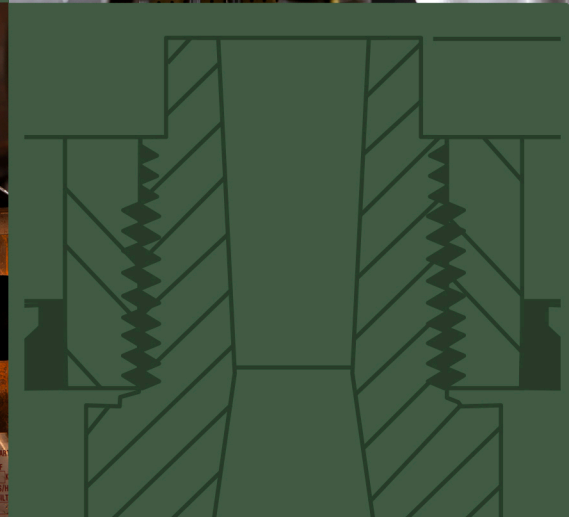
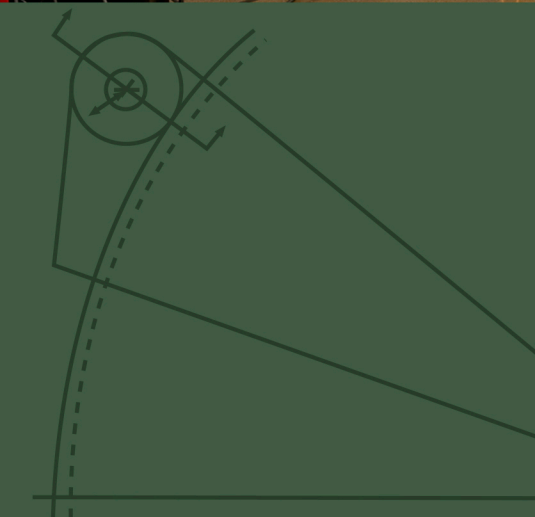
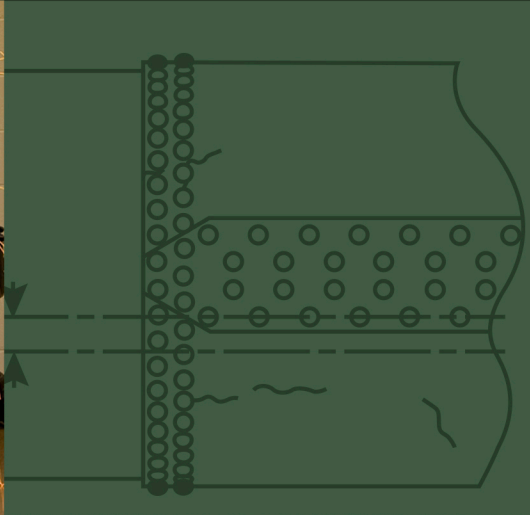




2013 NBIC

NATIONAL BOARD INSPECTION CODE



AN AMERICAN NATIONAL STANDARD

PART 1 INSTALLATION

2013 **NBIC**

PART 1, INSTALLATION

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Headquarters

1055 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.847.1828 Fax

Testing Laboratory

7437 Pingue Drive
Worthington, Ohio 43085-1715
614.888.8320
614.848.3474 Fax

Training & Conference Center

1065 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.847.5542 Fax

Inspection Training Center

1075 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.431.3208 Fax

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National Board Inspection Code
2013 Edition
Date of Issue — July 1, 2013

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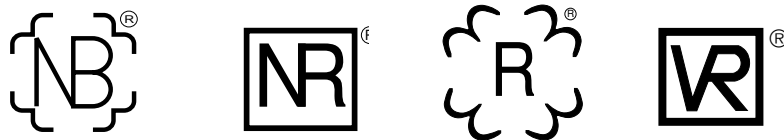
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The National Board accepts responsibility for only those interpretations issued in accordance with governing National Board procedures and policies that preclude the issuance of interpretations by individual committee members.

The footnotes in this document are part of this American National Standard.



The above National Board symbols are registered with the US Patent Office.

“National Board” is the abbreviation for The National Board of Boiler and Pressure Vessel Inspectors.

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Foreword

The National Board of Boiler and Pressure Vessel Inspectors is an organization composed of Chief Inspectors for the states, cities, and territories of the United States and provinces and territories of Canada. It is organized for the purpose of promoting greater safety to life and property by securing concerted action and maintaining uniformity in post-construction activities of pressure-retaining items, thereby ensuring acceptance and interchangeability among Jurisdictional authorities responsible for the administration and enforcement of various codes and standards.

In keeping with the principles of promoting safety and maintaining uniformity, the National Board originally published the NBIC in 1946, establishing rules for inspection and repairs to boilers and pressure vessels. The National Board Inspection Code (NBIC) Committee is charged with the responsibility for maintaining and revising the NBIC. In the interest of public safety, the NBIC Committee decided, in 1995, to revise the scope of the NBIC to include rules for installation, inspection, and repair or alteration to boilers, pressure vessels, piping, and nonmetallic materials.

In 2007, the NBIC was restructured into three Parts specifically identifying important post-construction activities involving safety of pressure-retaining items. This restructuring provides for future expansion, transparency, and uniformity, ultimately improving public safety.

The NBIC Committee's function is to establish rules of safety governing post-construction activities for the installation, inspection, and repair and alteration of pressure-retaining items, and to interpret these rules when questions arise regarding their intent. In formulating the rules, the NBIC Committee considers the needs and concerns of individuals and organizations involved in the safety of pressure-retaining items. The objective of the rules is to afford reasonably certain protection of life and property, so as to give a reasonably long, safe period of usefulness. Advancements in design and material and the evidence of experience are recognized.

The rules established by the NBIC Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design, or as limiting in any way an organization's freedom to choose any method that conforms to the NBIC rules.

The NBIC Committee meets regularly to consider revisions of existing rules, formulation of new rules, and to respond to requests for interpretations. Requests for interpretation must be addressed to the NBIC Secretary in writing and must give full particulars in order to receive Committee consideration and a written reply. Proposed revisions to the Code resulting from inquiries will be presented to the NBIC Committee for appropriate action.

Proposed revisions to the Code approved by the NBIC Committee are submitted to the American National Standards Institute and published on the National Board Website to invite comments from all interested persons. After the allotted time for public review and final approval, the new edition is published.

Organizations or users of pressure-retaining items are cautioned against making use of revisions that are less restrictive than earlier requirements without having assurance that they have been accepted by the Jurisdiction where the pressure-retaining item is installed.

The general philosophy underlying the NBIC is to parallel those provisions of the original code of construction, as they can be applied to post-construction activities.

The NBIC does not contain rules to cover all details of post-construction activities. Where complete details are not given, it is intended that individuals or organizations, subject to the acceptance of the Inspector and Jurisdiction when applicable, provide details for post-construction activities that will be as safe as otherwise provided by the rules in the original code of construction.

Activities not conforming to the rules of the original code of construction or the NBIC must receive specific approval of the Jurisdiction, who may establish requirements for design, construction, inspection, testing, and documentation.

There are instances where the NBIC serves to warn against pitfalls; but the Code is not a handbook, and cannot substitute for education, experience, and sound engineering judgment.

It is intended that this edition of the NBIC not be retroactive. Unless the Jurisdiction imposes the use of an earlier edition, the latest effective edition is the governing document.

Introduction

It is the purpose of the National Board Inspection Code (NBIC) to maintain the integrity of pressure-retaining items by providing rules for installation, and after the items have been placed into service, by providing rules for inspection and repair and alteration, thereby ensuring that these items may continue to be used safely.

The NBIC is intended to provide rules, information and guidance to manufacturers, Jurisdictions, inspectors, owner-users, installers, contractors, and other individuals and organizations performing or involved in post-construction activities, thereby encouraging the uniform administration of rules pertaining to pressure-retaining items.

Scope

The NBIC recognizes three important areas of post-construction activities where information, understanding, and following specific requirements will promote public and personal safety. These areas include:

- Installation
- Inspection
- Repairs and Alterations

The NBIC provides rules, information, and guidance for post-construction activities, but does not provide details for all conditions involving pressure-retaining items. Where complete details are not provided in this Code, the Code user is advised to seek guidance from the Jurisdiction and from other technical sources.

The words shall, should, and may are used throughout the NBIC and have the following intent:

- Shall – action that is mandatory and required.
- Should – indicates a preferred but not mandatory means to accomplish the requirement unless specified by others such as the Jurisdiction.
- May – permissive, not required or a means to accomplish the specified task.

Organization

The NBIC is organized into three Parts to coincide with specific post-construction activities involving pressure-retaining items. Each Part provides general and specific rules, information, and guidance within each applicable post-construction activity. Other NBIC Parts or other published standards may contain additional information or requirements needed to meet the rules of the NBIC. Specific references are provided in each Part to direct the user where to find this additional information. NBIC Parts are identified as:

- Part 1, Installation – This Part provides requirements and guidance to ensure all types of pressure-retaining items are installed and function properly. Installation includes meeting specific safety criteria for construction, materials, design, supports, safety devices, operation, testing, and maintenance.
- Part 2, Inspection – This Part provides information and guidance needed to perform and document inspections for all types of pressure-retaining items. This Part includes information on personnel safety, non-destructive examination, tests, failure mechanisms, types of pressure equipment, fitness for service, risk-based assessments, and performance-based standards.

- Part 3, Repairs and Alterations – This Part provides information and guidance to perform, verify, and document acceptable repairs or alterations to pressure-retaining items regardless of code of construction. Alternative methods for examination, testing, heat treatment, etc., are provided when the original code of construction requirements cannot be met. Specific acceptable and proven repair methods are also provided.

Each NBIC Part is divided into major Sections as outlined in the Table of Contents.

Tables, charts, and figures provide relevant illustrations or supporting information for text passages, and are designated with numbers corresponding to the paragraph they illustrate or support within each Section. Multiple tables, charts, or figures referenced by the same paragraph will have additional letters reflecting the order of reference. Tables, charts, and figures are located in or after each major Section within each NBIC Part.

Text Identification and Numbering

Each page in the text will be designated in the top header with the publication's name, part number, and part title. The numbering sequence for each section begins with the section number followed by a dot to further designate major Sections (e.g., 1.1, 1.2, 1.3). Major Sections are further subdivided using dots to designate subsections within that major Section (e.g., 1.1.1, 1.2.1, 1.3.1). Subsections can further be divided as necessary.

Paragraphs under Sections or Subsections shall be designated with small letters in parenthesis [e.g., a), b), c)] and further subdivided using numbers in parentheses [e.g., 1), 2), 3)]. Subdivisions of paragraphs beyond this point will be designated using a hierarchical sequence of letters and numbers followed by a dot.

Example: 2.1 Major Section
 2.1.1 Section
 2.1.2 Section
 2.1.2. Subsection
 a) paragraph
 b) paragraph
 1) subparagraph
 2) subparagraph
 a. subdivisions
 1. subdivisions
 2. subdivisions
 b. subdivisions
 1. subdivisions
 2. subdivisions

Tables and figures will be designated with the referencing Section or Subsection identification. When more than one table or figure is referenced in the same Section or Subsection, letters or numbers in sequential order will be used following each Section or Subsection identification.

Supplements

Supplements are contained in each Part of the NBIC to designate information pertaining only to a specific type of pressure-retaining item (e.g., Locomotive Boilers, Historical Boilers, Graphite Pressure Vessels.) Supplements follow the same numbering system used for the main text, preceded by the letter "S." Each page of the Supplement will identify the Supplement number and name in the top heading.

Editions

Editions, which include revisions and additions to this Code, are published every two years. Editions are permissive on the date issued and become mandatory six months after the date of issue.

Interpretations

On request, the NBIC Committee will render an interpretation of any requirement of this Code. Interpretations are provided for each Part and are specific to the Code edition and addenda referenced in the interpretation. Interpretations provide information only and are not part of this Code.

Jurisdictional Precedence

Reference is made throughout this Code to the requirements of the "Jurisdiction." Where any provision herein presents a direct or implied conflict with any jurisdictional regulation, the Jurisdictional regulation shall govern.

Units of Measurement

Both U.S. customary units and metric units are used in the NBIC. The value stated in U.S. customary units or metric units is to be regarded separately as the standard. Within the text, the metric units are shown in parentheses. In Supplement 6, from Parts 2 and 3, Continued Service and Inspection of DOT Transport Tanks, however, the metric units are shown first with the U.S. customary units shown in parentheses.

U.S. customary units or metric units may be used with this edition of the NBIC, but one system of units shall be used consistently throughout a repair or alteration of pressure-retaining items. It is the responsibility of National Board accredited repair organizations to ensure the appropriate units are used consistently throughout all phases of work. This includes materials, design, procedures, testing, documentation, and stamping. The NBIC policy for metrication is outlined in each Part of the NBIC.

Accreditation Programs

The National Board administers and accredits three specific repair programs¹ as shown below:

- “R”.....Repairs and Alterations to Pressure-Retaining Items
- “VR”.....Repairs to Pressure Relief Valves
- “NR”.....Repair and Replacement Activities for Nuclear Items

Part 3, Repairs and Alterations, of the NBIC describes the administrative requirements for the accreditation of these repair organizations.

The National Board also administers and accredits four specific inspection agency programs as shown below:

New Construction

Criteria for Acceptance of Authorized Inspection Agencies for New Construction (NB-360)

Inservice

Qualifications and Duties for Authorized Inspection Agencies (AIAs) Performing In-service Inspection Activities and Qualifications for Inspectors of Boilers and Pressure Vessels (NB-369)

Owner-User

Accreditation of Owner-User Inspection Organizations (OUIO) Owners or users may be accredited for both a repair and inspection program provided the requirements for each accreditation program are met (NB-371)

Federal Government

Qualifications and Duties for Federal Inspection Agencies (FIAs) Performing Inservice Inspection Activities (NB-390)

These programs can be viewed on the National Board Website. For questions or further information regarding these programs, contact:

The National Board of Boiler and Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, OH 43229-1183
Phone — 614.888.8320
Fax — 614.847.1828
Website — www.nationalboard.org

Certificates of Authorization for Accreditation Programs

Any organization seeking an accredited program may apply to the National Board to obtain a Certificate of Authorization for the requested scope of activities. A confidential review shall be conducted to evaluate the organization’s quality system. Upon completion of the evaluation, a recommendation will be made to the National Board regarding issuance of a Certificate of Authorization.

