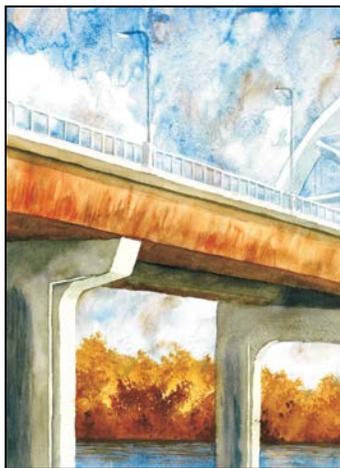
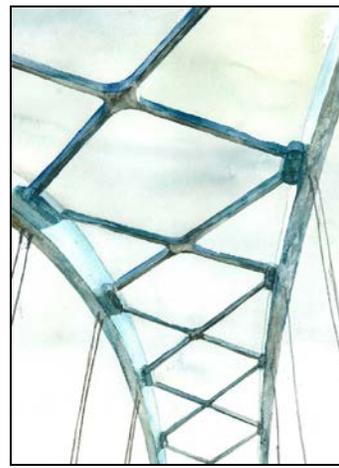




Division of Transportation  
System Development  
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**Bridge Manual**



**Standard Details**

DATE: January 29, 2014  
TO: Bridge Manual Users  
FROM: DTSD – Bureau of Structures  
SUBJECT: **January 2014 Bridge Manual Update**

The Bridge Manual revisions to text and standards are now complete and posted online for this six month cycle. Please see the attached sheets for a list, with brief explanation, of the Text and Standards that were revised. Corresponding plan insert sheets have also been updated and posted online.

Of particular interest in this edition:

- **Multiple Chapters:** AASHTO LRFD [5.4.2.6] formula for modulus of rupture changed, resulting in text and example modifications.
- **Chapter 12:** Fig 12.6-2 updated to reflect Base Aggregate Dense to be bid in tons instead of CY.
- **Chapter 14:** Updated guidance on retaining wall numbering.
- **Chapter 30:** Railing policy, particularly for local roads, is changed to reflect the Policy Memo that was sent out on 8/27/13.
- **Chapter 30** standards for SS Parapets now show 1'-3" level beneath parapets.
- **Standards 12.03, 12.04, 12.05, 12.06, 12.09 – Corbel added to Type A3 & A4 Expansion Abutments:** The addition of the corbel on the back of the backwall continues to provide support for the approach while increasing the paving block width from 1'-0" to 1'-8" – a request from bridge maintenance engineers.
- **New Standard 7.03 – Precast Pier Cap and Columns:** Details for precast pier cap and columns for Accelerated Bridge Construction (ABC). The policy for use of such details is being developed and should be available in the July, 2014 release of the Bridge Manual. If use of such details is desired prior to that time, please contact the Bureau of Structures.

- **New Standard 7.04 – Precast Pier Cap and Column Details:** Details to complement Standard 7.03.
- **New Standard 12.12 – Structural Approach Slab for Type A3 & A4 Abutments:** Details for structural approach slabs to be used with expansion abutments. These slabs had previously only been allowed with Type A1 abutments.
- **New Standard 12.13 – Structural Approach Slab Details for Type A3 & A4 Abutments:** Details to complement Standard 12.12.
  
- **Updated Special Provisions:**
  - Concrete Masonry Deck Patching
  - Sawing Pavement Deck Preparation Areas
  
- **New Special Provisions:**
  - SPMT Bridge Construction

Most other changes are fairly minor. Please use the example calculations with care (follow along in AASHTO). A couple of mistakes have been pointed out. Unfortunately, due to time/resource issues, the corrections were not made at this time.

If anything in a given chapter was edited, the date for the entire chapter was updated. A vertical black bar in the left margin notes all changes. Previous black bars were not removed from chapters which were not edited in this update.

The user's feedback regarding the Bridge Manual is important to us as that is where we get many ideas for corrections, clarification and new ideas for enhancement.

