Pugh & Co International

Production & marketing of chemical specialities since 1947

ISO 9001 certified

Based in Belgium

Surface treatment expertise based on the original KELATE patent

40 years of expertise (1980)

Water based formulations (no solvents)



ISO 9001 BUREAU VERITAS Certification

Responsible Care® Good Chemistry at Work

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5

million m^2 of metal surfaces treated yearly with Kelate® or Actan®

30

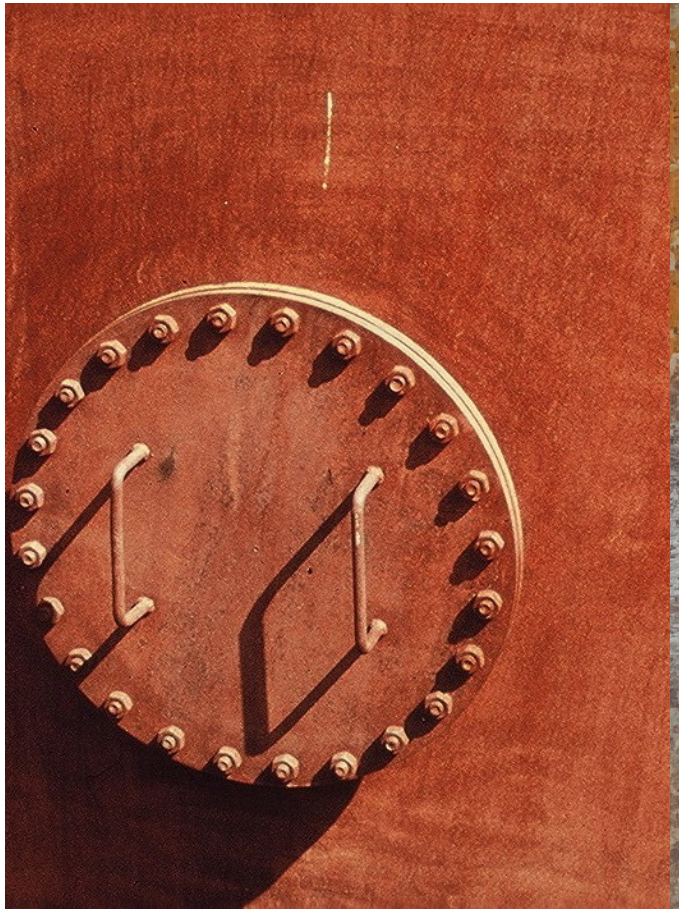
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How to paint on rust





How to paint on oxidized (rusted) steel ?

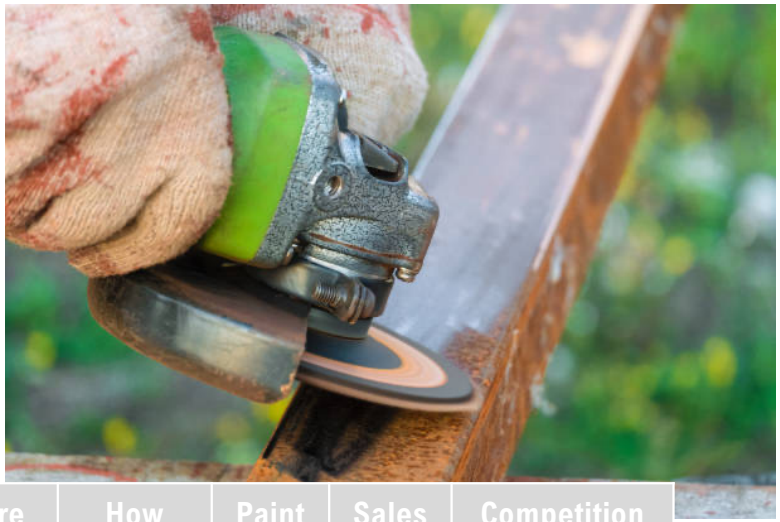
1. Mechanical surface treatments
2. Coatings and paints ?
3. Wet/dry blasting ?
4. Chemical derusting ?
5. Rust passivation ?



