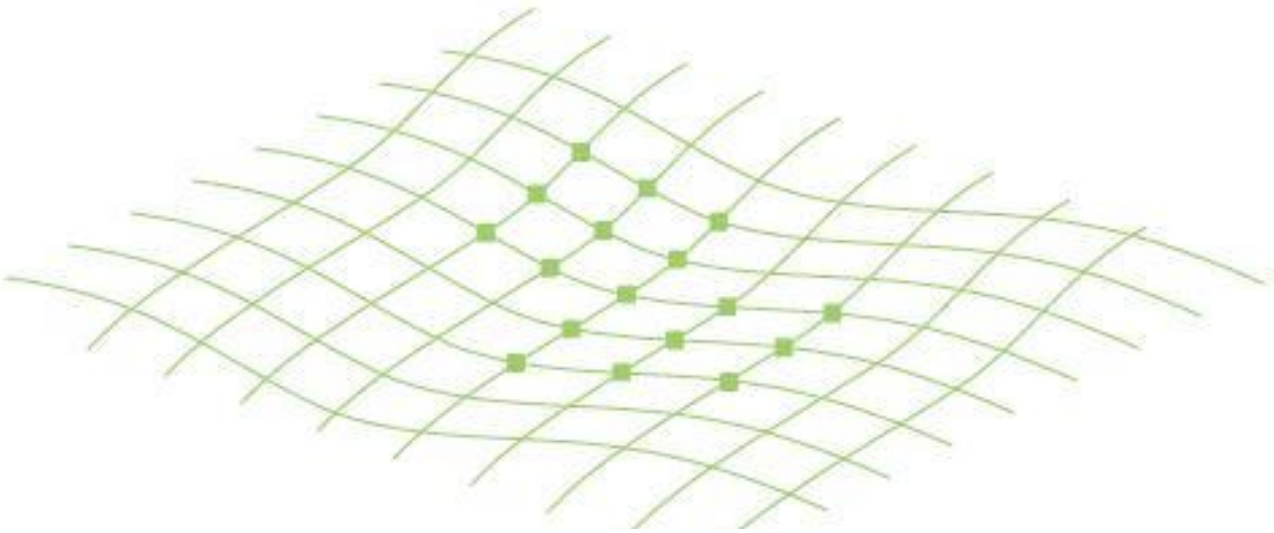
BRITISH COLUMBIA SAFETY AUTHORITY

Approval of Biomass Boilers in Accordance with the British Columbia Safety Standards Act



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1.0 Introduction

This document details the registration and conformity assessment process for the approval of biomass fired boilers, in accordance with the British Columbia *Safety Standards Act* and the *Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation*. Dependent on a biomass boiler's capacity, output or size and the application for which it is to be installed and/or used, the boiler may be subject to other regulatory requirements in addition to those of the *Safety Standards Act* and the *Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation*. Sources for other legal requirements may include, but are not limited to, the *British Columbia Building Code* and the *Environmental Management Act*. Persons seeking approval for the installation and/or use of biomass boilers in British Columbia are advised to seek out, and to ensure compliance with any other applicable provincial, federal or municipal legal requirements in addition to those that are dealt with herein.

The designs of all biomass boilers within the scope defined in Section 2.0, must be registered in accordance with the *Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation*. The *Safety Standards Act* also requires that all regulated boilers must either have a certification mark proving that they meet the codes and standards adopted under the *Safety Standards Act* or have an approval mark that has been issued by a Provincial Safety Manager. Boilers that do not, at a minimum, meet the foregoing conditions can not be installed and/or used in British Columbia.

2.0 Scope

2.1 Except as indicated in clause 2.2 this procedure applies to all biomass boilers used to generate steam or heat water.

