

SUPERSEDED BY EB 15-031 EFFECTIVE 9/28/15		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 13-009
Title: REVISION TO STANDARD SPECIFICATIONS FOR CAST DUCTILE IRON FRAMES, GRATES, AND COVERS			
Target Audience: ☒ Manufacturers (18) ☒ Local Govt. (31) ☐ Agencies (32) ☐ Surveyors (33) ☒ Consultants (34) ☒ Contractors (39)		Approved:  Richard W. Lee, P.E. Acting Deputy Chief Engineer, Design Date <u>7/8/13</u>	

ADMINISTRATIVE INFORMATION:

- **Effective Date:** This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of 01/09/14.
- This EI does not supersede any other issuances.
- The revisions issued with this EI will be incorporated into the next update of the Standard Specifications. See <https://www.dot.ny.gov/main/business-center/engineering/specifications>.

PURPOSE: The purpose of this EI is to issue revisions to Standard Specification Sections 655 – *Frames, Grates, and Covers* and 715-07 *Proof-Loaded Iron Castings*.

TECHNICAL INFORMATION: Cast ductile iron frames and grates are now also acceptable for NYSDOT projects. Successfully proof loaded cast ductile iron frames and grates will appear on the Approved List.

IMPLEMENTATION: DQAB will insert the revisions to “655-Frames, Grates, and Covers” and “715-07 Proof-Loaded Iron Castings” into all projects containing 655 items, beginning with projects submitted for the letting of 01/09/14.

TRANSMITTED MATERIALS:

- Attached are both the USC and Metric Standard Specification revisions for the subject changes.
- The Approved List for these items and their submitted materials details will be available on the Technical Services – Materials web pages at:
<https://www.dot.ny.gov/divisions/engineering/technical-services/materials-bureau/materials-and-equipment> >> *Drainage Unit Castings and Risers* >> *Proof Loaded Iron Castings*.

BACKGROUND: For drainage frames, grates, and covers, the Standard Specifications limited the materials to fabricated steel and cast iron. A manufacturer submitted cast ductile iron grates to NYSDOT for proof load testing. The proof load tests on these grates were successful, which indicates that acceptable performance can be expected as from both ductile cast iron and gray cast iron grates.

VENDORS: Vendors desiring to have their Ductile Iron drainage products appear on the subject Approved List will be required to submit an Approval Request, materials details, and representative samples to the Materials Bureau for review and proof-load testing.

CONTACT: For additional information, contact Neil Sergott of the Design Quality Assurance Bureau at (518)-485-5106, nsergott@dot.ny.gov.

PROOF-LOADED IRON CASTINGS

Make the following changes to the Standard Specifications of May 1, 2008:

Page 688, **Delete** SECTION 655 – FRAMES, GRATES AND COVERS entirely and **Replace** it with the following:

"SECTION 655 – FRAMES, GRATES AND COVERS

655-1 DESCRIPTION. This work shall consist of furnishing and placing frames, grates, covers and curb boxes for drainage structures as shown on the plans or as directed by the Engineer.

655-2 MATERIALS

655-2.01 Castings. All cast gratings, covers, frames and curb boxes manufactured in conformance to the Standard Sheets "Cast Manhole Frames, Grates and Covers", or "Cast Frames and Curb Boxes and Welded Frames", or "Telescoping Manhole Casting & Ring" shall meet the requirements of §715-05 Iron Castings, Class No. 30B or Class No. 35B. All other gratings, covers, frames and curb boxes shall meet the requirements of §715-02, Steel Castings, Grade N-1; or §715-07, Proof-Loaded Iron Castings; or §715-09, Malleable Iron Castings, Grade 32510, at the Contractor's option. No substitutions will be allowed.

655-2.02 Fabricated Articles. All frames, grates and appurtenant parts shall be fabricated from steel conforming to ASTM A36, AISI Grade 1020 Steel, AISI Grade 1025 Steel, or ASTM A529 Gr. 50, except that the longitudinal bars for grates G1, G2, G3, 10 PCB, 11 PCB and 12 PCB shall meet the requirements of ASTM A529, Gr. 50. The Contractor shall submit mill certifications, to the Engineer, for ASTM A529, Gr.50. Welding or splicing by welding of any member of the frame or grate, other than the welds shown on the standard sheets, plans, approved shop drawings, approved Materials Details, or in the proposal will not be permitted. Galvanizing shall be in accordance with §719-01 Type I, unless indicated otherwise.