Mechanical surface treatment

1. Most mechanical surface treatments, such as scraping, hand brushing or power cleaning, **do not remove all the rust** from the cavities of the surface
2. The presence of this **residual rust encourages continuation of the corrosion** process under paint films subsequently applied.





Paint & coatings on rust.

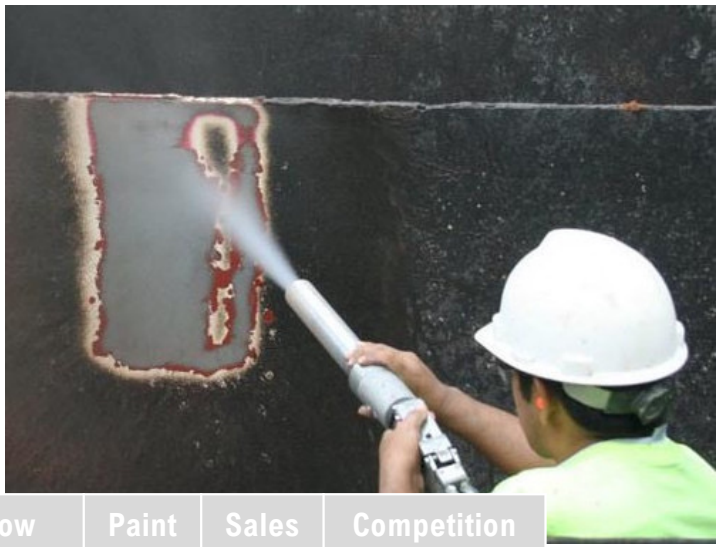
1. Surface rust always creates problems and its presence should be **strictly avoided**.
2. Rust does not provide a firm mechanical base
3. More important, **rust is electrochemically unstable** under a paint film.
4. Therefore, even the best paint will not give a full protection when applied on a steel surface which is not entirely rust free.
5. This **may cause many problems**, despite existing techniques available for surface preparation





Wet/dry steel blasting





1. Blasting the surface to white metal provides an excellent substrate for paint, but a freshly blasted surface is highly reactive
2. Freshly blasted surface must be coated immediately.
3. Blast cleaned steel may rust rapidly.
4. Water jetting can produce flash rusting.
5. Re-rusting occurs when freshly blasted steel is exposed to moisture.
6. Steel blasting is often ruled out due to cost, environment, protection, inconvenience of rigging, dust and spark potential, limited size of areas to be cleaned, difficulty of arranging, blasting/painting cycles, …

Acid surface pre-treatment

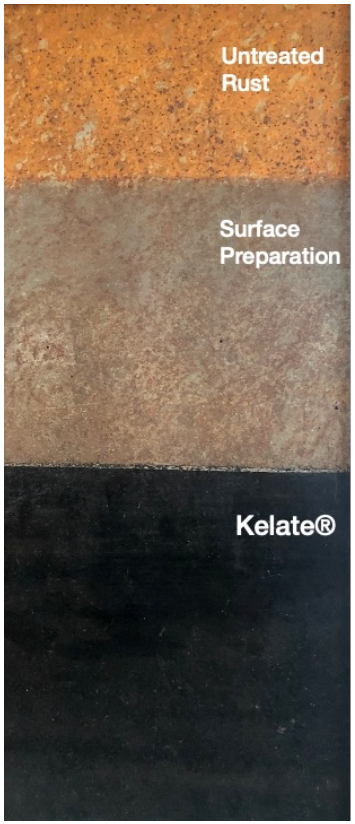
1. Rust removal is extremely difficult under temperature, concentration and application conditions of the field.
2. In many situations, residual acids or salts left in the pores of the rust have caused failure by osmotic blistering of the paint system.
3. Even under the best field conditions, the use of conventional phosphoric acid based pre-treatment do not accomplish a true passivation of the metal surface, and their reaction with the different rust layers is not homogeneous and inefficient.





