THE NATIONAL BOARD

2017 NBIC

NATIONAL BOARD INSPECTION CODE

PART 1
INSTALLATION

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE
2017 EDITION
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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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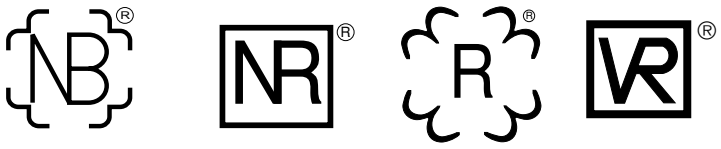

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INTRODUCTION

It is the purpose of the National Board Inspection Code (NBIC) to maintain the integrity of pressure-retaining items by providing rules for post-construction activities including 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 safely used.

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 four 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 requirements 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.
- Part 4, Pressure Relief Devices – This part provides information and guidance to ensure pressure relief devices are installed properly, information and guidance needed to perform and document inspections for pressure relief devices, and information and guidance to perform, verify, and document acceptable repairs to pressure relief devices.

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. 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 provide requirements and guidance only pertaining 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 be tabbed to identify the supplement number.

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.

CODE STAMPING

ASME Code "Stamping" referenced throughout the NBIC includes the ASME Boiler and Pressure Vessel Code Symbol Stamps used for conformity assessment prior to the 2010 edition/2011 addendum and the equivalent ASME Certification Mark with Designator required to meet the later editions of the ASME Boiler and Pressure Vessel Code Sections. When other construction codes or standards are utilized for repairs or alterations, stamping shall mean the identification symbol stamp required by that code or standard.

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 clarification of existing rules in the code 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 are to be regarded separately as the standard. Within the text, the metric units are shown in parentheses. In Part 2, Supplement 6 and Part 3, Supplement 6 regarding DOT Transport Tanks, 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 four specific accreditation programs[1] as shown below:

"**R**"…….Repairs and Alterations to Pressure-Retaining Items (NB-415)
"**VR**"……..Repairs to Pressure Relief Valves (NB-514)
"**NR**"……..Repair and Replacement Activities for Nuclear Items (NB-417)
"**T/O**"……..Testing of Pressure Relief Valves (NB-528)

The administrative requirements for the accreditation for these accreditation programs can be viewed on the National Board Website at www.nationalboard.org.

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 Inservice Inspection Activities and Qualifications for Inspectors of Boilers and Pressure Vessels (NB-369)

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

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

These programs can be viewed on the National Board Website at www.nationalboard.org. For questions or further information regarding these programs contact the National Board by phone at (614) 888-8320 or by fax at (614) 847-1828.

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.

FOREWORD

The National Board of Boiler and Pressure Vessel Inspectors is an organization comprised 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, uniformity, and ultimately improving public safety.

In 2017, the NBIC was once again restructured into 4 parts, adding a new Part 4, Pressure Relief Devices. This purpose of this restructuring was to provide one distinct integrated part for pressure relief devices complied from all PRD information referenced in Part 1, Installation; Part 2, Inspection; and Part 3, Repairs and Alterations.

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 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. The Foreword, Introduction, Personnel and Index Sections of the NBIC are provided for guidance and informational purposes only and shall not be considered a part of the Code. Theses sections are not approved by the NBIC Committee or submitted to the American National Standards Institute.

Organizations or users of pressure-retaining items are cautioned against making use of revisions that are less restrictive than former 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 from 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.

PERSONNEL
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PART 1, SECTION 1
INSTALLATION — GENERAL GUIDELINES

(17) 1.1 SCOPE

This part provides requirements and guidelines for the installation of power boilers, steam heating boilers, hot-water heating boilers, hot-water supply boilers, potable water heaters, pressure vessels and piping.

