49-00001

Process Specification

PRINT ISSUED	TITLE	PART NO.
	MECHANICAL POLISHED ALUMINUM	49-00001
LAST CHG. LTR. B		SHEET 1 OF 1

SCOPE This specification identifies the polishing of aluminum alloy materials.

APPLICATION General; surfaces, either large or small, that affect appearance.

PROCESS NUMBERS

PROCESS STEPS			REMARKS	FREIGHTLINER PROCESS NUMBER
OPERATION	ABRASIVE	TOOL		
For High Gloss (1)				49-00001-001
1. Rough Polish	#220 Grit With Grease	Belt or Wheel	If and As Required	
2. Fine Polish	#240 Grit With Grease	Build up Cloth	Optional	
3. Buffing	Tripoli	Loosely Sewed, Open Face Buff		
4. Coloring	Coloring Compound & Cotton	Clean Open Faced Buff	Min. Pressure for best luster.	
For Satin Finish (2)				49-00001-002
1. Rough Polish	#80-120 Grit With Grease	Belt or Wheel		
2. Fine Polish	#180 Grit	Build up Cloth or Belt	To required satin finish	

REQUIREMENTS AND PROCEDURES

(1) High gloss finish shall be a highly lustrous mirror finish essentially free of detrimental defects. Aluminum association spec. AA-M32

(2) Satin finish shall be a uniformly fine grain, non-specular surface with uni-directional texture essentially free of detrimental defects. Aluminum association spec. AA-M33

3. Distortion, dragging out, or elongation at edges of surface openings shall not exceed normal commercial practice.

CHG	BY	DATE	WAS
			B
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.			

CHG	BY	DATE	WAS
A	HJR	7-13-72	Rev'd & Redrawn; -002 Added; J # A0542
B	GJM	2-20-79	#80, #180-220 66323

COMPILED	HJR	DATE DRAWN			
APPROVED	Rollins	7-13-72			

ns

Portland FREIGHTLINER CORPORATION Oregon 97208 B

E-183

Process Specification

PRINT ISSUED		TITLE	PART NO.
		COATINGS, CONVENTIONAL AND HARD ANODIC, AND SEALING OF ANODIZED ALUMINUM	49-00009
LAST CHG. LTR.	F		SHEET 1 OF 2

CHG	BY	DATE	WAS	JOB NO

CHG	BY	DATE	WAS	JOB NO
D	HJR	9-3-75	Rev'd., Redrawn	A0773
E	HJR	8-12-76	Added -005	C0893
F	GJM	2-20-79	Add AA-# (8)	66323

SCOPE: This specification identifies anodic coatings on aluminum alloys, and the sealing of these coatings.

APPLICATION: Surface treatments for abrasion and corrosion resistance.

SPECIFICATION NUMBERS

PURPOSE OF TREATMENT	PROCESS		COATING THICKNESS (MILS)	FREIGHTLINER SPECIFICATION NUMBER
	BASIC	PLUS		
Abrasion Resistance, Moderate	AA-A13 Hard Anodic Coating EQUIV. (Alumilite 225)		1.0 Min.	49-00009-001
Abrasion Resistance, Maximum	AA-A13 Hard Anodic Coating EQUIV. (Alumilite 226)		2.0 Min.	-101
Abrasion & Corrosion Resistance, Heavy	AA-A13 Conventional Anodic Coating	(8)	2.0 Min.	-002
Abrasion & Corrosion Resistance in a Saline Environment	AA-A21 Conventional Anodic Coating EQUIV. (Alumilite 200)	(8)	.30 Min.	-003
Exterior Automotive Applications	AA-A2X Conventional Anodic Coating	(8)	.30 Min.	-004
Abrasion & Corrosion Resistance, Medium	AA-3X Conventional Anodic Coating EQUIV. (Alumilite 204)	(8)	.4 Min	-005

ENGINEERING NOTES

1. Water Seal

Immerse 15 to 20 minutes in de-ionized water at 208°to 212°F (98°to 100°C) to seal.

A. De-ionized water should contain not more than 12 ppm total dissolved solids of which less than 4 ppm may be soluble silica contamination.

continued. . . .

kh	COMPILED	HJR	DATE DRAWN 9-3-75		
	APPROVED				

Process Specification

PRINT ISSUED		TITLE	PART NO.
		COATINGS, CONVENTIONAL AND HARD ANODIC, AND SEALING OF ANODIZED ALUMINUM	49-00009
LAST CHG. LTR	F		SHEET 2 OF 2

ENGINEERING NOTES (CONT.)

1 (Cont.)
B. The pH of sealing water should be maintained at 5.5 to 6.5.

2 Dichromate Seal
Immerse 15 minutes (minimum) in a boiling 5% potassium dichromate solution to seal.

3 Metal Salt Seal:
Immerse for 15 minutes in a 5 wt-% solution* of nickel-acetate @ 45°-50°F (7-10°C).

4 Testing:
A. Taber Abraser Test: The hard anodic coatings must meet the following abrasion test per Mil-A-8625C, Type III hard coatings 10,000 revolutions with a CS17 wheel and 1,000 gram load.
(1) No more than 20 milligram weight loss for all alloys except those containing copper.
(2) No more than 40 milligrams weight loss for alloys containing copper.
B. ASTM Test: The sealed anodic coatings must meet the following corrosion test per ASTM B117-73 Salt Fog Test:
500 Hours with No Failures

5 This specification is applicable only to aluminum and aluminum alloys.

6 Example of call out:

"Anodic coat and water seal per Process Specification 49-00009-002"

7. AA - Aluminum Association STD. code.

8. Apply one or a combination of the following sealing operations after anodized which will provide a corrosion reseistant surface:
A. Water seal (see note 1)
B. Dichromate seal (see note 2): Yield better corrosion resistance, but results in a yellowish appearance.
C. Metal salt seal (see note 3): Yield better corrosion resistance.

*Recommended procedures for preparing a nickel acetate seal solution:

a. Adjust water pH to 4-4.5 with acetic acid.

b. Dissolve 2-5 grams per liter nickel acetate and 0.5 grams per liter Eloxan Salt in water from Step a.

c. Adjust pH to 5.2-5.5 with sodium hydroxide and maintain this range during operation. A higher pH will accelerate precipitation of nickel and a lower pH will retard sealing.

d. Use continuous filtration.

