

Product Evaluation

RE: Review of Dur-A-Span Aluminum Structural Plate

PRODUCT

Dur-A-Span is an aluminum structural plate which is fabricated by Atlantic Industries Limited.

VENDOR CLAIMS AND INFORMATION

CLAIMS

The aluminum's oxide surface film resists the effects of corrosion – abrasion cycles in harsh environments. Dur-A-Span is lightweight when compared to concrete and steel.

Dur-A-Span is an aluminum alloy incorporating elements of magnesium and chromium to improve ultimate and yield strengths and create a structure that accommodates AASHTO highway loadings.

Standard end finishes for Dur-A-Span include square ends, step bevels, skews, partial bevels and skew bevels.

The corrugation profile for Dur-A-Span is 230 mm x 64 mm (the corrugation profile does not conform to the CSA Standard for Structural Plate CSP of 152 mm x 51 mm).

Dur-A-Span can be installed on short footing pads and concrete footings.

Dur-A-Span is available in various shapes, such as round, ellipse, pipe arch and arch. These shapes can be applied to uses such as culverts, storm drains and underpasses. Custom shapes are available on request.

Product web link: <http://www.ail.ca/en/home/default.aspx>

HISTORY

Aluminum has a history of corrosion resistance and its abrasion resistance has been demonstrated through years of exposure to wet/dry abrasion-corrosion cycles. There have been over 1,000 aluminum structural plate structures installed in North America (U.S. and Canada).

Aluminum culvert has been available since 1960.

POTENTIAL USAGE

Dur-A-Span aluminum structural plate is suitable for use in harsh environments. Aluminum alloy culvert can be used where minimum soil resistivity is above 500 ohm-cm, and where pH of water and soil falls within the range of 4 to 9.

STANDARDS

AASHTO M219M	- Corrugated Aluminum Structural Plate
ASTM B746M	- Corrugated Aluminum Structural Plate
ASTM B209M	- Specification for Metric Plate
ASTM B789M	- Installation of Structural Plate
ASTM B790M	- Design of Aluminum Pipe and Structural Plate
AASHTO	- Standard Specifications for Highway Bridge, Section 12 (Design)

ALBERTA TRANSPORTATION COMMENTS

Additional Technical Requirements

Culverts with a diameter equal to or greater than 1.5 meters are classified as bridge size structures, and as such must be designed, fabricated and constructed in accordance with all the requirements of the "Engineering Consultant Guidelines for Highways and Bridges – Volumes 1 & 2", and the codes and documents references contained within the manuals.

Suppliers of new culvert materials should be familiar with the design and fabrication processes contained within the manuals that are applicable to their product. They should also ensure that all technical information, design parameters, materials data etc. for their product that are necessary to meet the design requirements of the manuals are available to hydrotechnical, structural, fabrication, and construction engineers upon request.

Atlantic Industries shall ensure that the Dur-A-Span product meets the requirements of Section 18 of the Bridge Construction Specification of CSP and SPCSP Structures (i.e. fabrication, inspection, sampling and testing, handling and shipping requirements). Atlantic Industries state that their product will be included in the next CSA release in May 2000.

The literature provided by Atlantic Industries states that the use of aluminum is generally satisfactory within a pH range of 4 to 9 and a minimum soil resistivity greater than 500 ohm-cm. However there is no mention of the product's life span when used within the ranges stated. The department requires a minimum life span of 50 years for culvert structures. The department Guidelines for Suitability Limits for Metal Culverts is based on 50 years to perforation. Suitability guidelines for aluminum alloy culverts need to be established.

Galvanic corrosion is the attack of the most active metal when two or more dissimilar metals are electrically coupled in a corrosive environment.

The department requires assurances that the use of galvanized fasteners (nuts and bolts) on Aluminum Structural Plate Pipe will not create a problem due to galvanic corrosion.

Bolting configuration: A joint research project between Alberta Transportation (AT), and the University of Alberta (U of A) carried out in 1987 proved conclusively that the ductile performance of the longitudinal seams of SPCSP's could be significantly improved depending on how they were lapped. Based on the findings of the U of A report AT's current standard is to only allow two-bolt configurations for longitudinal seams, and that the seams be lapped in accordance with the recommendations of the report i.e. that the bolts in the valleys are closest to the visible edge.

If a supplier wishes to deviate from AT's current two-bolt standard, then it is their responsibility to provide satisfactory proof to AT that the system of bolting being proposed will provide equal or superior performance to the current standard in terms of ductility and strength. (Copies of the 1987 U of A report are available upon request)

RECOMMENDATIONS

Dur-A-Span Aluminum Structural Plate will be posted as a Trial Product on the Alberta Infrastructure and Transportation Products List, Culverts – SPCMP – Proprietary, based on the information provided. Final acceptance as a proven product will be based on field performance.

TRIAL PROJECTS

Primrose bombing range near Cold Lake, Alberta – installed in 2007

Joe Filice

cc New Product Evaluation Standing Committee - Terry Willis
Clive Clarke/ Abdul Waheed