

# **Pressure Equipment Repair and Alteration Requirements**

**AB-513**

Edition 3, Revision 3 - Issued 2019-07-12

# Table of Contents

<b>FOREWORD .....</b>	<b>iii</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>2.0 DEFINITIONS AND ACRONYMS .....</b>	<b>3</b>
<b>3.0 GOVERNING LEGISLATION AND REQUIREMENTS.....</b>	<b>6</b>
<b>4.0 REFERENCED CODES AND STANDARDS AND OTHER GOOD ENGINEERING PRACTICES.....</b>	<b>8</b>
<b>5.0 GENERAL.....</b>	<b>9</b>
<b>6.0 QUALITY MANAGEMENT SYSTEM CERTIFICATE OF AUTHORIZATION PERMITS .....</b>	<b>10</b>
6.1 Repairs and Alterations Performed In Alberta .....	10
6.2 Repairs and Alterations Performed Outside Alberta .....	11
6.3 Repairs and Alterations Inspected and Certified under an Owner-User's Quality Management System Certificate of Authorization Permit (CAP) .....	11
6.4 Certified Integrity Assessment Organizations.....	12
<b>7.0 NOTIFICATION AND AUTHORIZATION OF REPAIR OR ALTERATION.....</b>	<b>12</b>
7.1 Notification to ABSA of Repairs and Alterations to Boilers and Pressure Vessels ....	12
7.2 Notification to ABSA of Repairs and Alterations to Pressure Piping Systems.....	12
7.3 Notification to ABSA of Repairs and Alterations to Fittings.....	13
<b>8.0 EQUIPMENT ASSESSMENT, WORK SCOPE AND REPAIR AND ALTERATION PROCEDURES (STRATEGIES) .....</b>	<b>13</b>
8.1 Root Cause that Prompted the Work.....	13
8.2 Condition of the Item to be Altered or Repaired .....	13
8.3 Fitness-For-Service Evaluations .....	14
8.4 Preparation of the Work Scope .....	14
8.5 Preparation of Repair and Alteration Procedures (Methods, Strategies) .....	14
8.6 Submission of Repair and Alteration Procedures and Design Information to ABSA.....	15
8.6.1 Alteration Procedures for Boilers and Pressure Vessels .....	16
8.6.2 Repair Procedures for Boilers and Pressure Vessels.....	16
8.6.3 Repair and Alteration Procedures for Pressure Piping Systems.....	17
8.6.4 Repair and Alteration Procedures for Fittings.....	17
8.6.5 Engineered Pressure Enclosures (EPEs).....	17
<b>9.0 QUALIFICATIONS OF INSPECTORS .....</b>	<b>17</b>
<b>10.0 WELDING, BRAZING AND OTHER JOINING PROCEDURES .....</b>	<b>18</b>
10.1 Welding, Brazing and Other Joining Procedures .....	18
10.2 Welders .....	18
10.3 Personnel Performing Joining Processes Other than Welding .....	18
<b>11.0 EXAMINATION, INSPECTION AND CERTIFICATION OF REPAIRS AND ALTERATIONS OF BOILERS AND PRESSURE VESSELS .....</b>	<b>19</b>
11.1 Inspection and Test Plan (ITP).....	19
11.2 Inspection and Certification .....	19
11.3 Inspection and Certification Activities.....	20
11.4 Boilers and Pressure Vessels Repair and Alteration Report.....	21
11.5 Repair, Alteration, or Replacement Nameplates .....	22
<b>12.0 EXAMINATION, INSPECTION AND CERTIFICATION OF REPAIRS AND ALTERATIONS TO PRESSURE PIPING SYSTEMS AND FITTINGS .....</b>	<b>24</b>
<b>13.0 ALTERNATIVE PRESSURE TEST METHODS .....</b>	<b>24</b>

**14.0 HOT TAPPING ..... 25**  
**APPENDIX 1 ..... 27**  
**APPENDIX 2 - Summary of Required Activities ..... 28**  
**15.0 REVISION LOG ..... 29**

## **FOREWORD**

As provided for under Section 40 of the Pressure Equipment Safety Regulation, the Administrator in the pressure equipment discipline has established that ABSA document AB-513 Pressure Equipment Repair and Alteration Requirements specifies requirements that must be met for pressure equipment repair and alteration.

## 1.0 INTRODUCTION

The *Pressure Equipment Safety Regulation* (PESR) establishes requirements that must be met by persons who own, operate, design, construct, install, repair, alter or maintain pressure equipment or provide related services to ensure that the pressure equipment is safe for operation.

AB-513 was developed to establish the requirements for post-construction repair and alteration activities of pressure equipment. Additional information is provided to assist stakeholders in ensuring that repairs and alterations of pressure equipment restore it to a safe working condition. AB-513 applies to pressure equipment that is subject to the *Safety Codes Act* and is not exempt from the *Pressure Equipment Safety Regulation*.

The term “*post-construction repairs and alterations*” refers to repairs and alterations to pressure equipment after new construction inspection, stamping and certification on the required construction data reports have been completed.

API 510, API 570, NBIC Part 3, and ASME PCC-2 are widely-used and recognized generally accepted codes and standards governing repairs and alterations that apply for most industry sectors. Information from these publications and other relevant good engineering practices has therefore been used in preparing the AB-513. They are referenced in the applicable AB-513 sections and provide guidance on repair methods and other technical information that is used when the code of construction cannot be followed because of its new construction orientation. This includes guidance such as: inspection requirements, nondestructive examination (NDE), alternate heat treatment methods, welding considerations and pressure test requirements.

NBIC, API, and ASME PCC codes and standards and similar publications are not adopted directly as regulations in Alberta. Their application is established through reference in this document and other ABSA policy documents. The *Safety Codes Act*, regulations and AB-513 requirements shall govern in the event that there is a conflict between these requirements and any industry code and standard. It should also be noted that NBIC, API, and ASME PCC codes and standards state that their use is not permitted in conflict with any prevailing jurisdictional requirements.

Particular attention is drawn to the ASME PCC-2 Standard *Repair of Pressure Equipment and Piping*. This standard has been issued by the ASME Post Construction Committee and provides technical information, procedures, and recommendations for repair methods that were determined to be recognized and generally accepted good engineering practice.

ASME PCC-2 contains a caution that also applies for other engineering practices: "*Users of the articles contained in this Standard are cautioned that these articles have been developed generically and are recommended for general applications. They may not be necessarily suitable for all applications. Precautionary considerations are provided but should not be considered all inclusive. Sound engineering practices and judgment should be used to determine the applicability of a specific method or part of a*

*method to a specific application. Each repair should be subject to an appropriate review by qualified personnel and this review should consider subsequent deterioration of the repaired component".*

**Repairs or alterations to creep-strength-enhanced (Grade 91) items of pressure equipment fabricated prior to the 2019 ASME Boiler and Pressure Vessel (BPV) Code must conform to AB-536 - *Requirements for the Integrity Management of Grade 91 Steel Used Above Currently-Permitted Allowable Stresses.***

ABSA policy documents were developed through close cooperation with owners and other stakeholders; their input has been invaluable in compiling this document. In particular, we would like to acknowledge the input from the following user groups that represent the industry sectors in Alberta:

- Alberta Refinery & Petrochemical Inspection Association (ARPIA)
- Upstream Chief Inspectors Association (UCIA)
- Contract Chief Inspectors Association (CCIA)
- Generation Utilities Advisory Committee (GUAC)
- Integrity Management Association Pulp Producers (IMAPP)

ABSA policy documents are living documents that are reviewed periodically to ensure that they are aligned with current industry practices. We would welcome any suggestions you have to improve this document. Please provide your comments to the Manager of Inspections at [prefumo@absa.ca](mailto:prefumo@absa.ca).