The proper installation of boilers, pressure vessels, piping, and other pressure-retaining items is essential for safe and satisfactory operation. The owner-user is responsible for ensuring that installations meet all the requirements of the Jurisdiction at the point of installation including licensing, registration, or certification of those performing installations. NBIC Part 1 identifies minimum safety requirements for installing pressure-retaining items when NBIC Part 1 is mandated by a Jurisdiction. Otherwise, the requirements specified in NBIC Part 1 provide information and guidance for installers, contractors, owners, inspectors, and Jurisdictions to ensure safe and satisfactory installation of specified pressure-retaining items. Jurisdictions may require other safety standards, including following manufacturer's recommendations. When a Jurisdiction establishes different requirements or where a conflict exists, the rules of the Jurisdiction prevail. Users of NBIC Part 1 are cautioned that other requirements may apply for a particular installation and NBIC Part 1 is not a substitute for sound engineering evaluations.

1.2 PURPOSE

a) The purpose of these rules are to establish minimum requirements, which, if followed, will ensure that pressure-retaining items, when installed, may be safely operated, inspected, and maintained.

b) It should be recognized that many of the requirements included in these rules must be considered in the design of the pressure-retaining item by the manufacturer. However, the owner-user is responsible for ensuring that the installation complies with all the applicable requirements contained herein. Further, the installer is responsible for complying with the applicable sections when performing work on behalf of the owner-user.

1.3 APPLICATION OF THESE RULES

a) As referenced in lower case letters, the terms "owner," "user," or "owner-user" means any person, firm, or corporation legally responsible for the safe operation of the boiler, pressure vessel, piping, or other pressure-retaining item. Further, where the term "owner" is used, it shall mean the owner, or user, or the owner's or user's designee.

b) Where the owner is required to perform an activity, it is intended that the owner or the owner's designee may perform the activity; however, the owner retains responsibility for compliance with these rules.

c) These rules refer to documentation obtained from the Jurisdiction (installation permit, operating permit). It is not intended to require the Jurisdiction to issue such permits but rather a caution to owners and installers that such permits may be required.

1.4 CERTIFICATION, INSPECTION, AND JURISDICTIONAL REQUIREMENTS

1.4.1 RESPONSIBILITY

a) The owner is responsible for satisfying jurisdictional requirements for certification and documentation. When required by jurisdictional rules applicable to the location of installation, the boilers, pressure vessels, piping, and other pressure-retaining items shall not be operated until the required documentation has been provided by the installer to the owner and the Jurisdiction.

THE NATIONAL BOARD

2017 NBIC

NATIONAL BOARD INSPECTION CODE

PART 2
INSPECTION

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE
2017 EDITION
DATE OF ISSUE — JULY 1, 2017

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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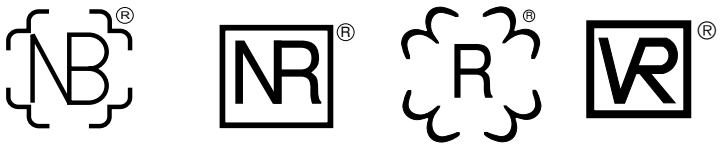

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INTRODUCTION

It is the purpose of the National Board Inspection Code (NBIC) to maintain the integrity of pressure-retaining items by providing rules for post-construction activities including 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 safely used.

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 four 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 requirements 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.
- Part 4, Pressure Relief Devices – This part provides information and guidance to ensure pressure relief devices are installed properly, information and guidance needed to perform and document inspections for pressure relief devices, and information and guidance to perform, verify, and document acceptable repairs to pressure relief devices.

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. 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 provide requirements and guidance only pertaining 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 be tabbed to identify the supplement number.

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.

CODE STAMPING

ASME Code "Stamping" referenced throughout the NBIC includes the ASME Boiler and Pressure Vessel Code Symbol Stamps used for conformity assessment prior to the 2010 edition/2011 addendum and the equivalent ASME Certification Mark with Designator required to meet the later editions of the ASME Boiler and Pressure Vessel Code Sections. When other construction codes or standards are utilized for repairs or alterations, stamping shall mean the identification symbol stamp required by that code or standard.

