Resist 78

Product description

This is a two component moisture curing inorganic zinc ethyl silicate coating. It is a fast curing, very high zinc dust containing product. It conforms to the compositional requirements of SSPC paint 20, level 2 and ISO 12944-5. It provides excellent corrosion protection as part of a complete coating system. It is heat resistant up to 540 °C (1004 °F). To be used as primer in atmospheric environments. Suitable for properly prepared carbon steel substrates only. This product complies with ASTM D520 type II zinc dust.

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.
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.

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.

Soluble salts removal

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Soluble salts have a negative impact on the coating systems performance, especially when immersed. Jotun's general recommendations for maximum soluble salts (sampled and measured as per ISO 8502-6 and -9) content on a surface are:
For areas exposed to (ISO 12944-2):
C1-C4: 200 mg/m²
C5M or C5I: 100 mg/m²

Carbon steel

Initial rust grade

The steel shall preferably be Rust Grade A or B (ISO 8501-1). It is technically possible to apply the coating to rust grade C, but it is practically challenging to ensure specified film thickness on such a rough surface and difficulty of removing/reducing soluble salts from pitted steel, hence risk of reduced lifetime of the coating system. When steel of Rust Grade C is coated, the frequency of inspection and testing should be increased to make sure that recommended surface cleanliness and surface profile are achieved, soluble salts are within acceptable limits and the primer is applied at recommended dry film thickness. Rust Grade D is not recommended.

Metal finishing

For areas in corrosivity category C5 the requirement is conformance to grade P3 (ISO 8501-3) Table 1.
Defective welds shall be replaced and treated to an acceptable finish before painting. Temporary welds and brackets shall be ground to a flat finish after removal from the parent metal.
Surface preparation and coating should normally be commenced only after all metal finishing and degreasing of a specific area is complete. It is important that as much hot work as possible is completed before coating commences.

Abrasive blast cleaning

Application of protective coating shall commence before degradation of the surface standard occurs.

Cleanliness

After pre-treatment is complete, the surface shall be dry abrasive blast cleaned to Sa 2½ (ISO 8501-1) using abrasive media suitable to achieve a sharp and angular surface profile.

Surface profile

The surface shall have a sharp and angular surface profile 30-85 µm, grade Fine to Medium G (ISO 8503-2). Measure the achieved profile with surface replication tape (Testex) (ISO 8503-5) or by surface roughness stylus instrument (ISO 8503-4).

Dust contamination

At the completion of abrasive blasting the prepared surface shall be cleaned to remove residues of corrosion products and abrasive media, and inspected for surface particulate contamination. Maximum contamination level is rating 1 (ISO 8502-3) as per Figure 1. Dust size no greater than class 2.

Coated surfaces

Shop primers

When over coated the shop primer must be abrasive swept, clean, dry and undamaged.
Corroded and damaged areas must be blast cleaned to minimum Sa 2½ (ISO 8501-1).

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Application

Environmental conditions

If the relative humidity is below 60 %, the application may still be done. Complete curing will however not take place, or will be very slow.
To facilitate curing under such conditions
• the applied coating can be wetted with fresh water
• the surrounding atmosphere can be artificially humidified, for instance by spraying water on the floor
• curing speed can be increased by use of Jotun Zinc 100 LHA (Low Humidity Additive).

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	5 - 40	°C
Substrate temperature	5 - 45	°C
Relative Humidity (RH)	60 - 85	%

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
• Do not apply the coating in high wind conditions

Product mixing

Product mixing ratio (by volume)

Resist 78 Comp A	9 part(s)
Jotun Zinc 100 Comp B	2.6 part(s)

Product mixing

Component A is a liquid and Component B is dry zinc dust. Component A must be well shaken before use. Pour the zinc dust slowly into the liquid during mechanical mixing. Stir until lump free and pass through a 60 mesh sieve.