KELATE®

CONVERSION COAT



1. Mechanical treatment often leaves residual rust
2. Acid cleaning in the field is unsatisfactory
3. Steel blasting is often difficult to apply and requires immediate coating
4. **Rust is electrochemically unstable** under a paint film

➔ an ideal solution is to completely passivate the tightly bound residual rust, chemically preventing it from participating in further corrosion. This is why we have developed KELATE®

1. Thorough passivation of residual rust (rust is neutralised)
2. High reactivity
3. Excellent adhesion promoter for subsequent coatings
4. Will react with blasted steel
5. Water based / VOC free

KELATE®

CONVERSION COAT

1 Limited surface preparation



Provides full rust passivation on adequate surfaces (CSt2-DSt2 standards).
Allows to save on costly additional mechanical surface preparation. Can be applied on humid surfaces

2 Reactive and efficient



High reactivity: penetrates into steel surfaces
Visible reaction: surface turns blue-black
Only one coat without excess
High coverage (20m²/litre)
No need to rinse off the surface after reaction

3 Increases paints durability



Coatable after 3 hours
Adhesion promoter for subsequent coatings.
No brush marks (thin and homogeneous coat).
Compatible with most solvent-based metal protective paints.

4 Safe to use



Water based – Zero VOC -
Low environmental impact
Phosphoric acid free
Not irritant nor corrosive
Long shelf-life
40 years experience

KELATE®

CONVERSION COAT

What it is

KELATE® is a highly reactive water reducible chelating polymer for rust passivation on rusted steel which has been hand or power cleaned, or blasted

SPECIFICATION :

colour	beige
odour	slight
density at 20°C	1.02 ± 0.05 g/m³ ISO 2811-1:1997
viscosity at 20°C	10-16 sec. Ford Cup N° 4
pH value at 20°C	1.5 ± 0.5
VOC in %	free



KELATE®

CONVERSION COAT

What it does

KELATE® neutralizes the corrosion process. It reacts quickly (3 hours) with the rust and transforms iron oxides into a stable and insoluble blue-black metallo-organic complex which is ready for painting after reaction.

KELATE® effects a thorough chemical passivation of the substrate and makes it a sound base for the application of coating systems.

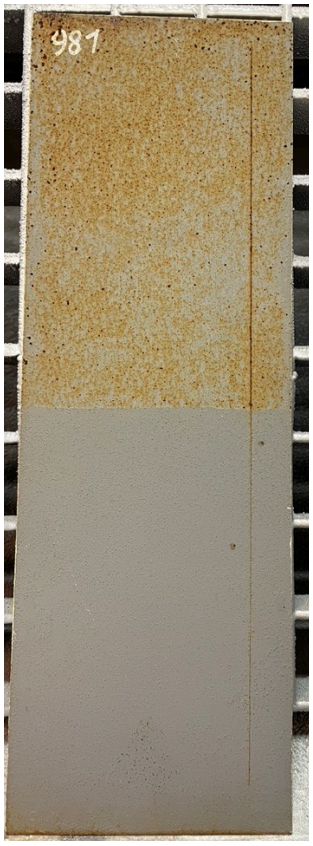


Rust passivation benefits



Sa3 surface preparation
8 days outdoors uncoated
1 coat expoxy-polyamid primer
5 years outdoor exposure

Sa3 surface preparation
8 days outdoors uncoated
1 coat KELATE® MR6D
1 coat expoxy-polyamid primer
5 years outdoor exposure



St2 surface preparation
1 coat short-oil alkyd
(fast drying type-car body repair)
3 months outdoor exposure

