

"Proper Site Practice" The key Word to Job Success

The success of bridge deck waterproofing operation is often reliant on site procedures, workmanship and weather conditions.

Professional preparation is as important as the properties of material or system to be used.

Before work commences on site the following major issues need be addressed:

- Availability of properly trained workforce, and qualified supervisors.

- Site engineer must have design detailing and construction records accessible.

- Provision of adequate storage area for material to be used.

- A safe access to bridge deck must be secured for personnel, equipment and materials.

- Established method of statement, and execution program discussed and approved by all parties.

- Review of weather conditions likely to affect the waterproofing operation.

- Preparation of concrete deck to meet strict surface finish requirements (sound, even, uncontaminated, dry, dust free). There

by offering optimum opportunity for a strong bond to waterproofing membrane.

- Use of an appropriate primer.

- Choice and application of a waterproofing system approved and in compliance with Highway Agency Standards.

- Adequate protection of the waterproofing membrane prior to the application of the asphalt road surfacing.

- Use of approved asphalt road surfacing with low void content mix design.

BITUNIL Bridge Deck Waterproofing System

BITUNIL Bridge Deck Waterproofing System consists of two layers of fully torch welded heavy duty APP modified bitumen membranes with composite polyester reinforcement, applied on a primed substrate.

System Application:

- Concrete surface must have a minimum acceptable gradient to ensure drainage on the surface of the asphalt pavement.

- A primer coat must be applied to concrete deck

to seal voids, promote W.P. adhesion, and assure against blister formation.

- Prior to membrane application, a reinforcing MBM strip shall be applied to cover all intersections with edge beams.

- Waterproofing Membrane shall be applied fully bonded to bridge deck, parallel to down slope direction. Side laps and end laps shall be 8- 12 cm, and 12- 15cm respectively.

- Second waterproofing layer shall be applied fully-bonded onto the first layer,

at the same direction of rolls length, with shifting the side laps 0.5 meter in order to secure the membrane waterproofing system with maximum overlaps.

- Flashings must extend min. of 10cm up against the edge beams.

- Waterproofing must be protected against sun light until asphalt layers, of drainage, protective, and wear courses are applied. It is recommended to apply the asphalt layers as soon as possible.

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Thorough Preparation Leads to Smooth Execution



BituNil

50 Al Khalifa Al Mamoun,
Roxy, Heliopolis

PHONE:
(02) 24511194

Fax:
(02) 24511198

E-MAIL:
Tech.support@bitunil.com

We're on the Web!
See us at:
www.bitunil.com

Bridge Joints: Selection and Water Management

Based on the predicted movement related to imposed design loads, and temperature variation ranges, the bridge designer specifies the appropriate bridge joints. Selection can vary from a wide range of pre-fabricated expansion joints, to cast in place Asphaltic plug joints. The

drainage system for the joint should ideally overlap the deck waterproofing system used. Combined subsurface drainage outlets serve to discharge water and prevent build-up behind the joint. Regular inspection of surfacing and joints is necessary to maintain satisfactory performance

through out bridge service life. Early fault detection, such as blocked drainage or damaged surfacing, is necessary to avoid major remedial work. Inspection and maintenance should be scheduled to coincide with other bridge maintenance work to reduce disruption and consequential costs.

Cont'd ... (Bitunil Bridge Deck Waterproofing System)

- Thickness and mix design of asphalt courses are as per consultant and project specifications.

- Bridge deck joints must be filled up (Grouted) and covered with 200 mm

MBM cover strip prior to membrane application.

- Our System recommendation is for two layers of MBM fully torch welded onto deck surface, however, for bridges with low daily traffic

(ADT< 2000), with out significant importance to local and regional traffic, and with out frequent breaking and turning traffic, a single layer system is adequately sufficient.

About Our Organization...

The Nile Waterproofing Materials Company S.A.E., **BITUNIL**, is the product of experience, prudence and knowledge.

