

Penguard Express MIO WF

Product description

This is a two component waterborne amine cured epoxy coating. It is a fast drying, micaceous iron oxide (MIO) pigmented, high solids, high build product. Specially designed for new construction where short dry to handle and over coating times are required. Can be used as mid coat in atmospheric environments. It is part of a complete water borne system with a recommended Jotun water borne primer and topcoat, or a part of a hybrid system with suitable solvent borne primer and topcoat.

Scope

The Application Guide offers product details and recommended practices for the use of the product.

The data and information provided are not definite requirements. They are guidelines to assist with efficient and safe use, and optimum service of the product. Adherence to the guidelines does not relieve the applicator of responsibility for ensuring that the work meets specification requirements. Jotuns liability is in accordance with general product liability rules.

The Application Guide (AG) must be read in conjunction with the relevant specification, Technical Data Sheet (TDS) and Safety Data Sheet (SDS) for all the products used as part of the coating system.

Referred standards

Reference is generally made to ISO Standards. When using standards from other regions it is recommended to reference only one corresponding standard for the substrate being treated.

Surface preparation

The required quality of surface preparation can vary depending on the area of use, expected durability and if applicable, project specification.

When preparing new surfaces, maintaining already coated surfaces or aged coatings it is necessary to remove all contamination that can interfere with coating adhesion, and prepare a sound substrate for the subsequent product.

Inspect the surface for hydrocarbon and other contamination and if present, remove with an alkaline detergent. Agitate the surface to activate the cleaner and before it dries, wash the treated area using fresh water.

Paint solvents (thinners) shall not be used for general degreasing or preparation of the surface for painting due to the risk of spreading dissolved hydrocarbon contamination. Paint thinners can be used to treat small localized areas of contamination such as marks from marker pens. Use clean, white cotton cloths that are turned and replaced often. Do not bundle used solvent saturated cloths. Place used cloths into water.

Process sequence

Surface preparation and coating should normally be commenced only after all welding, degreasing, removal of sharp edges, weld spatter and treatment of welds is complete. It is important that all hot work is completed before coating commences.

Coated surfaces

Verification of existing coatings including primers

When the surface is an existing coating, verify with technical data sheet and application guide of the involved products, both over coatability and the given maximum over coating interval.

Over coating

When applied on coatings past maximum intercoating interval light abrading may be required to achieve proper intercoat adhesion.

Shop primers

Shop primers are accepted as temporary protection of steel plates and profiles. Refer to the technical data sheet for the generic types accepted. Certain standards require pre-approval of the shop primer as part of a complete system. Contact your nearest Jotun office for specific system compatibility. Before being overcoated the shop primer must be fully cured, clean, dust free, dry and undamaged. Inorganic zinc shop primers must be free of zinc salts (white rust). PH value for the surfaces to be painted should be maintained between 6-8. Corroded and damaged areas must be blast cleaned to minimum Sa 2½ (ISO 8501-1).

Application

Environmental conditions

The suitable humidity range is 40-70 %, and 80 % of RH is the upper limit. If humidity is below 40 %, humidification is recommended. When the surrounding relative humidity exceeds 70 %, no water should be added. If necessary, the amount of water allowed to add is maximum 5 %.

Acceptable environmental conditions - before and during application

Before application, test the atmospheric conditions in the vicinity of the substrate for the dew formation according to ISO 8502-4.

Air temperature	10 - 40	°C
Substrate temperature	10 - 40	°C
Relative Humidity (RH)	30 - 80	%

The following restrictions must be observed:

- Only apply the coating when the substrate temperature is at least 3 °C (5 °F) above the dew point
- Do not apply the coating if the substrate is wet or likely to become wet
- Do not apply the coating if the weather is clearly deteriorating or unfavourable for application or curing

When the substrate temperature exceeds 40 °C no application is recommended. Application in direct sun light shall be avoided.

For further advice please contact your local Jotun office.

Product mixing

Product mixing ratio (by volume)

Penguard Express MIO WF Comp A	1.35 part(s)
Penguard Express WF Comp B	1 part(s)

Product mixing

Coatings should be mixed with an air powered mechanical paint mixing tool that is clean and fit for purpose. Mechanically mix the contents of component A for a period of time that is suitable to fully incorporate all of the ingredients into a homogenous mixture.