## January 2014 Bridge Manual Text Update Summary

<u>Chapter</u>	<u>Page Number(s)</u>	<u>Change</u>
2	3	Updated BOS Organizational Chart information.
3		No revisions
4	4	Refer to the WisDOT Traffic Guidelines Manual for CSD signs on bridges
5	5, 6, 7, 8	Re-organized bid items to be placed in ascending order.
6	12, 13	Clarified requirements of minimum vertical underclearance dimensions to be shown on preliminary plans.
	23	Minor text revision.
	24, 25	Minor text revisions.
	26	Clarified rehabilitation note - applies to all structures, not only bridges.
	36, 37	Relocated Table 6.3-2 to be located completely on one page.
	40	Inserted Floor Drains Type "WF" into quantities calculations heading.
7		No revisions
8		No revisions
9	2	Updated link to approved products list
	2	Corrected reference to CMM Manual
	4	Added text covering epoxy coated reinf. in structural approach slabs
	6	Referenced Figure 9.9-3 for closed stirrup details
	7,8	Updated Figure number to match current number
	9	Added fencing to railing types listed
	11	Corrected references to Sections in the Standard Specifications
	12	Removed reference to the Standard Specifications for Timber Piling (Section 508) because it was removed in 2012
	13	Added structural approach slabs as another location where polyethelene sheets are used
	14	Added railing post base plates as another location where non-staining gray non-bituminous joint sealer is used
	15	Highlighted link to Federal Color Standards
	16	Corrected reference to Wisconsin Structure Inspection Manual
	21	Added new Figure 9.9-3 for Closed Stirrup details
	22	Changed Figure numbers
	23	Expanded bar spacing choices in Table 9.9-4

10		No revisions
11		No revisions
12	3, 4, 5, 6	Updated Figures 12.1-1, 12.1-2, 12.2-1, and 12.2-2 based on current abutment backwall design standards.
	19, 20	Updated Figures 12.6-1 and 12.6-2 based on current abutment backwall design standards.
	20	Updated Figure 12.6-2 to show the bid item for Base Aggregate Dense in Tons.
	22	Updated Figure 12.7-1 based on current abutment backwall design standards.
	34	Updated Figure 12.9-1 based on current abutment backwall design standards.
	35	Minor text revisions.
13	51	Revised example headings to coordinate between chapters.
	37	Removed Section 13.9.1 because it no longer applied
13E -1	66, 67	Corrected coefficient used for calculating modulus of rupture (fr) per LRFD [5.4.2.6] for min. reinf. criteria
	52, 54	Corrected equation for moment of inertia (I <sub>s</sub> ). Corrected units for stiffness. Corrected typing errors.
13E -2	16, 18, 21, 23	Corrected coefficient used for calculating modulus of rupture (fr) per LRFD [5.4.2.6] for min. reinf. criteria
	15, 20	Corrected equation for calculating bar spacing
	16, 17	Correction on page 15 changed these sheets
	18, 19	Changed de to de', which changed highlighted values
	21, 23, 24	Changed de to de_neg, which changed highlighted values
	22, 23	Correction on page 20 changed these sheets
29	Updated bar cutoff location on Figure E13-2.7-1	
14	8, 9	Updated information pertaining to retaining wall numbering.
	12	Added clarification regarding Modular Block Gravity Wall heights.
	126, 127	Updated Special Provisions section to be accurate with current bid items.
	132	Revised example headings to coordinate between chapters.
14E -1	22, 25, 28, 29	Corrected coefficient used for calculating modulus of rupture (fr) per LRFD [5.4.2.6] for min. reinf. criteria
14E -4	26, 27, 28, 30, 33	Corrected coefficient used for calculating modulus of rupture (fr) per LRFD [5.4.2.6] for min. reinf. criteria
15		No revisions
17	59	Clarified contact within WisDOT policy item.

