

Information Bulletin No. IB21-020

December 17, 2021

## Interpretation

### Interpretation of Code Requirements in Paragraph UG-84 Relative to the Determination of the Number of Vessel (Production) Impact Test Plates Required

#### 1.0 Introduction

When production impact testing is required for a pressure vessel that is to be fabricated in accordance with the rules of ASME Section VIII, Division 1, it is necessary to determine how many vessel (production) test plates will be required to ensure the proper representation of production welding used in the fabrication of the vessel. The test plate welding is meant to represent the quality and type of welding that is used in the production welding. Within the Code the “type” of welding means automatic, semi-automatic, or manual welding. The most accurate means of ensuring the test plate weld represents the production weld is by welding the test plate in an identical manner to the production weld, hence the use of an “extension of the production weld”, or as is commonly known to industry a “run-off tab”.

The minimum Code requirement is for one test plate for each Welding Procedure Specification used for joints of Category A and B, and in the case of a vessel having a longitudinal seam in a cylindrical shell, this coupon must be prepared as an extension to the end of the first longitudinal seam. In addition, if the type of welding used to produce the head-to-shell joint is not the same as that used for the longitudinal seam, then additional test plates are required to represent the type of welding used to produce the additional joint(s).

This Information Bulletin replaces IB07-009 which has been withdrawn.

#### 2.0 Background

With respect to the number of vessel (production) test coupons required by the Code paragraphs UG-84(i)(1) and UG-84(i)(3), there may be some variation amongst Manufacturers and ABSA Authorized Inspectors in the understanding of the combined requirements of these two Code paragraphs.

The key language, extracted from the respective paragraphs, reads as follows:

From UG-84(i)(1)

*“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.”*

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From UG-84(i)(3)

*“(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:*

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

*(-a)(-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.”*

The issue or possible misunderstanding of Code requirements stems from the fact that many Manufacturers are using a single welding procedure specification (WPS) that includes multiple processes (e.g., GMAW, SMAW, & SAW) and types of welding (e.g., automatic, machine, semi-automatic and manual) to weld all Category A and B joints in any given vessel. Additionally, in some instances these Manufacturers may elect to weld Category A and B joints with different processes or combinations of processes using the multiple-process WPS.

Because of differences in the types of welding used (i.e., automatic, machine, semi-automatic, manual) for Category B joints as compared to the Category A joints, it may not be possible to meet the requirements of UG-84(i)(3)(-a)(-1) and UG-84(i)(3)(-a)(-2) with respect to the Category B weld joints using the Category A weld joint run-off-tab test plate, prepared as required by UG-84(i)(1).

In an attempt, therefore, to meet all of the requirements with only one test coupon, and thus save on the cost of additional mechanical testing, some Manufacturers have proposed to prepare a test plate coupon, which is attached to the first longitudinal seam to be welded, with all of the types of welding that will be used in production, as required by UG-84(i)(3)(-a)(-1) and UG-84(i)(3)(-a)(-2). This test plate weldment could conceivably represent the quality and type of welding in the vessel Category A joint(s). The thinking appears to be that, provided the welding type used in the Category A joint is present including the specific weld process associated with each type of welding, and each weld process has been tested as per UG-84(h)(5), the vessel impact test plate, would satisfy UG-84(i)(1). Interpretation VIII-1-21-12 supports this approach. A test plate weldment completed with the first production longitudinal seam that includes two or three types of welding could represent additional Category A joints made with a single type of welding. The run-off tab (test plate) shall be welded as an extension to the end of the production joint so the test plate weldment will represent as nearly as practicable the quality and type of welding in the vessel joint to meet Code requirements. A test plate welded with the first longitudinal seam that is a composite of all types of welding that exist in the remaining Category A and Category B joints is allowed based on the interpretation.

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To promote uniformity of application of the above Code requirements in Alberta, this document describes the interpretation of the Code rules that shall be enforced during ABSA shop inspections.

### 3.0 Interpretation

The decision process illustrated in Figure 1 of this interpretation shall be applied for ABSA shop inspections.

This decision diagram indicates that unless it is impracticable to do so, a vessel production test plate will be required to be prepared in order to represent the quality and type of welding in the vessels initial Category A weld joint(s). It may be possible that under some circumstances, when the type of welding would be different and therefore not meet the requirements of UG-84(i)(3)(-a)(-1) and UG-84(i)(3)(-a)(-2), that more than one test plate could be required to adequately represent the types of welding used in all of the vessel Category A weld joints. After this Code requirement relative to Category A weld joints has been met, it will then be necessary to determine if the remainder of the Code requirements related to the type of welding used in all Category A and B joints are satisfied. If all Code requirements cannot be met with the Category A weld joint test plate(s), then additional test plates shall be prepared as required by the Code paragraphs for the Category B joints and any remaining Category A joints.

Examples of the Application of the Interpretation:

Given: A simple vessel that requires production impact testing, having a cylindrical shell and semi-ellipsoidal heads. The selected welding procedure is qualified for GMAW, SMAW and SAW.

1. The longitudinal joint and all the circumferential joints will be made using a GMAW root, followed by 3 passes of SMAW with the remainder of the weld completed by SAW.

Under these circumstances one test plate welded as an extension to the longitudinal joint may be used to represent all welding on the vessel.

2. The longitudinal joint will be made using SAW only. The circumferential joints will be made using a GMAW root (flat position), followed by 3 passes of SMAW (flat position) with the remainder of the weld completed by SAW.

