In designing friction grip bolted connections, engineers need to ensure that the Coefficient of Friction between the connecting surfaces exceeds 0.35. It is possible for hot dip galvanized structural steel to meet this coefficient of friction requirement, provided the connecting surfaces are treated appropriately. Industrial Galvanizers has developed its QA procedures to ensure that friction grip bolting requirements are satisfied, as a result of a comprehensive research project that was conducted by the University of Newcastle’s Engineering Research facility (TUNRA) in the 1980’s. This research was done on to support a major construction project involving several thousand tonnes of railway bridge steelwork for the NSW State rail Authority.

WHY GALVANIZE?
Hot dip galvanized coatings are applied to steel to improve the anti-corrosion performance of the steel to ensure that it lasts as long as possible with a minimum of maintenance.

COATINGS DIFFER
Only hot-dip galvanizing gives a coating that can reach the 50 year life required of structural building products.

THICKNESS COUNTS
Compared to other zinc-rich coatings, hot-dipped galvanizing is:-
- THICKER
- HARDER
- FULLER

HOT-DIP GALVANIZED PRODUCTS LAST LONGER...

Can hot dip galvanized steel be friction grip bolted?

These QA procedures have subsequently been used on a large number of structural projects since that time with 100% satisfactory outcomes. For the 0.35 Coefficient of Friction requirement to be met, the following information should be noted. Australian research findings:-

1. A conventional shiny hot dip galvanized coating will have a Coefficient of Friction in the order of 0.20 – 0.25.
2. A reactive steel (gray or matt colour) hot dip galvanized coating will have Coefficient of Friction in the order of 0.50.
3. Abrading the hot dip galvanized surface with an appropriate grinding disc will result in a Coefficient of Friction in the order of 0.40.
4. Abrasive blasting (brush blasting) the hot dip galvanized surface will result in a Coefficient of Friction exceeding 0.50.
5. Where free zinc is present on the connecting hot dip galvanized surfaces, the slip factor can increase over time under cyclic loading through ‘cold welding’ of the free zinc under high compression loadings.

To achieve a coefficient of friction exceeding 0.35 for the friction grip bolted connections on the galvanized structure, the following procedures are recommended:

Friction bolting of galvanized surfaces. Proper design and erection procedures need to be followed for the successful use of friction bolts.
Can hot dip galvanized steel be friction grip bolted?

Procedure for mechanical buffing.
Buffing the connecting surfaces to remove any surface irregularities and to roughen the surface.

This should be done using an air grinder of a type equivalent to a Model SP-1222SD 125 mm high-speed grinder (max rpm 15,000).

The grinder should be used with a flexible backing pad and 36 grit resin grinding discs.

This process should not remove more than 10% of the galvanized coating. This proportion of the coating comprises the free zinc layer. The balance of the coating is made up of much harder zinc-iron alloys, which are not subject to plastic deformation. This ensures that bolt relaxation will be minimal after torqueing of the friction grip bolts.

Procedure for brush abrasive blasting.
The following procedure should be observed when sweep blast cleaning is carried out to ensure that a good surface is produced for painting, without severely damaging the existing galvanized coating.

a. Use fine abrasives of a size which will pass through a test sieve of nominal aperture size 150 μm to 180 μm (80 to 100 mesh), e.g. ilmenite or garnet.

b. Use a venturi nozzle which has an orifice diameter of 10 mm to 13 mm.

c. Set the blast pressure at 275 kPa (40 psi) maximum.

d. Keep the venturi nozzle at a distance of 350 mm to 400 mm from the surface of the work piece and at an angle no greater than 45° to the surface.