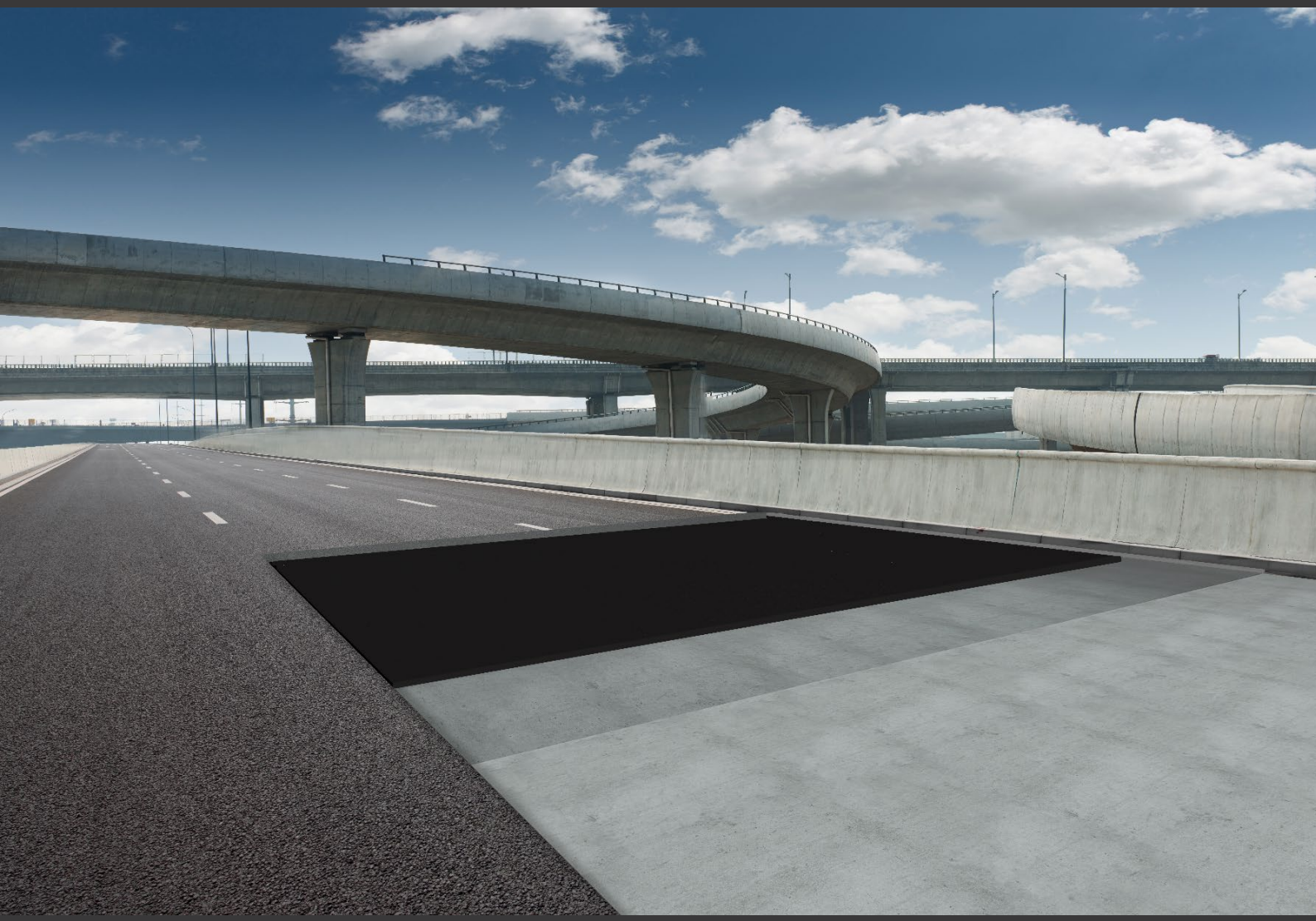
BRIDGE DECK WATERPROOFING SYSTEM BASED ON

