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26883 PDF

CITRA SAFE ®

INLAND TECHNOLOGY INCORPORATED
2612 Pacific Hwy. East, Tacoma,. WA 98424
206-922-8932 • 800-552-3100

Inland Technology Incorporated

Inland Technology Incorporated, is a privately owned corporation that is dedicated to the development and production of advanced solvents that are critical to all industries having to respond to the environmental challenges of the 1990s. Inland, operating from their facilities in Tacoma, Washington, is committed to customer satisfaction through quality - Total Quality Management (TQM) is an essential component of Inland's corporate commitments. During the past eight years, Inland has become a preeminent company in the advancement of environmentally responsive solvents:

- Inland is a member of the Joint Association for the Advancement of Supercritical Technology (JAAST). Inland was invited to participate as a full member amongst other technology giants such as Los Alamos National Laboratories, Battelle Northwest Laboratories, IBM, Boeing, Hughes and Autoclave Engineering.

- Inland is an invited member of International Air Transport Association and participated in their subcommittee for non-chlorinated paint stripping alternatives.

- Inland is active in the ASTM G-4 subcommittee searching for new technologies for cleaning LOX lines.

- Inland is active in the SAE G-9 subcommittee on advanced methods for sealant applications.

- Inland is an invited participant on U.S. Environmental Protection Agency's "Use Cluster" committees for development of printing and aerospace industry regulations.

Inland actively supports many of the largest companies in the United States, as well as federal government agencies, including: Westinghouse, Weyerhaeuser, Kodak, McDonnell Douglas, Grumman, Northrop, Boeing, Los Alamos National Laboratories, Lawrence Livermore National Laboratory, U.S. Navy, and the U.S. Air Force.

TO DATE, THE SCIENTISTS AND ENGINEERS AT INLAND TECHNOLOGY INC. VE DEVELOPED SUCCESSFUL SUBSTITUTES FOR THE FOLLOWING PROBLEM SOLVENTS:

TOXIC SOLVENT	USAGE	SUBSTITUTES	COMMENTS
Methylene Chloride	Paint stripping; cold tank soak; resin removal	**CITREX X-CALIBER**	Both products are biodegradable; CITREX is not regulated by RCRA or SARA, Title III. Both are low VOC.
1,1,1 :hloroethane	Electronic & electrical cleaning. Also, metal preparation	**CITRA SAFE® TEKSOL EP**	CITRA SAFE is biodegradable; TEKSOL EP is not regulated by SARA, Title III. Both are low VOC and non chlorinated
Methyl Ethyl etone (MEK)	Surface preparation for painting or welding	**SAFETY PREP CITRA SAFE TEKSOL EP**	SAFETY PREP, CITRA SAFE and TEKSOL EP are biodegradable; all are low VOC's
luene / Xylene	Surface preparation for painting or welding	**SAFETY PREP CITRA SAFE TEKSOL EP**	Same as above
Acetone	Cleaning of fiberglass & epoxy resins	**Z-STRIP CITREX**	Low VOC's & toxicity; High flash point; CITREX is biodegradable
ldard Solvent / ineral Spirits	Parts washing & paint clean up	**CITRA SAFE TEKSOL EP BREAKTHROUGH**	Low VOC's: CITRA SAFE is biodegradable; BREAKTHROUGH is free from most regulations TEKSOL EP is low toxicity
:hloroethylene	Degreasing & resin removal	**CITREX TEKSOL EP CITRA SAFE**	CITREX and CITRA SAFE are biodegradable, low VOC. TEKSOL EP is non chlorinated with low toxicity
:hloroethylene	Degreasing	**CITRA SAFE ISO-PREP BREAKTHROUGH**	Non-halogenated Low VOC's, easier disposal; Low Toxicity
lethyl Ethyl :tone (MEK)	Paint Gun Cleanup	**EP 921**	Biodegradable, High Flash Point, Low VOC, not regulated by RCRA or SARA Title III
Freon 113	Vapor Degreasing; Precision Cleaning	**CITRA SAFE OR SKYSOL WITH ULTRA FILTRATION**	CITRA SAFE biodegradable; SKYSOL is not regulated by RCRA or SARA Title III, Section 313, both are low VOC's
1,1,1 chloroethane	Vapor Degreasing; Precision Cleaning	**CITRA SAFE OR SKYSOL WITH ULTRA FILTRATION**	CITRA SAFE is biodegradable; SKYSOL is not regulated by RCRA or SARA Title III, Section 313. Both are low VOC's

ıld be noted that performance needs vary from application to application and that none of these substitutes be expected to be 100% cross over for all applications.

:he chemical behaviors of these substitutes (vapor pressures, dry time, etc.) may differ from solvents being :d which may require changes in work practices in order for substitutes to be successful.

INLAND TECHNOLOGY INC. 1-800-552-3100

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CITRA SAFE®

Developed for use in the aerospace industry, **CITRA SAFE®** is a *low-volatility substitute* for Methyl Ethyl Ketone (MEK), 1, 1, 1 Trichloroethane, Toluene and blends of MEK and Toluene. **CITRA SAFE®** is made especially for surface preparation, general solvent cleaning, and cleaning prior to sealing. It is literally a biodegradable solvent replacement for mineral spirits, thinners, and chlorinated solvents. The use of **CITRA SAFE®** reduces risks of hazardous chemical spills, eliminates most hazardous waste disposal costs, and eliminates the health hazards associated with traditional solvents.

CITRA SAFE® enjoys the following specifications:

BOEING AIRCRAFT COMPANY

- BAC 5504 cleaning prior to sealing in fuel cells
- BAC 5000 cleaning prior to general sealing
- BAC 5750 general solvent cleaning

AIRBUS INDUSTRY

- SIL Number 20-006 - replace 1, 1, 1 Trichloroethane and Methyl Ethyl Ketone for general cleaning tasks

ROCKETDYNE DIVISION ROCKWELL INT.

- RB0210 - 028 cleaning fluid, low vapor pressure aliphatic.

ADVANCED TECHNOLOGY LABORATORIES

- ATL 2310 - 0624 - 01 Replace 1, 1, 1 Trichloroethane for general solvent cleaning
- ATL 2301 - 0625 - 01 Replace Freon 113/IPA blend for cleaning crystal lattices

NORTH ATLANTIC TREATY ORGANIZATION

- NATO 6850-66-137-6036

PHYSICAL/CHEMICAL CHARACTERISTICS

Initial Boiling Point: 340F
Vapor Pressure mmHg @ 25° C:<2
Vapor Density (air=1):>4
Evaporation Rate (N-Butyl=1): < .1
Solubility: Not water soluble

Appearance & Odor: Clear with mild citrus odor
Specific Gravity (H_2O=1): .84
Volatile by Volume: 100%
Flash Point: 132F PMCC
Surface Tension (dynes/cm) = 29.8

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The following pages contain an article printed in Boeing's Airliner Magazine, January 1990 issue.

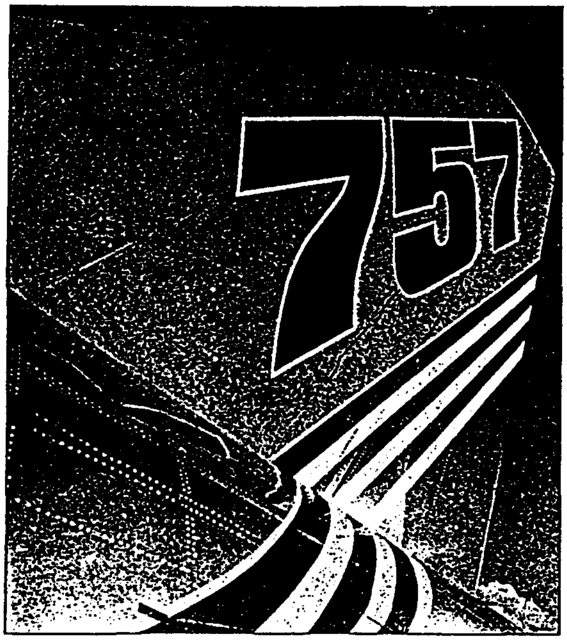
In it the author is describing some of Boeing's developments in using Environmentally Friendlier Processes and Products.