Welding shall comply with the requirements specified in the New York State Steel Construction Manual, except that radiographic inspection will not be required.

655-3 CONSTRUCTION DETAILS

655-3.01 Frames and Grates. Frames, covers and grates shall be placed true to line and grade. Covers, grates and frames shall make firm, full and even bearing on their respective underlying surfaces and shall be non-rocking under the influence of traffic or other loads. On all frames, the Contractor shall have the option of drilling and tapping holes or drilling holes in and welding nuts to the bottom of the frame to facilitate the stud bolts used to hold down the grate. Alternate forms of locking will be approved by the office of Design.

Unless otherwise specified, the hole shall be drilled and tapped or the nut welded to the frame before any galvanizing. The threads shall be tapped sufficiently oversize to conform to the dimensions for coarse thread with class 2B tolerances prescribed in the American National Standards for Unified Screw Threads, ANSI B1.1., after galvanizing.

655-3.02 Field Repairs for Improperly Fitting Systems. The Contractor may propose to the Engineer reasonable field repair procedures for improperly fitting castings. No field repairs of improperly fitting fabricated frames and grates shall be allowed. Field repairs may include grinding and/or proper welding techniques for the materials involved. Repairs that involve welding shall be allowed only on steel castings, and not on iron, and only with prior approval of the DCES. Implemented repairs must result in systems whose constituent parts have full, uniform and even bearing contact on their respective underlying surfaces and that do not rock or move under the influence of traffic and other loads. All such repairs must be completely satisfactory to the Engineer or the work will be rejected. All repairs shall be done at no cost to the State.

655-4 METHOD OF MEASUREMENT

655-4.01 Frames and Grates. The quantity to be measured for payment will be the number of frames and

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grates satisfactorily installed.

655-5 BASIS OF PAYMENT

655-5.01 Frames and Grates. The unit price bid for each frame and grate shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including the cost of any field repair work for improperly fitting castings or to render the frame and grate non-rocking.

Payment will be made under:

Item No.	Item Description	Pay Unit
655.0701	Cast Frame F1, Mountable Curb Box CM1 & Reticuline Grate G1	Each
655.0702	Cast Frame F2, Mountable Curb Box CM2 & Reticuline Grate G2	Each
655.0703	Cast Frame F3, Mountable Curb Box CM3 & Reticuline Grate G3	Each
655.0704	Cast Frame F1, UnMountable Curb Box CU1 & Reticuline Grate G1	Each
655.0705	Cast Frame F2, UnMountable Curb Box CU2 & Reticuline Grate G2	Each
655.0706	Cast Frame F3, UnMountable Curb Box CU3 & Reticuline Grate G3	Each
655.0801	Cast Frame F1, Mountable Curb Box CM1 & Parallel Bar Grate 6 PCB	Each
655.0802	Cast Frame F2, Mountable Curb Box CM2 & Parallel Bar Grate 7 PCB	Each
655.0803	Cast Frame F3, Mountable Curb Box CM3 & Parallel Bar Grate 8 PCB	Each
655.0804	Cast Frame F1, UnMountable Curb Box CU1 & Parallel Bar Grate 6 PCB	Each
655.0805	Cast Frame F2, UnMountable Curb Box CU2 & Parallel Bar Grate 7 PCB	Each
655.0806	Cast Frame F3, UnMountable Curb Box CU3 & Parallel Bar Grate 8 PCB	Each
655.0901	Parallel Bar Frame 10 PCB & Parallel Bar Grate 10 PCB	Each
655.0902	Parallel Bar Frame 11 PCB & Parallel Bar Grate 11 PCB	Each
655.0903	Parallel Bar Frame 12 PCB & Parallel Bar Grate 12 PCB	Each
655.1003	Welded Frame & Rectangular Grate 3	Each
655.1006	Welded Frame & Rectangular Grate 6	Each
655.1011	Welded Frame & Rectangular Grate 11	Each
655.1016	Welded Frame & Rectangular Grate 16	Each
655.1022	Welded Frame & Rectangular Grate 22	Each
655.1103	Welded Frame & Reticuline Grate 3	Each
655.1106	Welded Frame & Reticuline Grate 6	Each
655.1111	Welded Frame & Reticuline Grate 11	Each
655.1116	Welded Frame & Reticuline Grate 16	Each
655.1122	Welded Frame & Reticuline Grate 22	Each
655.1201	Manhole Frame & Grate	Each
655.1202	Manhole Frame & Cover	Each
655.1301	Telescoping Manhole Frame & Grate	Each
655.1302	Telescoping Manhole Frame & Cover	Each"

