19.5.4 Determination of remaining wall thickness

Proceed as follows.

a) For imperfections penetrating the wall approximately radially, measure the wall thickness on each side of the imperfection adjacent to its deepest penetration. Subtract the depth of the imperfection from the average of these wall thickness readings.

b) For imperfections penetrating the wall at an angle (e.g. a lap or a hook crack), measure the wall thickness on each side of the exploratory grind at the point of maximum penetration of the imperfection. Subtract the depth of the imperfection from the average of these wall thickness readings.

c) If practical, callipers shall be used to measure the wall thickness near the ends of the OCTG.

19.5.5 Further exploration

If an electromagnetic or ultrasonic inspection indication is displayed and a magnetic particle build-up exists but no imperfection is readily identifiable, refer to 19.6.4 for the procedure for further exploration.

19.5.6 Linear defects — Group 1 and Group 2 (except C-90 and T-95) materials

Any linear imperfection that is deeper than 12,5 % of the specified wall thickness, as measured from the surface, or that reduces the wall thickness remaining at the root of the imperfection to less than 87,5% of the specified wall thickness shall be considered a defect.

NOTE Linear imperfections include, but are not limited to, cracks, seams, laps, plug scores, cuts and gouges.

19.5.7 Linear defects — Group 3 and Group 4, C-90 and T-95 materials

Any linear imperfection that is deeper than 5 % of the specified wall thickness, as measured from the surface, or that reduces the wall thickness remaining at the root of the imperfection to less than 87,5 % of the specified wall thickness shall be considered a defect.

19.5.8 Non-linear defects—All grades

Any non-linear imperfection, such as a pit, that results in a wall thickness above or below the imperfection with a value less than 87,5 % of specified wall thickness shall be considered a defect.

19.5.9 Disposition

Pipe containing defects shall be given one of the following dispositions.

a) Disposition A. The defect may be removed by grinding, providing the remaining wall thickness is not less than 87,5% of the specified wall thickness. If the depth of a grind exceeds 10 % of the specified wall thickness, the remaining wall thickness shall be verified. Removal of defects by grinding may be performed only by agreement between the owner and the agency.

b) Disposition B. Reject the length. The defect shall not be contoured or removed but shall be left in the pipe for confirmation by the manufacturer.

c) Disposition C. The section of pipe containing the defect may be cut off within the limits of requirements on length, if agreed upon between the owner and the manufacturer.

19.5.10 Radius grinding

Contour all exploratory grinds and file marks with generous radii in acceptable pipe. Coat all outside surface grinds in acceptable pipe with a rust inhibitor.

19.6 Procedure for evaluating inside-surface-breaking pipe body imperfections

19.6.1 Imperfections near pipe ends

If the inside surface-breaking imperfection is near the end of the pipe, but not in the threads, an attempt shall be made to explore and measure the imperfection if the diameter permits, see 19.5.1 through 19.5.4.

19.6.2 Ultrasonic evaluation

If the inside surface imperfection is not accessible from the pipe end, it shall be evaluated using shear- and/or compression-wave UT. API RP 5UE should be used as a guide to performing shear-wave standardization and evaluation of imperfections. Specific evaluation procedures should be agreed upon between the owner and the agency. The following shall apply.

a) The area to be evaluated shall have been located and marked when applying the NDT method that originally detected the indication.

b) Manual ultrasonic thickness gauging may also be used to aid in locating the imperfection. Manual ultrasonic thickness gauges shall be standardized prior to use in accordance with 18.9.4.

c) An ultrasonic thickness gauge may be used to measure the wall thickness above the imperfection to determine if 87,5 % of the specified wall thickness is present, provided it can be demonstrated that the imperfection breaks the inside surface.

19.6.3 Defects and disposition

The requirements of 19.5.5 through 19.5.9 apply.

19.6.4 Further exploration

If an electromagnetic or ultrasonic inspection indication is displayed and/or a magnetic powder build-up exists but no imperfection is readily identifiable, supplementary tools and techniques shall be used to evaluate these imperfections as either acceptable or rejectable, as follows.

a) Inspect the inside surface using a high intensity light source or a borescope;

b) Perform an internal MPI in the area of interest in accordance with 13.12.3.