18	26	Corrected coefficient used for calculating modulus of rupture ( $f_r$ ) per LRFD [5.4.2.6] for min. reinf. criteria
18E -1	19, 23, 24, 69, 70	Corrected coefficient used for calculating modulus of rupture ( $f_r$ ) per LRFD [5.4.2.6] for min. reinf. criteria
19	23	Removed $\beta_1$ from numerator of equation.
	25	Corrected coefficient used for calculating modulus of rupture ( $f_r$ ) per LRFD [5.4.2.6] for min. reinf. criteria
	29	Corrected coefficient value to match AASHTO Spec. and Examples
19E -1	5	Spelling error corrected
	8	Changed subscripts for $g_x$ to match number of lanes loaded
	9	Corrected LRFD reference
	12	Corrected units shown
	13	Corrected units shown
	14	Corrected LRFD reference
	16	Highlighted stresses shown are being calculated after losses
	17, 18	Highlighted stresses shown are being calculated before losses and cleared up confusion between subscripts used
	22	Modified text in Figures for clarity
	23	Modified text in Figure for clarity and cleared up confusion between subscripts used. Removed $\beta_1$ from numerator of equation.
	25	Removed redundant equations at top of page
	27	Clarified which equations shown apply to Service 1, Service 3 and Fatigue Limit States. Added LRFD references.
	34	Corrected coefficient used for calculating modulus of rupture ( $f_r$ ) per LRFD [5.4.2.6] for min. reinf. criteria
	36,37	Changed subscripts for $g_{vx}$ to match number of lanes loaded
	42	Displayed values of shear contributing to the calculation of $V_{u\_crit}$ and also the value of $V_{u\_crit}$
	43, 44	Corrected stirrup spacing to max. of 18 inches to match WisDOT policy, which changed other values on these pages. Also added missing units for 0.125 f'c.
45	Corrected units shown	
46, 47	Corrected stirrup spacing to 18 inches, which changed other values on these pages.	
19E - 2	14, 18	Corrected coefficient used for calculating modulus of rupture ( $f_r$ ) per LRFD [5.4.2.6] for min. reinf. criteria
19E - 3	22, 23	Corrected coefficient used for calculating modulus of rupture ( $f_r$ ) per LRFD [5.4.2.6] for min. reinf. criteria
23		No revisions
24	90	Minor text revision.

27	19	Minor text revision.
28		No revisions
29		No revisions
30	6	Clarified note #2 regarding the application of bridge railings.
	7	Updated Railing Application note for Type PF railings.
	16, 17	Rearranged protective screening notes and added reference to FDM to coordinate Manuals.
	19, 20, 21	Provided examples of Preventative Maintenance and 3R projects to further clarify railing rehabilitation projects.
	21,22	Updated Railing Rehabilitation note for Type PF railings.
	24	Added new reference.
32		No revisions
36	49	Minor text revision.
	49	Revised example headings to coordinate between chapters.
	12	Corrected coefficient used for calculating modulus of rupture (fr) per LRFD [5.4.2.6] for min. reinf. criteria
36E -1	21, 27	Corrected coefficient used for calculating modulus of rupture (fr) per LRFD [5.4.2.6] for min. reinf. criteria
37		No revisions
38		No revisions
39		No revisions
40	17	Modified provision that all Interstate Highway bridge requiring deck widenings should have full deck replacements based on current role of traffic impacts on project costs.
	33	Updated minimum bond stress values based on updates to the Approved Products List.
45		No revisions
45E - 2	5	Corrected units displayed

## January 2014 Standard Details Update Summary

### Chapter 4

- Std 4.01 ■ No revisions.

### Chapter 7

- Std 7.01 ■ No revisions.  
Std 7.02 ■ No revisions.  
**NEW** Std 7.03 ■ Precast Pier Cap and Columns  
**NEW** Std 7.04 ■ Precast Pier Cap and Column Details

### Chapter 11

- Std 11.01 ■ No revisions.