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 clarification of existing rules in the code 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 are to be regarded separately as the standard. Within the text, the metric units are shown in parentheses. In Part 2, Supplement 6 and Part 3, Supplement 6 regarding DOT Transport Tanks, 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 four specific accreditation programs[1] as shown below:

"**R**"…….Repairs and Alterations to Pressure-Retaining Items (NB-415)
"**VR**"……..Repairs to Pressure Relief Valves (NB-514)
"**NR**"……..Repair and Replacement Activities for Nuclear Items (NB-417)
"**T/O**"……..Testing of Pressure Relief Valves (NB-528)

The administrative requirements for the accreditation for these accreditation programs can be viewed on the National Board Website at www.nationalboard.org.

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 Inservice Inspection Activities and Qualifications for Inspectors of Boilers and Pressure Vessels (NB-369)

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

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

These programs can be viewed on the National Board Website at www.nationalboard.org. For questions or further information regarding these programs contact the National Board by phone at (614) 888-8320 or by fax at (614) 847-1828.

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.

FOREWORD

The National Board of Boiler and Pressure Vessel Inspectors is an organization comprised 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, uniformity, and ultimately improving public safety.

In 2017, the NBIC was once again restructured into 4 parts, adding a new Part 4, Pressure Relief Devices. This purpose of this restructuring was to provide one distinct integrated part for pressure relief devices complied from all PRD information referenced in Part 1, Installation; Part 2, Inspection; and Part 3, Repairs and Alterations.

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 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. The Foreword, Introduction, Personnel and Index Sections of the NBIC are provided for guidance and informational purposes only and shall not be considered a part of the Code. Theses sections are not approved by the NBIC Committee or submitted to the American National Standards Institute.

Organizations or users of pressure-retaining items are cautioned against making use of revisions that are less restrictive than former 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 from 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.

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PART 2, SECTION 1
INSPECTION — GENERAL REQUIREMENTS FOR INSERVICE INSPECTION OF PRESSURE-RETAINING ITEMS

1.1 SCOPE (17)

This part provides requirements and guidelines for conducting inservice inspection of pressure-retaining items.

This section provides general requirements and guidelines for inservice inspection. This section includes precautions for the safety of inspection personnel. The safety of the public and the Inspector is the most important aspect of any inspection activity.

1.2 ADMINISTRATION (17)

Jurisdictional requirements describe the frequency, scope, type of inspection, whether internal, external, or both, and type of documentation required for the inspection. The Inspector shall have a thorough knowledge of jurisdictional regulations where the item is installed, as jurisdictional or regulatory inspection requirements do vary.

Unless otherwise specifically required by the jurisdiction, the duties of the Inspector do not include inspection to other standards and requirements (e.g., environmental, construction, electrical, operational, undefined industry standards, etc.) for which other regulatory agencies have authority and responsibility to oversee.

1.3 REFERENCE TO OTHER CODES AND STANDARDS

Other existing inspection codes, standards, and practices pertaining to the inservice inspection of pressure-retaining items can provide useful information and references relative to the inspection techniques listed in this part. Use of these codes, standards, and practices are subject to review and acceptance by the Inspector, and when required by the Jurisdiction. Any inconsistency or discrepancy between the requirements of the NBIC and these inspection codes, standards, and practices shall be resolved by giving precedence to requirements in the following order:

a) The requirements of the Jurisdiction having authority.

b) The requirements of the NBIC supersede general and specific requirements of other inspection codes, standards, and practices.

c) The general and specific requirements of the references to other codes and standards listed herein that are recognized and generally accepted good engineering practices.