Certificate of Authorization scope, issuance, and revisions for National Board accreditation programs are specified in the applicable National Board procedures. When the quality system requirements of the appropriate accreditation program have been met, a Certificate of Authorization and appropriate National Board symbol stamp shall be issued.

¹ Caution, some Jurisdictions may independently administer a program of authorization for organizations to perform repairs and alterations within that Jurisdiction.

2013 NBIC

PART 1, INSTALLATION

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PART 1 — INSTALLATION TABLE OF CONTENTS

National Board Contact Information	II
NB Board of Trustees / Advisory Committee Members	III
National Board Members	IV
NBIC Committee Structure	V
National Board Inspection Code Edition / Addendum	XI
Foreword	XII
Introduction.....	XIV
Section 1 General Guidelines.....	7
1.1 Introduction	8
1.2 Purpose	8
1.3 Application of these Rules	8
1.4 Certification, Inspection, and Jurisdictional Requirements	9
1.4.1 Responsibility	9
1.4.2 Equipment Certification	9
1.4.3 Jurisdictional Review	9
1.4.4 Inspection	10
1.4.5 <i>Boiler Installation Report</i>	10
1.4.5.1 <i>Boiler Installation Report I-1</i>	11
1.4.5.1.1 <i>Guide for Completing National Board Boiler Installation Report</i>	12
Section 2 Power Boilers	15
2.1 Scope	16
2.2 Definitions	16
2.3 General Requirements	16
2.3.1 Supports, Foundations, and Settings	16
2.3.2 Structural Steel	16
2.3.3 Clearances	16
2.4 Boiler Room Requirements	17
2.4.1 Exit	17
2.4.2 Ladders and Runways	17
2.4.3 Drains	18
2.4.4 Water (Cleaning)	18
2.5 Source Requirements	18
2.5.1 Feedwater	18
2.5.1.1 Volume	18
2.5.1.2 Connection	18
2.5.1.3 Pumps	19
2.5.1.4 Valves	19
2.5.2 Fuel	20
2.5.3 Electrical	20
2.5.3.1 Wiring	20
2.5.3.2 Remote Emergency Shutdown Switches	20
2.5.3.3 Controls and Heat-Generating Apparatus	21
2.5.4 Ventilation and Combustion Air	21
2.5.5 Lighting	21
2.5.6 Emergency Valves and Controls	22
2.6 Discharge Requirements	22

2.6.1	Chimney or Stack	22
2.6.2	Ash Removal	22
2.6.3	Drains	22
2.6.3.1	Connection	22
2.6.3.2	Pressure Rating	22
2.6.3.3	Parts	23
2.7	Operating Systems	23
2.7.1	Breeching and Dampers	23
2.7.2	Burners and Stokers	23
2.7.3	Steam Supply	23
2.7.4	Condensate and Return	24
2.7.5	Blowoff	24
2.8	Controls and Gages	26
2.8.1	Water	26
2.8.2	Pressure Gage	27
2.8.2.1	Connection	27
2.8.3	Temperature	27
2.9	Pressure Relief Valves	27
2.9.1	Valve Requirements — General	27
2.9.1.1	Number	28
2.9.1.2	Location	28
2.9.1.3	Capacity	28
2.9.1.4	Set Pressure	30
2.9.2	Forced-Flow Steam Generator	30
2.9.3	Superheaters	31
2.9.4	Economizers	31
2.9.5	Pressure-Reducing Valves	31
2.9.6	Mounting and Discharge Requirements	32
2.10	Testing and Acceptance	33
2.10.1	General	33
2.10.2	Pressure Test	33
2.10.3	Nondestructive Examination	33
2.10.4	System Testing	34
2.10.5	Final Acceptance	34
2.10.6	Boiler Installation Report	34
2.11	Tables and Figures	34
Section 3	Steam Heating Boilers, Hot-Water Heating Boilers, Hot-Water Supply Boilers, and Potable Water Heaters	35
3.1	Scope	36
3.2	Definitions	36
3.3	General Requirements	36
3.3.1	Supports	36
3.3.1.1	Methods of Support for Steam Heating, Hot-Water Heating, and Hot-Water Supply Boilers	36
3.3.2	Settings	38
3.3.3	Structural Steel	38
3.3.4	Clearances	38
3.4	Boiler Room Requirements	39
3.4.1	Exit	39
3.4.2	Ladders and Runways	39
3.5	Source Requirements	40
3.5.1	Water	40
3.5.2	Fuel	40
3.5.3	Electrical	40
3.5.4	Ventilation and Combustion Air	41
3.5.5	Lighting	41
3.5.6	Emergency Valves and Controls	41

3.6	Discharge Requirements	42
3.6.1	Chimney or Stack	42
3.6.2	Ash Removal	42
3.6.3	Drains	42
3.7	Operating Systems	42
3.7.1	Oil Heaters	42
3.7.2	Breeching and Dampers	42
3.7.3	Burners and Stokers	42
3.7.4	Feedwater, Makeup Water, and Water Supply	43
3.7.5	Stop Valves	43
3.7.5.1	Steam Heating, Hot-Water Heating, and Hot-Water Supply Boilers	43
3.7.5.2	Potable Water Heaters	47
3.7.6	Return Pipe Connections	47
3.7.7	Bottom Blowoff and Drain Valves	47
3.7.7.1	Steam Heating, Hot-Water Heating, and Hot-Water Supply Boilers	47
3.7.7.2	Potable Water Heaters	49
3.7.8	Modular Steam Heating and Hot-Water Heating Boilers	50
3.7.8.1	Individual Modules	50
3.7.8.2	Assembled Modular Boilers	50
3.7.9	Provisions for Thermal Expansion	50
3.7.9.1	Expansion Tanks and Piping for Steam Heating, Hot-Water Heating, Hot-Water Supply Boilers	50
3.7.9.2	Expansion Tanks and Piping For Potable Water Heaters	52
3.8	Instruments, Fittings, and Controls	54
3.8.1	Steam Heating Boilers	54
3.8.1.1	Steam Gages	54
3.8.1.2	Water Gage Glasses	55
3.8.1.3	Water Column and Water Level Control Pipes	55
3.8.1.4	Pressure Control	56
3.8.1.5	Automatic Low-Water Fuel Cutoff and/or Water Feeding Device	56
3.8.1.6	Modular Steam Heating Boilers	56
3.8.1.7	Instruments, Fittings, and Controls Mounted Inside Boiler Jackets	57
3.8.2	Hot-Water Heating or Hot-Water Supply Boilers	57
3.8.2.1	Pressure or Altitude Gages	57
3.8.2.2	Thermometers	57
3.8.2.3	Temperature Control	57
3.8.2.4	Low-Water Fuel Cutoff	58
3.8.2.5	Modular Hot-Water Heating Boilers	58
3.8.2.6	Instruments, Fittings, and Controls Mounted Inside Boiler Jackets.....	58
3.8.3	Potable Water Heaters	59
3.8.3.1	Temperature Controls	59
3.8.3.2	Thermometer	59
3.9	Pressure-Relieving Valves	59
3.9.1	Safety Valve Requirements — General	59
3.9.1.1	Mounting Safety and Safety Relief Valves for Steam Heating, Hot-Water Heating, and Hot-Water Supply Boilers	59
3.9.1.1.1	Permissible Mounting	59
3.9.1.1.2	Requirements for Common Connections for Two or More Valves	60
3.9.1.2	Threaded Connections	60
3.9.1.3	Prohibited Mountings	60
3.9.1.4	Use of Shutoff Valves Prohibited	60
3.9.1.5	Safety and Safety Relief Valve Discharge Piping	60
3.9.1.6	Temperature and Pressure Safety Relief Valves	60
3.9.2	Safety Valve Requirements for Steam Boilers	61
3.9.3	Safety Relief Valve Requirements for Hot-Water Heating or Hot-Water Supply Boilers	62
3.9.4	Safety Relief Valve Requirements for Potable Water Heaters	63
3.9.4.1	Installation	64
3.9.4.2	Permissible Mountings	64

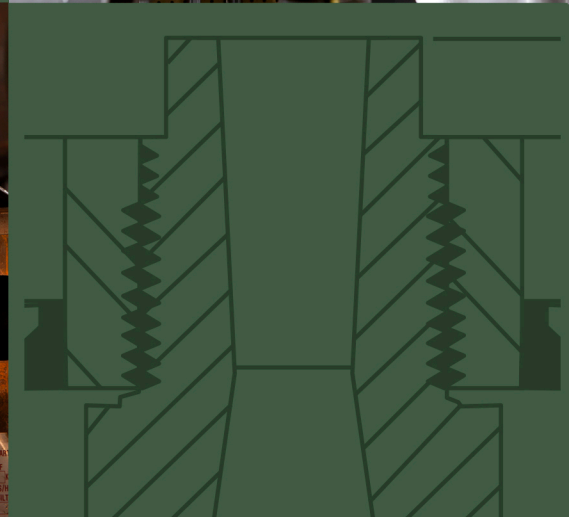
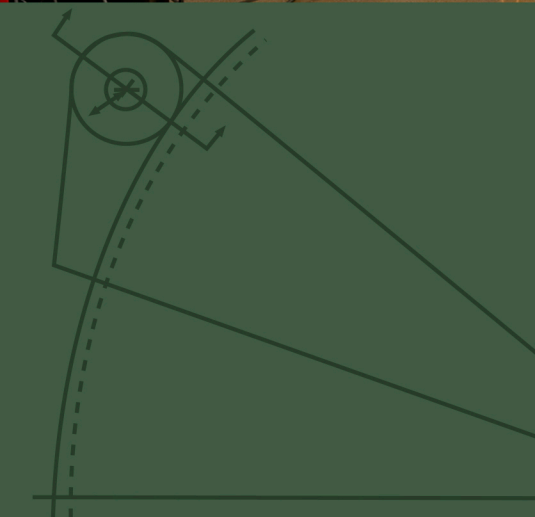
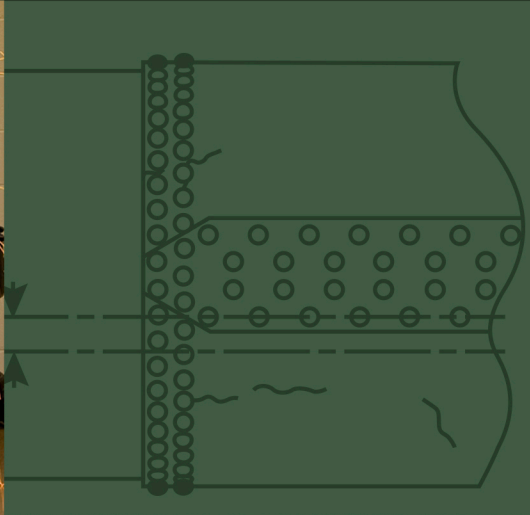
3.9.4.3	Requirements for Common Connection for Two or More Valves	64
3.9.4.4	Threaded Connections	64
3.9.4.5	Prohibited Mountings	64
3.9.4.6	Use of Shutoff Valves Prohibited	64
3.9.4.7	Safety Relief Valve Discharge Piping	65
3.9.5	Safety and Safety Relief Valves for Tanks and Heat Exchangers	65
3.9.5.1	Steam to Hot-Water Supply	65
3.9.5.2	High-Temperature Water to Water Heat Exchanger	65
3.9.5.3	High-Temperature Water to Steam Heat Exchanger	65
3.10	Testing and Acceptance	65
3.10.1	Pressure Test	65
3.10.2	Final Acceptance	66
3.10.3	<i>Boiler Installation Report</i>	66
3.11	Tables and Figures	66
Section 4	Pressure Vessels.....	67
4.1	Scope	68
4.2	Definitions	68
4.3	General Requirements	68
4.3.1	Supports	68
4.3.2	Clearances	68
4.3.3	Piping	68
4.3.4	Bolting	69
4.4	Instruments and Controls	69
4.4.1	Level Indicating Devices	69
4.4.2	Pressure Indicating Devices	69
4.5	Pressure Relief Devices	69
4.5.1	Device Requirements	69
4.5.2	Number of Devices	69
4.5.3	Location	70
4.5.4	Capacity	70
4.5.5	Set Pressure	70
4.5.6	Installation and Discharge Piping Requirements	71
4.6	Testing and Acceptance	72
4.7	Requirements for Hot Water Storage Tanks	72
4.7.1	Supports	72
4.7.2	Clearance and Acceptability	72
4.7.3	Safety Relief Devices	72
4.7.4	Thermometers	73
4.7.5	Shut Off Valves	73
4.7.6	Testing and Acceptance	73
Section 5	Piping	75
5.1	Scope	76
5.2	General Requirements	76
5.2.1	Additions to Existing Piping	76
5.2.2	Proximity to Other Equipment and Structures	76
5.2.3	Flanges and Other Non-Welded Joints	76
5.2.4	Valves	76
5.2.5	Materials	77
5.2.6	Hangers and Supports	77
5.2.7	Protection and Cleaning	77
5.2.8	Welding and Brazing	77
5.2.9	Bolting	77
5.3	Pressure Relief Devices	77
5.3.1	Device Requirements	79
5.3.2	Number of Devices	79
5.3.3	Location	79

