

WELDING INSPECTION AND NONDESTRUCTIVE EXAMINATION



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on Welding Inspection
and Nondestructive
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CHAPTER 14

WELDING INSPECTION AND NONDESTRUCTIVE EXAMINATION

INTRODUCTION

This chapter addresses the inspection and nondestructive examination of joints produced by welding and related processes. The term *inspection* denotes an all-encompassing quality control activity that includes numerous steps applied at different stages during a component's fabrication and service life. Thus, this term describes activities that are performed not only at the time of manufacture but also after the component has been subjected to service. While the types of discontinuities revealed during these varying stages may differ, the basic principles governing the inspection activity are essentially the same. Consequently, the majority of the information presented in this chapter is applicable to new manufacture, repair operations, or the evaluation of components that have already been subjected to their intended service conditions.

Many of the same methods used for welding inspection are also used to determine the quality of components joined by brazing or soldering. However, because of the physical nature of brazed and soldered joints (e.g., dissimilar materials, thinness of the joint, and so forth), some of the techniques described here may be inappropriate for use with these methods. For this reason, specific techniques that are applicable to the inspection of brazed and soldered joints are also discussed in this chapter.

Members of the quality assurance community often utilize the terms *examination*, *evaluation*, and *testing* to convey a meaning similar to that of *inspection*. However, for purposes of this discussion, these terms are defined as follows:

Examination—An activity that results in the indirect measurement or determination of the quality of a

material or component. Examinations can be performed without causing the destruction of the test object;

Evaluation—The consideration of examination and test results to determine the suitability of a component in terms of its quality or performance;

Testing—An activity that results in the direct measurement or determination of the suitability of a material or component for a prescribed service. Since a test involves the application of an actual or simulated service condition, the test object may be destroyed as a result of this process; and

Inspection—The overall quality control and assurance activity that encompasses other elements, including examination, testing, and evaluation.

With respect to welding inspection, the terms *discontinuity*, *flaw*, and *defect* are defined as follows:

Discontinuity—An interruption in the typical structure of a weldment, consisting of a lack of homogeneity in the mechanical, metallurgical, or physical characteristics of the base metal or the weld metal. A discontinuity is not necessarily a defect;

Flaw—A term nearly synonymous with *discontinuity*, but with the connotation of undesirability; and

Defect—A discontinuity that by nature or effect renders a weldment unable to meet specifications or acceptance standards. This term designates a condition that necessitates rejection.