2.2 This procedure does not apply to a biomass boiler that:

a) generates steam at a pressure exceeding 103 kPa, heats water to a pressure exceeding 1100 kPa or a temperature exceeding 121°C and has a heating surface of $2m^2$ or less;
b) generates steam at a pressure not exceeding 103 kPa, heats water to a pressure not exceeding 1100 kPa or a temperature not exceeding 121°C and has a heating surface of $3m^2$ or less;
c) is installed in a water heating system operating at a pressure not exceeding 1100 kPa or a temperature not exceeding 121°C that has no valves or other obstruction to prevent circulation of the water between the boiler and an expansion tank that is fully vented to the atmosphere; or
d) is installed in a water heating system operating at a pressure not exceeding 1100 kPa or a temperature not exceeding 121°C that is located in a building that contains only 4 or fewer self-contained residential units.

2.3 The registration and approval procedures in this document apply only to new biomass boilers. Biomass boilers already in service are not subject to these procedures and must

continue to satisfy the requirements of the regulations, code or standard which applied at the time of their installation.

3.0 Referenced Publications

American Society of Mechanical Engineers (ASME)
Boiler and Pressure Vessel Code

Canadian Standards Association (CSA)
B51- 09 Boiler, Pressure Vessel and Pressure Piping Code

EC Directive 2006/42/EC on Machinery

National Fire Protection Code (NFPA)
NFPA 85 Boiler and Combustion Systems Hazards Code

Pressure Equipment Directive (PED) 97/23/EC of the European Parliament and the European Council May 1997

EC Directive 2006/95/EC on “electrical equipment designed for use within certain voltage limits”

EC Directive 94/9/EC on “equipment and protective systems intended for use in potentially explosive atmospheres”

EC Directive 2004/108/EC on “the electromagnetic compatibility”

EN 303-5 Heating boilers – Part 5: Heating boilers for solid fuels, hand and automatically stoked, nominal heat output of up to 300 kW – Terminology, requirements, testing and marking

EN 12952 (series) Water-tube boilers and auxiliary installations

EN 12953 (series) Shell boilers

4.0 Definitions

Accredited inspection body – an organization accredited for the applicable testing or inspection by accreditation bodies which are members of the European co-operation for Accreditation (EA) or International Accreditation Forum (IAF) Multilateral Recognition Agreement (MLA)

BC Limited Design Number (BCLD #) – an approval mark allotted by the BC Safety Authority to boiler designs that which have been approved by a Provincial Safety Manager and allows a boiler to be used in British Columbia

Biomass – solid material that comes from plants including wood, forest residue from logging, sawdust, grass cuttings, domestic refuse, charcoal, agricultural waste, non-food energy crops

Biomass Boiler – a vessel which uses biomass as a fuel to create heat, the application of which is capable of:

a) generating and pressurizing steam, or
b) heating or pressurizing water

and includes fittings and boiler external piping associated with the vessel

Canadian Registration Number (CRN) – a number allotted by the BC Safety Authority to boiler designs that comply with the requirements of CSA B51 which have been accepted for registration and allows a boiler to be used in British Columbia.

Design – technical documentation which may include calculations, drawings, specifications, codes, standards, conformity assessment procedures, certifications, qualification of assembly procedures (welding, brazing etc.), safeguards, controls, safety interlocks and operating instructions.

Harmonized Standard – European Standards that are produced by CEN, CENELEC, or ETSI as 'harmonized standards' (hEN) under a mandate given by the European Commission.

Notified Body (NB) – an organization that has been appointed by a member state of the European Union to carry out the third party conformity assessment procedures of the New Approach directives.

Regulatory Authority – the body responsible for administering and enforcing a Canadian provincial or territorial Act governing the design, fabrication, installation, repair, and alteration of boilers, pressure vessels, fittings, and piping.

Safety Relief Valve – a pressure relieving device which is automatically activated by the pressure upstream of the valve.

5.0 Design Registration

5.1 The design of all biomass boilers used in British Columbia must be registered with the BC Safety Authority. To register a design the owner, licensed contractor, consulting engineer, manufacturer or designer of the biomass boiler must submit an application for registration containing all technical documentation specified in this section before construction of the boiler is commenced.

