

## **Product Evaluation**

### **RE: Review of MMFX ChrōmX 2100**

#### **PRODUCT**

ChrōmX 2100 Grade 100 [690] are high strength reinforcing steel bars which are specified as ASTM A1035/A1035 M Type CL Grade 100[ 690]. These bars have lower corrosion resistance than either ChromX 9000 or 4000 series bars and are produced in similar manner to ChromX 9000 series bar with lower chromium (Cr) content and higher carbon (C) content than either the 9000 or 4000 series.

### **VENDOR CLAIMS AND INFORMATION**

#### **CLAIMS**

MMFX ChromX 2100 Reinforcing Steel has improved corrosion resistant and equal, or in many cases, far superior to existing conventional carbon steel in its properties of strength, energy absorption, toughness, brittleness, ductility, and formability. MMFX steel achieves its superior properties of corrosion resistance as a result of the patented and proprietary steel microstructure that is formed during production. Web link for this product: [www.mmfx.com](http://www.mmfx.com)

#### **DESCRIPTION**

Microcomposite Multistructural Formable Steel (MMFX) is steel that has unique and different microstructures which have enhanced corrosion resistance and mechanical properties over other conventional standard steels to suit the needs of advancing construction technologies. MMFX steels are highly corrosion resistant without the use of coating technologies as a result of the patented chemical composition and proprietary steel microstructure that is formed during their production associated with controlled rolling and cooling of the steels. This unique physical feature minimizes the formation of micro galvanic cells in the steel structure, hence minimizing corrosion initiation.

#### **POTENTIAL USAGE**

ChrōmX 2100 (ASTM A1035 Grade 100 Type CL) bars are appropriate for use in bridge (girders, columns, and abutments), retaining walls, pavement (dowel bars and lane tie bars) and other related cast-in-place and precast reinforced concrete members.

#### **STANDARDS**

MMFX ChromX 2100 Reinforcing Steel meets the requirements of ASTM A1035/1035M rebar standards.

### **ALBERTA TRANSPORTATION COMMENTS**

#### **EXPERIENCE**

Alberta Transportation has no experience with this product.

As per 2017 Standard Specifications for Bridge Construction and Bridge Structures Design Criteria (Version 8.0), only Low carbon/chromium reinforcing steel shall be permitted, meeting the requirements of ASTM A1035. The alloy type shall be CS (ChromX 9100) and the minimum yield strength based on the 0.2% offset method shall be equal to 690 MPa.

#### **APPLICABLE STANDARDS**

- 2017 Standard Specifications for Bridge Construction, Section 5, Reinforcing Steel
- Bridge Structures Design Criteria Version 8.0

#### **RECOMMENDATIONS**

ChromX 2100 Reinforcing Steel will be listed as a Potential Product under Alberta Transportation's Products List, Reinforcing Steel – Proprietary, based on the information provided. Final acceptance as a proven product will be based on field performance.

#### **RESTRICTIONS**

ChromX 2100 Reinforcing Steel may only be considered for use in substructure components (foundations, piers, and abutments) where the use of the high strength properties may effectively reduce the reinforcing steel congestion and improve constructability. ChromX2100 may not be used as approach slab connection dowels or in areas where increased corrosion protection is warranted.

It is to be noted that as per Bridge Structure Design criteria V8.0 Section 5.6.2, the design and proportioning of the low carbon/chromium steel reinforcing bar, including hooks, development lengths and bar splices, shall be based on yield strength of 500MPa. In essence although 690MPa yield strength is a requirement but in design Maximum 500 MPA yield strength shall be used.

***The use of ChromX 2100 Reinforcing Steel requires prior written approval of the Director of Bridge Engineering Section of Technical Services Branch.***

#### **TRIAL PROJECTS**

Junaid Iqbal

Erum Mohsin

Cc: Innovation Evaluation Group – Roger Skirrow  
Mike Tokar  
Dave Besuyen  
Joe Filice