welding process, the welding procedure shall be qualified by testing separate sets of impact test specimens removed from the weld metal and heat-affected zone, as follows:

(-a) The requirements of (f) shall be met.

(-b) The requirements of (g) and (3) specifying the location, number, and orientation of test specimen sets to be removed for each welding process or set of variables shall be modified as follows:

(-1) The weld thickness shall be considered the base metal thickness.

(-2) The surface of the last deposited layer of weld metal shall be considered the weld surface.

(-3) The root side of the first deposited layer of weld metal shall be considered the root surface.

(-c) If the weld thickness for a welding process or set of variables is small enough that the maximum obtainable Charpy specimen has a width along the notch less than 0.099 in. (2.5 mm), toughness testing of the weld metal and heat-affected zone is not required for that welding process or set of variables.

(i) Vessel (Production) Impact Test Plates

(1) General. In addition to the requirements of (h) above, impact tests of welds and heat-affected zones shall be made in accordance with (g) above for each qualified welding procedure used on each vessel or group of vessels as defined in (3) below. The vessel impact test plate shall be from one of the heats of steel used for the vessel or group of vessels. For Category A joints, the test plate shall, where practicable, be welded as an extension to the end of a production joint so that the test plate weldment will represent as nearly as practicable the quality and type of welding in the vessel joint. For Category B joints that are welded using a different welding procedure than used on Category A joints, a test plate shall be welded under the production welding conditions used for the vessel, using the same type of equipment and at the same location and using the same procedures as used for the joint, and it shall be welded concurrently with the production welds or as close to the start of production welding as practicable.

(2) When Required. Vessel (production) impact test plates shall be made for all joints for which impact tests are required for the welding procedure by UCS-67, UHT-82, or UHA-51 (except where production test plates are specifically exempt by these paragraphs). Test shall be made of the weld metal and/or heat-affected zone to the extent required by the procedure test (see UCS-67 and UHA-51).

(3) Number of Vessel Impact Test Plates Required

(-a) For each vessel, one test plate shall be made for each welding procedure used for Category A and B joints, unless the vessel is one of several as defined in (-b) or (-c) below.

In addition, for Category A and B joints the following requirements shall apply:

(-1) If automatic, machine, or semiautomatic welding is performed, a test plate shall be made in each position employed in the vessel welding.

(-2) If manual welding is also employed, a test plate shall be made in the flat position only, except if welding is to be performed in other positions a test plate need be made in the vertical position only (where the major portions of the layers of welds are deposited in the vertical upward direction). The vertically welded test plate will qualify the manual welding in all positions.

(-b) For several vessels or parts of vessels, a minimum of one test plate shall be made for each welding procedure used for Category A and B joints, provided that all of the following requirements are met:

(-1) Welding is completed within any 3-month period at one location.

(-2) The cumulative length of all joints welded by each welding procedure does not exceed 400 ft (120 m).

(-3) Materials are of the same specification and grade.

(-4) The plate thicknesses of the vessels or parts of vessels do not vary by more than 1/4 in. (6 mm) or 25%, whichever is greater.

(-5) The number of heat-affected-zone impact specimen sets to be removed and the locations of their removal shall be as shown in Figure UG-84.5 and Table UG-84.6 for the largest plate thickness in the range specified in (-4).

(-6) The additional requirements specified in (-a) shall be met.

(-c) For small vessels not exceeding the volume limitations defined in U-1(j) made from one heat of material requiring impact tests, one welded test joint made from the same heat of material and welded with the same electrode and the same welding procedure may represent one lot of 100 vessels or less, or each heat treatment furnace batch, whichever is smaller.

(f) Rejection. If the vessel test plate fails to meet the impact requirements, the welds represented by the plate shall be unacceptable. Reheat treatment and retesting or retesting only are permitted.

UG-85 HEAT TREATMENT

When plate specification heat treatments are not performed by the material manufacturer, they shall be performed by, or be under the control of, the Manufacturer who shall then place the letter "G" in the Mill plate marking (see SA-20) to indicate that the heat treatments required by the material specification have been performed. The Manufacturer shall also document in accordance with UG-93(b) that the specified heat treatment has been performed.

