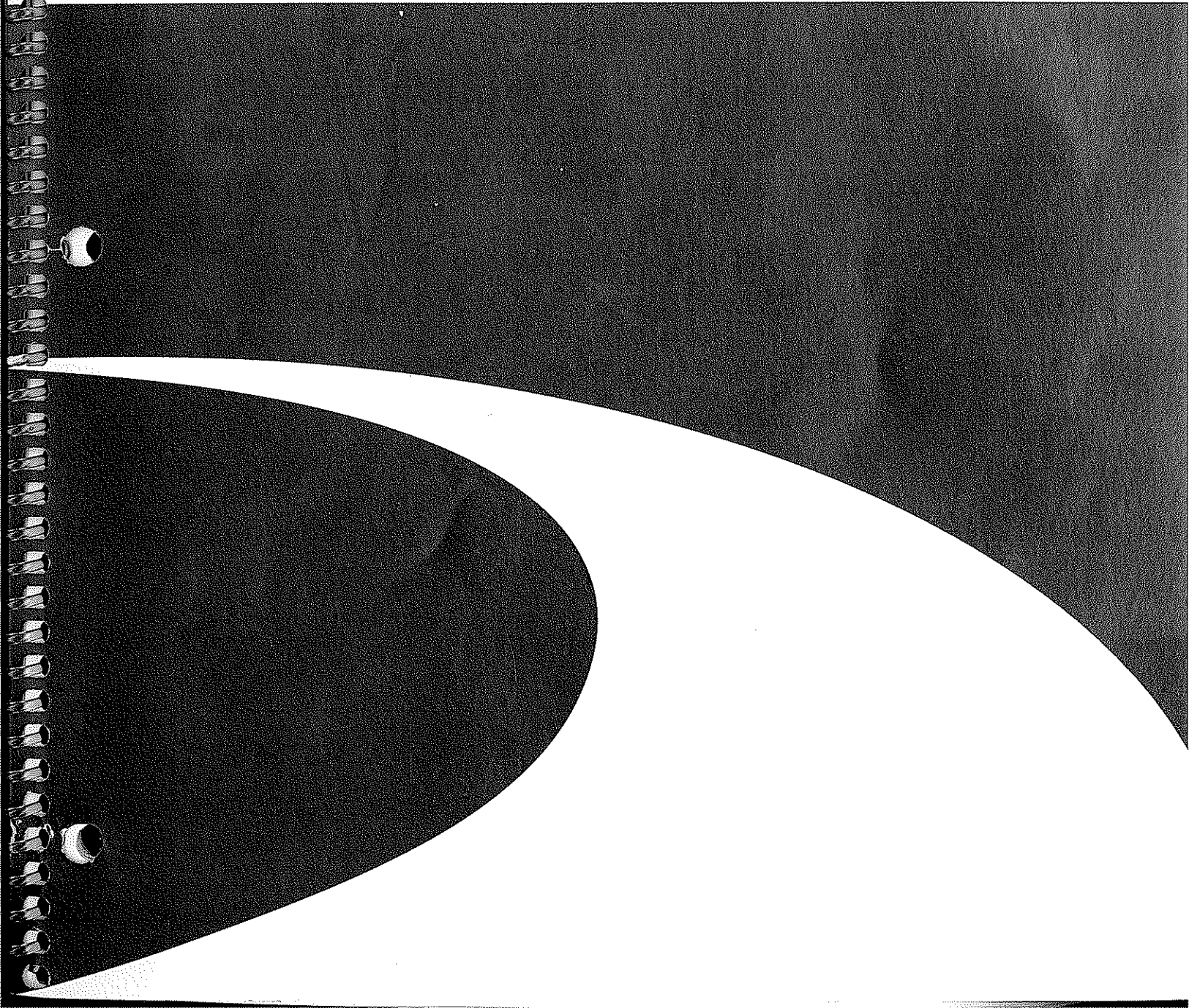




**CQI-12**

***Special Process: Coating System Assessment***



## ABOUT AIAG

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Founded in 1982, AIAG is a globally recognized organization where OEMs and suppliers unite to address and resolve issues affecting the worldwide automotive supply chain. AIAG's goals are to reduce cost and complexity through collaboration; improve product quality, health, safety and the environment; and optimize speed to market throughout the supply chain.

