Product Description

Aeropel™ APW100 is a two-component water-based nanocomposite protective layer (NPL) designed to protect aerospace metallic substrates from corrosion damage. NPL has excellent properties in creating a low-energy surface to disperse moisture and prevent penetration into the metallic substrate. NPL is transparent and is suitable as a topcoat application to a wide range of existing protective coating systems. NPL may also be applied directly to various aerospace metallic substrates for corrosion protection.

It is recommended to consult with an Aeropel™ representative to discuss your specific use-case.

Scope

This application guide details product data and recommended guidance for an application of APW100. The contents are non-exhaustive and target primary uses. Definitive requirements for any application may vary on a case-to-case basis and your process specification requirements.

It is recommended that the Application Guide (AG), Technical Data Sheet (TDS), and Safety Data Sheet (SDS) are read prior to start of work.

A successful APW100 application is dependent on the quality of planning and execution of the following activities:

1) Site Preparation
2) Surface Preparation
3) Surface Application
4) Health, Safety, and Environmental Considerations

Referenced Standards

This application guide references standards associated with ASTM, AMPP, AMS, ISO and MIL. Since various standards are associated with different geographical regions and procuring authorities, utilize the standard most appropriate for your use case

ASTM F21	Standard Test Method for Hydrophobic Surface Films by the Atomizer Test
ASTM F22	Standard Test Method for Hydrophobic Surface Films by the Water-Break Test
ASTM D4285	Standard Test Method for Indicating Oil or Water in Compressed Air
ASTM D4414	Standard Practice for Measurement of Wet Film Thickness by Notch Gages
ASTM D4417	Standard Test Methods for Field Measurements of Surface Profile of Blast Cleaned Steel
ASTM D4940	Conductimetric Analysis of Water-Soluble Ionic Contamination of Blast Cleaning Abrasives
AMS 3819C	CLOTHS, CLEANING For Aircraft Primary and Secondary Structural Surfaces
ISO 8502-6	Extraction of Soluble Contaminants for Analysis – The Bresle Method
NACE No.1	White Metal Blast Cleaning
SSPS SP5	White Metal Blast Cleaning
SSPC SP11	Power Tool Cleaning
SSPC-PA 2	Procedure for Determining Conformance to Dry Coating Thickness Requirements
SSPC Guide 15	Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates
MIL-PRF-23377	Performance Specification – Primer Coatings: Epoxy, High Solids
MIL-DTL-53022	Detail Specification – Primer, Epoxy Coating, Corrosion Inhibiting Lead and Chromate Free
MIL-PRF-85285	Performance Specification - Topcoat, Aircraft and Support Equipment

Contents

Example Systems

Aeropel™ APW100 may be applied onto existing topcoat and primer systems as well as directly to metallic substrates. Example systems are not exhaustive, and other systems may be appropriate for use with APW100. Consult your Aeropel™ representative about your specific system.

Multicomponent Systems

Primer Systems

MIL-PRF-23377 Ty I, II, Cl N	*0.6-0.9 mil*
Aeropel™ APW100	*1.0-2.0 mil*
MIL-DTL-53022 Ty IV, Cl L, U	*1.3-1.7 mil*
Aeropel™ APW100	*1.0-2.0 mil*

Topcoat Systems

MIL-PRF-85285, Ty I, II, III, Cl H	*1.7-2.3 mil*
Aeropel™ APW100	*1.0-2.0 mil*

Direct to Substrate

Class A: Steel Alloys

Aeropel™ APW100	*1.0-2.0 mil*

Class B: Aluminum Alloys

Bondrite® M-CR 1201™ Aero	*Conversion*
Aeropel™ APW100	*1.0-2.0 mil*

Site Preparation

- Proper lighting is important for a quality application. 50 lumens/ft^2 is recommended at the working surface.
- All rinse water should be clean and contaminant free. Type II deionized water is recommended for any process involving equipment or the application surface.
- All compressed air streams should be clean and dry as indicated by ASTM D4285.
- Work areas should be isolated from other processes that generate dust, or air contaminates such as machining, welding, combustion exhaust, etc.
- All rags/wipes should be durable and not produce lint. It is recommended to meet or exceed AMS 3819C Class 2 Grade A.

