**945 ALUMINUM PIPE, INCLUDING UNDERDRAIN, PIPE ARCH AND STRUCTURAL PLATE PIPE AND PIPE ARCH.**
**(REV 1-18-08) (FA 2-11-08) (7-08)**

SECTION 945 (Pages 841-843) is deleted and the following substituted:

## SECTION 945
## ALUMINUM PIPE, INCLUDING UNDERDRAIN, PIPE ARCH AND STRUCTURAL PLATE PIPE AND PIPE ARCH

**945-1 Corrugated Aluminum-Alloy Culverts and Underdrains.**

Aluminum-alloy culvert pipe and underdrains shall meet the requirements of AASHTO M 196 and the additional provisions contained herein. Except for underdrain, corrugated aluminum pipe including pipe arch shall be fabricated with helical corrugations with a minimum of two annular corrugations formed into each end of each pipe to accommodate a coupling band. Annular fabrication is not permitted unless specifically called for in the plans or specifications. Provide certification of the actual mean diameter of pipe shipped to the project. Include in the certification the minimum and maximum diameters used to certify the actual mean diameter. The certification shall be attested to by a person having legal authority to bind the manufacturing company.

For Sidedrains, unless shown otherwise in the plans the minimum thickness of the metal shall be as specified below.

| NON SI UNITS | | |
|---|---|---|
| TABLE I THICKNESS OF METAL FOR SIDEDRAIN PIPE | | |
| Nominal Diameter or Equivalent (inches) | Sheet Gauge No. | Mean Thickness of Metal (inches) |
| 6 | 18 | 0.048 |
| 8 | 16 | 0.060 |
| 10 | 16 | 0.060 |
| 12 | 16 | 0.060 |
| 15 | 16 | 0.060 |
| 18 | 16 | 0.060 |
| 21 | 16 | 0.060 |
| 24 | 16 | 0.060 |
| 30 | 14 | 0.075 |
| 36 | 14 | 0.075 |
| 42 | 12 | 0.105 |
| 48 | 12 | 0.105 |
| 54 | 12 | 0.105 |
| 60 | 10 | 0.135 |
| 66 | 10 | 0.135 |
| 72 and over | 8 | 0.164 |

Where bituminous coated aluminum pipe is specified the bituminous coating shall meet the requirements as specified for corrugated steel pipe in 943-5. Bituminous coated and paved aluminum pipe shall meet the additional requirements specified in 943-6 and 943-7, as applicable.

Class IV pipe shall not be used.

Ensure that the pipe joints have been tested at the plant hydrostatically at the specified pressure using test methods in ASTM D 3212 with the exceptions of Sections 7.3 and 7.4. In lieu of Section 7.4, deflect one side of the pipe to a 5% reduction in internal diameter using the parallel plate testing methodology of ASTM D 2412. Load the deflected pipe to within 1/2 the actual pipe diameter from the centerline of the gasket or just beyond the end of the hugger band, whichever is greater. Ensure that the loading mechanism does not contact the hugger band or associated hardware. Testing shall be witnessed by the Engineer.

**945-2 Aluminum Alloy Structural Plate Pipe, Pipe Arch and Arches.**

**945-2.1 General Requirements:** Aluminum alloy structural plate pipe, pipe arch, and arches shall conform to AASHTO M 219, with the exceptions and additions specified herein. The nominal thickness of the plate shall be as shown in the plans.

**945-2.2 Bolts and Nuts:** In lieu of shaped bolts and nuts, standard type bolts and nuts, with special shaped washers, may be used. For aluminum bolts and nuts the material shall conform to the chemical requirements shown in Table I of ASTM B 211, for Alloy 6061. Nuts shall be lubricated at the factory, with a suitable wax compound. The bolts may be sampled and tested before erection or may be accepted on the basis of the manufacturer's certification.

For steel bolts and nuts, the material shall meet the requirements of either ASTM A 307 or ASTM A 325, as appropriate, and shall be hot double-dipped galvanized. Aluminized steel bolts, or other equally suitable devices for connecting the plates, may be used if approved by the Engineer.

**945-2.3 Certification of Tests:** For all aluminum materials, test certifications as specified in 965-2, shall be furnished.

**945-2.4 Direct Purchases by the Department:** The provisions of 944-9, for the conditions of direct purchase of structural plate steel pipe and pipe arches, shall also apply to Departmental purchases of aluminum alloy structural plate pipe, pipe arches and arches.

**945-2.5 Pipe Markings:** In lieu of the coined markings required by AASHTO M 196, Section 14, information may be ink stamped on the pipe at the time of manufacture. The pipe fabricator's identity, date of corrugating or forming into pipe may be stamped onto the pipe using indelible ink and a suitably fashioned stamping device. The pipe markings must be clearly legible upon arrival at the jobsite and at the time of installation. Pipe with illegible or incomplete markings may be rejected.