

Information Bulletin No. IB13-006

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INTERPRETATION
Random Non-Destructive Examination (including Radiography)
for a Designated Lot of ASME B31.3 Piping

Background

ASME B31.3, Process Piping Code is adopted in the Pressure Equipment Safety Regulation (AR49/2006) under Section 6(e)(ii). Misapplication of Paragraph 344.1.3 of the Code by considering results of examination to qualify work yet to be completed may lead to inferior quality and pressure equipment safety hazards.

This Interpretation encompasses and supersedes IB07-002 "INTERPRETATION -Random Radiography for a Designated Lot of ASME B31.3 Piping" issued March 23, 2007, and as such, IB07-002 is hereby rescinded.

ASME B31.3-2012 Provision

Paragraph 344.1.3 of ASME B31.3-2012 defines random examination as "complete examination of a percentage of a specified kind of item in a designated lot of piping".

Note 2 of the same paragraph clarifies a "designated lot" as the quantity of piping to be considered in applying the requirements for examination in the Code. These requirements apply to any type of examination under Chapter VI of the Code. For all random examinations, the quantity and extent of a designated lot must be established by agreement between the contracting parties, prior to the welding and the examination. In all cases, the examination should be conducted as soon as practicable after completion of welding of the designated lot.

Interpretation

In accordance with Paragraph 344.1.3, random examination performed before the completion of a designated lot (or sub-lot), can not and must not be used to accept welds which have not yet been completed when the examination is being performed.

In accordance with this interpretation, it is not permissible to pre-designate a welder's first production weld for radiographic examination for a job-test or qualification test, and then use that radiograph to qualify production welds made after the radiographic examination. It is also not permissible to pre-designate any given number of sequential welds, such as the first 25 welds of 500.

However it is permissible and in some cases more practical, particularly for a larger project or large lot size, to undertake progressive examination during fabrication of the lot to ensure consistent quality throughout the lot. If progressive examination is to be conducted, it may also be used to satisfy random examination requirements of the Code if the provisions of the Code and this interpretation are complied with.

Examples

Let us consider a designated lot comprised of 500 welds. It may be good practice, for quality control purposes, to perform progressive examination so fabrication problems may be identified and corrected before the repair rate becomes excessive (similarly, for quality control purposes, random examination required by Code should be undertaken as soon as possible following completion of a designated lot). One may then choose to perform random examination on incremental subsets (sometimes called sub-lots) of these 500 welds. Any number of welds (depending on agreement of the contracting parties) could be chosen.

In this example, let us look at the first 100 welds completed and randomly select 5% (or more) of these completed welds. If only 5 welds are randomly chosen and examined, in addition to having performed progressive examination during the job, the 5 welds examined would also fully satisfy the Code provision for a minimum 5% random examination for all the completed 100 welds, just as if those 100 welds were considered as a designated lot or the complete job.

The next sub-lot could also be 100 completed welds (or some other number as agreed upon by the contracting parties), and so the examination would progress until all 500 welds were completed, and the 5% random examination would be satisfied for the entire lot as required by the Code.

However, if one were to randomly examine 10 welds of the initial 100 welds completed, this would mean the initial sub-lot was subjected to 10% random examination. It is important that to satisfy Code provisions, none of the examined welds are to be considered as part of the next or subsequent sub-lots that will make up the remaining 400 welds, which have not yet been completed. There are two simple reasons why this is not allowed.

- (i) By standard definition, "random" means each weld in a lot has equal chance of being selected. If the selection is made and the examination completed before the weld was made, then it had no chance of being selected, and thus it is not part of the lot that was subject to random examination.
- (ii) In the example, 5% of 500 is 25 welds. If 10 welds are selected from the first 100, and 15 welds then selected from the next 400, the examination coverage would be reduced from 5% to 3.5% for the remaining 400 welds, and thus not meet the Code requirements. Conversely, if one were to examine only 3 welds in the first 100 welds, the minimum percentage for that sub-lot would not be met and that would defeat the objective of random examination and progressive examination.

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