HYPERDESMO®-PB-2K



ALCHIMICA® BUILDING CHEMICALS

TABLE OF CONTENTS

WHY CHOOSE ALCHIMICA IN BRIDGE DECK WATERPROOFING PROJECTS? 4

ALCHIMICA'S POLYURETHANE LIQUID MEMBRANES 6

ALCHIMICA'S BITUMEN-EXTENDED POLYURETHANE TECHNOLOGY 7

HYPERDESMO®-PB-2K: THE OPTIMAL SOLUTION FOR BRIDGE DECK WATERPROOFING 8

FROM ETAG 005 (PART 1&6) TO 10

EAD 030350-00-0402 10

PREPARATION 10

REPAIR AND LEVELING MORTARS 11

PRIMER SELECTION 12

SEALING SOLUTIONS 13

METHOD STATEMENT

GENERAL SYSTEM CONDITIONS 15

SYSTEM PRODUCTS BUILD-UP 19

SUBSTRATE PRIMING 20

DILATATION JOINTS, INNER ANGLES & SMALL CRACKS 22

MAIN WATERPROOFING 24

CLEANING 25

REPAIR AND OVERLAPS PROCESSES 26

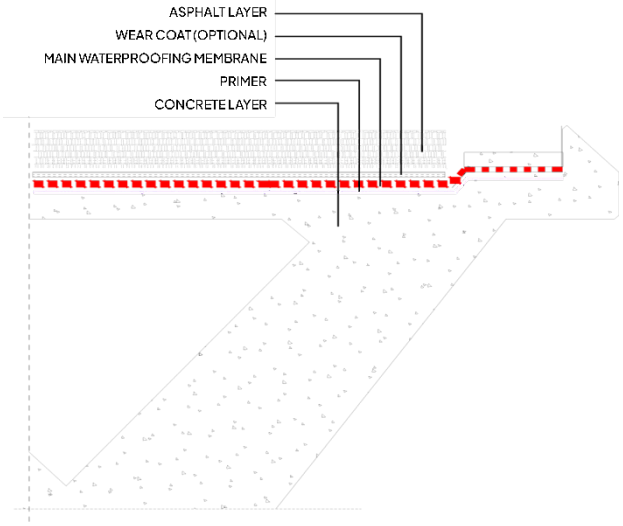
REFERENCES 27

HEALTH AND SAFETY 28

PRECAUTIONS AND VARIATIONS. 28

LEGAL NOTES AND CITATION 28

WHY CHOOSE ALCHIMICA IN BRIDGE DECK WATERPROOFING PROJECTS?



Waterproofing bridge decks is a critical aspect of this infrastructure maintenance and longevity. Bridge decks are particularly vulnerable to water damage due to their direct exposure to environmental elements and heavy traffic loads. The critical need to waterproof bridge decks, particularly beneath asphalt overlays, underscores why ALCHIMICA's waterproofing systems are an ideal choice for this application. While bridge components can indeed be made from various materials such as steel, wood, or composite materials, bridge decks are typically constructed from reinforced concrete due to its strength, durability, and ability to be formed into the necessary shapes and spans required for bridge construction.

Waterproofing exposed concrete structures is crucial due to the porous nature of concrete and its susceptibility to water damage. Without proper waterproofing, water infiltration can cause structural deterioration, especially in reinforced concrete structures with steel reinforcement embedded within the concrete matrix. Waterproofing serves as a protective barrier, preventing water from penetrating the concrete and preserving its integrity. It also extends the lifespan of the structure by shielding it from the harmful effects of water, such as corrosion of reinforcing steel and freeze-thaw cycles. Additionally, waterproofing prevents mold and mildew growth, which pose risks and further structural issues. Although the initial investment in waterproofing may seem significant, it is justified when compared to the future costs of repairing water damage. Proactively addressing high quality waterproofing can avoid costly repairs and replacements, making it a cost-effective long-term strategy.

Waterproofing bridge decks is essential for several reasons. The bridge deck, being the surface directly exposed to traffic and environmental elements, is particularly vulnerable to damage. Without effective waterproofing, water can infiltrate the deck, leading to several detrimental effects. Road salts used for de-icing can penetrate the bridge deck and accelerate the corrosion of steel reinforcements. The waterproofing system must prevents chlorides from reaching the steel, thus protecting the structural integrity of the deck. Also, in colder climates, water infiltration can lead to freeze-thaw cycles. Water that enters cracks and pores can freeze and expand, causing significant damage. Waterproofing

prevents water ingress, mitigating the risk of freeze-thaw damage. Additionally, waterproofing protects the bridge deck from water and chemical infiltration, significantly enhancing its durability and extending its lifespan. A well-maintained and correct waterproofed bridge deck provides a safer driving surface by preventing the formation of water damage and other structural weaknesses, enhancing the overall safety and performance of the bridge deck for all users.

