

Inspection & Servicing Requirements for Pressure Equipment

2008-01-28

Rev 5

Table of Contents

1.0	Purpose	2
2.0	General	2
3.0	Definitions	3
4.0	Inspection Practices	4
5.0	Ownership and Location Changes	4
6.0	Installation Inspection	5
7.0	Thorough Inspection Grading Allocation	5
7.1	Inspection Grade (0)	6
7.2	Inspection Grade (1)	6
7.3	Inspection Grade (2)	6
7.4	Inspection Grade (3) Applicable to Owner-Users only	6
7.5	Allocation to lower Grade/lower interval	6
7.6	Grading Review	7
8.0	Requirements for Certified Owner-Users	7
8.1	New Vessels in Known Service Conditions	7
8.2	Sample Inspection of Pressure Vessels	8
8.3	Risk Based Inspection Programs	8
8.4	Inspection Date Deferral	8
9.0	Pressure Relief Devices	8
9.1	Pressure Relief Valves	8
9.2	Rupture Discs	9
9.3	Control of Pressure Relief Devices.....	9
9.4	Other Protective Devices	9
TABLE 1 MAXIMUM THOROUGH INSPECTION/SERVICING INTERVALS.....		11
REFERENCE DOCUMENTS		13
REVISION LOG.....		14

1.0 Purpose

This AB-506 *Pressure Equipment Inspection and Servicing Requirements* document (ISRD), has been issued by the Alberta pressure equipment safety Administrator, to specify inspection and servicing requirements for pressure equipment under the Safety Codes Act. It covers the requirements for determining inspection practices and establishes maximum inspection/servicing intervals for pressure equipment and pressure relief devices.

The application of AB-506 under an Owners Certificate of authorization permit issued under the Pressure Equipment Safety regulation (PESR), and for risk based inspection programs provided in accordance with AB- 505- *Risk-Based Inspection Requirements for Pressure Equipment* is also addressed.

2.0 General

Pressure equipment for process applications installed in Alberta covers a broad range of facilities from major petrochemical plants, pulp mills, and power utilities to small oil and gas processing facilities and commercial and other applications.

The information in AB-506 and other referenced ABSA policy documents was developed, and is updated periodically, based on ongoing consultation with Alberta pressure equipment owners and other stakeholders and information from codes, standards and other published information. This process is designed to ensure that policy documents issued by ABSA, as the Alberta pressure equipment jurisdiction, reflect current best industry practices that are suitable for all industry sectors.

The sections of the National Board Inspection Code NB-23 and API-510 Pressure Vessel Inspection Code that are referenced, shall be used in conjunction with AB- 506 to determine the inspection requirements and inspections intervals for pressure equipment.

While the principles for establishing inspection intervals in API-510 and NB-23 Codes are similar, API Codes were developed for pressure equipment used by the petroleum and chemical process industries and NBIC is intended for pressure equipment that is not covered by API Codes. It should be noted that these codes are not adopted as regulations in Alberta and that they contain a caution that if their use is in conflict with jurisdictional regulatory requirements, the jurisdictional requirements shall prevail. In Alberta, there are a number of exceptions and additional requirements that must be met in order to comply with the Safety Codes Act and (PESR).

The grading system that is described in this procedure is based on the Institute of Petroleum Pressure Vessel Examination Code of Practice grading system. It was selected as an adjunct to the above Codes to provide an objective method for setting inspection intervals that is suited for all sectors of Alberta's pressure equipment industry.

3.0 Definitions

For the purpose of this procedure, the following definitions apply:

- 3.1 RBIP: a risk based inspection program that meets *Risk-Based Inspection Requirements for Pressure Equipment (AB-505)* and has been reviewed and accepted by ABSA.
- 3.2 External Assessment: a periodic evaluation, not to exceed five years. The assessment shall include a review of equipment history, current on-stream monitoring data (as defined in the equipment inspection plan), process deviations or other incidents which have occurred during the assessment period, any design changes and any anticipated changes to the long term process operating parameters (or envelope). It includes an external visual examination, verification of relief devices and a review of all the relevant information needed to ensure that equipment is safe for operation until the next thorough inspection interval.
- 3.3 Integrity Assessment under the PESR means an examination of an item of pressure equipment, related processes and documentation to determine its conformity to the requirements established by the Safety Codes Act and the regulations. When the terms inspection and assessment are used in this document it shall mean integrity assessment under the PESR
- 3.4 Installation Inspection: a pre-commissioning inspection of a boiler or pressure vessel.
- 3.5 Inspection Intervals: the period between thorough inspections.
- 3.6 Owner-User: an organization who has provided a satisfactory program for managing the integrity of their pressure equipment and has been issued an Certificate of Authorization Permit under PESR Section 11(3)
- 3.7 Thorough Inspection

