SeaQuantum X200

Product description

This is a one component state of the art chemically hydrolysing silyl methacrylate antifouling coating. It is anticipated to provide superior fouling protection and incomparable hull performance. This is achieved through highly predictable and stable self polishing characteristics reducing hull deterioration, friction and speed loss. The initial smooth surface provides an excellent out of dock performance. To be used as finish coat in immersed environments only. It can be applied at sub zero surface temperatures.

Application of SeaQuantum X200 shall follow the instructions in **Application Procedure Jotun – Hull Performance Solutions**.
For further advice please contact your local Jotun office.

SeaQuantum X200-2: Intended for vessels trading at medium speed and with medium to high activity.
SeaQuantum X200-3: Intended for vessels trading at medium and high speed and with high activity.

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.

The quality and condition of the substrate and the coating system onto which the antifouling is applied will largely affect the hydrodynamic performance. Surface preparation and coating system requirements are covered in 3.1.

Process sequence

Surface preparation and coating application should normally be done 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 done before coating application.

Soluble salts removal

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:
Areas exposed to (ISO 12944-2):
Im 1-Im3: 80 mg/m²

Coated surfaces

Organic primers/intermediates

The existing hull coating system must be high pressure washed at 500-600 bar. Evaluate according to ASTM D610 pictorial assessment guide of these defects combined: mechanical damage, rust/bare metal, flaking, cracks, checks, blisters, animal fouling remains/roots.

New tie coat or new antifouling

This product can be applied on top of most of Jotun's other antifouling products assuming the surface is clean and dry.
When applying to new tie coat or new antifouling, remove any contamination that could interfere with coating adhesion by methods such as degreasing with alkali detergent and/or high pressure freshwater washing. If the tie coat's maximum over coating interval has been exceeded, another coat of tie coat is required, or the surface of the hardened tie coat should be thoroughly abraded for roughness by powered orbital/eccentric/dual action abrasive discs on soft backing pads, or by sweep blasting using a fine grade of blast media. Coarse blast media may damage the remaining coatings and will roughen the surface excessively. This may compromise the hull's smoothness, hydrodynamic properties and consequent through-water performance.

Aged antifouling with leached layer

The spent, skeletal, porous layer at the surface of aged antifouling known as leached layer can cause popping/ pinholes/bubbling when over coated. Furthermore the leached layer will be weaker in cohesive strength than a new antifouling system. Therefore, all efforts should be made to properly remove the leached layer. Various factors will determine the leached layer’s thickness and its strength and integrity; mainly the antifouling's binder technology, but also the vessel's speed and the water temperature where the ship was trading (slow speeds and cold waters often result in thicker leached layer). Leached layers should be removed by very thorough high pressure freshwater washing.

Note that the use of a tie coat is no substitute for proper washing of aged antifouling. Sealer coatings are not significantly better at sealing porous surfaces than are antifoulings. Popping or compromised adhesion may still result. Furthermore, sealing aged antifouling has the disadvantage of blocking off antifouling that might become exposed, and therefore provide fouling protection later in service.

Practically Jotun recommends doing a test spray with thinned antifouling on the washed and dry surface in order to check for potential popping. Please note that the popping itself will have no negative effect on the performance of the antifouling properties, however it will have a negative visual effect.

Aged antifouling: Cracked, flaked or "sandwiched" coating systems

It should again be highlighted that if the coating exhibits weak adhesion or has been spot repaired for more than 3 dockings or 15 years, the general recommendation is to blast the surface to Sa 2 as per ISO 8501-1.

Aged antifouling systems of suspect physical integrity which exhibit cracking, flaking and/or heavy ‘sandwiching’ of multiple layers are best fully removed by grit blasting to Sa 2 or by water-jetting back to WJ 2. An alternative solution to remove existing antifouling paints by sweeping the surface by the means of hydrojetting or abrasive blast cleaning using fine grit. The sweeping should be done down to intact primer system, the method should be with focus on not to create unnecessary surface roughness.

Cracking in an antifouling should not be confused with surface “checking” which would appear as superficial cracks in top of the surface, but not penetrating the full coating layer. A checked surface should be carefully washed in order to remove salts or other contamination but would then be possible to over coat.

Exposed sealer/tie coat

In case of through polishing exposing the existing tie coat another new coat of tiecoat is required in order to ensure proper adhesion to the aged sealer/tiecoat. Before any application takes place it should be high pressure fresh water cleaned as per above guidelines. Overlapping with new sealer coat on top of existing, intact antifouling should be limited as much as practically possible.

