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TECHNICAL BULLETIN #1

**TO: ALL VCNZ CERTIFIERS, VCNZ APPROVED ENGINEERS,
AND NZHRA MEMBER CLUBS**

REVISION #00

ELECTROPLATING OF HI-TENSILE FASTENERS

This Bulletin takes effect as at the 1st of January 1996

INTRODUCTION:

This Bulletin covers some rule changes to the NZHRA Code of Construction Manual relating to the electroplating of hi-tensile bolts in critical locations such as steering, brakes, and suspension. The intention of the rule change is to allow the electroplating of Grade -5 (Metric 8.8) where previously it has not been allowed. The conclusion has been reached by the Technical Advisory Committee after exhaustive consultation within the electroplating and related industries, namely: Air New Zealand, D.S.I.R., various electroplaters, fastener importers and distributors, and extensive library research on the subject.

RULES AMENDMENT

1. Rule affected by this change are (New Code):

1.34(c), Page 54; 2.49, Page 67; 3.19, Page 74, 4.20, Page 79 6.42 Page 88

The Rule is to be changed from:

"No electroplating of hi-tensile bolts, especially Grade 5 (Metric 8.8) and up, and socket head cap screws". to:

"No electroplating of hi-tensile bolts Grade 8 (Metric 10.9) and up, and socket head cap screws".

Also, Rule 2.7, Page 64, and 2.41, Page 66 are to be amended from:

"..... 12.0 mm (1/2") diameter, Grade 5 (8.8 Metric), and must not be electroplated", to

"..... 12.0 mm (1/2") diameter, Grade 5 (8.8 Metric). If using a higher tensile fastener, it must not be electroplated".

2. Rules affected by this change are (Retrospective Code):

1.34(c), Page 195; 2.39, Page 205; 3.2, Page 209; 4.17, Page 212; 6.38, Page 219

The rules noted above (in the case of 3.2 the content of the rule relating to electroplating) are to be amended to read:

“No electroplating of Grade 8 (Metric 10.9) and up fasteners (including all socket head cap screws) in critical load or stress applications”.

Also, Rule 2.5, Page 202, and 2.33, Page 205, are to be amended from:

“..... 12.0 mm (1/2”) diameter, high tensile and must not be electroplated”. to:

“..... 12.0 mm (1/2”) diameter, Grade 5 (Metric 8.8). If using a higher tensile fastener it must not be electroplated”.

BACKGROUND

This is a very complex subject, with a great deal of differing opinion even within the industry, therefore the NZHRA Technical Advisory Committee initially regulated on the conservative side until complete analysis of the subject could be carried out.

Put very simply:

During the acid cleaning and plating process, various chemical reactions take place within items being electroplated, which sets free Hydrogen Atoms that dissolve into the steel. These atoms concentrate themselves into high stress areas like the head-to-shank corners, and thread corners at the shank end. This concentration of Hydrogen atoms weakens the area that they settled in, and this is basically what is known as “Hydrogen Embrittlement”.

Tiny cracks can begin at these points, particularly after continued movement and loading, eventually leading to the failure of the component, which is known as a “Hydrogen Embrittlement Fracture”. The NZHRA Technical Advisory Committee have already seen some evidence of this, and it's a very real occurrence. Actual examples seen include bolt heads popping off and shearing of shanks under loads far less than the bolts were made to withstand.

Hydrogen absorption and entrapment, or embrittlement, becomes more likely in higher tensile materials. In other words, the higher the steel strength, the higher the likelihood of electroplating causing a failure to occur.

The Technical Advisory Committee has determined that the tensile strength cut-off point (where there is sufficient likelihood of absorption of Hydrogen and subsequent failure to justify banning of electroplating of items beyond that point) is 60 tons per square inch.

This effectively means that any item made of steel with a tensile strength of 60 tons per square

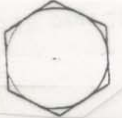




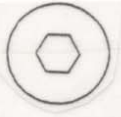
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inch or more, (which is a figure just greater than Imperial Grade-5 or Metric 8.8) would fall into the high risk category, and may therefore **not** be electroplated.

This is on a very basic overview of a very scientific subject, but hopefully should give enough background to explain why the rules have been established as they have been.

COMMON BOLT MARKING I.D:

To follow is a list of common bolt head markings, what the markings mean, and the tensile strength:

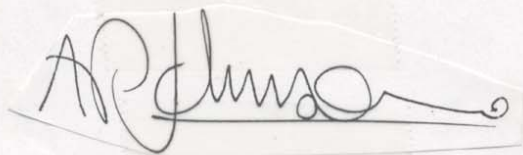
MARKING	IDENTIFICATION	ELECTROPLATING RULE
	Hex-head bolt. Mild steel. (not high tensile)	Okay to electroplate.
	Hex-head bolt 3 lines. Grade 5 (Metric 8.8) 54 tons per square inch.	Okay to electroplate.
	Hex-head bolt. 8.8 marking. Grade 5 (Metric 8.8) 54 tons per square inch.	Okay to electroplate.
	Hex-head bolt. 6 lines. Grade 8 (Metric 10.9). 67 tons per square inch.	NO Plating.
	Internal hex cap screw. Approx 84 tons per square inch.	NO Plating.
	Button-head cap screw. Approx 84 tons per square inch.	NO Plating.

IMPORTANT NOTES

1. In all cases, the "NO PLATING" rule only refers to items in critical (high load or stress) applications. Any fasteners or items of a purely decorative nature may be electroplated.

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2. All fasteners to be electroplated must be previously unplated.
3. Head markings may not be removed. This is for the purpose of identification by NZHRA Certifiers. A good cleaning process will be required to remove head scale and achieve a good finish.
4. Electroplating includes Zinc plating, Cadmium plating, Gold, Silver and any other process where chemicals and electrolysis is used during the plating process.



Signed:
Tony Johnson
General Manager
New Zealand Hot Rod Association (Inc)

Date: 20/11/96

Any enquires relating to the information provided within this Bulletin may be directed to the Project Manager, Tony Johnson at the NZHRA Office.

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