Some examples are as follows:

a) National Board *Bulletin* - National Board Classic Articles Series

b) American Society of Mechanical Engineers - *ASME Boiler and Pressure Vessel Code Section V* (Nondestructive Examination)

c) American Society of Mechanical Engineers - *ASME Boiler and Pressure Vessel Code Section VI* (Recommended Rules for the Care and Operation of Heating Boilers) this section when performing inspections of heating boilers. There may be occasions where more detailed procedures will be required.

d) American Society of Mechanical Engineers- *ASME Boiler and Pressure Vessel Code Section VII* (Recommended Guidelines for the Care of Power Boilers)

THE NATIONAL BOARD

2017 NBIC

NATIONAL BOARD INSPECTION CODE

PART 3

REPAIRS AND ALTERATIONS

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE
2017 EDITION
DATE OF ISSUE — JULY 1, 2017

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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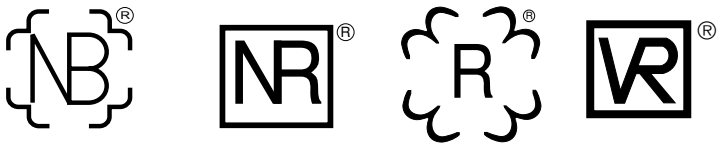

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INTRODUCTION

It is the purpose of the National Board Inspection Code (NBIC) to maintain the integrity of pressure-retaining items by providing rules for post-construction activities including 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 safely used.

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 four 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 requirements 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.
- Part 4, Pressure Relief Devices – This part provides information and guidance to ensure pressure relief devices are installed properly, information and guidance needed to perform and document inspections for pressure relief devices, and information and guidance to perform, verify, and document acceptable repairs to pressure relief devices.

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. 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 provide requirements and guidance only pertaining 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 be tabbed to identify the supplement number.

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.

CODE STAMPING

ASME Code "Stamping" referenced throughout the NBIC includes the ASME Boiler and Pressure Vessel Code Symbol Stamps used for conformity assessment prior to the 2010 edition/2011 addendum and the equivalent ASME Certification Mark with Designator required to meet the later editions of the ASME Boiler and Pressure Vessel Code Sections. When other construction codes or standards are utilized for repairs or alterations, stamping shall mean the identification symbol stamp required by that code or standard.

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 clarification of existing rules in the code 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 are to be regarded separately as the standard. Within the text, the metric units are shown in parentheses. In Part 2, Supplement 6 and Part 3, Supplement 6 regarding DOT Transport Tanks, 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 four specific accreditation programs[1] as shown below:

"**R**"…….Repairs and Alterations to Pressure-Retaining Items (NB-415)
"**VR**"……..Repairs to Pressure Relief Valves (NB-514)
"**NR**"……..Repair and Replacement Activities for Nuclear Items (NB-417)
"**T/O**"……..Testing of Pressure Relief Valves (NB-528)

The administrative requirements for the accreditation for these accreditation programs can be viewed on the National Board Website at www.nationalboard.org.

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 Inservice Inspection Activities and Qualifications for Inspectors of Boilers and Pressure Vessels (NB-369)

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

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

These programs can be viewed on the National Board Website at www.nationalboard.org. For questions or further information regarding these programs contact the National Board by phone at (614) 888-8320 or by fax at (614) 847-1828.

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.

FOREWORD

The National Board of Boiler and Pressure Vessel Inspectors is an organization comprised 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, uniformity, and ultimately improving public safety.

In 2017, the NBIC was once again restructured into 4 parts, adding a new Part 4, Pressure Relief Devices. This purpose of this restructuring was to provide one distinct integrated part for pressure relief devices complied from all PRD information referenced in Part 1, Installation; Part 2, Inspection; and Part 3, Repairs and Alterations.

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 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. The Foreword, Introduction, Personnel and Index Sections of the NBIC are provided for guidance and informational purposes only and shall not be considered a part of the Code. Theses sections are not approved by the NBIC Committee or submitted to the American National Standards Institute.

Organizations or users of pressure-retaining items are cautioned against making use of revisions that are less restrictive than former 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 from 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.