Asphalt overlays are a cost-effective method to constantly improve the quality and durability of bridge decks without the need for complete reconstruction. These overlays address issues like cracks, potholes, and surface irregularities, extending the road's life and performance. The waterproofing system used under the asphalt overlay must be highly effective and compatible with asphalt. This is crucial for accommodating structural movements and expansion joints. The waterproofing system must provide a strong bond to the substrate and be compatible with both the bridge deck and the asphalt on top. It must withstand the stress and wear of the road traffic. The materials must possess specific characteristics such as water resistance, flexibility, chemical resistance, and durability to withstand weather conditions, traffic wear, and environmental factors. Waterproofing systems need to be user-friendly and easy to apply by professionals, minimizing downtime during application materials and reduces the risk of errors. These are also important considerations.

ALCHIMICA has developed advanced waterproofing systems specifically designed to address the challenges of waterproofing bridge decks, particularly under asphalt overlays. ALCHIMICA's innovative PU-based materials achieve performance levels that are unmatched in the industry. These membranes provide excellent adhesion, flexibility, and durability. They are resistant to water, chemicals, and temperature variations, making them ideal for bridge deck applications. Importantly, ALCHIMICA's systems ensure compatibility with both the bridge deck substrate and the asphalt overlay, and they offer superior chemical resistance to withstand exposure to de-icing salts and other harmful substances. ALCHIMICA's systems are designed for easy and efficient application, reducing downtime, risk of errors and labor costs. The systems form a durable, monolithic, seamless barrier that protects the bridge deck from water damage. Furthermore, ALCHIMICA's waterproofing systems are designed to withstand heavy traffic loads, harsh weather conditions, and chemical exposure, ensuring that the bridge deck remains in optimal condition, providing long-term protection and performance.

ALCHIMICA is a pioneer and a global leader in complete polyurethane waterproofing solutions. With pedigree and expertise in this field, ALCHIMICA overcomes the challenges that others deem impossible. The technological depth and know-how of ALCHIMICA allow the formulation of innovative PU-based materials that can achieve performance levels that are not typically met. ALCHIMICA has been active in the research, development, and production of

building chemicals for 42 years providing solutions for liquid waterproofing, reparations, sealing, flooring, and ETICs. The know-how of ALCHIMICA in Research and Development laboratories in construction, repair, and renovation solutions of buildings and infrastructure meets international industry standards.

ALCHIMICA'S POLYURETHANE LIQUID MEMBRANES

To ensure effective waterproofing, it is crucial to select PU membranes that meet specific criteria: impermeability, flexibility, durability, breathability, and resistance to environmental factors such as UV radiation, heat, humidity, and chemical exposure.

ALCHIMICA is a leader in the waterproofing industry, pioneering the use of liquid applied polyurethane membranes. With a commitment to high performance and durability, ALCHIMICA's products excel in applications where seamless systems are paramount, whether for structural integrity or aesthetic appeal. These membranes offer decisive advantages, particularly in complex scenarios like geometrically complicated connections with ventilation outlets or upturns.

Throughout its history, ALCHIMICA has continuously expanded its range of polyurethane liquid membranes to provide versatile installation alternatives and long-lasting solutions. From one and two-component polyurethane liquid membranes to bitumen-extended polyurethanes, water-based liquid polyurethane membranes, and advanced technology polyurethane dispersion (PUD) products, each solution is meticulously designed to address a wide array of waterproofing challenges with optimal performance and durability.

ALCHIMICA's liquid membranes offer durability upon application, elasticity to withstand various stresses and traffic, and resistance to chemicals, and ponding water. These properties meet stringent technical specifications, making them suitable for a diverse range of applications. The core objective of ALCHIMICA is to develop waterproofing systems that are competitive, simple to apply, and accessible to all professionals. By prioritizing ease of application and reliability, ALCHIMICA empowers users to achieve effective waterproofing solutions efficiently and effectively. The membranes are seamless, durable, and flexible and provide superior waterproofing performance, waterproof and moisture permeable, preventing water penetration, allowing moisture to escape, and reducing the risk of degradation and failure over time. With mechanical, thermal, and chemical resistance properties and breathability, ALCHIMICA's PU membranes ensure the longevity and efficiency of waterproofing systems.

ALCHIMICA's commitment to innovation and excellence has revolutionized waterproofing technologies globally. With a comprehensive range of polyurethane liquid membranes tailored to meet the demands of modern construction projects, ALCHIMICA remains the premier choice for effective, long-lasting waterproofing solutions.

ALCHIMICA'S BITUMEN-EXTENDED POLYURETHANE TECHNOLOGY

HYPERDESMO®-PB technology is ALCHIMICA's innovative approach to waterproofing, utilizing bitumen-extended polyurethane technology. This technology leverages the longstanding use of bitumen in waterproofing and protection applications, enhancing it with the flexibility and resilience of polyurethane. Bitumen, known for being an excellent humidity barrier, provides robust protection against moisture, while polyurethane (PU) resins introduce superior flexibility to the bitumen, ensuring the material can handle movement and stress without cracking. ALCHIMICA's pioneering efforts have led to the creation of HYPERDESMO®-PB, a product line that combines these materials to produce waterproofing membranes of exceptional quality.

