DENSIPHALT®

Semi-flexible pavements in ports

- Container terminals
- General cargo terminals
- Ro/Ro terminals
- Lo/Lo terminals
- Bulk terminals
- Refuelling pads
- Port storage
- Warehouse facilities

ITW Engineered Polymers

Densiphalt

Semi-flexible pavements for port areas

Densiphalt®

– a semi-flexible and joint-free pavement proven to be an optimum solution in ports worldwide

Densiphalt® is a semi-flexible pavement that combines the flexible properties of asphalt with the static bearing capacity and durability of concrete. It is applied as an asphalt-based wearing course that hardens to a matrix, in which the voids are filled with a Densiphalt® mortar.

Pavements for port areas

The activities in port areas and terminals expose the pavements to conditions that constantly stress and eventually damage the pavements.

- Wear and tear from traffic by handling equipment.
- High point loads from stacked containers and other cargo.
- Rutting from continual driving along the same routes.
- Impact from loading and discharging of cargo and containers.

The Densiphalt® pavement is the natural choice to meet these challenges as it combines the flexible and joint free asphalt with the excellent bearing capacity and high wear resistance of concrete. It provides a safe and efficient cargo handling, and withstands wear on the handling equipment.

Installation of Densiphalt® mortar.

Densiphalt® mortar.

Container handling on Densiphalt® pavement.

Densiphalt® surfacing on bituminous bound layers for heavy-duty port areas

SUBGRADE TYPE COURSES	Heavy loaded areas [1]			Medium loaded areas [2]		
	WEAK 20 MPa	MEDIUM 40 MPa	STRONG 80 MPa	WEAK 20 MPa	MEDIUM 40 MPa	STRONG 80 MPa
Densiphalt®	40 mm	40 mm	40 mm	40 mm	40 mm	40 mm
Bituminous binder course [3]	90 mm	90 mm	90 mm	80 mm	80 mm	65 mm
Bituminous base course	180 mm	140 mm	80 mm	100 mm	80 mm	65 mm
Subbase 1 [4]	300 mm	250 mm	250 mm	250 mm	200 mm	200 mm
Subbase 2 [5]	400 mm	250 mm	200 mm	350 mm	200 mm	200 mm

(The examples of layer thicknesses and designs are from projects around the world. We recommend use of a consulting engineer for the design in every case.)

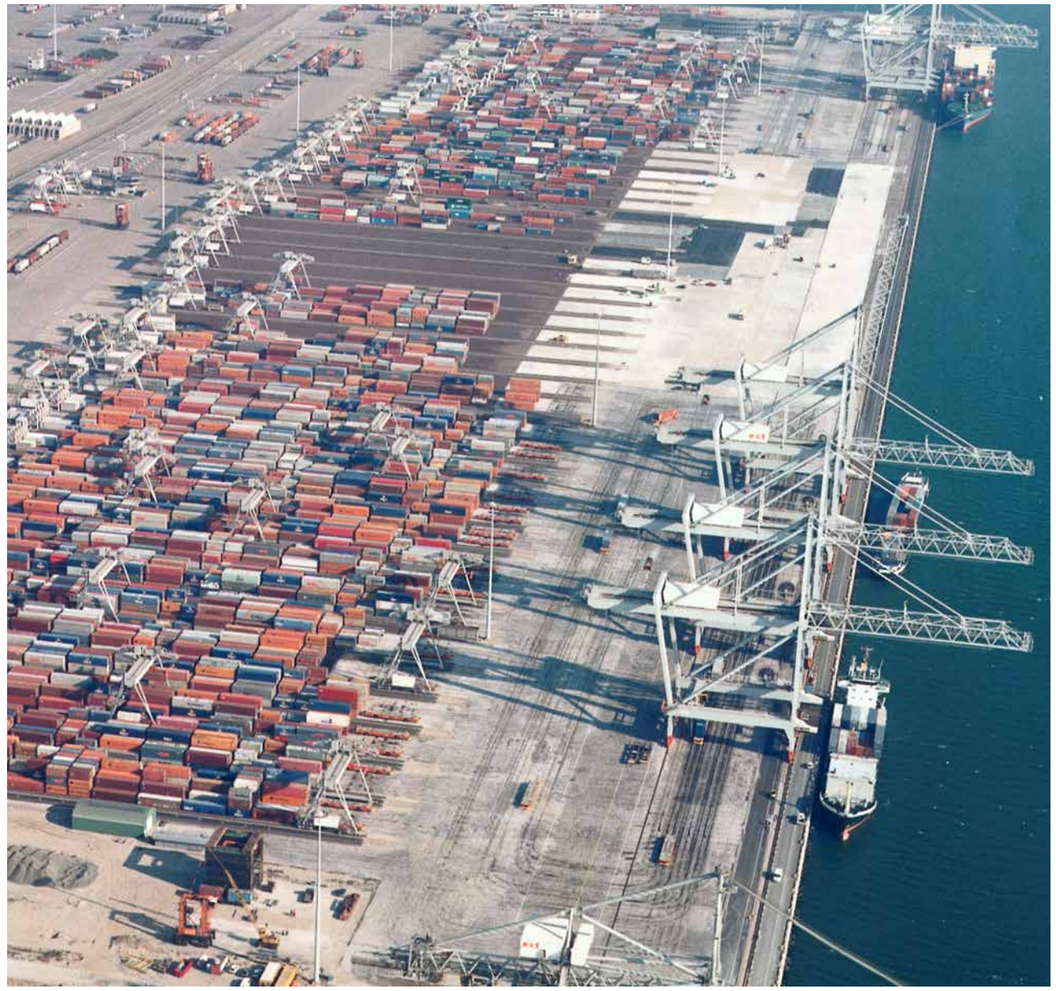
1) The design resists 2000 annual operations from heavy equipment e.g. DRD450-65S5 Reach Stacker.

