ASME PTB-8-2014

Procurement Guidelines for Metallic Materials

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PROCUREMENT GUIDELINES FOR METALLIC MATERIALS

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FOREWORD

The scope of this document is to discuss the requirements in the ASME Codes and in the ASME material specifications for metallic materials, to address the various issues that affect the materials, and to provide guidelines for evaluating materials manufacturers and for preparing materials specifications that include the requirements for procuring material for ASME Code construction.

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Established in 1880, the American Society of Mechanical Engineers (ASME) is a professional not-for-profit organization with more than 135,000 members and volunteers promoting the art, science and practice of mechanical and multidisciplinary engineering and allied sciences. ASME develops codes and standards that enhance public safety, and provides lifelong learning and technical exchange opportunities benefiting the engineering and technology community. Visit www.asme.org for more information.

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1 INTRODUCTION

The ASME Boiler and Pressure Vessel Codes (BPVC) typically use ASME material specifications in practice, whereas, the ASME Piping Codes use ASTM material specifications. The ASME material specifications used in BPVC construction are based on the American Society for Testing Materials (ASTM), American Welding Society (AWS), or other international material specifications for metallic materials. The material specifications include mandatory requirements for manufacturing, testing and inspecting material, and may include a number of supplementary requirements, which are only used when specified by the purchaser. The specifications may also contain requirements pertaining to ordering and supplying of the materials.

ASTM and ASME material specifications generally do not include requirements that address fabrication effects on materials, except for statements that the material is suitable for welding construction. The BPVC and the ASME B31 Pressure Piping Codes do include certain requirements for fabrication effects, such as forming strains, tests on representative test coupons to simulate fabrication heat treatments, impact test requirements for materials and welded joints, and inspection requirements. Where these additional requirements are mandated by the ASME Codes, it is generally the responsibility of the vessel or piping designer/purchaser to specify these requirements when specifying/purchasing raw materials.

The ASME Codes and the various material specifications also do not generally include special requirements for environmental effects on the materials. The 2013 Edition of the BPVC Section II, Part D includes an expanded Non-mandatory Appendix A that describes various materials degradation mechanisms for materials that are used in ASME Code construction. Generally, it is the responsibility of the user or designer to identify service related material requirements for vessels and piping. It is the responsibility of the vessel or piping manufacturer to specify these requirements when procuring materials.

Frequently, ASME material requirements or service related conditions are not properly identified, or communicated between the parties involved during design, specification, procurement, and fabrication of vessels and piping, This document is intended to highlight common problems associated with the specification and procurement of materials for ASME Code construction. The relevant ASME Codes in this document include BPVC Section I, BPVC Section IV, BPVC Section VIII, BPVC Section XII, B31.1 Power Piping Code (ASME B31.1), and B31.3 Process Piping Code (ASME B31.3). The information in this report may also be applicable to other codes; however, such other codes have not been evaluated for inclusion in this document.

2 SCOPE

The ASME Codes and material specifications include specific requirements for use of the materials in ASME Code construction. However, they do not address all requirements. It is the responsibility of the user to specify service related requirements to prevent in-service degradation of the materials. It is the responsibility of the vessel manufacturer to account for materials degradation during fabrication and to include all necessary requirements in the raw material purchase specifications for ASME Code construction.

The scope of this document is to discuss the requirements in the ASME Codes and in the ASME material specifications for metallic materials, to address the various issues that affect the materials, and to provide guidelines for evaluating materials manufacturers and for preparing materials specifications that include the requirements for procuring material for ASME Code construction.

Some of the sections in this document pertain only to ferrous materials (carbon steels, low alloy steels and high alloy steels) because many of the past problems have been related to these materials (refer to Section 4 and Section 11 herein). However, most of the issues and considerations discussed in this document also pertain to nonferrous materials, particularly Sections 12 – 14 herein.