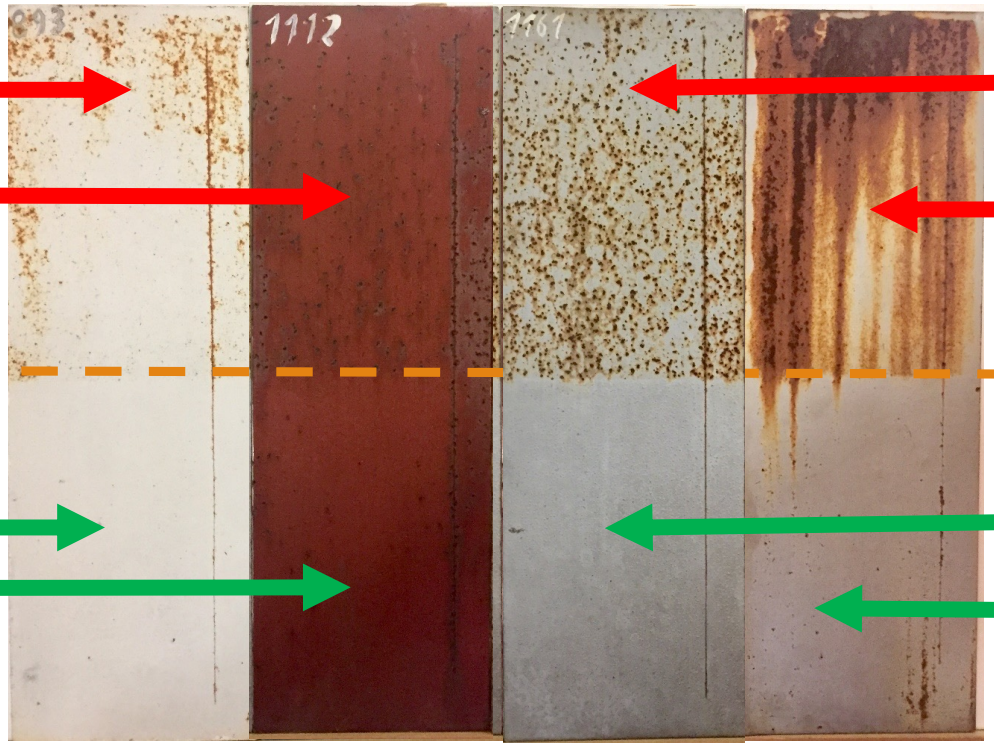
St2 surface preparation
1 coat KELATE® MR6D
1 coat short-oil alkyd
(fast drying type-car body repair)
3 months outdoor exposure

Outdoor test panels

KELATE®
CONVERSION COAT

** Weathered 3 months up to St3 ** 8 days outdoor weathered*

Surface preparation	St2	Sa3*	St2	Sa3**
Outdoor exposure	30 months	48 months	18 months	60 months



(A) 1 coat long oil alkyd primer without anti-corrosive pigment

(B) 1 coat alkyd red iron oxide primer

(C) 1 coat chlorinated rubber high build

(D) 1 coat epoxy-polyamide primer high build

1 coat Kelate MR6D + (A)

1 coat Kelate MR6D + (B)

1 coat Kelate MR6D + (C)

1 coat Kelate MR6 D+ (D)

KELATE® - Where to use

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KELATE®

CONVERSION COAT

Where to use

KELATE® can be applied on any rusted surface which has been mechanically brushed (CST2 standards). It will also react with mechanically activated steel like blasted steel.





KELATE®

CONVERSION COAT

Ferrous surfaces

such as railings, radiators, fences,concrete steels (pillars, beams, balconies, facades, etc.)



Automotive

ideal for small areas of rust, stone chips and scratches, …



KELATE®

CONVERSION COAT

On steel surfaces

which cannot be blasted and/or are partially rerusted (cavities). On blasted surfaces to prevent or passivate «flash rust».



Marine

on all rusted steel surfaces before painting or repainting when preparation by blasting is a problem, e.g. cargo holds, decks, hatch co-vers, superstructures, pipelines,winches, rails etc.









