

PROCESS PAINT MATERIALS FOR METAL PARTS, SUPPLY REQUIREMENTS**1. SCOPE**

1.1 This specification describes supply requirements for paint materials to be applied to metal parts by CNH facilities and suppliers. These requirements are intended to verify that approved paint materials when applied to metal substrates comply with performance class requirements for Process Paint specified within CNH MAT0103, Paint Material Requirements – Metal Parts. Paint materials include the topcoat, primer, and /or any combination of the applicable finish system components for a metal part.

1.2 The term “Supplier” as referenced in this specification applies to CNH plants and external suppliers.

1.3 All National Standards and related test methods are to be latest issue unless otherwise specified.

2. APPLICATION

2.1 The requirements in this specification apply to painted metal parts, using MAT0103Q approved paint materials.

2.2 This specification is not intended to replace or supersede any other Initial Sample Inspection Report (ISIR) supplier quality requirements. The manufacturer of a part is responsible to meet all applicable requirements of CNH Engineering Specification ENS0301 (86620212) Significant Characteristics, CNH Supplier Quality Assurance (SQA) Approval of Manufactured Parts - Advanced Product Quality Planning and Part Qualification Process (CNH Procedure #30), and any requirements on the Engineering drawing.

2.3 Suppliers shall reference the process flow chart in Appendix A, at the end of this document for guidance on the steps to follow for the paint process approval.

2.4 Changes in the part design or painting process may require re-approval. The Supplier shall contact Materials Engineering to determine if re-approval is required. The following examples of part or process changes may require re-approval per this specification.

- Change to a different approved paint system and metallic substrate combination for a given part.
- Change to a different pretreatment or supplier.
- Dimensional changes in the part design. Re-approval depends on the extent of the change.
- Changes in the process steps of how the paint is applied.
- The use of a new part.

ISSUED BY J HANSEN 27MAY24	ECN NO. 35389947	NAME PROCESS PAINT - METAL PARTS SUPPLY REQ.	
APPROVED BY T SHAH 27MAY24	REV. M	PAGE 1 OF 9	CNH NUMBER 47406457

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3. REFERENCED STANDARDS

ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus
 ASTM D523 Standard Test Method for Specular Gloss
 ASTM D714 Standard Test Method for Evaluating Degree of Blistering
 ASTM D870 Standard Practice for Testing Water Resistance of Coatings
 ASTM D1186 Standard Test Method for Non-Destructive Measurement of Dry Film Thickness of Non-Magnetic Coatings to Ferrous Base
 ASTM D1654 Standard Test Method for Evaluation of Painted Coated Specimens Subjected to a Corrosive Environment
 ASTM D1729 Standard Practice for Visual Appraisal of Color and Color Differences of Diffusely Illuminated Opaque Materials
 ASTM D1735 Standard Practice for Testing Water Resistance of Coatings using Water Fog Apparatus
 ASTM D3363 Standard Test Method for Film Hardness by Pencil
 ASTM D4366 Standard Test Method for Hardness of Organic Coatings by Pendulum Damping Test
 ASTM D5402 Standard Practice Assessing Solvent Resistance of Organic Coatings using Solvent Rubs
 ASTM E308 Standard Practice for Computing the Colors of Objects by Using the CIE System
 CNH Procedure #30, (Advanced Product Quality Planning and Part Qualification Process)
 CNH MAT0101 (86628042) Color Requirements and Color Control
 CNH MAT0103 (86628044) Paint Material Requirements – Metal Parts
 CNH MAT0103Q (48158409) Approved Paint Materials for Metal Parts
 CNH MAT1010 (86979053) Low Carbon Steel, Cold Rolled Sheet
 CNH MTM0102 (86628045) Test Panel Preparation
 CNH MTM0106 Cyclic Corrosion Test
 CNH MTM0120 Tape Adhesion, Paint Materials
 ENS0301 (86620212) Significant Characteristics
 FNHA-4-A-007 Surface Requirements

4 REQUIREMENTS

4.1 To assure the quality of a painted metal part the supplier must verify that paint materials to be applied to a part comply with the specified performance class requirements indicated in Tables 1 and 2. Results of required tests must be included with the initial part samples provided to the procuring CNH facility. Identification of all subject sample materials, including topcoat, primer, pretreatment process, and substrate with supporting documentation must be provided with the submitted test results.

