



**Including Special Road
Maintenance Feature**

Protection in a Marine Environment

Denso SeaShield Systems for the corrosion control of marine piling in splash and inter-tidal zones have been in use since the 1960's and are currently specified worldwide. The systems' versatility and choice of armouring make them particularly suitable for use in difficult areas.

SeaShield System for Ro-Ro Terminal

Winn & Coales (Denso) Ltd's engineers recently completed application of a corrosion protection system for the bracings of the Ro-Ro mooring structure at Port Ramsgate. It was the largest UK marine structure protected so far using the Denso SeaShield Series 100 system.

Port Ramsgate is the UK terminal for Sally Line's passenger/freight ferry service to Dunkirk and Schiaffino Freight Ferries' service to Ostend. It is now Britain's second busiest cross Channel ferry port. Frequency of sailings demands that berths are available 365 days of the year with only limited times between arrivals and departures.

The brief from the Port Ramsgate engineer was for a system that would ensure that there was no further significant corrosion to the welded steel 60cm-67cm tube bracings for the next 20 years. A length of 1,021 metres of bracings required protection.

Initial Denso Marine Piling Tape wrap.



Raked bracing undergoing cleaning.

The upper horizontal bracings are permanently above water and the original coating showed patches of breakdown and rust at weld areas where they are subject to wave splash. The lower horizontal bracings are within the tidal zone and the raked ones are partially submerged at high tide.

The regularly submerged areas support marine growth which, when removed, revealed the coating in remarkably good condition. As to be expected, the splash zone areas of the raked members were badly corroded with heavy rusting.



Port Ramsgate Ro-Ro terminal.

The system proposed by Winn & Coales was thorough cleaning to remove all marine growth, loose coating and loose rust, followed by wrapping with petrolatum tape using a 55% overlap and a final protective layer of 2mm thick uv stabilised polypropylene sheet wrapped over the tape and secured with heavy duty plastics banding.

Two separate anti-corrosion tapes were recommended. For the upper, permanently dry bracings which are exposed to the full sun, Densyl Tape to accommodate the high surface temperature reached in midsummer under the black polypropylene sheeting. Standard Denso Tape might bleed oil under these conditions and give rise to pollution in the port area. For the lower bracings which would be wrapped when damp, Denso Marine Piling Tape was chosen.

To commence the project, special access equipment was designed and built by Winn & Coales Engineering Department, including platforms and a raft with a demountable scaffold tower to reach the upper and lower bracings on the periphery of the structure. Many of the 600mm diameter bracings were free from obstructions so a wrapping machine was modified to fit these and greatly speeded up the wrapping.

Bracing ends coated with petrolatum primer before application of tape and scrim.



Finished protection consisted of two coats of solventless epoxy compound.



Upper Horizontal bracings finally protected with black polypropylene SeaShield covers.



Work commenced by cleaning with scrapers and wire brushes, with heavier rust being first removed with chipping hammers. At this stage pipe wall thickness measurements were taken of uncorroded and corroded areas as a reference for subsequent readings at the annual inspections. Before wrapping with protective tape, heavily corroded areas were coated with Denso S105 Paste to ensure thorough sealing of the surface.

The polypropylene sheeting was easily placed and cut to fit around upstands and other obstructions. Where the sheets could not be secured because of the angle at which the bracings entered the concrete anchor block in the central causeway, a modified Covercoat System was employed to protect the tape. It was coated with petrolatum primer, reinforced cloth cut to fit and laid on, then two coats of black pigmented solventless epoxy compound applied to give the necessary protection against mechanical damage.

By working with the tides all the work was carried out without the need for diving and within the schedule time of 10 weeks.

Long Lasting Road Maintenance

Tokband Spezial is a polymer modified bitumen in the form of rectangular strips in rolls with disposable interleaving. It is used for sealing joints in hot asphalt wearing courses to asphalt, concrete, or road castings in road repair or construction. Since its introduction in 1988 it has rapidly become acknowledged as one of the best asphalt jointing mediums available and this has culminated in its recently obtaining approval by the Department of Transport.

M11 Water Seepage Problem Solved

Due to inadequate drainage of ground water, a total of 29km of hard shoulder has had to be replaced on both carriageways of the M11 junctions 7 and 8. One of the problems was that water was seeping through the joint between the asphalt hard shoulder and the concrete carriageway. This was causing considerable damage to the hard shoulder, aggravated by the use of de-icing salts in winter, in addition to damage to the main carriageway.

Essex County Council as agents for the Department of Transport, decided that the affected sections of the M11 hard shoulder would have to be dug out and replaced. The main contractors, Tilbury Construction (Eastern Region) based at Claydon near Ipswich, Suffolk, began work on the project in late February and completed by early May. The £4m contract was for completion within 68 days on a lane rental basis.

