



Designation: C660 – 81 (Reapproved 2020)

Standard Practices for Production and Preparation of Gray Iron Castings for Porcelain Enameling¹

This standard is issued under the fixed designation C660; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Porcelain-enameled gray iron is a composite of a vitreous or glassy inorganic coating, bonded to a casting by fusion at temperatures above 800 °F (425 °C). Porcelain enamels are a family of coatings available in a wide variety of compositions and properties, but all are characterized by their glass-like nature. Selection of an appropriate porcelain enamel must be made on the basis of the end-use requirements. Certain casting design features and processing considerations can facilitate the application and efficient use of the selected enamel.

Two general types of enamels are available for use on cast iron. These are commonly referred to as wet-process and dry-process enamels (see Terminology C286). In wet-process enameling, a slurry of wet-ground materials is dipped or sprayed on the casting, the water removed by drying, and the coating matured by heating in a furnace for sufficient time to bring about fusion of the glassy particles. In dry-process enameling, dry-powdered glassy material is applied by dusting onto a redhot casting that has been ground-coated by the wet process prior to firing. The partially matured dusted coating is returned to the furnace to complete the fusion process. In general, wet-process enamels are thinner over-all than dry-process enamels.

1. Scope

1.1 These practices are intended to indicate certain casting characteristics and pre-enameling practices which will facilitate finishing by the wet- or dry-process methods of porcelain enameling. All of the listed recommendations are based on experiences with gray iron casting and enameling.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*²

[A48/A48M Specification for Gray Iron Castings](#)

[A74 Specification for Cast Iron Soil Pipe and Fittings](#)

[A126 Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings](#)

[A278/A278M Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures Up to 650 °F \(350 °C\)](#)

[C286 Terminology Relating to Porcelain Enamel and Ceramic-Metal Systems](#)

3. Recommended Casting Characteristics

3.1 Design of the casting should be such as to minimize variations in temperature during firing and cooling. Section thickness should be uniform to eliminate possible warping and fire cracking of castings; to facilitate an even rate of heating

¹ These practices are under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and are the direct responsibility of Subcommittee B08.12 on Materials for Porcelain Enamel and Ceramic-Metal Systems.

Current edition approved Nov. 1, 2020. Published December 2020. Originally approved in 1970. Last previous edition approved in 2015 as C660 – 81(2015). DOI: 10.1520/C0660-81R20.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.