4.2 Test samples to be evaluated under this specification shall be primed and/or topcoated only with materials that have been approved by CNH Materials Engineering and are listed in the MAT0103Q specification.

4.2.1 Submission of test samples shall include a description of all steps in the process cycle used in applying these paints and technical data sheets for the paint materials.

4.2.2 Testing of paint materials to verify properties shall be performed by a qualified company such as a paint supplier or pretreatment company. Paint materials may also be submitted to CNH for evaluation.

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4.3 TEST SAMPLES

Paint materials to be tested per Tables 1 or 2 to confirm specified performance for metal part production shall be applied to sample panels processed through all production steps to be used to produce the applicable metal part. Test panels shall be 10 x 30 cm (4 x 12 inches), matt finish, rust free, #20 gauge, cold rolled steel sheet per CNH MAT1010 Grade A. For less common part substrates, such as aluminum or castings, CNH Materials Engineering shall designate the type of test panels to be used for these tests. Refer to MTM0102, for preparation of samples.

4.3.1 Finished Painted Parts Testing

4.3.1.1 Finish painted parts, especially aluminum cab steps, metal grill screens, hydraulic valve body castings, and tire rims, shall be tested to confirm final corrosion resistance. These parts exhibit features or geometry that makes it difficult to achieve adequate paint coverage consistently. Features of concern include parts with multiple small holes and sharp edges, lap joints, weld seams, and rough surface finish. CNH Plant Quality at the procuring facility and / or CNH Supplier Quality Engineering (SQE) shall identify parts of this type and require the corrosion testing for initial samples before approving supplier part production.

4.3.1.2 Testing shall be conducted for the hours required for the specified paint performance class per Tables 1 and 2. After testing, for the specified hours, the sample shall be evaluated per the criteria of Tables 1 and 2 as applicable. There shall be no visible corrosion products on un-scribed part surfaces. Where corrosion products are present, the finish painted part shall be classified and reported as having failed corrosion resistance. The test(s) performed will be identified.

4.4 Topcoat paint materials to be applied to metal parts shall meet initial supply property requirements listed in Table 1 for the appropriate topcoat performance class specified. Topcoat requirements are determined with the applicable primer coating as a complete finish system, unless approved for direct to metal (DTM) application.

4.5 Primer paint materials to be applied to parts shall meet initial supply property requirements specified in Table 2. Primer performance requirements are the same regardless of whether a primed only part is subsequently topcoated and must also comply with requirements of a finish system performance class.

4.6 A copy of the completed CNH MAT0103S Test Form and supporting data shall be retained by the supplier for a period of five (5) years. This information must be available upon request by CNH SQE or CNH Purchasing. A copy of this form and supporting data shall be submitted to CNH SQE for their use in review of a supplier related to approval for production of a part.

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4.7 PAINT PROCESS

4.7.1 Substrate Quality

4.7.1.1 The quality of the part surfaces prior to painting is the third element (besides paint materials and paint processes) that determines the appearance and performance of finish painted parts. This specification avoids unduly limiting both CNH plants and outside suppliers regarding items such as mold and die surface conditions or characteristics of the unpainted plastic or metal part surfaces. However, because the quality of the part surfaces prior to painting so strongly influences finish painted part appearance, factors such as mold or die surface finish, part surface roughness and texture, etc., will need to be specified and controlled by the part manufacturer if finish painted parts are to meet the stated requirements. Substrates must also remain free of visible discontinuities throughout the entire fabrication process (forming, molding etc.) to ensure that the part, when finish painted, will conform to all applicable requirements of this specification.

4.7.1.2 Parts shall be cleaned and coated only with paint systems (primer and/or topcoat) that have been approved by CNH Materials Engineering. Such paint materials are tabulated in the CNH MAT0103Q (48158409), Approved Paint Materials for Metal Parts.

4.7.2 Substrate Cleaning and Pretreatment

4.7.2.1 Parts shall be mechanically cleaned (wire brushed, ground, sand blasted, shot blasted, etc.) and/or chemically cleaned (solvent wiped, alkaline cleaned, acid cleaned, etc.) Cleaning must remove rust, scale, drawing compounds, rust preventives, weld flux, weld spatter, etc. After cleaning, all surfaces must be kept free of dirt, dust, finger marks, oil, rust, and other contaminants. Cleaning processes described provide surface conditions necessary for painted parts to meet specified paint performance.

