MASKANT PRODUCTS & PROCEDURES

FOR DIFFUSION PROCESSING OF NEW OR OVERHAULED AERO/JET OR INDUSTRIAL ENGINE BLADES

a technology of

APV® ENGINEERED COATINGS

ADVANCED AEROSPACE MATERIALS ENGINEERING

APV Engineered Coatings offers masking procedures and compounds to prevent coating formation on portions of alloy/superalloy parts and assemblies during high-temperature diffusion coating/processing.

The APV masking system is highly accredited in the gas turbine engine industry and can be utilized in the operations of diffusion coating for new or overhauled aero/jet engines and industrial engines.

THE MASKANT SYSTEM AND MATERIALS OVERVIEW

The M-1/M-5/M-7/M-8/M-10 masking system consists of dry powders, binders, and diluents.

The slurry system components can be mixed at your location on an as-required basis or purchased as ready-to-use slurries. Several of the maskants can also be used dry, with no binders.

All components of the system are tested chemically and metallurgically after processing and all masking materials are tested under actual coating conditions.

SYSTEM COMPONENTS:

Dry Powders

Binders

Diluents

Stripper

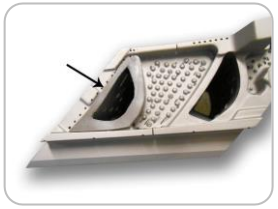
Process Powders

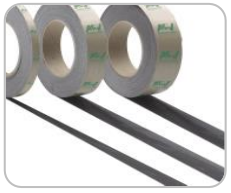
Tapes

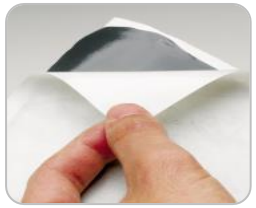
Putty

Ready-to-Use Slurries

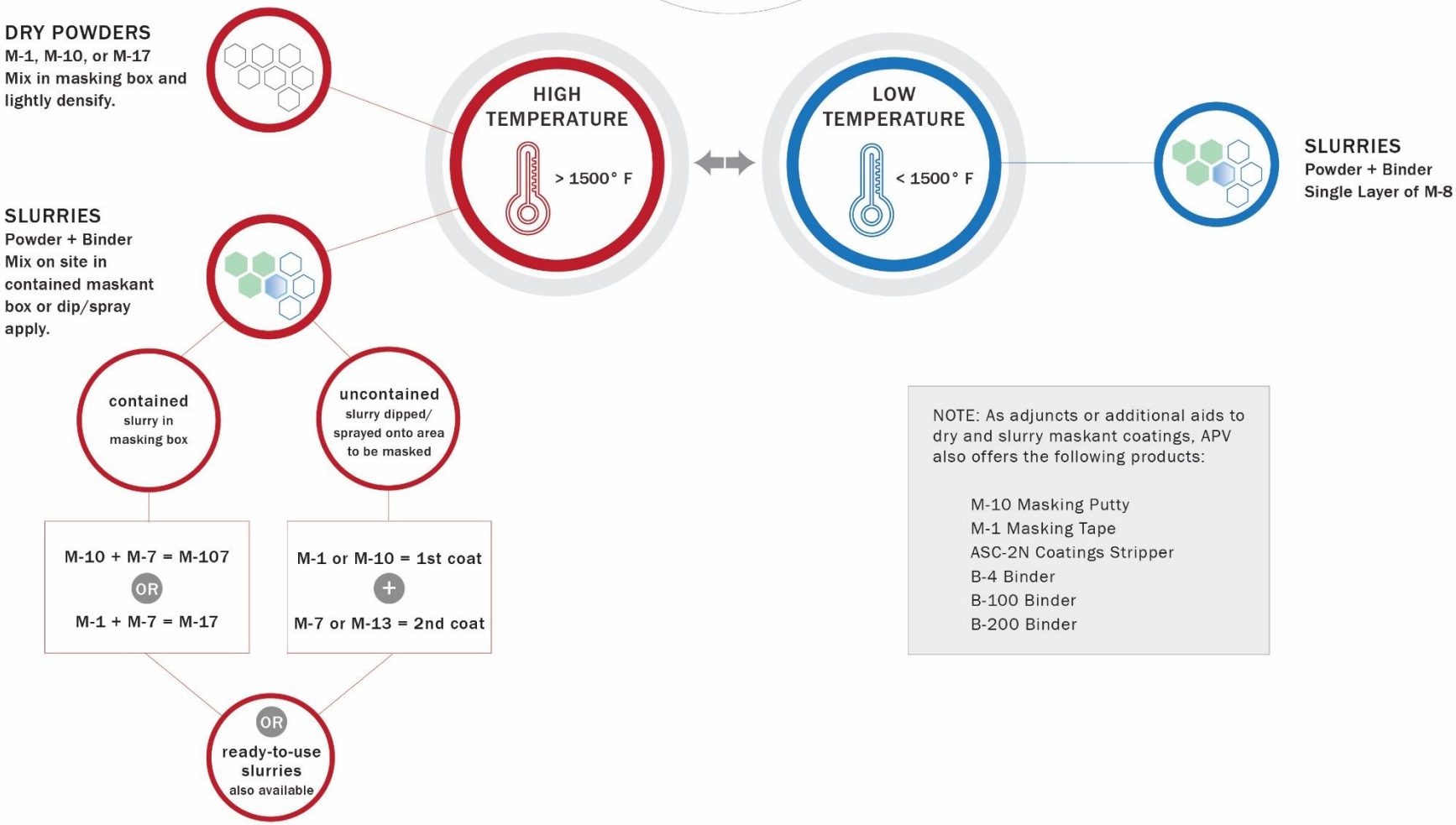
Customized Preforms







THE MASKANT SYSTEM AND MATERIALS OVERVIEW

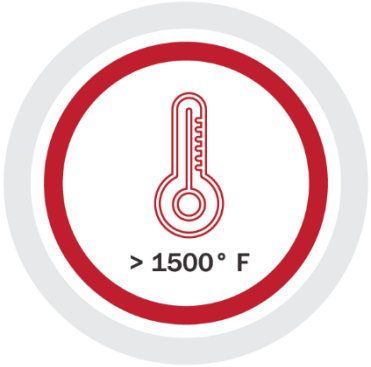


NOTE: As adjuncts or additional aids to dry and slurry maskant coatings, APV also offers the following products:

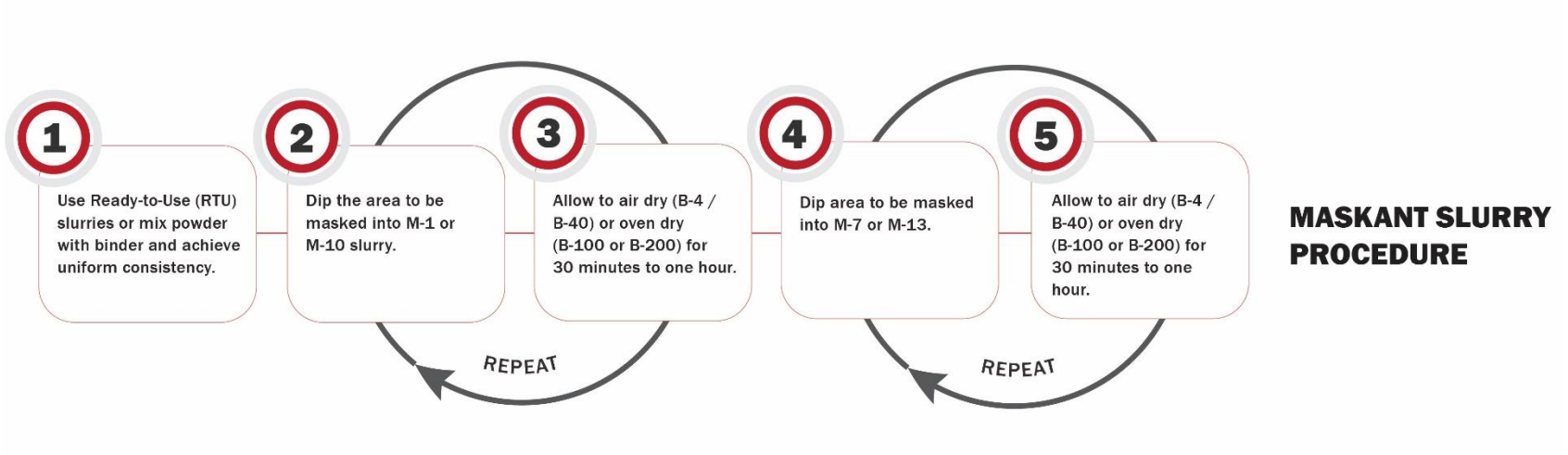
- M-10 Masking Putty
- M-1 Masking Tape
- ASC-2N Coatings Stripper
- B-4 Binder
- B-100 Binder
- B-200 Binder