5.3.4	Capacity	78
5.3.5	Set Pressure	78
5.3.6	Inlet and Discharge Piping Requirements	79
5.4	Examination, Inspection, and Testing	80
Section 6	Supplements	81
Supplement 1	Installation of Yankee Dryers (Rotating Cast-Iron Pressure Vessels) with Finished Shell Outer Surfaces	82
S1.1	Scope	82
S1.2	Assessment of Installation.....	82
S1.3	Determination of Allowable Operating Parameters	85
S1.4	ASME Code Primary Membrane Stress Criteria	86
S1.5	Pressure Testing.....	86
S1.6	Nondestructive Examination.....	87
Supplement 2	Safety Valves on the Low-Pressure Side of Steam Pressure-Reducing Valves	88
S2.1	Scope	88
S2.2	Safety Valve Capacity	88
S2.3	Calculation of Safety Valve Relieving Capacity	89
S2.4	Steam Flow When Flow Coefficients Are Not Known	93
S2.5	Two-Stage Pressure-Reducing Valve Stations	93
Supplement 3	Installation of Liquid Carbon Dioxide Storage Vessels	95
S3.1	Scope	95
S3.2	General Requirements Storage Tank Location	95
S3.2.1	General Requirements (Enclosed and Unenclosed Areas)	95
S3.2.2	Unenclosed Area LCDSV Installations	96
S3.2.3	Enclosed Area LCDSV Installations	96
S3.3	Fillbox Location / Safety Relief/Vent Valve Circuit Termination	96
S3.4	Gas Detection Systems	97
S3.5	Signage	97
S3.6	Valves, Piping, Tubing and Fittings	98
S3.6.1	System Description	99
Section 7	NBIC Policy for Metrication	103
7.1	General	104
7.2	Equivalent Rationale	104
7.3	Procedure for Conversion	104
7.4	Referencing Tables	105
Section 8	Preparation of Technical Inquiries to the <i>National Board</i> <i>Inspection Code Committee</i>	109
8.1	Introduction	110
8.2	Inquiry Format	110
8.3	Code Revisions or Additions	111
8.4	Code Interpretations	111
8.5	Submittals	112
Section 9	Glossary of Terms	113
9.1	Definitions	114
Section 10	NBIC Approved Interpretations	121
10.1	Scope	122
10.2	Index of Interpretations.....	122
10.3	Subject Index of Interpretations.....	125
Section 11	Index	129



2013 NBIC

NATIONAL BOARD INSPECTION CODE



AN AMERICAN NATIONAL STANDARD

PART 2 INSPECTION

2013 NBIC

PART 2, INSPECTION

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Headquarters

1055 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.847.1828 Fax

Testing Laboratory

7437 Pingue Drive
Worthington, Ohio 43085-1715
614.888.8320
614.848.3474 Fax

Training & Conference Center

1065 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.847.5542 Fax

Inspection Training Center

1075 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.431.3208 Fax

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M. Gorman
Digital Wave

D. Hodgkinson
Consultant

D. Keeler
The Dow Chemical Company

H. Marsh
Consultant

N. Newhouse
Lincoln Composites

J. Richter
Plant Maintenance Services, Inc.

Historical Boilers

R. Reetz, Chair
State of North Dakota

T. Dillion, Vice Chair
Deltak

B. Smith, Secretary
National Board

B. Babcock
Consultant

R. Bryce
Heartland Software Solutions

F. Johnson
PBF Energy

J. Larson
*One Beacon America
Insurance Company*

D. Rupert
Consultant

M. Wahl
WHSEA

National Board Inspection Code
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This code was developed under procedures accredited as meeting the criteria for American National Standards. The Consensus Committee that approved the code was balanced to ensure that individuals from competent and concerned interests had an opportunity to participate. The proposed code was made available for public review and comment, which provided an opportunity for additional public input from industry, academia, regulatory and jurisdictional agencies, and the public-at-large.

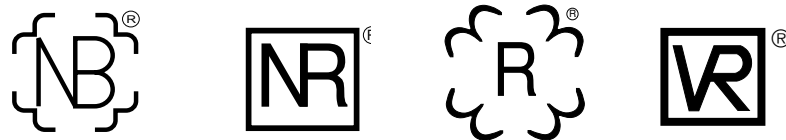
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The footnotes in this document are part of this American National Standard.



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“National Board” is the abbreviation for The National Board of Boiler and Pressure Vessel Inspectors.

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Foreword

The National Board of Boiler and Pressure Vessel Inspectors is an organization composed of Chief Inspectors for the states, cities, and territories of the United States and provinces and territories of Canada. It is organized for the purpose of promoting greater safety to life and property by securing concerted action and maintaining uniformity in post-construction activities of pressure-retaining items, thereby ensuring acceptance and interchangeability among Jurisdictional authorities responsible for the administration and enforcement of various codes and standards.

In keeping with the principles of promoting safety and maintaining uniformity, the National Board originally published the NBIC in 1946, establishing rules for inspection and repairs to boilers and pressure vessels. The National Board Inspection Code (NBIC) Committee is charged with the responsibility for maintaining and revising the NBIC. In the interest of public safety, the NBIC Committee decided, in 1995, to revise the scope of the NBIC to include rules for installation, inspection, and repair or alteration to boilers, pressure vessels, piping, and nonmetallic materials.

In 2007, the NBIC was restructured into three Parts specifically identifying important post-construction activities involving safety of pressure-retaining items. This restructuring provides for future expansion, transparency, and uniformity, ultimately improving public safety.

The NBIC Committee's function is to establish rules of safety governing post-construction activities for the installation, inspection, and repair and alteration of pressure-retaining items, and to interpret these rules when questions arise regarding their intent. In formulating the rules, the NBIC Committee considers the needs and concerns of individuals and organizations involved in the safety of pressure-retaining items. The objective of the rules is to afford reasonably certain protection of life and property, so as to give a reasonably long, safe period of usefulness. Advancements in design and material and the evidence of experience are recognized.

The rules established by the NBIC Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design, or as limiting in any way an organization's freedom to choose any method that conforms to the NBIC rules.

The NBIC Committee meets regularly to consider revisions of existing rules, formulation of new rules, and to respond to requests for interpretations. Requests for interpretation must be addressed to the NBIC Secretary in writing and must give full particulars in order to receive Committee consideration and a written reply. Proposed revisions to the Code resulting from inquiries will be presented to the NBIC Committee for appropriate action.

Proposed revisions to the Code approved by the NBIC Committee are submitted to the American National Standards Institute and published on the National Board Website to invite comments from all interested persons. After the allotted time for public review and final approval, the new edition is published.

Organizations or users of pressure-retaining items are cautioned against making use of revisions that are less restrictive than earlier requirements without having assurance that they have been accepted by the Jurisdiction where the pressure-retaining item is installed.

The general philosophy underlying the NBIC is to parallel those provisions of the original code of construction, as they can be applied to post-construction activities.

The NBIC does not contain rules to cover all details of post-construction activities. Where complete details are not given, it is intended that individuals or organizations, subject to the acceptance of the Inspector and Jurisdiction when applicable, provide details for post-construction activities that will be as safe as otherwise provided by the rules in the original code of construction.

Activities not conforming to the rules of the original code of construction or the NBIC must receive specific approval of the Jurisdiction, who may establish requirements for design, construction, inspection, testing, and documentation.

There are instances where the NBIC serves to warn against pitfalls; but the Code is not a handbook, and cannot substitute for education, experience, and sound engineering judgment.

It is intended that this edition of the NBIC and not be retroactive. Unless the Jurisdiction imposes the use of an earlier edition, the latest effective edition is the governing document.

Introduction

It is the purpose of the National Board Inspection Code (NBIC) to maintain the integrity of pressure-retaining items by providing rules for installation, and after the items have been placed into service, by providing rules for inspection and repair and alteration, thereby ensuring that these items may continue to be used safely.

The NBIC is intended to provide rules, information and guidance to manufacturers, Jurisdictions, inspectors, owner-users, installers, contractors, and other individuals and organizations performing or involved in post-construction activities, thereby encouraging the uniform administration of rules pertaining to pressure-retaining items.

Scope

The NBIC recognizes three important areas of post-construction activities where information, understanding, and following specific requirements will promote public and personal safety. These areas include:

- Installation
- Inspection
- Repairs and Alterations

The NBIC provides rules, information, and guidance for post-construction activities, but does not provide details for all conditions involving pressure-retaining items. Where complete details are not provided in this Code, the Code user is advised to seek guidance from the Jurisdiction and from other technical sources.

The words shall, should, and may are used throughout the NBIC and have the following intent:

- Shall – action that is mandatory and required.
- Should – indicates a preferred but not mandatory means to accomplish the requirement unless specified by others such as the Jurisdiction.
- May – permissive, not required or a means to accomplish the specified task.

Organization

The NBIC is organized into three Parts to coincide with specific post-construction activities involving pressure-retaining items. Each Part provides general and specific rules, information, and guidance within each applicable post-construction activity. Other NBIC Parts or other published standards may contain additional information or requirements needed to meet the rules of the NBIC. Specific references are provided in each Part to direct the user where to find this additional information. NBIC Parts are identified as:

- Part 1, Installation – This Part provides requirements and guidance to ensure all types of pressure-retaining items are installed and function properly. Installation includes meeting specific safety criteria for construction, materials, design, supports, safety devices, operation, testing, and maintenance.
- Part 2, Inspection – This Part provides information and guidance needed to perform and document inspections for all types of pressure-retaining items. This Part includes information on personnel safety, non-destructive examination, tests, failure mechanisms, types of pressure equipment, fitness for service, risk-based assessments, and performance-based standards.

- Part 3, Repairs and Alterations – This Part provides information and guidance to perform, verify, and document acceptable repairs or alterations to pressure-retaining items regardless of code of construction. Alternative methods for examination, testing, heat treatment, etc., are provided when the original code of construction requirements cannot be met. Specific acceptable and proven repair methods are also provided.

Each NBIC Part is divided into major Sections as outlined in the Table of Contents.

Tables, charts, and figures provide relevant illustrations or supporting information for text passages, and are designated with numbers corresponding to the paragraph they illustrate or support within each Section. Multiple tables, charts, or figures referenced by the same paragraph will have additional letters reflecting the order of reference. Tables, charts, and figures are located in or after each major Section within each NBIC Part.

Text Identification and Numbering

Each page in the text will be designated in the top header with the publication's name, part number, and part title. The numbering sequence for each Section begins with the Section number followed by a dot to further designate major sections (e.g., 1.1, 1.2, 1.3). Major Sections are further subdivided using dots to designate Subsections within that major Section (e.g., 1.1.1, 1.2.1, 1.3.1). Subsections can further be divided as necessary.

Paragraphs under Sections or Subsections shall be designated with small letters in parenthesis [e.g., a), b), c)] and further subdivided using numbers in parentheses [e.g., 1), 2), 3)]. Subdivisions of paragraphs beyond this point will be designated using a hierarchical sequence of letters and numbers followed by a dot.

Example: 2.1 Major Section
 2.1.1 Section
 2.1.2 Section
 2.1.2.1 Subsection
 a) paragraph
 b) paragraph
 1) subparagraph
 2) subparagraph
 a. subdivisions
 1. subdivisions
 2. subdivisions
 b. subdivisions
 1. subdivisions
 2. subdivisions

Tables and figures will be designated with the referencing Section or Subsection identification. When more than one table or figure is referenced in the same Section or Subsection, letters or numbers in sequential order will be used following each Section or Subsection identification.

Supplements

Supplements are contained in each Part of the NBIC to designate information pertaining only to a specific type of pressure-retaining item (e.g., Locomotive Boilers, Historical Boilers, Graphite Pressure Vessels.) Supplements follow the same numbering system used for the main text, preceded by the letter "S." Each page of the Supplement will identify the Supplement number and name in the top heading.

Editions

Editions, which include revisions and additions to this Code are published every two years. Editions are permissive on the date issued and become mandatory six months after the date of issue.

Interpretations

On request, the NBIC Committee will render an interpretation of any requirement of this Code. Interpretations are provided for each Part and are specific to the Code edition and addenda referenced in the interpretation. Interpretations provide information only and are not part of this Code.

Jurisdictional Precedence

Reference is made throughout this Code to the requirements of the "Jurisdiction." Where any provision herein presents a direct or implied conflict with any jurisdictional regulation, the Jurisdictional regulation shall govern.

Units of Measurement

Both U.S. customary units and metric units are used in the NBIC. The value stated in U.S. customary units or metric units is to be regarded separately as the standard. Within the text, the metric units are shown in parentheses. In Supplement 6, from Parts 2 and 3 Continued Service and Inspection of DOT Transport Tanks, however, the metric units are shown first with the U.S. customary units shown in parentheses.

U.S. customary units or metric units may be used with this edition of the NBIC, but one system of units shall be used consistently throughout a repair or alteration of pressure-retaining items. It is the responsibility of National Board accredited repair organizations to ensure the appropriate units are used consistently throughout all phases of work. This includes materials, design, procedures, testing, documentation, and stamping. The NBIC policy for metrication is outlined in each part of the NBIC.

Accreditation Programs

The National Board administers and accredits three specific repair programs¹ as shown below:

- “R”.....Repairs and Alterations to Pressure-Retaining Items
- “VR”.....Repairs to Pressure Relief Valves
- “NR”.....Repair and Replacement Activities for Nuclear Items

Part 3, Repairs and Alterations, of the NBIC describes the administrative requirements for the accreditation of these repair organizations.

The National Board also administers and accredits four specific inspection agency programs as shown below:

New Construction

Criteria for Acceptance of Authorized Inspection Agencies for New Construction (NB-360)

Inservice

Qualifications and Duties for Authorized Inspection Agencies (AIAs) Performing In-service Inspection Activities and Qualifications for Inspectors of Boilers and Pressure Vessels (NB-369)

Owner-User

Accreditation of Owner-User Inspection Organizations (OUIO) Owners or users may be accredited for both a repair and inspection program provided the requirements for each accreditation program are met. (NB-371)

Federal Government

Qualifications and Duties for Federal Inspection Agencies (FIAs) Performing Inservice Inspection Activities (NB-390)

These programs can be viewed on the National Board Website. For questions or further information regarding these programs, contact:

The National Board of Boiler and Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, OH 43229-1183
Phone — 614.888.8320
Fax — 614.847.1828
Website — www.nationalboard.org

Certificates of Authorization for Accreditation Programs

Any organization seeking an accredited program may apply to the National Board to obtain a Certificate of Authorization for the requested scope of activities. A confidential review shall be conducted to evaluate the organization’s quality system. Upon completion of the evaluation, a recommendation will be made to the National Board regarding issuance of a Certificate of Authorization.