## 2.0 DEFINITIONS AND ACRONYMS

For the purpose of AB-513, the following definitions apply. Relevant definitions from the *Alberta Safety Codes Act (SCA)* and *Pressure Equipment Safety Regulation (PESR)* are also included in this section.

**ABSA** – is the organization delegated by the Government of Alberta to administer the pressure equipment safety legislation under the *Safety Codes Act*.

**ABSA Safety Codes Officer (SCO)** – means a safety codes officer, designated under the Act, in the pressure equipment discipline. [PESR 1(1)(ee)]

**Act and Regulations** – means the Alberta Safety Codes Act and the following regulations:

- Pressure Equipment Exemption Order (Alberta Regulation 56/2006),
- Pressure Equipment Safety Regulation (Alberta Regulation 49/2006),
- Power Engineers Regulation (Alberta Regulation 85/2003),
- Pressure Welders Regulation (Alberta Regulation 169/2002)

**Administrator** – means the Administrator in the pressure equipment discipline appointed under the Act. [PESR, 1(1)(b)]

**Alteration** – means any change to an item of pressure equipment as described in the original manufacturer's data report that requires a change of design calculations or otherwise affects the pressure-containing capability of the item of pressure equipment. [PESR 1(1)(d)]

Non-physical changes such as a change in the maximum allowable working pressure or design temperature of a boiler or pressure vessel pressure retaining item are considered alterations, as are reductions, such as reduction in minimum temperature.

**API** – American Petroleum Institute

**ASME** – American Society of Mechanical Engineers

**Certificate of Authorization Permit (CAP)** – means a permit issued pursuant to section 44 of the Act authorizing a person to carry out the activities stated on the certificate of authorization permit. [PESR 1(1)(g)]

**Certification (or certify)** – means to authenticate integrity assessment records by signature, or other means established in the employer's quality management system.

**Competent** – in relation to a person, means possessing the appropriate qualifications, knowledge, skill and experience to perform the work safely and in accordance with the Act. [PESR 1(1)(i)]

Note: competent includes working in accordance with this document.

**CSA** – Canadian Standards Association

**Damage Mechanism** – any type of deterioration encountered that can result in flaws or defects that can affect the integrity of pressure equipment; for example, corrosion, cracking, erosion, dents, and other mechanical, physical, or chemical impacts.

**Equipment Record** – includes design information, data reports, inspection plans and integrity assessment, repair and alteration records. [PESR 1(1)(k)]

**Fitness-For-Service (FFS)** – quantitative engineering evaluations that are performed to demonstrate the structural integrity of an in-service component that may contain a flaw or damage.

**Grade 91 Steel** – a creep-strength-enhanced ferritic steel alloy identified in various ASME and ASTM material specifications as grade C12A, F91, P91, T91, or WP91, which has a specified chemical composition and which when properly processed, exhibits enhanced creep strength at high temperatures, making it useful for high-temperature, high-stress applications

**In-service Inspector (ISI)** – means a person who holds the required Alberta in-service inspector certificate of competency, has the required competency, and is authorized by their employer to perform integrity assessments of pressure equipment under their employer's quality management system Certificate of Authorization Permit.

**Inspection** – means the activities performed by an Authorized Inspector or an Owner's Inspector, to verify that all required examinations and testing have been completed for pressure piping, and to ensure all the documentation for material, fabrication, and examination conforms to the applicable requirements of the Code of construction and the engineering design.

**Inspector** – means an Owner's Inspector, an In-service Inspector, or and ABSA Safety Codes Officer, who is responsible for inspecting and certifying the item of pressure equipment.

**Integrity Assessment Organization (formerly known as Authorized Inspection company)** – an organization that conducts integrity assessments on behalf of pressure equipment owners under a Certificate of Authorization Permit (CAP) issued per PESR Section 11(2).

**Integrity Management System (IMS)** – means a system for ensuring that pressure equipment is designed, constructed, installed, operated, maintained and decommissioned in accordance with the Pressure Equipment Safety Regulation. [PESR 1(1)(s)]

**NBIC NB-23** – National Board Inspection Code



**Owner** – includes a lessee, a person in charge, a person who has care and control and a person who holds out that the person has the powers and authority of ownership or who for the time being exercises the powers and authority of ownership or who for the time being exercised the powers and authority of ownership. [SCA 1(1)(v)]

**Owner's Inspector** – the person responsible to the Owner for ensuring the requirements for inspection, examination, testing, and certification of the pressure piping are met.

**Owner-User** – an owner that has provided an Integrity Management System in accordance with the Pressure Equipment Safety Regulation and has been issued a quality management system Certificate of Authorization Permit under PESR Section 11(3).

**Pressure Equipment** – means a boiler, a fired-heater pressure coil, a thermal liquid heating system and other equipment designed to contain expansible fluid under pressure, including, but not limited to, pressure vessels, pressure piping systems and fittings, as defined in the regulations. [SCA 1(1)(y)]

**Pressure Piping System** – means pipes, tubes, conduits, fittings, gaskets, bolting and other components that make up a system for the conveyance of an expansible fluid under pressure and may also control the flow of that fluid. [PESR 1(1)(aa)]

**Pressure Vessel** – means a vessel used for containing, storing, distributing, processing or otherwise handling an expansible fluid under pressure. [PESR 1(1)(cc)]

**Public Occupancy** – means any facility where members of the general public are likely to be present. This would include schools, offices, shopping malls, stores, arenas, pools, restaurants, hotels, etc.

**Repair** – work necessary to restore an item of pressure equipment to a safe and satisfactory operating condition, provided that there is no deviation from the original registered design.

Note: "Original design" includes previously registered design alterations.

**Repair Organization** – means a repair company or an owner-user who performs the repair or alteration and holds an Alberta quality management Certificate of Authorization Permit as required by section 11 of the PESR for the scope of work to be undertaken.

### 3.0 GOVERNING LEGISLATION AND REQUIREMENTS

Legislation that governs the pressure equipment discipline includes the following:

- *Safety Codes Act*
- *Pressure Equipment Exemption Order* (Alberta Regulation 56/2006)
- *Pressure Equipment Safety Regulation* (Alberta Regulation 49/2006)
- *Power Engineers Regulation* (Alberta Regulation 85/2003)
- *Pressure Welders Regulation* (Alberta Regulation 169/2002)
- *Administrative Items Regulation* (Alberta Regulation 16/2004)

The following documents have been issued to define requirements under the Pressure Equipment Safety Regulation that must be met for in-service pressure equipment.

*AB-506 Inspection & Servicing Requirements for In-Service Pressure Equipment*  
Specifies requirements for integrity assessments (in-service inspection) of pressure equipment and pressure relief valve servicing.

*AB-512 Owner–User Pressure Equipment Integrity Management Requirements*  
Specifies quality management system requirements for owners who are required to hold a Certificate of Authorization Permit (CAP) under PESR section 11(3).

*AB-515 Quality Management System Requirements for Integrity Assessment Organizations*  
Specifies the types of integrity assessment activities which are required to be carried out by an organization having Certificate of Authorization Permit, and when such a permit is required under PESR section 11(2). It also provides guidance as to the required content of a Quality Management System in order for it to be acceptable to the Administrator.

*AB-518 Pressure Piping Construction Requirements*  
Specifies quality management system requirements for persons who construct pressure piping.

*AB-519 Pressure Piping Alternative Test Methods Procedure Requirements*  
Specifies the quality management system and minimum procedure requirements for Owner-User organizations considering alternative pressure piping test methods under section 30(2) of the Pressure Equipment Safety Regulation (PESR).