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Page 915 Delete SECTION 715-07 PROOF LOADED IRON CASTINGS entirely and Replace it with the following:

"SECTION 715-07 PROOF LOADED IRON CASTINGS

SCOPE. This specification covers material and testing requirements for proof loaded iron castings.

MATERIAL REQUIREMENTS. Iron castings shall conform to the requirements of AASHTO M306, except for gray iron may be class 30B or class 35B and ductile iron shall have a minimum yield strength of 50 ksi. Castings shall be true to pattern in form and dimensions, free from pouring faults, sponginess, cracks, blow holes and other defects at locations affecting their strength and value for the service intended, and shall not be galvanized.

Grates, covers and curb boxes shall have continuous, full, and uniform bearing contact with their corresponding frames and shall be non-rocking when in place and under the influence of traffic or other loads. Methods that are permissible to achieve secure non-rocking fit between grates, covers and their corresponding frames are:

- Ground mating surfaces
- Machined and milled mating surfaces (horizontal and/or vertical).

All gratings, covers, frames and curb boxes shall be free of any coatings unless specified otherwise.

Castings shall be boldly filleted at angles, and the arrises shall be sharp and perfect.

Castings having blow-holes plugged or filled with putty or cement of any kind will be rejected.

Materials Details. All dimensions, including specified tolerances, in the Material Details shall substantially comply with the dimensions specified on the relevant standard sheets.

The class of gray iron and yield strength of ductile iron shall be clearly identified on the drawings.

Testing Facility. The Department will conduct the proof load testing for acceptance of the design.

SAMPLES AND SUBMISSIONS. The manufacturer/supplier shall provide the following to the Materials Bureau before any testing can begin:

- Two (2) copies of the Material Details for each iron casting to be approved
- Two (2) samples of each cast article to be load tested
- One (1) sample of corresponding approved frame, grate, or cover, and any nuts and bolts required for assembly
- Two (2) tension test specimens cast within an hour of casting each of the test samples and machined as per AASHTO M 105 Type B.

It is the manufacturer/supplier's responsibility to remove in an expedient manner all supplied material from the Department's premises after the tests are done.

Failure Criteria. The design of an iron casting will be rejected if the following conditions are not met:

A. Permanent Set. This criterion applies to cast iron grate and cover. The maximum permanent set in any article, measured relative to a fixed horizontal plane, shall not exceed the lesser of 1/8 inch or 1/150 of the clear opening.

B. Cracks. All articles will be inspected after the completion of each test. No part of any article shall break or have any cracks.

Retests and Re-submissions. If the dimensions of the article(s) do not comply with the dimensions given in the Material Details, either new article(s) or new Details shall be submitted at the manufacturer's option. Upon failure under proof loading no retests will be allowed. Complete new designs shall be submitted for further testing.

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BASIS OF APPROVAL. Material Details shall be prepared and submitted to the Director of Materials Bureau for approval. The articles will be proof-load tested in accordance to the Department's Test Method "Proof Loading of Cast Iron Frames, Grates, Covers and Curb Boxes", a copy of which may be obtained from the Director of Materials Bureau. After the proof-load tests are successful and the drawings are approved, the manufacturer's name, Material Details and approval date will be placed on the Department's Approved List.