Certificate of Authorization scope, issuance, and revisions for National Board accreditation programs are specified in the applicable National Board procedures. When the quality system requirements of the appropriate accreditation program have been met, a Certificate of Authorization and appropriate National Board symbol stamp shall be issued.

¹ Caution, some Jurisdictions may independently administer a program of authorization for organizations to perform repairs and alterations within that Jurisdiction.

2013 NBIC

PART 2, INSPECTION

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PART 2 — INSPECTION TABLE OF CONTENTS

National Board Contact Information	II
NB Board of Trustees / Advisory Committee Members	II
National Board Members	III
NBIC Committee Structure	IV
National Board Inspection Code Edition / Addendum	X
Foreword.....	X
Introduction	XIII
Section 1 General Requirements for Inservice Inspection of Pressure-Retaining Items.....	13
1.1 Scope	14
1.2 Administration	14
1.3 References to Other Codes and Standards	14
1.4 Personnel Safety	15
1.4.1 Personal Safety Requirements for Entering Confined Spaces.....	16
1.4.2 Equipment Operation	17
1.5 Inspection Activities	17
1.5.1 Inservice Inspection Activities	17
1.5.2 Pre-Inspection Activities	17
1.5.2.1 Inspection Planning	18
1.5.3 Preparation for Internal Inspection	18
1.5.4 Post-Inspection Activities	19
Section 2 Detailed Requirements for Inservice Inspection of Pressure-Retaining Items	21
2.1 Scope	22
2.2 Boilers	22
2.2.1 Scope	22
2.2.2 Service Conditions	22
2.2.3 Pre-Inspection Activities	22
2.2.4 Condition of Boiler Room or Boiler Location	23
2.2.5 External Inspection	23
2.2.6 Internal Inspection	23
2.2.7 Evidence of Leakage	24
2.2.8 Boiler Corrosion Considerations	24
2.2.9 Waterside Deposits	24
2.2.10 Inspection of Boiler Piping, Parts, and Appurtenances	25
2.2.10.1 Boiler Piping	25
2.2.10.2 Flanged or Other Connections	25
2.2.10.3 Miscellaneous	25
2.2.10.4 Gages	25
2.2.10.5 Pressure Relief Devices	26
2.2.10.6 Controls	26
2.2.11 Records Review	28
2.2.12 Description and Concerns of Specific Types of Boilers	28
2.2.12.1 Cast-Iron Boilers	28
2.2.12.2 Firetube Boilers	29
2.2.12.3 Watertube Boilers	31

2.2.12.4	Electric Boilers	32
2.2.12.5	Fired Coil Water Heaters	32
2.2.12.6	Fired Storage Water Heaters	33
2.2.12.7	Thermal Fluid Heaters	33
2.2.12.8	Waste Heat Boilers	35
2.2.12.9	Kraft or Sulfate Black Liquor Recovery Boilers	36
2.3	Pressure Vessels	38
2.3.1	Scope	38
2.3.2	Service Conditions	38
2.3.3	External Inspection	39
2.3.4	Internal Inspection	40
2.3.5	Inspection of Pressure Vessel Parts and Appurtenances	41
2.3.5.1	Gages	41
2.3.5.2	Safety Devices	41
2.3.5.3	Controls/Devices	41
2.3.5.4	Records Review	41
2.3.6	Description and Concerns of Specific Types of Pressure Vessels	42
2.3.6.1	Deaerators	42
2.3.6.2	Compressed Air Vessels	43
2.3.6.3	Expansion Tanks	44
2.3.6.4	Liquid Ammonia Vessels	44
2.3.6.5	Inspection of Pressure Vessels with Quick-Actuating Closures	48
2.3.6.6	Anhydrous Ammonia Nurse Tanks	50
2.3.6.7	Inspection of Pressure Vessels for Human Occupancy (PVHO).....	51
2.4	Piping and Piping Systems.....	54
2.4.1	Scope	54
2.4.2	Service Conditions	54
2.4.3	Assessment of Piping Design	54
2.4.4	External Inspection of Piping	54
2.4.5	Internal Inspection of Piping	55
2.4.6	Evidence of Leakage	55
2.4.7	Provisions for Expansion and Support	55
2.4.8	Inspection of Gages, Safety Devices, and Controls	56
2.4.8.1	Gages	56
2.4.8.2	Safety Devices	56
2.4.8.3	Quick-Disconnect Coupling.....	56
2.5	Pressure Relief Devices	56
2.5.1	Scope	56
2.5.2	Pressure Relief Device Data	57
2.5.3	Inservice Inspection Requirements for Pressure Relief Device Conditions	57
2.5.4	Inservice Inspection Requirements for Pressure Relief Devices Installation Condition	58
2.5.5	Additional Inspection Requirements	58
2.5.5.1	Boilers	58
2.5.5.2	Pressure Vessels and Piping	59
2.5.5.3	Rupture Disks	59
2.5.6	Packaging, Shipping, and Transportation.....	61
2.5.7	Testing and Operational Inspection of Pressure Relief Devices.....	61
2.5.8	Recommended Inspection and Test Frequencies for Pressure Relief Devices	63
Section 3	Corrosion and Failure Mechanisms	67
3.1	Scope	68
3.2	General	68
3.3	Corrosion	68

3.3.1	Macroscopic Corrosion Environments	68
3.3.2	Microscopic Corrosion Environments	70
3.3.3	Control of Corrosion	71
3.3.3.1	Process Variables	71
3.3.3.2	Protection	71
3.3.3.3	Material Selection	71
3.3.3.4	Coatings	71
3.3.3.5	Engineering Design	72
3.3.3.6	Conclusion	72
3.4	Failure Mechanisms	73
3.4.1	Fatigue	73
3.4.2	Creep	73
3.4.3	Temperature Effects	73
3.4.4	Hydrogen Embrittlement	73
3.4.5	High-Temperature Hydrogen Attack	74
3.4.6	Hydrogen Damage	75
3.4.7	Bulges and Blisters	75
3.4.8	Overheating	75
3.4.9	Cracks	76
Section 4	Examinations, Test Methods, and Evaluations	77
4.1	Scope	78
4.2	Nondestructive Examination Methods (NDE)	78
4.2.1	Visual	78
4.2.2	Magnetic Particle	78
4.2.3	Liquid Penetrant	79
4.2.4	Ultrasonic	79
4.2.5	Radiography	79
4.2.6	Eddy Current	80
4.2.7	Metallographic	80
4.2.8	Acoustic Emission	80
4.3	Testing Methods	80
4.3.1	Pressure Testing	80
4.3.1.1	All Pressure Testing	81
4.3.1.2	Liquid Pressure Testing	81
4.3.1.3	Pneumatic Pressure Testing	82
4.4	Methods to Assess Damage Mechanisms and Inspection Frequency for Pressure-Retaining Items.....	82
4.4.1	Scope	82
4.4.2	General Requirements	83
4.4.3	Responsibilities	83
4.4.4	Remaining Service Life Assessment Methodology	84
4.4.5	Data Requirements for Remaining Service Life Assessments	84
4.4.6	Identification of Damage Mechanisms	85
4.4.7	Determining Inspection Intervals	86
4.4.7.1	Method for Estimating Inspection Intervals for Pressure-Retaining Items Subject to Erosion or Corrosion.....	86
4.4.7.2	Method for Estimating Inspection Intervals for Exposure to Corrosion	86
4.4.7.3	Estimating Inspection Intervals for Pressure-Retaining Items Where Corrosion Is Not a Factor.....	89
4.4.8	Evaluating Inspection Intervals of Pressure-Retaining Items Exposed to Inservice Failure Mechanisms.....	90
4.4.8.1	Exposure to Elevated Temperature (Creep).....	90
4.4.8.2	Exposure to Brittle Fracture.....	91
4.4.8.3	Evaluating Conditions That Cause Bulges/Blisters/Laminations.....	91
4.4.8.4	Evaluating Crack-Like Indications in Pressure-Retaining Items.....	91
4.4.8.5	Evaluating Exposure of a Pressure-Retaining Item to Fire Damage.....	92
4.4.8.6	Evaluating Exposure of Pressure-Retaining Items to Cyclic Fatigue	93

4.4.8.7	Evaluating Pressure-Retaining Items Containing Local Thin Areas	93
4.5	Risk-Based Inspection Assessment Programs.....	94
4.5.1	Scope	94
4.5.2	Definitions.....	94
4.5.3	General.....	95
4.5.4	Considerations	96
4.5.5	Key Elements of an RBI Assessment Program	96
4.5.6	RBI Assessment.....	97
4.5.6.1	Probability of Failure.....	97
4.5.6.2	Consequence of Failure	97
4.5.6.3	Risk Evaluation.....	98
4.5.6.4	Risk Management	98
4.5.7	Jurisdictional Relationships.....	98
Section 5	Stamping, Documentation, and Forms.....	99
5.1	Scope	100
5.2	Replacement of Stamping During Inservice Inspection	100
5.2.1	Authorization	100
5.2.2	Replacement of Stamped Data	100
5.2.3	Reporting.....	100
5.3	National Board Inspection Forms	101
5.3.1	Scope	101
5.3.2	Replacement of Stamped Data Form (NB-136)	102
5.3.3	New Business or Discontinuance of Business Form (NB-4)	104
5.3.4	Boiler or Pressure Vessel Data Report Form (NB-5).....	105
5.3.5	Boiler-Fired Pressure Vessels Report of Inspection Form (NB-6).....	107
5.3.6	Pressure Vessels Report of Inspection Form (NB-7)	108
5.3.7	Report of Fitness For Service Assessment Form (NB-403)	110
5.3.7.1	Guide For Completing Fitness For Service Assessment Reports	112
Section 6	Supplements	115
6.1	Scope	116
Supplement 1	Steam Locomotive Firetube Boiler Inspection and Storage	116
S1.1	Scope	116
S1.2	Special Jurisdictional Requirements	117
S1.3	Federal Railroad Administration (FRA)	117
S1.4	Locomotive Firetube Boiler Inspection	117
S1.4.1	Inspection Methods	117
S1.4.2	Inspection Zones	118
S1.4.2.1	Riveted Seams and Rivet Heads	118
S1.4.2.2	Welded and Riveted Repairs.....	120
S1.4.2.3	Boiler Shell Course.....	120
S1.4.2.4	Dome and Dome Lid	120
S1.4.2.5	Mudring	121
S1.4.2.6	Flue Sheets	121
S1.4.2.7	Flanged Sheets	122
S1.4.2.8	Stayed Sheets.....	122
S1.4.2.9	Staybolts.....	123
S1.4.2.10	Flexible Staybolts and Sleeves	123
S1.4.2.11	Girder Stay and Crown Bars	124
S1.4.2.12	Sling Stays	125
S1.4.2.13	Crown Stays and Expansion Stays	125
S1.4.2.14	Diagonal and Gusset Braces.....	126

S1.4.2.15	Flues.....	127
S1.4.2.16	Superheater Units and Header.....	128
S1.4.2.17	Arch Tubes, Water Bar Tubes, and Circulators.....	128
S1.4.2.18	Thermic Syphons.....	129
S1.4.2.19	Firebox Refractory.....	129
S1.4.2.20	Dry Pipe.....	129
S1.4.2.21	Throttle and Throttle Valve.....	130
S1.4.2.22	Screw-Type Washout Plugs, Holes, and Sleeves.....	130
S1.4.2.23	Handhole Washout Doors.....	130
S1.4.2.24	Threaded and Welded Attachment Studs.....	131
S1.4.2.25	Fusible Plugs.....	131
S1.4.2.26	Water Glass, Water Column, and Gage Cocks.....	132
S1.4.2.27	Steam Pressure Gage.....	132
S1.4.2.28	Boiler Fittings and Piping.....	133
S1.4.2.29	Boiler Attachment Brackets.....	133
S1.4.2.30	Fire Door.....	133
S1.4.2.31	Grates and Grate Operating Mechanism.....	134
S1.4.2.32	Smokebox.....	134
S1.4.2.33	Smokebox Steam Pipes.....	134
S1.4.2.34	Ash Pan and Fire Pan.....	135
S1.4.3	Method of Checking Height of Water Gage Glass.....	135
S1.4.3.1	Water Height Measurement Method.....	135
S1.4.3.2	Flexible Spirit Level Method.....	137
S1.5	Guidelines for Steam Locomotive Storage.....	138
S1.5.1	Storage Methods.....	138
S1.5.2	Wet Storage Method.....	138
S1.5.3	Dry Storage Method.....	139
S1.5.4	Recommended General Preservation Procedures.....	139
S1.5.5	Use of Compressed Air to Drain Locomotive Components.....	142
S1.5.6	Return to Service.....	143
S1.6	Safety Valves.....	144
S1.7	Tables and Figures.....	144
Supplement 2	Historical Boilers.....	145
S2.1	Scope.....	145
S2.2	Introduction.....	145
S2.3	Responsibilities.....	145
S2.4	General Inspection Requirements.....	145
S2.4.1	Pre-Inspection Requirements.....	146
S2.4.2	Post-Inspection Activities.....	146
S2.4.3	Boiler Operators.....	146
S2.4.4	Examinations and Tests.....	147
S2.4.4.1	Nondestructive Examination Methods.....	147
S2.4.4.2	Testing Methods.....	147
S2.5	Specific Examination and Test Methods.....	147
S2.5.1	Specific Examination Methods.....	147
S2.5.2	Visual Examination.....	148
S2.5.2.1	Preparation for Visual Inspection.....	148
S2.5.2.2	Visual Examination Requirements.....	148
S2.5.3	Ultrasonic Examination.....	149
S2.5.4	Liquid Penetrant Examination.....	149
S2.5.5	Magnetic Particle Examination.....	149
S2.6	Specific Testing Methods.....	149
S2.6.1	Hydrostatic Pressure Testing.....	149
S2.6.2	Ultrasonic Thickness Testing.....	149
S2.7	Inspections.....	150
S2.7.1	Inservice Inspections.....	150