HIGH TEMPERATURE COATING

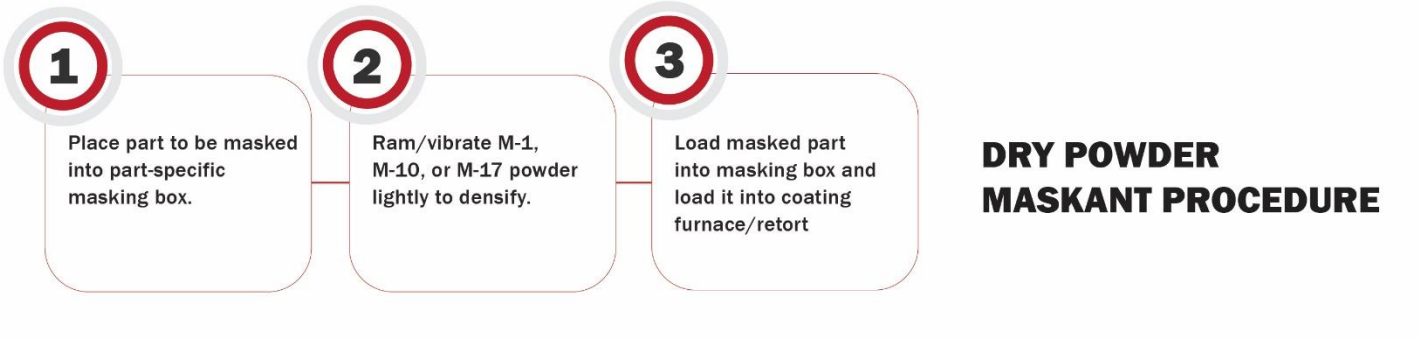
APPLICATION TEMPERATURE



MASKANT SLURRY PROCESS



DRY POWDER PROCESS



DRY POWDER MATERIALS

M-1 Maskant | Base Metal Powder Maskant

USAGE

As undercoating for other materials in the APV masking system or as a dry powder

When used as a slurry it is combined with B-4, B-100, or B-200 Binders and topcoated with M-7

FUNCTION

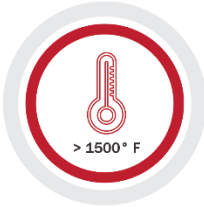
Acts as a “getter” for diffusion coating metals

Prevents the coating from developing on unwanted surfaces

Removed after processing with an air blast (no grit blasting or wire brushing required)

Metallographic examination shows alloy depletion of approximately 0.0003-0.0005 inches with coating processing of ~ 2000°F (1095°C)

Blue is available to distinguish it from the part to be coated



DRY POWDER MATERIALS

M-5 Maskant | Base Metal Masking Powder

USAGE + FUNCTION

During chromium diffusion coating

It can be used dry or as a slurry mask when combined with B-4, B-100 or B-200

Protects unwanted coated areas from chromium diffusion

M-7 Maskant | Overcoating Powder Maskant

USAGE + FUNCTION

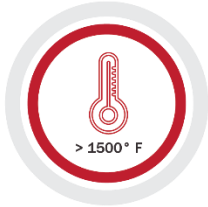
During aluminum diffusion coating (usually combined with APV Binder) provides a top coating to the M-1

May also be used in combination with M-1 as a mixture

Forms an “envelope/cocoon” over the M-1 retaining both products intact (avoids contamination) after coating when used in slurry form

Removes easily by “cracking” open

Green is available to distinguish it from the part to be coated



DRY POWDER MATERIALS

M-10 Maskant | Base Metal Masking Powder

Same Material Chemically as M-1 but Finer Particle (Mesh) Size- approx. 50% reduction in particle [mesh] size)

USAGE + FUNCTION

Primarily for diffusion coating processes above 1500°F

Gives a sharper demarcation between the coating and masked surfaces (coat-no coat-zone)

M-17 and M-107 Maskant

Mixture of M-1 and M-7 (=M-17) OR M-10 and M-7 (=M-107) Powders

USAGE + FUNCTION

Primarily for diffusion coating processes above 1500°F

Can be used in slurry or as a dry mask

When used in slurry form, does not require separate coats of M-1 or M-10 and M-7

M-18 and M-108 Maskant

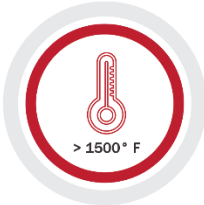
Mixture of M-1 and M-8 (=M-18) OR M-10 and M-8 (=M-108) Powders