UCS-85, UHT-5(e), and UHT-81 provide requirements for heat treatment of test specimens.

letters "MT" (denoting material treatment)

"G" (denoting green)
(d) All conflicts between the material specification and the supplemental requirements stipulated in this Part shall be noted, and compliance with the supplemental requirements shall be certified.

3.2.6.2 Certificate of Compliance and Material Test Reports by Other Than Materials Manufacturer.

(a) Except as otherwise provided in 3.2.5.3 and 3.2.7, if the requirements in a material specification listed in Annex 3-A have been completed by other than the materials manufacturer, then the vessel Manufacturer shall obtain supplemental material test reports and the Inspector shall examine these documents and determine that they represent the material and meet the requirements of the material specification.

(b) The vessel Manufacturer shall certify compliance with all the supplemental requirements stipulated in this Part for any of the treatments or examinations specified herein. The certification shall include certified reports of results of all tests and examinations performed on the materials by the vessel Manufacturer.

3.2.7 PRODUCT IDENTIFICATION AND TRACEABILITY

3.2.7.1 General Requirements.

(a) Material for pressure parts shall be organized so that when the vessel is completed, one complete set of the original identification markings required in the specifications for all materials of construction will be clearly visible. In case the original identification markings are unavoidably cut out or the material is divided into two or more parts, the vessel Manufacturer shall assure identification of each piece of material during fabrication and subsequent identification of the markings on the completed vessel by using the methods listed below.

(1) Accurate transfer of the original identification markings to a location where the markings will be visible on the completed vessel.

(2) Identification by coded marking, described in the Quality System Manual, acceptable to the Inspector and traceable to the original required marking.

(b) An as-built sketch or tabulation of materials shall be made, identifying each piece of material with a test report or, where permitted by this Part, with a Certificate of Compliance and the coded marking that ensure identification of each piece of material during fabrication and subsequent identification in the completed vessel.

(c) When plate specification heat treatments are not performed by the material manufacturer, they shall be performed by, or under the control of, the vessel Manufacturer who shall then place the letter “T” following the letter “G” in the Mill plate marking (see SA-20) to indicate that the heat treatments required by the material specification have been performed. The fabricator shall also document in accordance with 3.2.6.2(b) that the specified heat treatments have been performed in accordance with the material manufacturer’s recommendation.

3.2.7.2 Method of Transferring Markings by the Manufacturer.

(a) Transfer of markings shall be made prior to cutting except that the Manufacturer may transfer markings immediately after cutting, provided the control of these transfers is described in the Manufacturer’s written Quality Control System. The Inspector need not witness the transfer of the marks but shall be satisfied that it has been done correctly.

(b) The material may be marked by any method acceptable to the Inspector; however, all steel stamping shall be done with commercially available “low stress” dies.

(c) Where the service conditions prohibit die-stamping for material identification, and when so specified by the user, the material manufacturer and the vessel Manufacturer shall mark the required data on the plates in a manner which will allow positive identification upon delivery. The markings must be recorded so that each plate will be positively identified in its position in the completed vessel to the satisfaction of the Inspector.

3.2.7.3 Transfer of Markings by Other Than the Manufacturer.

(a) When material is to be formed into shapes by anyone other than the Manufacturer of the completed pressure vessel and the original markings as required by the applicable material specification are unavoidably cut out, or the material is divided into two or more parts, the manufacturer of the shape shall either:

(1) Transfer the original identification markings to another location on the shape.

(2) Provide for identification by the use of a coded marking traceable to the original required marking, using a marking method agreed upon and described in the Quality Control System of the Manufacturer of the completed pressure vessel.

(b) The mill certification of the mechanical and chemical properties requirements of the material formed into shapes, in conjunction with the above modified marking requirements, shall be considered sufficient to identify these shapes. Manufacturer’s Partial Data Reports and parts stamping are not required unless there has been fabrication of the shapes that include welding, except as exempted by 3.2.8.2.