JOTUN

Hardtop topcoats

An excellent finish
whatever the structure

The Hardtop range

An excellent finish whatever the structure

The application properties and performance of Hardtop AS have been proven since Jotun first introduced Hardtop during the 1950s. Today Jotun's customers demand more than just good colour stability from a topcoat. These demands vary depending on what is to be painted, potential stress elements, level of UV exposure and need of excellent appearance.

Jotun has taken account of these increasingly varying customer needs and placed its premium topcoats under the Jotun Hardtop name – the premium brand name for only the best topcoat paint formulations.

Jotun protects industrial plant and storage tanks above and below ground, the oil and gas sector, offshore and subsea structures, support vessels and FPSOs.

We understand the special challenges presented in the protection and presentation of structures in the power generation industry.

Jotun provides protection of bridges, viaducts and other concrete or steel structures and of concrete floors, for both new constructions and repair and maintenance.

In the marine sector more than 15,000 vessels in the world's merchant fleets are protected by Jotun, from fishing boats to cruise ships, to VLCCs. Jotun protects every part of any vessel, large or small, in service, in any trade, around the world.

With factories and offices in more than 50 countries, Jotun products, services and advice on achieving optimum protection are available wherever you are in the world.

www.jotun.com

Jotun will continue to strive to satisfy the requirements of the most demanding customer and not limit the Hardtop range to one particular technology. For this reason new functional coatings – Hardtop XP (high performance, 63% volume solids, polyurethane), Hardtop Flexi (impact resistant polyurethane) and Hardtop PS5 (polysiloxane) – are included in the range.

New, innovative, premium performance products, whatever their technology will be the qualifications for membership of the Hardtop range.

Application of a topcoat is the final stage of a paint system. In time, its cosmetic appearance may be how the success of the paint system is judged.

Appearance, however, is only a part of the story. Whilst the topcoat's contribution to good appearance is important, it must also give protection to the corrosion system.

The topcoat must also be compatible with the system to which it is to be applied and be formulated to achieve its expected technical, health, safety and environmental performance. It is also vitally important to choose the correct primer for the coating system.

To ensure the success of the paint system, it is important to only apply a primer recommended by the paint manufacturer.

Hardtop XP

Setting new standards. The high solids, high performance polyurethane topcoat

Hardtop XP is the result of intensive development by Jotun to meet future global VOC regulations and set new standards for a high performance polyurethane topcoat. Whereas Hardtop AS is recognised as a global leader in polyurethane topcoat performance, Hardtop XP provides equal performance but with a higher volume solid of 63%.

The Hardtop XP formulation is very robust with a high degree of predictability. This ensures an excellent result every time. The finish is glossy with good float and hiding power. Hardtop XP has good melting properties and 'overlap zones' will be less visible compared to traditional polyurethanes. This, in combination with a high level of tolerance to high wet film thickness, gives better results, especially when difficult objects are coated with airless spray.

A key factor in the development of Hardtop XP is the great attention given to improved application properties. Hardtop XP has excellent spray properties with less dry spray. The benefits this provide include a better finish, a cleaner environment and a reduced loss factor as less paint is consumed and application is easier and more efficient.

During the last year of testing Hardtop XP has established itself as an applicator's favourite.

Hardtop XP

Product experience

Hardtop XP has been tested with several applicators. The high dry film thick thickness tolerance of Hardtop XP has been especially appreciated by painters. It is not technically possible to achieve an even dry film thickness on the different angles and corners of many industrial objects, being aware that Hardtop XP is one of the most tolerant products in its category adds to the painter's confidence.

High solids

Low VOC

(Volatile organic compound)

Reduced application costs

Less dry spray

Excellent application properties

Cleaner environment

Unlimited colour choice

Glossy finish

Excellent colour and gloss stability

Product experience

Hardtop XP has been tested on large industrial gas cylinders. The product was easy to apply and very tolerant to different dry film thickness (DFT) levels.

Reduced dry-spray is better for the environment as there is less paint on the floor, clothes and on spray hoses.

We have also seen that Hardtop XP can be opened for longer periods thus ensuring minimal difference in gloss on areas where painting starts and then stops.

Roller and brush:

Hardtop XP has improved properties for application by brush and roller.

For the best possible finish Jotun recommends diluting the product by 2% and using a short pile roller.

Hardtop AS

A polyurethane topcoat with decades of world proven performance

Hardtop AS has a lengthy track record of success as a world proven polyurethane topcoat providing durability in every climate in the world in the marine and protective industry.