USAGE + FUNCTION

Primarily for diffusion coating processes above 1500°F

Can be used in slurry or as a dry mask

When used in slurry form, does not require separate coats of M-1 or M-10 and M-8



DRY POWDER MATERIALS

M-13 Maskant | Overcoating Powder

(combined with APV binder) provides a top coating to the M-1/M-10

USAGE + FUNCTION

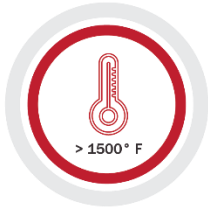
Especially effective in “pure” CVD coating processes which do not usually introduce the coating gases until the part to be coated reaches the coating temperature

Does not require aluminum to form tight envelope/cocoon

Primarily for diffusion coating processes above 1500°F

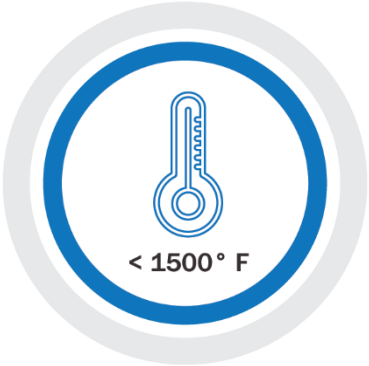
Forms an “envelope/cocoon” over the M-1/M-10 without necessity for aluminum retaining both products intact (avoids contamination)

Removes easily (powdery)



LOW TEMPERATURE COATING

APPLICATION TEMPERATURE



DRY POWDER MATERIALS

M-8 Maskant | Masking Powder

Designed to protect selected areas of nickel base superalloy parts such as roots of blades during aluminum diffusion coating

USAGE + FUNCTION

Primarily used as a slurry with *low-temperature* coating processes below 1500°F

Acts as a “getter” for aluminum providing a protective envelope/cocoon over selected area

Prevents coating formation

It hardens and removes easily

Green or red is available where color is required by the user

< 1500° F

PROCESSING AIDS + ADDITIONAL PRODUCTS

BINDERS, DILUENTS, TAPE, PUTTY, RTU SLURRIES AND PREFORMS

BINDERS

B-4 Binder

Mixture containing organic binders and a non-explosive, non-flammable solvent.

USAGE + FEATURES

To prepare slurries with APV masking powders

Volatilizes during the diffusion coating cycle

There is no contamination of the pack or coating nugget mixes

Oven-drying is typically not required

B-40 Binder

Solvent-based binder system

Oven drying is typically not required

B-100 Binder

Water-based binder system

Oven drying is required

B-200 Binder

Higher viscosity water-based binder

Oven drying is required

DILUENTS

D-4 Diluents

Organic mixture for slurry making

USAGE

Used to maintain the viscosity of maskant slurries

Replaces room-temperature, volatilized components of masking slurry. (For B-4 containing masking slurries.)

Oven drying required

STRIPPER

ASC 2-N Stripper

Blue crystalline compound, soluble in water

USAGE + FUNCTION

Use in water solution with nitric acid

Effectively removes freshly prepared Aluminide coatings and/or coatings on nickel and cobalt superalloys that have experienced engine exposure.

FEATURES

Dry

Granular

Water-soluble

Used at room temperature- No solution heating required

PROCESS POWDERS

P-1 Powder

Pack aluminizing powder

USAGE + FEATURES

Used on cobalt and nickel alloys

PWA-approved (PWA 252 Specification) high temperature coating

R-3 Powder

Replenishing Powder for P-1

ONA 108

Chromium Powder

ONA 101

Aluminum Powder

TAPE

M-1 Masking Tape

Flexible masking tape consisting of M-1 and a clean burning organic binder

USAGE + FUNCTION

Effective as a “gasket” material between turbine blade root bottoms and manifold.