Component A is highly thixotropic what might look like gelling, but agitation at medium speed will destroy thixotropic structure and make component A to flow. Thixotropic structure will be build up again over time if not disturbed.

Do not combine the pre-mixed component A and component B before you are ready to commence application and take note of the recommended induction time for the product, especially in colder weather. When ready to apply, add the component B slowly to component A while continuing to mix component A. Continue mixing until the combined content is homogenous. Paint is ready to use.

Induction time and Pot life

Paint temperature	10 °C	23 °C	40 °C
Pot life	1.5 h	1.5 h	1 h

The temperature of base and curing agent must be 10 °C or higher when the product is mixed.

If pot life is exceeded the residue in the can should be discarded as the long-term properties may have been impaired, even if it does not show obvious change in viscosity.

Pot life of the most chemical curing solvent borne epoxy coatings can usually be observed from the viscosity increase. However, this is not applicable to the most two-component water borne epoxy coatings. If pot life is exceeded the residue in the can should be discarded as the long-term properties may have been impaired, even if it does not show obvious change in viscosity.

Thinner/Cleaning solvent

Thinner: Deionized water

Thinning max.: 15 %

Metal ions in tap water may lead to early corrosion failure.

If thinning with water is required, this shall be done after mixing of the two components.

Thinning:

Care must be taken to the amount of water used for thinning. More thinning means slower drying. If the amount of water added exceeds the recommended limit paint defects such as flash rusting / blistering / cracking and bad curing may happen, especially when application is done at high humidity with poor air movement.

Thinning may be required to adjust the spray pattern and for rolling and brushing. Thinning will lower the viscosity, which can reduce sag resistance, prolong pot life and increase drying time. Thinning must be done with care as this will result in lower maximum thickness. Thick wet films will require much longer drying times than specified in TDS.

Add thinner in properly mixed paint before the end of pot life.

Measure the thinner volume accurately with a measuring container. Do not add thinner by eye measurement.

Always have sufficient tools available in order to be able to dismantle and clean out the application equipment should blockages or an unscheduled stop to the work occur.

When using single feed airless spray and conventional air spray equipment ensure the pump, pressure pot, lines and gun are fully flushed with thinner after spraying stops for a prolonged period.

All equipment containing solvents in the pump, hoses and gun have to be thoroughly cleaned according to the following instructions.

Before spraying:

Circulate Jotun Thinner No. 17 through the equipment and hoses. Then Jotun Thinner No. 4 before fresh clean water. Circulate water in equipment and hoses long enough to remove Thinner.

After spraying:

Circulate clean fresh water in the equipment and hoses long enough to get the clean water from the outlet. Then circulate Jotun Thinner No. 4 and finally Jotun Thinner No. 17.

If the application equipment is made in stainless steel, designed for and only used for application of water borne coatings this preparation and cleaning procedure is not needed. Thoroughly wash equipment with water between waterborne coatings. Make sure that no paint is left in the pump, hoses or gut.

Application data

Spray application

Airless Spray Equipment

Pump ratio (minimum) :	42:1
Pressure at nozzle (minimum) :	150 bar/2100 psi
Nozzle tip (inch/1000) :	17-23
Nozzle output (litres/minute) :	1.0-2.2
Filters (mesh) :	70

Several factors influence, and need to be observed to maintain the recommended pressure at the nozzle. Among factors causing pressure drop are:

- extended hoses or hose bundles
- extended hose whip-end line
- small internal diameter hoses
- high paint viscosity
- large spray nozzle size
- inadequate air capacity from compressor
- incorrect or clogged filters

Maintaining of equipment:

- Water based coatings are corrosive to steely equipment, therefore equipment made of carbon steel is generally not recommended.
- Equipment made of carbon steel (if however is used) should be cleaned thoroughly with water and then filled with Jotun Thinner No. 4 or other approved mildew preventive, if the next application is after more than 4 hours. This is to prevent rusting or mildew growth. Flushing with water is needed before next use of the equipment.
- Other non-steel equipment should also be filled with Jotun Thinner No .4 or approved mildew preventive for daily maintenance. Flushing with water is needed before next use of the equipment.