An improved drainage material, a Type 1 sub-base, has been laid, followed by black asphalt.

Essex County Council paid particular attention to the choice of material to form a flexible joint between the hard shoulder and the concrete carriageway in order to reduce the likelihood of water ingress to a minimum. As a result of its good track record as a joint sealant on a number of road bridges, they decided to use Winn & Coales (Denso) Ltd's Tokband Spezial.

Tilbury Construction applied the 8mm thickness x 45mm Tokband Spezial using a special 'Tokker' machine from Winn & Coales. This applies the Tokband to the vertical joint face of the concrete prior to the asphalt being laid and rolled, thereby giving a seal to the full depth of the asphalt wearing course.

Looking at the work completed, Mr Robert Nourse, Resident Engineer with Essex County Council, has expressed full satisfaction with the role of Tokband Spezial and has stated: "It certainly forms a very tight joint".

Tokband Spezial applied to vertical joint face with 'Tokker' machine.



Close up of rolled joint.



Asphalt in position and rolling underway.

Stop Press....

Tokband Spezial is now approved by the Department of Transport!

Flexible Seal for A604 Trunk Repairs

Following its success as a highly effective seal for joints in the recent relaying of large sections of the M11 hard shoulder, Winn & Coales' Tokband Spezial was chosen for repairs to cracked concrete sections of the busy A604 trunk road Cambridgeshire.

The contract was designed and supervised by Cambridgeshire County Council as agents for the Department of Transport Eastern Regional Office.

Several sections of both carriageways of the A604 between Huntingdon turn off and the junction with the A1 were suffering from cracking. According to Andy Rosamund, Cambridgeshire County Council's Resident Engineer, the increase in heavy traffic now using the road was the main contributory factor to the cracking of the concrete slabs. Replacing individual bays in the past with concrete had been tried and found to be unsuccessful. This led to the decision to dig out damaged concrete sections and replace with flexible construction.

To prevent ingress of water – and all the damage it can do, particularly in winter time when de-icing salts are present – Cambridgeshire County Council needed a sealant and bonding agent that would cater for the flexibility of the new asphalt and the rigidity of the existing concrete.

The Tokband Spezial is applied to the vertical joint face of the concrete prior to the asphalt being laid and rolled, thereby giving a seal to the full depth of the asphalt wearing course joint.



Damaged bays removed and base courses in place.



Tokband Spezial in position on the vertical joint face.



The finished joint.

Starting in early March and finishing in Mid-April, the work was carried out by Beazer Construction East Anglia Ltd of Wisbech. After digging out the damaged concrete sections they thickened up the sub-base to a depth of 150mm using Type 1 sub-base for most efficient drainage. This was followed by the asphalt to a depth of 420mm, with Tokband Spezial in position against the existing concrete prior to the application of the wearing course. Some 4400 metres of Tokband Spezial, with a thickness of 15mm by 55mm wide was used for the repair over a total length of 5km of both carriageways of the damaged A604 sections.

Waterproof Seal for M6 Viaduct

Motorway bridges have been much in the news of late for their susceptibility to corrosion, particularly rebar corrosion resulting from the use of de-icing salts. Aware of this problem, Staffordshire County Council specified Winn & Coales (Denso) Ltd's Tokband Spezial as a joint sealant for work carried out on the Penkrudge Viaduct on the M6 motorway.

The road leading to each side of the viaduct is in concrete, but it is asphalted over the viaduct in order to retain flexibility. Tokband Spezial has been used for sealing vertical joints between the road asphalt and kerb on the viaduct deck in order to prevent ingress of surface water.

In recent months Tokband Spezial has been utilised as a sealant on motorway bridges by a number of UK specifying authorities.

Before the application of Tokband Spezial, the clean, dry concrete kerb or metal expansion rail are coated with Tokseal Primer, which is a solution of bitumen based compound in hydrocarbon

solvents. The surface of the Tokband Spezial is then heated with a propane burner until it is just molten and pressed on to the joint face. It is followed with application of the hot asphalt road surface materials in the normal manner.

Tokband Spezial has overcome a common maintenance problem on bridges where the joint fails between the road asphalt and the kerb. Constant vibration of the deck combined with thermal movement causes the inevitable opening of gaps, allowing ingress of water and de-icing salts on to the bridge deck, with the inevitable corrosion of reinforcing bars and other steel



Tokband Spezial in place prior to asphaltting.

work. Obviously, a flexible but watertight seal here is essential but until now has proved difficult to achieve.