Bitumen-extended polyurethane technology marks a significant advancement in waterproofing materials by ingeniously merging the durability of bitumen with the flexibility of polyurethane. This innovative blend results in a composite that is not only resilient but also adaptable, making it suitable for a vast array of construction and refurbishment projects. The HYPERDESMO®-PB series of products exemplify this technology, offering liquid-applied waterproofing membranes that integrate the best attributes of their base materials to form a protective layer that is exceptionally elastic and hydrophobic. After curing, HYPERDESMO®-PB creates a robust membrane that adheres strongly to a variety of surfaces, including concrete, metal, and asphalt. The versatility of HYPERDESMO®-PB is evident in its wide range of applications—it can be effectively used in foundations, on both horizontal and vertical surfaces, beneath tiles on balconies and verandas, and for waterproofing green roofs, flat and inclined concrete roofs in non-exposed areas, as well as in complex structures like tunnels and bridges. It is also suitable for areas experiencing heavy traffic and for moisture-rich environments such as bathrooms and saunas.

The benefits of using bitumen-extended polyurethane are manifold. The material exhibits enhanced durability, resisting weathering, chemicals, and physical wear. Its superior elasticity allows it to comfortably handle the natural expansion and contraction caused by temperature fluctuations, maintaining its integrity over time. The strong adhesion of the material ensures a continuous and effective barrier against water ingress on various substrates. Its hydrophobic properties keep surfaces dry, crucial in preventing water damage. The seamless nature of the application eliminates joints or seams, which are potential weak points for leaks, thereby enhancing the overall effectiveness of the waterproofing system. The technology is not only versatile, fitting a broad range of applications but also cost-effective, with the potential for significant long-term savings on maintenance and repairs. Furthermore, some formulations of bitumen-extended polyurethane are designed to be environmentally friendly, reducing the ecological impact associated with traditional waterproofing materials.

The HYPERDESMO®-PB products stand out in the field of construction for their robust, flexible, and durable solutions that meet diverse waterproofing needs. Their reliability and adaptability make them a preferred choice among professionals in the construction industry, underscoring the practical benefits and innovative application of bitumen-extended polyurethane technology.

HYPERDESMO®-PB-2K: THE OPTIMAL SOLUTION FOR BRIDGE DECK WATERPROOFING

When it comes to waterproofing bridge decks, the demands on materials are high due to the extreme mechanical forces and temperature variations they must endure. ALCHIMICA's HYPERDESMO®-PB-2K stands out as an ideal solution for bridge deck waterproofing under asphalt overlays. Here's why:

- ✓ **Exceptional Adhesion and Compatibility**

HYPERDESMO®-PB-2K offers strong adhesion to a variety of substrates, including concrete and asphalt. This ensures a secure bond even under the most extreme mechanical forces and temperatures encountered during asphalt casting. The use of GEODESMO-50 primer enhances adhesion on both porous and non-porous surfaces, making it versatile for different project requirements.

- ✓ **Superior Material Properties:**
  - ✓ *High elongation (over 2000%)*
  - ✓ *Excellent flexibility and durability*
  - ✓ *Outstanding crack-bridging capabilities*

HYPERDESMO®-PB-2K is a two-component, bitumen-extended polyurethane waterproofing membrane that boasts excellent mechanical properties. It offers high elongation (over 2000%), flexibility, and durability, which are critical for effective crack-bridging and handling substrate movements. These properties ensure that the waterproofing layer remains intact and functional even under heavy traffic and extreme weather conditions.

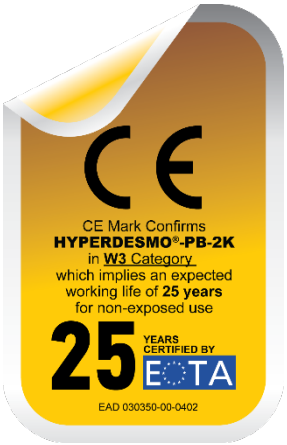
- ✓ **Ease of Application**

One of the significant advantages of HYPERDESMO®-PB-2K is its user-friendly application. The material can be applied using a brush, notched trowel, squeegee, rubber spatula or roller conforming easily to irregular surfaces

and intricate details. This versatility makes it suitable for a range of substrates and conditions. Its fast-curing nature allows for rapid application, minimizing downtime during construction projects.