5.2 Upon satisfactory review of the registration documentation, the design will be assigned a CRN or a BCLD #. A design registration letter indicating the CRN or BCLD #, date of registration, manufacturer's name, drawing/revision numbers, registration fee and any other pertinent information will be sent to the applicant.

5.3 A registration pertains to the design of the biomass boiler and any number of boilers may be manufactured to a registered design. The registration remains valid until a change in any

aspect of the design, code, standard, *Act* or Regulation invalidates the design. Manufacture of boilers to invalidated design is not permitted until the design is altered or revised and the alterations or revisions are accepted by the BC Safety Authority.

5.4 The design of a biomass boiler complying with CSA B51 may be registered with a CRN and after registration with the BC Safety Authority application can be made for reciprocal registration in other Canadian provinces and territories. The standards governing the design, construction, conformity assessment, testing and inspection of a biomass boiler design registered with a CRN are the ASME Boiler and Pressure Vessel Codes.

5.5 The design of a biomass boiler that does not comply with CSA B51 shall be eligible for approval by a Provincial Safety Manager and registration with a BCLD # if the boiler complies with a regulation of another country, code or standard acceptable to the BC Safety Authority. Biomass boiler designs approved by a Provincial safety manager are approved for British Columbia only and are not eligible for reciprocal registration in other Canadian provinces and territories.

5.6 All registration documentation, nameplates or stampings affixed to a biomass boiler, manufacturers' data reports and declarations of conformity must be in English.

6.0 Biomass Boilers Complying with CSA B51

An application for registration of a biomass boiler design for the pressure retaining components complying with CSA B51 and its fuel system shall be made to the BC Safety Authority.

6.1 Pressure Retaining Components

6.1.1 Sufficient documentation to verify that the biomass boiler design conforms to CSA B51 and the applicable ASME code shall be submitted with the application. As a minimum the following information and documentation shall be submitted:

i) A completed British Columbia CRN application form.
ii) Design data such as ASME code specification, material specifications, pressure ratings, temperature ratings and type of service.
iii) Drawings showing dimensions, construction and welding details of the proposed vessel design
iv) ASME code calculations.
v) Copy of manufacturer's ASME accreditation or certification from a Canadian regulatory authority.

6.1.2 The drawings should be identified by number and revision and indicate the applicable ASME code of construction (edition and addenda), nondestructive examination requirements, maximum allowable working pressure, minimum and maximum design temperatures, service fluid specific gravity, heat treatment, impact testing, corrosion allowance, nozzle locations, reinforcement and dimensions, flange and fitting standards, ASME material specifications, bill of material and nameplate facsimile. All design details and material specifications referenced in the calculations shall be included in the drawing. Conditions such as seismic or wind loadings, which may limit the vessel's location must be detailed on the drawing.

6.1.3 Design calculations shall be to the latest ASME Code edition and addenda unless the submission details the reasons for using an earlier edition or addenda. The calculations shall contain sufficient information to verify that all applicable requirements of the specified ASME code have been complied with. If exemptions from specific code requirements are utilized in the design, the specific code section and subsection permitting the exemption must be identified and supported by an explanation or reason detailing how the exemption applies to the design. The calculations shall show the formulas used and reference the appropriate code section. Where the ASME code does not cover all details of the vessel design and construction, the submission must provide details utilizing recognized engineering practices or proof test results to show that the design method is as safe as those of the applicable ASME code. The calculations shall be signed by the person responsible for that function in the manufacturer's quality control manual. The calculation package shall be numbered and have a method for revision control.

6.1.4 Biomass boilers constructed by a manufacturer accredited by a Canadian regulatory authority in accordance with CSA B51 section 4.10.2 shall submit a facsimile of the name plate or stamping to be put on the vessel. The nameplate or stamping shall list all the information required by CSA B51.