Specifically mentioned on pages 9 - 10 under Manual Solvent Cleaner Substitutes is Inland Technology's CITRA SAFE, a low VOC material acceptable for cleaning before painting and sealing.

BOEING AIRLINER

PUBLISHED QUARTERLY

JANUARY-MARCH 1990



NEW AIRCRAFT FINISHES

NEW AIRCRAFT FINISHES HELP CLEAN UP THE ENVIRONMENT

John H. Jones
Principal Engineer
Boeing Materials Technology

New finishing materials and processes are starting to be implemented into the production of Boeing airplanes as a result of recent advances in technology and increasingly stringent environmental regulations. New cleaning solvents, primers, and an acid deoxidizer have so far been incorporated, and development and testing are underway on other new environmentally compliant materials. Boeing has an on-going program of materials and process development to decrease or eliminate the use of potentially hazardous substances.

Environmental regulations are decreasing permissible amounts of commonly used aircraft finishing materials. Boeing Puget Sound operations and Boeing subcontractors nationwide are affected. Two broad categories of materials are currently receiving most of the attention: solvents and hexavalent chromium (sometimes called *chrome 6*). These are two vital components in the finishing of aircraft structure.

FINISHING REQUIREMENTS

Approximately 79% of aircraft structure is aluminum alloy (see Figure 1). Most fuselage, empennage, and wing primary structure is made of high strength aluminum alloys. Typical assembled structure on the inside of the fuselage is pictured in Figure 2. Because of their tendency to corrode in aircraft environments, the extended time between routine inspection in many hard to access places, and their load carrying functions, aluminum alloy parts are protected with finishes which have closely controlled properties. On the inside of the airplane, all aluminum load carrying structure is painted before assembly. The paint system consists of an epoxy primer and in many areas, an epoxy or polyurethane enamel topcoat. The primer contains special corrosion inhibiting compounds which are very effective in protecting aluminum alloys. The primer and topcoat are resistant to fluids commonly found on aircraft such as water, hydraulic fluid, jet fuel, and lubrication oil.

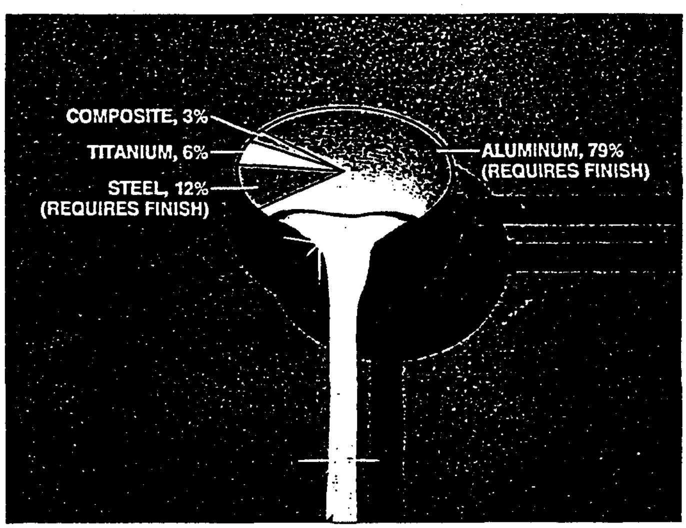


Figure 1. Approximate distribution of airplane materials.

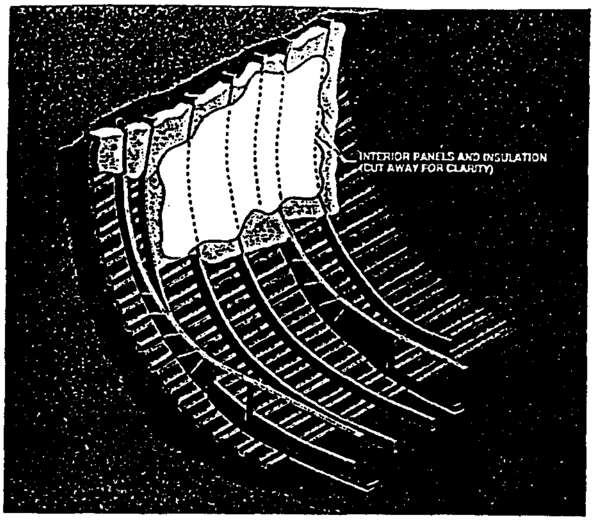


Figure 2. Typical airplane structure.

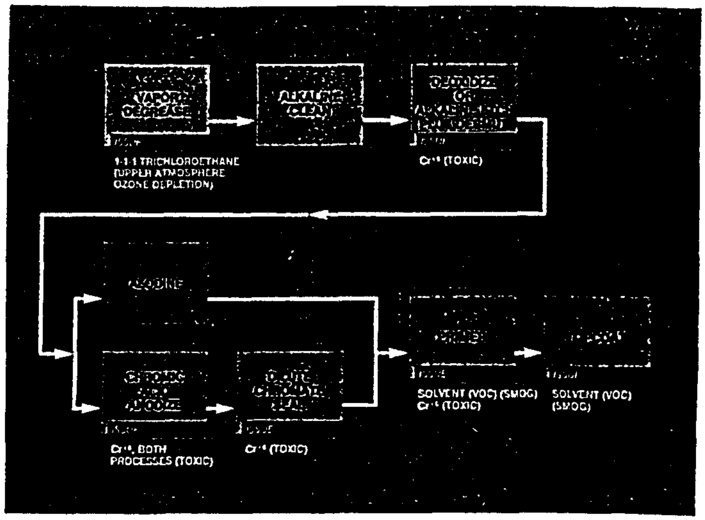


Figure 3. Typical flow chart for aluminum finishing, emphasizing environmental concerns.

Before being painted, each aluminum part must be cleaned of oil, grease, and other contamination to assure that the paint will adhere. The typical aluminum finishing process flow is shown in Figure 3. The vapor degreaser and alkaline cleaner remove grease and oil. The deoxidizer removes the contaminated natural oxide film. The next step, anodizing or chemical conversion coating, produces a new, clean, uniform oxide film (which may contain corrosion inhibitors) to which primer readily adheres. Also, manually applied solvents are used extensively to clean up incidental contamination and to clean assemblies of painted parts before application of more paint and sealant.

REGULATED MATERIALS

As shown in Figure 3, most of the steps in the typical finishing process utilize regulated solvents and/or hexavalent chromium. Recent environmental studies have shown that these materials, which were previously industry standards, appear to be potentially hazardous to both people and the environment.

Vapor Degreasing Solvents

Common vapor degreasing solvents such as 1-1-1 trichloroethane and trichloroethylene are coming under increased regulation as upper atmosphere (stratosphere) ozone depleters. Some industrial solvents, notably chlorofluorocarbons (CFCs), cause relatively rapid ozone destruction, eliminating its shielding effectiveness. Other solvents such as 1-1-1 trichloroethane destroy ozone more slowly but are used in much greater quantities than the CFCs.

Smog-Forming Solvents (VOCs)

Many solvents used in paints and for general wipe cleaning purposes contribute to *smog* formation. Examples of these solvents are alcohols, acetone, methyl ethyl ketone, toluene and xylene. Solvents which produce smog are commonly referred to as *volatile organic compounds* or VOCs in regulatory terminology.