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PART 3, SECTION 1
REPAIRS AND ALTERATIONS — GENERAL AND ADMINISTRATIVE REQUIREMENTS

(17) 1.1 SCOPE

a) This part provides requirements and guidelines that apply when performing repairs and alterations to pressure-retaining items.

b) The National Board administers three specific accreditation programs:

1) "R" — Repairs and Alterations to Pressure-Retaining Items

2) "NR" — Repair and Replacement Activities for Nuclear Items

3) "VR" — Repairs to Pressure Relief Valves

c) This part describes some of the administrative requirements for the accreditation of repair organizations. Additional administrative requirements can be found in:

1) NB-415, Accreditation of "R" Repair Organizations

2) NB-417, Accreditation of "NR" Repair Organizations

3) NB-514, Accreditation of "VR" Repair Organizations

d) Requirements for repairs to pressure relief valves can be found in NBIC Part 4.

(17) 1.2 CONSTRUCTION STANDARDS FOR PRESSURE-RETAINING ITEMS

a) When the standard governing the original construction is the ASME Code or ASME RTP-1, repairs and alterations to pressure-retaining items shall conform, insofar as possible, to the section and edition of the ASME Code most applicable to the work planned.

b) If the pressure-retaining item was not constructed to a construction code or standard, or when the standard governing the original construction is not the ASME Code or ASME RTP-1, repairs or alterations shall conform, insofar as possible, to the edition of the construction standard or specification most applicable to the work. Where this is not possible or practicable, it is permissible to use other codes, standards, or specifications, including the ASME Code or ASME RTP-1, provided the "R" or "NR" Certificate Holder has the concurrence of the Inspector and the Jurisdiction where the pressure-retaining item is installed.

c) For historical boilers, ASME, Section I provides rules for design and features of construction.

d) Piping systems are designed for a variety of service conditions such as steam, water, oil, gas, or air. Design requirements for repairs and alterations are to meet the original code of construction or the code most appropriate for the repair or alteration. These systems shall be designed for the most severe conditions of pressure, temperature, loadings, and expected transients considered for normal operation. All pipe materials, fittings, and valves shall be rated for the maximum service conditions for normal operation. Design corrosion of piping systems should also be considered when determining types of materials and thicknesses.

e) For Transport Tanks, the Competent Authority, i.e. the U.S. Department of Transportation (DOT), shall be consulted for any requirements which it has established since they take precedence for repairs.

THE NATIONAL BOARD

2017 NBIC

NATIONAL BOARD INSPECTION CODE

PART 4

PRESSURE RELIEF DEVICES

THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD INSPECTION CODE
2017 EDITION
DATE OF ISSUE — JULY 1, 2017

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 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.

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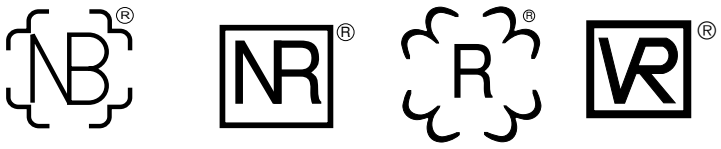

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"National Board" is the abbreviation for The National Board of Boiler and Pressure Vessel Inspectors.

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INTRODUCTION

It is the purpose of the National Board Inspection Code (NBIC) to maintain the integrity of pressure-retaining items by providing rules for post-construction activities including 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 safely used.

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 four 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 requirements 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.
- Part 4, Pressure Relief Devices – This part provides information and guidance to ensure pressure relief devices are installed properly, information and guidance needed to perform and document inspections for pressure relief devices, and information and guidance to perform, verify, and document acceptable repairs to pressure relief devices.

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. 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 provide requirements and guidance only pertaining 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 be tabbed to identify the supplement number.

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.

CODE STAMPING

ASME Code "Stamping" referenced throughout the NBIC includes the ASME Boiler and Pressure Vessel Code Symbol Stamps used for conformity assessment prior to the 2010 edition/2011 addendum and the equivalent ASME Certification Mark with Designator required to meet the later editions of the ASME Boiler and Pressure Vessel Code Sections. When other construction codes or standards are utilized for repairs or alterations, stamping shall mean the identification symbol stamp required by that code or standard.

