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A universal solution

Max Wedekind, Managing Director of DEKOTEC GmbH in Germany, explores how the company's new tape solution simplifies the process of corrosion protection.

Reliable and permanent protection of pipe sections and weld seams are one of the main challenges in pipeline construction. A wide range of often time-consuming processes that differ for every application have previously been used. However, DEKOTEC GmbH's patented SEALID® All-in-1 provides protection against corrosion as well as mechanical loads in a single step – without additional primer and without the use of other devices.

"The framework conditions in the pipeline business have changed significantly: the challenges in the industry are constantly increasing with shorter project times, higher standard requirements and the complex application of products", says Thomas Kaiser, Managing Director of DEKOTEC GmbH. "Besides the permanent protection of pipe sections and weld seams, speed, safety and efficiency are all essential requirements in the construction industry." SEALID All-in-1 keeps pace with the ever-increasing demands in international pipeline construction by fulfilling the ISO and EN standards: a single wrap is enough to fulfil the requirements of ISO 21809-3 at operating temperatures of up to +70 °C (+158 °F). The requirements of EN 12068 and DIN 30672 for class C50 are also met with a single wrap.

One wrap for corrosion and mechanical protection

Focussed on the goal of making corrosion protection even more reliable and efficient, after several years of development, DEKOTEC presents a global innovation: SEALID All-in-1, which simplifies the protection of pipes and weld seams.

Figure 1. SEALID® All-in-1 with outstanding cohesive separation pattern.

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"We set ourselves high standards when developing SEALID: no primer and just one wrap for both corrosion and mechanical protection. This required a tape with special adhesive properties as well as exceptional resistance. The outstanding cohesive separation pattern impressively shows the performance you get from SEALID", explains Thomas Kaiser (Figure 1).

The new all-in-one solution is manufactured in a genuine multi-layer co-extrusion process. When wrapped in a spiral pattern the tape forms a completely closed protective hose with exceptional durability. Impermeable to water vapour, oxygen, soil bacteria and soil electrolytes, the protective hose achieves a minimised cathodic disbondment together with an outstanding peel and lap shear strength.

Efficient and low-cost application at the construction site

The simple application of SEALID All-in-1 ensures sustainability with significant work, time and cost savings. In particular, the patented innovation is the ideal solution for complex construction projects and tight project timelines, where it significantly reduces time and effort. As a universal solution for new construction and rehabilitation, SEALID is suitable for a range of applications – whether for weld seam protection, whole-pipe wrapping, pipe bends or T-pieces. The product does not contain any harmful ingredients and it can be applied without using complex equipment or hazardous substances: an important contribution to environmental protection and occupational safety. "The flexible and easy application makes SEALID All-in-1 the universal solution for corrosion protection of pipelines," says Thomas Kaiser.

One solution for all applications

When joining pipe segments, the weld joint coating must protect the seam against corrosion and mechanical loads. The sensitive weld seam must be at least as well protected as the rest of the pipe; after all, a chain is only as strong as its weakest link. SEALID All-in-1 reliably protects the seam in a single step, with just one wrap. That's because SEALID All-in-1 does not need multiple system components, time-consuming primers and additional protective measures for people and the environment.

Figure 2. SEALID: easy application by hand.

To avoid costly interruptions, pipe coatings or pipe sections are often repaired while the pipeline is in operation. Due to the risk of explosion, only corrosion protection systems that are applied cold (without a flame) can be used. To put the pipeline back into full operation quickly, the process for applying the product must be rapid and simple. SEALID makes it quick and easy: comprehensive protection with cold application, without preheating the pipe, melting the material or any additional products for mechanical protection. SEALID is simply applied by hand or using DEKOMAT® wrapping devices (Figure 2).

The construction and operation of power stations and refineries are subject to some of the world's highest safety standards – due to their enormous influence on people and the environment as well as their technical complexity. These requirements extend to all plants, pipeline systems and components with complex geometries: their durable corrosion protection and permanent waterproofing ensure operational health and safety to prevent accidents and faults. Even here, SEALID provides universal protection without any time-consuming preparation or multi-stage workflows.

As an all-in-one solution, SEALID offers clear benefits compared to existing corrosion protection procedures.

Tapes and tape systems

In contrast to conventional tapes and tape systems, there is no need for a primer or a second tape. SEALID is just wrapped once. This saves time, money and material. The absence of solvents means that people and the environment are better protected.