Other application tools

Brush application

Suitable for application by brush, especially recommended for first coat or stripe coating application in corners, on edges and other areas difficult to reach. It will be necessary to apply additional coats to achieve a similar dry film thickness as when the coating is applied by airless or air spray. Brushes of natural materials are not recommended.

Roller application

Can be applied by roller. The addition of a small volume of thinner is recommended to achieve better flow. As with brush, it will be necessary to apply additional coats to achieve a similar dry film thickness when the coating is applied by airless or air spray. Roller is not recommended for application direct to prepared metal, and for stripe coating. Emulsion roller is recommended.

Film thickness per coat

Typical recommended specification range

Dry film thickness	75 - 150	µm
Wet film thickness	120 - 240	µm
Theoretical spreading rate	8.3 - 4.1	m ² /l

When air spray equipment is used thinning with water shall be kept at 5-10 % to achieve dry film thickness of 40-60 µm. More thinning will give higher risk of sagging, flash rust and cracking. If brush or roller is used for application, care must be taken to achieve the specified dry film thickness.

Film thickness measurement

Wet film thickness (WFT) measurement and calculation

To ensure correct film thickness, it is recommended to measure the wet film thickness continuously during application using a painter's wet film comb (ISO 2808 Method 1A). The measurements should be done as soon as possible after application.

Fast drying paints may give incorrect (too low) readings resulting in excessive dry film thickness. For multi layer physically drying (resoluble) coating systems the wet film thickness comb may give too high readings resulting in too low dry film thickness of the intermediate and top coats.

Use a wet-to-dry film calculation table (available on the Jotun Web site) to calculate the required wet film thickness per coat.

Dry film thickness (DFT) measurement

When the coating has cured to hard dry state the dry film thickness can be checked to SSPC PA 2 or equivalent standard using statistical sampling to verify the actual dry film thickness. Measurement and control of the WFT and DFT on welds is done by measuring adjacent to and no further than 15 mm from the weld.

Ventilation

Sufficient ventilation is very important to ensure proper drying/curing of the film.

Care must be taken to the amount of water used for thinning. More thinning means slower drying. If the amount of water added exceeds the recommended limit, paint defects such as flash rusting / blistering / cracking and bad curing may happen, especially when application is done at high humidity with poor air movement.

Stripe coating

The stripe coat sequence can be

- Surface preparation, stripe coat, full coat.

This sequence can be used when a large substrate area has been prepared and leaving the substrate exposed for a long time while doing stripe coating could lead to surface deterioration. Stripe coat is recommended on weld seams for flash rust and sagging prevention.

It is important to pay special attention to edges, openings, rear sides of stiffeners, scallops etc. and to apply a stripe coat to these areas where the spray fan may not reach or deposit an even film.

When applying a stripe coat to bare metal use only a stiff, round stripe coating brush to ensure surface wetting and filling of pits in the surface.

Stripe coating shall be of a different colour to the main primer coat and the topcoat colour and should be applied in an even film thickness, avoiding excessive brush marks in order to avoid entrapped air. Care should be taken to avoid excessive film thickness. Pay additional attention to pot life during application of stripe coats.

Jotun recommends a minimum of one stripe coat. However, in extremely aggressive exposure conditions there may be good reason to specify two stripe coats.

Drying process

Good ventilation is necessary during the drying proces. When humidity is higher than 70 % or temperature is below 15 °C, enforced ventilation shall take place.

Coating loss

The consumption of paint should be controlled carefully, with thorough planning and a practical approach to reducing loss. Application of liquid coatings will result in some material loss. Understanding the ways that coating can be lost during the application process, and making appropriate changes, can help reducing material loss.

Some of the factors that can influence the loss of coating material are:

- type of spray gun/unit used
- air pressure used for airless pump or for atomization
- orifice size of the spray tip or nozzle
- fan width of the spray tip or nozzle
- the amount of thinner added
- the distance between spray gun and substrate
- the profile or surface roughness of the substrate. Higher profiles will lead to a higher "dead volume"
- the shape of the substrate target
- environmental conditions such as wind and air temperature

Drying and Curing time

Substrate temperature	10 °C	23 °C	40 °C
Surface (touch) dry	4 h	2 h	1 h
Walk-on-dry	15 h	7 h	4 h
Dry to over coat, minimum	15 h	7 h	4 h
Dried/cured for service	12 d	7 d	3 d

Drying and curing times are determined under controlled temperatures and relative humidity below 70 %, and at average of the DFT range for the product.