4.7.2.2 While not expected to be present on parts following the cleaning processes described above, any residual scale, such as weld scale or scale [e.g. metal oxides] on edges from laser, plasma, or torch cutting, will affect parts meeting specified painted part performance requirements. Parts where final paint quality is negatively impacted by these conditions generally require additional processing to meet specified paint performance requirements. Use of nitrogen shielding gas to limit scale (oxide deposits) from cutting processes, buffing or grinding edges, blasting parts, or acid pickling are processes that may be used to reduce or remove scale to improve finish painted part performance.

4.7.3 Acid Cleaning, High Hardness Parts

Acid cleaning operations must be controlled to prevent hydrogen assisted cracking (HAC), particularly on metal parts that are hardened, cold worked, and/or highly stressed in service. Acid cleaning is not permitted for parts of this type with hardness above 39 HRC (or equivalent). Also review CNH MAT0310 Zinc Plating, Hydrogen Embrittlement / Baking guidelines for additional information related to parts that are susceptible to HAC.

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4.7.4 Chemical Cleaning and Coating

4.7.4.1 Hot rolled bar, plate, tubing, structural shapes, castings, and forgings that have been mechanically cleaned but not painted within 2 hours shall be chemically cleaned just prior to painting. Parts to be coated with heat resistant paint, such as mufflers, exhaust pipes, etc. must be thoroughly deoiled prior to painting. Deoiling processing is acceptable provided the finish painted parts meet all specified requirements for high temperature parts according to CNH MAT0141 (86630224) CNH Heat Resistant Paint or heat resistance determined by CNH MTM0110 (86628049) Heat Resistance of Paint.

4.7.4.2 Parts to be coated by autodeposition shall be chemically cleaned and water rinsed prior to coating or follow coating manufacturer's recommendations.

4.7.4.3 Metal parts, except those to be coated with heat resistant paint or by autodeposition, should be given an iron or zinc phosphate, zirconium or other thin layer chemical conversion treatment. Minimum recommended coating weight shall be 40mg/ft² (0.43 g/m²) for iron phosphate and 120 mg/ft² (1.3 g/m²) for zinc phosphate. Sealer application and final rinse with clean, deionized water (35 µMho/cm max conductivity) may be needed to meet the performance requirements. Phosphate coated parts must be thoroughly dried prior to painting. All recommendations and requirements of the chemical pretreatment system, from the chemical manufacturer should be followed.

4.7.5 Painting of Finished Metal Parts

All parts should be painted prior to assembly, whenever possible. Uniform film build that meets the recommended minimums shall be achieved on all surfaces, including edges and recesses. Parts shall be primed and/or topcoated only with materials that have been approved by CNH Materials Engineering. Finished parts shall be cured per the specified schedule prior to exposure to any detrimental environment. Approved paint materials for use on finished parts are tabulated in the CNH MAT0103Q.

For castings with a rough surface it is recommended to apply a total film thickness of 2 times the surface roughness Rz-value to meet the uniform film build.

4.8 SURFACE QUALITY

Where required, surface finish requirements or quality for parts shall be specified on the engineering drawing using established specifications such as FNHA-4-A-007 (Surface Requirements). Acceptance levels defined in FNHA-4-A-007 are applicable for metallic and non-metallic substrates.

4.9 REPAIR - FINISH PAINTED PARTS

Repaired parts must meet the finish painted part performance requirements specified and be accomplished with no visible defects.

