidents. Penalties. Insecure scaffolding. Planklag. The Sanitary code. Mafessance and Nonfeassance.
- CHAPTER XXI.—Extracts From the Rules and Regulations of the Bureau of Buildings.**
Relative to Iron Inspectors. Hours of duty. Violations of Law. Reports. Complaints. Inspections. Use of official badge.
- CHAPTER XXII.—Reports.**
General remarks. Daily journal reports. Reports on violations of law. Reports in full form. Digests of reports on violations of

Labor Laws. Digests of over fifty reports on violations of provisions of the laws relating to iron work. Special reports in full form. Report on complaint. Report on succumbering fire exit. Dismissing a violation. Report on working without a permit. Report for dismissal of a violation. Report on defective ladders. Report on dangerous construction. Report on defective work about to be covered up. Final report of completion of work. Monthly report of progress of steel work on an important building.

CHAPTER XXIII.—Questions and Answers.

For previous Civil Service examinations for Inspector of Iron and Steel construction.

First paper questions: Technical. Arithmetic.

Second paper questions: Technical. Arithmetic. Report.

First paper answers: Technical. Arithmetic.

Second paper answers: Technical. Arithmetic. Report.

PART THREE.

CHAPTER XXIV.—Explanation of Tables.

Wire and sheet metal gauges. Determining gauges.
Shearing and bearing value of rivets. Length of rivets.
Properties of American Standard and Special beams. Definitions.
Moment of Inertia. Radius of Gyration. Section Modulus.
Properties of American Standard and Special channels.
Properties of Standard and Special Angles.
Properties of Bethlehem I Beams and Bethlehem Girder Beams.
Comparison with standard beams.
Properties of Bethlehem H Columns. Advantages and disadvantages.
Safe loads for beams, channels and angles. Uniform loads. Concentrated loads. Design of beams.
Safe loads on channels set flatwise.
Safe loads for Cast Iron Columns. Design of cast iron columns.
Design of steel columns.
Safe loads for standard shapes used as struts. Maximum unsupported length for various shapes.
Cylindrical tanks and their capacity.
Conversion tables. Decimals of an inch for each 1-32. Decimals of a foot for each 1-16.

CHAPTER XXV.—Tables.

Twenty ready reference tables for field use.

INDEX.

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 reporting and compliance with regulatory requirements. The text notes that incomplete or inaccurate records can lead to significant legal and financial consequences for the organization.

2. The second section focuses on the role of internal controls in preventing fraud and errors. It outlines various control mechanisms, such as segregation of duties, regular audits, and the implementation of robust approval processes. The document stresses that a strong internal control system is not only a defense against fraud but also a key factor in ensuring the reliability of financial data.

3. The third part of the document addresses the challenges of data security in the digital age. It highlights the need for organizations to invest in advanced cybersecurity measures, including encryption, firewalls, and regular security updates. The text also discusses the importance of employee training and awareness programs to mitigate the risk of data breaches caused by human error.

4. The final section discusses the impact of emerging technologies on business operations. It explores how artificial intelligence, cloud computing, and big data analytics can be leveraged to improve efficiency and decision-making. However, it also cautions against the potential risks associated with these technologies, such as data privacy concerns and the need for robust governance frameworks.