Surface (touch) dry: The state of drying when slight pressure with a finger does not leave an imprint or reveal tackiness.

Walk-on-dry: Minimum time before the coating can tolerate normal foot traffic without permanent marks, imprints or other physical damage.

Dry to over coat, minimum: The recommended shortest time before the next coat can be applied.

Dried/cured for service: Minimum time before the coating can be permanently exposed to the intended environment/medium.

Maximum over coating intervals

Maximum time before thorough surface preparation is required. The surface must be clean and dry and suitable for over coating. Inspect the surface for chalking and other contamination and if present, remove with an alkaline detergent. Agitate the surface to activate the cleaner and before it dries, wash the treated area by low-pressure water cleaning using fresh water.

If maximum over coating interval is exceeded the surface should in addition be carefully roughened to ensure good inter coat adhesion.

Areas for atmospheric exposure

Average temperature during drying/curing	10 °C	23 °C	40 °C
Itself	45 d	30 d	7 d
epoxy	45 d	30 d	7 d
polyurethane	45 d	30 d	7 d

water borne acrylic	45 d	30 d	7 d
water borne polyurethane	45 d	30 d	7 d

Other conditions that can affect drying / curing / over coating

Moisture contamination

If the wet coating is exposed to relative humidity above 85% or to moisture before the coating is at least Walk-on-dry, then blushing may occur. Blushing will cause fading of bright colours, and will affect the gloss. Provided the coating is fully dried/cured the protective properties will not be affected. All affected areas should be lightly sanded, cleaned and recoated.

Repair of coating system

Damages to the coating layers:

Prepare the area through sandpapering or grinding, followed by thorough cleaning/vacuuming. When the surface is clean and dry the coating may be over coated by itself or by another product, ref. original specification.

Damages exposing bare substrate:

Remove all rust, loose paint, grease or other contaminants by spot blasting, mechanical grinding, water and/or solvent washing. Feather edges and roughen the overlap zone of surrounding intact coating. Apply the coating system specified for repair.

Areas with too low DFT: Remove contaminants, roughen the surface and apply new coating as soon as possible to prevent contamination.

For small areas and touch-up, this product can be applied with an efficient airless spray or air spray or with a brush.

Overlapping zones to intact coating shall be masked off with a minimum 200 mm distance to the damage and shall cover the surrounding area so that overspray to sound coating does not occur during repair application.

Edges of intact coating around damage shall be feathered to ensure a smooth transition from the coating to the prepared steel. Consecutive layers of coating shall be feathered to expose each layer and new coating shall always overlap to an abraded existing layer.

Repair of damaged areas

Sags and runs can be caused by too high wet film thickness, too much thinner added or the spray gun used too close to the surface.

Repair by using a paint brush to smooth the film when still wet.

Sand down to a rough, even surface and re-coat if the coating is cured.

Orange peel can be caused by poor flow/levelling properties of the paint, poor atomization of the paint, thinner evaporating too fast or the spray gun held too close to the surface.

This can be rectified by abrading the surface and applying an additional coat after having adjusted the application properties or the application technique.

Dry spray can be caused by poor atomization of the paint, spray gun held too far from the surface, high air temperature, thinner evaporating too fast or coating applied in windy conditions.

Sand down to a rough even surface and re-coat.

Pinholes can be caused by entrapped solvents in the film or by incorrect application technique. Pinholes can be repaired as per procedure for damages to the coating layer or to the substrate, ref. above.

Coating film continuity

When required by the specification, the coating shall be tested for film discontinuity according to ASTM D 5162, test method A or B as appropriate for the actual dry film thickness.

All recorded defects shall be repaired by best practical means.

Quality assurance

The following information is the minimum required. The specification may have additional requirements.