Hexavalent Chromium

Chromium in the +6 oxidation state (i.e., chromium which has lost 6 electrons), called *hexavalent chromium*, has been found to be a carcinogen in humans when inhaled. Hexavalent chromium compounds such as chromic acid, sodium dichromate, zinc chromate, and strontium chromate are integral parts of several processing solutions and primers as shown in Figure 3.

NEW MATERIALS AND PROCESSES

Vapor Degreasing Solvent Substitutes

Boeing is pursuing a concept of replacing vapor degreasers with heavy duty emulsion cleaners. This represents a significant departure from conventional practice because vapor phase cleaning would be replaced by immersion in a water-solvent suspension. Several candidates have been successfully laboratory tested and are undergoing larger scale tests. When the Boeing Sheet Metal Center begins production in 1990, emulsion cleaners will be used instead of vapor degreasers in some of its major finishing lines.

Manual Solvent Cleaner Substitutes

Many manual wipe cleaners such as acetone, methyl ethyl ketone, and toluene are VOCs. Replacements have been qualified which have low VOC vapor pressures. A common regulatory limit for VOC vapor pressure is 45 mm Hg, so the newly developed products are formulated to fall below this value. Low VOC solvents recently qualified for cleaning before painting are listed in Table 1. The materials listed are low VOC mixtures

Solvent Mixture	Vapor Pressure
MEK (60% by volume) + MIBK (40%)	< 45 mm Hg
MEK (42±2% by volumne) + Secondary Butyl Alcohol (58±2%)	< 45 mm Hg

Table 1. Low VOC manual solvent cleaners qualified to BAC 5750.

BOEING SPECIFICATION	MANUFACTURER	SOLVENT TYPE	COMMENTS
BMS 10-11 Type I, Class A, Grade B	DeSoto Base: 515x385 Curing Solution: 910 x 769 Thinner: 010 x 319	1-1-1 Trichloroethane	Low VOC primer. Cannot be used for wet installations. Lead free.
	AKZO Base: 463-6-78 Curing Solution: X-515 Thinner: TL-164	1-1-1 Trichloroethane	Low VOC primer. Cannot be used for wet installations. Lead free.
BMS 10-79 Type II and III, Class A, Grade B	DeSoto Base: 513x411 Curing Solution: 910 x 811 Thinner: 010 x 320	1-1-1 Trichloroethane	Low VOC primer. Cannot be used for wet installations. Lead free.
BAC 5710 Type 59	Crown Metro Base: 10-P4-19 Curing Solution: EC-178	Conventional	Low VOC, non-chlorinated. For wet installation only, cannot be sprayed.
BMS 10-79 Type III, Class A, Grade C	DeSoto Base: 515x394 Curing Solution: 910 x 897	Conventional	Low VOC, non-chlorinated. For wet installation only, cannot be sprayed. Urethane compatible.
BMS 10-103 Type I	DeSoto Base: 512x310 Curing Solution: 910 x 533	Conventional	Chrome-free primer for use on composites. Urethane compatible.

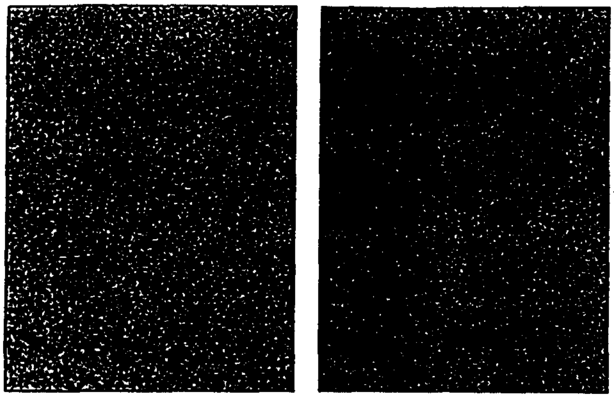
Table 2. Environmentally compliant primers and wet-installation materials.

of conventional cleaning solvents. Another material, *Citra-Safe* (Inland Technology Company), a low VOC citrus extract, has been found to be technically acceptable for cleaning before painting and sealing. Implementation of this material is Boeing shops is awaiting full industrial hygiene evaluation.

Paint Primer Substitutes

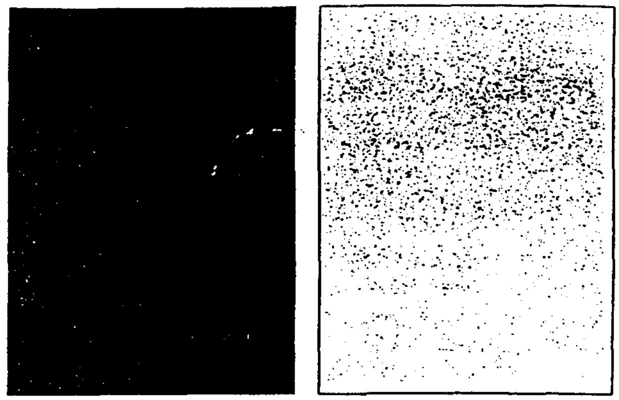
Three new low VOC primers with VOC contents less than 350 grams/liter are now in use on Boeing airplanes. Details are given in Table 2. One BMS 10-11 Type I substitute (DeSoto) is a slightly different shade of green compared to conventional solvent BMS 10-11 Type I, as illustrated in Figure 4. The Akzo Type I substitute has the conventional green color.

The three low VOC primers contain solvents which must not be used to wet *install* components such as bushings, bearings, and shims. This is to avoid the possibility of trapping the solvent which could decompose, form an acid, and cause corrosion in the joint. As substitutes for wet installation primers, two new non-chlorinated low VOC materials have been developed with details given



Grade A (conventional) and Akzo Grade B (low-VOC) | Desoto Grade B (low-VOC)

Figure 4. Appearance of BMS 10-11, Type I primers.



Conventional BMS 10-79, Type III | Chrome-free BMS 10-103, Type I

Figure 5. Appearance of primers for use on composites.

in Table 2. These low VOC materials can be applied by brushing or dipping but are too thick for spray application.

A chrome-free, conventional-solvent primer, BMS 10-103 Type I, has been developed for use on composite structure (details in Table 2). Since composites do not corrode, corrosion inhibiting chromates are not required in primers applied to them. This new material, which is a substitute for BMS 10-79 Type III primer is gray in color, compared to the dark olive drab of conventional BMS 10-79 Type III, as pictured in Figure 5. Work is continuing in Boeing laboratories to identify chrome-free low VOC primers for use on aluminum alloys, low VOC primers which do not contain chlorinated solvents, and low VOC topcoats.

Deoxidizer Substitutes

A chrome-free deoxidizer has been approved for use in surface preparation prior to the phosphoric acid anodizing process (details are in Table 3). This new process is electrolytic in a phosphoric acid solution, with parameters which differ from phosphoric acid anodizing. Work is underway to test this deoxidation process as preparation prior to conventional anodizing and chemical conversion coating application, which would qualify it as an option for general purpose deoxidizing.

Simple immersion (non-electrolytic) deoxidizers are under study in the laboratory, and plans to scale-up a promising candidate are being made. Chrome-free desmut solutions, used after alkaline etch cleaning, are in limited production use in Boeing shops.

Chemical Conversion Coating Substitutes

Development work on chrome-free chemical conversion coatings is being pursued in Boeing laboratories. While several candidates are under study, only one has so far shown all of the required corrosion resistance and paint adhesion properties. This candidate is being extensively evaluated and optimized, with the goal of developing it to pilot-scale in mid-1990. It is currently being submitted for patent coverage.