6.2 Biomass Fuel Systems

6.2.1 Documentation detailing the design and operation of the biomass boiler fuel system shall be submitted. Boilers exceeding 3.7 MW shall comply with NFPA 85 Boiler and Combustion Systems Hazards Code. As a minimum the following information and documentation shall be submitted:

i) Design specifications, including information respecting safeguards, controls, interlocks, and logic data.
ii) A list of all combustion, control, and safety equipment giving manufacturer, type, model and number.
iii) Purge, ignition trials and other fuel safety sequencing.
iv) A detailed description of the function and sequence of operations for interlocks and safety equipment in the fuel system.

Boilers with automatic fuel feeding systems shall be equipped with an automatic device for stopping the fuel feed to the boiler for any of the following conditions:

i) Low water level
ii) Pressure exceeding the maximum allowable working pressure
iii) Temperature exceeding the maximum allowable working temperature
iv) Shut down or failure of a fan providing combustion air or failure of the combustion air supply
v) Shutdown or failure of mechanical flue gas exhaust fan or failure of flue gas flow

6.2.2 All electrical safety devices, controls and other electrical components should be listed or certified to a Canadian standard by an organization accredited by the Standards Council of Canada (SCC), for the service intended or approved by a Provincial Safety Manager if listed or certified devices are not available.

6.3 Certification Mark

Every biomass boiler manufactured to a CRN registered design shall be stamped with an ASME Code symbol stamp or the stamp approved by the Canadian regulatory authority accrediting the manufacturer. The stamping or nameplate shall include all information required by CSA B51.

6.4 Manufacturer's Data Report

A manufacturer's data report completed in accordance with the requirements of CSA B51 or the ASME codes shall be provided to the owner of the boiler and made available to a safety officer on request.

7.0 Biomass Boilers Complying with Standards other than CSA B51

7.1Provincial Safety Manager Approval

Biomass boilers that do not comply with the requirements of CSA B51 may be approved for use in British Columbia by a Provincial Safety Manager when they conform to a code or standard acceptable to the BC Safety Authority.

7.2 Standards Accepted for Provincial Safety Manager Approval

European New Approach Directives – Companies that demonstrate that their biomass boilers meet the essential requirements of the EC Directives or the European standards prescribed in sections 7.2.1 and 7.2.2 and are subject to ongoing assessment by a Notified Body are eligible for Provincial Safety Manager approval.

7.2.1 Pressure Retaining Components

7.2.1.1 Biomass Boilers Within Categories I, II, III or IV of the Pressure Equipment Directive (PED) 97/23/EC

Pressure retaining components shall meet the essential safety requirements for category IV of the PED and be subjected to one of the following conformity assessment procedures detailed in the PED:

Category	Module
up to and including III	B1+D, B1+F, B+E, B+C1,
IV	B+D, B+F, G, H1

In conforming to this requirement, the boiler manufacturer may have to select conformity assessment procedures which are more stringent than those required for boilers placed on the market in the European Community. The conformity assessment procedure selected shall not be applicable to a hazard category lower than that required by the boiler's hazard classification in the PED.

Pressure retaining components shall be designed, manufactured and tested according to European Standards EN 12952 for water tube boilers and/or EN 12953 for shell boilers,

7.2.1.2 Biomass Boilers Covered by Article 3 Section 3 of the PED (sound engineering practice)

7.2.1.2.1 Biomass Boilers Within the Scope of European Standard EN 303-5

Limits of the scope of EN 303-5:

i) maximum allowable operating pressure: 6 bar
ii) maximum allowable operating temperature: 100°C
iii) nominal heat output: up to 300 kW

Pressure retaining components shall meet the requirements of European Standard EN 303-5 and the supplementary requirements of Appendix I. The manufacturer shall implement and maintain manufacturing controls as detailed in Appendix II during the manufacturing process.