A thorough examination of pressure equipment in order to determine its actual condition and the period of time for which it may be safely used until the next thorough inspection. It shall include an external assessment and, unless otherwise specified using a RBI program, an internal inspection or equivalent in accordance with API 510. Alberta Safety Codes Act and Regulations

Legislation that govern the pressure equipment discipline are:

- [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), and
- [Administrative Items Regulation](#) (Alberta Regulation 16/2004).

4.0 Inspection Practices

An external assessment shall be done at a maximum interval of 5 years and during the thorough inspection.

NB-23, API 510, and API 572, "Recommended Practice for Inspection of Pressure Vessels", provide information on inspection practices, causes of deterioration, inspection methods, etc. for installed boilers and pressure vessels. The applicable information contained in these documents, other relevant industry standards and AB-506 shall be used to determine appropriate inspection methods.

To ensure the integrity (safety) of the entire process system, all process plant owners shall have a suitable system in place for ensuring that their process piping remains in a satisfactory condition for continued operation. The inspection principles covered in API 570 Piping Code Part 5, 6, 7, 9 shall be applied for process piping. NB-23, lists information for inspection of piping that is not within the scope of API 570.

Organizations performing in-service inspections shall develop appropriate inspection procedures and individual inspection plans in accordance with the above documents.

5.0 Ownership and Location Changes

Owners and vendors who sell or lease equipment must ensure that the equipment records are provided to the new owners. The owner who acquires the equipment must ensure that relevant equipment history and other equipment records are provided to them. They must assess the integrity of all purchased assets. This would include reviewing all historical data and performing inspections when required. Refer PESR Section 36

ABSA form AB-10, Status Report, and owners electronic summary reports(ESR) are used to notify ABSA when there is a change of ownership, location and other status changes.

6.0 Installation Inspection

An inspection shall be performed after installation and prior to commissioning. The installation inspection shall include:

- Verification that the correct Manufacturer's Data Report is available and that the design has been registered with ABSA and the nameplate information is correct.
- An external visual examination
- Verification of pressure relief devices
- Review of the process conditions and other relevant information to establish any on-stream monitoring needed and to designate the initial thorough inspection interval.
- Verify that the vessel is identified with an Alberta 'A' number and an ABSA Certificate of Inspection has been issued (unless item otherwise exempt from stamping per Safety Codes Act)

Boilers and pressure vessels, which were built outside Alberta, and are not exempt from a certificate of inspection under Section 33 of the Pressure Equipment Safety Regulation, must be inspected and certified by an ABSA Safety Codes Officer prior to initial operation.

Owner-Users shall provide installation reports to ABSA for installation inspections of new and relocated equipment that already has an 'A' Number (eg. equipment built in Alberta)

7.0 Thorough Inspection Grading Allocation

(Except as otherwise provided in the "Owner-Users" section)

All requirements contained in this procedure, including the progressive grading system identified in this section, shall be followed when assigning inspection intervals. Note: for Owner-Users who have an ABSA accepted RBI program the progressive grading system does not apply.

To determine the maximum thorough inspection interval for a pressure item, the appropriate grade must be established as described below.

The maximum thorough inspection intervals assigned for each of the following grades shall not exceed that shown in TABLE 1 at the end of this procedure.

7.1 Inspection Grade (0)

At the time of installation inspection, all equipment shall be assigned an initial interval up to the maximum shown for Grade (0) and will remain in this grade until a thorough inspection confirms that an allocation to a higher grade is appropriate.

7.2 Inspection Grade (1)

Equipment may be assigned to grade (1) after the first or subsequent thorough inspection(s) at Grade (0) has proved that the interval can be increased safely up to the maximum period established for Grade (1).