The **BITUNIL** plant is built over an area of 20,000 square meters in Al Max Alexandria Port. The production plant is state of the art for manufacturing of

modified bitumen membranes, and is fully equipped to manufacture quality products that comply with internationally recognized standards.

Special Interest Articles:

- BUR: Pros and Cons.

- MBM. A contemporary update of classic BUR.

- Bridge Decks & waterproofing choice.

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BituNil Highlights

News from Egypt's leading Modified Bitumen Membranes Manufacturer-Bitunil S.A.E.

The Traditional BUR; Pros and Cons.

Built-Up Roofing, composed of layers of bitumen saturated felts, either fiberglass or organic, and layers of oxidized bitumen mopping in-between, are still very popular in Egypt. It has been in use for ages, and known to have reasonable strength. Roofers have experience with its application, it is cost effective, and is suitable for our moderate climate.

entrapped between felt plies. The void will grow as the water vapor expands inside it. A large blister can puncture from foot traffic or dropped tools. The sloping sides of a blister can cause roof surfacing to slide, exposing membrane, and resulting in impeded degradation, brittleness and cracks. Eventually, the w.p. element is compromised.

Movements caused by structural settlement, LWC shrinkage, or movement of under laying insulation boards, along with BUR membrane limited elasticity will cause splitting failure.



Ridging, a third common problem with only organic felt built-ups, is caused by moisture absorption of vapor traveling up from the building interior. The cyclic wetting and drying of felts manifest as ridges in the membrane. Fatigue will cause the membrane to crack and its strength to decline.



Yet, among the most common problems associated with BUR is **Blistering**. Blisters are voids

A less frequent, yet more serious problem, is **Splitting**. A split develops from the bottom up, offering little or no advance warning.

Guide lines for BUR System Upgrade

BUR is field fabricated, and thus is subject to many application errors. Proper international application standards have to be strictly enforced, to end up with a reliable BUR system.

Follow international recommendations for bitumen heating.

- Proper heating kettles must be used at application sites, no other primitive hazardous methods should be allowed.

- The **Type of Bitumen**, the **EVT** (*The optimum temperature range at which bitumen attains the proper viscosity for built up membrane application*), and the **Flash Point** should be furnished by manufacturer and printed on asphalt packages.
- If the EVT information is not supplied on packages, application temperature ranges recommended by international standards, should be used as guide lines.

- Excessive prolonged heating should be avoided since it has detrimental effect on bitumen quality.
- Bitumen should never be heated above flash point, and material should circulate while heating.
- Asphalt fumes during the heating process raises concerns of pollution and potential health hazards.

It should be considered that fume control systems be an integral part of bitumen heating equipment.

Asphalt Fumes and Health Concerns



Asphalt fumes released from hot asphalt, during BUR application raise lots of health concerns. Besides the fact that it contributes to environmental pollution, it also has adverse impact on

workers and surroundings, especially when executed on school or hospital roofs where people are sensitive to such fumes. Potential health hazards are allergies including headache, skin

rash, fatigue, eye and throat irritation and cough, while long term exposure increases risks for respiratory ailments.

MBM, A Contemporary Update of the Classic BUR

With the advent of polymer modified bituminous membrane products in the 80's, a forward leap in low slope roofing was achieved. Whether torch applied, hot mopped, or self-adhered, polymer modified waterproofing membranes have matured into reliable, popular low-slope roof systems.

- They possess enhanced physical and mechanical properties.

- They are easy to apply and maintain.
- They are compatible with traditional roofing practices. Their use resulted in considerable labor saving over the more traditional BUR system.

- And they are cost effective.
The single largest mode of failure for MBM is defective lap seams. Open seams usually occur due to

inadequately heated asphalt at the time of application. Conversely overheating the membrane during torch application will cause its damage and will also result in poor bonding.

Occurrence of such problem can be highly avoided when skilled, trained workmen handle the job, under qualified and experienced roofing contractor supervision.

APP or SBS Modified Membranes. Which to choose ?