	ELECTROLYTE COMPOSITION	ELECTROLYTE TEMPERATURE	IMMERSION TIME	RECTIFIER DC VOLTAGE
Phosphoric Acid Deoxidizer (BAC 5555)	20 ± 2% H_3PO_4 in water	85 ± 5°F	8 - 12 minutes	7 ± 1 volts
Phosphoric Acid Anodize (BAC 5555)	10 ± 2% H_3PO_4 in water	77 ± 5°F	20 - 25 minutes	15 ± 1 volts

Table 3. Non-chromated phosphoric acid deoxidizer for use in structural adhesive bonding surface preparation. Phosphoric acid anodize parameters listed for comparison.

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The following is a Boeing Process Specification for general solvent cleaning indicating that Inland Technology's CITRA SAFE has been approved for use under Boeing's Aircraft Specification BAC 5750

APPROVED SUBSTITUTION:

Low VOC, CITRA SAFE substitutes for M.E.K. and 50/50 blends of M.E.K. and 1,1,1 Trichloroethane.

PROCESS SPECIFICATION DEPARTURE		PSD NUMBER 6-39 PG 1 OF 2	PROCESS SPEC NO BAC 5750
☒ OPTION ☐ REQUIREMENT ☐ COMMITTED CHANGE	ORIG R. G. Lantz (signature)	PROCESS SPEC TITLE	
	SUPV (signature)	SOLVENT CLEANING	
REASON: Allow the use of Citrasafe for solvent cleaning.	MFG J.E. HOWELL (signature)		
	QUAL R. A. (signature)		
	MAT'L J.E. HOWELL (signature)		
	ENG APPROVAL (signature) Cator	1-28-91 REL'S DATE	
SUBCONTRACTOR(S) AFFECTED	ON MODELS	MFG DEPTS OF DIV BELOW AFFECTED	
ALL	ALL COMMERCIAL AIRPLANES AND DERIVATIVES THEREOF	BCAG AND SUPPORTING	

5 MATERIALS CONTROL

Add the following new Item:

x. Citra-Safe, Inland Technology, Inc., Tacoma, WA

8 MANUFACTURING CONTROL

ADVANCE COPY

PROCESS SPECIFICATION DEPARTURE ☐ OPTION ■ REQUIREMENT ☐ COMMITTED CHANGE	K. Ekstrom ORIG K. Ekstrom	PSD NUMBER 6-43 PG 1 OF 5	PROCESS SPEC NO. BAC 5750
	SUPV. T. Lelland	PROCESS SPEC TITLE SOLVENT CLEANING	
	S.A. Richardson for MFG J.E. HOWELL		
REASON: Add compliant solvents for final cleaning; add instructions for cleaning new polymerics. To make consistent with restrictions in BAC 5753, the titanium group has confirmed that 550F is the proper temperature.	E. Tanng for QUAL R. A. SENSKE		
	S.A. Richardson for MAT'L J.E. HOWELL		
	ENG APPROVAL Narayanan FOR R.G. CATON	9-12-91 REL'S DATE	
SUBCONTRACTOR(S) AFFECTED ALL	ON MODELS ALL COMMERCIAL AIRPLANES AND DERIVATIVES THEREOF	MFG DEPTS OF DIV BELOW AFFECTED BCAG AND SUPPORTING	

THIS PSD SUPERSEDES PSDs 6-39 AND 6-42

5 MATERIALS CONTROL

Add the following new Items:

x. sec-Butyl Alcohol, ASTM D 1007

y. Citra Safe, Inland Technology, Inc., Tacoma, Wa.

z. 1,1,1-Trichloroethane (TCA), MIL-T-81533, O-T-620

8 MANUFACTURING CONTROL

8.2 SOLVENT SELECTION

Revise Table I and Table II to read as follows:

PROCESS SPECIFICATION DEPARTURE ☒ OPTION ☐ REQUIREMENT ☐ COMMITTED CHANGE	ORIG R. G. Lantz	PSD NUMBER 6-39 PG 1 OF 2	PROCESS SPEC NO BAC 5750
REASON: Allow the use of Citrasafe for solvent cleaning.	SUPV MFG J.E. HOWELL QUAL MAT'L J.E. HOWELL ENG APPROVAL	PROCESS SPEC TITLE SOLVENT CLEANING REL'S DATE 1-28-91	
SUBCONTRACTOR(S) AFFECTED ALL	ON MODELS ALL COMMERCIAL AIRPLANES AND DERIVATIVES THEREOF	MFG DEPTS OF DIV BELOW AFFECTED BCAG AND SUPPORTING	

5 MATERIALS CONTROL

Add the following new Item:

x. Citra-Safe, Inland Technology, Inc., Tacoma, WA

8 MANUFACTURING CONTROL

ADVANCE COPY

8.2 SOLVENT SELECTION

TABLE I

SOLVENTS FOR METALS AND COATED SURFACES

Add the following new Item:

	Solvent	Method: Preclean (8.3) Spot Clean (8.5)	Final Clean (8.4)	Hydraulic Fluid; Fuel (8.7)	Surface: Metal	Coatings	Low Toxicity, Low Vapor Pressure	Confined Areas 1/
Nonpolar	Aliphatic, Non-petroleum							
Nonpolar	Citra-Safe	X	X		X	X		
	Chlorinated Solvents and Solvent Mixtures 2/							
	1:1 Mixture of 1,1,1-Tri-Chloroethane (Section 5ae.) + Methyl Ethyl Ketone (Section 5v.)	X	X		X	Solv. Res. Finish Only		

2/ These solvents contain chlorinated hydrocarbons and are prohibited for use on titanium and titanium alloys which will be subjected to temperatures of 600F or above during subsequent processing such as stress relieving, annealing, welding, or service environment.

TABLE II

CLEANERS FOR POLYMERIC MATERIALS

Change the Composite Laminated Structures to read as follows:

Composite (Epoxy Resin) Laminated Structures	Graphite Epoxy Fiberglas/Epoxy Kevlar/Epoxy	MEK, Acetone or Citra-Safe

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The following is a Boeing Process Specification for cleaning prior to sealing in fuel cells. It indicates (on page 3 of BAC 5504) that Inland Technology's CITRA SAFE has been tested and approved under Boeing Aircraft Specification BAC 5504.

APPROVED SUBSTITUTION:

Low VOC, CITRA SAFE substitutes for M.E.K. and 1,1,1 Trichloroethane.

PROCESS SPECIFICATION DEPARTURE ☐ OPTION ☒ REQUIREMENT ☐ COMMITTED CHANGE	ORIG W. G. Joyce 3/7/90	PSD NUMBER 6-49 PG 1 OF 4	PROCESS SPEC NO. BAC 5504
	SUPV John Bailey 3/12/90	PROCESS SPEC TITLE INTEGRAL FUEL TANK STRUCTURE SEALING	
	MFG G. Barkley for J. Hewell		
REASON: To implement the usage of BMS 5-26, Ty II, Class A-4, an improved sealant for pre-coating and BMS 5-26, Ty II, Class C-168, a new long assembly time sealant for faying surface sealing.	QUAL Orlie Cooper for R.A. Senske		
	MAT'L G. Barkley for J. Hewell		
	ENG APPROVAL Alan Miller 4/9/90		REL'S DATE 4-25-90
SUBCONTRACTOR(S) AFFECTED	ON MODELS	MFG DEPTS OF DIV BELOW AFFECTED	
ALL	ALL COMMERCIAL AIRPLANES AND DERIVATIVES THEREOF	BCAG AND SUPPORTING	

THIS PSD SUPERSEDES PSD'S 6-47 AND 6-48

8 MANUFACTURING CONTROL

8.2 SEALING MATERIALS

8.2.1 BMS 5-26 INTEGRAL FUEL TANK SEALANT

Revise Items b.(1) and d., and Table I to read as follows:

b. There are three Classes of sealant in BMS 5-26, Type II as follows:

(1) BMS 5-26, Type II, Class A is a two-component (base and curing compound) sealing material suitable for brush application. Class A-2 and Class A-4 materials are covered under BMS 5-26. Class A-4 is the only Class A material approved for use under this specification.