Many alternative methods have been tried, such as cutting out and sealing chases, but both have been impractical and unpopular with contractors. The Tokband Spezial joint sealing strip provides an easy and relatively cheap means of solving this problem.

Jointing Problem Solved on Roof Car Park

An extension has recently been completed to NCP Ltd's multi-storey car park at Birmingham International Airport. The architects were the Seymour Harris Partnership of Birmingham. The new extension was designed and constructed by Norwest Holst and included an additional roof parking space. This required particular attention to a traditional problem area, namely the joint between the asphalt surfacing and the concrete drainage channel. Here, water tends to collect and this combined with thermal movement can cause the opening of gaps and the ingress of water. In winter, this can also mean that snow and ice falling off cars containing de-icing salts picked up from the roads has been one of the principal causes of corrosion of the concrete reinforcing bars.

Norwest Holst decided to tackle this problem by using Tokband Spezial which had established a good track record in recent months by being specified as a sealant for several motorway bridges. Furthermore, contractors find it an easy and cost effective way of solving jointing problems.

A good test for Tokband Spezial was the very high temperatures in August last year where, in accordance with its specification, it was unaffected by the expansion, with no signs of pulling away from the concrete drainage channel.

Before the Tokband Spezial was

applied, the clean, dry concrete drainage channel was coated with Tokseal Primer. The surface of the Tokband Spezial was then heated with a propane burner until it was just molten and then pressed on to the joint face. This was followed with application of the hot asphalt surfacing materials in the normal manner.



Tokband Spezial applied to concrete drainage channel.



Flexible Jointing Seal for Forth Road Bridge Carriageway

Complete resurfacing of the central span of the southbound carriageway of the Forth Road Bridge has recently been completed by the main contractors Wimpey Asphalt Ltd. This entailed the removal of the road surface down to the steel decking of the bridge, applying a waterproof membrane on to the steel, then applying mastic asphalt in panels, a panel at a time. The mastic asphalt sub-contractor was The Pure Asphalt Co. (Bolton).

A key feature for a successful project was the type of longitudinal joint sealant to be used between the panels for the slow and fast lanes of the carriageway. This joint sealant had to have sufficient flexibility to be able to withstand considerable mechanical stress from the bridge's movement and also thermal stress ranging from sub-zero winter temperatures to high summer temperatures.

As a result of their experience of Winn & Coales (Denso) Ltd's Tokband Spezial in meeting

mechanical and thermal stresses when they were asphalt contractors for the extension to the multi-storey car park at Birmingham International Airport, Mr Jim Hope of The Pure Asphalt Company recommended Tokband Spezial to the consultant engineers for the Forth Road Bridge project, W A Fairhurst & Partners of Edinburgh.

Mr M Fraser, an Associate of the consultant engineers, reports that they first did a number of trial panels on the northbound carriageway using Tokband Spezial as a joint sealant. He states that they were very pleased with the results and the go ahead was then given for its use in the resurfacing of the southbound main span.



Asphalting in progress.



Tokband Spezial applied to the vertical joint face.



A flexible waterproof joint.

Not only has Tokband Spezial proved to be most effective in providing a waterproof flexible joint, but it was found to be simple to use with no wooden shuttering required for its installation. In fact, Mr Albert Keith, Assistant Manager of the Forth Bridge Administration offices, confirmed that the complete job was finished 27 days ahead of schedule.

Stop Press....

Tokband Spezial is now approved by the Department of Transport!

A First for British Rail – Tokband Spezial Specified as Platform Joint Sealant

Tokband Spezial was specified by Anglia Region of British Rail as a sealant to stop the ingress of water between the platform kerb edges and mastic asphalt.

The initial trial took place at Ware Station in Hertfordshire and was followed by several more successful applications at other Anglia Region stations.

The Tokband Spezial was hot applied on the longitudinal joints against the platform kerb edges and the back edge of the platform. On transverse joints, the Tokband Spezial was placed in without applying heat.

British Rail were impressed both by the effectiveness of the Tokband Spezial in keeping out surface water, which in winter can contain de-icing salts, and with the speed in which the joint sealant can be laid. Because of its flexibility, it can cope with thermal movements without the joints opening up. There are up to 60 platforms in the Anglian Region where the Winn & Coales joint sealant will be used in the future.

Additionally, British Rail London Midlands Region has also used Tokband Spezial as a joint sealant on a Red Star parcels loading bay at Euston Station.



Tokband Spezial is applied to platform kerb edge.



Mastic asphalt application.



The finished platform.



Tokstrip was also applied to metal lump bases prior to asphaltting.



New Road Maintenance Products

To complement Tokband Spezial Winn & Coales have developed three new road repair tapes which together form a comprehensive range of highway maintenance products.