CHG	BY	DATE	WAS	JOB NO
D	HJR	9-3-75	Rev'd., Redrawn	AQ773
E	HJR	8-12-76	See Sheet 1	C0893
F	GJM	2-20-79	Add note 7&8	66323

CHG	BY	DATE	WAS	JOB NO

		DATE DRAWN			
COMPILED	HJR	9-3-75			
APPROVED					

Portland FREIGHTLINER CORPORATION Oregon 97208

Process Specification

ORIGINAL JOB NO.	TITLE	PART NO.
	WELDING FUEL TANK, ALUMINUM	49-00014
LAST CHG LTR D		SHEET 1 OF 5

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
D	B-1136	FB	4-17-79	Welding & Clean. Outli

B

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
-	40500	-	-	-
A	60660	HJR	12/22/72	See Sht. 3
B	60740	DL	1-12-73	Rev. & Retyped
C	64592	SB	7-14-77	See Sht. 3 & 4

D

SCOPE

The purpose of this specification is to provide standards for meeting Bureau of Motor Carrier Safety Standard No. 393 effective date for production January 1, 1973. This specification applies to welding fuel tank assemblies to meet 30-foot and 10-foot drop test requirements and to ensure leak-free assembly.

Basis of the specification shall be "Welding Qualifications", American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section IX, 1971, Part B, Requirements for Nonferrous Materials.

MATERIALS

Materials used for tank construction shall be those specified on the drawings, without exception. If the drawings do not specify materials or weld wire, Corporate Engineering must be contacted for specifications before the tanks are assembled. Weld wire used for tank welding shall be stored in a clean, dry area with the temperature to be held between 70° and 110°F at all times. All joints shall be cleaned, first with Chlorothene-NU, new clean lacquer thinner, ethyl alcohol or acetone. In no case will re-refined lacquer thinner be used to remove oil and dirt from joints. A mild abrasive such as stainless steel wire cloth, or a stainless steel wire brush, can be used to break up oxide scale on the surface. If power operated stainless steel wire brushes are used, care must be taken to ensure the wire brush does not erode or deeply scratch the aluminum. Abrasive materials used to clean up the aluminum oxide must be kept clean (free of oil and dirt) so these impurities are not ground into the surface of the aluminum. Shears must be kept sharp and clean so they do not grind impurities into sheared surfaces.

RECOMMENDED WELD PROCEDURES AND MATERIAL CLEANING

I. SEAM

Cleaning

1. Wipe down seam area with clean shop cloths and solvent.
2. Allow solvent to evaporate.

Welding

1. Clean seam with stainless brush.
2. Place run off tabs at beginning and end of weld joint.
3. Weld and inspect.

II. BAFFLES

Cleaning and Welding

1. Wipe inside of shell and edge of baffle with clean shop cloths and solvent.
2. Baffle pressed in with machine.
3. Weld on baffle welder (90% visual).

COMPILED	DEJ	DATE DRAWN			
APPROVED	Rollins	11-2-72			

49-0001

ORIGINAL JOB NO.	TITLE	PART NO.
	WELDING FUEL TANK, ALUMINUM	49-00014
LAST CHG LTR D		SHEET 2 OF 5

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
D	40500	FB	4-17-79	Weld. & Clean. Outline

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
-	40500	-	-	-
A	60660	HJR	12-22-72	See Sht. 3
B	60740	DL	1-12-73	Rev. & Retyped
C	64592	SB	7-14-77	See Sht. 3 & 4

B

III. DRUM END

Cleaning (Drum Edge and Drum End)

1. Wipe down with clean shop cloths and solvent.

Welding (Drum Ends)

1. Place tank and drum ends in automatic welder.
2. Rotate tank and drum ends, wire brush for one full revolution.
3. Weld both ends.

IV. NECK, SUMP, END SEAM PATCH, AND FUEL RETURN FITTING

Cleaning

1. Wipe down weld area with clean shop cloths and solvent.
2. On repairs, use a stainless steel wire brush. Clean off with shop cloths and solvent.

Welding

1. Hand tig weld neck, sump, end seam patch and fuel return fitting.

V. TANK TESTING

Tank tested with three pounds air pressure.

Bubble tested with 50/50 mixture of soap and water. All welds tested under pressure. Any repair back to hand tig welder.

Inspect by Q.C.

PERSONNEL QUALIFICATIONS

Each individual welding fuel tanks and fuel tank components must be certified for the welds they actually perform on the fuel tanks. The four weld types for certification required for welders and welding operators are listed below. Applicable paragraphs from the ASME "Welding Qualifications" are listed with revisions noted.

1. MIG for Tank Shell Seams

   Plate in a horizontal plane (QN-3, (1)(a)). Figure Q-3(a) and QI3.1(a) apply with the plates not grooved (butt joint). Normal plate size is 12" x 12".

   Testing will be done per QN-5, 6, & 8. Ultimate tensile strength for P-22; 5052H32 (as welded) shall be 25,000 psi minimum. QN-6 (Tension Test) paragraph (1) using Figure QN-6(a) and paragraph (4) apply. Also, Guided Bend Tests (QN-8) shall be made using the jigs in Figure QN-8.2.

		DATE DRAWN			
COMPILED	DEJ				
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ORIGINAL JOB NO.	TITLE	PART NO.
	WELDING FUEL TANK, ALUMINUM	49-00014
LAST CHG LTR D		SHEET 3 OF 5

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
D	B-1136	FB	4/17/79	Weld. & Clean. Outlin

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
-	40500	-	-	-
A	60660	HJR	12/22/72	See Sht. 3
B	60740	DL	1/12/73	Rev. & Retyped
C	64592	SB	7/14/77	See Sht. 3 & 4

PERSONNEL QUALIFICATIONS (Continued)

2. MIG Fillet Weld for Tank Ends, Baffles

A special case exists for the tank end fillet weld. Figure 1 of this specification shows the section of tank end for sample removal. The fillet length shall be 12 inches long, similar to that shown in Figure Q -9(a). Test of the fillet shall follow procedures of QN-9, Fillet Weld Test. Qualification on all thicknesses of material used is required. Welding shall be done on the fuel tank welding lathe used in production.

