





## Enhanced Corrosion Protection of Structural Plate Fasteners

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### 3. Performance Criteria

Minimum performance criteria is no red rust in the following conditions:

Kesternich: Minimum 30 cycles.

Salt Spray: Minimum 3000 hours.

Abrasion: Minimum one cycle.

### 4. NZF3000

MTQ report 'Evaluation of Bolt Coatings (File #16-011)' dated December 2016 summarized the following results:

Abrasion: Black NZF3000 fasteners withstood one abrasion cycle. Performance for Silver NZF3000 coated bolts is expected to be similar.

Salt Spray: Black NZF3000 fasteners started to demonstrate coating attack at 3150 hours. At 4180 hours the samples were removed and exhibited no red rust. Performance for Silver NZF3000 is expected to be similar.

Kesternich: Black NZF3000 fasteners withstood 30 Kesternich cycles with no red rust. Silver NZF3000 fasteners withstood 35 Kesternich cycles with no red rust.

### 5. Application

Fasteners satisfying the performance criteria and requirements of CAN/CSA G401 cl. 4.4.2 may be used with coated structural plate for the following environments. NZF3000 fasteners satisfy the following conditions:

Soil:

pH = 4 to 9.

Resistivity > 750 ohm-cm.

Water:

pH = 4 to 9.

Resistivity > 750 ohm-cm.

Hardness: no limit.

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Most fasteners are located out of the water. Galvanized fasteners located in water have historically satisfied structural criteria. Fasteners located in flowing water tend to have lower abrasion exposure due to the corrugation profile, bedding or rip rap slowing down water. When a fastener is located in flowing water, the fastener's bolt head or nut and thread beyond the nut have the greatest exposure. The most critical part of the bolt is the major load carrying portion: bolt diameter at the plate/fastener interface. Abrasion exposure is typically low at the plate/fastener interface. Accordingly, fastener abrasion performance concerns are more aesthetic than structural.

### 6. Bolt Torque

Leland Industries indicates NZF3000 fasteners have a  $K = 0.18$  to  $0.24$ . Typical  $K$  values for mechanically and hot-dip galvanized fasteners are  $0.20$  and  $0.25$  respectively. CHBDC bolt torques are considered applicable to NZF3000 fasteners.

### 7. Confidentiality

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