7.3 Inspection Grade (2)

Equipment may be moved to Grade (2) after a thorough inspection(s) at Grade (1) has proved the interval can be safely increased up to the maximum period for Grade (2).

7.4 Inspection Grade (3) Applicable to Owner-Users only

For equipment inspected under a certified Owner-User program, the interval can be extended to the maximum interval shown at grade 3 when the item has successfully concluded a period of service at grade 2 and a thorough inspection has proved that the interval can be increased to grade 3.

7.5 Allocation to lower Grade/lower interval

On the basis of an inspection, any item of equipment in Grade 1, 2 or 3 will be reduced to a lower grade/interval if:

- The results of the inspection show that conditions for the higher Grade/Interval are not being met.
- Significant changes have taken place in the conditions of service of any items in any Grading allocation, which could affect its deterioration in whole or in part.
- When a change of duty is proposed. In such cases the grading allocation shall be reassigned based on the equipment history, the new service, and any knowledge of equipment in the same service. As a minimum, changes in pressure, temperature, throughput, additional loading, and susceptibility to corrosion, (stress corrosion, fatigue, creep, etc.) shall be considered.

Note for equipment that is designed for a specific life period/cycle (eg. Fired Process Heaters and Div 2 vessels), it may be necessary to reduce the inspection period when it is approaching its design life.

7.6 Grading Review

A Grading Review is required:

- A) Following an abnormal incident which has or could have affected the safety of operation of the equipment, or
- B) When "On-stream" inspection from corrosion probes, metal content of process streams, pH levels, etc. has indicated that there has been a significant change in the condition of the vessel that could warrant a change in the Grading Allocation, or
- C) When the equipment approaches its intended design life or when it is proposed to extend the service life of the equipment beyond its original design life.
- D) When any thorough inspection indicates a significant change in the condition of the vessel.

8.0 **Requirements for Certified Owner-Users**

All requirements in this procedure, including the progressive grading system, also apply to owner-users equipment, except as modified below:

8.1 New Vessels in Known Service Conditions

Exceptions to the normal Grading procedures may be applied in cases where a vessel:

- A) Will perform the same duty as that of an existing vessel at the same location, and
- B) Is substantially the same as the existing vessel regarding geometry, design, construction and conditions of service, and
- C) There is sufficient and relevant inspection history to allow for a similar service comparison.

In such cases the new vessel may be given the same Grade, up to maximum Grade 2, as the vessel with which it is being compared.

8.2 Sample Inspection of Pressure Vessels

Where a group of vessels are substantially the same in terms of geometry, design, construction, conditions of service, and are located at the same site, such that they are subject to the same deterioration, and Grade 1 or above is appropriate, a sample inspection of at least 1/3 of the vessels may be utilized. Sample inspection of vessels in the group may commence at the first inspection following installations and may continue to be applied subject to the proviso that each vessel shall be given a thorough inspection within the maximum period allowed for Grade 3. Assessments shall be done at 5-year intervals max.

8.3 Risk Based Inspection Programs

Owner-Users who use an RBIP (refer to definition) are not required to use the progressive grading system. These owners may establish appropriate inspection intervals up to the maximum listed in Table under Grade 3 for the specific type of equipment, in accordance with their RBIP, any time after the installation inspection.

8.4 Inspection Date Deferral

The Table indicates the maximum time which may be allowed to elapse between thorough inspections. Owners may be granted one deferral beyond the inspection due date, providing they have a formal deferral procedure in their OUP. Key procedure elements include: an individual assessment of each item to be deferred; approval from the Chief Inspector, operations and Management Representative; and formal acceptance in writing from ABSA.

9.0 **Pressure Relief Devices**

The owner has responsibilities under the PESR to ensure pressure equipment is protected against overpressure, and to ensure the overpressure protection system is designed and maintained to prevent overpressure, and to ensure devices are serviced at intervals acceptable to the Administrator.

9.1 Pressure Relief Valves

Valve servicing intervals shown on the attached table are the maximum periods of time a pressure relief valve may remain in service before it requires servicing. This work shall be done by an organization who has a valid ABSA Certificate of Authorization to service pressure relief valves. Pressure relief valves are to be serviced or replaced if there is evidence that they are not in good working order.