19.6.5 Defects and disposition

The requirements of 19.5.5 through 19.5.9 apply.

19.6.6 Radius grinding

In acceptable pipe, contour all exploratory grinds and file marks with generous radii.

19.7 Procedure for evaluating welds

19.7.1 Surface-penetrating imperfections

Evaluate in accordance with 19.5 or 19.6.

19.7.2 Non-surface-breaking imperfections

Non-surface-breaking imperfections shall be evaluated by the procedure in 18.8. Any weld seam imperfection within 1,6 mm (1/16 in) of either side of the weld line, not breaking the inside or outside surface, that is proven to reduce the net effective wall thickness below 87,5 % of the specified wall thickness shall be considered a defect.

19.7.3 Flash height

Flash in electric-welded OCTG is considered a defect if its height exceeds the limits described in ISO 11960:2001, 8.8.

19.7.4 Excessive trim

Excessive trim in electric-welded pipe is considered a defect if the depth of the groove exceeds the limits described in ISO 11960:2001, 8.8. The depth of the groove is the difference between wall thickness measurements taken approximately 25,4 mm (1 in) away from the groove and in the groove in the same transverse plane.

19.7.5 Disposition

The disposition of pipe containing defects shall be according to 19.5.9.

19.7.6 Radius grinding

In acceptable pipe, contour all exploratory grinds and file marks with generous radii. Also, coat all grinds on the outside surface of acceptable pipe with a rust inhibitor.

19.8 Procedure for evaluating grinds

19.8.1 Inspection

Inspect the area using MPI to ensure complete removal of the imperfection. If the imperfection is not completely removed, use the procedure in 18.7 or 18.8 to evaluate the imperfection.

19.8.2 Wall thickness measurement

If no further imperfection is found, measure the wall thickness in several places in the grind area to ensure that a wall thickness of 87,5 % or greater of the specified wall thickness remains. If not, the length shall be rejected. Refer to 19.9 for procedures related to determining rejection.

19.8.3 Defects and disposition

The requirements of 19.5.5 through 19.5.9 apply.

19.9 Procedure for evaluating large-area wall reduction

19.9.1 Wall thickness measurement

Determine the wall thickness using an acceptable measuring device such as an ultrasonic wall thickness gauge or mechanical calliper.

Mechanical callipers shall meet the construction requirements of ISO 11960:2001, 10.13.4 or ISO 11961:1996, 8.4.2 or API Spec 5D:2001, 7.4.2.

When using an ultrasonic thickness gauge, if the minimum reading is borderline on 87,5 % of the specified wall thickness, multiple readings shall be taken to determine the lowest measured wall thickness. The “measured” wall thickness is then defined as the average of at least three ultrasonic readings within a circle of approximately 6,3 mm (1/4 in) diameter. Each reading shall be no closer than 3,2 mm (1/8 in) to any other. Readings shall not be used for averaging if they differ by more than 0,25 mm (0.010 in). No single reading shall be a basis for rejection.

19.9.2 Disposition

If the “measured” wall thickness is less than 87,5 % of the specified wall thickness, it shall be considered a defect and dispositioned according to 19.5.9.

In case of disputed wall thickness measurements, direct measurement by mechanical calliper shall govern, as stated in ISO 11960:2001, 10.13.4, or ISO 11961:1996, 8.4.2 or API Spec 5D:2001, 7.4.2.

19.10 Procedure for evaluating imperfections in upsets

19.10.1 Surface-penetrating imperfections

The maximum permissible depth of imperfections measured from the surface of the upset portion of the pipe shall be in accordance with ISO 11960:2001, Table C.34 or Table E.34, or ISO 11961:1996, 8.5.2 or API Spec 5D:2001, Table 10.

The internal upset configuration on all upset products shall exhibit no sharp corners or drastic changes of sections and shall permit a 90° hook-type tool to be pulled through without snagging (hanging-up).

