

RANDOM EXAMINATION

ES-48

Prepared by

Pipe Fabrication Institute Engineering Committee



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USA

5901 Coastal Hwy #27
Ocean City, MD. 21842

CANADA

200-3633 Blvd Des Sources
D.D.O. QC Canada H9B 2K4

WEBSITE

www.pfi-institute.org

RANDOM EXAMINATION

Expectations, Guidelines and Methodology

1. Scope

- 1.1. Codes and specifications often require that welds be subjected to spot or random radiography, ultrasonic or other examination methods. The purpose of this standard is to:
 - 1.1.1. Present the expectations, effectiveness, and limitations of random examinations.
 - 1.1.2. Identify common industry practices and methods for specifying random examinations.
 - 1.1.3. Provide guidance in establishing and defining the makeup of a lot to be subjected to random examination, focusing on the ASME B31.3 use of the term “designated lot”.

2. Definitions

- 2.1. Commonly used extent of examination are defined as follows:
 - 2.1.1. **Random examination:** the complete examination of a specified percentage of welds selected randomly from a designated lot of piping.
 - 2.1.2. **Spot examination:** the examination of a limited length of a weld (e.g. 1 six inch spot in each 50 feet of weld)
 - 2.1.3. To avoid repetition of the inspection methods, this standard uses the term “random examination” to represent all examination methods including but not limited to radiography and ultrasonic methods.

3. Expectations, effectiveness, and limitations of random examination

- 3.1. Random or spot examination of welds in a piping system will not ensure that all the welds in that system will be of the same quality level as the welds that were examined. For example, if 10 welds in a piping system containing 100 welds are examined and accepted using random radiography, the remaining 90 welds

may contain rejectable flaws that would have been disclosed if additional welds had been radiographed. If all rejectable weld flaws must be eliminated from a given piping system, then 100% of all the welds in that system must be examined¹. Simply put, to ensure that all the welds are free of rejectable flaws, 100% of those welds must be examined, repaired as necessary and reexamined.

- 3.2. Random examination of welds is an effective quality control tool when properly implemented.

- 3.2.1. When random examination is used to check the quality of the welder’s work, the welder shall have no knowledge of which welds will be selected for examination. The examination provides feedback to the welder showing that the work is or is not satisfactory. If the work is not satisfactory, the welder and the welding supervisor can take corrective steps to improve weld quality in subsequent work; such steps can include the full range of changes from tighter control of fit-up, to better interpass cleaning and grinding, to better welding techniques to replacement of the welder.

- 3.2.2. For this process to work effectively, it is critical that examinations be made contemporaneously with the work being done to provide meaningful and timely feedback to the welder. The sooner welders learn that their welds require repair, the sooner they can take corrective action; this impacts cost and schedule positively by reducing the number of repairs and additional examinations that have to be made.

- 3.2.3. Accordingly, random examination may be performed before completion of all the welds in a lot.

4. Specifying Random Examination

- 4.1. The method, extent of examination and acceptance criteria to be applied must be clearly defined in the standard or specification and be agreed upon prior to the start of work. Prior agreement on the method, extent and acceptance criteria is standard industry practice that is well established in various welding

¹ See ASME B31.3 para. 341.4.1(b) and ASME section VIII Div 1, UW-52 footnote.