BASIS OF ACCEPTANCE. Cast iron frames, grates, covers and curb boxes will be accepted at the project site based on the manufacturer's name appearing on the Approved List, conformance to the approved Material Details, and a Material Certification. *Buy America Requirements Apply.*

For each type of casting supplied, the following shall be provided to the Engineer:

A. Material Certification. The manufacturer or supplier shall provide certification that every piece of cast iron frame, grate, cover and curb box supplied was manufactured in accordance with these specifications and the approved Material Details.

B. Material Details. One copy of the approved Material Details, as referenced on the Approved List."

PROOF-LOADED IRON CASTINGS

Make the following changes to the standard Specifications of May 4, 2006:

Page **653** Delete SECTION 655 – FRAMES, GRATES AND COVERS entirely and **Replace** it with the following:

"SECTION 655 – FRAMES, GRATES AND COVERS

655-1 DESCRIPTION. This work shall consist of furnishing and placing frames, grates, covers and curb boxes for drainage structures as shown on the plans or as directed by the Engineer.

655-2 MATERIALS

655-2.01 Castings. All cast gratings, covers, frames and curb boxes manufactured in conformance to the Standard Sheets "Cast Manhole Frames, Grates and Covers", or "Cast Frames and Curb Boxes and Welded Frames", or "Telescoping Manhole Casting & Ring" shall meet the requirements of §715-05 Iron Castings, Class No. 30B or Class No. 35B. All other gratings, covers, frames and curb boxes shall meet the requirements of §715-02, Steel Castings, Grade N-1; or §715-07, Proof-Loaded Iron Castings; or §715-09, Malleable Iron Castings, Grade 22010, at the Contractor's option. No substitutions will be allowed.

655-2.02 Fabricated Articles. All frames, grates and appurtenant parts shall be fabricated from steel conforming to ASTM A36M, AISI Grade 1020 Steel, AISI Grade 1025 Steel, or ASTM A529M Gr. 345, except that the longitudinal bars for grates G1, G2, G3, 10 PCB, 11 PCB and 12 PCB shall meet the requirements of ASTM A529M, Gr. 345. The Contractor shall submit mill certifications, to the Engineer, for ASTM A529M, Gr.345. Welding or splicing by welding of any member of the frame or grate, other than the welds shown on the standard sheets, plans, approved shop drawings, approved Materials Details, or in the proposal will not be permitted. Galvanizing shall be in accordance with §719-01 Type I, unless indicated otherwise.

Welding shall comply with the requirements specified in the New York State Steel Construction Manual, except that radiographic inspection will not be required.

655-3 CONSTRUCTION DETAILS

655-3.01 Frames and Grates. Frames, covers and grates shall be placed true to line and grade. Covers, grates and frames shall make firm, full and even bearing on their respective underlying surfaces and shall be non-rocking under the influence of traffic or other loads. On all frames, the Contractor shall have the option of drilling and tapping holes or drilling holes in and welding nuts to the bottom of the frame to facilitate the stud bolts used to hold down the grate. Alternate forms of locking will be approved by Office of Design.

Unless otherwise specified, the hole shall be drilled and tapped or the nut welded to the frame before any galvanizing. The threads shall be tapped sufficiently oversize to conform to ANSI B1.13M Class 6h after galvanizing.

655-3.02 Field Repairs for Improperly Fitting Systems. The Contractor may propose to the Engineer reasonable field repair procedures for improperly fitting castings. No field repairs of improperly fitting fabricated frames and grates shall be allowed. Field repairs may include grinding and/or proper welding techniques for the materials involved. Repairs that involve welding shall be allowed only on steel castings, and not on iron, and only with prior approval of the DCES. Implemented repairs must result in systems whose constituent parts have full, uniform and even bearing contact on their respective underlying surfaces and that do not rock or move under the influence of traffic and other loads. All such repairs must be completely satisfactory to the Engineer or the work will be rejected. All repairs shall be done at no cost to the State.

655-4 METHOD OF MEASUREMENT

655-4.01 Frames and Grates. The quantity to be measured for payment will be the number of frames and grates satisfactorily installed.

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655-5 BASIS OF PAYMENT

655-5.01 Frames and Grates. The unit price bid for each frame and grate shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the work, including the cost of any field repair work for improperly fitting castings or to render the frame and grate non-rocking.