- ✓ **Chemical and Thermal Resistance**

HYPERDESMO®-PB-2K exhibits excellent resistance to a wide range of chemicals, including petrochemicals and salts, making it highly suitable for bridge decks exposed to harsh environmental conditions. It also maintains elasticity at low temperatures and withstands shock temperatures up to 200°C, ensuring performance in both hot and cold climates.



- ✓ **Certified Performance**

This waterproofing system is certified according to ETAG 005, Part 1 & Part 6, now EAD 030350-00-0402 with a minimum expected working life of 25 years (Class W3). Such certification provides confidence in its long-term performance and reliability. Additional certificates (root resistance, etc.) are available under request at alchimica@alchimica.com.

- ✓ **Proven Success Worldwide**

HYPERDESMO®-PB-2K has been successfully used in numerous projects around the globe, demonstrating its reliability and effectiveness in real-world applications. ALCHIMICA's extensive portfolio of completed projects showcases the versatility and success of this material in diverse settings. Request references at alchimica@alchimica.com.

- ✓ **Comprehensive Support and Technical Assistance**

For specific project requirements, ALCHIMICA provides detailed technical support and guidelines to ensure the correct application of HYPERDESMO®-PB-2K. This support helps construction professionals achieve optimal results and maintain the integrity of their waterproofing systems over time.

HYPERDESMO®-PB-2K is the ideal material for bridge deck waterproofing under asphalt overlays, offering exceptional adhesion, superior mechanical properties, and proven long-term performance. Its high elongation and crack-bridging capabilities ensure durable and reliable waterproofing solutions, while its compatibility with various substrates, bridge components, and other systems enhances its versatility. Fast curing and easy application reduces project downtime, promoting efficiency and quicker completion. Certified to meet stringent industry standards, HYPERDESMO®-PB-2K ensures safety and regulatory compliance. With comprehensive support from ALCHIMICA, consulting and infrastructure companies, as well as contractors, can confidently implement this membrane, ensuring the success and longevity of their projects.

FROM ETAG 005 (PART 1&6) TO EAD 030350-00-0402

ETAG 005 is a European technical guideline for liquid-applied roof waterproofing systems (kits). The ETAG 005 outlines specific stipulations for liquid-applied roof waterproofing kits based on polymer-modified bitumen emulsions and solutions, glass-reinforced resilient unsaturated polyester, flexible unsaturated polyester, hot-applied polymer-modified bitumen, polyurethane, bitumen emulsions and solutions, and water dispensable polymers. These guidelines aim to ensure the safety and effectiveness of roof waterproofing systems. Since the LARWKs (Liquid Applied Roof Waterproofing Kits) are based on different materials, which might necessitate additional specific verification and/or assessment, the kits are divided into families of products, dealt with in Complementary Parts. Part 1 provides general requirements for the assessment of liquid-applied roof waterproofing kits and Part 6 is a complementary part of ETAG 005 that specifies specific stipulations for kits based on polyurethane.

The ETAG 005 has been replaced by EAD 030350-00-0402 which is a European Assessment Document for Liquid Applied Roof Waterproofing Kits (LARWK). EADs are more comprehensive than ETAGs and provide a more detailed assessment of construction products. EADs are intended to be used as a basis for issuing European Technical Assessments (ETAs).

The EAD 030350-00-0402 specifies the essential characteristics and relevant assessment methods and criteria for LARWKs. It also provides information on the intended use(s) of the construction product, working life/durability, and specific terms used in the EAD. It outlines the methods and criteria for evaluating a product's performance based on essential characteristics such as external fire performance, reaction to fire, content, emission, and/or release of dangerous substances, resistance to water vapor, watertightness, resistance to wind loads, resistance to mechanical damage (perforation), resistance to fatigue movement, resistance to the effects of low and high surface temperatures, resistance to ageing media, resistance to plant roots, effects of variations in kit components and site practices, effects of day joints, and slipperiness and more.

By choosing a LARWK that is certified according to EAD 030350-00-0402, you can be confident that the product meets the required EU standards and provides long-term protection against water penetration, thus extending the roof's service life.

PREPARATION

For successful and safe waterproofing applications specific tools and equipment are required. Each application might have different requirements.

Minimum application equipment includes protective clothing, a 1KW slow-speed drill, and a brush, roller, or airless spray machine for mixing and application. Before installing the system, the weather working conditions should be considered in order to ensure the correct and safe application of the system. Overall, avoid extreme cold or hot surface conditions. In case of high heat, contractors may apply the products either in the morning or afternoon. The application temperature range is 5°C to 35°C, with no dew point conditions, a maximum 95% relative humidity, and substrate temperature above 3°C. Store materials cool, tools dry, and avoid application during hot hours.