NOTE: Existing stocks of BMS 5-26, Type II, Class A-2 may be utilized until the required inventory of BMS 5-26, Type II, Class A-4 is established.

1 **SCOPE**

This specification establishes the requirements for the sealing of integral fuel tank structures. When no sealant type is indicated on drawings, BMS 5-26, Type II applies.

2 **CLASSIFICATION**

Not applicable to this specification.

3 **REFERENCES**

The current issue of the following references shall be considered a part of this specification to the extent herein indicated.

BAC 5000	Sealing, General
BAC 5004	Riveting
BAC 5009	Bolt and Nut Installation
BAC 5019	Chromic Acid Anodizing
BAC 5020	Rivet and Collar Assembly Installation
BAC 5047	Fluid Tight, Fastener Installation
BAC 5060	Installation of Interference Fit, Radius Lead-In Fastener
BAC 5719	Chemical Conversion Coatings for Aluminum and Aluminum Alloys
BAC 5793	Application of Corrosion Resistant Finish for Integral Fuel Tanks
BSS 7217	Air Cleanliness Shop Compressed Air

ACTIVE PAGES: (1) Rev. K (2) Rev. F (3) Rev. K (4) Rev. K (5) Rev. K (6) Rev. K (7) Rev. K (8) Rev. K (9) Rev. F (10) Rev. K (11) Rev. K (12) Rev. K (13) Rev. K (14) Rev. K (15) Rev. K (16) Rev. K (17) Rev. K (18) Rev. K (19) Rev. K (20) Rev. K (21) Rev. K (22) Rev. K (23) Rev. K

ORIGINAL ISSUE: 5-19-55

REV.: "F" 10-13-77 "G" 10-19-78 "H" [illegible] "J" 10-21-86 "K" 12-2[illegible]

A. A. Turja

MFG R G Crumier

Q.C. R. H. Senske

MAT'L R. G. Crumier

INTEGRAL FUEL TANK STRUCTURE SEALING

BOEING PROCESS SPECIFICATION

BAC

5504

ER TO NUMERICAL INDEX FOR PSD ACTIVITY INFORMATION

1 NO. 81205

3E REV 5 85

X 310

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5 **MATERIALS CONTROL**

5.1 MATERIALS

a. Aluminum Oxide Paper, 180 Grit or Finer

b. Fiberglass Cloth HG87, Burlington Glass Fabric Co.

c. Buna N Type Coating, EC-776SR (MIL-S-4383B)

d. Cleaning Solvent, Presealing, BMS 11-7

e. Corrosion-Resistant Finish for Integral Fuel Tanks, BMS 10-20

f. Cover, Metal Seal (SDS Item), BAC C50H

g. Dowclean EC, Dow Chemical Company

h. Integral Fuel Tank Sealant, BMS 5-26, Type II 1/

i. Methyl ethyl ketone, ASTM D740 (Flash Point 24F)

j. Sealant cutters and trimmers, made from fiberglass composites, wood, or nonabrasive plastic no harder than 2024-T3 aluminum.

k. Wiping Materials

(1) Finetex, Buffalo Sanitary Wipers Company

(2) Gauze sponges, Johnson and Johnson

(3) Leshner industrial wipers, Leshner Corporation

(4) Pipe cleaners, new, white, American Tobacco

(5) BMS 15-5 Class A

(6) Duralace 9404, Chicopee, New Brunswick, NJ

m. 1,1,1-Trichloroethane in accordance with Federal Spec. O-T-620C

n. Citra Safe Solvent, Inland Technology, Inc.

1/ Storage life is 6 months when stored at 35 to 80F (see Section 5.2 for extension of storage life).

5.2 MATERIAL RETEST REQUIREMENTS

BMS 5-26, Type II shall be retested prior to usage beyond the end of storage life. Retesting shall be in accordance with the acceptance tests of the applicable material specification. When found satisfactory, the storage life may be extended for 3 months, one time only.

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The following is a Boeing Process Specification for cleaning prior to general sealing. Page 1 indicates that Inland Technology's CITRA SAFE has been tested and approved under BAC 5000 for cleaning prior to general sealing application.

APPROVED SUBSTITUTION:

Low VOC, CITRA SAFE substitutes for M.E.K.

PROCESS SPECIFICATION DEPARTURE	ORIG A. A. Turla 9/14/90	PSD NUMBER 6-100 PG 1 OF 2	PROCESS SPEC NO. BAC 5000
☒ OPTION ☐ REQUIREMENT ☐ COMMITTED CHANGE	SUPV 9/17/90	PROCESS SPEC TITLE	
	MFG J.E. HOWELL	SEALING, GENERAL	
REASON: To add Citra Safe as an approved cleaning solvent.	QUAL		
	MATL J.E. HOWELL		
	ENG APPROVAL for A.G. Miller	REL'S DATE 9-27-90	

SUBCONTRACTOR(S) AFFECTED	ON MODELS	MFG DEPTS OF DIV BELOW AFFECTED
ALL	ALL COMMERCIAL AIRPLANES AND DERIVATIVES THEREOF	BCAG AND SUPPORTING

5 **MATERIALS CONTROL**

5.3 SOLVENTS

Add the following new Item:

x. Citra Safe, Inland Technology, Inc.

8 **MANUFACTURING CONTROL**

8.4 APPLICATION REQUIREMENTS

8.4.3 CLEANING

8.4.3.1 General Requirements

Revise Items a. and e. to read as follows:

a. Preliminary cleaning to remove chips, etc. from areas to be sealed may be accomplished with clean wipers (Section 5.4c.) or clean bristle brushes wet with solvents as specified in Section 5.3a., c., f., g., i., or x. Preliminary cleaning also may be accomplished by cleaning in accordance with BAC 5744 where the areas can be thoroughly rinsed. Cleaning in accordance with BAC 5744 shall not be done in an enclosed structure where water can collect or become entrapped.

e. Final cleaning of all surfaces, except unpainted composite laminate surfaces, shall be done just prior to sealant or primer application using solvents specified in Section 5.3a., c., f., g., i., or x. Use wipers in accordance with Section 5.4 for applying and removing solvents.

8.5 DETAIL METHODS OF SEALING

8.5.2 FAYING SURFACE SEALING

Revise Item f.(1) to read as follows;

f. After assembly of the structure, a small bead or fillet of extruded sealant shall be evident along the entire joint. After inspection has noted that squeeze-out requirements have been met and that all voids are filled, treat the excess as follows:

(1) On the exterior side of body skin laps and in locations where fuel tank sealant will be subsequently applied in accordance with BAC 5504, remove the squeeze-out with a plastic or wooden tool and clean cloth dampened with solvent in accordance with Section 5.3a., c., f., g., i., or x. (See Figure 1.)

8.5.8 CORROSION PROTECTION SEALING

8.5.8.4 Fastener Sealing for Corrosion Prevention

Revise Item c.(4) to read as follows:

c. Installation of BACB30PT Fasteners

(4) Clean off excess sealant with a 1:1 by volume mixture of the solvents specified in Sections 5.3a. and h. Solvents specified in Section 5.3a., f., i., or x. also may be used. Use solvents sparingly followed by a dry wipe.

8.5.8.5 Sealing of Bushings and Bearings for Corrosion Prevention

Revise Items a.(1), b.(1) and b.(6) to read as follows:

a. Fillet Sealing Without Wet Installation

(1) Clean the seal surfaces (bushings or bearings and housing) in accordance with Section 8.4.3. Clean bearings with wipers lightly dampened with solvents specified in Section 5.3a., c., f., g., i., or x.

b. Wet Installation and Sealing of Bushings and Bearings

(1) Clean the seal surfaces (bushings or bearings and housing) in accordance with Section 8.4.3. Clean bearings with wipers lightly dampened with solvents specified in Section 5.3a., c., f., g., i. or x.