7.2.1.2.2 Biomass Boilers Exceeding the Limits of European Standard EN 303-5

Pressure retaining components shall meet the requirements of European Standards EN 12952 and/or EN 12953. The manufacturer shall implement and maintain manufacturing controls as detailed in Appendix II during the manufacturing process.

7.2.1.3 Each biomass boiler design shall have at least one safety relief valve set to activate at or below the maximum allowable working pressure of the boiler. The capacity of the safety relief valves shall be such that at the maximum heat input from the fuel system the pressure will not exceed the maximum allowable working pressure by more 10%.

7.2.2 Biomass Fuel Systems

7.2.2.1 The fuel system for the biomass boiler shall meet the essential safety requirements of Directive 2006/42/EC on machinery, *Directive 2006/95/EC on "electrical equipment designed for use within certain voltage limits, Directive 94/9/EC on "equipment and protective systems intended for use in potentially explosive atmospheres (ATEX), Directive 2004/108/EC on "the electromagnetic compatibility and Directive 97/23/EC on "pressure equipment" where applicable.* The conformity of biomass fuel systems designed according to harmonized standards covering all the relevant essential requirements may be certified by the manufacturer. For all other biomass fuel systems the manufacturer shall choose between EC type-examination by a Notified Body or approval by a Notified Body of the manufacturer's full quality assurance system.

7.2.2.2 Boilers with automatic fuel feeding systems shall be equipped with an automatic device for stopping the fuel feed to the boiler for any of the following conditions:

i) Low water level
ii) Pressure exceeding the maximum allowable working pressure
iii) Temperature exceeding the maximum allowable working temperature

iv) Shut down or failure of a fan providing combustion air or failure of the combustion air supply
v) Shutdown or failure of mechanical flue gas exhaust fan or failure of flue gas flow

7.2.2.3 All electrical safety devices, controls and other electrical components shall be:

i. listed or certified to a Canadian standard by an organization accredited by the Standards Council of Canada (SCC), for the service intended, or
ii. conform to the requirements of the EC Directives and be supplied as an integral component of the biomass boiler assembly with a CE mark attached

7.3 Registration and Approval

7.3.1.1 Manufacturers of biomass boilers conforming to 7.2.1.1 shall select a Notified Body acceptable to the BC Safety Authority, to verify the biomass boiler satisfies the essential safety requirements and the applicable conformity assessment procedures of the PED.

7.3.1.2 Manufacturers of biomass boilers conforming to 7.2.1.2.1 shall select an accredited inspection body acceptable to the BC Safety Authority. The selected inspection body shall conduct type testing according clause 5.1.3 of EN 303-5 to verify that the biomass boiler meets the requirements of EN 303-5 and of Appendix I. The selected inspection body shall verify that the manufacturer's manufacturing controls satisfy the requirements of Appendix II.

7.3.1.3 Manufacturers of biomass boilers conforming to 7.2.1.2.2 shall select a Notified Body acceptable to the BC Safety Authority. The selected Notified Body shall conduct a design check to verify that the biomass boiler meets the requirements of EN 12952 and/or EN 12953. The selected Notified Body shall verify that the manufacturer's manufacturing controls satisfy the requirements of Appendix II.

7.3.2 An application for registration and approval of the biomass boiler design for the pressure retaining components and the fuel system shall be made to the BC Safety Authority. The following documentation shall be submitted with the application:

i) a general description, technical data and drawings of the biomass boiler sufficient to explain the design, construction, safety devices and controls for the operation of the boiler and its fuel system
ii) if applicable a list of the standards applied to the biomass boiler design
iii) the selected conformity assessment procedures or manufacturing controls
iv) a report from the selected Notified Body or accredited inspection body that:
- contains the name and address of the manufacturer, boiler models, and any other information for the identification of the boiler design
- verifies that the technical documentation with respect to design and manufacturing procedures has been examined and the design conforms to the essential safety requirements of the PED or the relevant CEN standards and if required, the supplementary requirements of Appendix I have been correctly applied

