

# Application Guide



## Muki Z 2001

### Product description

This is a two component inorganic low zinc moisture curing zinc ethyl silicate coating. It is a shop primer designed for very high welding and cutting speed, giving reduced weld porosity and back burning. It is fast drying and has good abrasion resistance making it suitable for stacking shortly after application. Can be used as temporary primer in a new construction phase or as primer in a complete coating system in atmospheric and immersed environments. Suitable for properly prepared carbon steel substrates and recommended to be applied in an automated shop priming line. Compatible with advanced welding technologies including MIG, MAG and G-FCAW.

### 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:

Potable water tanks: 20 mg/m<sup>2</sup>

For areas exposed to (ISO 12944-2):

C1-C4: 200 mg/m<sup>2</sup>

C5M or C5I: 100 mg/m<sup>2</sup>

Im1-Im3: 80 mg/m<sup>2</sup>

### 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 grades C and D, but it is practically challenging to ensure specified film thickness on such a rough surface, hence risk of reduced lifetime of the coating system. When steel of Rust Grade C or D is coated, the frequency of inspection and testing should be increased.

#### Metal finishing

It is recommended for the steel to be degreased and cleaned by low-pressure Water Cleaning LP WC method to Wa 1 (ISO 8501-4) using fresh water.

### Abrasive blast cleaning

#### 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

Recommended surface profile 40-75 µm, grade Fine to Medium S/G (ISO 8503-2).

#### 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.

## Application

### 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	23 - 40	°C
Relative Humidity (RH)	50 - 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

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## Product mixing

### Product mixing ratio (by volume)

Muki Z 2001 Comp A	10 part(s)
Muki Z 2001 Comp B	6.75 part(s)

### Induction time and Pot life

**Paint temperature** **23 °C**

Pot life 24 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

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

## Spray application

### Airless Spray Equipment

Pump ratio (minimum) :	32:1
Pressure at nozzle (minimum) :	50 bar/700 psi
Nozzle tip (inch/1000) :	15-23
Nozzle output (litres/minute) :	4.0
Filters (mesh) :	50-70

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

## Film thickness per coat

### Typical recommended specification range

Dry film thickness	15 - 20	µm
Wet film thickness	55 - 70	µm
Theoretical spreading rate	18.7 - 14	m <sup>2</sup> /l

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Can be applied up to 25 % higher than maximum specified film thickness without loss of technical properties. Particular attention must be paid to avoid sagging.

## Film thickness measurement

### Dry film thickness (DFT) measurement

Measuring of the DFT (dry film thickness) shall be carried out for every start up and during the day 3-4 times. Use smooth test plates for measuring of the DFT. The length of the panels should have a length equal to the spraying angle of the nozzles + 25 %. In this way one will also measure the overlapping zone. The panels used should be 500 x 100 x 1 mm. 1 mm plates are used because thinner plates can give incorrect measurement. We recommend to make a cassette for the steel plates ex. one for every month and store them for at least one year. Put in date, DFT, max, min average etc. Measuring of the thickness on the steel plates can be done with an electromagnetic instrument. Ensure the instrument is calibrated to measure low film thickness. Calibrate the instrument by using a shim with known thickness. The shim should have a thickness of about 20-25 micron when measuring shopprimer. At least 10 measurements equally spaced out over the length of each test panel must be carried out. 85 % of the reading should be within  $\pm 3 \mu\text{m}$  of the specified film thickness.

### Ventilation

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

### Drying process

When applying 20 $\mu\text{m}$  shopprimer on steel with surface roughness Ry (maximum amplitude peak to valley) 75 $\mu\text{m}$  the shopprimer has to be fast drying. Fast evaporating solvents prevent the shopprimer from flowing down in the 'valleys' of the surface profile. Slow drying shopprimer will cause low DFT on the 'peaks' which will cause early breakdown of the paint film. It will also lead to sticking of paint to the conveyor belt and a prolonged period of time before the shopprimed steel can be handled. As a rule, the shopprimer should be wet 5-10 seconds before dry spots start to appear on the steel objects.

If the shopprimer is too slow drying this can be due to:

- too high film thickness
- too cold paint or
- too low temperature of the steel

However, if the paint is too quickly drying this will lead to a porous film with little or no corrosion protection and a big risk of delamination if the shopprimer is overcoated.

A reduction of the steel temperature will in most cases eliminate this problem. Addition of a slowly evaporating thinner may also eliminate the problem.

### 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

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## Drying and Curing time

Substrate temperature	23 °C	40 °C
Surface (touch) dry	1 min	20 sec
Walk-on-dry	3 min	1 min
Dry to over coat, minimum	1 d	1 d
Dried/cured for service	1 d	1 d
Dried/cured for immersion	1 d	1 d

Drying and curing times are determined under controlled temperatures and relative humidity below 85 %, 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 shortest time allowed 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.

Dried/cured for immersion: Minimum time before the coating can be permanently immersed in sea water.

## 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 jetting to Wa 1 (ISO 8501-4) 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	23 °C	40 °C
acrylic	extended	extended
epoxy	extended	extended
vinyl	extended	extended

### Areas for immersed exposure

Average temperature during drying/curing	23 °C	40 °C
acrylic	extended	extended
epoxy	extended	extended
vinyl	extended	extended

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## Other conditions that can affect drying / curing / over coating

### 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.

Always observe the maximum over coating intervals. If the maximum over coating interval is exceeded the surface should be carefully roughened in order to ensure good intercoat adhesion.

#### 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.

## 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

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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	TDS = Technical Data Sheet
h = hours	AG = Application Guide
d = days	SDS = Safety Data Sheet
°C = degree Celsius	VOC = Volatile Organic Compound
° = unit of angle	MCI = Jotun Multi Colour Industry (tinted colour)
µm = microns = micrometres	RAQ = Required air quantity
g/l = grams per litre	PPE = Personal Protective Equipment
g/kg = grams per kilogram	EU = European Union
m <sup>2</sup> /l = square metres per litre	UK = United Kingdom
mg/m <sup>2</sup> = milligrams per square metre	EPA = Environmental Protection Agency
psi = unit of pressure, pounds/inch <sup>2</sup>	ISO = International Standards Organisation
Bar = unit of pressure	ASTM = American Society of Testing and Materials
RH = Relative humidity (% RH)	AS/NZS = Australian/New Zealand Standards
UV = Ultraviolet	NACE = National Association of Corrosion Engineers
DFT = dry film thickness	SSPC = The Society for Protective Coatings
WFT = wet film thickness	PSPC = Performance Standard for Protective Coatings
	IMO = International Maritime Organization

## 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.