(6) Remove sealant that extends onto the face of bushing flanges or onto the inner surface of the non-flanged ends using a plastic or wooden scraper or a clean cloth or Q-tip dampened with solvent (Section 5.3a., c., f., i., or x.).

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The following is a specification for CITRA SAFE awarded by Airbus Industrie.

Subject CML - Airbus approval of CITRA SAFE solvent for all general cleaning tasks. This approval was conveyed by the following service information letter (SIL) number 20-006 dated 2 March 1993.

1 ROND POINT MAURICE BELLONTE
31707 BLAGNAC CEDEX FRANCE
TELEPHONE 61 93 33 33
TELEX AIRBU 530526 F

AIRBUS INDUSTRIE

DATE 2nd March 1993
YOUR REFERENCE
OUR REFERENCE SP21/932.0651/93
DIRECT LINE 61.93.43.91
TELECOPY 61.93.43.66

INLAND TECHNOLOGY INC.
2612 Pacific Highway East,
Tacoma,
WA 98424
U.S.A.

Attn : **Marketing Dept.**

SUBJECT : CML - AIRBUS APPROVAL OF "CITRA SAFE" SOLVENT

Dear Sirs,

Please find herewith enclosed an advance copy of Airbus Industrie Service Information Letter (SIL) number 20-006 announcing approval by Airbus Industrie of "Citra Safe" in lieu of CFC containing solvents for all general cleaning tasks.

We trust that this will be of interest to you and remain,

Yours sincerely,

R.W. CORNER
Senior Engineer
Engineering Documentation
Tech Pub/Product Support Directorate

Encl. 6 pages

PRODUCT SUPPORT DIRECTORATE
1 ROND POINT MAURICE BELLONTE
31707 BLAGNAC CEDEX FRANCE
TELEPHONE 61 93 33 33
TELEX AIRBU 530526 F
TELECOPY 61 30 01 25

AIRBUS INDUSTRIE

SERVICE INFORMATION LETTER

APPLICABLE TO : **ALL AIRBUS AIRCRAFT**

SUBJECT : **CONSUMABLE MATERIALS - SOLVENTS**

1. REASON

Airbus Industrie approved materials 11-003 methylethylketone, 11-004 1.1.1. trichloroethane, 11-005 trichlorotrifluoroethylene and their approved alternatives 11-003A, 11-004A, 11-004B, 11-005A contain ozone damaging chlorofluorocarbons (CFC's).
Use of these materials is more and more restricted or banned completely in countries throughout the world.
This SIL advises details of an ozone friendly, non toxic, biodegradable alternative approved for general solvent cleaning tasks on Airbus aircraft.
The new material is known as "citra safe".

2. RECOMMENDATION

Citra safe is an organic D-limonene citrus solvent that may be used as an alternative for all general cleaning tasks detailed in Airbus documentation which call-up usage of materials 11-003, 11-004 or 11-005.

CAUTION

Airbus Industrie does not today approve the use of Citra safe prior to :

- Application of sealants
- Application of paints
- Structural bonding

Further tests are necessary before these approvals can be given.

Citra safe will be entered in the Airbus Industrie consumable materials list as mat. nr 11-016 on the April 1993 revision of this document.

../..

EFFECTIVITY

3. MATERIAL INFORMATION

AIB MAT. NR	DESCRIPTION	REF	PACKAGING
11-016	Safety Solvent	Citra safe	4 liter, 20 liter and 205 liter containers

4. PROCUREMENT INFORMATION

Citra safe is available from :

1. In the USA,

   INLAND TECHNOLOGY Inc. (C.A.G.E. OK 209)
   2612 Pacific Highway East,
   TACOMA
   WA 98424
   U.S.A.

   Telephone : (1) 206.922.8932

2. In EUROPE,

   AKZO Coatings S.A. (NATO F 0098)
   B.P. 140
   93204 SAINT-DENIS
   CEDEX 01
   FRANCE

   Telephone : (33) 1.48.20.61.64
   Telex : 236495 ACOAT
   Telefax : (33) 1.48.20.49.17

3. In AUSTRALIA,

   CALLINGTON HAVEN PTY. LTD.
   2, Euston Street
   Rydalmere
   NSW 2116
   AUSTRALIA

   Telephone : (61) 2.684.1666
   Telefax : (61) 2.684.4215
   Telex : AA176998

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The following is a partial reprint of a paper on V.O.C. Reduction in Solvent Cleaning presented at the 26th annual Aerospace/Airline Plating and Metal Finishing Forum and Exposition in April of 1990.

This paper identifies test protocols and the results of tests on solvent substitute candidates for preparation of surfaces prior to sealant application.

"Only one material was satisfactory for cleaning prior to general sealing - CITRA SAFE, Inland Technology."

The Engineering Society
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Land Sea Air and Space®
INTERNATIONAL

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SAE Technical Paper Series

900958

VOC Reduction: Solvent Cleaning and Paint Stripping

Vanessa Gemmell and Brian Smith
Boeing Commercial Airplane Group
Materials Technology

**26th Annual Aerospace/Airline
Plating & Metal Finishing
Forum & Exposition
Tulsa, Oklahoma
April 23-26, 1990**

900958

VOC Reduction: Solvent Cleaning and Paint Stripping

Vanessa Gemmell and Brian Smith
Boeing Commercial Airplane Group
Materials Technology

ABSTRACT

ew and anticipated environmental regulations andate development of processes that will educe air emissions of smog forming volatile rganic compounds or VOC's. Current rocesses responsible for producing uantities of VOC's include chemical paint tripping and manual solvent cleaning. hemicals used in these processes also enerate hazardous waste and expose workers o toxics. This presentation will outline ome of the work being done at Boeing ommercial Airplane Group to address these roblems: 1) evaluation of alternatives to igh vapor pressure solvents for manual leaning prior to painting and sealing, and) use of plastic media blasting to remove aint.

Recent environmental regulations have mphasized a reduction in the release of smog forming materials--namely organic solvents or OC's. The effects these regulations have ad on the aerospace industry are widespread ince materials under scrutiny have been used uccessfully for years and replacements are ot readily evident. Organic and inorganic oatings, cleaners, and chemical strippers re affected. Of equal concern are health, safety, and disposal issues associated with these processes.

The purpose of this paper is twofold. Efforts to evaluate alternatives to highly volatile organic solvents for manual cleaning will be discussed; and an evaluation of plastic media blasting as a means of paint removal to replace or minimize use of toxic chemical strippers will be presented.

SOLVENT CLEANING

The objective of this study is to identify compliant cleaners and evaluate their suitablility for cleaning prior to painting or sealing. Existing VOC regulations commonly limit the vapor pressure to 45 mm Hg at 20°C for solvent cleaners, and future legislation can be expected to reduce that further. Solvent cleaners may also be controlled by volatile organic content in grams per liter. For example, the South Coast Air Quality Management District, SCAQMD, in the Los Angeles area has included a 200 g/l option which would mandate use of cleaners with volatile solvent only as a component of the mixture.

The cleaners evaluated in this study are either (1) solvents with less than 45 mm Hg vapor pressure and many less than 10 mm Hg, (2) solvent emulsions, or (3) alkaline cleaners. MEK and MEK/toluene mixtures are the most common solvents currently used for cleaning prior to painting and are therefore used as controls for the painting tests (MEK has a vapor pressure of 71 mm Hg). A solvent blend (BMS 11-7) is used for the sealing test control with a vapor pressure of approximately 72 mm Hg.