If an imperfection in the upset extends under the coupling, where it is inaccessible for exploration, the imperfection shall be classified as a defect. Grinds that run under the coupling are not considered defects provided the grind is well-contoured with the circumference of the pipe and displays a high degree of workmanship. Because of the difficulty in defining "well-contoured" and "high degree of workmanship", the owner's discretion shall govern (only with respect to the contour of the grind).

When practical, evaluation shall be done in accordance with 19.5.1 and 19.5.2.

19.10.2 Internal inaccessible imperfections

If the imperfection is inaccessible for direct depth measurements, a substantial effort shall be made to determine its depth using a mechanical calliper and/or ultrasonic thickness measurements.

The following procedures shall be used.

a) Measure the wall thickness on each side of the imperfection adjacent to its deepest penetration.

b) Measure the remaining wall thickness at the deepest penetration of the imperfection. Subtract the value from the average of the adjacent wall thickness measurements.

c) Evaluate with UT in accordance with 19.6.1.

19.10.3 Additional requirements for plain-end drill pipe

The maximum permissible depth of a visible imperfection in the L_{eu} or L_{iu} areas of the upsets of plain-end drill pipe is determined from respective ISO/API diameter allowances. The minimum allowable value of D_{ou} is used for outside surface imperfections. The maximum allowable value of d_{ou} is used for inside surface imperfections.

19.10.4 Disposition

An imperfection that has a depth exceeding the maximum allowable depth shall be considered a defect. A wall thickness that is less than the allowable minimum shall be considered a defect. In the case of disputed wall thickness measurements, direct measurement by mechanical calliper shall govern, as stated in ISO 11960:2001, 10.13.4 or ISO 11961:1996, 8.4.2 or API Spec 5D:2001, 7.4.2.

Pipe containing a defect in the upset portion shall be rejected unless the defect can be removed by grinding. Grinding shall not be done in areas for which wall thickness or diameter tolerances are not specified. Removal of defects by grinding may be performed only by agreement between the owner and the agency. Grinding shall not produce any of the following:

a) a wall thickness less than 87,5 % of the specified body wall thickness in the upset runout area;

b) an outside diameter less than the applicable minimum allowable;

c) an inside diameter greater than the applicable maximum allowable.

19.11 Procedure for evaluation of outside surface imperfections on couplings

19.11.1 Pits, round-bottom gouges, and similar imperfections are not considered defects unless the depth of the imperfection exceeds that listed in Table A.15.

19.11.2 Grip marks, sharp-bottom gouges, and similar imperfections are not defects unless the depth of the imperfection exceeds that listed in Table A.15. If a gouge has an adjacent metal protrusion, the protrusion shall be removed prior to making a depth measurement.

19.11.3 For Group 1, Grades J-55 and K-55 impact tested above 0 °C (32 °F) and Grade H-40, the following shall apply:

Finished couplings shall be free of all visible seams, cracks and porosity as specified in ISO 11960.

NOTE Visible seams or cracks are those that can be seen without the aid of magnetic particle inspection or other NDT methods on uncoated couplings or if the coating is removed.

19.11.4 For Group 1, Grade J-55 and K-55 couplings that comply with the requirements of ISO 11960:2001, 9.14.6 and are marked as required in ISO 11960:2001, Table C.67 or Table E.67, the following shall apply:

Linear imperfections, such as seams or cracks on the outside surface are not defects unless their depth exceeds that listed in Table A.16.

19.11.5 For Group 1 (N80) and Groups 2, 3, and 4, the following shall apply:

Linear imperfections such as seams or cracks on the outside surface are not defects unless their depth exceeds that listed in Table A.16. Indications of nonmetallic inclusions are not defects unless their depth exceeds 0,89 mm (0,035 in).

19.11.6 The depth of the imperfection shall be measured from the normal surface or contour of the coupling extended over the imperfection. All depth measurements shall be done in accordance with 19.5.3. Evaluation of linear imperfections such as seams or cracks shall be done in accordance with 19.5.6 or 19.5.7, depending on the material.