3. MIG Fillet Weld for Filler Necks, Fittings, Sumps

Qualification for these welds is made under the provisions of QN-9 Fillet Weld Test. Table QN11-1 for aluminum and aluminum alloy (P-22) for 5052 will be used for all alloys of aluminum. The plate position of QN-4(b) for the horizontal position 2F shown in Figures QN-9(a) and (b) will be used. Plate thickness shall be 3/16 inch.

4. TIG Weld for Repair

Qualification for this weld procedure will be accomplished using the same conditions of fillet weld as in No. 3 above, except for welding process (TIG vs. MIG). Also, in the fracture test (QN-9(b)), zero defects (0 inches) such as inclusions, gas pockets, etc., will be allowed. (This is a deviation from the 3/4-inch maximum.)

PLANT PROCEDURE QUALIFICATION

Qualification of each plant welding fuel tanks shall be accomplished by following the procedures of QN-10 through 13, Procedure Qualification. As noted in QN-10, qualification for the butt weld (groove) using tensile and guided-bend specimens shall qualify the fillet weld within the range of essential variables.

The number of samples required are shown in Table 13.1 (two tension, two face bend, and two root bend).

INSPECTION OF PRODUCTION TANKS

Each butt weld seam must be inspected visually for full penetration for 100 percent of its length. If more than two inches of the seam show less than 100 percent penetration, the tank shell shall be rejected. Short (less than two inches) poor penetration sections may be repaired by welding from the inside of the tank shell in the horizontal position with TIG welds.

Fillet welds attaching tank shells to tank ends must have at least 0.030" to 0.060" crown. Repairs must be made using TIG weld with the correct filler alloy. Cratering will not be allowed.

COMPILED	DEJ	DATE DRAWN			
APPROVED	Rollins	11-2-72			

ORIGINAL JOB NO.	TITLE	PART NO.
	WELDING FUEL TANK, ALUMINUM	49-00014
LAST CHG LTR D		SHEET 4 OF 5

INSPECTION OF PRODUCTION TANKS, (Continued)

Physical performance of the fuel tank will be evaluated by testing one tank (100 gallon or larger) per 1000 manufactured at each location on a totally random selection basis using the test procedures of Bureau of Motor Carrier Safety Standard No. 393. If failure occurs in this test, three more tanks shall be tested. If failure occurs in any of those three, grounds shall exist for recall of all fuel tanks built in that plant since the last test.

PROCESS RECORDS

In order to guarantee that quality welds are obtained using this process specification, it is mandatory that records be maintained covering both the qualifications of persons performing the welding, and the number and results of all quality control sampling tests.

Qualification records for individual welders are a responsibility of the plant manager at each plant where tank welding occurs. Similarly, quality control sampling and test records are the responsibility of the quality control manager at each plant where welding occurs.

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
-	40500	-	-	-
A	60660	HJR	12/22/72	See Sht. 3
B	60740	DL	1/12/73	Rev. & Retyped
C	64592	SB	7/14/77	See Sht. 3 & 4

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
D	B-1136	FB	4/17/79	Weld. & Clean. Outline

C

		DATE DRAWN			
COMPILED	DEJ	11-2-72			
APPROVED	Rollins				

Process Specification

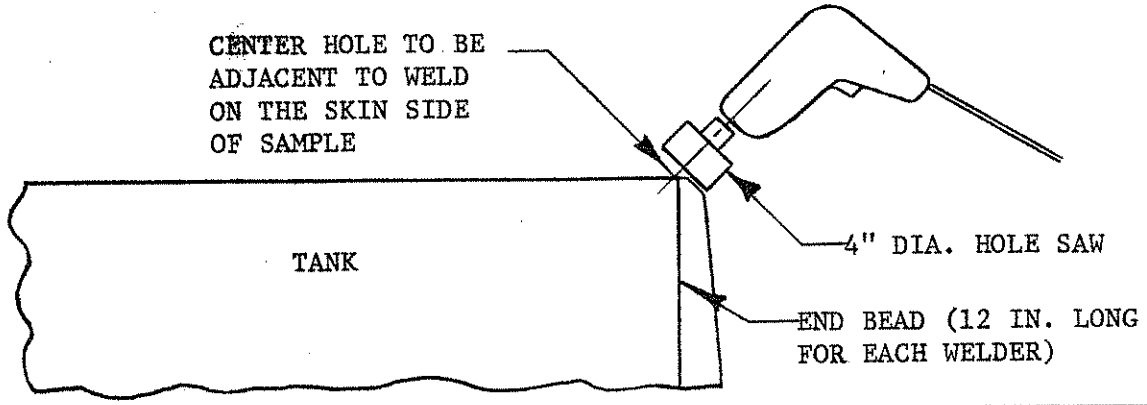
PRINT ISSUED		TITLE	PART NO.
		WELDING FUEL TANK, ALUMINUM	49-00014
LAST CHG. LTR.	D		SHEET 5 OF 5

CHG	BY	DATE	WAS
D	FB	4/17/79	Weld. & Clean. Outline

CHG	BY	DATE	WAS
-	-	-	Job #40500
A	HJR	12-22-72	See sht. 2; J #60660
B	DL	1-12-73	See Shts 1 & 2;J #60740
C	SB	7-14-77	See Sht. 3 #64592