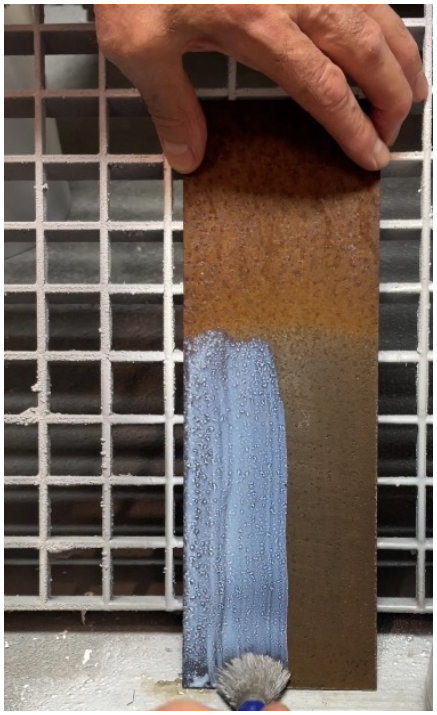
What makes KELATE® unique

1. Water based – Zero VOC
2. Quick reaction time (Coatable after 3 hours)
3. Provides full rust conversion on adequate surfaces (CST2-DST2 standards)
4. High coverage: 20m² per litre.
5. Requires only one coat without excess (surface wetting)
6. Can be applied on humid surfaces
7. Does not contain phosphoric acid which usually leaves acidic residues on the surface
8. No brush marks (thin and homogeneous coat)
9. No need to rinse off the surface after reaction
10. Not irritant nor corrosive

KELATE® - How to use

KELATE® - Brush application







One single application without excess
Use brush or roll.
Apply between 5 and 35°C. Reaction time is 3 hours and is characterized by the surface turning a blue-black colour.

KELATE® - Brush excess correction

Wetting the surface is sufficient. KELATE® in excess will not react and will need to be cleaned .