S2.7.2	Inservice Inspection Documentation	151
S2.7.3	Inspection Intervals	151
S2.7.3.1	Initial Inspection.....	151
S2.7.3.2	Subsequent Inspections.....	151
S2.8	Safety Devices — General Requirements.....	152
S2.8.1	Safety Valves.....	152
S2.8.2	Gage Glass	153
S2.8.3	Try-Cocks	153
S2.8.4	Fusible Plug.....	153
S2.8.5	Pressure Gage	154
S2.9	Appurtenances – Piping, Fittings, and Valves	154
S2.9.1	Piping, Fittings, and Valve Replacements.....	155
S2.10	Maximum Allowable Working Pressure (MAWP).....	155
S2.10.1	Strength.....	155
S2.10.2	Rivets and Rivet Heads.....	156
S2.10.2.1	Rivet Head Types	156
S2.10.2.2	Inspection of Corroded Rivets.....	156
S2.10.3	Cylindrical Components	157
S2.10.4	Stayed Surfaces	176
S2.10.4.1	Staybolts	176
S2.10.5	Construction Code.....	176
S2.10.6	Nomenclature	185
S2.10.7	Limitations	186
S2.11	Boiler Inspection Guideline.....	186
S2.12	Initial Boiler Certification Report Form	192
S2.13	Guidelines for Historical Boiler Storage.....	192
S2.13.1	Storage Methods.....	192
S2.13.1.1	Wet Storage Method	192
S2.13.1.2	Dry Storage Method	193
S2.13.2	Recommended General Preservation Procedures.....	193
S2.13.3	Use of Compressed Air to Drain Historical Boiler Components	196
S2.13.4	Return to Service.....	196
S2.14	Safety Procedures.....	197
S2.14.1	Experience	197
S2.14.2	Stopping Engine in an Emergency.....	197
S2.14.3	Water Glass Breakage	198
S2.14.4	Runaway Engine and Governor Over Speed	198
S2.14.5	Killing a Fire.....	199
S2.14.6	Injector Problems	199
S2.14.7	Foaming or Priming Boiler.....	200
S2.14.8	Handhole Gasket Blows Out.....	201
S2.14.9	Tube Burst.....	201
S2.14.10	Leaking Valves	202
S2.14.11	Broken Pipes	202
S2.14.12	Safety Valve Problems	202
S2.14.13	Safety Valve Opens But Will Not Close.....	202
S2.14.14	Leaking Pipe Plugs.....	202
S2.14.15	Melted Grates.....	202
S2.15	Tables and Figures	203
Supplement 3	Inspection of Graphite Pressure Equipment	207
S3.1	Scope	207
S3.2	Application	207
S3.3	Operations	207
S3.4	Inservice Inspection	207

Supplement 4 Inspection of Fiber-Reinforced Thermosetting Plastic Pressure Equipment.....	209
S4.1 Scope	209
S4.2 Inservice Inspection	209
S4.3 General	209
S4.4 Visual Examination	210
S4.5 Inspector Qualifications	211
S4.6 Assessment of Installation	212
S4.6.1 Preparation	212
S4.6.2 Leakage	212
S4.6.3 Tools	212
S4.7 External Inspection	212
S4.7.1 Insulation or Other Coverings	213
S4.7.2 Exposed Surfaces	213
S4.7.3 Structural Attachments	213
S4.8 Internal Inspection	213
S4.8.1 General	214
S4.8.2 Specific Areas of Concern	214
S4.9 Inspection Frequency	215
S4.9.1 Newly Installed Equipment	215
S4.9.2 Previously Repaired or Altered Equipment	216
S4.10 Photographs of Typical Conditions	217
S4.11 Tables and Figures	217
Supplement 5 Inspection of Yankee Dryers (Rotating Cast-Iron Pressure Vessels) with Finished Shell Outer Surfaces	233
S5.1 Scope	233
S5.2 Assessment of Installation	233
S5.2.1 Determination of Allowable Operating Parameters	235
S5.2.2 Adjusting the Maximum Allowable Operating Parameters of the Yankee Dryer Due to a Reduction in Shell Thickness from Grinding or Machining.....	236
S5.2.3 Documentation of Shell Thickness and Adjusted Maximum Allowable Operating Parameters.....	237
S5.3 Causes of Deterioration and Damage	237
S5.3.1 Local Thinning	237
S5.3.2 Cracking	238
S5.3.2.1 Through Joints and Bolted Connections	238
S5.3.2.2 Through-Wall Leakage	238
S5.3.2.3 Impact From Objects Passing Through The Yankee/ Pressure Roll Nip	239
S5.3.2.4 Stress Magnification Around Drilled Holes	239
S5.3.2.5 Thermal Stress and/or Micro-Structural Change From Excessive Local Heating and Cooling	239
S5.3.2.6 Joint Interface Corrosion	239
S5.3.2.7 Stress-Corrosion Cracking of Structural Bolts.....	240
S5.3.3 Corrosion	240
S5.4 Inspections	240
S5.5 Nondestructive Examination.....	240
S5.6 Pressure Testing.....	241
S5.7 Tables and Figures	241
Supplement 6 Continued Service and Inspection of DOT Transport Tanks	242
S6.1 Scope	242
S6.2 Terminology	242
S6.3 Administration	242
S6.4 Inspection	242
S6.4.1 Scope	242

S6.4.2	General Requirements for Inspectors	243
S6.4.3	Registration of Inspectors.....	243
S6.4.4	Qualifications of Inspectors	243
S6.4.5	Codes of Construction.....	243
S6.4.6	Inspector Duties for Continued Service Inspections.....	243
S6.4.6.1	Inspector Duties for Continued Service Inspection of Cargo Tanks	244
S6.4.6.2	Inspector Duties for Continued Service Inspection of Portable Tanks	244
S6.4.6.3	Inspector Duties for Continued Service Inspections of Ton Tanks	245
S6.4.7	Continued Service, Inspection for DOT Transport Tanks Scope	245
S6.4.7.1	Administration.....	245
S6.4.7.2	Inspection and Test Required Frequencies	245
S6.4.7.3	External Visual and Pressure Tests.....	246
S6.4.7.4	Leak Tightness Testing of Transport Tanks	246
S6.4.7.4.1	Cargo Tanks	246
S6.4.7.4.2	Portable Tanks	246
S6.4.7.4.3	Ton Tanks	246
S6.4.7.4.4	Leak Tightness Testing of Valves	247
S6.4.7.4.4.1	Cargo Tanks	247
S6.4.7.4.4.2	Portable Tanks.....	247
S6.4.7.4.4.3	Ton Tanks	247
S6.4.7.5	Leak Tightness Testing of Safety Relief Devices.....	248
S6.4.7.5.1	Cargo Tanks	248
S6.4.7.5.2	Portable Tanks.....	248
S6.4.7.5.3	Ton Tanks	248
S6.4.7.6	Testing of Miscellaneous Pressure Parts	249
S6.4.7.6.1	Cargo Tanks	249
S6.4.7.6.2	Portable Tanks.....	249
S6.4.7.6.3	Ton Tanks	249
S6.4.7.7	Acceptance Criteria	249
S6.4.7.8	Inspection Report	250
S6.4.7.8.1	Cargo Tanks	250
S6.4.7.8.2	Portable Tanks.....	250
S6.4.7.8.3	Ton Tanks	250
S6.5	Stamping and Record Requirements for DOT Transport Tanks in Continued Service	250
S6.5.1	General.....	250
S6.5.2	Stamping	250
S6.5.3	Owner or User Required Records For Cargo Tanks	251
S6.5.3.1	Reporting Requirements by the Owner or User of Tests and Inspections of DOT Specification Cargo Tanks.....	253
S6.5.3.2	DOT Marking Requirements for Test and Inspections of DOT Specification Cargo Tanks	253
S6.5.4	Owner or User Required Records for Portable Tanks	254
S6.5.4.1	Reporting of Periodic and Intermediate Periodic Inspection and Tests of DOT Specification Portable Tanks.....	254
S6.5.4.2	Marking Requirements for Periodic and Intermediate Inspection and Test for IM or UN Portable Tanks	254
S6.5.4.3	DOT Marking Requirements for Periodic and Intermediate Inspection and Tests of DOT Specification 51, 56, 57, or 60 Portable Tanks	255
S6.5.5	Owner or User Required Reports for DOT Specification 106A and DOT 110A Ton Tanks.....	255
S6.5.5.1	Reporting of Inspection and Tests for DOT Specification 106A and DOT 110A Ton Tanks	255
S6.5.5.2	DOT Marking Requirements for Tests and Inspection of DOT Specification 106A and 110A Ton Tanks	256
S6.6	Corrosion and Failure Mechanisms in Transport Tanks	256

S6.6.1	Scope	256
S6.6.2	General.....	257
S6.6.3	Internal and/or External Corrosion	257
S6.6.3.1	Types of Corrosion	257
S6.6.4	Failure Mechanisms	259
S6.7	Classification Boundaries	261
S6.8	Pressure, Temperature, and Capacity Requirements for Transport Tanks	261
S6.9	Reference to Other Codes and Standards	261
S6.10	Conclusion	262
S6.11	Personnel Safety and Inspection Activities	262
S6.12	Transport Tank Entry Requirements.....	263
S6.12.1	Pre-Inspection Activities	263
S6.12.2	Preparation for Internal Inspection	264
S6.12.3	Post-Inspection Activities	265
S6.13	Inspection and Tests of Cargo Tanks	265
S6.13.1	Visual External Inspection	265
S6.13.2	Inspection of Piping, Valves, and Manholes	266
S6.13.3	Inspection of Appurtenances and Structural Attachments	267
S6.13.4	Visual Internal Inspection	270
S6.13.5	Lining Inspections	271
S6.13.6	Pressure Tests	271
S6.13.6.1	Hydrostatic or Pneumatic Test Method	273
S6.13.6.2	Pressure Testing Insulated Cargo Tanks	274
S6.13.6.3	Pressure Testing Cargo Tanks Constructed of Quenched and Tempered Steels	274
S6.13.6.4	Pressure Testing Cargo Tanks Equipped with a Heating System	275
S6.13.6.5	Exceptions to Pressure Testing	275
S6.13.6.6	Acceptance Criteria	275
S6.13.6.7	Inspection Report	276
S6.13.7	Additional Requirements for MC 330 and MC 331 Cargo Tanks	277
S6.13.8	Certificates and Reports	278
S6.13.9	Leakage Test	278
S6.13.10	New or Replaced Delivery Hose Assemblies	281
S6.13.10.1	Thickness Testing	281
S6.13.10.2	Testing Criteria	281
S6.13.10.3	Thickness Requirements	282
S6.13.11	Cargo Tanks That No Longer Conform to the Minimum Thickness Requirements in NBIC Tables S6.13.1-a and S6.13.1-b	282
S6.13.11.1	Minimum Thickness for 400 Series Cargo Tanks	283
S6.13.11.2	DOT 406 Cargo Tanks	283
S6.13.11.3	DOT 407 Cargo Tanks	284
S6.13.11.4	DOT 412 Cargo Tanks	284
S6.14	Inspection and Tests of Portable Tanks	289
S6.14.1	Periodic Inspection and Test	289
S6.14.2	Intermediate Periodic Inspection and Test	290
S6.14.3	Internal and External Inspections	290
S6.14.4	Exceptional Inspection and Test	291
S6.14.5	Internal and External Inspection Procedure	292
S6.14.6	Pressure Tests Procedures for Specification 51, 57, 60, IM or UN Portable Tanks	292
S6.14.6.1	Specification 57 Portable Tanks	292
S6.14.6.2	Specification 51 or 56 Portable Tanks	293
S6.14.6.3	Specification 60 Portable Tanks	294
S6.14.6.4	Specification IM or UN Portable Tanks	295
S6.14.7	Inspection and Test Markings for IM or UN Portable Tanks	296
S6.14.8	Inspection and Test Markings for Specification DOT 51, 56, 57, or 60	296
S6.14.9	Record Retention	297