- the manufacturer's production control or quality assurance procedures have been assessed and conform to the PED conformity assessment modules chosen by the manufacturer or the requirements of Appendix II
- an agreement has been established between the manufacturer and the Notified Body or accredited inspection body to carry out the sampling, audits, inspections, tests or surveillance assessment required for 7.7 Validity of Approval
- includes conditions of validity for the report

v) installation and operating instructions

vi) facsimile or copy of the nameplate or stamping which will be affixed to the boiler

vii) facsimile or copy of the declaration of conformity or manufacturer's declaration of compliance with relevant CEN standards and the supplementary requirements of Appendix I which will be supplied with the boiler

7.3.3 A report of the final acceptance tests shall be submitted by the selected Notified Body to the Provincial Safety Manager if module F or G has been applied for conformity assessment.

7.3.4 Pressure and Safety Accessories

Pressure accessories such as valves and level gauges shall comply with the PED. If required by the PED, pressure accessories must have the CE mark and be accompanied by a declaration of conformity as well as instructions for the user. Safety accessories designed to protect pressure equipment against the allowable limits being exceeded shall comply with the PED, bear the CE-mark and be accompanied by a declaration of conformity as well as instructions for the user.

7.4 Stamping and Nameplate

7.4.1 Biomass boilers according to 7.2.1.1 approved with a BCLD # shall have a nameplate or stamping that includes:

- manufacturer's name
- number of the notified body responsible for conformity assessment
- maximum allowable pressure
- maximum allowable temperature
- minimum safety relief valve capacity
- heating surface
- manufacturer's serial number
- year built
- BCLD #
- CE marking

7.4.2 Biomass boilers according to 7.2.1.2.1 or 7.2.1.2.2 meeting the applicable electrical and machinery EC Directives and approved with a BCLD # shall have a nameplate or stamping that includes:

- manufacturer's name
- name of the accredited inspection body or the Notified Body responsible for conformity assessment
- maximum allowable pressure

- maximum allowable temperature
- minimum safety relief valve capacity
- heating surface
- manufacturer's serial number
- year built
- BCLD #

7.5 Declaration of Conformity, Declaration of Compliance

7.5.1. For each biomass boiler according to 7.2.1.1 the manufacturer shall issue a declaration of conformity. In addition to the information required by Annex VII of Directive 97/23/EC, the declaration must list the BCLD #. The declaration of conformity shall be provided to the owner of the boiler and made available to a safety officer on request.

7.5.2 For each biomass boiler according to 7.2.1.2.1 or 7.2.1.2.2 the manufacturer shall issue a declaration of compliance with the relevant CEN standards, the applicable EC Directives and if required, with the supplementary requirements of Appendix I.

The declaration must list:

- name and address of the manufacturer
- description of the boiler and assembly including serial number, material specifications, and dimensions,
- name and address of the accredited inspection body or the Notified Body responsible for monitoring the manufacturer's production control procedures according to Appendix II
- where appropriate, the references of the harmonized standards applied,
- where appropriate, other technical standards and specifications used,
- where appropriate, the references of the other Community Directives applied,
- particulars of the signatory authorized to sign the legally binding declaration for the manufacturer
- the BC Limited Design Number .

The declaration of compliance shall be provided to the owner of the boiler and made available to a safety officer on request.

7.6 Instructions

Operating instructions shall be provided in English and French languages.

7.7 Validity of Approval

7.7.1 For a Provincial Safety Manager's approval to remain valid for a biomass boiler according 7.2.1.1, the Notified Body which reviewed the manufacturer's conformity assessment procedures for the biomass boiler, must carry out the sampling, audits, inspections or tests required by the applicable conformity assessment module in the PED to ensure the conformity assessment programs function correctly.

7.7.2 For a Provincial Safety Manager's approval to remain valid for a biomass boiler according 7.2.1.2.1 or 7.2.1.2.2 the accredited inspection body or the Notified Body which reviewed the manufacturer's manufacturing control procedures for the biomass boiler, must carry out surveillance/maintenance assessment visits to ensure the manufacturing controls function correctly.