### Chapter 12

- Std 12.01 ■ No revisions.  
Std 12.02 ■ Revised wing length dimension to include 10'-0" minimum requirement in "Wing with Pile Elevation".  
■ Revised "Top of Wing Details" note regarding sidewalk notch.  
■ Revised optional construction joint symbol for clarity.  
■ Added rubberized membrane waterproofing to wing sections and symbol legend for clarity.  
Std 12.03 ■ Revised wing length dimension to include 10'-0" minimum requirement in "Plan".  
■ Added corbel and revised paving block size in "Section Thru Body".  
■ Updated "Plan" to show paving block and corbel elements correctly based on "Section Thru Body".  
■ Added "Legend" notes to clarify dimensions when structural approach slab is utilized.  
Std 12.04 ■ Revised wing length dimensions to include 10'-0" minimum requirement in "Wing With Pile Elevation" and "Wing Without Pile Elevation".  
■ Adjusted location of name plate based on revised typical paving block.  
■ Removed isometric elements from "Wing Without Pile Elevation".  
■ Reorganized wing pile requirement notes on "Wing With Pile Elevation" to be consistent with notation shown on Std. 12.02.  
■ Added clarification elements to "Section W3".  
■ Added rubberized membrane waterproofing to wing "Sections W1 & W2" and "Designer Notes" for clarity.  
Std 12.05 ■ Revised backwall, corbel, and paving block elements of "Back Face" elevations.  
■ Added corbel and revised paving block size in "Section AA".  
■ Updated "Plan" to show paving block and corbel elements correctly based on "Section Thru Body".  
■ Relocated vertical construction joint from "Legend" to "Designer Notes".  
■ Added "Legend" notes to clarify dimensions when structural approach slab is utilized.  
■ Updated piling spacing "Designer Note" for clarity.  
■ Modified multiple symbols and descriptions in "Legend" for consistency with other abutment standards.  
Std 12.06 ■ Updated "Wing Elevations" to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.  
■ Adjusted location of name plate based on revised typical paving block.  
■ Added rubberized membrane waterproofing to wing "Sections W1 & W2" and "Designer Notes" for clarity.

- Std 12.07 ■ No revisions.
- Std 12.08 ■ No revisions.
- Std 12.09 ■ Updated A3 & A4 abutment cross sections to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.
- Std 12.10 ■ Removed bar detail length for T505 bar due to the fact that bar dimensions may vary at edge of slab locations under parapets.
  - Coordinated symbols between Standards 12.10 and 12.11.
  - Added guidance to "Designer Note" regarding use of HPC.
- Std 12.11 ■ Clarified the filler material used on footing and paving notch in "Section Thru Approach Slab".
  - Coordinated symbols between Standards 12.10 and 12.11.
  - Updated width of joint filler note in "Section Thru Approach Slab".
  - Added guidance to "Designer Note" regarding use of HPC.
  - Removed the polyethylene sheeting from beneath the footing.
- NEW** Std 12.12 ■ Structural Approach Slab for Type A3 & A4 Abutments.
- NEW** Std 12.13 ■ Structural Approach Slab Details for Type A3 & A4 Abutments.

**Chapter 13**

- Std 13.01 ■ No revisions.
- Std 13.02 ■ No revisions.
- Std 13.03 ■ No revisions.
- Std 13.04 ■ No revisions.
- Std 13.05 ■ No revisions.
- Std 13.06 ■ No revisions.
- Std 13.07 ■ Removed 3" dimension from "Elevation". Dimension may vary.
- Std 13.10 ■ No revisions.
- Std 13.11 ■ No revisions.

**Chapter 14**

- Std 14.01 ■ No revisions.
- Std 14.02 ■ Added "Designer Notes" section to Standard.
  - Changed 10" MAX. dimension in top two sections to 10" TYP.
- Std 14.03 ■ No revisions.
- Std 14.04 ■ Updated "Cross Section Thru Abutment at MSE Wall" to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.
  - Updated notes in "Eye Bolt Detail" regarding allowable bolt and insert diameters in order to convey primary anchorage intent requiring 3500 lb minimum strength.
  - Revised first note in "Notes" section regarding unfactored loads to be included on bridge plans (loads shall be shown individually, not a summation, in order for load factors to be applied properly by MSE manufacturer).
- Std 14.05 ■ No revisions.

**Chapter 15**

- Std 15.01 ■ No revisions.
- Std 15.02 ■ No revisions.
- Std 15.03 ■ No revisions.

**Chapter 17**

- Std 17.01 ■ No revisions.
- Std 17.02 ■ Added additional notes to "Longitudinal Construction Joint Detail".
  - Added guidance to "Designer Notes" regarding protective surface treatment application at abutment and wingwalls when used with open railings.

## **Chapter 18**

- Std 18.01 ■ Changed note for top reinforcement in slab at ends to require designers to select reinforcement and to check temperature and shrinkage criteria.
- Std 18.02 ■ Changed note for top reinforcement in slab at ends to require designers to select reinforcement and to check temperature and shrinkage criteria.