Substrate: To ensure successful application, substrate preparation is crucial. New concrete should be at least 28 days old, clean, dry, and free of substances that could reduce adhesion. Dust removal is recommended, and ALCHIMICA's primer application can be done over damp concrete.

In case of doubtful conditions, please contact ALCHIMICA's technical assistance for instructions.

REPAIR AND LEVELING MORTARS

REPAIRING

In case any spots on the concrete surface require repairs, filling, and/or smoothing such as large cracks, cavities, or surface levelling, ALCHIMICA's HYGROSMART® range of cementitious mortars may be used:

1**. HYGROSMART®-FIX&FINISH** (Single component, rapid-setting shrinkage-compensated, thixotropic, fiber-reinforced, cementitious mortar applied in a single layer from 3 to 40 mm thick, for repairing and smoothing concrete, certified according to EN1504-03, Type R4 CLASS III), or

2. **HYGROSMART®-BUILDING-45-THIXO** (Single-component, shrinkage-compensated, thixotropic, fiber-reinforced cementitious repair mortar, certified according to EN1504-03, Type R4 CLASS III), or

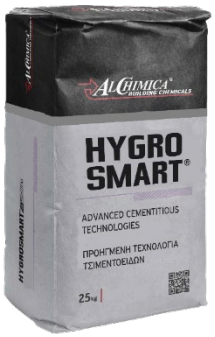
3. **HYGROSMART®-BUILDING-F** (Single-component, reinforced, quick-setting, cementitious repair mortar with excellent adhesion and mechanical properties, easy application in horizontal/vertical substrates. Long pot life allows the application of thick coats without cracking. CE Certified as Class R3 class III repair mortar according to EN 1504-03.

4. **HYGROSMART®-MAK-FLOW** (Single-component, highly flowable and shrinkage compensated mortar for structural repairs and anchoring, certified according to EN 1504-6: 2006 (Anchoring cementitious mortar for strengthening concrete by installing reinforcing steel) and EN 1504-3: 2005, Class R4(Hydraulic mortar (R4-CC) for structural repair of concrete in building and civil engineering works).

LEVELING

In cases where the concrete needs to be levelled or slopes need to be created prior to the installation of the waterproofing membrane, the following products from the HYGROSMART® range can be used, depending on the requirements and desired outcome.

1. **HYGROSMART®-MAK FLOW** (as described above)
2. **HYGROSMART® -DUR CEM 3K** (Three-component, epoxy modified mortar, waterborne, solvent-free, low viscosity, self-levelling, quick curing, zero VOC. Primer for flooring and waterproofing applications, floor-levelling compound. Will effectively seal the substrate as a solution to the problems arising in waterproofing applications on porous and/or humid concrete. The material is available as SELF LEVELLING (**HYGROSMART®-DUR CEM 3K SL**) or THIXOTROPIC (**HYGROSMART®-DUR CEM 3K THIXO**).



PRIMER SELECTION

After checking the weather conditions and having completed the substrate preparation along with any repairs that might be needed, you can start the waterproofing system's build-up with the selection of a suitable primer. ALCHIMICA's primer range provides unique properties for different substrates.

SUBSTRATE AND CONDITIONS	CONCRETE	HUMID CONCRETE	GYPSUM	METAL STEEL	POROUS CERAMIC TILES	GLASS / GLAZY TILES	PVC MEMBRANES	TPO MEMBRANES	BITUMEN MEMBRANES	LOW TEMPERATURE APPLICATION	VAPOR BARRIER	NEGATIVE PRESSURE / RISING HUMIDITY (1atm ≤)
PU PRIMERS												
PRIMER-PU	X	-	-	X	-	-	-	-	-	-	-	-
MICROPRIMER-PU	X	-	-	X	X	-	-	-	-	-	-	-
MICROSEALER-PU	X	X	X	X	X	-	-	-	-	-	-	-
MICROSEALER-50	X	X	X	X	X	-	-	-	-	-	-	-
GEODESMO 50	X	X	-	X	-	-	-	-	-	X	-	-
UNIVERSAL PRIMER-2K 4060	X	X	-	-	-	-	-	-	X	X	-	-
PRIMER T	-	-	-	-	-	X	-	-	-	-	-	-
PRIMER W	-	-	-	-	-	X	-	-	-	-	-	-
PRIMER TPO/FPO	-	-	-	-	-	-	-	X	-	-	-	-
PRIMER PVC	-	-	-	-	-	-	X	-	-	-	-	-
WATER-BASED PRIMERS												
AQUADUR	X	X	X	-	-	-	-	-	-	-	X	X
AQUASMART-DUR	X	X	X	-	-	-	-	-	-	-	X	X
AQUASMART-PRIMER PU-2K	X	X	-	-	-	-	-	-	-	X	-	-

ALCHIMICA's primers are designed to secure your waterproofing application in every substrate by strengthening the substrate, stabilizing, and sealing it, offering remarkable adhesion with their respective main membranes and sealants.