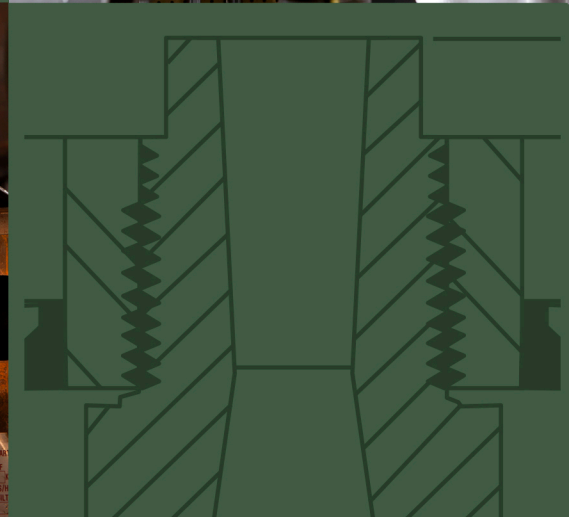
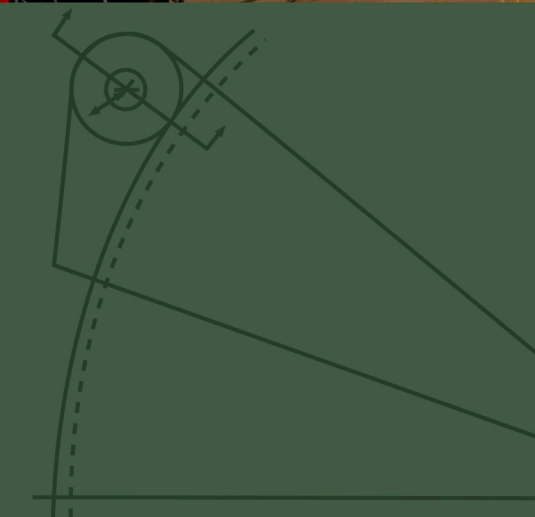
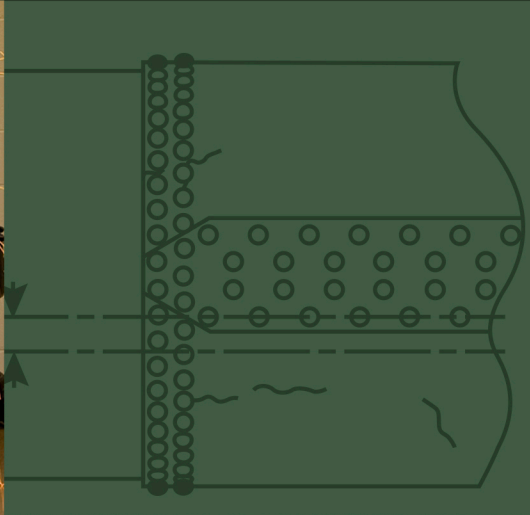
S6.15	General Requirements for DOT Specification 106A and 110A Tank Cars (Ton Tanks)	297
S6.15.1	Special Provisions for Ton Tanks	297
S6.15.2	Visual Inspection of Ton Tanks	299
S6.15.3	Inspection and Tests of DOT Specification 106A and DOT Specification 110A Ton Tanks	300
S6.15.3.1	Air Tests	301
S6.15.3.2	Pressure Relief Device Testing	301
S6.15.3.3	Rupture Discs and Fusible Plugs	301
S6.15.3.4	Successful Completion of the Periodic Retesting	301
S6.15.3.5	Exemptions to Periodic Hydrostatic Retesting	301
S6.15.3.6	Record of Retest Inspection	302
S6.15.4	Stamping Requirements of DOT 106A and DOT 110A Ton Tanks	302
S6.16	Pressure Relief Devices	303
S6.16.1	Scope	303
S6.16.2	Safety Considerations	303
S6.16.3	Installation Provisions	303
S6.16.4	Pressure Relief Device Inspection	304
S6.16.5	Schedule of Inspections	304
S6.16.6	External Visual Inspection of Pressure Relief Devices	304
S6.16.7	Pressure Testing of Pressure Relief Valves	305
S6.16.8	Correction of Defects	306
S6.16.9	Inspection of Rupture Disks and Non-Reclosing Devices	306
S6.17	Definitions	306
S6.18	Tables and Figures	314
Supplement 7	Inspection of Pressure Vessels in Liquefied Petroleum Gas (LPG) Service	315
S7.1	Scope	315
S7.2	Pre-Inspection Activities	315
S7.3	Inservice Inspection for Vessels in LP Gas Service	315
S7.3.1	Nondestructive Examination (NDE).....	316
S7.4	External Inspection	316
S7.5	Internal Inspection	317
S7.6	Leaks	317
S7.7	Fire Damage	317
S7.8	Acceptance Criteria	317
S7.8.1	Cracks	318
S7.8.2	Dents	318
S7.8.3	Bulges	318
S7.8.4	Cuts or Gouges	319
S7.8.5	Corrosion	319
S7.8.6	Anhydrous Ammonia Service	319
S7.9	ASME LPG Containers less than 2000 Gallons being Refurbished by a Commercial Source	319
Supplement 8	Pressure Differential Between Safety or Safety Relief Valve Setting and Boiler or Pressure Vessel Operating Pressure	321
S8.1	Scope	321
S8.2	Hot-Water Heating Boilers	321
S8.3	Steam Heating Boilers	321
S8.4	Power Boilers	321
S8.5	Pressure Vessels	322
Section 7	NBIC Policy for Metrication	325
7.1	General	326
7.2	Equivalent Rationale	326

7.3	Procedure for Conversion	326
7.4	Referencing Tables	327
Section 8	Preparation of Technical Inquiries to the <i>National Board Inspection Code</i> Committee	331
8.1	Introduction	332
8.2	Inquiry Format	332
8.3	Code Revisions or Additions	333
8.4	Code Interpretations	333
8.5	Submittals	334
Section 9	Glossary of Terms	335
9.1	Definitions.....	336
Section 10	NBIC Approved Interpretations.....	344
10.1	Scope	344
10.2	Index of Interpretations.....	344
10.3	Subject Index of Interpretations.....	347
Section 11	Index.....	351



2013 NBIC

NATIONAL BOARD INSPECTION CODE



AN AMERICAN NATIONAL STANDARD

PART 3 REPAIRS AND ALTERATIONS

2013 **NBIC**

PART 3, REPAIRS AND ALTERATIONS

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Headquarters

1055 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.847.1828 Fax

Testing Laboratory

7437 Pingue Drive
Worthington, Ohio 43085-1715
614.888.8320
614.848.3474 Fax

Training & Conference Center

1065 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.847.5542 Fax

Inspection Training Center

1075 Crupper Avenue
Columbus, Ohio 43229-1183
614.888.8320
614.431.3208 Fax

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G. Galanes <i>Diamond Technical Services</i>	
C. Hopkins <i>Seattle Boiler Works</i>	
Z. Jabal <i>Tampa Electric Company</i>	
F. Johnson <i>PBF Energy</i>	
L. McManamon <i>Great Lakes Apprenticeship Program</i>	
R. Milletti <i>The Babcock & Wilcox Company</i>	

Subcommittee for Pressure Relief Devices (Parts 1, 2, and 3)

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Furmanite America Inc.

D. DeMichael
DuPont

A. Cox, Vice Chair
Industrial Value

R. Donalson
Tyco Valves and Controls

T. Beirne, Secretary
National Board

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DuPont

B. Anthony
State of Rhode Island

R. McCaffrey
Quality Valve

M. Brodeur
International Valve & Instr. Corp.

B. Nutter
DuPont

S. Cammeresi
CCR

T. Patel
Farris Engineering

R. Dobbins
Zurich N.A.

K. Simmons
Crane Energy

Special Subgroups for Installation, Inspection, and Repairs and Alterations (Parts 1, 2, and 3)

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Strasburg Railroad

S. Lee
Union Pacific Railroad

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Consultant

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Tennessee Valley Authority

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Midwest Locomotive & Machine Works

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State of North Dakota

D. Conrad
Valley Railroad Co.

G. Scerbo
Federal Railroad Administration

R. Franzen
Steam Services of America

R. Stone
ABB/Combustion Engineering

D. Griner
Wasatch Railroad Contractors

R. Yuill
Consultant

S. Jackson
D & SNG

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SGL Carbon Group/SGL Technic

F. Brown, Secretary
National Board

T. Bonn
Carbone of America

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M. Minick
One CIS Insurance

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SGL Carbon Group/SGL Technic

Fiber-Reinforced Pressure Vessels

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Bustillos and Consultants

T. Cowley
Dupont

R. Crawford
L&M Fiberglass

D. Eisberg
Energy Recovery Inc.

T. Fowler
Retired/Spicewood, TX

M. Gorman
Digital Wave

D. Hodgkinson
Consultant

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T. Dillion, Vice Chair
Deltak

B. Smith, Secretary
National Board

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Heartland Software Solutions

F. Johnson
PBF Energy

J. Larson
One Beacon America Insurance Company

D. Rupert
Consultant

M. Wahl
WHSEA

National Board Inspection Code
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This code was developed under procedures accredited as meeting the criteria for American National Standards. The Consensus Committee that approved the code was balanced to ensure that individuals from competent and concerned interests had an opportunity to participate. The proposed code was made available for public review and comment, which provided an opportunity for additional public input from industry, academia, regulatory and jurisdictional agencies, and the public-at-large.

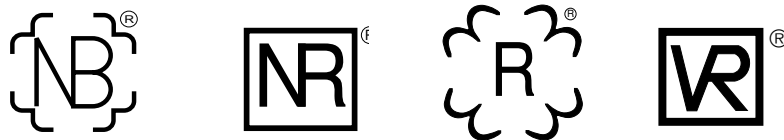
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The footnotes in this document are part of this American National Standard.



The above National Board symbols are registered with the US Patent Office.

“National Board” is the abbreviation for The National Board of Boiler and Pressure Vessel Inspectors.

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Foreword

The National Board of Boiler and Pressure Vessel Inspectors is an organization composed of Chief Inspectors for the states, cities, and territories of the United States and provinces and territories of Canada. It is organized for the purpose of promoting greater safety to life and property by securing concerted action and maintaining uniformity in post-construction activities of pressure-retaining items, thereby ensuring acceptance and interchangeability among Jurisdictional authorities responsible for the administration and enforcement of various codes and standards.

In keeping with the principles of promoting safety and maintaining uniformity, the National Board originally published the NBIC in 1946, establishing rules for inspection and repairs to boilers and pressure vessels. The National Board Inspection Code (NBIC) Committee is charged with the responsibility for maintaining and revising the NBIC. In the interest of public safety, the NBIC Committee decided, in 1995, to revise the scope of the NBIC to include rules for installation, inspection, and repair or alteration to boilers, pressure vessels, piping, and nonmetallic materials.

In 2007, the NBIC was restructured into three Parts specifically identifying important post-construction activities involving safety of pressure-retaining items. This restructuring provides for future expansion, transparency, and uniformity, ultimately improving public safety.

The NBIC Committee's function is to establish rules of safety governing post-construction activities for the installation, inspection, and repair and alteration of pressure-retaining items, and to interpret these rules when questions arise regarding their intent. In formulating the rules, the NBIC Committee considers the needs and concerns of individuals and organizations involved in the safety of pressure-retaining items. The objective of the rules is to afford reasonably certain protection of life and property, so as to give a reasonably long, safe period of usefulness. Advancements in design and material and the evidence of experience are recognized.

The rules established by the NBIC Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design, or as limiting in any way an organization's freedom to choose any method that conforms to the NBIC rules.

The NBIC Committee meets regularly to consider revisions of existing rules, formulation of new rules, and to respond to requests for interpretations. Requests for interpretation must be addressed to the NBIC Secretary in writing and must give full particulars in order to receive Committee consideration and a written reply. Proposed revisions to the Code resulting from inquiries will be presented to the NBIC Committee for appropriate action.

Proposed revisions to the Code approved by the NBIC Committee are submitted to the American National Standards Institute and published on the National Board Web site to invite comments from all interested persons. After the allotted time for public review and final approval, the new edition is published.

Organizations or users of pressure-retaining items are cautioned against making use of revisions that are less restrictive than earlier requirements without having assurance that they have been accepted by the Jurisdiction where the pressure-retaining item is installed.

The general philosophy underlying the NBIC is to parallel those provisions of the original code of construction, as they can be applied to post-construction activities.

The NBIC does not contain rules to cover all details of post-construction activities. Where complete details are not given, it is intended that individuals or organizations, subject to the acceptance of the Inspector and Jurisdiction when applicable, provide details for post-construction activities that will be as safe as otherwise provided by the rules in the original code of construction.

Activities not conforming to the rules of the original code of construction or the NBIC must receive specific approval of the Jurisdiction, who may establish requirements for design, construction, inspection, testing, and documentation.

There are instances where the NBIC serves to warn against pitfalls; but the Code is not a handbook, and cannot substitute for education, experience, and sound engineering judgment.

It is intended that this edition of the NBIC not be retroactive. Unless the Jurisdiction imposes the use of an earlier edition, the latest effective edition is the governing document.

Introduction

It is the purpose of the National Board Inspection Code (NBIC) to maintain the integrity of pressure-retaining items by providing rules for installation, and after the items have been placed into service, by providing rules for inspection and repair and alteration, thereby ensuring that these items may continue to be used safely.

The NBIC is intended to provide rules, information and guidance to manufacturers, Jurisdictions, inspectors, owner-users, installers, contractors, and other individuals and organizations performing or involved in post-construction activities, thereby encouraging the uniform administration of rules pertaining to pressure-retaining items.

Scope

The NBIC recognizes three important areas of post-construction activities where information, understanding, and following specific requirements will promote public and personal safety. These areas include:

- Installation
- Inspection
- Repairs and Alterations

The NBIC provides rules, information, and guidance for post-construction activities, but does not provide details for all conditions involving pressure-retaining items. Where complete details are not provided in this Code, the Code user is advised to seek guidance from the Jurisdiction and from other technical sources.

The words shall, should, and may are used throughout the NBIC and have the following intent:

- Shall – action that is mandatory and required.
- Should – indicates a preferred but not mandatory means to accomplish the requirement unless specified by others such as the Jurisdiction.
- May – permissive, not required or a means to accomplish the specified task.

Organization

The NBIC is organized into three Parts to coincide with specific post-construction activities involving pressure-retaining items. Each Part provides general and specific rules, information, and guidance within each applicable post-construction activity. Other NBIC Parts or other published standards may contain additional information or requirements needed to meet the rules of the NBIC. Specific references are provided in each Part to direct the user where to find this additional information. NBIC Parts are identified as:

- Part 1, Installation – This Part provides requirements and guidance to ensure all types of pressure-retaining items are installed and function properly. Installation includes meeting specific safety criteria for construction, materials, design, supports, safety devices, operation, testing, and maintenance.
- Part 2, Inspection – This Part provides information and guidance needed to perform and document inspections for all types of pressure-retaining items. This Part includes information on personnel safety, non-destructive examination, tests, failure mechanisms, types of pressure equipment, fitness for service, risk-based assessments, and performance-based standards.

- Part 3, Repairs and Alterations – This Part provides information and guidance to perform, verify, and document acceptable repairs or alterations to pressure-retaining items regardless of code of construction. Alternative methods for examination, testing, heat treatment, etc., are provided when the original code of construction requirements cannot be met. Specific acceptable and proven repair methods are also provided.

Each NBIC Part is divided into major Sections as outlined in the Table of Contents.

Tables, charts, and figures provide relevant illustrations or supporting information for text passages, and are designated with numbers corresponding to the paragraph they illustrate or support within each Section. Multiple tables, charts, or figures referenced by the same paragraph will have additional letters reflecting the order of reference. Tables, charts, and figures are located in or after each major Section within each NBIC Part.