This two-pack, aliphatic polyurethane topcoat provides a high-glossy finish with excellent weather resistance and very good gloss and colour retention – better than most other generic types of topcoat. Hardtop AS is ideal for use over an epoxy based primer on steel structures in aggressive weather conditions. It is resistant to a number of solvents and various chemicals, has good application properties and cures at relatively low temperatures.

Hardtop AS is amongst the most versatile of topcoats for high performance application on steel and other metals, concrete and plastics.

Ashore

Afloat

Hardtop Flexi

New technology brings higher standards of flexibility, durability, gloss and colour retention to topcoats

With Hardtop Flexi, Jotun introduces new technology and brings new standards of flexibility, durability and cosmetic excellence to the protection and appearance of marine and industrial structures.

Tests dramatically demonstrate the remarkable flexibility of Hardtop Flexi and its ability to resist damage to paintwork from the influence of high impact. These tests are supported by the successful results of 5 years' practical in-service use, ashore and afloat, confirmed by the case histories in this brochure.

Hardtop Flexi is a high solids (64% by volume) high quality polyurethane topcoat with excellent wetting and adhesion properties. Designed with a gloss level that provides 'forgiveness' – hiding imperfections and unevenness in areas of steel – Hardtop Flexi matches the colour and gloss retention expected of a polyurethane topcoat and maintains a semi-gloss appearance for extended periods.

The benefits of low VOCs, application of single coats up to 150 micron and fast drying properties add to the impact resistance feature of Hardtop Flexi making it the ideal choice as an all round flexible topcoat.

Case History

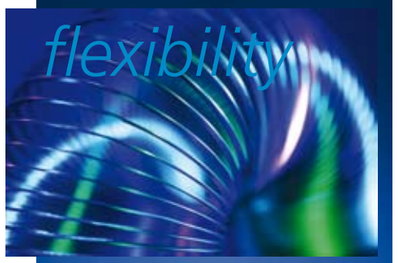
Langh Ship

"Hardtop Flexi was introduced in 2000 for maintenance of hatch covers on our mv. Aila. Now, after four years without any repairs, the hatch covers are still in good condition.
Our experience is that Hardtop Flexi has very good properties to withstand mechanical wear and weathering.
We are very satisfied with the product and will increase the use of it in our vessels"

Reino Verosaari
Superintendent

Oy Langh Ship Ab is one of the largest cargo shipping companies in Finland providing reliable shipping services for the export industry. Its modern multipurpose vessels are specialised in delivering cargo to its destination in tough northern shipping conditions.

Hardtop Flexi



High solids means lower VOCs, fewer coats lower application costs less downtime

With volume solids of 64% Hardtop Flexi is more friendly to the environment with low VOC emissions. That makes it popular with applicators too. Plus, it can be applied up to 150µm DFT in a single coat bringing benefits for yard and owner – fewer coats are needed, reducing downtime and application time.

Good wetting properties makes Hardtop Flexi ideal for small maintenance jobs

Excellent adhesion and wetting properties mean small areas can be touched up either on intact primer, whatever the type, over other topcoats in good condition or direct to metal (150µm) will give light corrosion protection (class C3).
A high quality mastic primer is recommended where the environment is more extreme.

Excellent adhesion and great flexibility mean high impact resistance and a long lasting coat

Excellent adhesion properties combined with a level of flexibility greater than other topcoats. This provides exceptional protection against cracking and adhesion failure damages in areas where heavy impact is a problem. Hardtop Flexi's elasticity improves the durability of the protective system – wherever it is applied.

Hardtop Flexi's fast-to-dry formulation means less downtime, saving time, saving costs

Fast drying is a primary benefit with Hardtop Flexi, particularly when time is short and costs of downtime are high. Surface dry in just 90 minutes at 23°C and in only 3 hours at 10°C means project progress can be maintained with minimum delay combining with the benefits of fewer coats to maximise efficiency.

Combine Zinc epoxy primer (Barrier) for a durable, impact resistant system for marine decks and hatch covers

A zinc epoxy primer in combination with Hardtop Flexi is often chosen to protect decks and hatches. Now a 50 micron (min) coat of Barrier followed by a 150 micron (min) coat of Hardtop Flexi will provide good lasting protection of these impact prone areas.

Nearly unlimited colour choice with Jotun Multicolor Industry tinting technology

Whatever your choice of colour for the final cosmetic appearance it can be matched with Jotun MCI tinting system.
Add to this the benefit of lead times minimised at the large global network of stock points and ports equipped with Jotun Multicolor machines.