19.11.7 All seams, cracks or pits may be removed, and all other defects or imperfections may be removed or reduced to acceptable limits, by machining or grinding on the outer surface, provided that the resulting diameter is within the tolerances specified in Table A.17 or Table A.18, as applicable. The outside diameter of the finished coupling shall be measured across the finished surface or contour of the coupling (i.e. initial surface or grind contour resulting from the removal of a defect or imperfection). The outside diameter shall not be measured at the base of an acceptable imperfection. Grinding or machining shall not be performed by the agency except at the specific direction of the owner. The grinding shall be approximately faired into the outer contour of the coupling.

19.11.8 The minimum OD resulting from grinding or machining shall be measured with an OD micrometer or other suitable instrument capable of being read in hundredths of a millimetre (thousandths of an inch).

19.12 Procedure for evaluation of visually-located thread imperfections

19.12.1 General

Good judgment and discretion shall be exercised in field examination of exposed threads on casing and tubing. Some surface irregularities will not affect the joint strength or the pressure-seal performance unless they are large enough to act as a leak path. Recognizing that the crest of a round thread does not engage the root of the mating round thread, minor chatter, tears, cuts or other surface irregularities on the crests or roots of round threads are not cause for rejection.

NOTE Some surface roughness may even assist proper makeup, by holding thread compound in place as the thread is engaged.

Superficial scratches, minor dings, and surface irregularities on the threads are occasionally encountered and may not necessarily be detrimental. Because of the difficulty in defining superficial scratches, minor dings and surface irregularities, and because of the degree to which they can affect thread performance, no blanket acceptance criteria for such imperfections can be established. The thread flanks in the L_c area of round threads are the critical sealing elements.

Minor (cosmetic) field repair of threads and other repairs stated in 19.12 may only be performed by agreement between the owner and the agency.

Arc burns are rejectable anywhere in the threaded areas.

Refer to Table A.9 and Table A.10 to determine the length of specific thread areas (for example, L_c and PTL).

19.12.2 Rejection criteria outside the L_c area

The following shall apply.

a) Pits, seams, laps, cuts and other imperfections are rejectable if they penetrate through the root of the thread, or if they exceed 12,5 % of the specified body wall thickness as measured from the projected pipe surface, whichever is greater.

b) Detectable protrusions on the threads are rejectable if they could peel off the protective coatings on the coupling threads or score mating surfaces.

19.12.3 Rejection criteria within the L_c area

The following shall apply.

a) Threads shall be free of any visible imperfections as listed in 11.13.5.a) that break the continuity of the threads.

b) Detectable protrusions on the threads are rejectable if they could peel off the protective coatings on the coupling threads or score mating surfaces.

c) On round threads, all threads within the L_c area shall have full crests, otherwise they are rejectable.

d) In buttress casing, a single thread showing the original outside surface of the pipe for more than 25 % of the circumference is cause for rejection. More than two threads showing the original outside surface of the pipe is cause for rejection.

e) Minor pitting and thread discolouration may also be encountered and may not necessarily be detrimental. Because of the difficulty in defining pitting and discolouration and the degree to which they affect thread performance, no blanket acceptance criteria for such imperfections can be established. As a guide to acceptance, the most critical considerations are that any corrosion products protruding above the surface of the threads be removed and that no leak path exists. Filing or grinding shall not be performed to remove pits.

f) In field inspection, heat-tinting on threads might indicate localized hardening of the threads as a result of thermal cutting when removing couplings or protectors. This may be cause for rejection by agreement between the agency and the owner.

19.12.4 Rejection criteria in the chamfer area

The following shall apply.

a) A chamfer not present for a full 360° circumference is cause for rejection.

b) A thread root that runs out on the face of the pipe or produces a feather edge (and not on the chamfer) is cause for rejection. See Figure B.4.

c) Excessive chamfer that produces a knife edge (razor edge) on the face of the pipe is cause for rejection. See Figure B.5.

d) A burr on the starting thread within the chamfer is not cause for rejection unless the burr is loose or protrudes into the mating thread form. The burr shall be removed if either of these possibilities exist.

e) A false starting thread is not cause for rejection if it does not extend into the true starting thread. An interrupted starting thread is not cause for rejection but may indicate chamfer or thread misalignment, which shall then be evaluated.

f) Dents or mashes that cause out-of-tolerance thread dimensions are cause for rejection.