*AB-520 Finite Element Analysis (FEA) Requirements Regarding the Use of FEA to Support a Pressure Equipment Design Submission*  
Establishes the minimum documentation requirements that must be met when submitting an FEA design.

*AB-521 Requirements for Engineered Pressure Enclosures*

Defines the Alberta requirements that must be met for the design, fabrication, installation and removal of Engineered Pressure Enclosures.

*AB-522 Standard Pneumatic Test Procedure Requirements for Piping Systems*

Specifies requirements for establishing a standard pneumatic test procedure which is permitted to be used to test certain pressure piping systems, when the test procedure is established as a part of t/he testing organization's QMS and the test is carried out within the scope of a CAP.

*AB-525 Overpressure Protection Requirements for Pressure Vessels and Pressure Piping*

Defines Alberta requirements that must be met for systems that consist of pressure piping and/or pressure vessels where overpressure protection is provided by pressure relief valve (PRV), and/or other means of overpressure protection in lieu of a PRV.

*AB-526 In-Service Pressure Equipment Inspector Certification Requirements*

Sets forth the qualification and certification requirements for persons who conduct integrity assessments of pressure equipment installed in Alberta.

*AB-532 Design Registration Requirements for Application-Specific Pneumatic Test Procedures*

Specifies information that must be submitted with design registration documents when an application-specific pneumatic test is to be conducted in Alberta on a new or repaired pressure vessel or pressure piping system, or the test procedure for pressure piping system is not within the scope of AB-522.

*AB-535 Requirements for Alteration Design Registration Based on Fitness-for-Service*

Provides information to assist users when submitting alteration designs based on fitness-for-service evaluations/assessments.

*AB-536 – Requirements for the Integrity Management of Grade 91 Steel Used Above Currently-Permitted Allowable Stresses*

Provides information to assist users when conducting repairs/alterations to Grade P91 items of pressure equipment fabricated prior to the release of the 2019 ASME Boiler and Pressure Vessel (BPV) Code.

The following documents have been issued as guidance documents to assist stakeholders in meeting the requirements of the PESR.

*AB-516 Pressure Equipment Safety Regulation User Guide*

Provides information and guidance to assist stakeholders in meeting the requirements of the *Pressure Equipment Safety Regulation* and in assuring the safe operation of their pressure equipment.

*AB-527 Guideline for the Competence Assessment of Inspectors*

Who perform inspections under an Owner-User or Inspection Company Quality System Certificate of Authorization Permit.

*AB-529 Pressure Equipment Exemption Order User Guide*

Provides information to assist users in understanding the use of the exemptions allowed by the PEEO.

The following forms describe the responsibility of key activities within a Quality Management System:

- *AB-512a Owner-User Pressure Equipment Integrity Management System Scope and Responsibilities*. This form is used to define the responsibility for key activities under the Owner-User's program.
- *AB-515a Integrity Assessment Organization Authorized Scope Form*. This form is used to define the responsibility for key activities under the Integrity Assessment Organization's program.

The following ABSA documents are used to submit repair and alteration designs.

- AB-31 Design Registration Application*
- AB-96 General Engineering Requirements For Design & Construction Of Pressure Piping Systems*
- AB-230 General Engineering Requirements for Boilers and Pressure Vessels Repair and Alteration Procedure*

The following ABSA documents are used to document repairs and alterations.

- AB-40 Boilers and Pressure Vessels Repair/Alteration Report*
- AB-83 Pressure Piping Construction and Test Data Report*
- AB-83F Pressure Piping Construction and Test Data Report For Manufacturers Outside of Alberta*

The official versions of ABSA documents and forms are posted on [www.absa.ca](http://www.absa.ca).

#### **4.0 REFERENCED CODES AND STANDARDS AND OTHER GOOD ENGINEERING PRACTICES**

The adopted codes and standards, and other recognized and generally accepted good engineering standards that are cited in AB-513 are listed below. A full listing of the codes and standards declared in force is provided in PESR Section 6.

- |                              |  |
|------------------------------|--|
| CSA B51                      | <i>Boiler, pressure vessel, and pressure piping code</i>           |
| ASME Section I               | <i>Rules for Construction of Power Boilers</i>                     |
| ASME Section IV              | <i>Rules for Construction of Heating Boilers</i>                   |
| ASME Section VIII Division 1 | <i>Rules for the Construction of Pressure Vessels</i>              |
| ASME Section VIII Division 2 | <i>Alternative Rules</i>   |
| ASME Section VIII Division 3 | <i>Alternative Rules for Construction of High Pressure Vessels</i> |

ASME Section IX	<i>Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators</i>
ASME Code for Pressure Piping	B31 Codes

The following documents are some generally accepted good engineering standards that are referred to in this document. However, they are not adopted directly by the regulation:

ASME PCC-2	<i>Repair of Pressure Equipment and Piping</i>
National Board NB-23	<i>National Board Inspection Code (Part 3)</i>
API 510	<i>Pressure Vessel Inspection Code</i>
API 570	<i>Piping Inspection Code</i>
API Recommended Practice 577	<i>Welding Processes, Inspection, and Metallurgy</i>
API Standard 579-1/ASME FFS-1	<i>Fitness-For-Service</i>
API Recommended Practice 582	<i>Recommended Practice and Supplementary Welding Guidelines for the Chemical Oil and Gas Industries</i>
API Recommended Practice 2201	<i>Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries</i>

## 5.0 GENERAL

Repairs and alterations to pressure equipment shall conform, insofar as possible, to the section and edition of the ASME Code most applicable to the work planned. The code edition and addenda of the original code of construction shall be used for the allowable design stresses and design evaluation. There may be occasions when the current edition of the code of construction has more stringent rules than the edition and addenda of the code of construction declared on the registered drawing. For those situations, the more stringent rules shall be applied. The methods employed for all repairs and alterations shall maintain the factor of safety in accordance with the code of construction declared on the registered drawing.

The nondestructive examination (NDE) requirements, including technique, extent of coverage, and acceptance criteria, shall be in accordance with the original code of construction for the pressure-retaining item. Weld repairs and alterations shall be subjected to the same nondestructive examination requirements as the original welds.

Other design requirements, such as material requirements, and heat treatment shall also meet the minimum requirements specified on the original Manufacturer's Data Report. The latest accepted code edition and addenda of the construction code that the item was built to is normally used for the execution of work (e.g. material controls, welding, fabrication, quality control), as the current code editions reflect advances in technology and experience.

The code of construction shall be supplemented by the applicable good engineering practices for in-service equipment, as repairs and alterations often require additional consideration that is not provided for in the new construction code. These might include:

- contamination of the base metal;
- fluid service, environmental, and other welding considerations;
- welded repairs may exacerbate the problem, e.g. repairs to equipment in H<sub>2</sub>S service;
- post weld heat treatment may be impractical;
- welding method may be unique and require special welding techniques, such as weld sequence to avoid distortion, and controlled deposition methods;
- the time element is often critical;
- weather conditions, etc.;
- pressure testing may be impractical.

All parties involved in repair and alteration activities (e.g. designers, owners, repair organizations, inspectors, ABSA) must follow the Safety Codes Act, applicable code of construction, and current recognized and generally accepted engineering practices that apply for the specific type of equipment and its service. They must ensure that the required resources and competent persons are assigned to design the repair or alteration, execute the work, and conduct all the examinations, inspections and other activities needed to meet AB-513 and to ensure that the repaired or altered item is safe for continued operation at the design conditions.

## **6.0 QUALITY MANAGEMENT SYSTEM CERTIFICATE OF AUTHORIZATION PERMITS**

PESR sections 11, 12, and 13 cover requirements for quality management systems (QMS) and certificate of authorization permits (CAP), and PESR section 40 contains specific requirements for repairs and alterations.