SAMPLE CUTTING

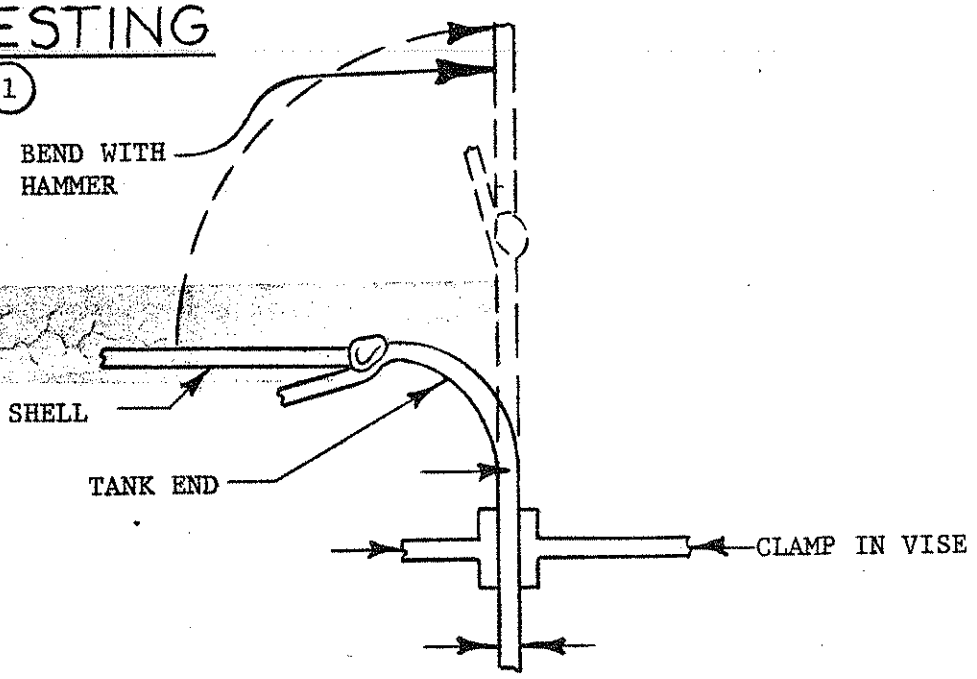
A.



B.

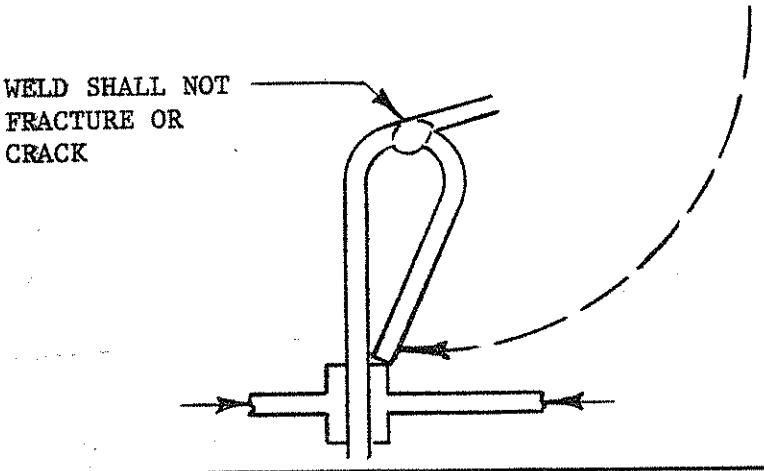
TESTING

(1)



C.

(2)



COMPILED	DEJ	DATE DRAWN			
APPROVED	Rollins	11-2-72			

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D

ORIGINAL JOB NO.	TITLE	PART NO.
6266B	PAINTING, METAL PARTS	49-00023
LAST CHG LTR D		SHEET 1 OF 7

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
B	6266B	DSC	6-22-83	REVISED & REDRAWN
C	K0183	BEL	05-21-84	SEE SHEET 2 &3
D	K0183	BEL	06-18-84	SEE SHEET 2 & 3

Scope:

This specification defines the performance and coating requirements for primed and/or painted metal parts used in the company's products. It is not intended to supersede the F/L Paint and Finish Specification Manual, which will take precedence when any conflict occurs. Any additional requirements shall be cited on the part drawing.

NOTE TO USER: The tests specified herein are intended primarily for routine acceptance and control of painted parts previously found satisfactory in more elaborate laboratory tests, in test field exposure, and/or in actual service; and should not be relied on for initial qualification of paint finishes.

Application and Classification:

Class 1

Normally applicable to decorative exterior cab components which are visible appearance items requiring a high degree of corrosion and weathering resistance. This finish can be recoated during vehicle assembly and must be compatible with standard Freightliner topcoats.

Class 2

Normally applicable to chassis and suspension components or non-decorative exterior parts requiring a high degree of corrosion resistance.

Class 3

Normally applicable to interior cab parts which require minimum corrosion resistance but where good appearance is essential.

Class 4

Normally applicable to interior cab parts which require minimum corrosion resistance and are not highly visible.

Class 5

Normally applicable to engines and parts which mount to the engine.

Requirements:

Parts can be specified either topcoated - "T" (primed and painted) or primer only - "P". The basic coating requirements and Freightliner specification numbers are given in Tables I and II. Performance requirements for topcoated parts are presented in Table III.

COMPILED	KCB	DATE DRAWN			
APPROVED	DL	6-22-83			

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION

If parts are specified as "primer only", it is the suppliers responsibility to make sure that the primer used is: 1) compatible with the topcoat system used, and 2) suitable to meet the performance requirements cited in Table III after top coating as prescribed by the purchaser. In addition, all parts supplied in the "primer only" condition must meet the adhesion test requirements (Table III) before the topcoat is applied.

When requested, the vendor shall provide written certification that the parts supplied are in compliance with this specification. Testing may only be done by an approved laboratory and the vendor shall be responsible for all costs incurred.

Parts supplied in either Class 1 or Class 3 finishes require a surface free from sags, runs, scratches, pits, weld spatter or other visible defects when viewed with the unaided eye.

Mating surfaces must be free from any defects that may be detrimental to the function of the part or which would prevent a properly fastened joint from being achieved.

Table I

Primer Only Process Requirements

Class	Color	Pretreatment Of Metal	Dry Film Thickness (Mils) Primer	Top Coat	Total	Freightliner Specification Number
1P	Light Gray (f)	Chemical (a)	1.0-1.4	---	1.0-1.4	49-00023-104*
2P	Black or Red Oxide or light Gray (f)	As Required (a) (b)	0.6-1.0	---	0.6-1.0	49-00023-102
3, 4 & 5P (e)		As Required (a) (b)	0.4-1.0	---	0.4-1.0	49-00023-103

*Old Spec Number 49-00023-100 and -101 are replaced by 49-00023-104

See footnotes Table II.