SEALING SOLUTIONS

Dilatation joints and inner angles should NOT be treated with a polyurethane-based sealant if bitumen-based materials are used or exist. Bitumen-based materials and polyurethane-based sealants are not compatible if in contact directly. The chemical properties of these materials can react negatively when they come into contact, potentially causing degradation or failure of the sealant. Flashing points, surface irregularities, cracks, and details can be repaired using HYPERDESMO® PB-1K. Dilatation joints and large cracks should be treated with HYPERDESMO®-PB-1K or with HYPERDESMO®-PB-2K.

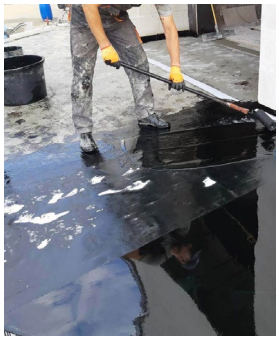
VERTICAL AND HORIZONTAL AREAS CAN BE TREATED WITH HYPERDESMO®-PB-1K.

HYPERDESMO®-PB-1K is a quick-curing, one component, thixotropic, bitumen-extended polyurethane fluid for flashing, waterproofing and protection. It produces a hydrophobic, elastic membrane with very strong adhesion to most types of substrates while offering excellent mechanical and chemical resistance properties. It is ideal for application on vertical surfaces: no running, no bubbling. It is based on pure elastomeric hydrophobic polyurethane resin and is extended with chemically polymerised virgin bitumen. Also, you can reinforce the joints and cracks with geotextile stripes and HYPERDESMO®-PB-1K applied wet-on-wet, allowing it to form a composite layer that offers additional protection from future cracking at these vulnerable points.

The material does not require thinning, but SOLVENT-01 may be used if needed. HYPERDESMO®-PB-1K has excellent thermal resistance and never turns soft, with a maximum service temperature of 80°C and a maximum shock temperature of 150°C. It also has outstanding mechanical properties, including high elongation, tensile and tear strength, and high abrasion resistance. The material has excellent chemical resistance and is an effective humidity barrier.

HORIZONTAL AREAS CAN BE TREATED WITH HYPERDESMO®-PB-2K.

HYPERDESMO®-PB-2K stands out not only as a waterproofing membrane but also as an exceptionally effective sealant for joints, cracks, detailed areas, and especially large areas thanks to its versatile and resilient properties. This two-component, bitumen-extended polyurethane product creates a highly elastic membrane that excels in sealing and bridging gaps, even in areas that experience significant movement or vibration. Its superior adhesion capabilities ensure a strong bond to a variety of substrates including concrete, asphalt, and metal, which is critical for long-term durability and integrity of the seal. Additionally, HYPERDESMO®-PB-2K cures quickly, reducing wait times and accelerating project timelines. The material is also capable of withstanding extreme temperatures and environmental conditions without degradation, making it an ideal choice for both indoor and outdoor applications where reliability is paramount.



Treating joints, cracks, and detailed areas under the main waterproofing membrane with HYPERDESMO®-PB-2K is crucial for ensuring the integrity and longevity of waterproofing systems. Proper treatment of these vulnerable points with HYPERDESMO®-PB-2K before applying the main waterproofing layer is essential to prevent water ingress and structural damage.

HYPERDESMO®-PB-2K is a two-component waterproofing system that leverages a reaction curing process, allowing for a single-coat application to achieve the desired total thickness. This method ensures strong adhesion, making it ideal for seamless waterproofing. To ensure maximum compatibility and adhesion, particularly when HYPERDESMO®-PB-2K is used both for sealing and as the primary waterproofing layer, the application should follow a "wet-on-wet" method. Start by treating the joints and angles, then immediately proceed with the main waterproofing application while the HYPERDESMO®-PB-2K is still wet. This approach creates a seamless bond between layers, ensuring secure adhesion. The product's self-leveling properties and ability to be applied in full thickness with a single coat, using a notched trowel, squeegee, or roller, offer strong protection. This reduces the risk of leaks and guarantees the seamless bond that preserves the structural integrity and protection of the building.