Surface Preparation

Inadequate surface preparation is a primary constituent for coating related failures. Whether APW100 is being applied direct to substrate or to a coating systems as a topcoat, the surface must be thoroughly examined for surface contaminants and meticulously cleaned and prepared. Clean entails no presence of organic contaminants, surface corrosion, soluble salts, scale, fluids, abrasive media, and foreign debris. Invisible contaminants, such as dissolved salts, may cause coating related failures if left at high concentration. It is recommended to test your surface for surface soluble salts and clean your surface of salts until values are less than 5 µg/cm^2 or 70 µS/cm.

Depending on your substrate, the following test standards may be utilized to verify cleanliness.

- Test for Water-break: ASTM F21 / F22
- Test for Soluble Salts: ISO 8502-6
- Test for Surface Profile: ASTM D4285

The desired method of preparation is dependent on what APW100 is being applied to. The following content details recommendations and guidance on preparing your surface.

Multi-Component Systems

Primer & Topcoat Systems

If APW100 is to be applied as a topcoat over a primer or existing topcoat system, it is imperative that base systems are applied per their manufactures specification and are fully cured.

APW100 may only be applied to a surface that is clean and water-break free. Choose a cleaning method appropriate for your use case. Reference the water-break free specification. Surface finishes of base coats may impact the ability to achieve water-break. Verify cleanliness prior to application.

Gloss – Gloss finishes must be scoured via a hand pad (or alternative methods) to a flat finish, followed by a solvent wipe appropriate for your surface.

Semi-Gloss – *Semi*-Gloss finishes typically must be scoured via a hand pad (or alternative methods) to a flat finish, followed by a solvent wipe appropriate for your surface.

Flat – Verify a clean and water-break free surface.

Direct to Substrate

Class A: Steel Alloys

Steel covers a broad range of potential surface conditions. Whether your surface is new or heavily corroded it is important that the surface is classified as a clean bare-metal substrate prior to application.

Broadly, there are 3 steps prior to applying APW100 to steel:

Step #1: Clean your surface of contaminants utilizing an appropriate method, commonly a pressure washing regimen with DI water and degreaser.

Step #2: Mechanically clean and roughen the surface via SSPC SP-5 White Metal Blasting or SSPC SP-11 Power Tool Cleaning. Target a surface profile of 0.5-1.8 mils.

Step #3: Verify Cleanliness & Roughness.

Note* due to the corrosion nature of steel, APW100 should be applied in a timely manner and no more than 4 hours since completing preparation. If you expect the application to take place after 4 hours you

may apply a holding solution to prolong onset corrosion of the steel. Approved holding solutions include HoldTight 102® and Cleanwirx 207. Inspect surface prior to application.

Class B: Aluminum Alloys

A chemical conversion coating of aluminum and alloys is recommended preceding APW100 direct to aluminum. Consult the manufacturer's recommendations and/or governing specifications for proper cleaning of the substrate prior to conversion coating. The conversion compound must be thoroughly rinsed after application to remove any residual compounds or salts. Ensure the conversion coating is completely dehydrated, clean, and water-break free prior to application.

Application of APW100

Environmental Conditions

APW100 is a water based two-component ambient cured nanocomposite. The primary parameter of influence is the dew point. The following guidelines guidline when APW100 should be applied.

- **Application Advised**: The surface & air temperature is greater than 10°F of the dew point.
- **Application Cautioned**: The surface & air temperature is less than 10°F of the dew point.
- **Application Not Reccomended**: The surface & air temperature is less than 5°F of the dew point.

The following restrictions apply to APW100 and should be observed:

Air Temperature	50° - 110 °F
Substrate Temperature	50° - 110 °F
Material Temperature	50°F minimum

Do not apply APW100 when the substrate is wet or likely to become wet.

Figure 1 details the dew point as a function of relative humidity and the temperature of the air or substrate, whichever is colder.[1] Dew point differentials are color coded to assist in determining application advised, cautioned, and not recommended conditions.

[1] Note: ΔD_p is the difference of the ambient and surface temperature from the measured dew point temperature.