The applicable grading allocation requirements that are established in 5.0 and 6.0 of this document shall also be used for pressure relief valves. Any increase in

the servicing interval shall be based on satisfactory history in a particular fluid service such as pre-popping, cleanliness and other servicing information. Conversely, when a pressure relief valve servicing report indicates the valve was in unsatisfactory condition when it was removed from service a lower interval may need to be assigned. The owner should conduct a root cause analysis for the purpose of preventing reoccurrence, because reducing the length of the service interval may not always address the cause. This is particularly important when failed the valve fails the service pre-pop test, or is otherwise found to be in an in-operable condition. The information to support servicing interval assignments shall be available on file.

9.2 Rupture Discs

The device must be inspected at the assembly stage to verify that it has been installed correctly and that the disc meets the requirements defined in Section VIII, Div 1. Rupture discs shall be replaced at specified intervals based on the applicable manufacturer's recommendations and past experience.

There shall be a document system to ensure that correct rupture discs are installed and maintained safely.

9.3 Control of Pressure Relief Devices

Owners shall maintain documented procedures and personnel training records for controlling the servicing, installation and maintenance of PRDs. This shall also address management of any PRD isolating valves. Suitable records shall be available at the site to confirm compliance with the above.

9.4 Other Protective Devices

Other protective devices that are essential to prevent a dangerous situation from arising, such as thermal relief valves, shall be examined, tested, and/or maintained at intervals that are appropriate to their service.

TABLE 1 MAXIMUM THOROUGH INSPECTION/SERVICING INTERVALS

Table 1, Page 1 of 2

TYPE OF EQUIPMENT	MAXIMUM Thorough Inspection intervals Boilers and Pressure Vessels				MAXIMUM Servicing Intervals PRVs				Note #	Notes Intervals are in Years
	Grade				Grade					
	0 (Installation)	1	2	3 (Certified O/U Only)	0	1	2	3 Certified OU only		
1.0 Boilers										A Manual Test PRV monthly and at the time of the thorough inspection. Replace/service if there is any malfunction, leakage etc. B Pressure Vessels in steam, air & clean dry gases service – Manual test PRV annually and at time of the thorough inspection. Replace/service if there is any malfunction, leakage, etc. C Assist- lift test at half the servicing interval. This must be done by an approved servicing organization. D System test or lift test annually. System test not recommended above 2750 kPa (400 psig).
1.1 High Pressure Boilers										
Pressure Plant H.P. Boilers	1	1	2	3	2	3	3	4	C or D	
Thermal Generating Station	1	1	1	3	2	4	4	4	C or D	
Waste Heat Boilers e.g. (Sulphur Plant Boilers)	2	2	3	4	2	2	3	4	C or D	
Portable Boilers - Rig and Others	1	1	1	1	1	1	2	2	D	
Laundry/Public Occupancy	1	1	1	N/A	1	1	2	N/A	D	
Once Through Steam Generators – Heavy Oil Processing	1	1	2	2	2	2	3	3	D	
High Temperature Hot Water/Glycol Boilers	2	2	3	3	2	2	3	3	D	
1.2 Heating Boilers (Section IV) (All Types)										
Public Occupancy Buildings *	2	2	3	3	Refer to Note A				A	
Process Heating	2	2	3	4	Refer to Note A				A	
2.0 Public Occupancy Unfired Vessels*										
Air Receivers/Dryers	4	4	5	5	Refer to Note B				B	
Misc. Vessels in Building Service – Expansion Tanks, Hydro Pneumatic	4	4	5	5	Refer to Note B				B	
Potable Hot Water Storage Tanks	4	4	5	5	Refer to Note A				A	
Blow Down Tanks	4	4	5	5						
Deaerators	4	5	5	5	4	4	5	5		
Vessels with Quick Opening Closures	2	4	4	4	2	4	4	4		
Refrigeration Vessels Group A1	5	5	10	10	5	5	5	5		
Refrigeration (other incl. Ammonia)	5	5	5	5	5	5	5	5		
Ammonia Storage	5	5	5	10	5	5	5	5		
LPG and other non-corrosive Storage Vessels eg. (Cryogenic)	5	5	10	10	5	5	5	5		

*Note: Public Occupancy defined as 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, control rooms etc.

