

*Standard Specification
for*

Steel Castings for Highway Bridges

AASHTO DESIGNATION: M 192M/M 192-94
(ASTM DESIGNATION: A 486/A 486M-84)

1. SCOPE

1.1 This specification covers steel castings for use as highway bridge components.

1.2 The values stated in SI units are to be regarded as the standard.

2. REFERENCED DOCUMENTS

2.1 AASHTO Standards:

A 244 Methods and Definitions for Mechanical Testing of Steel Products

2.2 ASTM Standards:

A 781 Specification for Common Requirements for Steel and Alloy Castings for General Industrial Use
E 44 Definitions of Terms Relating to Heat Treatment of Metals

3. ORDERING INFORMATION

3.1 The inquiry and order shall include or indicate the following:

3.1.1 A description of the casting by pattern number or drawing. Dimensional tolerances shall be included on the casting drawing.

3.1.2 Grade of steel.

3.1.3 Options in the specification.

3.1.4 The supplementary requirements desired including the standards of acceptance.

4. GENERAL CONDITIONS FOR DELIVERY

4.1 Material furnished to this specification shall conform to the applicable

requirements of ASTM A 781/A 781M, including the supplementary requirements that are indicated on the purchaser's order.

5. HEAT TREATMENT

5.1 All castings shall receive a heat treatment proper to the class designation as follows:

5.1.1 *Class 485 (70)*—Normalize, or normalize and temper, or quench, and temper.

5.1.2 *Class 620 (90)*—Normalize, or normalize and temper, or quench and temper.

5.1.3 *Class 825 (120)*—Quench and temper.

5.2 Definitions of heat treating terms shall be those listed in Definitions ASTM E 44.

5.3 Furnace temperatures for heat treatment shall be effectively controlled by pyrometers.

TABLE 1 Chemical Requirements

	Composition, Max Percent		
	Class 485 (70)	Class 620 (90) ^A	Class 825 (120) ^A
Carbon	0.35	0.35	0.35
Manganese	0.90	^A	^A
Phosphorus	0.05	0.05	0.05
Sulfur	0.06	0.06	0.06
Silicon	0.80	^A	^A

^A The manganese, silicon, and other alloying elements which are added to obtain the mechanical properties specified shall be selected by the manufacturer.

TABLE 2 Mechanical Properties

	Class 485 [70]	Class 620 [90]	Class 825 [120]
Tensile Strength, min, MPa (ksi)	485 (70)	620 (90)	825 (120)
Yield Strength, min, MPa (ksi)	250 (36)	415 (60)	655 (95)
Elongation in 50.8 mm (2 in.), min, percent	22	20	14
Reduction of Area, min, percent	30	40	30
Charpy V-notch impact 21°C (70°F), min, J (ft·lb) ^A	34 (25)	34 (25)	41 (30)

^A Values apply only to sections up to 50.8 mm (2 in.) thick.

6. CHEMICAL COMPOSITION

6.1 The steel shall conform to the requirements as to chemical composition prescribed in Table 1.

7. MECHANICAL PROPERTIES

7.1 Steel used for castings shall conform to the requirements as to mechanical properties prescribed in Table 2.

7.2 Tension tests and impact tests shall be prepared and performed from cast coupons in accordance with Methods and Definitions A 370.

7.3 Steel castings for highway bridges may be required for service under moderately cold and cold conditions. When specified in the inquiry, contract, or order, the impact properties of the steel used for low-temperature service castings shall conform to the requirements prescribed in Table 3. The class, the testing temperature, and the minimum impact value must be clearly stated in the inquiry and order.

7.4 Impact requirements for temperatures below -46°C [-50°F] may be specified in the contract or order when agreed upon between the manufacturer and the purchaser.

8. NUMBER OF TESTS

8.1 One tension test specimen and three impact test specimens shall be made from each heat.

TABLE 3 Impact Properties for Low-Temperature Service

Charpy V-Notch Impact	Class 485 (70)	Class 620 (90)	Class 825 (120)
-18°C (0°F) min, J (ft·lb) ^A	20 (15)	20 (15)	34 (25)
-46°C (-50°F) min, J (ft·lb) ^A	—	20 (15)	20 (15)

^A Values apply only to sections up to 50.8 mm (2 in.) thick.

TABLE 4 Minimum Preheat Temperature

Class	Thickness, mm (in.)	Minimum Preheat Temperature, °C (°F)
Class 485 (70)	25 (1) and under	10 (50)
	Over 25 (1)	79 (175)
Class 620 (90)	all	121 (250)
Class 825 (120)	all	149 (300)

9. RETESTS

9.1 If the results of the mechanical tests for any heat do not conform to the requirements specified, the castings may be reheat treated and retested.

heated to at least the minimum temperatures in Table 4.

11. PRODUCT MARKING

11.1 Castings shall be marked for material identification with the ASTM symbols for the class of steel and an identification number.

10. REPAIR BY WELDING

10.1 Repair welds shall conform to the same inspection standards as those required of the casting.

10.2 When methods involving high temperatures are used in the removal of discontinuities, castings shall be pre-

12. REJECTION AND REHEARING

12.1 Samples tested in accordance with Section 7, that represent rejected material, shall be preserved for 2 weeks from the date of transmission of the test report. In case of dissatisfaction with the

results of the tests, the manufacturer may make claim for a rehearing within that time.

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall not apply unless specified in the purchase order. A list of standardized supplementary requirements for use at the option of the purchaser is included in Specification A 781/A 781M. Those which are ordinarily considered suitable for use with this specification are given below. Others enumerated in Specification A 781/A 781M may be used with this specification upon agreement between the manufacturer and purchaser.

S1. MAGNETIC PARTICLE EXAMINATION

S2. RADIOGRAPHIC EXAMINATION

S5. EXAMINATION OF WELD PREPARATION