Assignment: At the September 2019 meeting in Columbus, OH ballot 15-19-12 was proposed by the subcommittee and general committee to revise existing Article 3.2.2k. In reviewing the ballots, it was decided to editorially move existing Article 3.2.14 to precede existing Article 3.2.2.

Rationale: Remove routine duplicate rotational capacity testing. Testing at the manufacturer or distributor is already required in existing Article 3.2.14.1d(1).

Submitted by: Heather Gilmer, Chair SC 3 Fabrication & Erection
Due Date: January 31, 2020

Move existing Article 3.2.14 to precede existing Article 3.2.2 (re-numbering as necessary including associated Commentary. Combined existing Commentary 9.3.2.1 and 9.3.2.2 is now split) and revise existing Article 3.2.2k as shown (deletions in bold red strikethrough, new text in red bold underline, remainder of Article unchanged):

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Holes for shop fasteners 3.2.5 3.2.6
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Holes, size and workmanship 3.2.4 3.2.5
Installation of high-strength bolts 3.2.2 3.2.3
Match marking 3.2.10 3.2.11
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Quantity of field fasteners 3.2.3 3.2.4
Reaming and drilling after assembly 3.2.9 3.2.10
Reaming and drilling templates 3.2.7 3.2.8
Reaming and drilling through templates 3.2.8 3.2.9
Reuse of high-strength bolts 3.2.2(3) 3.2.3(3)
Size and workmanship of holes 3.2.4 3.2.5
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Templates for reaming and drilling 3.2.7 3.2.8
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3.2 Bolted Construction

3.2.1 High-Strength Bolts, Nuts and Washers (2017)

3.2.2 Testing and Documentation of High-Strength Fasteners (2017)

3.2.3 Installation of High-Strength Bolts (2018-2021)

3.2.4 Quantity of Field Fasteners (2017)

3.2.5 Size and Workmanship of Holes (2020)

3.2.6 Preparation of Holes for Shop-Installed Fasteners (2017)

3.2.7 Preparation of Holes for Field-Installed Fasteners (2017)

3.2.8 Templates for Reaming and Drilling (2017)


3.2.10 Reaming and Drilling In Assembly (2017)


3.2.12 Alignment of Finished Holes (2017)

3.2.13 Surface Preparation of Slip-Critical Faying Surfaces (2019)

3.2.14 Fitting for Shop Bolting (2017)

3.2.14.1 3.2.2.1 Testing

   a. Bolts: In addition to …

   b. Nuts: In addition to …

   c. Washers: In addition to …

   d. Assemblies:

       (1) Rotational capacity tests …

       (2) Each combination of …

       (3) A rotational-capacity lot …

       (4) The minimum frequency …

       (5) Failure of any …

   e. Reporting:

       (1) The results of all …

       (2) Location where tests …

   f. Witnessing: The tests need …

[continued]
Documentation

a. Mill Test Report(s) (MTR):
   
   (1) MTR shall be furnished …
   
   (2) MTR shall indicate …

b. Manufacturer Certified Test Report(s) (MCTR):
   
   (1) The manufacturer of the …
   
   (2) Each MCTR shall show the relevant information required in accordance with Article 3.2.14.1e 3.2.2.1e.
   
   (3) The manufacturer performing the rotational-capacity test shall include on the MCTR:
      
      (a) The lot number of each of the items tested.
      
      (b) The rotational-capacity lot number as required in Article 3.2.14.1d(3) 3.2.2.1d(3).
      
      (c) The results of the tests required in Article 3.2.14.1d 3.2.2.1d.
      
      (d) The pertinent information required in Article 3.2.14.1e(2) 3.2.2.1e(2).
      
      (e) A statement that MCTR …
      
      (f) The location where …

c. Distributor Certified Test Report(s) (DCTR):
   
   (1) The DCTR shall include …
   
   (2) The rotational-capacity test …
   
   (3) The DCTR shall show the results of the tests required in Article 3.2.14.1d 3.2.2.1d.
   
   (4) The DCTR shall also show the pertinent information required in Article 3.2.14.1e(2) 3.2.2.1e(2).
   
   (5) The DCTR shall show the rotational-capacity lot number as required in Article 3.2.14.1d(3) 3.2.2.1d(3).
   
   (6) The DCTR shall …

[continued]
3.2.2 3.2.3 INSTALLATION OF HIGH-STRENGTH BOLTS (20182021)

At the direction of the Engineer, if the condition of the fastener assembly is in question, the rotational-capacity test for ASTM F3125 Grade A325 and Grade A490 high-strength bolts described in Article 3.2.14 3.2.2 shall be performed on two fastener assemblies from each the rotational-capacity lot at the site prior to the start of bolt installation in question. Hardened steel washers are required as part of the test although they may not be required in the actual installation procedures.

3.2.3 3.2.4 QUANTITY OF FIELD FASTENERS (2017)

3.2.4 3.2.5 SIZE AND WORKMANSHIP OF HOLES (2020)

3.2.5 3.2.6 PREPARATION OF HOLES FOR SHOP-INSTALLED FASTENERS (2017)

a. For meeting the …

Table 15-3-3. Contractor Acceptable Substitutes

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Acceptable Substitute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punching full-size</td>
<td>Drilling full size or subpunching and reaming to size with or without all parts assembled.</td>
</tr>
<tr>
<td>Subpunching</td>
<td>Subdrilling, plasma-cutting, or laser-cutting to the required Subpunched hole size</td>
</tr>
<tr>
<td>Reaming with parts assembled</td>
<td>Drilling full size with parts assembled or, if approved by the Engineer, drilling full size without assembly, provided the drilling is done by suitable numerically controlled (N/C) drilling equipment, subject to the specific limitations contained in Article 3.2.6d 3.2.7d and Article 3.2.6e 3.2.7e.</td>
</tr>
</tbody>
</table>

b. Holes to be …

c. Holes may only …

(1) the holes are …

(2) the material is …

d. If condition (1) of …

e. Holes in rolled …

f. Where matching …

[continued]
American Railway Engineering & Maintenance-of-Way Association
Letter Ballot 15-19-12

If approved by the Engineer, the contractor shall have the option to drill full size through individual pieces or any combination of pieces held tightly together, the holes designated to be subpunched or subdrilled and reamed in paragraph e or paragraph f provided the drilling is done by suitable numerically controlled (N/C) drilling equipment, subject to the specific limitations contained in 3.2.6 and Article 3.2.7.