To test the cleaning efficiency of the solvents a standard contaminant mixture is used as follows: 20 parts Boelube, 20 parts Monsanto low density Aviation Hydraulic Test Fluid, 20 parts TT-S-735, Type VII (fuel) to 3 parts fine Arizona dust. The contaminant is aged on the test surface for 24 hours at room temperature plus 72 hours at 120F unless directed by other test conditions.

EVALUATION FOR CLEANING PRIOR TO PAINTING

The use of solvents for cleaning is widespread at BCAG (Boeing Commercial Airplane Group). For example, approximately 210,000 gallons of MEK were used at Boeing in the Puget Sound area in 1988 although conservation efforts have since reduced that quantity. Cleaning prior to painting is critical to ensure paint adhesion, urrosion resistance and satisfactory ppearance. Solvent cleaning may be repeated everal times during the finishing process, s is reflected by the following test matrix.

Cleaning of treated (alodine or anodize on 2024 clad or 7075 bare) metal prior to the application of a corrosion resistant or fuel tank primer (BMS 10-11, Type I or BMS 10-20).

Cleaning of corrosion resistant primer (BMS 10-79, Type II or BMS 10-11, Type I) on 7075 bare prior to polyurethane topcoat (BMS 10-60) application.

Reactivation of aged primer prior to additional primer or topcoat application.

The prepared panels were cleaned with : test solvents and overcoated. Some iels for each condition were intentionally itaminanted before cleaning. In some cases : solvent was allowed to evaporate rather in being wiped dry. Application of solvent ılsions or alkaline cleaners was followed a water rinse and wipe dry. Controls for h condition were prepared using MEK.

Testing conducted after a 7 day cure of finish system included paint adhesion, and after a 7 day water immersion; coat appearance and paint flow; and rain sion (for reactivated BMS 10-79 only). ure I shows an example of an atisfactory topcoat appearance where the didate solvent has left a residue ompatible with the enamel.

Because of the non-conventional nature some of the cleaning candidates, patibility with aircraft metals, plastics, :ings and sealants was evaluated including 'osion testing, degradation testing of :tics, elastomers and paint and hydrogen 'ittlement testing.

Of those materials where testing has completed, the following have been found ptable as pre-paint cleaning solvents in they will not harm the substrates, have atible or no residues, and seem to have onable cleaning utility - although no rt was made to identify all possible aminants.

Citra Safe Inland Technology

DeSoClean 45 (solvent mixture) DeSoto, Inc.

Turco 6709 (solvent mixture) Turco Products, Inc.

DBE, DBE-5 (dibasic esters) DuPont

Butyl Carbitol (diethylene glycol monobutyl ether) Union Carbide

EVALUATION FOR CLEANING PRIOR TO SEALING

ning prior to sealing is critical to 'e adhesion and integrity of the sealant. nt cleaning may be repeated several during any sealing process. The test x includes cleaning the following prior aling surfaces.

- o epoxy primer (BMS 10-11, Type I)
- o alodined aluminum
- o fuel tank primer (BMS 10-20)
- o titanium.

Sealants evaluated include Integral Fuel Tank (BMS 5-26), Chromated Pressure and Environmental (BMS 5-95), Low Density Pressure and Weather (BMS 5-32) and Firewall (BMS 5-63). Surfaces were both contaminated and uncontaminated. The solvents were wiped dry in all cases. BMS 11-7 was used as a control for each condition. Soaks were for 7 days at 120-140F. Tests conducted included:

- o Peel strength after (1) no soak, (2) 3% NaCl soak and (3) fuel soak
- o Lap shear after (1) no soak, (2) 3% NaCl soak and (3) fuel soak
- o Dynamic performance after (1) no soak, (2) 3% NaCl soak and (3) fuel soak.

Six solvents and one emulsion cleaner were tested to these requirements and the following were found acceptable for cleaning prior to sealing of fuel tanks, i.e., BMS 10-20 surfaces:

- o CitraSafe Inland Tech.
- o MOK III (proprietary mixture) Boeing Aerospace
- o Butyl Carbitol (diethylene glycol monobutyl ether) Union Carbide
- o DBE 5 (dibasic ester) DuPont
- o Turco 6709 (solvent mixture) Turco
- o Biogenic SE377C (d-limonene emulsion) Rochester Midland

Only one material was satisfactory for cleaning prior to general sealing -CitraSafe, Inland Tech.

PLASTIC MEDIA BLASTING

Chemical paint strippers have been used for years to remove organic finishes from aircraft exteriors and components. However, recent environmental legislation on solvent use, concerns with toxicity of phenols and chromates and the high cost of hazardous waste disposal require a serious re-evaluation of methods available for removing these coatings. In addition, chemical strippers cannot be used on composite surfaces -which make up an increasing percentage of exterior surfaces on newer airplane models.

Many alternate methods have been proposed. Environmentally safe chemical strippers have been developed but their efficiency is debatable. Blast or impact techniques include plastic, water, ice, dry ice, and baking soda have been tried. Lasers, xenon arc lamps and enzymes have been studied. Of all these techniques, the method most publicized has been plastic media blasting (PMB).

Boeing's involvement in PMB began several years ago at the request of numerous customers and subcontractors looking to eliminate chemical stripping. PMB, as a method of paint removal, uses pneumatically propelled dry plastic

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The following document is the engineering variation authority from United Airlines.

It authorized the use of Inland Technology's CITRA SAFE as a low VOC surface preparation substitute, for an M.E.K., Toluene, M.I.B.K blend used to prep a Boeing 737-200 for painting.

This document also outlines the application procedures used during this process.

ENGINEERING VARIATION AUTHORITY

SEE AOP-45-09-00-01

EVA NO. P64 90068

ION:
SFOEG FILES
MGR. Jim Uhl

SHOP

FOR ENGINEERING USE ONLY

[x] FOLLOW-UP REQ'D. [ ] NO FOLLOW-UP REQ'D.

GIVE REF. TO SPEC. DWG. COA MANUAL ETC.

ACCOMPLISHMENT BY L. Lutz DATE 1/31/91

ORIGINAL DATE 10-16-90

REVISED DATE N/A

FILE NO. C-95-13-68

APPLICABILITY A/C # 1301
AIRCRAFT OR PART

EFFECTIVE UNTIL one time
DATE/CHRONOLOGY

ervice evaluation of new solvent cleaner, ıtrasafe, prior to aircraft painting

COA/DWG/SPEC NO. GN/MM 5-0-1-6

RTS REQUIRED, COMPONENTS AFFECTED, EFFECT ON WEIGHT AND BALANCE, EFFECT ON OTHER ADMINISTRATIONS

WEIGHT & BALANCE YES [ ] SFR 3205.3 NO [x]

MAJOR REPAIR YES [ ] NO

GN/MM 5-0-1-6 specifies the use of an approved solvent cleaner, SOL3000-20, for removing grease, oil and other contaminants, etc. prior to painting.

epancy: UA will evaluate new solvent to determine effectiveness in removi contaminants from aluminum surfaces. The new solvent cleaner has been ap roved by Boeing for cleaning surfaces prior to painting and sealing. The currently used material is highly flammable and personal protection equipment is mandatory.

n:

1) Evaluate the new solvent cleaner per the attached procedure.
2) Process Engineering will evaluate the effect of the new solvent with regard to adhesion of the paint system.