## **Chapter 19**

- Std 19.01 ■ No revisions.
- Std 19.02 ■ No revisions.
- Std 19.03 ■ No revisions.
- Std 19.04 ■ No revisions.
- Std 19.11 ■ No revisions.
- Std 19.12 ■ No revisions.
- Std 19.13 ■ No revisions.
- Std 19.14 ■ No revisions.
- Std 19.15 ■ No revisions.
- Std 19.16 ■ No revisions.
- Std 19.17 ■ No revisions.
- Std 19.18 ■ No revisions.
- Std 19.19 ■ No revisions.
- Std 19.20 ■ No revisions.
- Std 19.31 ■ No revisions.
- Std 19.32 ■ No revisions.
- Std 19.33 ■ Updated "Expansion End" cross section to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.
- Std 19.34 ■ Updated "Expansion End" cross section to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.
- Std 19.35 ■ Updated "Expansion End" cross section to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.
- Std 19.36 ■ No revisions.
- Std 19.37 ■ No revisions.
- Std 19.38 ■ No revisions.
- Std 19.51 ■ No revisions.
- Std 19.52 ■ No revisions.
- Std 19.53 ■ No revisions.

## **Chapter 23**

- Std 23.01 ■ No revisions.
- Std 23.02 ■ No revisions.
- Std 23.03 ■ No revisions.

## **Chapter 24**

- Std 24.02 ■ No revisions.
- Std 24.03 ■ No revisions.
- Std 24.04 ■ No revisions.
- Std 24.06 ■ No revisions.
- Std 24.08 ■ No revisions.
- Std 24.09 ■ No revisions.
- Std 24.10 ■ No revisions.
- Std 24.11 ■ No revisions.

- Std 24.12 ■ Updated "Section Thru Expansion End" cross section to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.
- Added new note for rehabilitation projects related to paving block dimensions (for rehabilitation projects, paving block dimensions shall match original).

### **Chapter 27**

- Std 27.02 ■ Added Designer Note pertaining to bearing replacements.
- Added rehabilitation detail for anchor bolt location requirements.
- Std 27.05 ■ No revisions.
- Std 27.06 ■ Updated Type S concrete masonry anchor notes in "Elevation - Deck Replacement" detail to match current Chapter 40 guidance.
- Std 27.07 ■ Updated plan view "At Skewed Abutments" to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.
- Std 27.08 ■ Added Designer Notes pertaining to bearing replacements.
- Std 27.09 ■ No revisions.

### **Chapter 28**

- Std 28.01 ■ Updated "Typical Section Thru Joint at Steel Girder" and "Section Thru Joint" to accurately reflect new, current standard detailing practice utilizing corbel and wider paving block.
- Revised number of horizontal paving block reinforcing bars based on new, wider paving block in "Typical Section Thru Joint at Steel Girder".
- Revised  $\phi$  symbol note to "Dia." in multiple locations.
- Std 28.02 ■ No revisions.
- Std 28.03 ■ Updated dimensions in "Joint at Abut. (Steel Girders)" to coordinate with current A3 and A4 abutment standards.
- Updated 1'-5" dimension in "Anchorage Detail" to coordinate with current A3 and A4 abutment standards.
- Updated ■ note under "Legend" to match current Chapter 40 guidance.
- Std 28.04 ■ No revisions.
- Std 28.05 ■ No revisions.
- Std 28.06 ■ No revisions.
- Std 28.07 ■ No revisions.
- Std 28.08 ■ No revisions.

### **Chapter 29**

- Std 29.01 ■ Added 1'-0" maximum dimension to downspout extension in Section A2.
- Std 29.02 ■ Added 1'-0" maximum dimension to downspout extension in Section A2.
- Std 29.03 ■ Added 1'-0" maximum dimension to downspout extension in Section A-A and Section B-B.

### **Chapter 30**

- Std 30.01 ■ No revisions.
- Std 30.02 ■ No revisions.
- Std 30.04 ■ Added missing end base plate thickness.
- Std 30.05 ■ Added missing end base plate thickness.
- Std 30.07 ■ No revisions.
- Std 30.10 ■ No revisions.
- Std 30.11 ■ No revisions.
- Std 30.12 ■ Inserted 1'-3" Level dimension to "Section Thru Parapet on Bridge" for clarity.
- Std 30.13 ■ Inserted 1'-3" Level dimension to "Section Thru Parapet on Bridge" for clarity.
- Std 30.14 ■ No revisions.