Text Identification and Numbering

Each page in the text will be designated in the top header with the publication's name, part number, and part title. The numbering sequence for each section begins with the section number followed by a dot to further designate major Sections (e.g., 1.1, 1.2, 1.3). Major Sections are further subdivided using dots to designate Subsections within that major Section (e.g., 1.1.1, 1.2.1, 1.3.1). Subsections can further be divided as necessary.

Paragraphs under Sections or Subsections shall be designated with small letters in parenthesis [(e.g., a), b), c)] and further subdivided using numbers in parenthesis [e.g., 1), 2), 3)]. Subdivisions of paragraphs beyond this point will be designated using a hierarchical sequence of letters and numbers followed by a dot.

Example: 2.1 Major Section
 2.1.1 Section
 2.1.2 Section
 2.1.2.1 Subsection
 a) paragraph
 b) paragraph
 1) subparagraph
 2) subparagraph
 a. subdivisions
 1. subdivisions
 2. subdivisions
 b. subdivisions
 1. subdivisions
 2. subdivisions

Tables and figures will be designated with the referencing Section or Subsection identification. When more than one table or figure is referenced in the same Section or Subsection, letters or numbers in sequential order will be used following each Section or Subsection identification.

Supplements

Supplements are contained in each Part of the NBIC to designate information pertaining only to a specific type of pressure-retaining item (e.g., Locomotive Boilers, Historical Boilers, Graphite Pressure Vessels.) Supplements follow the same numbering system used for the main text, only preceded by the Letter “S.” Each page of the Supplement will identify the Supplement number and name in the top heading.

Editions

Editions which include revisions and additions to this Code are published every two years. Editions are permissive on the date issued and become mandatory six months after the date of issue

Interpretations

On request, the NBIC Committee will render an interpretation of any requirement of this Code. Interpretations are provided for each Part and are specific to the Code edition and addenda referenced in the interpretation. Interpretations provide information only and are not part of this Code.

Jurisdictional Precedence

Reference is made throughout this Code to the requirements of the “Jurisdiction.” Where any provision herein presents a direct or implied conflict with any jurisdictional regulation, the Jurisdictional regulation shall govern.

Units of Measurement

Both U.S. customary units and metric units are used in the NBIC. The value stated in U.S. customary units or metric units is to be regarded separately as the standard. Within the text, the metric units are shown in parentheses. In supplement 6, from Parts 2 and 3, Continued Service and Inspection of DOT Transport Tanks, however, the metric units are shown first with the U.S. customary units shown in parentheses.

U.S. customary units or metric units may be used with this edition of the NBIC, but one system of units shall be used consistently throughout a repair or alteration of pressure-retaining items. It is the responsibility of National Board accredited repair organizations to ensure the appropriate units are used consistently throughout all phases of work. This includes materials, design, procedures, testing, documentation, and stamping. The NBIC policy for metrication is outlined in each Part of the NBIC.

Accreditation Programs

The National Board administers and accredits three specific repair programs¹ as shown below:

- “R”.....Repairs and Alterations to Pressure-Retaining Items
- “VR”.....Repairs to Pressure Relief Valves
- “NR”.....Repair and Replacement Activities for Nuclear Items

Part 3, Repairs and Alterations, of the NBIC describes the administrative requirements for the accreditation of these repair organizations.

The National Board also administers and accredits four specific inspection agency programs as shown below:

New Construction

Criteria for Acceptance of Authorized Inspection Agencies for New Construction (NB-360)

Inservice

Qualifications and Duties for Authorized Inspection Agencies (AIAs) Performing In-service Inspection Activities and Qualifications for Inspectors of Boilers and Pressure Vessels (NB-369)

Owner-User

Accreditation of Owner-User Inspection Organizations (OUIO) Owners or users may be accredited for both a repair and inspection program provided the requirements for each accreditation program are met. (NB-371)

Federal Government

Qualifications and Duties for Federal Inspection Agencies (FIAs) Performing Inservice Inspection Activities (NB-390)

These programs can be viewed on the National Board Website. For questions or further information regarding these programs, contact:

The National Board of Boiler and Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, OH 43229-1183
Phone — 614.888.8320
Fax — 614.847.1828
Website — www.nationalboard.org

Certificates of Authorization for Accreditation Programs

Any organization seeking an accredited program may apply to the National Board to obtain a Certificate of Authorization for the requested scope of activities. A confidential review shall be conducted to evaluate the organization’s quality system. Upon completion of the evaluation, a recommendation will be made to the National Board regarding issuance of a Certificate of Authorization.

Certificate of Authorization scope, issuance, and revisions for National Board accreditation programs are specified in the applicable National Board procedures. When the quality system requirements of the appropriate accreditation program have been met, a Certificate of Authorization and appropriate National Board symbol stamp shall be issued.

¹ Caution, some Jurisdictions may independently administer a program of authorization for organizations to perform repairs and alterations within that Jurisdiction.

2013 NBIC

PART 3, REPAIRS AND ALTERATIONS

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PART 3 — REPAIRS AND ALTERATIONS

TABLE OF CONTENTS

National Board Contact Information	II
National Board Board of Trustees / Advisory Committee Members	II
National Board Members	III
NBIC Committee Structure	IV
National Board Inspection Code Edition	X
Foreword	XI
Introduction	XIII
Section 1 General and Administrative Requirements	11
1.1 Scope	12
1.2 Construction Standards for Pressure-Retaining Items	12
1.3 Inspector	13
1.3.1 Authorization	13
1.3.2 Acceptance Inspection	13
1.4 Definitions Relating to Pressure Relief Devices	13
1.5 Accreditation.....	14
1.5.1 Accreditation Process.....	14
1.5.2 National Board “R” Symbol Stamp	15
1.6 Quality System	15
1.6.1 Outline of Requirements for a Quality System for Qualification for the National Board “R” <i>Certificate of Authorization</i>	15
1.7 Accreditation of “VR” Repair Organizations	20
1.7.1 Scope	20
1.7.2 Jurisdictional Participation	20
1.7.3 Issuance and Renewal of the “VR” <i>Certificate of Authorization</i>	20
1.7.3.1 General.....	20
1.7.3.2 Issuance of Certificate.....	20
1.7.4 Use of “VR” Authorization	20
1.7.4.1 Technical Requirements.....	20
1.7.4.2 Stamp Use.....	20
1.7.5 Quality System	21
1.7.5.1 General.....	21
1.7.5.2 Written Description	21
1.7.5.3 Maintenance of Controlled Copy	21
1.7.5.4 Outline of Requirements for a Quality System	21
1.8 “NR” Accreditation Requirements.....	25
1.8.1 Scope	25
1.8.2 Prerequisites for Issuing a National Board “NR” <i>Certificate of Authorization</i>	25
1.8.3 Procedures for Obtaining or Renewing a National Board “NR” <i>Certificate of Authorization</i>	25
1.8.4 National Board “NR” Symbol Stamp	27
1.8.5 Quality System Program	28
1.8.5.1 Outline of Requirements for a Quality System Program for Qualification for the National Board “NR” Symbol Stamp	28

1.8.6	Interface with the Owner’s Repair/Replacement Program	34
Section 2	Welding and Heat Treatment.....	37
2.1	Scope	38
2.2	Welding	38
2.2.1	Welding Procedure Specifications	38
2.2.2	Standard Welding Procedure Specifications	38
2.2.3	Performance Qualification	38
2.2.4	Welding Records	38
2.2.5	Welder’s Identification	39
2.2.6	Welder’s Continuity	39
2.2.6.1	Welder’s Continuity Records.....	39
2.3	Standard Welding Procedure Specifications	39
2.4	AWS Reference Standards	46
2.5	Heat Treatment	46
2.5.1	Preheating	46
2.5.2	Postweld Heat Treatment (PWHT).....	48
2.5.3	Alternative Welding Methods Without Postweld Heat Treatment	50
2.5.3.1	Welding Method 1	51
2.5.3.2	Welding Method 2	51
2.5.3.3	Welding Method 3	53
2.5.3.4	Welding Method 4	54
2.5.3.5	Welding Method 5	55
Section 3	Requirements for Repairs and Alterations.....	57
3.1	Scope	58
3.2	General Requirements for Repairs and Alterations	58
3.2.1	Material Requirements for Repairs and Alterations	58
3.2.2	Replacement Parts	58
3.2.3	Drawings	59
3.2.4	Design Requirements for Repairs and Alterations	59
3.2.5	Calculations	60
3.2.6	Reference to Other Codes and Standards	60
3.3	Repairs to Pressure-Retaining Items	60
3.3.1	Defect Repairs	60
3.3.2	Routine Repairs	60
3.3.3	Examples of Repairs	61
3.3.4	Repair Methods	62
3.3.4.1	Scope	62
3.3.4.2	Defect Repairs	63
3.3.4.3	Wasted Areas	65
3.3.4.4	Seal Welding	69
3.3.4.5	Re-Ending or Piecing Pipes or Tubes	71
3.3.4.6	Patches	71
3.3.4.7	Stays	74
3.3.4.8	Repair of Pressure-Retaining Items Without Complete Removal of Defects	74
3.3.5	Repair of ASME Section VIII, Division 2 or 3, Pressure Vessels	75
3.3.5.1	Scope	75
3.3.5.2	Repair Plan	75
3.4	Alterations	75
3.4.1	Re-Rating	75
3.4.2	Alterations Based on Allowable Stress Values	76
3.4.3	Examples of Alterations	77
3.4.4	Alteration of ASME Code Section VIII, Division 2 or 3, Pressure Vessels	77
3.4.4.1	Alteration Plan	77

Section 4	Examination and Testing	79
4.1	Scope	80
4.2	Nondestructive Examination	80
4.3	Pressure Gages, Measurement, Examination, and Test Equipment	80
4.4	Examination and Test for Repairs and Alterations	80
4.4.1	Test or Examination Methods Applicable to Repairs	81
4.4.2	Test or Examination Methods Applicable to Alterations.....	83
4.5	Pressure Relief Valve Performance Testing and Testing Equipment	85
4.5.1	Test Medium and Testing Equipment	85
4.5.2	Owner-User ASME Code Section VIII Steam Testing	86
4.5.3	Lift Assist Testing	86
4.5.4	Pressure Test of Parts	87
Section 5	Certification/Documentation and Stamping	89
5.1	Scope	90
5.2	Documentation	90
5.2.1	Preparation of Form R-1 (Repairs)	90
5.2.2	Preparation of Form R-2 (Alterations)	90
5.3	Distribution of Form R-1	91
5.4	Distribution of Form R-2	91
5.5	Registration of "R" Forms – General	91
5.5.1	Registration for Repairs	92
5.5.2	Registration for Alterations	92
5.5.3	Registration for Fiber-Reinforced Vessels	92
5.5.4	Registration for Nuclear Repair/Replacement Activities	92
5.5.5	Registration for Graphite Vessels.....	92
5.6	Form "R" Log	92
5.7	Stamping Requirements for Repairs and Alterations	92
5.7.1	General	92
5.7.2	Stamping Requirements for Repairs	93
5.7.3	Stamping Requirements for Alterations	93
5.7.4	Stamping Requirements for Parts	93
5.7.5	Specific Requirements of Stamping and Nameplates	93
5.8	Stamping for Fiber-Reinforced Vessels	96
5.8.1	Stamping for Repairs	96
5.8.2	Stamping for Alterations	96
5.9	Stamping Requirements for Yankee Dryers	96
5.10	Alternative Marking and Stamping for Graphite Pressure Equipment	96
5.11	Removal of Original Stamping or Nameplate	97
5.12	Stamping Requirements for Pressure Relief Devices	97
5.12.1	Nameplates	97
5.12.2	Repair Nameplate	98
5.12.3	Changes to Original Pressure Relief Valve Nameplate Information	98
5.12.4	Test Only Nameplate	99
5.12.5	Replacement of Illegible or Missing Nameplates	99
5.13	Repair and Alteration Forms and Instructions for Completing Forms	100
5.13.1	Form R-1, <i>Report of Repair</i>	101
5.13.2	Form R-2, <i>Report of Alteration</i>	102
5.13.3	Form R-3, <i>Report of Fabricated Parts</i>	104
5.13.4	Form R-4, <i>Report Supplementary Sheet</i>	106
5.13.4.1	Instructions for Completing National Board Form "R" Reports.....	107
5.13.5	Form NR-1, <i>Nuclear Components and Systems in Nuclear Power Plants</i>	110
5.13.6	Form NVR-1, <i>Nuclear Pressure Relief Devices</i>	112
5.13.6.1	Guide for Completing National Board Form NR-1 and NVR-1 Reports	113
Section 6	Supplements	115

Supplement 1 Steam Locomotive Firetube Boiler Repairs	118
S1.1 Scope	118
S1.1.1 Federal Railroad Administration (FRA)	118
S1.1.2 Requirements for Welding Activities	118
S1.1.3 Materials.....	118
S1.1.3.1 Material List for Steam Locomotive Boilers	119
S1.1.4 Formula and Calculations for Steam Locomotive Boilers.....	120
S1.2 Locomotive Firetube Boiler Repairs	120
S1.2.1 Repair of Staybolt Holes	120
S1.2.2 Threaded Staybolts	120
S1.2.3 Ball Socket-Type Flexible Staybolts, Sleeves, and Caps	122
S1.2.4 Seal Welded Staybolts	125
S1.2.5 Welded Installation of Staybolts	125
S1.2.6 Diagonal Braces, Gusset Braces, and Throat Sheet/Tubesheet Braces	125
S1.2.6.1 Girder Stays and Crown Bars	126
S1.2.6.2 Sling Stays	128
S1.2.6.3 Expansion Stays	129
S1.2.7 Threaded Studs	131
S1.2.8 Patch Bolts	131
S1.2.9 Flues, Arch Tubes, Circulators, Thermic Siphons	132
S1.2.9.1 Flue and Tube Re-Ending	133
S1.2.9.2 Arch Tubes	133
S1.2.9.3 Tube Wall Thickness for Arch Tubes	134
S1.2.9.4 Thermic Siphons	134
S1.2.9.5 Circulators	135
S1.2.9.6 Re-Rolling of Flue-Tubes after Seal Welding	136
S1.2.9.7 Ferrules	136
S1.2.9.8 Flues Smaller Than 3 Inches	136
S1.2.10 Repairs and Alterations to Boiler Barrel Unstayed Areas	136
S1.2.11 Repairs and Alterations to Boiler Barrel Stayed Area	137
S1.2.11.1 Firebox Sheet Repair	137
S1.2.11.2 Fireboxes and Other Stayed Area Patches	137
S1.2.11.3 Repair of Stayed Firebox Sheets Grooved or Wasted at the Mudring	139
S1.2.11.4 Mudring Repairs	139
S1.2.11.5 Repair of Firebox and Tubesheet Knuckles	140
S1.2.11.6 Tubesheet Repairs	143
S1.2.12 Seams and Joints	143
S1.2.12.1 Caulking Riveted Seams and Rivet Heads	143
S1.2.12.2 Threaded Openings in Vessel Walls, Bushings, and Welded Nozzles (Washout Plug Holes and Other Connections)	144
S1.2.13 Fittings and Gages	145
S1.2.13.1 Water Gage Connection	145
Supp. 2 Historical Boilers	146
S2.1 Scope	146
S2.2 Introduction	146
S2.3 Responsibilities	146
S2.4 Repairs and Alterations	146
S2.5 Construction Standards.....	147
S2.6 Accreditation.....	147
S2.7 Materials.....	147
S2.7.1 Material List for Historical Boiler Repairs	148
S2.7.2 Replacement Parts.....	148
S2.8 Welded Repair Inspection	149
S2.9 Welding	149
S2.10 Heat Treatment.....	149