### **6.1 Repairs and Alterations Performed In Alberta**

Repairs and alterations of pressure equipment installed in Alberta must be done by a repair organization that holds an Alberta QMS certificate of authorization permit for the scope of work that is to be undertaken per PESR section 11(1).

Note: This also applies for organizations that hold a National Board “R” Certificate of Authorization.

Organizations that repair and alter ASME Section VIII Division 2 or Division 3 vessels shall hold a valid ASME Certificate of Authorization for the construction of Division 2 or 3 vessels respectively.

The QMS certificate holder shall provide a documented system that identifies the actions needed to ensure that the repair or alteration restores the equipment to a

safe working condition and meets AB-513. Competent persons who have the appropriate knowledge and experience shall be assigned to prepare and approve the repair or alteration procedure, execute the work, and perform all the required examinations.

Fittings that are repaired or altered in an existing boiler, pressure vessel, or pressure piping system are treated as such and documented accordingly (e.g. fitting repairs within a pressure piping system would be covered under a piping repair CAP and documented on an AB-83 form).

Organizations that service, repair, set or seal pressure relief valves require a CAP for these activities. See AB-524, *Pressure Relief Device Requirements*.

A current directory of Alberta quality system permit holders and their authorized scope of work is posted on ABSA's website [www.absa.ca](http://www.absa.ca).

## **6.2 Repairs and Alterations Performed Outside Alberta**

Repairs and alterations to pressure equipment performed in another jurisdiction in Canada that are to be brought into Alberta must be performed in accordance with a quality control program acceptable to the jurisdiction where the item is being repaired or altered, in accordance with CSA B51. Work completed by a repair organization holding a National Board Certificate of Authorization (R stamp) is also acceptable.

Repairs and alterations to pressure vessels performed outside of Canada shall be performed by a repair organization holding a National Board Certificate of Authorization (R stamp).

## **6.3 Repairs and Alterations Inspected and Certified under an Owner-User's Quality Management System Certificate of Authorization Permit (CAP)**

Owner-Users who are required to hold a CAP under PESR section 11(3) and have demonstrated they have an appropriate organization, documented work processes and designated competent resources to manage repairs at their facilities, may be authorized under their CAP to inspect and certify certain repairs performed at their plant sites.

The scope of repairs an Owner-User is authorized to inspect and certify under their CAP is limited to items documented on the AB-512a form accepted by ABSA.

Appendix 1 of this document illustrates the scope of inspection and certification of repairs and alterations of boilers and pressure vessels that may be performed by an Owner-User, and what must be inspected and certified by ABSA.

## **6.4 Certified Integrity Assessment Organizations**

Integrity Assessment Organizations who are required to hold a CAP under PESR section 11(2) and have demonstrated they have an appropriate organization, documented work processes and designated competent resources to manage repairs, may be authorized under their CAP to inspect and certify certain repairs performed at the owner plant sites.

The scope of repairs an Integrity Assessment Organization is authorized to inspect and certify under their CAP is limited to items documented on the AB-515a form accepted by ABSA.

## **7.0 NOTIFICATION AND AUTHORIZATION OF REPAIR OR ALTERATION**

All repairs and alterations must be authorized by a competent person designated by the owner prior to the start of work.

### **7.1 Notification to ABSA of Repairs and Alterations to Boilers and Pressure Vessels**

PESR section 40(3) states that repairs and alterations shall not be undertaken without the prior agreement of a safety codes officer. Section 40(6) of the PESR requires that the owner of pressure equipment notify a safety codes officer reasonably in advance of the commencement of the alteration or repair.

When repairs are inspected and certified under an Owner-User's CAP, notification is limited to ensuring that the ABSA SCO is made aware of the repair.

The repair organization shall notify an ABSA SCO prior to the start of each repair or alteration that they will be performing.

Notification of repairs and alterations will assist ABSA in ensuring that all repairs and alterations are done in accordance with AB-513, and to complete any required inspection and certification activities when the repair or alteration is not covered under the scope of an Owner-User's CAP.

Appendix 1 of this document illustrates responsibilities for notification, and the inspection and certification of repairs and alterations to boilers and pressure vessels.

### **7.2 Notification to ABSA of Repairs and Alterations to Pressure Piping Systems**

Except as provided for below, notifying an ABSA SCO in advance of performing repairs or alterations of pressure piping is not normally required.



For boiler external piping (BEP), notifying an ABSA SCO in advance is required when performing alterations to BEP, or when repairs to BEP are outside the scope of an Owner-User program.

### **7.3 Notification to ABSA of Repairs and Alterations to Fittings**

For fittings that form part of a boiler, pressure vessel, or pressure piping system, the requirements of 7.1 and 7.2 must be met.

For all other fittings, per Section 40(3) of the PESR, an ABSA SCO must be notified in advance of performing a repair or alteration, or when repairs to fittings are outside the scope of an Owner-User program.

## **8.0 EQUIPMENT ASSESSMENT, WORK SCOPE AND REPAIR AND ALTERATION PROCEDURES (STRATEGIES)**

The owner must ensure that competent persons are assigned to assess the equipment, prepare and approve the work scope, repair or alteration procedures, and provide appropriate oversight over the repair or alteration. This may include, but is not limited to, persons who have competence in pressure equipment design, process considerations, corrosion, the code of construction, welding, inspection, NDE, and the relevant good engineering practices. The owner shall ensure that the competent persons assigned have a good understanding of the Safety Codes Act and Regulations.

### **8.1 Root Cause that Prompted the Work**

The owner shall ensure the root cause that prompted the repair or alteration is determined and then take suitable action to prevent similar causes that can affect the integrity of the pressure equipment. The operational and maintenance history of the item shall be reviewed along with other equipment in the system, and the inspection plans, process and mechanical design, and operational and maintenance work processes shall be revised accordingly.

### **8.2 Condition of the Item to be Altered or Repaired**

To assure the item will be safe for operation, the condition of all components of the item to be repaired or altered shall be known before the work scope is established. An in-service inspection, non-destructive examination or other test, suitable to identify the potential damage mechanisms, may be required in order to verify the extent of the defect and the condition of the item that is to be repaired or altered. AB-506 specifies requirements for conducting in-service inspections.

### **8.3 Fitness-For-Service Evaluations**

API 579-1/ASME FFS-1 details fitness-for-service assessment procedures for evaluating commonly encountered flaws, including general and widespread corrosion and pitting, blisters, crack-like flaws, etc. Additionally, API 510 and NBIC have some basic information for assessing local thin areas and pits.

Except for the items listed below, all fitness-for-service evaluations are deemed to be alterations and shall be submitted to Design Survey for acceptance. Fitness-for-service alteration designs shall be certified and documented as per section 11.4 and certified by the ABSA SCO. For additional requirements regarding fitness-for-service alteration design registration see AB-535 Requirements for Alteration Design Registration Based on Fitness-for-Service.

The following may be generally accepted without submission to ABSA:

- *API 510 FFS Analysis of Corroded Regions*
- *NBIC Evaluating Pressure-retaining Items Containing Local Thin Areas*

### **8.4 Preparation of the Work Scope**

Information that may need to be defined in the work scope the owner provides to the repair organization must include, but is not limited to:

- the code or standard which the repair or alteration is designed to,
- base metal cleaning and other preparation requirements such as degassing (bake out),
- welding requirements,
- material specifications and material testing requirements,
- heat treatment,
- NDE results and reports that define the extent of damage,
- pressure test or pressure tightness test requirements,
- coating requirements,
- the Inspector responsible for inspecting and certifying the repair or alteration (Alberta In-Service Inspector or ABSA SCO),
- the Inspector's hold and inspection points.

