BACKGROUND

This guideline and its requirements are based on the application of the rules and provisions of the ASME Codes and adopted Standards that allow the proof test method as an acceptable method to justify the pressure retaining capability of components.

This guideline considered the rules and provisions of the CSA B51, ASME BPV Codes Section I, Section IV and Section VIII, Div.1, ASME Piping Codes B31.1 and B31.3, and the adopted standards of ASME B16.9 and MSS SP-97.

This guideline does not introduce new rules or new requirements in addition to the rules and provisions of the ASME Codes and adopted standards.

The intent of this guideline is to consolidate the applicable Codes and Standards rules, and provide guidance with respect to compiling the documentation needed to be provided with a design submission that has been qualified by proof test.

PROOF TEST METHOD REQUIREMENTS

The proof test method is included in several ASME Codes and standards, such as:

1. Boilers and boiler components:
   i) ASME Section I, A-22;
   ii) ASME Section IV; HG-500, HC-400, and HLW-500;
2. Pressure vessels and vessel components:
   i) ASME Section VIII, Div. 1, UG-101;
3. Listed Piping components:
   i) As required by the standard;
   ii) Other listed components, that do not have standard established pressure temperature ratings, shall have their ratings established in accordance with No. 4. below.
4. Unlisted piping components (non-standard fittings):
   i) ASME B31.3, 304.7.2 (c)
   ii) ASME B31.1, 104.7.2 (c)

The manufacturer shall verify the applicability and limitations of the selected proof test method, and adopt the method that will be fully compliant with the requirements and provisions of the Code.

Failure of compliance will result in rejection of the proof test.

The Brittle Coating and Displacement Measurement method can not be used for validation of pressure equipment components made of material specifications that do not have a definitely determinable yield point. Some of the material specifications that do not comply with this requirement are high alloys steels, such as stainless steels.

The paragraphs 304.7.2 (c), of ASME B31.3, and 104.7.2 (c), of ASME B31.1, provide three different methods for proof testing of unlisted components (non-standard fittings). The proof test methods may be employed as follows:

i) ASME B16.9 for fittings having a configuration similar with ASME B16.9 fittings;
ii) MSS SP-97 for fittings having a configuration similar with MSS SP-97 fittings;
iii) ASME Section VIII, Div.1, UG-101 for all other fitting configurations.

PROOF TEST DOCUMENTATION REQUIREMENTS

Proof Test Report

The submission shall include a proof test report that describes the test, the instrumentation and the methods of calibration used, and the results obtained.

The proof test report must identify:

i) the tested part by the drawing & revision;
ii) the complete ASME/ASTM material specification(s), the heat treatment condition (as applicable) and the heat /lot/cast # of the tested part(s);
iii) the testing equipment used and provide a sketch/picture(s) of the test set-up. The test set-up must be in compliance with the requirements of the Code/Standard under which the proof test is conducted;
iv) the test pressure gauges ID number, pressure range and their last calibration date;
v) the pressure at which the test was stopped and specify the reasons and observations;

Proof Test Report Certification

The proof test report shall be verified and certified for completeness and correctness of the information by the manufacturer and accepted and signed off as follows:

1. For vessel/boiler and vessel/boiler components the report shall be signed by the Manufacturer's representative and an Inspector (appointed under the Act) or a National Board commissioned A.I.;
2. For listed piping components per ASME B 16.9 report shall be signed by a Professional Engineer or by an Inspector (appointed under the Act) or a National Board commissioned A.I.;
3. For other listed and unlisted piping components report shall be signed by an Inspector (appointed under the Act) or a National Board commissioned A.I.

Required Supporting Documentation

The proof test report must be supported by the following documentation:

1. The drawing(s) of the proof tested part, which must identify:
   i) the actual arrangement of all components;

ii) all relevant dimensions of the assembly and components, inclusive of all components thicknesses;
iii) all components by description and/or part number and their complete ASME/ASTM material specification or other published or proprietary material specification, with grade and heat treatment condition;
iv) specified weld details, configuration and dimensions;
v) any Code required examination or inspection and its extent applicable to the tested part(s);
vi) the corrosion and/or fabrication allowance;
vii) if PWHT is required, provide the applicable holding time and temperature;
viii) any other relevant/pertinent information.