Heat shrinkable sleeves

It eliminates the need to preheat the steel surface as well as the shrinking and air removal, as is the case for heat shrinkable sleeves. Errors are prevented from occurring in the first place. SEALID can be applied in just one step without additional devices (no gas burner) or time-consuming protective measures. Due to their properties, heat shrinkable sleeves can only be used almost exclusively on weld seams. However, SEALID can be used everywhere as a universal solution: on entire pipes, pipe bends and T-pieces.

Viscoelastic/petrolatum tapes

In contrast to viscoelastic/petrolatum tapes, no additional products are needed for mechanical protection. This eliminates timely and costly work steps. SEALID also ensures a permanent bond with the pipe. There are no shifts in the longitudinal direction as a result of pipe movements or mechanical forces, as is often the case with the components of viscoelastic systems.

Paint and spray coatings

Compared to liquid paint and spray coatings, SEALID is not dependent on weather conditions, such as temperature and humidity. Protective equipment and additional devices are not necessary, because no harmful substances are used. No time-consuming preparation is required. There is no need to follow

preparation guidelines, such as mixing ratios, layer thickness or curing time.

Adhesive properties and toughness

Products that are applied without a primer need to make sure that they coat the surface to be protected well. This is normally achieved by approaching a liquid state, such as by heating and melting the material (e.g. heat shrinkable sleeves or hot-applied tapes) or due to the property of the material (e.g. liquid coatings, petrolatum and viscoelastic products). The disadvantage of hot-applied products is that additional equipment is necessary, a naked flame is used and additional energy is needed. Materials with an intrinsically very high flowability (viscoelastic/petrolatum products) usually only have very low resistance to mechanical forces and – especially in viscoelastic systems – there is also a limited bond between the corrosion protection layer and the additional mechanical protection.

SEALID is the world's first product that is mechanically strong as well as elastic and also coats the surface well. "SEALID is a completely novel solution. The existing standard tests were simply boxes that needed to be ticked. In addition to this, we carried out performance tests that replicate the practical loads on corrosion protection materials", explains Dr. Reha Cetinkaya, Director Engineering of DEKOTEC. The performance tests were focused on the mechanical behaviour of SEALID: how well does the innovative product protect the pipe against external loads and if the pipe moves?

Even an underground pipeline is exposed to various mechanical forces during operation. These stresses, such as those caused by vertical loads and traffic loads, can impact on certain points of the pipeline depending on the type of bedding in the soil. What's more, the pipeline is exposed to relative movement, which causes stress along the pipeline. Both types of stress cause damage and impair the mechanical protection. "So we set up a test bench that can generate point loads and a force in the longitudinal direction," explains Dr. Reha Cetinkaya.

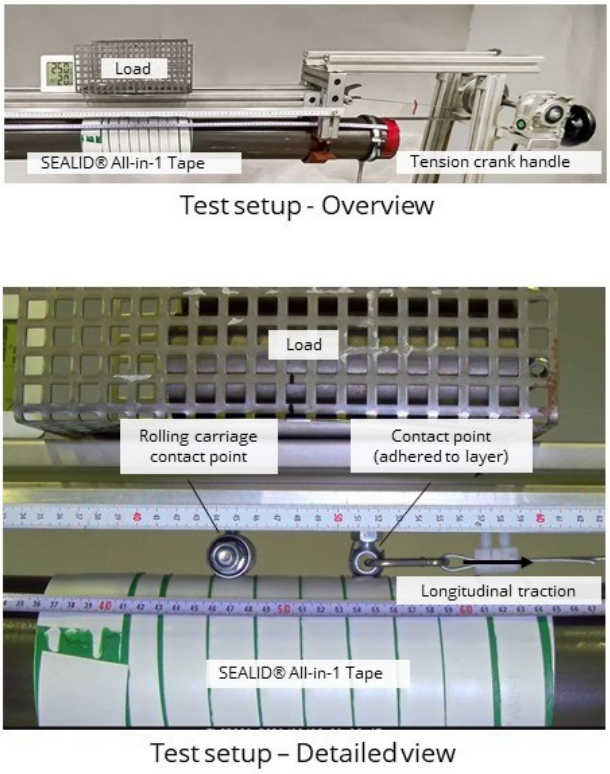

Figure 3. Test setup for the SEALID performance tests.