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	-10 - 60	°C
Substrate temperature	-10 - 50	°C
Relative Humidity (RH)	10 - 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

Material storage conditions

Enhanced flow-out/levelling properties help achieve a smooth coating film. These properties are fully exploited only if the coating's temperature, at time of application, is between 15 and 30°C. If the product is too cold, high viscosity will inhibit its levelling. If too warm, dry-spray/overspray may leave a rough surface. Therefore, the shipyard must facilitate storage conditions to secure temperature within that range.
During hot weather, paint cans must not be left in direct sunlight for prolonged periods. The material should be taken from the paint store just prior to application.

Product mixing

Product mixing

Single pack

Thinner/Cleaning solvent

Thinner: Jotun Thinner No. 7

Application data

To achieve the smoothest possible surface for optimum hydrodynamic performance, only hand-held airless spray equipment is recommended. Use of pole-guns and guns fitted with lances are strongly advised against.
To prevent dust contamination on hull coatings, the drydock floor is to be cleaned of grit and hosed down before applying the first full coat. To prevent dry-spray/overspray contamination by coatings applied onto the topside and/or boot top, such coating work must be completed before applying the antifouling.

Spray application

Airless Spray Equipment

Pump ratio (minimum) :	42:1
Pressure at nozzle (minimum) :	150 bar/2100 psi
Nozzle tip (inch/1000) :	21-31
Nozzle output (litres/minute) :	1.9-2.8

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

Spray application technique

To achieve the smoothest possible application for enhanced hydrodynamic properties on the hull, the following techniques should be adopted for each coat in the system:
• Application may only be carried out during daylight hours. Adequate lighting must be arranged beneath the flat bottom. So that dry-spray/overspray is always painted over, sprayers' starting points are positioned so that they move/apply in the same lateral direction as the wind. Note: application is not recommended during strong winds.
On the vertical sides, sprayers shall apply only in a downward direction. After reaching the bilges they must return to the waterline and proceed downwards again. This results in dry-spray/overspray being painted over. It also secures same or similar vertical spray overlap wet-edge/open-time on all areas.
The start point of application should be different for each coat. Meaning that spray overlaps are staggered and run down different vertical lines for each coat. Sprayers shall limit the width of their spray stokes. The strokes must be at a width that the sprayers are able to maintain a distance of 40-50 cm to the object. This is important; it reduces dry-spray/overspray and enhances blending and smoothness of overlaps at the extremity of each spray pass/stroke.
Training of applicators must be performed before application of each coat of the entire coating system. The training and testing should cover spray pattern, film thickness, pump pressure, nozzle distance from the substrate and the amount of thinner needed to get the best flow of the paint. It should be clear that the coating should be applied without any orange peel, sagging and dry spray.
The testing should not be performed on the vessel hull. Test panels should be made available for all applicators to ensure that they are familiar with the application properties of the different coats of SeaQuantum X200 system. After all painters have done a test on plates come to a conclusion they should all spray an easily accessible area of the hull (big enough to get an overlap) and the work should be examined by the whole group in order to get a feel of the flow and build of the coating. There should be a clear understanding on the quality standard required before each painter start applying their area. There should be an inspection after each coat has been applied. The inspection should include painter, foremen and a Jotun representative. Inspections for dry spray will be carried out using cotton gloves.
The application should be planned in order to apply the surface within 1 hour in order to avoid overlap on dry coating.

Film thickness per coat

Typical recommended specification range

Dry film thickness	75	-	175	µm
Wet film thickness	135	-	320	µm
Theoretical spreading rate	7.3	-	3.1	m²/l

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

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 cm from the weld.

Ventilation

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

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	0 °C	10 °C	23 °C	40 °C
Surface (touch) dry	8 h	2 h	45 min	30 min	30 min
Dry to over coat, minimum	27 h	16 h	9 h	7 h	6 h
Dried/cured for immersion	39 h	24 h	10 h	9 h	8 h

The dried/cured for immersion data in the above table is the time required until the product is ready for sailing. For mechanical resistance to fenders and similar equipment longer drying times may be required. Please consult the Application Procedure for further advice.

When high film thickness is applied the antifouling will stay soft longer. To enable hull roughness reading when two or more antifouling coats are applied in rapid succession it is recommended to double the minimum time for immersion.

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.

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

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 immersed exposure

Average temperature during drying/curing	-10 °C	0 °C	10 °C	23 °C	40 °C
Itself	extended	extended	extended	extended	extended

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.

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 dry.
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.
Physically drying paints can be solvent wiped and another coat applied. If area is too large to practically solvent wipe, consider sandpapering or grinding, followed by thorough washing. When the surface is dry the coating may be over coated by itself.

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.