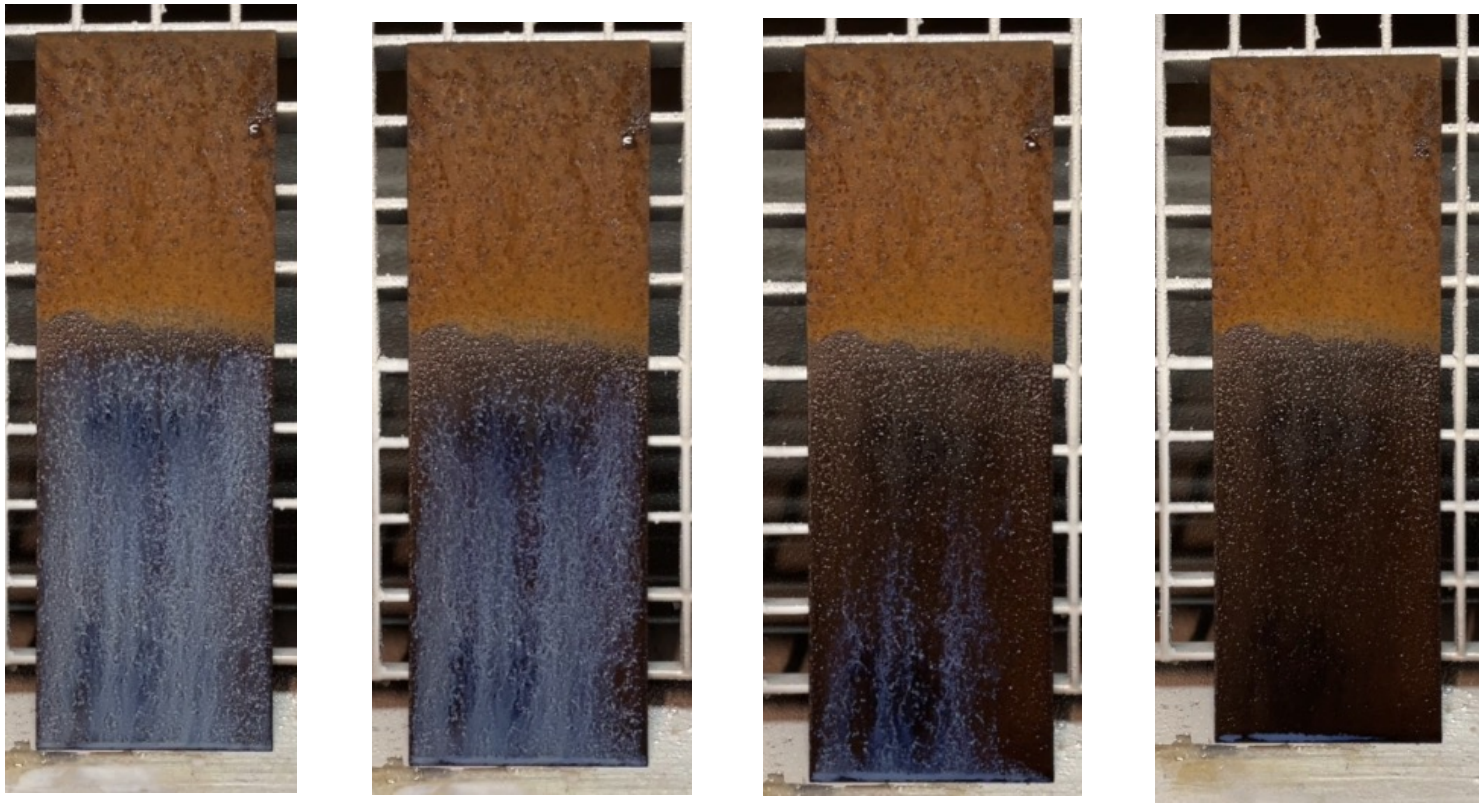






KELATE® - Accelerated drying 20 min

High reactivity.
Colour change in less than 15 min.



KELATE® – Ready to be coated



After 3 hours surface is completely dry and can be overcoated with any suitable paint and coating

Instructions for use Summary

KELATE®
CONVERSION COAT

		KELATE MR6D
	***Preparation***	Remove dirt, grease, oil, paint and wax residues. Thorough scraping, wire brushing, machine brushing, grinding, sanding to preparation grade CSt2-DSt2 / ISO 8501-1 Soluble salts and other contaminants are washed down with fresh mater.
	***Application***	Stiff brush or roller: 1 single application without excess
	Coverage	approx. 20 m² per litre
	***Air spray application:***	Nozzle orifice mm 1.3-1.5 - Nozzle pressure bar 3-4
	***Application conditions***	Temperature: 5°C – 35°C
		Drying time: 3 hours. The surface turns completely blue-black. After minimum 3 hours putties and/or metal protective paints can be applied.
		Over coating within 48h

Final recommendations

During application

- Precautions should be taken to avoid by sudden shower the possible staining **of concrete surfaces** adjacent to treated areas (masking with paper or plastic, etc.).

Handling precautions

- KELATE®MR6D has an acid pH and usual handling precautions (goggles, rubber gloves, etc.) should be taken.
- Avoid contact with skin and eyes. In case of contact
  - On hands: stains may be removed with a 1% solution of sodium hypochlorite (household bleach diluted with 4 times its volumes of water).
  - If splashed into the eye it should be rinsed immediately with a 1 % solution of sodium bicarbonate.
- KELATE®MR6D should not be swallowed. Thus keep out of reach of children.

