

RANDOM EXAMINATION

Prepared by
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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. Examine the expectations, effectiveness and limitations of random examination.
 - 1.1.2. Identify common industry practices and methods for specifying random examination.
 - 1.1.3. Provide guidance in establishing and defining the size of a lot to be subjected to random examination, focusing on the ASME B31.3 use of the terms “lot” and “kind of item.”

2. Definitions

- 2.1. Commonly used extent of examination are defined as follows:
 - 2.1.1. **Random examination:** complete examination of a percentage of a specified kind of item in a designated lot of piping
 - 2.1.2. **Spot examination:** a specified partial examination of a weld or specified group of welds (e.g. 1 six inch spot in each 50 feet of weld by a particular welder)
 - 2.1.3. **Random spot examination:** a specified partial examination of a percentage of a specified kind of item in a designated lot of piping
 - 2.1.4. This standard uses the term “random examination” to represent all examination methods such as radiography and ultrasonic or other examination that may be used in order to avoid excessive repetition of these inspection method names throughout this standard.

¹ See ASME B31.3 para. 344.1.3, footnote 2 and ASME section VIII Div 1, UW-52 footnote.

3. Expectations, effectiveness, and limitations of random examination

- 3.1. Random 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 examination of 100% of the welds in that system must be performed¹. More simply put, to insure that welds are free of rejectable flaws, 100% of those welds must be examined, repaired as necessary and then 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/or the welding supervisor can take corrective steps to improve weld quality in subsequent work; such steps can include the full range of changes from increased attention, to initial fit-up, to replacement of the welder.
 - 3.2.2. This will improve the quality of subsequent welds. For this process to work properly, it is critical that examinations be made, (and timely feedback provided to the welder), contemporaneously with the work being done. The sooner the welder learns that his weld requires repair, the sooner he can take corrective action.
 - 3.2.3. Accordingly, random examination may be performed before completion of all welds in a lot.