### **8.5 Preparation of Repair and Alteration Procedures (Methods, Strategies)**

The repair organization shall prepare a procedure and supporting documentation for each item to be repaired or altered. The repair procedure must meet the owner's requirements (work scope), describe the step-by-step method to be used, and provide all the information needed to ensure the repaired or altered item is safe for operation at the accepted design conditions.

The construction codes (refer to section 4 of this document), PCC-2, API 510, API 570, API 577, NBIC and other applicable good engineering standards provide detailed information that may need to be considered.

Applicable information that shall be clearly defined in the repair or alteration procedure or supporting documents (design drawings, specifications, data reports, sketches, etc.) includes, but is not limited to:

- weld joint designs and dimensions,
- weld sizes,
- the welding procedure specifications that are to be used for each specific weld joint and any special welding considerations,
- material specifications and material testing requirements,
- NDE requirements,
- preheat requirements,
- postweld heat treatment (PWHT),
- any pressure testing requirements, and
- any additional information designated by the owner.

The owner shall ensure competent persons approve each job scope to ensure that the proposed procedure is appropriate and all the required information is available to ensure the mechanical integrity of the repaired item.

The repair or alteration procedure must be accepted by the Inspector prior to the start of work.

The repair organization must ensure that the repair procedures, supporting documents, welding procedures and other applicable quality system documents are available at the worksite and are understood by the persons who will be executing the work.

## **8.6 Submission of Repair and Alteration Procedures and Design Information to ABSA**

PESR section 40 establishes that the owner must ensure the design information for an alteration of pressure equipment is submitted to ABSA Design Survey for registration in accordance with PESR section 14. PESR section 40 establishes that the owner may be required to submit to an ABSA SCO the details of the repair procedures for review and acceptance.

The allowable stresses of the original code of construction shall be used for all alterations, including re-rating. There may be occasions when the current edition of the code of construction has more stringent rules than the edition and addenda of the code of construction declared on the registered drawing. For those situations, the more stringent rules shall be applied.

### **8.6.1 Alteration Procedures for Boilers and Pressure Vessels**

Except as provided below, all alterations to boilers and pressure vessels require submission to ABSA Design Survey for review and registration.

The following alterations to ASME Section VIII, Division 1 pressure vessels do not require design registration:

- The addition of nozzles identical to existing nozzles, or for which reinforcement calculations are not required (ASME Section VIII, Division 1, UG-36), which meet the other applicable parts of the original code of construction and are located not less than 3 times the sum of their corroded inside diameters from existing nozzles.
- The addition of non-load bearing attachments to pressure-retaining items when postweld heat treatment is not required.

Alterations that meet the registration exemption criteria above shall be documented as repairs and shall be approved by the Owner-User's engineer or Inspector if the work is inspected and certified by the owner per section 6 or by the ABSA SCO if the item is not inspected and certified by the owner.

The registration exemptions listed above do not apply to the following pressure equipment. All alterations must be submitted to ABSA design survey for review and registration. This requirement applies to the pressure boundary and anything attached to the pressure boundary:

- Pressure vessels designed to ASME Section VIII, Division 2 and 3,
- Pressure vessels registered as Alberta Limited Designs (ALD),
- Pressure vessels designed in accordance with alternative code rules

PESR section 15 lists the information, as applicable, that must be provided to ABSA Design Survey in order to register an alteration to a boiler or pressure vessel.

The AB-230 may also be used to provide a detailed summary of repairs or alterations. See ABSA form *AB-230a Guide for Completing Form AB-230* for additional details.

### **8.6.2 Repair Procedures for Boilers and Pressure Vessels**

As provided by in PESR section 40(5), repair procedures for the following scenarios must be submitted to ABSA Design Survey for acceptance prior to the start of the repair:

- Pressure vessels designed to ASME Section VIII, Division 2 and 3,

- Pressure vessels registered as Alberta Limited Designs (ALD),
- Pressure vessels designed in accordance with alternative code rules
- Any other repair procedure that the ABSA SCO considers to be large or complex enough to require a formal assessment

Repair procedures within the scope of an Owner-User CAP do not normally require submission.

### **8.6.3 Repair and Alteration Procedures for Pressure Piping Systems**

For Owner-Users, pressure piping and components that are replaced, modified or added to an existing registered pressure piping system in conformance to the original registered pressure piping design specifications are not considered to be alterations, and the design information does not require submission to ABSA Design Survey for review and registration. Any such replacements, modifications and additions must be approved by the Owner-User's Professional Engineer. This is intended to be used for maintenance activities, and does not apply to new plants.

All other pressure piping systems must be designed and constructed in accordance with the latest adopted construction Code, and the design must be submitted to ABSA in accordance with PESR section 14 and section 16 when the aggregate capacity of the new pressure piping system exceeds 500 liters.

### **8.6.4 Repair and Alteration Procedures for Fittings**

Fittings that are repaired or altered in an existing boiler, pressure vessel, or pressure piping system are treated as such in accordance with 8.6.1, 8.6.2 and 8.6.3.

Alterations of all other fittings shall be submitted to Design Survey.

### **8.6.5 Engineered Pressure Enclosures (EPEs)**

Engineered Pressure Enclosures (EPEs) may be required to be installed over a leak or thin area. *AB-521 Requirements for Engineered Pressure Enclosures* provides details on the Alberta requirements that must be met for the design, fabrication, installation and removal of EPEs.

AB-521 applies to EPEs typically used in pressure piping systems and permits the limited use of EPEs for pressure vessels.

## **9.0 QUALIFICATIONS OF INSPECTORS**

The Inspector's employer (ABSA, Owner-User, or Integrity Assessment Organization) must maintain suitable documentation that defines the experience, training and qualifications required for each person involved in repair or alteration inspection activities. This shall include appropriate training in legislation, AB-513, the applicable codes of construction and recognized good engineering standards, welding, NDE and other relevant activities.

The Inspector's employer shall maintain suitable verification records to document that the above requirements have been met and that the person is competent to perform the inspection and certification activity.

*AB-527 Guideline for the Competence Assessment of Inspectors* was developed to assist the employer in ensuring their inspectors are competent to perform the assigned inspection activities.

Inspectors who inspect and certify repairs to boilers and pressure vessels under their employer's CAP must hold the appropriate Alberta in-service inspector certification. See *AB-526 In-Service Pressure Equipment Inspector Certification Requirements* for details on the In-Service Inspector certification requirements.

## **10.0 WELDING, BRAZING AND OTHER JOINING PROCEDURES**

### **10.1 Welding, Brazing and Other Joining Procedures**

All welding, brazing and other joining procedures used for repairs and alterations shall meet the registration requirements per PESR sections 18 and 27. Supplementary welding procedure requirements and welding data shall also be developed, as required, to ensure the integrity of the welded item under the operating conditions.

Additional welding considerations and welding procedure requirements are identified in publications such as API 510, NBIC, API 577 and API 582.

### **10.2 Welders**

Welders and welding operators shall meet the requirements of the Pressure Welders Regulation and have the required valid Alberta performance qualification cards for the welding procedures to be used. Additional testing and assessment must be done by the repair organization, as required, to ensure that the welder has the required skill for the welding that is to be done. Some repairs may require specific weld sequences, techniques and additional welder tests.

### **10.3 Personnel Performing Joining Processes Other than Welding**

For joining processes other than welding, the owner and/or the repair organization must ensure that the personnel performing the joining are

knowledgeable, trained and experienced, and meet the requirements of the code of construction.