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Material Specifications

MAT0103S**TABLE 1: Topcoat Process Paint Materials for Metal Parts, Supply Requirements**

Performance Class and Part Number		Class 6 (87070110)	Class 5W (91833601)	Class 5 (86628052)	Class 4 (86628053)	Class 4W (48011482)	Class 3 (86628054)	Class 2 (86628055)	Class 1 (86628056)	
Property			Performance requirements							Test Methods
Color Visual		Visual Match to Color Standard								ASTM D1729
Color, Instrumental ⁽¹⁾		$\Delta L, \Delta a, \Delta b = 0.6$ maximum $\Delta E = 1.0$ maximum								ASTM E308 Cie Lab Spherical D65/10deg included
Gloss		Meet gloss required per MAT0101 or as specified on the part drawing								ASTM D523
Thickness, maximum		Report value								ASTM D1186
Cure Test		25 rubs, solvent								ASTM D5402
Hardness ⁽²⁾ minimum	Persoz	150	250	250	250	150	150	150	100	ASTM D4366-95, Method B
	Pencil	H	2H	2H	H	H	H	H	B	ASTM D3363
Adhesion		Ad 1, minimum								CNH MTM0120
Salt Spray Complete Finish System Minimum requirements		500 hrs	1000 hrs	1000 hrs	700 hrs	500 hrs	500 hrs	350 hrs	200 hrs	CNH MTM0105
	Scribed ⁽³⁾ Rating 6	Scribed ⁽³⁾ Rating7	Scribed ⁽³⁾ Rating7	Scribed ⁽³⁾ Rating 6	Scribed ⁽³⁾ Rating 6	Scribed ⁽³⁾ Rating 6	Scribed ⁽³⁾ Rating 6	Scribed ⁽³⁾ Rating 6	Scribed ⁽³⁾ Rating 6	
	Edges on Test Panels: Rating 8, min. Edges of Painted Parts: <5% Visible Corrosion of Total Edge Length ⁽⁴⁾									ASTM D1654-05, Proc. C - Method 2 of A ⁽⁴⁾
	Un-scribed Areas: No Blisters, No Visible Corrosion									ASTM D1654-05 Procedure B
Cyclical Corrosion	5 Cycles Rating 6, min.	5 Cycles Rating 8, min	5 Cycles Rating 8, min.	5 Cycles Rating 6, min.	5 Cycles Rating 6, min.	5 Cycles Rating 6, min.	4 Cycles Rating 6, min.	4 Cycles Rating 6, min.	CNH MTM0106	
	Edges on Test Panels: Rating 8, min. Edges of Painted Parts: <5% Visible Corrosion of Total Edge Length ⁽⁴⁾									
	Un-scribed Areas: No Blisters, No Visible Corrosion									
Humidity	400 hrs min. 2 hr recovery	600 hrs min. 2 hr recovery	600 hrs min. 2 hr recovery	600 hrs min. 2 hr recovery	400 hrs min. 2 hr recovery	400 hrs min. 2 hr recovery	400 hrs min. 2 hr recovery	200 hrs min. 2 hr recovery	200 hrs min. 2 hr recovery	ASTM D1735
		No visual color change								ASTM D1729
		Blisters: Size=8, Frequency=Few(F)								ASTM D714
Water Immersion at 25 ± 2°C	200 hrs 4 hr recovery	400 hrs 4 hr recovery	400 hrs 4 hr recovery	400 hrs 4 hr recovery	200 hrs 4 hr recovery	200 hrs 4 hr recovery	200 hrs 4 hr recovery	100 hrs 4 hr recovery	100 hrs 4 hr recovery	ASTM D870
	No visual color change								ASTM D1729	
	No Rust									
	Blisters: Size=8, Frequency=Few(F)								ASTM D714	
	Adhesion: Ad 1, min								CNH MTM0120	

(1) This test is optional on test panels or initial part samples where visual color match meets the specified criteria.

(2) Hardness determination may be conducted by either specified method.

(3) Test panels and painted parts shall be scribed with an X pattern with the diagonal scribe lines crossing at the middle of the panel.

(4) For painted parts this inspection method is visual and includes all but any scribed area

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Material Specifications

MAT0103S**Table 2: Primer Process Paint Materials for Metal Parts, Supply Requirements**