### AIAG Organization

AIAG is made up of a board of directors, an executive director, executives on loan from member companies, associate directors, a full-time staff, and volunteers serving on project teams. Directors, department managers, and program managers plan, direct and coordinate the association's activities under the direction of the executive director.

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Volunteer committees focus on business processes or supporting technologies and methodologies. They conduct research and develop, publish, and provide training on standards, conventions, standard business practices, white papers, and guidelines in the areas of automatic identification, CAD/CAM, EDI/electronic commerce, continuous quality improvement, health focus, materials and project management, occupational health & safety, returnable containers and packaging systems, transportation/customs and truck & heavy equipment.

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**CQI-12**

**Special Process: Coating System Assessment**  
Version 1 Issued 8/07



APPROVED

## **FOREWORD**

Automotive Industry Action Group (AIAG) committees are made up of volunteers from member companies in the automotive industry. The work of preparing process audits is done by AIAG technical committees.

The main task of technical committees is to prepare Automotive Standards and System Requirements. Draft documents adopted by the technical committees are circulated to the Steering Committee for review and consensus approval. Publication of the documents requires approval by the Quality Steering Committee.

The Quality Steering Committee would like to acknowledge and thank the following individuals and their companies who have contributed time and effort to the development of this document.

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## **INTRODUCTION**

### **General**

The work of preparing CQI-12 Special Process: Coating System Assessment (CSA) was carried out through the AIAG Coating Work Group. These coating requirements are complementary to customer and product standards.

The CSA can be used to assess an organization's ability to meet the requirements in this assessment, as well as customer, regulatory, and the organization's own requirements. The CSA can also be used between an organization and its suppliers.

In the CSA, the word "shall" indicates a requirement for purposes of the self assessment. Failure to meet the requirements results in an assessment that is either "Not Satisfactory" or "Needs Immediate Action". The word "should" indicates a recommendation. Where the term "such as" is used, any suggestions given are for guidance only.

### **Process Approach**

The CSA supports the automotive process approach as described in ISO/TS 16949:2002.

### **Coating System Assessment Goals**

The goal of the CSA is the development of a coating management system that provides for continual improvement, emphasizing defect prevention and the reduction of variation and waste in the supply chain.

The CSA, coupled with an internationally recognized quality management system and applicable customer-specific requirements, defines the fundamental requirements for coating management systems.

The CSA is intended to provide a common approach to a coating management system for automotive production and service part organizations.

### **Assessment Process**

Ongoing assessments shall be conducted annually, unless otherwise specified by the customer, to reexamine the continuing compliance with the CSA. Each assessment shall include a review of the organization's systems using the CSA. Successive Job Audits (Section 3.0 of this document) shall sample parts from different automotive component manufacturers that require compliance to the CSA document.

The assessment shall use the process approach to auditing as identified by the requirements of ISO/TS 16949:2002.

## Assessor Qualifications

Assessor(s) shall have the following specific experience to conduct the COATING SYSTEM ASSESSMENT:

1. Be an experienced quality management system (QMS) internal auditor (for example, ISO/TS 16949:2002, ISO 9001:2000).
2. Assessor shall possess coating knowledge. Evidence shall include a minimum of 5 years experience in coating or a combination of formal chemical education and coating experience totaling a minimum of 5 years.
3. Assessor shall possess knowledge of and be familiar with the application of automotive quality core tools including statistical process control, measurement systems analysis, part approval, failure mode and effects analysis, and advanced quality planning.

Note: If more than one assessor is required to meet the above qualifications, the lead assessor shall be the person meeting the requirements in item #1.

## Other Requirements

The organization shall keep records as evidence of compliance to the requirements identified in the CSA, as well as all appropriate action plans to address any unsatisfactory ratings. These records shall be readily available for review by any customer requiring compliance to the requirements within this document.



## 1 SCOPE

### 1.1 General

This document specifies process requirements for an organization or its suppliers performing applicable coating, which need to:

- demonstrate ability to consistently provide product that meets customer and applicable regulatory requirements, and
- enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system.

The Coating System Assessment is applicable to sites where customer-specified parts for production and/or service are processed throughout the automotive supply chain.

### 1.2 Application

All requirements of the CSA are generic and are intended to be applicable to all organizations performing the coating operations addressed in this document, regardless of type, size, and product.