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
B	6266B	DS	6-22-83	REVISED & REDRAWN
C	K0183	BEL	05-21-84	REV COLOR TO LIGHT GRAY
D	K0183	BEL	06-18-84	0.6-1.0 TO 1.0-1.4

COMPILED	KCB	DATE DRAWN			
APPROVED		6-22-83			

JTR	JOB NO.	BY	DATE	CHANGE INFORMATION

Table II

Top Coat Process Requirements

Class	Color	Pretreatment Of Metal	Dry Film Thickness (Mils) Primer	Top Coat	Total	Freightliner Specification Number
1T	As Specified	Chemical (a)	1.0-1.4	1.8-2.2	2.8-3.6	49-00023-201
2T	As Specified	As Required (a) (b)	0.6-1.0	1.8-2.2	2.4-3.2	49-00023-202
3T	Black (d)	As Required (a) (b)	(c)	1.5 min.	1.5 min.	49-00023-203
4T	Black (d)	As Required (a) (b)	(c)	1.5 min.	1.5 min.	49-00023-204
5T	Black (d)	As Required (a) (b)	(c)	1.5 min.	1.5 min.	49-00023-205

Old Spec Number 49-00023-200 replaced with 49-00023-201.

(a) This specification is not intended to limit or specify the exact metal pretreatment. When a chemical surface pretreatment is required, any process such as zinc or iron phosphate, acid wash primer, or conversion coat which results in finished parts meeting the requirements of this specification will be approved. It is recommended that zinc phosphate be used on zinc substrates; iron or zinc phosphate on steel substrates; chromate conversion coat on aluminum substrates.

(b) If necessary to meet performance tests and other requirements.

(c) Classes 3, 4 and 5 generally do not require primers. If a primer is necessary, the primer film thickness shall be sufficient to meet the requirements of this specification.

(d) Unless otherwise specified or indicated on customer order.

(e) When necessary for protection during transit or in-house storage.

(f) Light gray primer to match P.P.G. Uniprime ED-3150.

JTR	JOB NO.	BY	DATE	CHANGE INFORMATION
B	6266B	DSS	6-22-83	REVISED & REDRAWN
C	K0183	BEL	05-21-84	ADD NOTE (f)
D	K0183	BEL	06-18-84	0.6-1.0, 2.4-3.2 TO 1.0-1.4, 2.8-3.6

COMPILED	KCB	DATE DRAWN			
APPROVED		6-22-83			

TR	JOB NO.	BY	DATE	CHANGE INFORMATION

TR	JOB NO.	BY	DATE	CHANGE INFORMATION
B	6266B	DS	6-22-83	REVISED & REDRAWN
C	K0183	BEL	05-21-84	SEE SHEET 2 & 3
D	K0183	BEL	06-18-84	SEE SHEET 2 & 3

Table III

Performance Requirements

Test	Class 1T	Class 2T	Class 3T	Class 4T	Class 5T
1. Adhesion % Min.	100	100	100	100	100
2. Salt Spray Exposure Scribed					
Hours, Min.	336	240	---	---	100
Creepage Max.	0.03" (0.8mm)	0.03" (0.8mm)	---	---	0.03" (0.8mm)
3. Humidity or Water Immersion Hours and Tape Adhesion	96 (a) (b)	96 (a) (b)	24 (a) (c)	24 (a) (c)	24 (a) (c)
4. Immersion					
Ethylene Glycol	Pass	Pass	---	---	
Engine Oil	---	---	---	---	24
Diesel Fuel	100 (a)	100 (a)	---	---	
5. Gravelometer Rating	8	8	---	---	---
6. Bleeding	Pass	Pass	Pass	Pass	Pass

(a) No evidence of blistering or other appearance changes at end of hours indicated.

(b) No more than 3.0mm (0.12 in.) peel back from intersection of lines scribed and tape tested immediately after a ten minute recovery period following exposure; and no other peeling in area under tape.

(c) No more than 3.0mm (0.12 in.) peel back from intersection of lines scribed and tape tested immediately after a 30 minute recovery period following exposure; and no other peeling in area under tape.

COMPILED	KCB	DATE DRAWN			
APPROVED		6-22-83			

TR	JOB NO.	BY	DATE	CHANGE INFORMATION

TR	JOB NO.	BY	DATE	CHANGE INFORMATION
B	6266B	DS	6-22-83	REVISED & REDRAWN
C	K0183	BEL	05-21-84	SEE SHEET 2 & 3
D	K0183	BEL	06-18-84	SEE SHEET 2 & 3

Test Procedures:

All test specimens shall be aged 72 hours prior to testing. Salt spray and tape adhesion tests may be performed on actual parts. All other tests shall be run in accordance with the following test procedures using standard test panels of the appropriate material prepared and finished identical to production parts. Test procedures are described as follows:

1. Tape Adhesion Test

   Using a razor blade or other sharp instrument, scribe crosshatch lines 1/8" apart over a one (1) square inch area of the test panels. Apply a piece of 1" wide 3M masking tape, No. 600, on the crosshatched area. Smooth tape tight and pull away sharply. No square shall pull away from test panel.

2. Salt Spray (Fog) Test

   Panels shall be tested in accordance with ASTM 117, "Salt Spray" standard method. Test shall be conducted by an independent testing laboratory or at chemical supplier's testing facility, if available. Tests should be run annually. Test panels shall show no signs of blistering, corrosion, rusting, haze, filiform or any combination or condition present after salt spray exposure for specified hours.

3. Humidity Test

   Panels shall be tested according to the requirements cited in ASTM D2247.

   Or

   Water Immersion Test

   Immerse two-thirds of the panel in distilled water, maintained at 100° ± 2° F., for specified hours. Remove panels and dry by blowing with clean air. Scribe and tape test immediately. No more than 3.0mm (12") peel back from intersection of scribed lines and no peeling in the area under the tape is permitted. The remainder of the panel should not show any signs of blistering or wrinkling.