Mandrel test proves superior flexibility

The Standard Test Method for Mandrel Bend Test established the flexibility of Hardtop Flexi by bending a sheet metal specimen coated with the product around a conical mandrel (1/8" – 1" or 3mm – 38mm dia.). From the diameter of the mandrel at the point where the crack starts, the maximum relative extension of the coating can be calculated.

Conical Mandrel – ASTM 522-93a

This test method covers the determination of the resistance to cracking (flexibility) of attached coatings to substrates of sheet metal. The coating material under test is applied at uniform thickness to panels of sheet metal. After drying or curing the coated panels are bent over a conical mandrel and the resistance to cracking of the coating is determined.
By preparing twenty panels and determining resistance to cracking throughout the post cure period, this shows how the coating retains its flexibility during service time. Hardtop Flexi was tested and compared to other polyurethanes' formulations on the ability to retain flexibility. All tests have shown that Hardtop Flexi has excellent flexibility during the product's service life.

Cupping test – ISO 1520-1973 (E)

This test method covers the determination of the resistance of a coating to cracking and detachment from a metal substrate, when subjected to gradual deformation by indentation. The indentation is accomplished by a moving steel sphere of predefined diameter and rate of speed. The test is ended when cracking of the coating is observed.
The Cupping test has also given proof of the excellent flexibility of Hardtop Flexi.

Case History

Sandvik – Ramtec

Rammer, part of Sandvik Group, is the world's leading manufacturer of hydraulic hammers and attachments.

About 2 years ago, production was transferred to Ramtec Oy by an MBO arrangement.
Hardtop Flexi replaced the two-pack epoxy paint system used previously. It is applied by electrostatic spray with a film thickness of approx. 120 µm and oven dried at around 70°C. The items are dry enough to handle about 1 hour after painting.

"Hardtop Flexi has greatly increased delivery from the paint shop. It has also enhanced the quality level of the surface finish as well as improving the outward appearance of the finished product"

Veikko Janhunen
Managing Director
Ramtec Oy

Case History

Irish Ferries

Irish Ferries vessel 'Ulysses' was built at Aker-Finnyards, Rauma in 2000. Hardtop Flexi was applied to the hull and decks.

"We are satisfied with its performance and impressed with its colour and gloss retention. We particularly value the fact that the product is a surface tolerant primer and finish coat which greatly reduces on board inventory and simplifies maintenance…also reduces documentation/administration for both on-board and drydock specification and execution"

John Reilly
Operations Director

Hardtop PS5

the ultimate finish

Polysiloxane technology takes a leap forward
The ultimate in lasting gloss appearance
Consistent flexibility for long term durability

Hardtop PS5 is based on a polysiloxane resin combination. Jotun has taken polysiloxane technology to its most advanced level presenting a topcoat with superior corrosion protection in extreme weather conditions, maintaining exceptional flexibility and gloss retention throughout its service life. Where an excellent glossy appearance over an extended period is the objective – Hardtop PS5 meets this need (with an initial gloss level of 85).

Careful selection of reactive components has been formulated to avoid stress in the film during curing. A carefully balanced formulation retains flexibility during the service life, thus cracking is eliminated. Such unique flexibility in a topcoat secures excellent intercoat adhesion that is essential in the achievement of long term protection.

Hardtop PS5 is designed to give excellent gloss and colour retention in combination with continual flexibility making it the ideal topcoat. It can be used in combination with an epoxy primer system, on steel structures where durability in aggressive atmospheric exposure is required.

Case History

'Farandole', operated and managed by Laurin Maritime, photographed in drydock, China 2003. The product tanker is coated with Jotun's polysiloxane, Hardtop PS5.

This is the first vessel ever to be coated with polysiloxane technology from Jotun Coatings. The product was chosen as a test bed for gauging the improved performance properties over existing two-pack topcoats. With improved weathering capability and with excellent opacity and gloss retention, Hardtop PS5 provides an owner with a far more versatile coating in the long term than any other two-pack generic topcoat used to date.

Hardtop PS5

the ultimate finish

Lower DFT means less material and reduced cost

Unlike other polysiloxane based topcoats which have a typical DFT of 125 microns, Hardtop PS5 can be applied in a wide range of dry film thicknesses (50 to 140 microns). Excellent hiding power and flexibility combine to ensure both protection and presentation are to the highest standard. Lower DFT, less material, less cost.