Ten Process Tables have been developed and the appropriate table(s) is to be referenced during the assessment. The Process Tables are specific to coating processes as noted below:

- Process Table A – Pretreatment – Aqueous Cleaning
- Process Table B – Pretreatment – Mechanical Cleaning
- Process Table C – Pretreatment – Phosphating
- Process Table D – Powder Coating
- Process Table E – Electrocoating
- Process Table F – Liquid (Spray)
- Process Table G – Dip/Spin Coating
- Process Table H – Autophoretic Coating
- Process Table I – Convective Cure
- Process Table J – Equipment

These Process Tables contain requirements for:

1. Process and Test Equipment
2. Process Monitor Frequencies
3. In-Process/Final Test Frequencies
4. Test Frequencies

The Process Tables specify the process parameters and the frequencies for checking process control parameters and parts, as well as periodic maintenance requirements. The Requirements and Guidance in the CSA form will notify the assessor when to refer to the Process Tables.

## 2 THE COATING SYSTEM ASSESSMENT PROCEDURE

1. Obtain current copy of CQI-12 Special Process: Coating System Assessment from AIAG.
2. Identify all coating processes to which CQI-12 Special Process: Coating System Assessment applies (see CQI-12, 1.2). Record these processes on the CSA.
3. Complete the CSA, determining the level of compliance. A minimum of one job audit (Section 3) shall be performed during each assessment
4. Address each "Not Satisfactory" item and determine corrective action, including root cause analysis and implementation of the corresponding corrective action(s). The corrective action(s) shall be completed within 90 days. Records of the corrective action, including verification, shall be maintained.
5. "Needs Immediate Action" requires immediate containment of suspect product. Address each "Needs Immediate Action" item and determine corrective action(s), including root cause analysis and implementation of the corresponding corrective action(s). The corrective action(s) shall be completed within 90 days. Records of the corrective action, including verification, shall be maintained.
6. Assessments shall be conducted annually unless otherwise specified by the customer.

### **3 SPECIAL PROCESS: COATING ASSESSMENT**

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## **Instructions for completing the Cover Sheet**

1. **Facility Name:** Name of the facility being assessed.  
One form shall be used for each facility. The facility may have several buildings or physical locations in the same general area. If there is a separate management team (Quality Manager and Coating Specialist) or different management system, then these locations shall be considered as separate facilities.
2. **Address:** The street address of the facility being assessed; P.O. Box numbers may be given as additional information.
3. **Phone Number:** The phone number of the facility.  
If there is no common phone number for the facility, the phone number of the Operations Manager or Quality Manager shall be used.
4. **Fax Number:** The fax number of the facility.
5. **Number of Coating Employees at this Facility:** The number of employees, salaried and hourly, associated with the coating operation at this facility.
6. **Captive Coater (Y/N):** Enter "Y" if this facility coats components for their own company. Enter "N" if the company does not coat any components for their own company.
7. **Commercial Coater (Y/N):** Enter "Y" if this facility coats components for companies other than their own company. Enter "N" if this facility does not coat any components for other companies.
8. **Date of Assessment:** Enter the date(s) of the assessment. An alphanumeric format shall be used to avoid confusion with different numeric formats.  
Example: May 3 – 4, 2006
9. **Date of Previous Assessment:** List the date of the previous CQI-12 Special Process: Coating System Assessment of this facility.
10. **Type(s) of Coating at this Facility:** Place a checkmark to designate the coating process(es) performed at this facility. This information determines the appropriate Process Table that shall be used during the assessment. Processes not listed on the cover sheet are not part of the Coating System Assessment.
11. **Current Quality Certification(s):** The coater shall list their current quality certifications, e.g., ISO/TS 16949:2002, ISO 9001:2000. Certifications may be from 3rd party sources or customer quality certifications. If customer quality certification is given, then the year of the last assessment by the customer shall also be given.
12. **Date of Re-assessment (if necessary):** If "Not Satisfactory" findings were observed from the original assessment, then the coater shall address each item and determine correct action, including root cause analysis and implementation of the corresponding corrective action(s). The date of the re-assessment shall be given here, and the appropriate Question(s) from Sections 1 – 3, in the original assessment, shall be modified to reflect that the evidence, relating to the implementation of the corrective action(s), has been observed. Also, the "Number of Not Satisfactory Findings" shall be modified as appropriate.
13. **Personnel Contacted:** List the name(s), title(s), phone number(s), and email address(es), if available, of the principal participants from the coater's organization.