Polymer modified bituminous sheets are based on the use of either APP polymer modifier, which gives the bitumen compound its "plasticized" characteristics, or SBS polymer modifier, which gives the compound its "rubberized" quality. APP modified membranes

will have the advantage of elevated softening points, and thus more resistance to high temperatures than SBS modified membranes. On the other hand, SBS modified membranes have a richer compound that better resists aging, weathering, and chemical attacks, and is better suited

for applications where greater flexibility at low temperatures is a desirable criteria. Your choice of membrane shall depend on project nature, location, surrounding environmental conditions, and desired membrane serviceability.

Exhibitions & International Exposure



The Big 5 Show Exhibition, Dubai, UAE.

BITUNIL has participated in the past year 2006 in a number of international exhibitions presenting its wide range of roofing and waterproofing systems.

Among the major exhibitions were the Big 5 Show, in Dubai, The China International Exhibition in Shanghai, the Build Con Expo in Ahmedabad, India, and the ACE-Tech in Bombay. Thousands of attendees came from every segment of the roofing market, including commercial, residential and metal roofing contractors, builders, building owners, consultants, architects, designers and other industry professionals.

Hundreds of exhibitors from all around the world participated in the events with various types of roofing materials including waterproofing materials, insulations, adhesive sealants, shingles, and metal roofing.



ACE- Tech Exhibition, Bombay, India.



Build Con Expo Exhibition. Ahmedabad, India.

In attendance were decision makers and senior level professionals from the world's leading roofing companies. The events provide the construction professionals with the opportunity to meet experts from all over the world, share knowledge and best practice with them, and source essential products, techniques, and expertise.

BITUNIL Booth, at the Egyptian Pavilion, with its attractive professional set up, and dedicated marketing staff, has attracted lots of visitors, and was admired by attendees.

BITUNIL's successful participation has given an excellent opportunity to establish networking between our roofing professionals and their counterparts abroad, build business relationships, promote products, and penetrate new markets.



China International Exhibition, Shanghai,

Bridge Decks, And the Waterproofing Choice

The waterproofing of bridge decks is recognized in many European countries as a vital and necessary operation to enhance the durability and longevity of the bridge.

It represents the first line of defense against the ingress of water, road de-icing salts, and aggressive chemicals which would corrode the steel reinforcing bars in the

concrete causing severe damage.

Some countries with mainly worm weather and dry climates choose not to waterproof their bridge decks but, a recent analysis, in the USA showed that 200,000 decks are suffering from corrosion resulting in direct cost of \$2 billion for replacement and refurbishment. Concrete will

always have a degree of porosity and, allied with surface wear and hair line cracking, will allow water and corrosive materials to penetrate and attack the steel reinforcement. The primary defense against such destructive agents is good dense concrete, along with a proven waterproofing system installed by a qualified contractor.



Bridge Deck Waterproofing Systems

1- Sheet Systems:

Are Polymer Modified Bituminous sheets bonded to the bridge deck, using torch application, hot mopping asphalt, or through self adhesion.

Manufacturers have developed systems that would satisfy the enhanced

requirements of the bridge deck waterproofing market.

2- Liquid (Sprayed) Systems:

They largely fall into acrylics and Polyurethanes. The systems normally consist of three elements:

Primer, Membrane applied

in one or two coats, and tack coat specially developed to enhance the bond of the membrane to the surfacing mix.



System Performance Requirements

Independent of the bridge deck waterproofing system choice, certain performance criteria has to be met in order to avoid potential concerns regarding leakage, poor bonding, embrittlement or softening of the membrane in service.

Such performance criteria are:

- Impermeability to water under all conditions.

- Good adhesion to deck.
- Good adhesion to surfacing.
- Capable of bridging shrinkage cracks in concrete.
- High mechanical properties to handle traffic loads including shear forces in curves and during braking and accelerating.

- Tolerant of deck texture and details.
- Tough to withstand site damage and operations.
- Safe to apply
- Able to withstand elevated surface temperatures.
- Can be applied over a wide range of ambient conditions.
- Non Degradable.