## **11.0 EXAMINATION, INSPECTION AND CERTIFICATION OF REPAIRS AND ALTERATIONS OF BOILERS AND PRESSURE VESSELS**

The proposed repair or alteration methods for boilers and pressure vessels (including fired-heater pressure coils, indirect fired heater coils, and thermal liquid heating systems) shall be accepted, prior to start of work by the Inspector who is responsible for inspecting and certifying the repair or alteration. Alteration procedures (and repair procedures when required by an ABSA SCO) shall have been accepted by Design Survey.

### **11.1 Inspection and Test Plan (ITP)**

The organization performing the repair or alteration work must prepare an inspection and test plan (ITP or travel sheet) for each item that is to be repaired or altered. This shall list in sequence all the examinations, inspections and tests needed to ensure that all the repair and alteration procedure elements are completed and work meets the AB-513 requirements. The repair organization shall ensure that sufficient competent personnel are assigned to complete all the specified examinations.

The ITP shall include provision to enable the Inspector to designate his or her inspection and hold points for the activities he or she needs to witness and to document acceptance of the repair or alteration procedure prior to the start of work.

### **11.2 Inspection and Certification**

All repairs and alterations to boilers and pressure vessels must be inspected and certified by an In-service Inspector or ABSA SCO. Repairs and alterations to boilers and pressure vessels that are not within the scope of an Owner-User's CAP must be inspected and certified by an ABSA SCO.

The Owner-User Inspector shall inspect and certify:

- repairs performed under an Owner-User Certificate of Authorization Permit (CAP) as provided for in Section 6.3 of this document.

The ABSA SCO shall inspect and certify:

- all alterations,
- all repairs and alterations to equipment in facilities of public occupancy,

- all repairs and alterations to ASME Section VIII, Division 2 & 3 vessels, ALDs
- repairs and alterations that are performed at a repair organization's facility, (i.e. not an Owner-User's facility),
- all repairs and alterations performed at owners' sites that are not inspected and certified by the Owner-User under its Certificate of Authorization Permit (CAP).

Notwithstanding the above, the ABSA SCO may authorize an Integrity Assessment Organization Inspector or an Owner-User Inspector to inspect and certify a specific repair to a boiler or pressure vessel that is not covered under the scope of an Owner-User's CAP, providing the Integrity Assessment Organization or Owner-User has a CAP that covers the inspection and certification of repairs, and the ABSA SCO is satisfied that the item will be repaired in accordance with AB-513.

### **11.3 Inspection and Certification Activities**

Inspectors who inspect and certify repairs and alterations shall complete all the inspections required to ensure that the item is restored to a condition that is suitable for safe operation at the design conditions. This would include the applicable inspections that are identified in the code of construction used.

Typical inspection activities for a boiler or pressure vessel repair may include:

- verifying that the repair and alteration organization has a valid Alberta Certificate of Authorization Permit (CAP) for the scope of work;
- monitoring the repair and alteration organization's quality system;
- reviewing the repair or alteration procedure (plan) and related drawings specifications, and other information to confirm that it is suitable for the scope of work, and documenting acceptance of this review;
- ensuring the repair organization has prepared a suitable inspection and test plan (checklist/travel sheet) that lists all the steps, examinations, inspections, and tests needed for the work scope and is used in accordance with the repair organization's quality system manual;
- documenting completion of each required inspection by initial and date on the repair organization's inspection and test plan (travel sheet), at the time of the inspection;
- verifying welding procedure requirements and monitoring that they are followed;
- ensuring welders are qualified, in accordance with the Pressure Welders Regulation, for the procedure used;
- ensuring the correct material is used for the work;
- performing visual examinations, as required;
- verifying that the required non-destructive examinations have been



- completed and properly documented;
- verifying that required heat treatment has been performed and properly documented;
- verifying that any pressure tests and alternative examination and tests have been completed, per the accepted repair or alteration procedure, and witnessing any pressure tests;
- verifying and certifying the AB-40 *Repair and Alteration Report*.

API 577 *Welding Processes, Inspection, and Metallurgy* provides guidance to inspectors on welding inspection as encountered with fabrication and repair of refinery and chemical plant pressure equipment, and provides valuable information to supplement the requirements covered in the new construction codes and the referenced post construction codes.

Owner-Users who have demonstrated that they have an appropriate organization, documented work processes and designated competent personnel to manage repairs per section 6 may authorize a competent person who does not hold an in-service inspector certificate to assist the Inspector by performing designated inspections during the execution of the work. The Inspector must be directly involved in the inspection activities, be available at the worksite and:

- approve the repair procedure, execution methods, materials, welding procedures and testing prior to the start of work.
- confirm that the person designated to perform the in-process inspection has the required documented competence.
- review the completed repair documentation. This shall include the repair procedure, the ITP (travel sheet), the AB-40 and any other relevant documents.
- certify the Certificate of Inspection section of the AB-40.

#### **11.4 Boilers and Pressure Vessels Repair and Alteration Report**

ABSA Form AB-40, *Boilers and Pressure Vessels Repair and Alteration Report*, shall be used to document and certify each alteration and each repair in Alberta. AB-40a is a guide for completing the AB-40. These forms are available on ABSA's website at [www.absa.ca](http://www.absa.ca).

The repair organization is responsible to ensure an AB-40 is submitted to ABSA, for every repair or alteration of a boiler or pressure vessel performed in Alberta. The AB-40 must be submitted within 10 working days of the completion of the repair or alteration. This report must also be provided to the owner.

When an alteration consists of no physical work being done to a boiler or pressure vessel (e.g. a change in the design temperature or pressure), the owner may complete the AB-40 (in lieu of an AQP Holder), and shall have the AB-40 certified by the ABSA SCO.

When the item is to be installed in Alberta, but the repair or alteration has been completed outside of Alberta, the appropriate Canadian provincial form, or National Board R1 *Report of Repair*, or R2 *Report of Alterations*, must be submitted to ABSA.

The owner must retain the AB-40, and other form(s) as applicable, on file for the life of the equipment.

PESR Section 1(1)(k) lists some of the records that must be maintained by the owner, while PESR Section 41 establishes that records must be maintained for each item of pressure equipment.

### **11.5 Repair, Alteration, or Replacement Nameplates**

An alteration nameplate shall be attached adjacent to the original boiler or pressure vessel manufacturer's stamping whenever the alteration procedure is required to be submitted to ABSA Design Survey (excluding fitness-for-service alteration designs).

Repair nameplates are generally not required for items that are installed in Alberta as this repair history is available through equipment records and the repair and alteration reports that ABSA keeps on file. Owners must maintain current records for all repairs or alterations of their equipment.

Repair nameplates are required for repairs to pressurized cargo transport vessels, and if required by the NBIC for "R" stamped repairs. Repair nameplates may also be required by the owner or the repair organization, or when the ABSA Inspector considers this necessary (e.g. for out-of-province equipment, and when there has been extensive repair work done).

Replacement nameplates may be generated by the Owner. The installation of the replacement nameplate must be witnessed by the ABSA SCO. The information on the original nameplate must not be changed. ASME code stamping is not required on replacement nameplates.

The following is a sample of a repair or alteration nameplate.

**Sample Nameplate for Repairs and Alterations**

(The following information shall be shown when a nameplate is required)

_____ <b>(Identify "Repaired", "Altered, or "Rerated" as applicable)</b>	<b>by</b>	_____ <b>(Show Name of Organization doing work)</b>
<b>MAWP</b> _____	<b>at</b>	_____ <b>TEMP.</b>
<b>MDMT</b> _____	<b>at</b>	_____ <b>pressure</b>
<b>CRN</b> _____		_____
		<b>Date work completed.</b>

Indicate  
Units

**NOTE:** Markings shall be produced by casting, etching, embossing, debossing, stamping or engraving. Letters and numbers must be at least 5/32" high. Whole numbers shall be used on the nameplate.