7.8 Correction of Nonconformities

7.8.1 Where the Notified Body that issued the report attesting the biomass boiler's design compliance ascertains that the boiler design no longer satisfies the essential safety requirements, the conformity assessment procedures have been improperly applied or manufacturing flaws are identified the Notified Body shall so inform the BC Safety Authority. The design, conformity assessment procedures or manufacturing process must be altered or revised to the satisfaction of the Notified Body. No further manufacture to the registered design shall be carried out until the alterations or revisions are accepted by the BC Safety Authority.

7.8.2 Where the accredited inspection body or the Notified Body that issued a report attesting the biomass boiler's design ascertains that the boiler design no longer satisfies the requirements, the manufacturing controls do not comply with Appendix II or manufacturing flaws are identified the accredited inspection body or the Notified Body shall so inform the BC Safety Authority. The design, manufacturing control procedures or manufacturing process must be altered or revised to the satisfaction of the accredited inspection body or Notified Body. No further manufacture to the registered design shall be carried out until the alterations or revisions are accepted by the BC Safety Authority.

Appendix I - Supplementary Requirements for Boilers Conforming to EN 303-5

1.0 General

Biomass boilers shall be in full compliance with EN 303-5[1]. Boilers shall be type tested by an accredited inspection body acceptable to the BC Safety Authority.

2.0 Additional Requirements

In addition to compliance with EN 303-5 the biomass boiler shall comply with the additional requirements specified in section 2.1 to 2.3.

2.1 Construction

All welded joints must comply with the weld details and welding procedures in EN 303-5 Table 2. The use of weld details 1.7in Table 2 is not allowed for pressure retaining parts.

2.2 Over pressure protection

For closed systems at least one safety relief valve set to activate at or below the maximum allowable working pressure of the boiler is mandatory. The capacity of the safety relief valves shall be such that at the maximum heat input from the fuel system the pressure will not exceed the maximum allowable working pressure by more 10%.

2.3 Instructions

Technical information and instructions supplied with the biomass boiler shall be as required by EN 303-5 and the following additional requirements:

a) Installation clearances for the boiler at the sides, rear, top and front
b) The type and size of flue
c) The type of floor the boiler is to be installed on(combustible or non-combustible)

[1] EN 303-5 Heating boilers – Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW – Terminology, requirements, testing and marking

Appendix II - Requirements for Manufacturing Controls

1.0 Introduction

1.1 This appendix contains the requirements for manufacturing controls which are assessed as part of the process for the approval of biomass fired boilers and heaters to be installed in British Columbia. Manufacturing controls are used to ensure that boiler manufacturing processes meet and continue to meet the relevant European Standard and where applicable the supplementary requirements of Appendix I. Proposals and manufacturing control documents may contain additional requirements but as a minimum the requirements as detailed in this appendix shall be in place and operating at each manufacturing site.

1.2 The approval of the manufacturer's production control or quality assurance procedures shall be maintained and held in force through surveillance/maintenance assessment visits by the Notified Body or accredited inspection body and satisfactory completion of agreed product audit testing or product assessment where necessary. The assessments shall be at a minimum rate of once each half year or as agreed between the manufacturer and the responsible Notified Body or accredited inspection body, depending on the number of boilers manufactured or intended to be manufactured. Adjustments for the number of assessments shall be made, if there is a significant change in production numbers.

2.0 General

The manufacturer shall maintain a manufacturing control program that will establish that all requirements of the relevant European Standard and where applicable the supplementary requirements of Appendix I are met. The program that the manufacturer uses shall be suited to its circumstances and reflect the complexity of the products produced. A written description of the program shall be available.