**THIS TABLE MUST BE USED IN CONJUNCTION WITH THE ABSA INSPECTION INTERVAL PROCEDURE OF WHICH THIS IS PART.
AN EXTERNAL ASSESSMENT TO BE DONE AT MAXIMUM INSPECTION INTERVAL OR EVERY 5 YEARS WHICHEVER IS LESS.**

TABLE 1 MAXIMUM THOROUGH INSPECTION/SERVICING INTERVALS

Table 1, Page 2 of 2

TYPE OF EQUIPMENT	MAXIMUM Thorough Inspection intervals Boilers and Pressure Vessels				MAXIMUM Servicing Intervals PRVs				Note #	Notes Intervals are in Years
	GRADE				GRADE					
	0 (Installation)	1	2	3 Certified OU Only	0	1	2	3 Certified OU only		
3.0 Cargo Transports		Refer to DOT Regs.								#E Inspection intervals are for external assessment (external visual of cold box and gas monitoring etc.). Thorough inspection of vessels if insulation is removed.
4.0 All Pressure Plant Vessels, other than those listed in 1, 2, or 3 above										
Air Receivers	4	5	5	10	Refer to Note B					
Blowdown Tanks	4	5	5	6						
Deaerators	4	5	5	6	4	5	5	6		
Vessels with Quick Opening Closures	2	4	4	4	2	4	4	4		
Product Storage Vessels	5	5	10	10	5	5	5	6		
Vessels in Cold Boxes	5 [#]	5 [#]	5 [#]	5 [#]	5	5	5	6		
Process Vessels										
Fired Process Vessels	2	3	4	6	2	3	4	6		
Unfired Process Vessels	3	4	5	10	2	3	5	6		
Note: Owners may need to develop category for their specific types of equipment – an example for the oil and gas upstream and midstream processing facilities is:										
Upstream and Midstream Oil and Gas Equipment										
Treaters, FWKO's	3	4	5	6	2	3	5	6		
Line Heaters	3	4	5	10	2	2	5	6		
Sweet Service Unfired Process Equipment*	4	5	5	10	2	3	5	6		
Sour Service Unfired Process Equipment*	3	4	4	6	2	3	4	4		
Compressor Bottles	3	4	4	6	2	3	4	4		
Storage Vessels	5	5	10	10	3	4	5	6		

*Per MR0175

**THIS TABLE MUST BE USED IN CONJUNCTION WITH THE ABSA INSPECTION INTERVAL PROCEDURE OF WHICH THIS IS PART.
AN EXTERNAL ASSESSMENT TO BE DONE AT MAXIMUM INSPECTION INTERVAL OR EVERY 5 YEARS WHICHEVER IS LESS.**

REFERENCE DOCUMENTS

ABSA - Risk Based Inspection Programs for Pressure Equipment

ANSI/NB-23 - National Board Inspection Code

API 510 - Pressure Vessel Inspection Code:

API 572 - Inspection of Pressure Vessels -

IP (Institute of Petroleum) - Pressure Vessel Examination, Model Code of Safe Practice, Part 12 (2nd edition - March 1993).

API 580 - Risk Based Inspection API Recommended Practice

API 576 – Inspection of Pressure Relieving Devices

API 570 - Piping Inspection Code

Note: unless otherwise identified, the latest Edition and Addenda of these documents shall be used in conjunction with AB-506

REVISION LOG

Rev #	Date	Description
1	2001-Oct-29	<p>Table 1 Section 1.1, for Portable Boilers and for Laundry Boilers the maximum PRV servicing interval for Grade 2 is now shown as 2 years. Note 4 requires annual test.</p> <p>Table 1 Section 4.0, for Vessels in Cold Boxes the maximum inspection interval is now shown as 5 years for all grades.</p> <p>Added Revision Log.</p>
2	2002-Apr-24	<p>Updated Table – changed notes from numeric to alpha</p> <p>- changed document numbering</p>
3	2002-Aug-28	<p>Updated Table – changed “Refer to Note 2” to “Refer to Note B”.</p>
5	2008- Jan- 28	<p>Document updated to reference current legislation .</p> <p>Note: the technical requirements are under revision</p>