When an alteration includes a change to the MAWP, design temperature or MDMT, the new values shall be marked on the alteration nameplate and the values that are changed on the original nameplate shall be marked out (i.e. a single horizontal line shall be stamped through the changed value). The following excerpt of markings provides an example of this requirement:

Original nameplate stamping	Rerate nameplate stamping
MAWP 4440 PSI at 100 Deg. F	MAWP 1200 PSI at 100 Deg. F

Attachment of the alteration nameplate shall be witnessed by an ABSA SCO.

## **12.0 EXAMINATION, INSPECTION AND CERTIFICATION OF REPAIRS AND ALTERATIONS TO PRESSURE PIPING SYSTEMS AND FITTINGS**

The requirements covered in the previous sections of this document, and the principles in Section 11, Examination, Inspection and Certification of Repairs and Alterations of Boilers and Pressure Vessels, also apply for pressure piping and fittings.

Note: Pressure piping listed under PESR section 4, partial exemption, is exempt from the specific requirements defined in this AB-513 document. However, the owner must ensure that any repairs or alterations done to such piping conform to the original code of construction.

Repairs and alterations of piping systems and fittings must be designed, inspected, documented and certified as provided for in the repair or alteration organization's quality management system manual filed with ABSA. A fitting that is part of a pressure piping system may be repaired or altered under a QMS whose scope of authorization includes repair/alteration of an applicable ASME B31 Code.

An ABSA SCO must inspect and certify all repairs and alterations to **boiler external piping** (as defined in ASME B31.1), with the exception of any repairs inspected and certified under the scope of an Owner-User program.

The owner shall define the competence requirements for their inspectors who inspect and certify repairs and alterations to pressure piping in accordance with Section 9 of this document. An Alberta in-service inspector certificate of competency is not required, unless the piping is classed as boiler external piping.

The *Pressure Piping Construction and Test Data Report*, AB-83, is used to document repairs and alterations to piping systems. If the AB-83 sections do not cover the scope of the piping repair (e.g. welded repairs for cracks, pits etc.), suitable notation shall be made in the remarks section. Pressure piping data reports must be retained on file by the owner for at least five years (refer to PESR section 31).

ABSA's AB-81 form, *Completion of Construction*, is used to document new construction and is not required for repairs or alterations of pressure piping systems.

Repairs and alterations of direct fired heater pressure coils, thermal liquid heating systems, and indirect fired heater coils are considered pressure vessels and require an AB-40 (see section 11.4).

## **13.0 ALTERNATIVE PRESSURE TEST METHODS**

Repairs and alterations to pressure equipment shall conform, insofar as possible, to the section and edition of the ASME Code most applicable to the work planned. The code edition and addenda of the original code of construction shall be used for the pressure testing requirements of the repaired or altered item. There may be occasions where the

pressure testing methods of the original code of construction are impractical. For those situations, acceptable technical justification shall be provided to ABSA unless otherwise covered under an Owner-User certificate of authorization permit.

*AB-519 Pressure Piping Alternative Test Methods Procedure Requirements* has been issued to specify the quality management system requirements that Owner-User organizations must comply with when considering alternative pressure piping test methods in lieu of hydrostatic pressure tests, as required under section 30 of the PESR.

*AB-522 Standard Pneumatic Test Procedure Requirements* outlines the quality management system and minimum procedure requirements for Alberta authorized organizations (an organization that holds a certificate of authorization permit to construct pressure piping) seeking acceptance of pneumatic testing of pressure piping in accordance with section 30(2) of the Pressure Equipment Safety Regulation (PESR).

## **14.0 HOT TAPPING**

Hot tapping is the technique of attaching a welded branch fitting or a bolted or mechanical fitting to piping or equipment that is in service, and then creating an opening in that piping or equipment by drilling or cutting a portion of the item within the attached fitting. API RP 2201 provides an in-depth review of the safety aspects that need to be considered when hot tapping.

Hot tapping is deemed to be an alteration. All requirements in AB-513 for alterations applicable to the item of pressure equipment that is to be hot tapped must be met in addition to the requirements specified in this section. API RP 2201 is a recognized good engineering practice that shall also be followed when developing hot tapping procedures and for executing all hot tapping activities.

Note: API RP 577 Section 11 provides additional information on welding issues related to hot tapping and in-service welding.

Hot tapping of pressure piping systems and pressure vessels may be permitted. Hot tapping of boilers and boiler external piping is not permitted.

The requirements for hot tapping that are contained in the Alberta *Occupational Health and Safety Code* apply to all hot tapping activities, including hot tapping on equipment that is exempt from the Safety Codes Act. Persons involved in hot tapping activities are responsible for compliance with all applicable legislation.

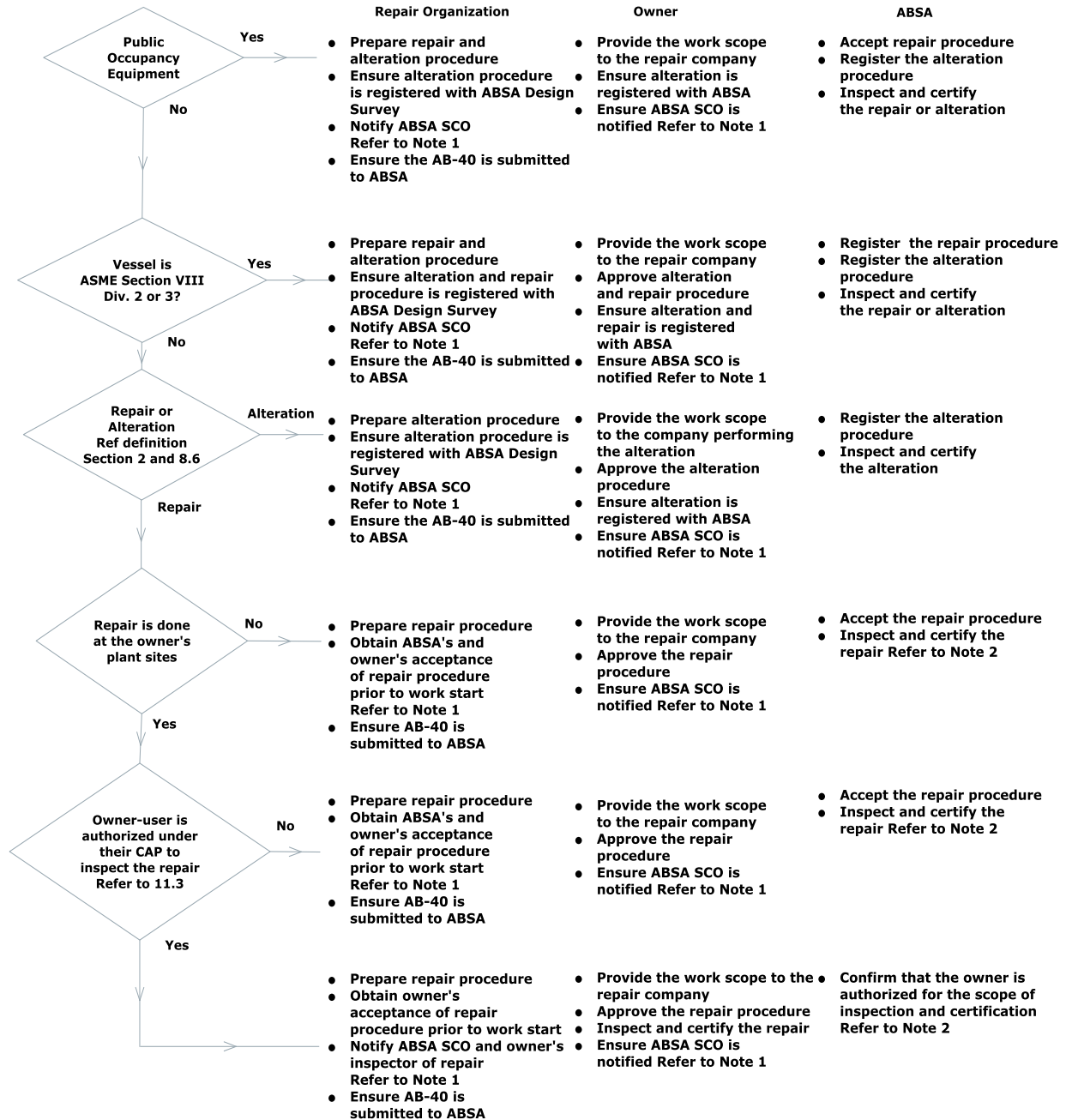
Hot tapping may be necessary when it is not feasible, or it is impractical, to take the pressure equipment out of service for making repairs or for installing additional connections. The process of hot tapping can be very hazardous. Hot taps can be accomplished safely, provided there are effective procedures in place to control all hot tap activities. Precautions include:

1. The owner shall maintain documented procedures that cover the controls for all hot tap activities including:
  - all the relevant information in AB-513 and API RP 2201;
  - ensuring that competent persons and required resources are assigned for all hot tap activities;
  - conducting job analysis and preparing the justification that no alternative method is feasible;
  - conducting a hazard evaluation and developing a risk mitigation plan;
  - preparing instructions for managing the changes (MOC) safely;
  - developing the design of the hot tap connection;
  - preparing the job-specific hot tap procedures;
  - establishing welding and mechanical attachment requirements;
  - pressure test details.
2. A hot tap is deemed to be an alteration and the hot tap procedure must be submitted to ABSA for each proposed hot tap. Notwithstanding this requirement, Owner-Users who have an acceptable hot tap procedure and appropriate organization, documented work processes and designated competent resources to manage hot taps under their CAP, may be authorized to perform hot taps without submitting individual hot tap procedures for registration.
3. Hot taps on pressure vessels shall be inspected and certified by an ABSA SCO.
4. A Contractor/Owner installing a fitting by welding for attaching a valve and machine for hot tapping shall:
  - hold a valid certificate of authorization permit for the hot tap activity, per AB-513 Section 6;
  - install the fitting in accordance with the requirements of the engineering design, hot tap procedure and the QMS;
  - certify the installation using an AB-83 form if the installation was performed on a pressure piping system, or an AB-40 form if the installation was performed on a pressure vessel.
5. The company creating an opening in the pressure equipment by drilling or cutting a portion of the item within the attached fitting shall have an Alberta certificate of authorization permit for this activity. The certificate holder shall, in conjunction with the owner, perform the work in strict accordance with documented hot tap procedures.
6. Only suitable hot tapping equipment and registered fittings shall be used.

# APPENDIX 1

## Responsibilities – Repair Organization, Owner, and ABSA

### Repair and Alteration Procedures and Inspection and Certification of Boiler and Pressure Vessels



**Notes:**

1. Repair organization and owner must ensure that ABSA is notified as required in Section 7.0.
2. The ABSA SCO may authorize an Owner-User or Integrity Assessment Organization to inspect a specific repair that is not covered in their authorized CAP SCOPE Refer to Section 11.2.

Doc ID 775349

## APPENDIX 2 - Summary of Required Activities

**Table 1 - Pressure Equipment** (includes BEP, excludes general piping and fittings)

Required Activity	Repair	Alteration	Reference
Mandatory notification to ABSA SCO	Yes	Yes	7.1, 7.2 (BEP)
Design Survey Submission <ul style="list-style-type: none"> <li>• General submissions</li> <li>• ASME Section VIII, Division 2</li> </ul>	NR* Yes	Yes Yes	8.6.1, 8.6.2
ABSA SCO Inspections (Non Owner-User)	Yes	Yes	11.2
ABSA SCO Inspections (Owner-User) <ul style="list-style-type: none"> <li>• Owner-User Program certified work completed on site as identified in AB-512(a) form</li> <li>• Work completed at an AQP holder location (not on-site)</li> </ul>	No Yes	Yes Yes	11.2
AB-40 certified by ABSA SCO <i>(Items certified by Owner-User Programs do not need ABSA SCO to certify them)</i>	Yes	Yes	11.3, 11.4
AB-40 to be submitted to ABSA SCO (within 10 working days)	Yes	Yes	11.4
Hydrostatic test	Yes**	Yes**	13.0

\* Not required UNLESS specifically requested by ABSA SCO e.g. complex repairs

\*\* Mandatory - Unless written acceptance for a waiver is received from an ABSA SCO

AB-83 forms (in lieu of AB-40) completed with ABSA SCO are also acceptable for Boiler External Piping (BEP) repairs and alterations

**Table 2 – Piping** (excludes BEP)

Required Activity	Repair	Alteration	Reference
Mandatory notification to ABSA SCO	No	No	7.2
Design Survey Submission	No	Yes	8.6.3
ABSA SCO Inspections	No	No	12.0

Notifying an ABSA SCO in advance of performing repairs or alterations of pressure piping is not normally required.

**Table 3 – Fittings** (Fittings that are repaired or altered in an existing boiler, pressure vessel, or pressure piping system are treated as such, refer to Table 1 in such cases)

Required Activity	Repair	Alteration	Reference
Mandatory notification to ABSA SCO	Yes	Yes	7.3
Design Survey Submission	No	Yes	8.6.4
ABSA SCO Inspections	No	No	12.0

**Public Occupancy** inspections shall be completed by ABSA SCO only. Integrity Assessment Organizations (Permit Holder) shall not perform public occupancy inspections per 11.2.



## 15.0 REVISION LOG

<b>Edition #</b>	<b>Revision #</b>	<b>Date</b>	<b>Description</b>
Edition 2	Revision 0	2011-06-21	New edition issued
	Editorial Revisions	2011-10-19	Editorial revisions as indicated by the vertical line in the left margin
	Editorial Revision	2012-12-13	Corrected editorial error on Appendix 1 as indicated by the vertical line in the left margin
Edition 3		2018-01-30	Updates throughout and updated formatting
	Revision 1	2018-02-28	<ul style="list-style-type: none"> <li>• Administrative clarifications and additions, and editorial changes throughout the document.</li> <li>• Technical change under 5.0 second paragraph. Weld repairs and alterations shall be subjected to the same non-destructive examination requirements as the original welds.</li> </ul>
	Revision 2	2018-06-28	<ul style="list-style-type: none"> <li>• Section 3.0 &amp; 8.3 - Added reference to ABSA document AB-535 Requirements for Alteration Design Registration Based on Fitness-for-Service.</li> <li>• Section 11 – Added reference to AB-535</li> <li>• Section 11.5 – Excluded fitness-for-service alterations from requiring an alteration nameplate attached to boiler or pressure vessel.</li> <li>• Table 1 – Added note regarding use of AB-83 forms for BEP repair &amp; alteration.</li> </ul>
	Revision 3	2019-07-12	<ul style="list-style-type: none"> <li>• Section 1 – Referred users of Grade 91 to AB-536.</li> <li>• Section 2 – Added definition of creep-strength-enhanced materials.</li> <li>• Section 3 – Added reference to AB-536.</li> <li>• Section 3 – Moved reference to AB-535.</li> <li>• Section 5 – Editorial for clarification.</li> </ul>