At relative humidity (RH) below 60% Jotun Zinc 100 LHA additive can be used to increase curing speed. Note the following guidelines.
The additive is in a 400ml bottle and should be used with the system of one bottle per set of Resist. The additive should be added to the component A, prior to adding the zinc (component B). The component A should be stirred carefully after adding the additive, and while the component B is being added to the coating.
If the RH is above 60%, the Jotun Zinc 100 LHA should not be used. The additive should not be added earlier than 2 hours prior to adding the zinc (component B).

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Induction time and Pot life

Paint temperature	23 °C
Pot life	8 h

The temperature of base and curing agent is recommended to be 18 °C or higher when the product is mixed.

Thinner/Cleaning solvent

Thinner: Jotun Thinner No. 4 / Jotun Thinner No. 25
Thinning max.: 5 %

Jotun Thinner No. 4: for fast evaporation
Jotun Thinner No. 25: for slow evaporation

Jotun Thinner No. 28 can be used as alternative to Jotun Thinner No. 4 for fast evaporation.

Thinning is not normally required. Consult the local representative for advice during application in extreme conditions. Do not thin more than allowed by local environmental legislation.
Note: Korean VOC regulation "Korea Clean Air Conservation Act" and its corresponding thinning limit will prevail over recommended thinning volumes.

Jotun Thinner No. 17 can be used as alternative cleaning solvent.

Application data

Spray application

Airless Spray Equipment

Pump ratio (minimum) :	42:1
Pressure at nozzle (minimum) :	100 bar/1400 psi
Nozzle tip (inch/1000) :	17-21
Nozzle output (litres/minute) :	1.3-1.9
Filters (mesh) :	50

Note*
Several factors influence and need to be observed to maintain the recommended fluid flow/product atomization pattern. Among factors causing pressure drop are:
- Pump size
- Extended hoses or hose bundles
- Extended hose whip-end line
- Small internal diameter hoses
- Narrow tip angle
- High paint viscosity
- Large spray nozzle size
- Inadequate air capacity from compressor
- Incorrect or clogged filters
- Product temperatures

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Film thickness per coat

Typical recommended specification range

Dry film thickness	50	-	90	µm
Wet film thickness	70	-	125	µm
Theoretical spreading rate	14.4	-	8	m²/l

This product can be applied up to 50 % higher than maximum specified film thickness without loss of technical properties.

There is a risk of mud-cracking if the thickness exceeds 120 µm.

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.

Application / Drying / Curing considerations

The curing will be retarded at relative humidity (RH) below 60 %. The preferred method to accelerate curing is by addition of Jotun Zinc 100 LHA (Low Humidity Additive) as described under Product mixing.

Alternative methods to accelerate curing at RH below 60 %:
• Wetting of the coated surface with fresh water. This can be initiated as soon as the surface is walk-on-dry. Finer water mist ensures complete curing throughout the film.
• The relative humidity in the atmosphere surrounding the coated structure can be increased by using commercial humidifiers. At RH above 70 % the drying times stated in the Technical Data Sheet apply.
• Addition of up to 2 % fresh water to Component A before mixing with Component B will contribute positively to completion of the curing reaction. However, this approach should only be considered when the relative humidity in the vicinity is below 40 % and after consulting Jotun's technical service representative.

Test of curing:
Before overcoating the applied coating must be visibly dry and tested for sufficient curing. Curing shall always be tested for resistance to MEK, Methyl Ethyl Ketone (ASTM D 4752). The test result should as a minimum equal Resistance Rating 4; "Burnished appearance in rubbed area; slight amount of zinc on cloth after 50 double rubs". The MEK test measures curing in the surface of the primer.

To ensure complete curing throughout the film additional Coin Test is recommended. The film is scraped harshly with a coin. The coin shall produce a shiny mark without any loosened zinc.

Ventilation

Sufficient ventilation is very important to ensure proper drying/curing of the film. Zinc ethyl silicate based coatings are different from other coatings in that they need humidity for the curing process. Hence while needing ventilation the coating should also be exposed to humidity, this should occur as soon as the application is completed.