19.12.5 Rejection criteria for pipe ends

a) Pipe ends with burrs or fins that cannot be removed by grinding shall be rejected.

b) Dents or mashes that cause out-of-tolerance thread dimensions are cause for rejection.

19.12.6 Rejection criteria for round or bullet nose tubing

a) Ends with sharp corners or abrupt radius changes are cause for rejection. See Figure B.6.

b) For other rejection criteria, refer to 19.12.8.

19.12.7 Other criteria

Other visually evident imperfections that are not specifically covered in the preceding sections, whether in the L_c area or not, that may be detrimental to the makeup, strength, or sealing capacity of the thread, or that could result in galling, shall be reported to the owner.

19.12.8 Rejection criteria for the PTL area of box or coupling threads

The threads in the PTL area have the same rejection criteria as for the L_c area (see 19.12.3). The PTL area is described in 11.13.4 c).

19.12.9 Rejection criteria for threads beyond the PTL area of box or coupling threads

Threads not extending to the centre of the coupling, or to a distance of L_4 plus 12,7 mm (0.500 in) from the box face of an integral joint, shall be cause for rejection. Threads in this area need not be full-crested.

NOTE Tapping machines might not produce uniform threads in the J area since they tap from each side using multi-toothed chasers. During the tapping of the second side, the lead side of the chaser taps the threads in the J area of the first side that has been tapped.

19.12.10 Rejection criteria for coupling faces, box faces and counterbores

The following shall apply.

a) Faces with burrs or fins that cannot be removed by grinding or filing shall be rejected.

b) Dents or mashes that cause counterbore diameter reduction or out-of-tolerance thread dimensions are cause for rejection.

c) Tool marks on the counterbore are not cause for rejection but may indicate incorrect counterbore diameter, counterbore misalignment, or thread misalignment, which shall then be evaluated.

19.12.11 Rejection criteria for seal-ring grooves

Fins, wickers and ribbons that are loose, or could become loose, and fold into the thread form are cause for rejection unless removed.

19.13 Procedure for triangle location and coupling makeup position

19.13.1 Buttress thread

Proceed as follows.

a) Verify the location of the triangle stamp on the field end of each length of buttress thread casing. Using a metal scale, measure from the end of the pin to the base of the triangle, holding the scale parallel to the longitudinal axis of the pipe. If the triangle cannot be located or is in the wrong position [i.e. more than 0,8 mm (1/32 in) from the A_1 position], it is cause for rejection.

b) Determine the distance ($N - A_4$), where N is the measured coupling length. This is the nominal position of the end of the pin in the coupling. Measure the distance from the end of the coupling to the end of the pin inside the coupling. If the measured distance is different from the nominal distance by more than +5 mm (0.200 in) or –9,5 mm (–0.375 in), the condition is cause for rejection.

19.13.2 Round thread

a) Verify the location of the triangle stamp on the field end of each length of Label 1: 16, 18-5/8, 20. round thread casing. Using a metal scale, measure from the end of the pin to the base of the triangle. Hold the scale parallel to the longitudinal axis of the pipe. If the triangle stamp cannot be located or if the triangle is in the wrong position [i.e. more than 0,8 mm (1/32 in) from the A_1 position], it shall be reported to the owner. The base of the triangle will aid in locating the vanishing point for basic power-tight makeup; however, the position of the coupling with respect to the base of the triangle shall not be a basis for acceptance or rejection of the product. As a guide, makeup of the couplings shall be measured as described below.

b) For all sizes, determine the distance ($N - L_4$), where N is the measured coupling length. This is the nominal position of the end of the pin in the coupling. Measure the distance from the end of the coupling to the end of the pin inside the coupling. If the measured distance is different from the nominal distance by more than $\pm$ 6 mm ($\pm$ 0.250 in), the condition shall be reported to the owner.