: Solvent clean left hand side of the fuselage with Citrasafe, right hand with SOL3000

ment:

IA NO. DIS-6400 MESSAGE MUST BE SENT FOR EVERY USE OF THIS REPAIR:

Leonila V. Lutz /876-3622

'ROVAL

SHOP ACCEPTANCE Les Carscadden 876-6543

PREPAINT SURFACE PREPARATION - ALUMINUM,
SOLVENT CLEANING

1. General
   A. This specification describes the materials and processes for solvent cleaning aluminum surfaces prior to paint application.
   B. Prepaint metal surface preparation requires completion of all the processes specified in this document. Deviation could result to premature paint adhesion failure and film defects.
2. Equipment, Special Tools and Materials
   A. Special Tools
      1) Scotch-Brite #7447
      2) Cloth, PCN 912-0041, CL511
      4) Plastic Bottle, PCN 914-0174, B0740
      5) Safety Cans, (Plunger or bench can)
   B. Materials
      1) Solvent, CITRASAFE by INLAND TECHNOLOGY

3. Limitations
   A. Unless specifically authorized by Process Engineering, only the materials/chemicals and processes specified in this document can be used on the airplane. Use of unauthorized materials can cause in embrittlement cracking in high strength steel, damage to protective coatings, and corrosion damage of aircraft components.
   B. The importance of consistently high quality surface preparation must be emphasized. Surface contamination, if not properly removed, will cause premature paint adhesion failure.

4. Safety Precautions
   A. The methods and processes specified in this document involve the use of hazardous and flammable materials. It is the responsibility of the user to ensure familiarity with the materials and processes involved. Take necessary precautionary measures to ensure health and safety of personnel who may come in contact with these chemicals. Good shop practices and referral to vendor Material Safety Data Sheets (MSDS) are minimum requirements. Refer to GN/MM Chapter 10 and Regulation 5-12-25 for detailed precautionary measures.

5. Procedure
   A. General
      1) Prior to solvent cleaning aircraft:
         a) Visually inspect and insure that masking and window aluminum tape are properly adhering to the surface. Replace as necessary.
         b) Remove masking and adhesive tape on surfaces to be painted.
         c) Blow off dust, dirt and loose debris from aircraft surfaces and areas within the perimeter to minimize dust and dirt accumulation on the surfaces to be cleaned and painted.
         d) Inform Dock Foreman that solvent cleaning will commence to insure that all personnel are informed that welding, cutting, grinding or any source of ignition must not be allowed within the perimeter during the cleaning

B. Preliminary Solvent Cleaning

1) Wet the surface with a small amount of solvent cleaner, Citrasafe dispensed from solvent resistant polyethylene bottles, being careful not to create a hazard to personnel below.
2) Carefully and lightly abrade the surface with an abrasive pad, (Scotch-Brite^R). Use conformable scotchbrite pad holder to abrade hard to reach areas. Abrade only enough to scuff the surface, use care to minimize removal of cladding. Overlapping should be minimal.

   NOTE: a) The aluminum clad is very thin so it is important not to abrade too heavily.
   b) The foreman must inspect abraded surfaces to insure that no shiny areas remain. Special attention should be paid to areas along skin laps and around windows and high erosion areas such as the front forward fuselage and leading edge of vertical fin.

3) Wipe surface dry.
4) Immediately follow with final solvent cleaning.
   a) Fold clean cloth and soak in solvent cleaner, Citrasafe.

   NOTE: A generous supply of clean wiping cloth must be available.

   CAUTION: Only UA approved safety containers such as Protectoseal safety cans (plunger or bench can) shall be used. Pouring of liquid onto rags from containers shall be minimized.

   b) Remove soaked cloth, squeeze lightly and wipe the surface in one direction only. Re-fold the cloth wiper to expose new, clean cloth surface before going back the second time.

   IMPORTANT: **THIS WIPING TECHNIQUE WILL ALLOW THE CLOTH WIPER TO PICK UP THE CONTAMINANTS INSTEAD OF SPREADING IT AROUND.**

   c) Immediately wipe dry with a clean unused cloth.
   NOTE: Solvent residue may be evident on the surface. Allow solvent to evaporate to dryness.

   d) Frequently exchange soiled wiper for a clean one.
   e) Repeat wiping cycle until there is no evidence of soil on either the cloth or the cleaned surface.

WARNING: THE FOLLOWING PRECAUTIONS MUST BE FOLLOWED PER UA REGULATION 5-12-25 FLAMMABILITY STANDARD REQUIREMENTS AND AIR POLLUTION REGULATION:

a) SPENT RAGS MUST BE DISPOSED IMMEDIATELY IN SELF CLOSING METAL CONTAINERS AND MUST BE REMOVED FROM THE DOCK AT THE END OF THE JOB OR AT THE END OF THE SHIFT WHICH EVER COMES FIRST.

b) SOLVENT CONTAINERS MUST BE CLOSED WHEN NOT IN USE.

c) PICK UP CANS AND BOTTLES OF SOLVENT BEFORE LEAVING WORK AREA. ALL CONTAINERS SHALL BE STORED IN A METAL CABINET WHEN NOT IN USE.

NON-ADHERENCE TO THE ABOVE MAY SUBJECT UA TO VIOLATION NOTICES AND FINES FROM THE LOCAL POLLUTION DISTRICT.

INLAND TECHNOLOGY INCORPORATED
2612 Pacific Highway East, Suite C • Tacoma, WA 98424 • (206) 922-8932

The following is a summary of the test results obtained by DOW Corning when using Inland Technology's CITRA SAFE as a low VOC surface preparation compound in place of M.E.K.

Following this report are the results of testing by TREMCO, another major sealant manufacturer.

DOW CORNING

January 13, 1989

Harmon Contract WSA Inc.
660 Kasota Avenue SE
Minneapolis, MN 55414

Attention: Mr. Lee Steffens

Reference: Solvent Testing

As you requested, Dow Corning has performed peel adhesion testing on a variety of substrates using a variety of solvents. The intent of this testing was to determine if the Citra-Safe natural solvent you submitted leaves any residue on the substrate which would be detrimental to the adhesion of DOW CORNING® 795 Silicone Building Sealant. Overall, the results of this testing indicate that the adhesion of DOW CORNING® 795 Silicone Building Sealant on substrates cleaned with this solvent is comparable to those cleaned with IPA/water, MEK, and xylene.

Adhesion testing was performed in accordance with a modified ASTM C794-80 procedure. Both a primed and an unprimed peel were tested using each cleaning solvent on each substrate. Adhesion test data is given in tables 1-11 as listed below.

Table	Substrate
1	Granite - back surface
2	Granite - edge surface
3	Clear Glass
4	Reflective Glass PPG 470-20
5	PPG Frit E6-7177
6	Silver Duranar XL
7	Rose Duranar
8	Duracron
9	Alodine Aluminum
10	Black Anodized Aluminum
11	Mill Finish Aluminum

Please note the requirements Dow Corning employs for making sealant recommendations as indicated in the enclosure, Interpretation of 180° Peel Adhesion Testing.

TREMCO

3735 GREEN ROAD • BEACHWOOD, OHIO 44122 • 216/292-5000
DIRECT DIAL NUMBER
(216) 292-5170

RECEIVED

MAR 13 1989
HARMON CONTRACT
PHILA.

September 14, 1988

Mr. Bud Vasterling
Harmon Contract W.S.A., Inc.
660 Kasota Avenue S.E.
Minneapolis, MN 55414

RE: Citra-Safe Solvent

Dear Bud:

We have evaluated "Citra-Safe" solvent from Inland Technology as a cleaner for glass and metal with Proglaze and Spectrem 2 sealants.

Our test results indicate that Citra-Safe is acceptable for use with these sealants. Due to our lack of history on this solvent it is suggested that its use be limited to general use, such as internal seals, unless specific testing is performed.

The testing performed was only to determine if the Citra-Safe caused a problem with our sealants or prevented adhesion of our sealants. We have not evaluated the ability of Citra-Safe to remove or clean any specific contaminant from a substrate. Considering this, the use of Citra-Safe should be closely monitored until some history is developed.

Very truly yours,

Stan Karn

Stan Karn
Engineering Services

sk9141/ct

cc: Mr. Mike Scanlon, Tremco
Mr. Roger Mathews, Harmon