TO:

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SUPERSEDED BY EI 76-034
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ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: Revisions to Standard Specifications for Highway Bridges

Subject Code: 7.35-4

Distribution:
☐ Main Office ☐ Regions ☒ Special

APPROVED:

R M Lamp
Deputy Chief Engineer (Structures)

Code: EI-72-45
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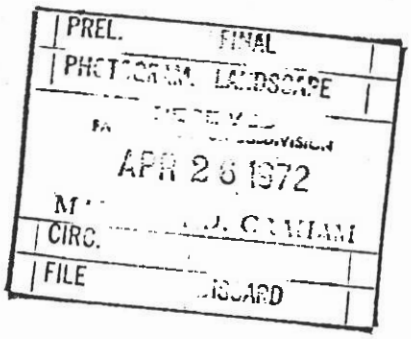
Supersedes:

The attached pages correct formulas shown on pages 113 and 165 issued with Engineering Instructions EI-72-34 dated 4/3/72.

Attachments



ALL BOLTS EXCEPT HIGH STRENGTH BOLTS, SHALL HAVE SINGLE SELF-LOCKING NUTS OR DOUBLE NUTS.

JOINTS REQUIRED TO RESIST SHEAR BETWEEN THEIR CONNECTED PARTS ARE DESIGNATED AS EITHER FRICTION TYPE OR BEARING TYPE CONNECTIONS. SHEAR CONNECTIONS SUBJECTED TO STRESS REVERSAL SHALL BE FRICTION TYPE EXCEPT FOR SECONDARY MEMBERS.

BOLTS IN GIRDER FIELD SPLICES SHALL BE FRICTION TYPE.

ASTM A-307 BOLTS SHALL NOT BE USED IN STRUCTURAL CONNECTIONS.

BOLTED BEARING TYPE CONNECTIONS USING HIGH STRENGTH BOLTS SHALL BE USED FOR CONNECTIONS OF SECONDARY MEMBERS.

IN BEARING TYPE CONNECTIONS, PULL-OUT SHEAR IN A PLATE SHOULD BE INVESTIGATED BETWEEN THE END OF THE PLATE AND THE END ROW OF FASTENERS.

FOR COMBINED SHEAR AND TENSION IN FRICTION TYPE JOINTS WHERE APPLIED FORCES REDUCE THE TOTAL CLAMPING FORCE ON THE FRICTION PLANE, THE ALLOWABLE UNIT SHEARING STRESS, f_v , IN(ASTM A325) HIGH STRENGTH BOLTS SHALL NOT EXCEED THE VALUES OBTAINED FROM THE FOLLOWING EQUATION:

$$f_v = 13{,}500 - .22f_t$$

WHERE f_t = TENSILE STRESS DUE TO APPLIED LOADS

WHEN BEARING TYPE CONNECTIONS ARE SUBJECT TO BOTH SHEAR AND TENSION, THE COMBINED STRESS SHALL NOT EXCEED VALUES OBTAINED FROM THE FOLLOWING EQUATION:

$$s^2 + (0.555T)^2 = S^2$$

WHERE s = THE COMPUTED UNIT STRESS IN SHEAR
T = THE COMPUTED UNIT STRESS IN TENSION
S = THE ALLOWABLE UNIT STRESS IN SHEAR

1.7.6-WROUGHT IRON (This Article deleted)

1.7.7-CAST STEEL, DUCTILE IRON CASTINGS, MALLEARLE CASTINGS AND CAST IRON

A. CAST STFEL AND DUCTILE IRON

FOR CAST STEEL CONFORMING TO SPECIFICATIONS FOR STEEL CASTINGS FOR HIGHWAY BRIDGES, ASTM A 486, MILD-TO-MEDIUM-STRENGTH CARBON-STEEL CASTINGS FOR GENERAL APPLICATION, ASTM A 27, AND CORROSION-RESISTANT IRON-CHROMIUM-NICKEL ALLOY CASTINGS FOR GENERAL APPLICAIION, ASTM A 296 AND FOR DUCTILE IRON CASTINGS, ASTM A 536 THE FOLLOWING ALLOWABLE STRESSES IN POUNDS PER SQUARE INCH SHALL BE USED:

ASTM DESIGNATION	A 27 A 486	A 486		A 296	A 536
CLASS OR GRADE	70-36 70	90	120	CA-15	60-40-18
YIELD POINT, MINIMUM, F_y	36,000	60,000	95,000	65,000	40,000
AXIAL TENSION	14,500	22,500	34,000	24,000	16,000
TENSION IN EXTREME FIBER	14,500	22,500	34,000	24,000	16,000
AXIAL COMPRESSION, SHORT COLUMNS	20,000	30,000	45,000	32,000	22,000
COMPRESSION IN EXTREME FIBER	20,000	30,000	45,000	32,000	22,000
SHEAR	9,000	13,500	21,000	14,000	10,000
BEARING, STEEL PARTS IN CONTACT	30,000	45,000	68,000	48,000	33,000
BEARING ON PINS NOT SUBJECT TO ROTATION	26,000	40,000	60,000	43,000	28,000
BEARING ON PINS SUBJECT TO ROTATION (SUCH AS USED IN ROCKERS AND HINGES)	13,000	20,000	30,000	21,500	14,000

WHEN IN CONTACT WITH CASTINGS OR STEEL OR A DIFFERENT YIELD POINT, THE ALLOWABLE UNIT BEARING STRESS OF THE MATERIAL WITH THE LOWER YIELD POINT

0.079	18.2	29.8	35.7
0.109	23.4	46.8	53.0
0.138	24.5	49.0	63.7
0.168	25.6	51.3	70.7

6 X 2 STRUCTURAL PLATE STEEL PIPE

THICKNESS	4 BOLTS/FT.	6 BOLTS/FT.	8 BOLTS/FT.
0.109	42.0		
0.138	62.0		
0.168	81.0		
0.188	93.0		
0.218	112.0		
0.249	132.0		
0.280	144.0	180.0	194.0

2 X 1/2 AND
2-2/3 X 1/2 CORRUGATED
ALUMINUM PIPE

THICKNESS	SINGLE RIVETS	DOUBLE RIVETS
0.060	9.0	14.0
0.075	9.0	18.0
0.105	15.6	31.5
0.135	16.2	33.0
0.164	16.8	34.0

9 X 2-1/2 STRUCTURAL PLATE
ALUMINUM PIPE

THICKNESS	ALUMINUN BOLTS 5 1/3 PER FT.	STEEL BOLTS 5 1/3 PER FOOT
0.09	22.2	
0.10	26.4	
0.125	34.8	
0.15	44.4	
0.175	52.8	
0.20		60.0
0.225		66.0
0.250		72.0

B. HANDLING AND INSTALLATION STRENGTH

HANDLING AND INSTALLATION STRENGTH MUST BE SUFFICIENT TO WITHSTAND IMPACT FORCES ASSOCIATED WITH SHIPPING AND PLACING OF PIPE. BOTH SHOP AND FIELD ASSEMBLED PIPE MUST HAVE STRENGTH ADEQUATE TO WITHSTAND COMPACTION OF THE BACKFILL WITHOUT INTERIOR BRACING TO MAINTAIN PIPE SHAPE.

HANDLING RIGIDITY IS MEASURED BY A FLEXIBILITY FACTOR DETERMINED BY THE FORMULA

$$FF = \frac{D^2}{(EI)}$$