If the drawing of the part submitted for registration has a different drawing and/or revision number than the drawing and revision number of the proof tested part, then both drawings must be presented and must meet the above requirements. These drawings shall allow ABSA Design Survey Department to determine if the burst test can qualify the part subject to registration.

2. The calculations establishing the MAWP as provided per the Code rules. These calculations must include all applicable corrections, such as for corrosion/fabrication allowance, higher temperature, or casting factor, as required by the Code. The calculations for determining the average Yield and/or Tensile strength shall also be included.

3. The casting factor must be justified in accordance with the applicable Code requirements. The Code requirements allowing the usage of the designated casting factor must be presented on the drawing(s) of the part;

4. The Mechanical Test Report of the specimens used to determine the actual Yield and/or Tensile strength needs to identify the following:
   i) The complete ASME/ASTM, other published or proprietary material specification, with grade(s) and heat treatment condition, as applicable;
   ii) The form of the base material, e.g.: plate, forging, etc., and the thickness;
   iii) The heat/lot/cast #;
   iv) For castings to identify the name/pattern and drawing and revision number of the part;
   v) The mechanical tests results, as applicable;

The actual yield or tensile strength shall be the average from three or four specimens cut from the tested part after the test is completed. The specimens shall be cut from a location where the stress during the test has not exceeded the yield strength.

Where the proof tested part is too small to permit obtaining the minimum required number of specimens, or specimens can not be cut as indicated above, then the minimum required number of specimens may be obtained from excess base material of

the same heat/lot/cast # that has been given the same heat treatment as the proof tested part.

When excess stock from the same piece of wrought material is available and has been given the same stress relieving heat treatment as the pressure part, the test specimens may be cut from this excess stock.

For cast parts, at least 3 or 4 separate cast test bars of the same heat/lot/cast # are to be ordered with the part(s) that will be subject to proof testing and be provided for mechanical testing.

5. Copies of the Material Technical Report (MTR - Mill Test Report) of tested parts shall be provided upon request;

6. When the proof test is intended to be used to extend the applicability of the results (MAWP) to other parts the following must be provided:

i) The other part(s) drawing(s) as required in 1. above;
ii) A complete and detailed technical justification on how the proof tested part can qualify the other parts. This justification must be in compliance with the applicable provisions of the Code/Standard used to perform the proof test.

ABSA Design Survey will evaluate the proposed justification for acceptability.

Proof Test Method Specific Requirements

The Brittle Coating, Strain and Displacement Measurement methods have specific requirements with respect to the location of the test and/or orientation of the measuring devices. These specific requirements must be considered and addressed by the manufacturer and be presented to ABSA's Design Survey Department for evaluation and acceptance.

1. Documentation Requirements:
   i) In tests requiring the determination of governing stresses, sufficient locations on the tested component shall be investigated to ensure that the measurements are taken at the most critical areas. The detailed technical justification (report) shall be provided clarifying how the critical areas were determined. For such tests the manufacturer may contact ABSA's Design Survey Department prior to conducting the test to discuss and agree on the critical areas.
   ii) The technical data/info of the devices to be used in these tests must be in full compliance with the respective Code requirements and be presented as part of the proof test documentation.
   iii) The Code required plotted curves must be signed off by the Inspector witnessing the proof test and be presented as part of the proof test documentation.

2. Modifications or Adaptations to the proof test assembly:
   i) If the proof test assembly requires modification and/or adaptation to avoid leakage prior to achieving the anticipated proof test pressure, the Manufacturer shall consult ABSA's Design Survey Department for evaluation and acceptance before starting the testing.

Failure to follow this guideline, without appropriate justification, may result in ABSA's Design Survey Department refusal of the proof test report for the validation of a design.