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655.1201	Manhole Frame & Grate	Each
655.1202	Manhole Frame & Cover	Each
655.1301	Telescoping Manhole Frame & Grate	Each
655.1302	Telescoping Manhole Frame & Cover	Each"

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Page 873 Delete SECTION 715-07 PROOF LOADED IRON CASTINGS entirely and Replace it with the following:

"SECTION 715-07 PROOF LOADED IRON CASTINGS

SCOPE. This specification covers material and testing requirements for proof loaded iron castings.

MATERIAL REQUIREMENTS. Iron castings shall conform to the requirements of AASHTO M306, except for gray iron may be class 30B or 35B and ductile iron shall have a minimum yield strength of 50 ksi. Castings shall be true to pattern in form and dimensions, free from pouring faults, sponginess, cracks, blow holes and other defects at locations affecting their strength and value for the service intended, and shall not be galvanized.

Grates, covers and curb boxes shall have continuous, full, and uniform bearing contact with their corresponding frames and shall be non-rocking when in place and under the influence of traffic or other loads. Methods that are permissible to achieve secure non-rocking fit between grates, covers and their corresponding frames are:

- Ground mating surfaces
- Machined and milled mating surfaces (horizontal and/or vertical).

All gratings, covers, frames and curb boxes shall be free of any coatings unless specified otherwise. Castings shall be boldly filleted at angles, and the arrises shall be sharp and perfect. Castings having blow-holes plugged or filled with putty or cement of any kind will be rejected.

Materials Details. All dimensions, including specified tolerances, in the Material Details shall substantially comply with the dimensions specified on the relevant standard sheets. The class of gray iron and yield strength of ductile iron shall be clearly identified on the drawings.

Testing Facility. The Department will conduct the proof load testing for acceptance of the design.

SAMPLES AND SUBMISSIONS. The manufacturer/supplier shall provide the following to the Materials Bureau before any testing can begin:

- Two (2) copies of the Material Details for each iron casting to be approved
- Two (2) samples of each cast article to be load tested.
- One (1) sample of corresponding approved frame, grate, or cover, and any nuts and bolts required for assembly.
- Two (2) tension test specimens cast within an hour of casting each of the test samples and machined as per AASHTO M 105 Type B.

It is the manufacturer/supplier's responsibility to remove in an expedient manner all supplied material from the Department's premises after the tests are done.

Failure Criteria. The design of an iron casting will be rejected if the following conditions are not met:

A. Permanent Set. This criterion applies to cast iron grate and cover. The maximum permanent set in any article, measured relative to a fixed horizontal plane, shall not exceed the lesser of 3 mm or 1/150 of the clear opening.

B. Cracks. All articles will be inspected after the completion of each test. No part of any article shall break or have any cracks.

Retests and Re-submissions. If the dimensions of the article(s) do not comply with the dimensions given

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in the Material Details, either new article(s) or new Details shall be submitted at the manufacturer's option. Upon failure under proof loading no retests will be allowed. Complete new designs shall be submitted for further testing.

BASIS OF APPROVAL. Material Details shall be prepared and submitted to the Director of Materials Bureau for approval. The articles will be proof-load tested in accordance to the Department's Test Method "Proof Loading of Cast Iron Frames, Grates, Covers and Curb Boxes", a copy of which may be obtained from the Director of Materials Bureau. After the proof-load tests are successful and the drawings are approved, the manufacturer's name, Material Details and approval date will be placed on the Department's Approved List.

BASIS OF ACCEPTANCE. Cast iron frames, grates, covers and curb boxes will be accepted at the project site based on the manufacturer's name appearing on the Approved List, conformance to the approved Material Details, and a Material Certification. Buy America Requirements Apply.

For each type of castings supplied, the following shall be provided to the Engineer:

A. Material Certification. The manufacturer or supplier shall provide certification that every piece of cast iron frame, grate, cover and curb box supplied was manufactured in accordance with these specifications and the approved Material Details.

B. Material Details. One copy of the approved Material Details, as referenced on the Approved List."