- Std 30.15 ■ No revisions.
- Std 30.16 ■ No revisions.
- Std 30.17 ■ No revisions.
- Std 30.18 ■ No revisions.
- Std 30.19 ■ No revisions.
- Std 30.20 ■ Inserted 1'-3" Level dimension to "Section Thru Parapet on Bridge" for clarity.
- Std 30.21 ■ No revisions.
- Std 30.22 ■ No revisions.
- Std 30.23 ■ No revisions.
- Std 30.24 ■ No revisions.
- Std 30.25 ■ No revisions.
- Std 30.30 ■ Inserted 1'-3" Level dimension to "Section Thru Parapet on Bridge" for clarity.
- Std 30.31 ■ Inserted 1'-3" Level dimension to "Section Thru Parapet on Bridge" for clarity.
- Std 30.32 ■ Inserted 1'-3" Level dimension to "Section Thru Parapet on Bridge" for clarity.
- Std 30.33 ■ Inserted 1'-5" Level dimension to "Section Thru Parapet on Bridge" for clarity.
- Std 30.34 ■ No revisions.
- Std 30.35 ■ No revisions.
- Std 30.36 ■ No revisions.
- Std 30.37 ■ No revisions.

### **Chapter 36**

- Std 36.01 ■ No revisions.
- Std 36.02 ■ No revisions.
- Std 36.03 ■ No revisions.
- Std 36.04 ■ No revisions.
- Std 36.05 ■ Clarified reinforcement clearance for welded wire
- Std 36.06 ■ No revisions.
- Std 36.07 ■ No revisions.
- Std 36.10 ■ No revisions.
- Std 36.11 ■ No revisions.
- Std 36.12 ■ No revisions.
- Std 36.13 ■ No revisions.
- Std 36.14 ■ No revisions.
- Std 36.15 ■ No revisions.
- Std 36.16 ■ No revisions.

### **Chapter 37**

- Std 37.01 ■ No revisions.
- Std 37.02 ■ No revisions.

### **Chapter 38**

- Std 38.01 ■ Added bid item reference to "Notes" section of standard detail.
- Modified pier protection "Designer Note" based on code updates.

### **Chapter 39**

- Std 39.01 ■ No revisions.
- Std 39.02 ■ No revisions.
- Std 39.03 ■ No revisions.
- Std 39.09 ■ No revisions.
- Std 39.10 ■ No revisions.
- Std 39.11 ■ No revisions.
- Std 39.12 ■ No revisions.

Std 39.13 ■ No revisions.

#### **Chapter 40**

- Std 40.01 ■ Separated Notes and Designer Notes. Cleaned up bid items.
- Std 40.02 ■ Revised note and added clarification note in "Cross Section" to coordinate the standard with the Bridge Manual text (i.e., no waterproofing membranes preferred on overlays). Separated Notes and Designer Notes.  
Cleaned up bid items.
- Std 40.03 ■ No revisions.
- Std 40.04 ■ Added note below "Section Thru Joint, Steel Girder Without Diaphragm".  
■ Updated Type L concrete masonry anchor note under "Section Thru Joint - Steel Girder Without End Diaphragm" to match current Chapter 40 guidance.
- Std 40.05 ■ No revisions.
- Std 40.06 ■ Added note to "Section P".
- Std 40.07 ■ No revisions.
- Std 40.08 ■ No revisions.
- Std 40.09 ■ No revisions.
- Std 40.10 ■ Updated Type S concrete masonry anchor notes in "Concrete Bearing Block Details" and "Precast Concrete Block Detail" to match current Chapter 40 guidance.
- Std 40.11 ■ No revisions.
- Std 40.12 ■ No revisions.
- Std 40.13 ■ No revisions.
- Std 40.14 ■ No revisions.
- Std 40.15 ■ No revisions.
- Std 40.16 ■ No revisions.
- Std 40.17 ■ No revisions.
- Std 40.18 ■ No revisions.
- Std 40.19 ■ No revisions.
- Std 40.20 ■ No revisions.
- Std 40.21 ■ No revisions.
- Std 40.22 ■ No revisions.
- Std 40.23 ■ No revisions.
- Std 40.24 ■ No revisions.
- Std 40.25 ■ No revisions.