Performance Class and Part Number		Class 3P (86628057)	Class 2P (87021662)	Class 1P (86628059)	
Test Description		Performance requirements			Test Methods
Color Visual		Visual Match to Color Standard			ASTM D1729
Thickness, maximum		Report value			ASTM D1186
Hardness, minimum ⁽¹⁾	PersoZ	200	100	100	ASTM D4366-95 Method B
	Pencil	H	F	B	ASTM D3363
Adhesion		Ad 1, min	Ad 1, min	Ad 1, min	CNH MTM0120
Salt Spray		700 hrs	300 hrs	100 hrs	ASTM B117
		Scribed ⁽²⁾	Scribed ⁽²⁾	Scribed ⁽²⁾	ASTM D1654-05
		Rating 7, min	Rating 6, min	Rating 6, min	Procedure A Method 2
		Edges on Test Panels: Rating 8, min. Edges of Painted Parts: <5% Visible Corrosion of Total Edge Length ⁽³⁾			ASTM D1654-05, Proc. C - Method 2 of A ⁽³⁾
		Un-scribed Areas: No Blisters, No Visible Corrosion			ASTM D1654-05 Procedure B
Cyclical Corrosion		5 Cycles Rating 8, min.	5 Cycles Rating 6, min.	1 Cycle Rating 6, min.	CNH MTM0106
		Edges on Test Panels: Rating 8, min. Edges of Painted Parts: <5% Visible Corrosion of Total Edge Length ⁽³⁾			
		Un-scribed Areas: No Blisters, No Visible Corrosion			
Humidity		400 hrs min, 4 hrs Recovery Blisters: 8 (min) Few (max)	200 hrs min, 4 hrs Recovery Blisters: 8 (min) Few (max)	100 hrs min, 4 hrs Recovery Blisters: 8 (min) Few (max)	ASTM D1735, ASTM D714
Water Immersion at 25 ± 2°C		400 hrs 4 hrs Recovery	200 hrs 4 hrs Recovery	100 hrs 4 hrs Recovery	ASTM D870
		No Rust			
		Blisters: Size=8, Frequency=Few(F)			ASTM D714
		Adhesion; Ad 1, min			CNHMTM0120

(1) Hardness determination may be conducted by either specified method.

(2) Test panels and painted parts shall be scribed with an X pattern with the diagonal scribe lines crossing at the middle of the panel.

(3) For painted parts this inspection method is visual and includes all but any scribed area

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**CNH INDUSTRIAL TEST FORM**
TEST RESULTS FOR MAT0103S**PART SUPPLIER CONTACT INFORMATION**COMPANY: _____
ADDRESS: _____
PHONE: _____ EMAIL: _____**PAINT APPLICATOR CONTACT INFORMATION**COMPANY: _____
ADDRESS: _____
PHONE: _____ EMAIL: _____**PRIMER APPLICATOR CONTACT INFORMATION (if different from topcoat applicator)**COMPANY: _____
ADDRESS: _____
PHONE: _____ EMAIL: _____**ZINC PLATING APPLICATOR CONTACT INFORMATION (if applicable)**COMPANY: _____
ADDRESS: _____
PHONE: _____ EMAIL: _____TOPCOAT CNH PART NUMBER: _____ TOPCOAT COLOR: _____
PRIMER CNH PART NUMBER: _____ PRIMER COLOR: _____
SUBSTRATE: _____ ZINC PLATED: _____
TEST PANELS or PARTS: _____ PART NUMBER TESTED: _____
TOPCOAT PRODUCT CODE: _____ DATE RECEIVED: _____
PRIMER PRODUCT CODE: _____ DATE COMPLETED: _____

PRETREATMENT: _____

PROCESS: _____

DOES THIS PAINT PRODUCT APPEAR ON THE MAT0103Q SPECIFICATION? YES ☐ NO ☐

TABLE USED: _____

PAINT SPECIFIED CLASS: _____

	SPECIFIED FROM TABLE	RESULTS
COLOR VISUAL		
GLOSS		
THICKNESS		
CURE		
HARDNESS		
SALT SPRAY		
CYCLIC CORROSION		
ADHESION		
HUMIDITY		
WATER IMMERSION		
TEST PARTS		
SALT SPRAY		
CYCLIC CORROSION		