3.0 Authority and Responsibility

The authority and responsibility of those in charge of the manufacturing control program shall be clearly established. Persons performing manufacturing control functions shall have sufficient and well-defined responsibilities, as well as the authority and organizational freedom to identify and correct manufacturing control problems. The company shall specify a named individual whose responsibility shall be the control and overall supervision of all production activities, which fall within the scope of this appendix. This Nominee shall be the primary contact between the company and the accredited inspection body.

4.0 Organization Chart

A chart showing the relationship between management, engineering, purchasing, manufacturing, inspection, and quality control personnel shall be prepared.

5.0 Production

5.1 All stages of the production process, including inspection and testing shall be conducted under controlled conditions. Where appropriate these shall include adequate descriptions of the

characteristics of the product and local work instructions. Each process, part or material, which is to be used, shall be identified, along with specified tolerances, methods and any other specifications that may be required. Where required all products must carry a unique identification, which determines their date of production and enables traceability to the contract or batch in which they are to be used.

5.2 All staff employed in production must have received adequate training in each of the areas or operations in which they are involved. The company must have a training record for each employee which details methods of training and approved areas of operation. These should identify the training authority and be signed by the employee as well as the training authority.

6.0 Drawings, Design Calculations, and Specification Control

Measures shall be established to ensure that boilers are produced in accordance with the required drawings and specifications. The company shall have a master list or equivalent document which details all documents and data associated with the production of the product(s) including raw material and material specifications. As a minimum, the list shall contain the document reference, issue status, number of pages and approval authorization. All documents and data shall have a unique identity and page number on every page, be authorized for use by representatives of the company and be available at all locations where they are to be used. Superseded or obsolete documents shall be removed from all points of issue. The company shall document procedures, which determine how the above requirements are managed.

7.0 Materials Control

Measures shall be established to ensure that only proper and certified materials are used. The company shall clearly identify the part number, class, grade, size, finish, trade name, tolerances, relevant product standards for products and materials and any other details which are incorporated into the boiler manufacturing process. Procedures to ensure that any material which is deemed to be non-conforming has been adequately identified (including by physical location), such that it is prevented from unintended use or being packaged with conforming material shall be documented. The procedures shall identify the actions necessary for the non-conforming material to be scrapped, re-worked or re-graded including labeling shall be documented.

8.0 Welding

Measures shall be established to ensure that any welding procedures used in the production or repair of boilers comply with the requirements of the relevant European Standard, that only welders qualified in the welding of the materials to be used and that welders are supervised by staff qualified in welding.

9.0 Heat Treatment

Measures shall be established to ensure that all heat treatment meets the requirements of the material specifications, welding procedures and the relevant European Standard.

10.0 Calibration of Equipment

Measures shall be established for calibrating examination, measuring, and testing equipment used in production. The company shall ensure that suitable equipment exists for the control and measurement of the products and that it is calibrated and labeled to indicate its calibration

status. A record shall be kept of all equipment which is used. The record shall include the serial number or number allocated by the company, scale and frequency of checking or calibration.

11.0 Examination, Inspection, and Testing Program

Measures shall be established to provide for examination, inspection, and testing. Such measures shall meet the requirements of the relevant European Standard. Inspection and testing is required to be carried out under controlled conditions and shall include:

Incoming inspection - All products and materials are checked to ensure that the correct product or material has been supplied. Any critical measurements should be identified and inspection records exist including a statement of acceptance or rejection of products or materials and the basis for this decision.

In Process and Final Inspection – Products shall be inspected in process and at final inspection to ensure that the requirements of the relevant European Standard and other specifications are met.

Records shall be kept of the results of incoming, in process and final inspections relative to each batch of product. All production records must be examined regularly by the company's Nominee, who must date and initial the records after each routine examination. Records related to production and inspection must be kept by the company for a minimum of five years.

12.0 Correction of Nonconformities

Measures shall be established to provide for a systematic review and correction of nonconformities. The company shall manage nonconformities under controlled conditions and shall keep a log or register of the nonconformities, the corrective and preventative actions taken. All nonconformities must be dealt with in a timely and effective manner.