Storage

- Use plastic containers
- May be stored for more than one year without deterioration.
- Do not put used product back in orginal container

How to paint on KELATE®

How to paint on KELATE®

- KELATE® is a waterborne system which is overcoatable in normal drying conditions after minimum 3 hours. Normal drying conditions mean temperature above 15°C and relative humidity below 80%.
- **Solvent-based paints** usually applied on steel surfaces are compatible with KELATE®. These may be paint systems based on alkyd, modified alkyd,), epoxy, polyurethane or vinyl.
- KELATE® can be overcoated with **all waterborne paint systems** but the final result is dependent from the drying-curing mechanism of the paint system.
- With **appropriate 2-components waterborne epoxy primers**, no staining has been observed when the primer was allowed to cure for at least 2 hours at ambient temperature and relative humidity below 80%.

Frequently Asked Questions (FAQ'S)

How is KELATE® different from a primer or a coating?

- KELATE® is a **surface treatment**. It is not a primer or a paint. The treated surface must always be protected by a suitable paint system.
- The **limited thickness** (10-15µ) of the metallo-organic complex formed by KELATE® will usually not compensate for the roughness of the rusted surface (sometimes more than 50µ)
- KELATE® will **stabilize the residual rust** but an adequate coating proportional to the roughness of the substrate is required to give full protection.
- But as KELATE® passivates and stabilizes (residual) rust, it is a **guarantee for a longer life** of the subsequent primer. Since residual rust can encourage further under film corrosion, KELATE® will help to protect subsequent coatings from the damages of rust.
- Additionally, KELATE® is an **excellent adhesion promoter** for subsequent coating systems.
- And contrary to most chemical treatments of the rust, it is **not necessary to wash** the treated surface with water before the application of the first coat of paint.

How is KELATE® different from a rust remover?

- KELATE® **will not remove the rust but will transform it** into a stable and insoluble blue-black metallo-organic complex.
- Unlike with a rust remover, the tightly bound residual rust is completely passivated, preventing it from participating in further corrosion.
- Using a rust remover does not eliminate the risk of further corrosion.

What is the recommended surface preparation?

- Apply KELATE® on a rusted surface which is clean. Remove oil and grease before brushing.
- Loose rust and mill scale are removed by metallic brush, abrasive disk or paper.
- KELATE® has been designed so that it will react and stabilize (residual) rust on **CSt2-DSt2** surfaces.
- When the surface is **blasted to Sa1**, KELAET® will react and stabilize the remaining light rust.
- Using KELATE® can therefore **prevent from going to costly Sa2** preparation.
- In **heavy industrial and marine** atmospheres, rust always contains soluble salts; these surfaces must be washed down with clear water before KELATE® treatment.

Can KELATE® be applied on non-rusted surfaces?

Mechanically activated / blasted steel

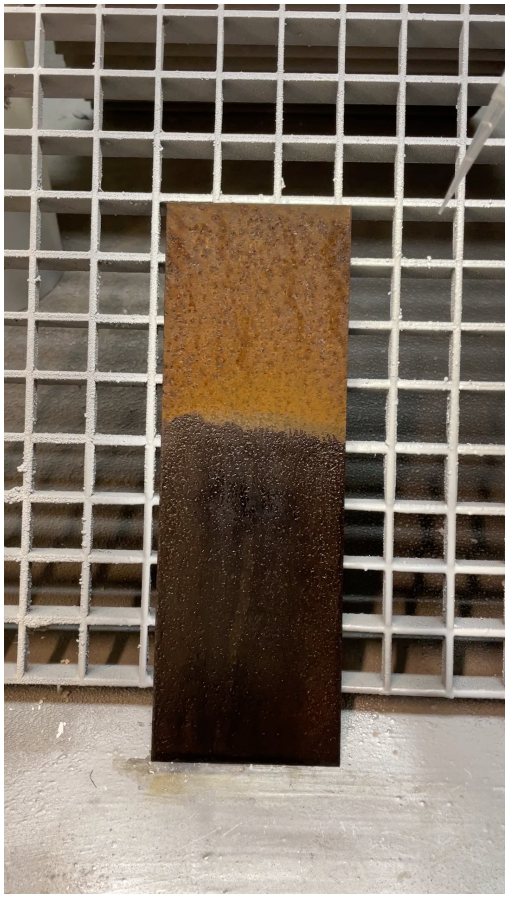
- Blasting steel to white metal provides an excellent substrate for painting. But a freshly blasted surface is highly reactive and will rust quickly once exposed to humidity, dew or rain.
- KELATE® will react quickly mechanically activated steel like blasted steel.
- KELATE® may also be applied on superficial rust such as the one that forms very quickly after blasting.