DOES THIS PROCESS MEET CNH REQUIREMENTS? YES ☐ NO ☐TESTING PERSON SIGNATURE: _____
COMPANY: _____ PHONE: _____

PLEASE ATTACH ANY SUPPORTING DOCUMENTATION TO THIS FORM INCLUDING TEST DATA

J Wilhelm 2/22/2024

NAME

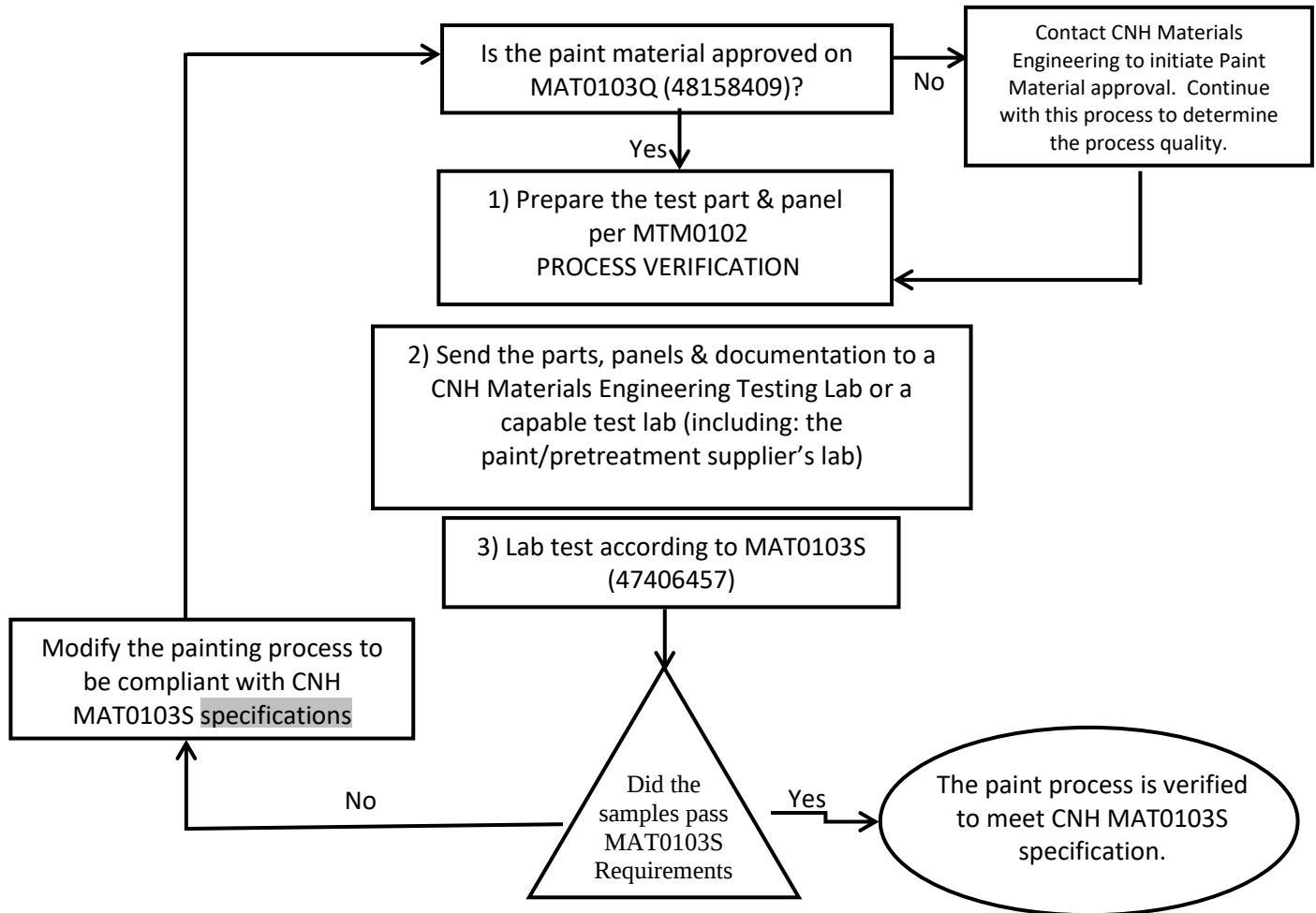
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Appendix A – Paint Process Approval for Metal Parts

SUPPLIER PAINT PROCESS VERIFICATION METAL PARTS (PPAP)

Valid for CNH Plants & Subcontractors

Supplier process approval is valid until a change or modification is made to the painting process.



✳️ MTM0102 (86628045)

Section: PROCESS VERIFICATION

Prepare painted parts & test panels of production substrate that run through the entire production line. Including: cleaning, pretreatment, ovens, spray guns, curing temperature and time.

Follow the complete process as normal production parts would follow.

Shipping Information:

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