19.14 Procedure for evaluating straightness

19.14.1 All pipe shall be reasonably straight. This criterion requires judgement; it applies to all sizes and is the only straightness requirement for sizes Label 1: below 4-1/2. If the pipe is not reasonably straight, it is cause for rejection.

19.14.2 For pipe sizes Label 1: 4-1/2 and larger, follow the following procedure.

a) Chock the pipe so it cannot roll, with the major arc or bow oriented in the horizontal plane.

b) Measure and record the total length of the pipe from one end to the other. Calculate the maximum allowable chord height, as follows.

1) In SI units

$$h_{c,\,max} = L \times 0{,}05 \qquad (5)$$

where

$h_{c,\,max}$ is the maximum allowable chord height, expressed in millimetres;

L is the total pipe length, expressed in millimetres.

2) In USC units

$$h_{c,\,max} = L \times 0{,}002 \quad (6)$$

where

$h_{c,\,max}$ is the maximum allowable chord height, expressed in inches;

L is the total pipe length, expressed in inches.

c) Stretch a taut string or wire across the arc or bow from one end to the other. The taut string or wire shall be extended between, and not over, couplings, upsets, or protectors. See Figure B.6. Measure and record the maximum distance (chord height) from the taut string or wire to the pipe body (see Figure B.6). If the measured value exceeds the calculated maximum chord height, $h_{c,max}$, the pipe shall be dispositioned in accordance with 19.14.4.

19.14.3 For plain-end pipe sizes Label 1: 4-1/2 and larger, the deviation from a straight line shall not exceed 3,2 mm (0.125 in) in a 1,8 m (6 ft) length at each end (see Figure B.6 for the method of measurement). If the measured value is greater than this amount, the pipe shall be dispositioned in accordance with 19.14.4.

19.14.4 Pipe not meeting straightness requirements shall be given one of the following dispositions:

a) the pipe is rejected;

b) hooked ends may be cut off within the limits of requirements on length if agreed upon between the owner and the manufacturer; or

c) the pipe may be straightened if agreed upon between the owner and the manufacturer.

19.15 Procedure for evaluating pipe diameter

19.15.1 Determination of outside diameter

Determine either the minimum or maximum outside diameter, at the point of interest, in accordance with ISO 11960:2001, 10.13.2.

19.15.2 Rejection criteria for pipe diameter

If the pipe has a diameter exceeding the tolerances of ISO 11960, it shall be dispositioned as follows.

a) Disposition A. The section of pipe containing an unacceptable diameter may be cut off within the limits of requirements on length if agreed between the owner and the manufacturer.

b) Disposition B. Reject the length.

c) Disposition C. By agreement between the owner and the manufacturer, pipe with an unacceptable diameter may be repaired.

20 Hydrostatic pressure testing

20.1 General

This clause describes the equipment and procedures used to hydrostatically pressurize OCTG for the purpose of detecting leaks in the body, couplings, mill end connections, or pin-end threads. This clause applies to rack-testing only.

Typically, field pressure testing is conducted using a pressure that produces a fibre stress in the OCTG which is in accordance with the formulas and applicable referenced tables in ISO 11960:2001, 10.12.

NOTE For environmental reasons, it might be desirable to use fresh water for hydrotesting.

20.2 Application

20.2.1 ISO 11960:2001, 10.12.1 requires that all OCTG shall comply with the test requirements for the particular designation, grade and end finish shown in referenced tables.

20.2.2 The OCTG body, upset, coupling or box (excluding threads) shall be free of leakage.

20.2.3 The connection between the coupling and mating mill end shall be free of leakage.

20.2.4 ISO 11960 contains no criteria for leakage of the threaded connections engaged by the pressure test plugs.

20.3 Equipment, safety and general procedures

20.3.1 Pressure gauge

The pressure test unit shall be equipped with an indicating pressure gauge that shall directly indicate the full hydrostatic pressure being applied. The indicating pressure gauge shall have a graduated dial for the entire pressure range, and its range will exceed the test pressure by a minimum of 25 %. The gauge shall be located in a position that will be convenient for the operator to observe throughout the test. The gauge shall have sufficient accuracy, scale divisions and damping so that it can be easily read to within 5 % of the applied pressure throughout the pressure cycle. Gauges shall not be over-pressurized.