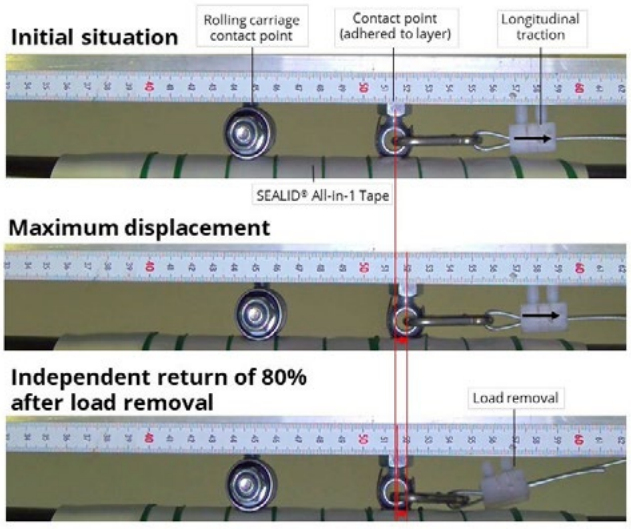

Figure 4. Elastic SEALID All-in-1 with excellent elastic resilience.

SEALID performance test

The test bench replicated a permanently installed DN100 (4 in.) pipeline. A frame to guide a carriage lengthways along the pipeline was positioned on top. The carriage was able to be fitted either with two fixed contact points (approx. 1 cm^2 contact area each) or one contact point and one rolling wheel as a contact point. It could also be loaded with weights. A pull cord allowed a force to be introduced along the pipeline – either as a constant load via an attached weight or as a forced movement, by winding the pull cord with a crank (Figure 3).

Test 1: Lap shear strength

In a first test, two fixed contact points were fitted on the carriage and loaded with 23 kg (equivalent to approx. 112 N/cm^2). After a conditioning time of five hours, it was loaded with a traction weight of 15 kg (equivalent to approx. 147 N traction force). The result: the carriage glided over the entire wrapping in around 70 minutes without displacing individual tape layers or the entire coating. Calculated at the contact surface, the tensile shear force amounted to around 73 N/cm^2. The carriage travelled over the coating without damaging it. In this test, the real-life loads did not impair the coating or the corrosion protection.

Test 2: Elastic resilience

The findings from the first test were linked with an additional issue in the second test. The investigation intended to find

out whether the tape would return to its original shape if it was displaced. This second test forced the displacement of a layer. Compared to the first test, the system load was changed from a load with constant force (147 N) to a defined displacement load. In practice, this simulates a longitudinal displacement of a pipeline that is 'clamped' in the bedding material.

In this test, the entire displacement was applied to just one fixed contact point. The simulation with just one contact point instead of two enhanced the effect. In this case, the contact point was permanently adhered to a layer with a two-component adhesive. The other carriage contact point consisted of a wheel, so was not able to transfer any force in the longitudinal direction. For this test, the carriage was loaded with 28 kg. After pre-conditioning, a displacement of 0.5 mm was applied at 30 minutes intervals. The result: the maximum displacement was 6 mm. The test showed that the individual layer moved with the adhered permanent contact point (centre image, Figure 4). The load was then removed from the carriage and the tension released from the pull cord. After approximately twelve hours the layer had independently moved around 5 mm (as well as the carriage) back towards the starting point. This corresponds to a return of over 80% from the previously applied displacement. SEALID clearly impresses with its exceptional elastic resilience.

This means that a single large particle (stone) impacting on a point of the coating would not lead to a permanent displacement of the corrosion protection material. "The performance test proved that SEALID is an extraordinarily durable material that also boasts exceptional elasticity. These properties are not something that you would expect to find in permanently free-flowing materials (viscoelastic/petrolatum), as displacements are usually not reversible," summarises Thomas Kaiser.

Conclusion

SEALID All-in-1 is DEKOTEC GmbH's patented global innovation for universal application. It is the first stand-alone product to protect against both corrosion as well as mechanical loads, in just one step, while fulfilling all relevant standards.

The performance test shows that a pipe protected with SEALID can reliably withstand loads caused by external mechanical influences as well as pipe movements. It not only protects as effectively as other high-quality tape materials, but is also extremely efficient: without time-consuming preparation (primers), multi-stage application steps or various system components. There is no need for time-consuming protective measures for people and the environment. Corrosion protection made easier than ever before.

Corrosive plus mechanical protection, in one step, without any primer: Only **SEALID® All-in-1** Tape makes it possible. Patented safety fulfilling ISO 21809-3 and EN 12068. Saving time and money has never been this simple. **sealid.de**

SEALID® All-in-1 Wrap once. All done.

made in Germany since 1922