Stainless steel, galvanised steel and non ferrous surfaces

Non-reactive surfaces covered with KELATE® will show very quickly no colour change and need to be cleaned and rinsed off with water (when KELATE® is still wet) or denatured alcohol (if KELATE® has dried).

Can KELATE® be applied on wet surfaces ?

- KELATE® treatment can be carried out on humid surfaces.
- KELATE® is water based
- A surface treated with KELATE® can be rinsed with water when reaction and drying are complete (min 3 hours)



Can KELATE® be applied on hot surfaces ?

- Recommended temperature range for application is 5-35°C.
- If temperature is too high, KELATE® will dry too quickly and it will decrease its reactivity and efficiency.
- For application in bright sunshine on hot surfaces above 40°C, a special formula, KELATE®MR80, is available.

Will KELATE® resist to very high temperatures ?

- In theory, the metallo-organic complex formed by KELATE® in its reaction with rust will be stable up to 250°C.
- After reaction of minimum 3 hours with the surface, it will resist to permanent exposure of maximum 90°C.
- Short term exposure of up to 130°C is possible but not permanent.
- At temperature of 400°C , the product is losing its mechanical resistance.
- However the risk of a thermal expansion of the metallic surface exists and may cause damages to the coatings applied, including KELATE®
- It is therefore not recommended to apply KELATE® on surfaces that may be mechanically affected by thermal variations.

KELATE® - How to test

Recommendations for testing

Surface preparation

1. **Hot rolled steel (structural steelwork):** only surfaces C and D of the Swedish Standards SIS 055900 can be considered. (free from any residual mill scale)
   The surfaces are de-rusted by wire brushing (hand or mechanical), scraping or chipping to a minimum degree CSt2-DSt2.
   If sandblasting is preferred, a brush-off cleaning to degree CSa1-CSa2 is sufficient.
2. **Cold rolled steel (car bodies, appliances):** a thorough de-rusting with abrasive paper is necessary up to degree St3. This surface smoothness is required to obtain the full gloss of the top-coat.

Recommendations for testing

KELATE® Application

1. Applied by brush on vertical panels, avoiding any excess; the minimum amount for **wetting** the surface is sufficient.
2. The treated panels should be allowed to react for 3 hours. After this period a uniform blue-black colour is observed and the reaction can be considered as completed.
3. NO COLORATION OR A NON UNIFORM COLORATION ARE INDICATIONS of UNSUFFICIENT SURFACE CLEANING.
4. After these 3 hours the surface is ready for painting. The panels are painted with one coat of paint (to be able to detect rust evolution under the coating)

Recommendations for testing

Paint application

One coat of paint is necessary and sufficient for testing purposes.

All types of air drying alkyd primers or even topcoats are appropriated. It is also possible to test KELATE®MR6D with modified alkyds, epoxies, urethanes, acrylics and vinyls. The panels are allowed to dry or cure during 1 week in case of salt spray testing and 24 hours in case of natural weathering.

Test and control

The best methods are either natural weathering or salt spray ASTM B117-73 during 150 hours. This gives a complete scope of the efficiency of the KELATE® treatment. A complete system primer-top coat and eventually intermediate coat can also be applied. This testing is even more realistic for long term protection but very time consuming.

In case of natural weathering the panels are controlled every 2 months. In salt spray every 48 hours and the test can be completed after 6 days.