3.2.6 3.2.7 PREPARATION OF HOLES FOR FIELD-INSTALLED FASTENERS (2017)

a. Field splices in …

b. Holes for field …
   (1) subpunched or subdrilled …
   (2) drilled full size …

c. Holes for field …

d. If approved …

e. Where N/C drilling equipment is used, the fabricator shall, if required by the Engineer, demonstrate by means of check shop assemblies that the drilling equipment will consistently produce holes and connections meeting all of the requirements of Article 3.2.4 and Article 3.2.5.

f. Where check shop …

Composition of check shop assemblies shall be based on the proposed order of erection, joints in bearing, special complex points and similar considerations. The fabricator shall submit the designation of members to be shop assembled to the Engineer for approval. If the shop assembly fails to produce holes and connections meeting the requirements of Article 3.2.4 and Article 3.2.5, the Engineer may …

g. When a span …

3.2.7 3.2.8 TEMPLATES FOR REAMING AND DRILLING (2017)

3.2.8 3.2.9 REAMING AND DRILLING THROUGH TEMPLATES (1995) R(2017)

3.2.9 3.2.10 REAMING AND DRILLING IN ASSEMBLY (2017)


3.2.11 3.2.12 ALIGNMENT OF FINISHED HOLES (2017)

3.2.12 3.2.13 SURFACE PREPARATION OF … SURFACES (2019)

3.2.13 3.2.14 FITTING FOR SHOP BOLTING (2017)

[continued]

a. Erection marks shall …

b. The responsibilities of …

The fabricator shall …

The Engineer may …

The Engineer may …

c. Fasteners, except ASTM …

d. Pins and other …

e. ASTM F3125 Grades …

The appropriate Mill Test Report(s) (MTR), Manufacturer Certified Test Report(s) (MCTR) and Distributor Certified Test Report(s) (DCTR) for high-strength bolts as required in Article 3.2.14.2 3.2.2.2 shall be supplied to the Engineer.

f. Long girders shall …

g. Special precautions may …

SECTION 4.16 FIT-UP OF FIELD CONNECTIONS (2017)

a. The Contractor shall …

b. All connections shall …

c. Following fairing-up of …

d. Permanent bolts may be used as fit-up bolts provided they are installed in accordance with Article 3.2.2 3.2.3.


a. Where high-strength bolts are used in field connections, they shall meet the requirements of Part 3, Fabrication, Article 3.2.1.

b. The installation procedure for permanent high-strength bolts and for fully tightened high strength fit-up bolts shall be as specified in Part 3, Fabrication, Article 3.2.2 3.2.3.

[continued]
7.4.2.3 Flanges and Webs

a. The flange section …

b. In open deck …

c. Where the cost …

d. Where flange material …

e. Holes in flange material may be drilled full size in the shop or in the field or subpunched in the shop and reamed in the shop or in the field. See Articles 3.2.5 3.2.6 3.2.7 and associated commentary.

f. Where fasteners are …

g. Where the web …

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9.3.2.3 Installation of High-Strength Bolts (2021) ....................................

9.3.2.4 9.3.2.5 Size and Workmanship of Holes (2017) ..............................

9.3.2.5 9.3.2.6 Preparation of Holes for Shop-Installed Fasteners (2017) .........

9.3.2.6 9.3.2.7 Preparation of Holes for Field-Installed Fasteners (2017) ...........


AND


High-strength bolts …

9.3.2.14 9.3.2.2 TESTING AND DOCUMENTATION … FASTENERS (2017)

9.3.2.14.1 9.3.2.2.1 Testing

9.3.2.3 INSTALLATION OF HIGH-STRENGTH BOLTS (2021)

See Article 9.3.2.1

9.3.2.4 9.3.2.5 SIZE AND WORKMANSHIP OF HOLES (2017)

9.3.2.5 9.3.2.6 PREPARATION … SHOP-INSTALLED FASTENERS (2017)

[continued]
PREPARATION … FIELD-INSTALLED FASTENERS (2017)

The same comments as for Article 3.2.5 3.2.6 regarding cracks …

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  A1.3.2.6 A1.3.2.7 Reaming and Drilling in Assembly ......................
  A1.3.2.8 A1.3.2.9 Alignment of Finished Holes ............................
  A1.3.2.10 A1.3.2.11 Fitting for Shop Riveting ............................

A1.3.2.3 A1.3.2.4 QUANTITY OF FIELD FASTENERS

The number of field rivets of each size and length furnished in excess of the nominal number required shall be 10% plus 10. (Current Article 3.2.3 3.2.4 was originally 3.2.3b 3.2.4b following this Article.)

A1.3.2.4 A1.3.2.5 SIZE AND WORKMANSHIP OF HOLES

A1.3.2.9 A1.3.2.10 REAMING AND DRILLING IN ASSEMBLY

A1.3.2.14 A1.3.2.12 ALIGNMENT OF FINISHED HOLES

A1.3.2.13 A1.3.2.14 FITTING FOR SHOP RIVETING