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14. **Auditors/Assessors:** List the name(s), Company(ies), phone number(s) and email address(es), if available, of the auditor/assessor(s).
15. **Number of "Not Satisfactory" Findings:** Enter the number of "Not Satisfactory" findings observed during the assessment.
16. **Number of "Needs Immediate Action" Findings:** Enter the number of "Needs Immediate Action" findings observed during the assessment.
17. **Number of "Fail" Findings in the Job Audit(s):** Enter the number of "Fail" findings observed from the job audit.

**Instructions for completing Sections 1 and 2**

Sections 1 - 2 contain questions and the requirements and guidance for each question. The Sections are:

Section 1 – Management Responsibility & Quality Planning

Section 2 – Floor and Material Handling Responsibility

The assessor shall assess the coater's compliance to Sections 1 and 2 by comparing the evidence presented by the coater to the requirements listed in the "Requirements and Guidance" column.

- |         |   |
|---------|---|
| NOTE 1: | In the "Requirements and Guidance" column, the word "shall" indicates a requirement and the term "such as" indicates that any suggestions given are for guidance only.  |
| NOTE 2: | The "Requirements and Guidance" column will indicate to the assessor when the Process Tables are pertinent to the Questions. When the Process Tables are pertinent to the Question, the assessor shall assess the coater's compliance to the specified section(s) in the Process Tables.  |
| NOTE 3: | If the question is not applicable to the coater, then the assessor shall place a checkmark in the "N/A" Assessment column. If the observed evidence is in compliance to the question, the assessor shall note the evidence in the "Objective Evidence" column and place a check mark in the "Satisfactory" column. If the observed evidence is not in compliance to the question, then the assessor shall note the non-compliance in the "Objective Evidence" column and place a check mark in the "Not Satisfactory" column. |
| NOTE 4: | Where nonconforming product is identified in the assessment of a given question the assessor shall place a check mark in the "Needs Immediate Action" (NIA) column. NIA requires immediate containment of suspect product.  |

## **Instructions for completing the Job Audit**

The organization is to complete a minimum of one coating part job audit during each assessment. This should be done preferably on a part identified for one of the customers requiring compliance to this document. More part job audits may be done if time permits. Preferably, safety or critical parts should be audited. This may not be easily determined with fasteners, especially if the fastener manufacturer does not identify the end customer (auto manufacturer, tier one, etc.). It is recommended that the job audit be performed at the end of the coating system assessment.

The job audit is not the only or main focus of the CSA. The other two sections on Management Responsibility and Quality Planning and Floor and Material Handling Responsibility are equally if not even more important. The job audit of one part, one coating process, is not sufficient to use as a basis to complete the other sections of the complete CSA.

The job audit is a compliance type audit/review of a specific part and its related paperwork and processing, including coating equipment and processing records for that job from the beginning receipt of a part through processing in the coating operation and inspection to packaging. Parts shall be taken from the shipping area at the dock or the end of the coating operation. If an automotive manufacturer's part is not available or identifiable, then parts from other customers requiring compliance with this document shall be used for the assessment.

The specific coating processing parameters (applies to 3.7 in the Job Audit) that are required in the job audit shall be added to the job audit form. This can be done by reviewing the customer specification(s), the Control Plan, the FMEA, and the floor work/job order. Each processing step shall be reviewed for proper production records/compliance/inspection. These steps can be compared to those in the Coating System Assessment for the actual job/coating process being reviewed for compliance.

## **APPENDIX A – PROCESS TABLES**

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## **GLOSSARY**

**Adhesion:** The ability of dry paint to attach to and remain fixed on the surface without blistering, flaking, cracking or being removed by tape.

**Alkaline cleaner:** A solution from a combination of alkali hydroxides and alkaline salts, with high pH value. The cleaning action may be enhanced by the addition of surface-active agents and special solvents.

**Alkaline wash:** A cleaning process that employs alkaline cleaner.

**Atomization:** The formation of tiny liquid droplets during the spraying of coatings.

**Autophoretic (A-coating):** A precipitation reaction of an organic resin that occurs by the action of an acid etching a metallic substrate. The ions of the oxidized metal codeposit with the vinyl emulsion resin in the autophoretic coating process.

**Blast cleaning:** A cleaning method by using loose abrasive materials such as steel grits, or sand that are propelled by compressed air to remove, for example, mill scale, rust or old paint from steel.

