

# بازرسی دیگ‌های بخار و مبدل‌های حرارتی

نویسنده

فریدون مجدنی

ایوگنی سرکیو



سرشناسه	مجدنیا، فریدون.
عنوان و نام پدیدآور	Majdnia, Fereydoun Inspection of steam boilers and heat exchangers/ by Fereydoun Majdnia, Evgeny Sergeev.
مشخصات نشر	تهران: کتاب یار مهربان، ۱۳۹۶=۲۰۱۷.
مشخصات ظاهری	۸۴ ص: ۱۴/۵×۲۱/۵ س.م
شابک	۹۷۸۶۰۰۷۵۳۶۹۴۰
وضعیت فهرست نویسی	فیبأ
یادداشت	انگلیسی
یادداشت	عنوان به فارسی: بازرسی دیگهای بخار و مبدل‌های حرارتی
آوانویسی عنوان	اینسپکشن آو...
نوع	دیگ‌های بخار --- بازرسی
موضوع	Steam-boiler inspection
موضوع	مبدل‌های گرمایی
موضوع	Heat exchangers
شناسه داده	سرگی. یف. یوگنی یوریویچ، ۱۹۵۹-م
شناسه افزوده	Sergeev, E. IU. (Evgenii IUr'evich)
رده بندی کنگره	TJ۲۹۸/م۳۹۳۱۹۵
رده بندی دیویی	۶۶۳۱
شماره کتابشناسی ملی	۴۹۶۳۱



## Inspection of Steam Boilers and Heat Exchangers

### بازرسی دیگ‌های بخار و مبدل‌های حرارتی

نویسندگان: فریدون مجنیا، ایوان سرگیو

ناشر: کتاب یار مهربان

طراح جلد: سعید بابایی

صفحه آرا: سیدمهدی تقوی

لیتوگرافی، چاپ و صحافی: نگین چاپ

نوبت چاپ: اول ۱۳۹۷ - تیراز: ۱۰۰۰ - قیمت: ۱۰۰۰۰ تومان

شابک: ۹۷۸-۶۰۰-۷۵۳۶-۹۴-۰

ISBN: 978-600-7536-94-0

تمامی حقوق برای نویسندگان محفوظ است

انتشارات کتاب یار مهربان: تلفکس: ۶۶۹۷۹۷۶

## Table of Content

INTRODUCTION	11
Chapter-1 Steam Boilers	15
1. Types Of Boilers	15
1.1. Electric Boilers	16
1.2. Fire Tube Boilers	16
1.3. Water Tube Boilers	18
1.4. Nuclear Reactor Boilers	19
Chapter-2 Degradation Of Boilers	25
2. Common Degradation In Boilers	25
2.1. Deterioration Of Boiler Tubes	25
2.2. External Damages Of Tubes	29
2.3. Mechanical Deterioration	34
2.4. Structure Failure	35
Chapter-3 Inspection Of Boilers	37
3. Preparation for Inspection	37
3.1. SAFETY PRECAUTIONS	39
3.2. Internal Cleaning Of Boilers	41
3.3. Inspection Of Boilers	43
3.4. Inspection of Heat Recovery Steam Generator	58

Chapter-4 Heat Exchangers .....	62
4. Types of Heat Exchangers.....	62
4.1. Tube-In-Tube Exchanger.....	62
4.2. Shell And Tube Heat Exchanger .....	63
4.2.1. Straight-Tube Design.....	63
4.2.2. U-Tube Design.....	64
4.2.3. Floating Head Exchangers.....	65
4.2.4. Fixed Tube Sheet Exchanger.....	65
4.2.5. Re-boiler / Kettle Type Heat Exchanger.....	65
Chapter-5 Degradation in Heat Exchangers .....	69
5. Degradation in Heat Exchangers.....	69
5.1. Degradation at Shell and Shell Cover.....	69
5.2. Degradation at Tubes .....	70
5.3. Degradation at Tube Sheets.....	73
5.4. Degradation at Floating Head Cover .....	74
5.5. Degradation at Channel and Channel Cover.....	74
5.6. Degradation at Baffles .....	74
5.7. Gaskets and Gasket Sealing Surfaces .....	75
Chapter-6 Inspection Of Heat Exchangers .....	76
6. Inspection Of Heat Exchangers .....	76
6.1. On Stream Inspection.....	76
6.2. Internal Inspection.....	77

## Preface

The authors are experienced inspection engineers with years of work in oil and gas industry with exposure to various types of projects, operations and have worked in the field of inspection, training of inspectors, establishing quality system program for projects and inspection program for the operational plants.

In line with the training of the inspectors, students and those interested in inspection of plant equipment, the authors decided to prepare book series on inspection of the equipment to be used by interested persons. The unique approach is, in addition to explaining the inspection methods the common degradations and problems of the equipment are also described.

We see it more useful to design small books on the inspection of various types of equipment rather than a single and bulky book to cover all items. The pocket type and handy books are easily accessible and are mobile to be used by students, inspectors and technicians with affordable price. These are not made for the shelves but for the desktops and pockets.

We have tried to cover the type of the equipment that are used widely in various processing plant such as crude oil refineries, petrochemical plants, boosting pump stations, tank farms and loading facilities, oil and gas processing plants as well as power generation and utility plants.

It worth to note that we have avoided to concentrate on inspection check lists and reporting formats as those can easily be prepared and designed by individuals and available in each company.