20.3.2 Pressure recording

In addition to the indicating pressure gauge, each hydrostatic pressure test unit shall have a recording-type pressure gauge connected to read the full applied pressure throughout each pressure cycle. The recording gauge reading shall be compared with the indicating pressure gauge a minimum of once per hour to ensure reliability.

20.3.3 Test plugs

Documentation shall be provided to assure the test plugs are fabricated from material sufficient to withstand the pressure to which they may be subjected. Test plugs shall have effective anti-gall (see note) protection on the threads. Round thread pin-end test plugs shall be manufactured so that they cover the threads to the plane L_1 plus four threads (minimum). Buttress pin-end test plugs shall completely cover the L_4 area (minimum).

NOTE Martensitic chromium steels (ISO 11960, grades L80-9Cr and L80-13Cr) are sensitive to galling. Special precautions might be necessary for thread surface treatment and/or lubrication to minimize galling during hydrostatic testing (plug application and removal).

20.3.4 Safety

The following shall apply.

a) Pressure testing of OCTG is a dangerous operation, and appropriate safety precautions shall be taken.

b) Care shall be taken to protect both the testing personnel and others from moving OCTG, test plugs, and test fluids in the event of failure of threads, pressure plugs, supply lines (e.g. hoses) or connections. If air is entrapped in the OCTG, the movement may be sudden, quick and without warning.

c) The pressure shall be under proper control at all times so that the required test pressure is never exceeded by more than 5 %.

20.3.5 General procedures

Proceed as follows.

a) The pressure-hold time shall be a minimum of five seconds after the gauge indicator has reached its maximum stable pressure value.

b) Care shall be taken when handling OCTG while the thread protectors are removed, to ensure that two lengths of pipe do not strike each other and damage the unprotected threads or sealing surfaces. Also, care shall be used in installing threaded pressure plugs onto the OCTG to ensure that no cross threading or other damage occurs to the threads.

c) Seal rings (if supplied) should be removed prior to testing.

d) The water or other liquid used for pressure testing, and the OCTG being tested, shall be at approximately the same temperature during the pressure-hold cycle. If testing is done at an ambient temperature below 4 °C (40 °F), the temperature of the water shall be by agreement between the owner and the agency.

e) Test plugs shall be visually inspected before each use for thread imperfections and damage that would affect the integrity of the mating product threads. Damaged test plugs shall be repaired or replaced. At regular intervals established by the responsible parties performing the testing, test plugs shall be inspected visually for wear and damage, and non-destructively for cracks using the wet fluorescent magnetic particle or liquid penetrant method of inspection. Prior to the start of each job, test plugs shall be thread-gauged with all thread element (lead, height and taper) readings recorded.

20.4 Equipment calibration

20.4.1 Calibration check

The indicating pressure gauge, recording gauge or reference gauge shall be checked for accuracy, over the entire range of the gauge, whenever:

a) there is a failure to respond smoothly and repeatably to slowly increasing pressures;

b) it is over pressurized, in which case it shall also be re-calibrated prior to further use;

c) gauge repairs have been made;

d) four (4) months or more have passed since the previous calibration check;

e) the indicating pressure gauge and recording gauge, or reference gauge, are in disagreement by more than 5 % of the applied pressure.

20.4.2 Calibration tag

A calibration tag shall be attached to each pressure gauge. Each tag shall indicate the calibration check date, due date, accuracy and the name of the person or organization performing the calibration.

20.4.3 Time control

When a time-delay controller or indicator is used to ensure proper test time, the controller shall be checked once every inspection shift; a stop-watch may be used for this.

20.5 Operating procedure

The following procedure shall apply.

a) After removing the thread protectors, examine the threaded areas. If the threads are dry and/or dirty, then the threads shall be cleaned of all old thread compound and/or dirt and fresh thread compound applied. If