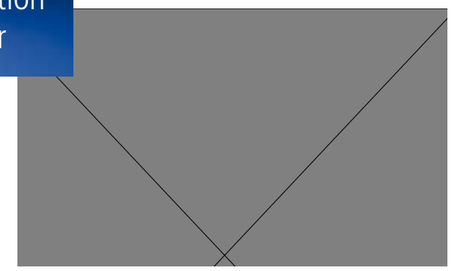
Fast drying Surface dry 5hrs Dry to recoat 12 hrs

Add fast drying properties to the list of advantages offered by Hardtop PS5. Together with lower DFT and excellent hiding power, durability, flexibility and gloss retention, all these features make Hardtop PS5 the ultimate topcoat choice.

Easy to apply Excellent finish whatever the methods

Apply by brush, roller or airless spray. Hardtop PS5 is formulated to deliver excellent results whatever the application methods – adding to its appeal as a maintenance coating.

Lower DFT without compromise in protection, presentation and hiding power



A coating remaining flexible over time is almost free from internal stress and will not crack or lose adhesion when exposed to mechanical impact or changes in temperature.

The graph illustrates the results of tests of the flexibility in the paint film of Hardtop PS5 and three other polysiloxane products. Continual high figures mean flexible coating. Decreasing figures mean increasing brittleness.

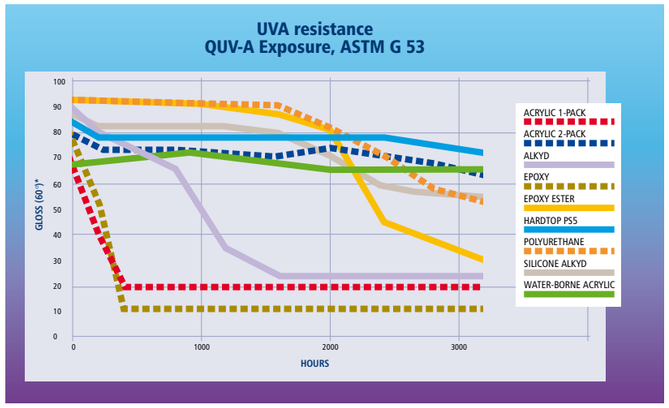
Conclusion: The results show that Hardtop PS5 retains its flexibility whilst the other products turn brittle. Note: Also tested according to ASTM D 522 with the same result.

Typical systems

NEWBUILDING TOPSIDE	OFFSHORE INDUSTRY
1 x 100µm Jotacote Universal	1 x 75µm Barrier
1 x 100µm Jotacote Universal	1 x 250µm Jotamastic Plus
1 x 60µm Hardtop PS5	1 x 75µm Hardtop PS5

These are typical systems, other systems are available

Gloss retention guide



*50° for Acrylic 1 pack, Alkyd and Water-borne Acrylic

Hardtop topcoats

PRODUCT DATA	HARDTOP XP	HARDTOP AS	HARDTOP FLEXI	HARDTOP PS5
Colours	Unlimited	Unlimited	Unlimited	Unlimited
Solids (vol %)	63% ± 2	50% ± 2	64% ± 2	52% ± 2
Film thickness: Dry, typical Dry Wet	 60µm 40–80µm 65–130µm	 50µm 40–60µm 80–120µm	 80µm 50–150µm 80–230µm	 70µm 50–140µm 95–250µm
Theoretical spreading rate (m^2 / ltr at 75µm)	8.4 m^2/ltr	6.6 m^2/ltr	8.5 m^2/ltr	9.5 m^2/ltr
Drying/overcoating time (23°C) Surface dry Dry to recoat, minimum	 3 hrs 6 hrs	 1 hr 5 hrs	 1.5 hrs 3 hrs	 5 hrs 12 hrs
Pot life (+ 23°C)	1.5 hrs	4 hrs	2 hrs	6 hrs
Flash point	30°C ± 2 (Setaflash)	26°C ± 2 (Setaflash)	25°C ± 2 (Setaflash)	28°C ± 2 (Setaflash)
Gloss retention	Very good	Very good	Very good	Excellent
Water resistance	Very good	Very good	Very good	Very good
Abrasion resistance	Very good	Very good	Good	Very good
Chemical resistance	Very good	Very good	Good	Very good
Flexibility	Very good	Very good	Excellent	Very good
VOC level (measured by PG6 method)	320	415	340	365
EU2010 VOC compliant	Yes	No	Yes	Yes

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Designed and produced by RMP Design & Marketing Ltd, Hull, England www.rmpdesign.com Warecode 8MM0538617/2K0807