2) The design resists 500 annual operations from heavy equipment e.g. DRD450-65S5 Reach Stacker.

3) High modulus asphalt binder course.

4) Crushed stone base. Alternative use of granular base influences the course thickness.

5) The thickness of Subbase 2 depends on the need for frost protection.



Rotterdam Port.

Densiphalt® technical data

Mortar component - Typical values

Compressive strength	Wear resistance	Freeze / thaw resistance
110 MPa	10 $cm^3/50cm^2$	<0,1 kg/m^2
EN 12390-3	EN 13892-3	DS/CEN/TS 12390-9

Wearing course

Compressive strength	E-Modulus	Freeze / thaw resistance
8 MPa	8.000 MPa	<0,1 kg/m^2
EN 12504-1	(ASTM-D-4123/ BS DD 213)	DS/CEN/TS 12390-9

Semi-flexible

Densiphalt® absorbs movements in the subgrade reducing the risk of cracks.

Impermeable

Densiphalt® prevents subbase erosion and deformation as well as contamination of subbase and ground water.

An economical solution

..in both the short and long term. Densiphalt® is easy to install and repair, and requires low maintenance, efficient cargo handling and minimum downtime.

Densiphalt®

The strength of concrete:

- Good wear resistance
- High bearing capacity
- Superior resistance to rutting
- Long service life
- Impermeable
- Excellent resistance to thermal movements

The flexibility of asphalt:

- Joint-free pavement
- Semi-flexible
- Freeze/thaw resistant
- Swift installation
- Early trafficking

ITW Engineered Polymers - a strong partner for Flooring and Pavements around the world

ITW Engineered Polymers
ITW Engineered Polymers is a division of ITW (Illinois Tool Works). ITW is one of the world's most diversified industrial companies, with a sales turnover in 2012 of USD 18 billion. Established in 1912, today ITW employs over 65,000 people worldwide.

ITW businesses serve local customers and markets around the globe with specialized industrial equipment, consumables, and related service businesses.

ITW Engineered Polymers is a global supplier of chemical solutions targeting industrial manufacturers. ITW Engineered Polymers manufactures, markets and sells a wide variety of industrial technologies including High Performance Cementitious products, epoxy adhesives and chocking compounds, methacrylate adhesive and polyurethane coatings under leading brands such as Densit®, Ducorit®, Devcon® and Plexus®.

Densit®
Densit® is a brand of ITW Engineered Polymers. Since 1983, ITW Engineered Polymers has been specializing in the development, manufacture and supply of high performance solutions based on its Ultra High performance Cementitious (UHPC) Densit® material.

ITW Engineered Polymers is working in partnership with the ITW WindGroup to bring this unique global platform of grout solutions for offshore and onshore foundation installations into the market.

In addition to connecting offshore structures in the wind industry, UHPC Densit® materials are applied worldwide in other demanding areas such as wear and abrasion resistant solutions, the reinforcement of oil and gas platforms, industrial flooring- and pavement and security barriers.

QUALITY ASSURANCE
ITW Engineered Polymers is certified to ISO 9001, ISO 14001 and OHSAS 18001.

LLOYD'S REGISTER · LRQA
ISO 9001 · ISO 14001
OHSAS 18001

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