COMPILED	KCB	DATE DRAWN			
APPROVED		6-22-83			

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION
B	6266B	DSB	6-22-83	REVISED & REDRAWN
C	K0183	BEL	05-21-84	SEE SHEET 2 & 3
D	K0183	BEL	06-18-84	SEE SHEET 2 & 3

4. Immersion

a. Ethylene Glycol

Immerse two-thirds of the painted panel in a 50-50 mixture of ethylene glycol and water maintained at 180° ± 5° F. for five minutes. Immediately after removal, examine the surface for evidence of blistering. After a two hour recovery in still air, examine the surface for color change. The panel shall show no blistering immediately after removal from the liquid and no appreciable color change.

b. Engine Oil

Immerse painted specimen in a bath of current production engine oil, maintained at 70 to 75° C. for the specified number of hours. Remove specimen from bath. Attempt to press sturdy thumb nail into painted surface. While holding nail in vertical position, and maintaining heavy pressure thereon, drag nail across surface so as to cause maximum marring and/or loosening effect. Visually examine the tested area and record the results as "marred" or "not marred". (Finish is considered marred if any paint has been removed and/or the appearance of the surface has been significantly changed.)

c. Diesel Fuel

Immerse two-thirds of the painted panel in diesel fuel maintained at 70 to 80° F. for 100 hours. At the end of the exposure period, examine the surface for evidence of peeling, blistering, color change, etc.

5. Gravelometer

The test shall meet requirements of SAE J400 specification and consists of projecting a standardized 3/8" to 5/8" road gravel by means of a controlled air blast onto a perpendicular test panel, using a standard container provided by test machine.

COMPILED	KCB	DATE DRAWN			
APPROVED		6-22-83			

CHANGE INFORMATION	DATE	BY	JOB NO.	LTR

CHANGE INFORMATION	DATE	BY	JOB NO.	LTR
REVISED & REDRAWN	6-22-83	DS	6266B	B
SEE SHEET 2 & 3	05-21-84	BEL	K0183	C
SEE SHEET 2 & 3	06-18-84	BEL	K0183	D

Panels must have a minimum rating of eight (8) per the following rating chart:

Rating		Condition
Excellent	10	Very slight marks, no metal showing.
Good	8	Film broken, no metal showing.
Fair	6	1/8" break in film, some to metal.
Poor	4	Chipping off of film, spots numerous.
Failed	2	Removal of 50% of film.

6. Bleeding

Prepare a 4" X 8" 0.032 inch steel panel by masking off a one inch wide strip lengthwise down the center of the panel. Apply a production prime coat and bake to achieve a complete cure.

Mask a 1-1/2" wide strip which will include the primed section. Apply test material and cure. Sand the bottom half of the panel with #360 sandpaper until the surface is completely free from gloss. Remove all sanding dust. Remove mask and spray the entire panel with production white baking enamel. The material is considered bleeding if there is a color change in the topcoat from one section of the panel to another.

Compiled	HADDOCK	SPECIFICATION, TIRE UNBALANCE AND RUNOUT LIMITS		49-00026
Approved	DEJ			
A Issued	7-14-78	Chg Ltr B	FREIGHTLINER CORPORATION PORTLAND, OREGON	Page 1 of 1
B Revised	10-19-78			

7L.43
72994

SCOPE

This specification is to provide tire unbalance limits and runout limits for incoming inspection of tires and tire and tube assemblies.

GENERAL

Tires not meeting the following standards are considered unacceptable to Freightliner Corporation and are subject to rejection and return.

Balance requirements for tube type tires apply to the tire and tube assembly. The tube valve stem shall be aligned with the tire balance mark to within ± 5 degrees.

NOTE: This requirement does not apply to tires without balance marks.

TIRE UNBALANCE LIMITS

The maximum static unbalance for tubeless tires and tube type tire and tube assemblies shall be:

SIZE	MAXIMUM STATIC UNBALANCE (OZ-in) For Use As: Front		Rear	
	Disc&Spoke	Duplex	Disc&Spoke	Duplex
20" and 22.5"	160	240	205	300
22" and 24.5"	175	265	225	310
B 12.00 x 20 and 12.00 R 20	190		225	
All Larger Sizes	205		225	

Tires having balance pad correction are acceptable provided that not over one 8 ounce pad for bias tires or one (4) ounce pad for radial tires is used.

TIRE RUNOUT LIMITS

Lateral and radial runout shall not exceed 0.100 and 0.090 respectively when mounted on a calibrated wheel and inflated to 80 psig.

B A M/F

Compiled	HADDOCK	SPECIFICATION, WHEEL AND TIRE ASSEMBLY UNBALANCE AND RUNOUT LIMITS		49-00028
Approved	DEJ			
143 A Issued	7-14-78	Chg Ltr B	FREIGHTLINER CORPORATION PORTLAND, OREGON	Page 1 of 1
72994 B Revised	10-19-78			

SCOPE

This specification is to provide balance and runout limits for in-process inspection of wheel and tire assemblies.

GENERAL

Tires shall be mounted to wheels in accordance with Freightliner Shop Practice 33-13101.

Any assembly which fails to conform to the following standards shall be rejected and tires and wheels checked for conformance to specification 49-00026 and 49-00027.

RUNOUT LIMITS-ALL ASSEMBLIES

Lateral and radial runout shall not exceed the following:

Lateral Runout - 0.100 in. TIR Maximum
Radial Runout - 0.09 in. TIR Maximum

STATIC BALANCE LIMITS

Wheel and tire assemblies shall be balance corrected to within the following limits:

Disc Wheel Assemblies	20 OZ-in Maximum
Spoke Wheel Assemblies - Front	20 OZ-in Maximum
Spoke Wheel Assemblies - Rear	30 OZ-in Maximum
Duplex Wheel Assemblies	40 OZ-in Maximum

MAXIMUM CORRECTION WEIGHT

Wheel and tire assemblies shall require not more than the following correction weight in order to achieve zero unbalance:

20" and 22.5" Front Assemblies	16 Ounces
22" and 24.5" Front Assemblies	16 Ounces
20" and 22.5" Rear Assemblies	20 Ounces
22" and 24.5" Rear Assemblies	20 Ounces
12.00x20 and 12.00 R 20 Front Assemblies	19 Ounces
B 12.00x20 and 12.00 R 20 Rear Assemblies	23 Ounces
All Larger Sizes, Front Assemblies	21 Ounces
All Larger Sizes, Rear Assemblies	23 Ounces
All Duplex Assemblies	30 Ounces

B A M/F

ORIGINAL JOB NO.	TITLE	PART NO.
C1290	ALUMINUM PAINT FINISH FOR DIE CASTINGS	49-00031
LAST CHG LTR		SHEET 1 OF 1

CHANGE INFORMATION	DATE	BY	JOB NO.	LTR

A. METAL PREPARATION

1. All parts shall be sanded, buffed and polished to remove the flash from parting line and mounting holes, surface defects and corrosion. The castings shall also be free of grinder marks and other surface defects. Use a coarse sanding paper to remove corrosion and/or surface imperfections, followed by a fine grit sanding paper to level and smooth the surface.