		Temperature of Surface or Air [°F]						
		50	60	70	80	90	100	110
Relative Humidity [%]	90	47	57	67	77	87	97	106
	85	46	55	65	75	85	95	104
	80	44	54	64	73	83	93	102
	75	42	52	62	71	81	91	100
	70	41	50	60	69	79	88	98
	65	39	48	58	67	77	86	96
	60	37	46	55	65	74	84	93
	55	34	44	53	62	72	81	90
	50	32	41	51	60	69	78	87
	45	29	39	48	57	66	75	84
	40	27	36	45	54	62	71	80
	35	23	32	41	50	59	67	76
	30	20	28	37	46	54	63	72
		ΔDp<5°F Application Not Reccomended		ΔDp<10°F Application Cautioned			ΔDp>10°F Application Advised	

Figure 1: Dewpoint as a function of Relative Humidity & Temperature

If auxiliary equipment such as dehumidifiers, heaters, or air conditioning is required it is important that equipment achieves a stable environmental condition.

Product Mixing & Pot Life

APW100 is a two-component system that is mixed by a 33:1 weight ratio.

- APW100 Part A — 33 Parts
- APW100 Part B — 1 Part
- Pot Life — 24 Hours across all working temperatures
- Viscosity — Zahn Cup #2 = 60 seconds
  Ford #4 = 73 seconds

APW100 has no induction time, and the viscosity will not change during its working life up to 24 hours, though, temperatures may influence viscosity marginally.

Manually shake the containers of Part A and Part B for 10 seconds to ensure components are well dispersed. Add Part B to Part A. Mechanically mix the mixture for 15 minutes. APW100 must be mixed vigorously though should not foam, foam is not detrimental to material quality but may influence application. The mixture should be slightly opaque white. Once mixing is completed, pass the contents through a coating mesh strainer to remove debris and generated foam.

Thinner & Cleaner

APW100 does not require thinner.

For cleanup, utilize rinse water to flush equipment. If desired, utilize a surfactant, though, ensure that no surfactant remains on equipment after cleaning.

In cases where additional cleanliness is desired, utilize 70+% Isopropyl Alcohol.

Application Equipment

Spray Application

APW100 is predominantly applied by spray. The recommended equipment is as follows:

- Gun Type: HVLP, LVMP, Conventional
- Pressure at Cap: Variable on model
- Tip Size: 1.8 mm
- Compressed Air: Clean and dry per ASTM D4285

It is recommended apply on test surface prior to application to adjust equipment for optimal surface finish quality. Apply the treatment utilizing the crosshatch technique. Use a wet film thickness comb or gauge to verify film thickness on your test surface before proceeding with the final product.

Roller Application

APW100 is suitable for roller applications. Utilize a high-density foam cover. Rolling will require numerous coats to achieve the desired dry film thickness. Be mindful that rolling may create surface texture to that off the texture of your roller. If you desire a high gloss and smooth finish, a spray application would be more appropriate.

Brush Application

APW100 is suitable for application by brush. It is recommended to use brushes in areas that are difficult to reach. Brusing will require numerous coats to achieve the desired dry film thickness. Synthetic brushes are recommended, polyester or nylon. Dispose after use. Do not use natural bristles. Be mindful that brushing may create streak marks from bristles depending on methods used.

Other

If your application requires anything other than the specified application methods, please contact technical support.

Film Thickness

Recommended film thickness specifications are detailed below:

- Final Dry Film Thickness (DFT): 1.0 – 2.0 mil
- Theoretical Spreading Rate: 290 ft^2/gal. for 1 mil DFT
- Number of Coats Required: 2.0+
- Wet Film Thickness (WFT) per coat: 3.0 – 5.0 mil

For vertical surfaces, a lower WFT and increased number of coats may be required to prevent runs / sags. Use your discretion given the environmental and geometrical constraints.

Application Considerations

Stripe Coating

Stripe coating is recommended for APW100 where justified. Stripe coating is the addition of +1 coat of material to difficult areas such as welds, fasteners, edges, etc. Therefore, if you are applying 2 base coats, stripe areas should contain 3 coats.

The sequence of stripe coating should be 1) surface preparation, 2) full first coat, 3) stripe coat, 4) full second coat. This reduces the chance of contamination. It is recommended to stripe coat with a roller or brush, as to ingress the treatment into the substrate pores. Avoid excessive film thickness. Apply subsequent coats within the stripe coat and 1st coat overcoat window.

If contamination risk is low, stripe coat sequences may be 1) surface preparation, 2) stripe coat, 3) full first coat, 4) full second coat.