As an adjunct to other APV masking products

Prevents coating gases from “leaking out” onto “no-coat” surfaces

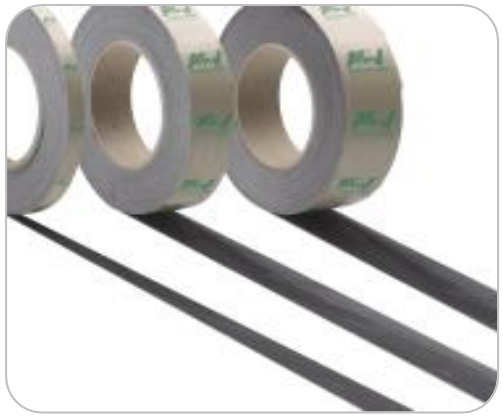
FEATURES

.040 in thickness

Flexible

Available in 25-foot rolls, several widths (1/2”, 3/8” & 1 ¼”)

Adhesive backing (one-or-two-sided)



PUTTY

M-10 Masking Putty

Putty containing M-10 material

USAGE + FUNCTION

Used as an adjunct to masking with dry and/or slurry mask

Has shown maximum alloy depletion of 0.0003 to 0.0005 inches

FEATURES

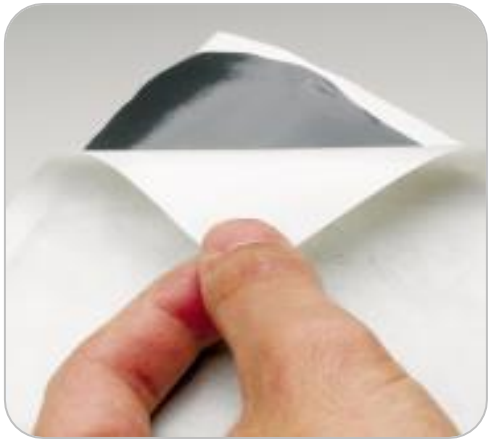
Moldable

Supplied in pieces- standard size is

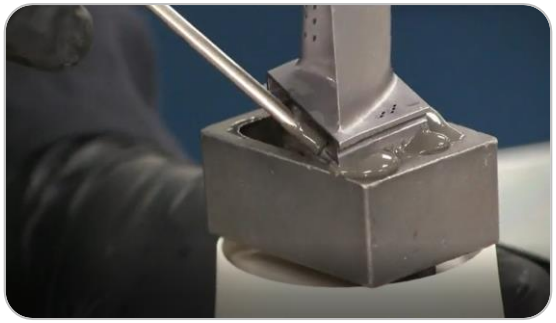
4 x 4 inches

No parting layer is required to prevent sintering (and/or “stick-on”)

Leaves no ash or other deposits



READY TO USE (RTU) SLURRIES



RTU SLURRIES | M-10, M-7, M-8, M-107, M-18

Slurries delivered pre-mixed

USAGE + FUNCTION

Same as slurry masking

Available with B-4 and B-40 binder

FEATURES

Simple to use and implement

Cost effective

Eliminates operator involvement from weighing, measuring, and slurry preparation

Ready-to-Use-Slurries remain in suspension for significantly longer periods of time than on-site prepared slurries and do not settle out

Recyclable

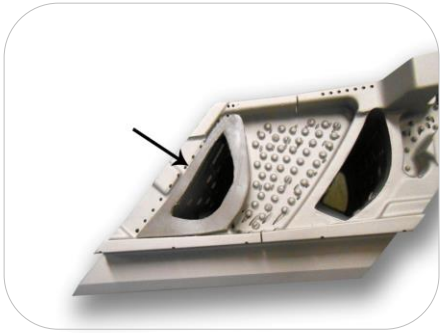
CUSTOMIZED PREFORMS

M-1 MASKING PREFORMS

Flexible masking preforms consisting of M-1 and a clean burning organic binder

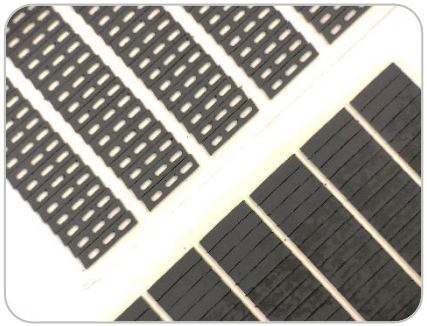
USAGE + FUNCTION

Effective for difficult to mask areas (i.e. turbine blade platforms and manifolds)
As an adjunct to other APV masking products
Prevents coating gases from “leaking out” onto “no-coat” surfaces
Protects imprecise manifolds



FEATURES

Can be custom designed to fit unique measurements
Moldable and flexible
.050 in thickness
Available in 10x10 sheets
Adhesive backing (one-or-two-sided)



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THANK YOU!

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