B. CHEMICAL PREPARATION

1. All castings must be cleaned and subjected to a chemical preparation treatment to provide better paint adhesion, reduced corrosion creepage under the paint surface and protection for unpainted surfaces. (Suggested chemical preparation treatment - DuPont 225S cleaner and 226S conversion coating)

C. PRIMING

Prime all exterior surfaces with DuPont Corlar epoxy primer, as follows:

1. Mix two parts Corlar 825S primer with one part 826S activator. Reduce three parts or this mixture with one part DuPont 360Z lacquer thinner reducer.
2. Allow one hour from time of mixing to time of use. This will allow the Corlar primer and activator to properly activate the resins for complete chemical induction.
3. The spraying viscosity is 18-22 seconds in the Zahn cup No. 2.
4. Apply primer to all exterior surfaces of cast housing and bracket. Spray one full wet coat to give a dry film thickness of 0.7 to 1.0 mils.
5. Allow the primer to dry 2 to 4 hours before applying top coat.

D. TOP COAT

1. Apply DuPont Acrylic Enamel "No smudge aluminum" No. 916-23994 using 65 psi pressure at the gun (pot pressure of 20 psi for a fluid flow of 20-25 oz. per minute).
2. Apply two full wet coats, allowing the first coat to flash-off completely before applying the second coat.
3. Allow paint to air dry.

CHANGE INFORMATION	DATE	BY	JOB NO.	TR

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APPROVED	NLK	9/8/78			

ORIGINAL JOB NO.	TITLE	PART NO.
66303	CHEMICALLY POLISHED ALUMINUM	49-00032
LAST CHG LTR		SHEET 1 OF 2

SCOPE: This specification identifies the chemical polishing of aluminum alloy materials.

APPLICATIONS: Surface treatments prior to coatings.

PROCESS NUMBERS:

TYPE OF PROCESS	TYPE OF FINISH	METHOD OF FINISHING	AA-DESIGNATION	APPLICATIONS	FREIGHTLINER PROCESS NUMBER
NON-ETCHED CLEANING	DEGREASED	(1)	C11		49-00032-101
	INHIBITED CHEMICAL CLEANED SURFACE	(2)	C12		-102
ETCHING	FINE MATTE	(3)	C21		-201
	MEDIUM MATTE	(4)	C22	-Grille	-202
	COARSE MATTE	(5)	C23		-203
BRIGHT DIP	HIGHLY SPECULAR	(6)	C31	-Grille	-301
	DIFFUSE BRIGHT	(7)	C32	-Grille(alt.)	-302

ENGINEERING NOTES:

(1) Treated with organic solvent.

(2) Use inhibited chemical-type cleaner.

COMPILED	DANG	DATE DRAWN			
APPROVED	RG	1/30/79			

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ORIGINAL JOB NO.	TITLE	PART NO.
66303	CHEMICAL POLISHED ALUMINUM	49-00032
LAST CHG LTR		SHEET 2 OF 2

ENGINEER NOTES: (continued)

3. Trisodium phosphate, 3-6 oz. per ga. used @ 140°-160°F for 3 to 5 minutes.

4. Sodium hydroxide, 4-6 oz. per ga. used @ 140°-150°F for 5 minutes.

5. Sodium fluoride, 1½ oz. plus sodium hydroxide, 4-6 oz. per ga. used @ 140°-150°F for 5 minutes.

6. Chemically bright-dip solution of the proprietary phosphoric nitric acid-type used, or proprietary electrobrightening or elctropolishing treatment.

7. Etched finish C22 followed by brightened finish C31.

8. This specification is applicable only to aluminum and aluminum alloys

9. AA: aluminum Association standard code for aluminum finish.

10. Example of callout:

"Chemical finish per process specification 49-00032-202"

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ORIGINAL JOB NO.	TITLE	PART NO.
C09102	PERFORATING ABS UPHOLSTERY PANELS	49-00033
LAST CHG LTR		SHEET 1 OF 1

SCOPE: This specification describes the hole pattern for perforated ABS sheet.

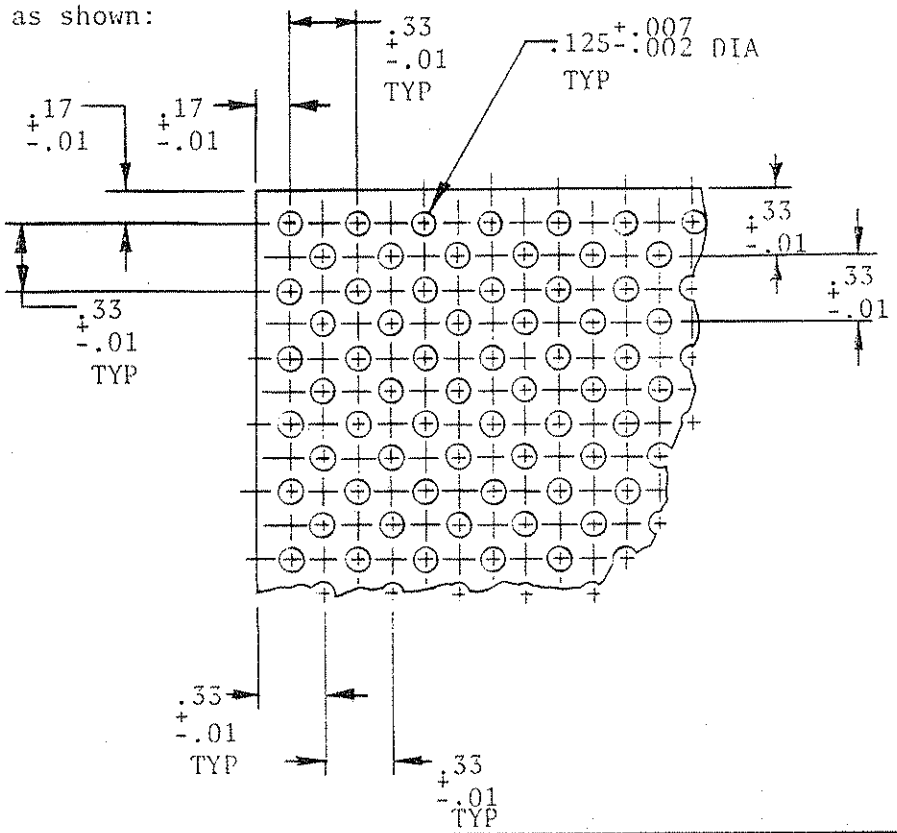
APPLICATION: Perforating ABS sheet used as raw material for cab interior upholstery.