Consumption Rates & Material Supply

Different substrates, preparation styles, application equipment, and application methodologies will consume material at variable rates. Ensure you have enough material to prime pumps, lines, consider transfer efficiency, and environmental conditions.

For roughened surfaces additional material is required to fill the valleys of your surface profile. A good rule of thumb is to add 50% of your roughness profile to your desired coating thickness. For example, if you are applying 1.5 mils DFT of APW100 to a surface that has a 1.0 mil roughness profile, you would want to have material sufficient to apply 2.0 mils DFT.

Drying, Curing, and Overcoat

Drying, curing, and overcoat times are dependent on temperature and relative humidity. Table 1 displays guidelines to assist applicators with anticipated dry times.

Table 1: Average Drying Times @ 5.0 mil (125 µm) WFT and 60% Relative Humidity

Average Drying Times @ 5.0 mil WFT & 60% RH	
	77°F (25°C)
Dry to Touch	60 min
Overcoat	
Minimum	60 min
Maximum	4 days
Cure to Service	24 hours

Definitions:

- **Dry-to-Touch**: Surface will not flow, no material transfer, and hardened.
- **Overcoat:** Time period where additional coats of treatment may be applied.
- **Cure to Service:** Treatment is fully hardened and serviceable.

When overcoating, it is important to keep the surface clean, dry, and suitable for application. If the overcoat window is exceeded before your desired DFT, clean the surface with 1% Alconox detergent and AMS 3819C Class 2, Grade A wipes. Rinse thoroughly and ensure all detergent is removed. Thoroughly dry the surface and reapply APW100.

Damages, Repair, & Other Considerations

Superficial Damage – No bare substrate or base system exposed.

Clean the surface with 1% Alconox detergent and AMS 3819C Class 2, Grade A wipes. Rinse thoroughly and ensure all detergent is removed. Thoroughly dry the surface, ensure all moisture has been removed. Reapply APW100.

Critical Damage – Bare substrate or base systems exposed.

Isolate the damaged area by masking a fixed control area to work between. Remove the treatment and perform repairs according to your specification guidelines. Remove masking prior to reapplication & clean masked edges via "*Superficial Damage*" procedure. Reapply APW100 by feathering across the repair site.

Material Storage & Shelf Considerations

APW100 has a shelf life of 12 months from the date of manufacturing. Store materials in a shaded and ventilated area with temperatures between 35 – 115 °F. Preferably, store APW100 in a climate-controlled area to mitigate flux in temperature. Do not allow APW100 to freeze.

Health, Safety, and Environmental Considerations

Industrial Best Practices

Aeropel™ APW100 and its associated derivatives are professional products and are for professional use only. Application crews should be well informed of industrial practices, experiences, and have thorough knowledge of coatings/treatment preparation, mixing, and application.

Health & Safety

In advance of APW100 use and procurement, review the SDS and don appropriate personal protective equipment (PPE). Understand the entire process as to don appropriate PPE for preparation steps, which is not detailed within APW100's SDS.

Environmental

Dispose of waste in accordance with local and government regulations. Reference the SDS for accidental release measures.

Disclaimer & Document Control

The documentation and contents presented here are to the best knowledge of Oceanit through laboratory and field testing of APW100. These are recommendations and guidance only and the contents are subject to change. Ensure you are referring to the current revision of this document. It is the applicator's responsibility to ensure that the application is in accordance with the specifications and requirements of the documentation and of the local jurisdiction's laws and regulations.

Oceanit warrants APW100 to be free of manufacturing defects upon departure from origin facility. Oceanit's sole obligation under this warranty shall be, at Oceanit's election, to repair, replace or refund the purchase price of the defective product. No other warranty or guarantee of any kind is made, implied, or expressed regarding performance and application of product and the surfaces they are applied to. Oceanit has no control over the quality of application nor preparation of surfaces

Except as expressly set forth herein, all other conditions, representations and warranties, whether express, implied, statutory or otherwise, including, without limitation, any implied warranty of merchantability, fitness for a particular purpose or non-infringement of third-party rights, are hereby disclaimed to the maximum extent permitted by applicable law.

Aeropel™ APW100 is not currently qualified under any specification, although it may be used in conjunction with existing coating systems.

Contact Information

If you find yourself with any questions regarding our product, please utilize the following contact to direct your questions.

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