

Nuclear

Short Form Specification

1101-22-010

Rev
1

Spec. Title OTSG KINETIC EXPANSION
DEPTH CRITERIA

QA Concur

GPUN

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Project Title TMI-1 OTSG REPAIR

Task No.
N/A

Prepared by Date

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GPUN 5/10/82

Approved by Date

GPUN [Signature] 5/10/82

- 1.0 This Specification establishes the criteria by which the depth to which OTSG tubes shall be expanded is to be determined.
- 2.0 Eddy Current Testing (ECT) indications of defects shall be classified into the following zones:
 - (a) Zone 1 -- Upper tubesheet primary face to 14 inches above the upper tubesheet secondary face (UP to US +14).
 - (b) Zone 2 -- Between 14 inches and 3 inches above the upper tubesheet secondary face (US +14 to US +3).
 - (c) Zone 3 -- Between 3 inches above and directly on the upper tubesheet secondary face (US +3 to US +0).
 - (d) Zone 4 -- All tube length below the upper tubesheet secondary face.
- 3.0 All tubes of both OTSGs not already plugged shall be kinetically expanded to one of two possible depths: 17" or 22".
 - 3.1 Tubes with no defect indications or defect indications in only one zone shall be expanded as follows:
 - (a) Tubes with no defect indications, a defect indication or group of defect indications in Zone 1 shall be expanded to a depth of 17".
 - (b) Tubes with a defect indication or group of defect indications in zone 2 shall be expanded to a depth of 22".
 - (c) Tubes with a defect indication or group of defect indications in zone 3 shall be expanded to a depth of 17".
 - (d) Tubes with a defect indication or group of defect indications in zone 4 shall be expanded to a depth of 17".
 - 3.2 Tubes with defect indications in more than one zone shall be expanded in accordance with the rules of 3.1 above for the zone containing the lowest elevation defect within the upper tubesheet (zones 1, 2 or 3, in order of decreasing elevation).
 - 3.3 Tubes with a defect indication exactly at the junction of two zones shall be considered to have that defect indication lower elevation zone of the two zones.

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4.0 The considerations taken into account in determining these criteria are:

- (a) For tubes that shall remain in service, a minimum of 6" of defect-free expanded length is necessary to assure a qualified joint.
- (b) For tubes to be removed from service, the inclusion of defects in the expanded length does not negate the benefits of the expanding the tubes.
- (c) The best accuracy of defect position by ECT is ± 1 " of axial length.
- (d) The total number of 22" deep expansions is to be minimized.
- (e) Whenever possible, the transition zone between the expanded and un-expanded areas of the tube should not be allowed to fall on or near a defect. If this is not achievable, the confluence of transition zone and defect is acceptable only in the case of tubes expanded to 17" depth and removed from service.

5.0 See Figure 1 for the correlation of expansion length, actual defect position, and defect indication. The intent of this figure is to illustrate how the physical characteristics of the expansion charge and the ± 1 inch uncertainty of actual defect position as determined by ECT defect indication have been taken into account in the definition of zones. Actual determination of expansion depth shall be accomplished by applying the rules in Section 2.0 and 3.0 of this Specification.

TITLE

OTSG KINETIC EXPANSION DEPTH CRITERIA

REV

SUMMARY OF CHANGE

APPROVAL

DATE

1

SECTION
CHANGE

3.3

 Added to remove position ambiguity of
 borderline defect indications.

B. Chen

9/29/12

FIGURE 1

Added Page number and revision number.

3.1(a)

Correct "depth" to "defect".

3.2

 Clarify "lowest" to refer to elevation
 of defect.

3.3

 Added to remove position ambiguity of
 border-line defect indications.

5.0

 Expanded to explain scope and limit
 use of Figure #1.

ECT
DEFECT INDICATIONACTUAL
DEFECT POSITION

ULP

ULS+24

17"

22"

ZONE 1

USE 17" EXPANSION

ECT
POSITION
UNCERTAINTY

ULS+19

ULS+12

ULS+13

USE 22" EXPANSION

ZONE 2

ULS+8

ULS+7

JOINT QUALIFICATION
LENGTHECT
POSITION
UNCERTAINTY

ULS+3

ULS+1

ULS+2

TRANSITION
ZONEJOINT QUALIFICATION
LENGTH

USE 17" EXPANSION

ULS+0

USE 17" EXPANSION

ZONE 3

ZONE 4