SPECIFICATION NUMBERS:

MATERIAL	PROCEDURE NUMBER (see below)	FREIGHTLINER SPECIFICATION NUMBER
ABS sheet (# specified by the raw material defined to be the "standard" level interior).	1	49-00033-000

PROCEDURE:

1. Perforate as shown:



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APPROVED		3/19/79			

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ORIGINAL JOB NO.	TITLE	PART NO.
0279C	ADHESIVE BONDING OF FRP MATERIAL	49-00041
LAST CHG LTR		SHEET 1 OF 1

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION

LTR	JOB NO.	BY	DATE	CHANGE INFORMATION

SCOPE:

This process specification outlines the proper procedures for the application of structural adhesives for bonding FRP material.

APPLICATION:

Used for adhesive bonding fiber reinforced plastics such as hoods and hood reinforcements.

PROCEDURE:

1. For an open molded part, scuff sand the bond area down to dry glass. This is to ensure that the bonding area is completely cured.
2. Completely air blow or solvent wipe the sanded area to remove sanding residue.
3. Make sure that the sanded areas are clean and dry.
4. Apply wash primer to the bond areas of both pieces being bonded. The primer may be applied in a continuous wiping motion such that the surface remains wet momentarily following the wipe action.
5. Apply adhesive and assemble. All excess adhesive should be removed from the bond line. This can be accomplished by using a paint scraper or spatula to trim excess material before post curing the bond.
6. Wait until fixturing strength is achieved before moving assembly.

Ref. Material Specification 48-02438 for materials.

COMPILED	KCB	DATE DRAWN			MASTER NUMBER
APPROVED	DJL	3/22/84			644N1

ORIGINAL JOB NO.	TITLE	PART NO.
K0183	PRIMING, PLASTIC EXTERIOR CAB COMPONENTS	49-00044
LAST CHG LTR		SHEET 1 OF 2

CHANGE INFORMATION	DATE	BY	JOB NO.	LTR

CHANGE INFORMATION	DATE	BY	JOB NO.	JR

1.0 Scope

1.1 This specification covers the surface finishing and prime painting requirements, inspection, quality control and handling of plastic exterior cab parts prior to shipment to a Freightliner assembly plant.

2.0 Application

2.1 This prime finish is intended for use on exterior plastic parts which will subsequently receive an approved production color coat in a Freightliner assembly plant.

3.0 Requirements

3.1 General

3.1.1 This specification is not intended to limit or specify the process used for painting. Any process resulting in a satisfactory primed part meeting the requirements of this specification will be approved.

3.1.2 The quality required is that obtained with best commercial practice to consistently meet the requirements of this specification.

3.2 Specific Requirements

3.2.1 Color - The color of the primer must be light gray to match PPG's "Uniprime" ED-3150.

3.2.2 Film Thickness - A primer coat of 0.75 mil (0.019 mm) minimum dry film thickness shall be applied which is compatible with subsequent coating of an approved production top coat.

3.3 Surface Finish

3.3.1 Any commercial method may be utilized to clean the substrate from all traces of contamination, such as dirt, grease, fingerprints, mold release agents, oils, etc., which may be detrimental to adhesion as well as surface appearance provided that the plastic part properties are not affected or degraded.

3.3.2 Surface quality shall be such that, after painting, the finish is equivalent to that of painted cold rolled steel sheet. There shall be no visible fiber pattern, pinholing, cratering, waviness, sags, runs or other surface defects.

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COMPILED	TW				
APPROVED	BEL	05-21-84			

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3.3.3 Parts must be free from surface porosity or the surface must be properly sealed so there is no crazing, blisters or any surface defects before or after they have gone through the complete Freightliner painting and baking cycle.

3.3.4 Control of production parts shall be accomplished through comparison with master samples from the initial qualification of molded parts.

3.3.5 The primed parts shall be compatible with paint finishing operations employed by Freightliner. Surface preparation shall be sufficient to allow the finishing paint top coat to meet the performance and quality requirements cited in the Freightliner Paint and Finish Specification Manual.

3.3.6 After being subjected to the standard Freightliner finishing operations, parts shall not delaminate, blister, shrink, warp or sag. The finish paint shall not exhibit craters or pinholes. There shall be no failure in adhesive bonded joints.

4.0 Inspection

4.1 After prime painting and curing, the parts shall be inspected for surface defects which would prevent the required final enamel surface (see 3.3.2) from being achieved. Defects shall be repaired so that the required final finish surface can be achieved.

5.0 Quality Control

5.1 The quality of the material and workmanship shall be the responsibility of the supplier. It is also the supplier's responsibility to insure that the materials chosen do not affect the substrate nor degrade the properties of the plastic. The materials shall be compatible with and not prevent the finish enamel from passing the adhesion, gloss and durability requirements as specified in the Freightliner Paint and Finish Specification Manual.

6.0 Shipment

6.1 Parts shall be packaged and shipped in such a manner as to protect the surface finish in transit, and thus minimize the surface preparation prior to top coat finishing.

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