Tok Paving Tape applied after priming.



Tape prior to overlaying of wearing course.

Tok Paving Tape

Tok Paving Tape is a cold applied fabric reinforced bituminuous tape for surface sealing of open seams or cracks in asphalt and concrete road pavements, prior to overlaying with asphalt. It is available in various widths up to 850mm.

Tok Paving Tape consists of a synthetic fibre fabric coated with a high tack bitumen adhesive, protected by a disposable release film. Its function is to provide a moisture barrier that reduces water penetration into the sub grade, thereby retarding cracks reappearing in the new overlay.

Application of Tokseal Primer – after first removing dirt and debris – is recommended beforehand.

Advantages of the new paving tape are its fast installation and instant seal against water. Also, it helps to retard cracks in new asphalt overlay and prevents further deterioration of the pavement. Application can be by roller or hand.

Tok Edge Sealing Tape

Tok Edge Sealing Tape is a cold applied, polymer modified bituminuous adhesive in tape form for sealing joints in hot rolled asphalt wearing courses, in road reinstatements and centre seams.

Tok Edge Sealing Tape can also be used for sealing joints in existing asphalt wearing courses around cast iron manholes etc.

The new tape is interleaved with a disposable release film. It is cold applied using a simple manually operated Tok Tape roller, which also automatically removes the release film.

Other advantages of the new Tok Edge Sealing Tape are: minimal delay to road reinstatement; the tape is evident after rolling of the asphalt; additional overbanding is unnecessary; and it can be applied by unskilled labour.



Tok Edge Sealing Tape applied with Tok Tape Roller.



Close up of tape in position prior to asphaltting.

Tape in position.



Tok Overbanding Tape

Tok Overbanding Tape is a cold applied polymer modified bituminuous tape for surface sealing of open seams or cracks up to 5mm width in road pavements on secondary roads.

The benefits of Tok Overbanding Tape include instant seal against water; fast installation so that traffic can pass over immediately. It also helps prevent further deterioration of the pavement.

Both Tok Paving Tape and Overbanding Tape can be applied by unskilled labour using a simple roller available from Winn & Coales (Denso) Ltd.

Protection of Above Ground Steelwork.....

The Denso Covercoat System for the protection of above ground steel structures has many advantages. Minimal surface preparation coupled with long-term cost effective protection make it the ideal choice for highly corrosive conditions or where shot blasting is impractical.

Denso Steelwork System for Pipe Bridges

During 1989 Northumbrian Water Ltd commenced a programme of renewing the anti-corrosion protection given to water pipe bridges.

At the onset, Winn & Coales (Denso) Ltd were called in to demonstrate the effectiveness of their latest Denso Covercoat System for protecting the pipe bridges. Northumbrian Water were sufficiently impressed with the capabilities of the Denso system that Winn & Coales were asked to quote for the protection of six more water pipe bridges.

The Denso Covercoat System was designed for the protection of above ground steel structures in general, as well as pipelines and pipe bridges, where such structures are either situated in extremely corrosive environments or are such that abrasive blast cleaning cannot be carried out.



Application of Denso Covercoat Tape.



Tape copes easily with bends and flanges.

The basic system comprises: Denso Priming Paste, which is brush applied petrolatum based adhesive primer, and Denso Covercoat Tape. The latter is a cold applied petrolatum based anti-corrosion tape with good adhesion and conformability. It is reinforced on the back with a polyester cloth layer.

Additional products are necessary for certain applications, such as: Densyl Mastic, for softening the profile of mechanical joints, nuts, bolts etc. prior to taping, and Denso Covercoat, which is a cold applied two pack brush applied epoxy solvent free coating for saturating the polyester cloth backing on the tape to provide high mechanical strength and an aesthetically pleasing finish.

Proven advantages of the Denso Covercoat System are as follows:
 Long term cost effective protection.
 Less dependent upon surface preparation than most liquid coatings.
 High conformability with strong adhesion.
 Can reduce or eliminate plant shut-down for maintenance.
 Instant and uniform protection given by Denso Covercoat Tape irrespective of the profile.
 Resistant to acids, alkalis, salts etc.
 Choice of system to suit the environmental conditions and requirements.
 Elimination of failure due to intercoat contamination.
 Years of proven effectiveness.
 Easily monitored performance.



Covercoat coating in progress.



Completed Covercoat protection.



Front Cover: M11 p.4.
Completed section of hard-shoulder.

Back Cover: Port Ramsgate p.2
Ro-Ro bracings showing different stages of SeaShield 100 system.



LEADERS IN CORROSION PREVENTION

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