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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	5 °C	10 °C	23 °C	40 °C
Surface (touch) dry	1 h	30 min	15 min	13 min
Walk-on-dry	1.5 h	45 min	30 min	25 min
Dry to over coat, minimum	18 h	13 h	4 h	1.5 h
Dried/cured for service	18 h	13 h	4 h	1.5 h

The drying and curing times, as well as over coating intervals for inorganic zinc ethyl silicates are measured under controlled temperatures, relative humidity (RH) 70 % during application and curing, and at average of the DFT range for the product. Higher RH will increase the curing speed.

At application below 60% RH curing will be retarded. Jotun Zinc 100 LHA can be used to speed up curing. Refer to the Application Guide (AG) for additional information.

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.

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Where an extended overcoating time is stated, the product can be overcoated after an extended time period, however the anticipated level of inter-coat adhesion can only be achieved through good painting practices.

The max overcoating time the product is able to achieve without any surface perpetration depends on environmental exposure conditions (such as UV, temperature, humidity etc.), system composition and other factors.

If the surface has signs of chalking or any contamination, surface treatment, such as methodical abrading followed by freshwater washing should be employed. Alkaline detergent should be used to remove heavy contamination. If you are unsure a test patch should be used to consider sufficient cohesion.

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	5 °C	10 °C	23 °C	40 °C
epoxy	extended	extended	extended	extended
silicone acrylic	extended	extended	extended	extended

Other conditions that can affect drying / curing / over coating

Repair of coating system

An inorganic zinc coating with extensive scattered mechanical damages or mud cracking is very difficult to spot repair and achieve a good overall results. Hence it is recommended to remove the coating by means of abrasive blasting or hydrojetting and re-apply a new system.

Repair of damaged areas

A damaged inorganic zinc coating is relatively difficult to repair. Minor mechanical damages are adressed below. For major damages (larger than 40 cm²) or scattered mechanical damages the optimum repair is vacuum blasting of affected areas, followed by feathering of an overlapping zone. The coating should then be touched up with the same product with a carefull overlapping of 2 cm on existing coating.

Alternatively, depending on the expectations of lifetime of the coating system and considering practical possiblities for repair: Minor damages may be mechanically prepared to St 3 (ISO 8501-1) using rough discs followed by touch up with a zinc epoxy primer (Barrier series).

Minor areas with mud cracking may be repaired by removing the cracked coating by use of a small hammer, followed by sandpapering the overlapping zone to intact coating. Touch up with specified product.

Mist coat technique

Zinc silicate paints are porous and the porosity may vary depending on weather conditions during application, on film thickness and on the application technique. When over coating, air from the pores will escape through the new coat of paint and may cause blisters or pinholes (popping) in the coat just after application. To avoid this a mist coat/full coat technique is recommended.
Firstly apply a thin, diluted (30-40 %) coat to fill the pores in the zinc silicate film. Allow flash-off for 30-45 minutes, and then apply a full coat as per specified thickness. In difficult cases it may be necessary to thin even the next coat, or use Penguard Tiecoat 100 as a sealer coat before applying subsequent coats.

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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

When applicable, products primarily meant for use as primers or antifoulings may have slight colour variations from batch to batch. Such products and epoxy based products used as a finish coat may chalk when exposed to sunlight and weathering.

Colour and gloss retention on topcoats/finish coats may vary depending on type of colour, exposure environment such as temperature, UV intensity etc., application quality and generic type of paint. Contact your local Jotun office for further information.

Reference to related documents

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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
d = days
°C = degree Celsius
° = unit of angle

TDS = Technical Data Sheet
AG = Application Guide
SDS = Safety Data Sheet
VOC = Volatile Organic Compound
MCI = Jotun Multi Colour Industry (tinted colour)

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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
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.

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