Under these circumstances one test plate welded as an extension to the longitudinal joint is required to represent the type of welding within the longitudinal joint. An additional test plate is required to represent the types of welding in the circumferential joints.

3. The first longitudinal seam will be made using GMAW root, followed by 3 passes of SMAW with the remainder of the weld completed by SAW. The remaining longitudinal joints will be made using SAW only. The circumferential seam will be made using a GMAW root (flat position), followed by 3 passes of SMAW (flat position) with the remainder of the weld completed by SAW.

Under these circumstances the test plate welded as an extension to the first longitudinal joint could be used to represent the type of welding within the remaining longitudinal and circumferential joints.

Manufacturers are cautioned to ensure all the UG-84(h)(5) requirements have been met when applying this approach to longitudinal and circumferential seams. A test plate welded with the first longitudinal seam with acceptable results as per UG-84(h)(5) can not be used exclusively in all cases for the remaining longitudinal and circumferential joints. Changes to essential and supplementary essential variables such as, adding additional weld types, deviations to deposited weld process thickness, etc. could affect the applicability of test plates previously tested, and if the limits of paragraph UG-84(h)(5) are exceeded additional test plates could be required.

*<original signed by>*

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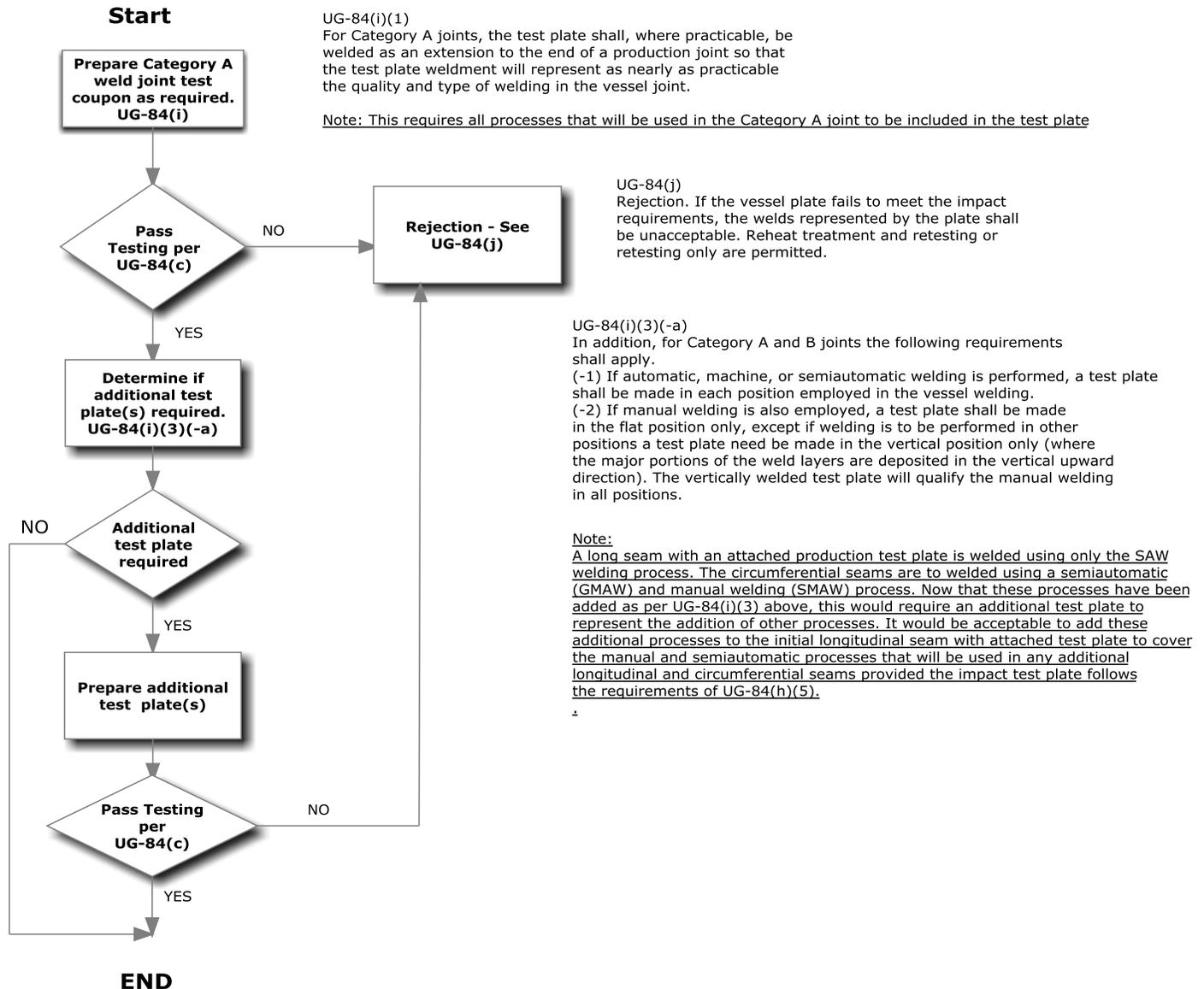
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Figure 1

**ASME Section VIII, Division 1, Paragraph UG-84 Vessel (Production) Impact test Plates**

**Example 1**

- a) Vessel contains both category A and Category B weld joints.
- b) Category A and B joints are welded using the same multi process(GMAW-SMAW-SAW) WPS
- c)The vessel is not one of several per UG-84(i)(3)(-b)or (-c)



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