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 clarification of existing rules in the code 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 are to be regarded separately as the standard. Within the text, the metric units are shown in parentheses. In Part 2, Supplement 6 and Part 3, Supplement 6 regarding DOT Transport Tanks, 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 four specific accreditation programs[1] as shown below:

"**R**"…….Repairs and Alterations to Pressure-Retaining Items (NB-415)
"**VR**"……..Repairs to Pressure Relief Valves (NB-514)
"**NR**"……..Repair and Replacement Activities for Nuclear Items (NB-417)
"**T/O**"……..Testing of Pressure Relief Valves (NB-528)

The administrative requirements for the accreditation for these accreditation programs can be viewed on the National Board Website at www.nationalboard.org.

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 Inservice Inspection Activities and Qualifications for Inspectors of Boilers and Pressure Vessels (NB-369)

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

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

These programs can be viewed on the National Board Website at www.nationalboard.org. For questions or further information regarding these programs contact the National Board by phone at (614) 888-8320 or by fax at (614) 847-1828.

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.

FOREWORD

The National Board of Boiler and Pressure Vessel Inspectors is an organization comprised 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, uniformity, and ultimately improving public safety.

In 2017, the NBIC was once again restructured into 4 parts, adding a new Part 4, Pressure Relief Devices. This purpose of this restructuring was to provide one distinct integrated part for pressure relief devices complied from all PRD information referenced in Part 1, Installation; Part 2, Inspection; and Part 3, Repairs and Alterations.

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 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. The Foreword, Introduction, Personnel and Index Sections of the NBIC are provided for guidance and informational purposes only and shall not be considered a part of the Code. Theses sections are not approved by the NBIC Committee or submitted to the American National Standards Institute.

Organizations or users of pressure-retaining items are cautioned against making use of revisions that are less restrictive than former 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 from 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.

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PART 4, SECTION 1
PRESSURE RELIEF DEVICES — GENERAL AND ADMINISTRATIVE REQUIREMENTS

1.1 SCOPE

This Part provides guidelines and requirements for the installation, in-service inspection and testing, and repairs of pressure relief devices.

1.2 CONSTRUCTION STANDARDS FOR PRESSURE RELIEF DEVICES

a) When the standard governing the original construction is the ASME Code, installation and repairs to pressure relief devices shall conform to the ASME Code section and edition most applicable to the work planned.

b) If the pressure relief device was not constructed to the ASME Code, then installation, inspection and repair shall wherever possible reference the original code of construction most applicable to the work.

c) If the pressure relief device was not constructed to any recognized construction code or standard, then installation, inspection, and repair shall reference a construction standard or specification most applicable to the work.

d) Where this is not possible or practicable, it is permissible to use other codes, standards, or specifications, including the ASME Code, provided there is concurrence of the Inspector (if applicable) and the Jurisdiction where the pressure relief device is installed.

1.3 PRESSURE RELIEF DEVICES — DEFINITIONS

Refer to Section 9, *Glossary* for definitions relating to pressure relief devices.

1.3.1 ADDITIONAL DEFINITIONS RELATING TO PRESSURE RELIEF DEVICES

Unless otherwise specified in the NBIC, the definitions relating to pressure relief devices in Section 2 of ASME PTC-25 shall apply.

1.4 ACCREDITATION

a) Organizations performing repairs to pressure relief valves shall be accredited as described in this section, as appropriate for the scope of work to be performed.

b) Organizations performing repairs to pressure relief valves outside the scope of the NBIC may be accredited and shall meet any additional requirements of the Jurisdiction where the work is performed.

1.4.1 ACCREDITATION PROCESS

a) The National Board administers accreditation programs for authorization of organizations performing repairs to pressure relief valves.

b) Any organization may apply to the National Board to obtain a *Certificate of Authorization* for a requested scope of activities. A review shall be conducted to evaluate the organization's Quality System. The individual assigned to conduct the evaluation shall meet the qualification requirements prescribed by the National Board. Upon completion of the evaluation, any deficiencies within the organization's