**Blistering:** Localized delamination of, for example, a paint film in the form of dome-shaped blisters from the underlying surface.

**Coating:** A finish used to create a protective and/or decorative layer, for example, paint, varnish, lacquer, or other, as well as the process of treating an object with a coating. Generally it is used to refer to paints and coatings applied in an industrial setting as part of the original equipment manufacturer's (OEM) process.

**Corrosion:** A process by which materials are deteriorated by chemical or electrochemical influences.

**CSA:** Coating System Assessment

**Cure:** The process of transforming a liquid or powder coating into a hard film with, for example heat, and developing specified properties in the coating.

**Cure schedule:** The time and temperature relationship required to cure a coating.

**Degreasing:** A form of cleaning which generally uses solvents, for example, chlorinated solvents, to remove organic contaminants on part surface.

**Dip-Spin:** A coating application technique in which small parts are placed in a basket that is lowered into a coating bath, then raised and spun to remove excess coating material. This process is typically utilized as an economical system for coating high volumes of small parts.

**Durability:** The degree to which coatings withstand the destructive effects of the environment to which they are exposed. Durability has two aspects: 1) durability of the coating, 2) the protective properties of the coating to safeguard the substrate from degradation.

**Electrocoating: (E-coat)** A coating application technique in which coating film is formed in a tank containing deionized water and coating particles. Coating particles can be either positively or negatively charged. The parts passing through the tank are oppositely charge and attract the coating particles.

**Electrostatic spray:** A spray coating method in which a coating is charged and deposited on a substrate that is oppositely charged.

**Film thickness:** The thickness of a continuous layer of coating applied to a substrate.

**Filtration:** A means of separating constituents, usually by physical methods.

**Mixing Ratio:** The proportion in which components of coating material must be mixed prior to application.

**Overbake or overcure:** Exposure of the coating to a higher temperature or longer period of time than that recommended for optimal curing, leading to unacceptable appearance and coating properties.

**Overspray:** Sprayed paint that misses the surface to be coated.

**Paint:** A coating including resin, a solvent, additives, pigments and, in some products, a diluent. Paints are generally opaque, and commonly represent the portion of the industry known as "architectural coatings."

**Peeling:** Loss of adhesion resulting in detachment and curling of the coating, particularly paint film, from either previous coatings or the substrate.

**Phosphating:** Surface pretreatment used on typically ferrous parts that provide a very thin crystalline film that enhances both corrosion resistance and adhesion. Aluminum surfaces can also be phosphate treated.

**Pickling:** A treatment for the removal of surface contaminants from steel by immersion in, for example, an acid solution or by electrolysis.

**Pigments:** Powders which give the paint its required anticorrosive or colored properties.

**Pot-Life:** The period of time after the mixing of reactive components of a multi-component coating, for example paint, during which the mixed coating can be used before losing its application properties or ultimate performance.

**Powder coatings:** Finely divided particles of organic polymers, pigments and additives uniformly mixed and applied to a substrate to form a coating.

**Pretreatment:** Processes for cleaning and conditioning a substrate to be coated. Note: Next to the choice of coating, pretreatment may be the most important factor in the use of high-performance coatings.

**Primer:** Paint intended for protection of, for example, metals against corrosion, or for preparing a surface for subsequent topcoats and intended for preparing a surface for a finishing process.

**Post-cure:** A subsequent cure at higher temperature to enhance specific properties such as release and non-wetting.

**Resin:** The constituent of the paint that serves to bind together the various other constituents as well as to provide adhesion to the surface.

**Sealer:** Coating, for example paint, used to seal the substrate or previous coats and prevent interaction between subsequent coats applied.

**Solvent:** Any liquid that can dissolve a material, such as a resin. For example, with paint, this generally refers to the liquid portion that evaporates as the paint dries.

**Surface appearance:** The smoothness, gloss and presence or lack of surface defects in a coating.

**Underbake or undercure:** Exposure of the coating to a lower temperature and/or for a shorter period of time than that recommended for optimal curing. The resulting condition can lead to tackiness, softness, and inferior film durability.

**Viscosity:** The property of a fluid whereby it tends to resist relative motion within itself, for example, resistance to flow.

**Zinc Phosphate:** A phosphate coating that includes zinc with corrosion inhibiting properties.

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## MAINTENANCE REQUEST FORM

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