- Confirm that all welding and other metal work has been completed before commencing pre-treatment and surface preparation
- Confirm that installed ventilation is balanced and has the capacity to deliver and maintain the RAQ
- Confirm that the required surface preparation standard has been achieved and is held prior to coating application
- Confirm that the climatic conditions are within recommendations in the AG, and are held during the application
- Confirm that the required number of stripe coats have been applied
- Confirm that each coat meets the DFT requirements in the specification
- Confirm that the coating has not been adversely affected by rain or other factors during curing
- Observe that adequate coverage has been achieved on corners, crevices, edges and surfaces where the spray gun cannot be positioned so that its spray impinges on the surface at 90° angle
- Observe that the coating is free from defects, discontinuities, insects, abrasive media and other contamination
- Observe that the coating is free from misses, sags, runs, wrinkles, fat edges, mud cracking, blistering, obvious pinholes, excessive dry spray, heavy brush marks and excessive film build
- Observe that the uniformity and colour are satisfactory

All noted defects shall be fully repaired to conform to the coating specification.

Caution

This product is for professional use only. The applicators and operators shall be trained, experienced and have the capability and equipment to mix/stir and apply the coatings correctly and according to Jotun's technical documentation. Applicators and operators shall use appropriate personal protection equipment when using this product. This guideline is given based on the current knowledge of the product. Any suggested deviation to suit the site conditions shall be forwarded to the responsible Jotun representative for approval before commencing the work.

For further advice please contact your local Jotun office.

Health and safety

Please observe the precautionary notices displayed on the container. Use under well ventilated conditions. Do not inhale spray mist. Avoid skin contact. Spillage on the skin should immediately be removed with suitable cleanser, soap and water. Eyes should be well flushed with water and medical attention sought immediately.

Accuracy of information

Always refer to and use the current (last issued) version of the TDS, SDS and if available, the AG for this product. Always refer to and use the current (last issued) version of all International and Local Authority Standards referred to in the TDS, AG & SDS for this product.

Colour variation

Some coatings used as the final coat may fade and chalk in time when exposed to sunlight and weathering effects. Coatings designed for high temperature service can undergo colour changes without affecting performance. Some slight colour variation can occur from batch to batch. When long term colour and gloss retention is required, please seek advice from your local Jotun office for assistance in selection of the most suitable top coat for the exposure conditions and durability requirements.

Reference to related documents

The Application Guide (AG) must be read in conjunction with the relevant specification, Technical Data Sheet (TDS) and Safety Data Sheet (SDS) for all the products used as part of the coating system.

When applicable, refer to the separate application procedure for Jotun products that are approved to classification societies such as PSPC, IMO etc.

Symbols and abbreviations

min = minutes
h = hours

TDS = Technical Data Sheet
AG = Application Guide

d = days
°C = degree Celsius
° = unit of angle
µm = microns = micrometres
g/l = grams per litre
g/kg = grams per kilogram
m²/l = square metres per litre
mg/m² = milligrams per square metre
psi = unit of pressure, pounds/inch²
Bar = unit of pressure
RH = Relative humidity (% RH)
UV = Ultraviolet
DFT = dry film thickness
WFT = wet film thickness

SDS = Safety Data Sheet
VOC = Volatile Organic Compound
MCI = Jotun Multi Colour Industry (tinted colour)
RAQ = Required air quantity
PPE = Personal Protective Equipment
EU = European Union
UK = United Kingdom
EPA = Environmental Protection Agency
ISO = International Standards Organisation
ASTM = American Society of Testing and Materials
AS/NZS = Australian/New Zealand Standards
NACE = National Association of Corrosion Engineers
SSPC = The Society for Protective Coatings
PSPC = Performance Standard for Protective Coatings
IMO = International Maritime Organization
ASFP = Association for Specialist Fire Protection

Disclaimer

The information in this document is given to the best of Jotun's knowledge, based on laboratory testing and practical experience. Jotun's products are considered as semi-finished goods and as such, products are often used under conditions beyond Jotun's control. Jotun cannot guarantee anything but the quality of the product itself. Minor product variations may be implemented in order to comply with local requirements. Jotun reserves the right to change the given data without further notice.

Users should always consult Jotun for specific guidance on the general suitability of this product for their needs and specific application practices.

If there is any inconsistency between different language issues of this document, the English (United Kingdom) version will prevail.