S2.11	Nondestructive Examination.....	149
S2.12	Documentation	149
S2.13	Repair Methods	149
S2.13.1	Repair of Threaded Staybolt Holes	150
S2.13.2	Installation of Threaded Staybolts	150
S2.13.3	Seal Welding of Threaded Staybolts	152
S2.13.4	Installation of Welded Staybolts	152
S2.13.5	Threaded Studs.....	153
S2.13.6	Patch Bolts	153
S2.13.7	Flue and Tube Re-Ending	154
S2.13.8	Flue and Tube Installation	155
S2.13.9	Repairs and Alterations to Unstayed Areas.....	156
S2.13.9.1	Weld Buildup of Wastage and Grooving in Unstayed Areas	156
S2.13.9.2	Welded Repair of Cracks in Unstayed Areas	157
S2.13.9.3	Welded Flush Patches in Unstayed Areas	158
S2.13.9.4	Repair of Cracks, Grooving, and Wastage Using a Riveted Patch in Unstayed Areas	159
S2.13.10	Repairs and Alterations to Stayed Areas.....	160
S2.13.10.1	Weld Buildup of Wastage and Grooving in Stayed Areas	160
S2.13.10.2	Welded Repair of Cracks in Stayed Areas	160
S2.13.10.3	Welded Flush Patches in Stayed Areas	160
S2.13.10.4	Repair of Stayed Firebox Sheets Grooved or Wasted at the Mudring	162
S2.13.11	Repair of Firebox and Tubesheet Knuckles	163
S2.13.11.1	Weld Buildup of Wastage and Grooving in Firebox and Tubesheet Knuckles	163
S2.13.11.2	Welded Repair of Cracks in Firebox and Tubesheet Knuckles	163
S2.13.11.3	Welded Flush Patches in Firebox and Tubesheet Knuckles	165
S2.13.12	Repair of Tubesheets	166
S2.13.12.1	Weld Buildup of Wastage and Grooving in Tubesheets	166
S2.13.12.2	Welded Repair of Cracks in Tubesheets.....	166
S2.13.12.3	Welded Flush Patches in Tubesheets	167
S2.13.13	Seams, Joints, and Rivets.....	167
S2.13.13.1	Caulking Riveted Seams and Rivet Heads	167
S2.13.13.2	Rivet Holes	168
S2.13.13.3	Assembly of Riveted Joints	168
S2.13.13.4	Riveting	168
S2.13.13.5	Seal Welding Seam, Joints, and Rivet Heads.....	171
S2.13.14	Repair of Openings	171
S2.13.14.1	Repair of Threaded Openings	171
S2.13.14.2	Repair of Handhole Openings.....	172
S2.13.14.3	Repair of Fusible Plug Opening	172
S2.13.14.4	Repair of Handhole Doors.....	172
Supp. 3	Repair and Alteration of Graphite Pressure Equipment	174
S3.1	Scope	174
S3.2	Repairs	174
S3.3	Repairs of a Routine Nature	176
S3.4	Alterations	176
S3.5	Repair Guide for Impervious Graphite	177
S3.5.1	Introduction	177
S3.5.2	Typical Graphite Fractures	177
S3.5.2.1	Major Fracture	177
S3.5.2.2	Intermediate Fracture	177
S3.5.2.3	Minor Fracture	180
S3.5.3	Graphite Repair by Plug Stitching	180
S3.5.3.1	Plug Stitching Procedure	181
S3.5.3.2	Figures – Typical Plug Stitching Procedure	182

S3.5.4	Re-Impregnation of Graphite Parts (Tubesheets, Heads, and Blocks)	182
S3.5.4.1	Control of Impregnation Material	182
S3.5.4.2	Finishing the Repair	183
S3.5.5	Pugging or Leaking of Damaged Tubes	183
Supplement 4	Repair and Alteration of Fiber-Reinforced Thermosetting Plastic	
	Pressure Equipment	185
S4.1	Scope	185
S4.2	Inspector Qualifications	185
S4.3	Tools	186
S4.4	Limitations	186
S4.5	Repair Limitations for Filament Wound Vessels	186
S4.6	Vessels Fabricated Using Elevated Temperature Cured Resin Systems	186
S4.7	Code of Construction.....	187
S4.8	Materials.....	187
S4.9	Replacement Parts.....	187
S4.10	Secondary Bonding	188
S4.10.1	Secondary Bonding Procedure Specifications	188
S4.10.2	Performance Qualifications	188
S4.10.3	Records	188
S4.10.4	Secondary Bonder's Identification	188
S4.10.5	Secondary Bonder's Continuity	188
S4.11	Curing.....	193
S4.12	Nondestructive Examination.....	193
S4.13	Pressure and Acoustic Emission Tests.....	193
S4.13.1	Pressure Gages, Measurement, and Examination and Test Equipment.....	193
S4.14	Acceptance Inspection	193
S4.14.1	Stamping.....	193
S4.14.2	Documentation	194
S4.14.3	Registration of Documentation	194
S4.14.4	Distribution of Documentation	194
S4.15	Pressure Testing For Repairs	194
S4.16	Additional Requirements for Repairs	195
S4.16.1	Scope	195
S4.16.2	Drawings	195
S4.16.3	Repair Plan	195
S4.16.4	Routine Repairs	195
S4.16.5	Repair Methods	196
S4.17	Additional Requirements for Alterations	196
S4.17.1	Scope	196
S4.17.2	Design	196
S4.17.3	Alteration Plan	196
S4.17.4	Calculations.....	197
S4.17.5	Re-Rating.....	197
S4.17.6	Pressure Testing.....	197
S4.18	Repair and Alteration Methods	199
S4.18.1	General Requirements	199
S4.18.2	Classification of Repairs	199
S4.18.2.1	Type 1a – Repair of the Corrosion Barrier	199
S4.18.2.2	Type 1b – Repair of the Corrosion Barrier for Vessels with Precision Bores	202
S4.18.2.3	Type 2 – Corrosion Barrier and Internal Structural Layer Repairs	204
S4.18.2.4	Type 3 – External Structural Layer Repairs	204
S4.18.2.5	Type 4 – Alterations	206
S4.18.2.6	Type 5 – Miscellaneous General External Repairs or Alterations	206
S4.18.2.7	Type 6 – Thermoplastic Repairs	206
S4.18.2.8	Type 7 – Gel Coat Repairs	206

Supplement 5	General Requirements for Repairs and Alterations to Yankee Dryers	207
S5.1	Scope	207
S5.2	Examinations and Test Methods	207
S5.3	Yankee Dryer Repair Methods	207
S5.3.1	Replacement Parts for Yankee Dryers	207
S5.4	Repair Guide for Yankee Dryers	207
S5.5	Procedures That Do Not Require Stamping or Nameplate Attachment	208
S5.6	Damage Repair	209
S5.6.1	Repair of Local Thinning	209
S5.6.2	Treatment of Crack-Like Flaws	209
S5.6.3	Driven Plug Repair	210
S5.6.4	Threaded Plug Repair	211
S5.7	Alterations to Yankee Dryers	211
S5.7.1	Scope	211
S5.7.2	Alteration Types	211
Supplement 6	Repair, Alteration, and Modification of DOT Transport Tanks	212
S6.0	General Requirements	212
S6.1	Scope	212
S6.2	Construction Standards	212
S6.3	Accreditation	212
S6.4	Materials	212
S6.5	Replacement Parts	212
S6.6	Authorization	213
S6.7	Inspection	213
S6.7.1	Inspector Duties for Repairs, Alterations, and Modifications	213
S6.8	Welding	214
S6.8.1	Welding Procedure Specification	214
S6.8.2	Standard Welding Procedure Specifications	215
S6.8.3	Performance Qualification	215
S6.8.4	Welding Records	215
S6.8.5	Welders' Identification	215
S6.8.6	Welders' Continuity	215
S6.9	Heat Treatment	216
S6.9.1	Preheating	216
S6.9.2	Postweld Heat Treatment	216
S6.9.3	Alternatives to Postweld Heat Treatment	216
S6.10	Nondestructive Examination	216
S6.11	Coatings and Linings	217
S6.12	Measurement, Examination, and Test Equipment	217
S6.13	Acceptance Inspection	217
S6.14	Stamping	217
S6.14.1	Removal of Original Stamping or Nameplate	217
S6.15	"TR" Forms	218
S6.15.1	Registration of "TR" Forms	218
S6.15.2	"TR" forms Log	218
S6.16	Additional Requirements for Repairs, Alterations, or Modifications	218
S6.16.1	Scope	218
S6.16.2	Repairs of Defects	218
S6.16.3	Modifications	218
S6.16.4	Drawings	218
S6.16.5	Authorization	218
S6.17	Examination and Test	219
S6.17.1	Methods	219
S6.17.2	Stamping	219
S6.17.3	Documentation	220

S6.18	Preparation of “TR” Forms	220
S6.18.1	Distribution	220
S6.18.2	Registration	220
S6.19	Repairs, Alterations, or Modification Reports	220
S6.19.1	Registration of Form TR-1 and Form TR-2.....	221
S6.19.2	General Requirements for “TR” Stamping and Nameplates	221
S6.19.3	Stamping of the “TR” Symbol.....	221
Supplement 7	Requirements for Repairs to Pressure Relief Devices	222
S7.1	Scope	222
S7.2	General Requirements	222
S7.3	Weld Repairs to Pressure Relief Valve Parts	222
S7.4	Materials for Pressure Relief Devices	223
S7.5	Replacement Parts for Pressure Relief Devices	223
S7.6	Initial Adjustments to Pressure Relief Valves	224
S7.7	Field Repair	224
S7.8	Audit Requirements	224
S7.9	Use of Owner-User Personnel	224
S7.10	Guide to Jurisdictions for Authorization of Owner-Users to Make Adjustments to Pressure Relief Valves	225
S7.10.1	General	225
S7.10.2	Training	225
S7.10.3	Documentation	225
S7.10.4	Quality System	225
S7.10.5	External Adjustments	226
S7.10.6	Repairs	226
S7.11	Training and Qualification of Personnel	226
S7.11.1	General	226
S7.11.2	Contents of Training Program	226
S7.11.3	Qualification of Personnel	226
S7.11.4	Annual Review of Qualification	227
S7.12	Welding for Pressure Relief Valves	227
S7.12.1	Welding Procedure Specifications	227
S7.12.2	Standard Welding Procedure Specifications	227
S7.12.3	Performance Qualification	227
S7.12.4	Welding Records	227
S7.12.5	Welders’ Identification	228
S7.12.6	Welders’ Continuity	228
S7.13	Heat Treatment	228
S7.13.1	Preheating	228
S7.13.2	Postweld Heat Treatment	228
S7.14	Recommended Procedures for Repairing Pressure Relief Valves	228
S7.14.1	Introduction	228
S7.14.2	Spring-Loaded Pressure Relief Valves	229
S7.14.3	Pilot Operated Safety Relief Valves	231
Supplement 8	Recommended Guide for the Design of a Test System for Pressure Relief Devices in Compressible Fluid Service	234
S8.1	Introduction	234
S8.2	General	234
S8.3	Test System Description	234
S8.4	Test Vessel Sizing Data	236
S8.5	Tables, Charts, and Figures	237

Supplement 9	Procedures to Extend the “VR” <i>Certificate of Authorization</i> and Stamp to ASME “NV” Stamped Pressure Relief Devices	238
S9.1	Introduction	238
S9.2	Administrative Procedures	238
S9.3	General Rules	239
Supplement 10	Repair and Alterations of Pressure Vessels in Liquefied Petroleum Gas Service	240
S10.1	Scope	240
S10.2	General and Administrative Requirements	240
S10.3	Welding	240
S10.4	Requirements for Repairs and Alterations	240
S10.5	Examination and Testing	240
S10.6	Certification/Documentation and Stamping	240
S10.7	Inspection	241
S10.8	Coatings	241
Section 7	NBIC Policy for Metrication	243
7.1	General	244
7.2	Equivalent Rationale	244
7.3	Procedure for Conversion	244
7.4	Referencing Tables	245
Section 8	Preparation of Technical Inquiries to the <i>National Board Inspection Code</i> Committee	249
8.1	Introduction	250
8.2	Inquiry Format	250
8.3	Code Revisions or Additions	251
8.4	Code Interpretations	251
8.5	Submittals	252
Section 9	Glossary of Terms	253
9.1	Definitions	254
Section 10	NBIC Approved Interpretations.....	261
10.1	Scope	262
10.2	Index of Interpretations.....	262
10.3	Subject Index of Interpretations.....	265
Section 11	Index.....	269