

CQI/ PASS THROUGH REQUIREMENTS – Section 5

All suppliers that provide steel parts to Powers & Sons, LLC, that are heat treated, plated or coated (forgings, stampings, springs, fasteners, etc.) are required to submit evidence of compliance to:

CQI-9

Special Processes: Heat Treat System Assessment – latest edition, and in addition, sintered powdered metal parts must comply with Customer (Ford, etc.) specific CQI-9 requirements.

- Where “needs immediate action” is assessed, immediate containment action is required and the action plan must include steps to address the root cause(s) within 30 days.
- Where “not satisfactory” is assessed the action plan must include steps to address the root cause(s) within 90 days.

CQI-11

Special Processes: Plating System Assessment – latest edition.

CQI-12

Special Processes: Coating System Assessment – latest edition.

An on-site survey, conducted by the Supplier and submitted to Powers & Sons Purchasing Department is required annually. A current CQI survey, conducted by Ford or a 3rd party may be substituted.

These survey(s) must have supporting evidence for how each question was scored submitted along with the Survey(s).

All other pass through characteristics will be addressed during APQP and documented in the supplier’s control plan.

CQI-15

Special Processes: Welding System Assessment – latest edition.

CQI-23

Special Processes: Molding System Assessment – latest edition.

CQI-27

Special Processes: Casting System Assessment – latest edition.

FORD MATERIAL SPECIFICATION WSS-M99A3-A

(Embrittlement Avoidance.)

Control Plans of heat-treated and cold worked components and fasteners must include controls for the following when applicable:

- Verification tests to demonstrate the effectiveness of De-embrittlement controls after electroplating.

- Part cleaning controls if surface or core hardness is greater than 35 HRC (or equivalent) to remove phosphorus containing products or any other detrimental contaminants before heat treatment. The formation of a white, phosphorus enriched layer caused by penetration of phosphorus during the hardening process is not permissible.
- Unintentional carburization prevention controls for through hardened parts must ensure the surface hardness is not more than 30 HV greater than the core hardness, and not more than 390 HV (39 HRC) unless specified on the engineering drawing.

MANUAL/SPECIFICATION INFORMATION

A copy of the CQI-Requirements and Assessments as well as WSS-M99A3-A (Embrittlement Avoidance Specification) can be ordered from:

Automotive Industry Action Group (AIAG)
26200 Lahser Road, Suite 200
Southfield, Michigan 48034
Phone: 248-358-3570 Fax: 248-358-3253

Engineering Standard Website Locations for Powers and Sons Suppliers

1. Ford/GM standards and all other industry standards (AIAG, ASTM, ISO, SAE etc.) with the exception of Chrysler
<http://global.ihs.com>
2. Chrysler standards are available at <https://essd.extra.chrysler.com/ESSD/login.jsp>

Ford Customer Specifics

Control Item (▽) Fasteners

The following control shall be included in the Control Plan for fasteners that are Control Items:

Material Analysis – Heat-Treated Parts

Prior to release of metal from an identified mill heat, a sample from at least one coil or bundle of wire, rod, strip, or sheet steel shall be analyzed and tested to determine its conformance to specifications for chemical composition and quenched hardness. The organization shall test a sample from each additional coil or bundle in the heat for either chemical composition or quenched hardness. The organization shall document the results and include the steel supplier's mill heat number.

This requirement applies to both purchased material and material produced by the organization.

Material Analysis – Non Heat-Treated Parts

The organization shall visually check the identification of each coil or bundle of wire, rod, strip, or sheet steel to determine that the mill heat number agrees with the steel supplier's mill analysis document and applicable specifications. The organization shall test each coil or bundle for hardness and other applicable physical properties.

Lot Traceability

The organization shall maintain lot traceability.

Subject: Avoidance of Hydrogen Embrittlement in Steel Parts

For suppliers to General Motors of steel components that are heat treated and subsequently exposed to acid cleaning and various plating treatments, compliance with SAE/USCAR 5 and SAE/USCAR 7 is a requirement. This requirement is referenced in all relevant GM plating and coating specifications. Conformance to recognized plating practices is measured through AIAG CQI-11 Plating Process Assessment and through GM's 1927-16B Hydrogen Embrittlement Process Audit.

ACTION REQUIRED - Review the components you manufacture and the components you purchase for susceptibility to Hydrogen Embrittlement. Ensure that you have, and that your suppliers have, the following standards and that all are in compliance with both:

- 1) SAE/USCAR 5 Avoidance of Hydrogen Embrittlement of Steel
- 2) SAE/USCAR 7 De-embrittlement Verification Test

These requirements have been in effect since 1998. This bulletin serves as a reminder that compliance is still expected.

Background Message:

Despite this requirement being in place, we find that Hydrogen Embrittlement issues occasionally disrupt the flow of parts and subassemblies to GM. Recently, it was discovered that a supplier was not aware of the requirement. The Tier 1 supplier did not clearly communicate the requirement to their supply base. It is critical that Tier 1 suppliers conduct a review of manufactured and purchased parts for the susceptibility to Hydrogen Embrittlement and ensure that USCAR 5 and 7 are being followed within their facilities and in their supplier facilities as well. Highlights include:

- Maximum acid clean time is 10 minutes
- All parts acid cleaned shall be baked
- Parts should be transferred to the baking oven no more than 1 hour after plating to ensure the part's core is at temperature within 2 hours of plating
- Parts with a hardness between 353 HV and 390 HV need to bake for 4 hours
- Parts with a hardness greater than 390 HV need to bake for 8 hours