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METHOD STATEMENT

BRIDGE DECK WATERPROOFING SYSTEM BASED ON THE HYPERDESMO®-PB-2K

Bridge decks require robust waterproofing to protect them from salts and water ingress. HYPERDESMO®-PB-2K is an innovative bitumen-extended polyurethane liquid-applied waterproofing membrane that produces a highly elastic and hydrophobic membrane with strong adhesion to surfaces. Its mechanical properties include high elongation, excellent flexibility, durability, and crack-bridging capabilities, making it ideal for heavy traffic and environmental conditions. The product has been certified for a 25-year expected working life by the EOTA organization under ETAG 005, now EAD 030350-00-0402.

GENERAL SYSTEM CONDITIONS

EQUIPMENT

For successful and safe applications specific tools and equipment are required. Each application might have different requirements in terms of application and protection equipment.

The following application equipment is at minimum required:

- Protective clothing: Protective overalls, masks, and gloves.
- Mixing equipment: 1KW slow speed drill, 400 or 500 rpm, and suitably sized mixing vessel.
- When stirring (or pigmenting) take care not to introduce air into the fluid, which may result in bubbling on the cured membrane. Stirring can either be done manually or with a low speed (300 rpm) mixer.
- Application equipment: Brush, roller, notched trowel, squeegee, rubber spatula, caulking gun, spatula. Specific airless spray machines can also be used. Caulking guns.
- Extra equipment: Digital scale or other measuring equipment

Products can be applied with a variety of equipment. Please choose the desired equipment and method of application according to your preferences and experience after consulting the proposed method of application on TDS of the Product.

DISCLAIMER: IMPORTANCE OF EQUIPMENT CLEANING

Use clean equipment when switching from different products, to prevent contamination between different products.

To maintain the integrity and efficacy of products, especially when working with liquid chemicals, it is crucial to use equipment that is thoroughly cleaned prior to use. Residual chemicals on containers, mixers, or other tools can initiate unintended chemical reactions or cause contamination **when switching between**

different products. Such occurrences may lead to product degradation, and project failure. Adherence to rigorous cleaning protocols is essential to prevent these risks. All users must strictly follow the equipment cleaning guidelines specified herein to ensure product performance and project success.

WORKING WEATHER CONDITIONS

- Application temperature range: 5°C to 35°C.
- Avoid dew point conditions during application.
- Relative humidity must be a maximum of 95% and substrate temperature must be at least 3°C above measured dew point temperatures.
- Do not apply under rain or snow.
- If temperature is above 35°C, the following guidelines are recommended:
    - Store materials in a cool environment, avoiding exposure to direct sunlight.
    - Keep application tools cool and dry.
    - Try to avoid application during the hottest hours of the day.

SURFACE PREPARATION

THE FOLLOWING FACTORS PRIOR TO APPLICATION SHOULD BE CHECKED:

✓ Substrate type and condition.

✓ Previous substrate mechanical preparations (sanding, polishing, shot blasting, or milling)

✓ Porosity of the surface

✓ Existing cracks or damaged areas.

In existing dilatation joints, remove old material and clean it.

✓ Existing membranes or coatings.

✓ The substrates must be both durable and cohesive. Check the substrate for contamination (oil, grease, etc.).

CONCRETE SUBSTRATES

Concrete substrates are used in the construction of roofs and foundations in modern architectural designs. However, because concrete is a porous surface exposed to different climatic conditions, it can absorb water which can then cause damage. Waterproofing is a basic need at almost all stages of construction work, in order to protect structures from the adverse effects of moisture and water ingress. In the case of exposed concrete roofs, it is vital to avoid any water leak in order to prevent any wear and corrosion of reinforcing steel in the concrete structure.

ALCHIMICA's high-quality concrete roof waterproofing and protection systems consist of quality products that hold excellent workability, durability, elasticity, and resistance to weather, chemical, mechanical, and thermal effects, as well as to UV radiation on either flat or sloping roofs.

Standard concrete substrate conditions

- Hardness: R28 = 15 MPa.
- Humidity: W < 10%.
- Temperature: 5-35 °C.
- Relative humidity: < 85%

PREPARATION

Proper preparation of the concrete substrate is essential for complete adhesion and successful application.

- New concrete or other cementitious substrates should be at least 28 days old.
- The substrate should be clean and free of loose particles, oil, and grease.
- The substrate should be free of any irregularities. If needed, it should be ground with the appropriate mechanical equipment in order to achieve a flat and sound surface.
- The substrate should be free of dust. Vacuum treatment or/ and high-pressure washing is recommended to remove dust.
- Primer application can be done over damp concrete too. But any ponding water should be removed before primer application.
- Metal details should be free of rust, oils, and old paints.
- The surface of PVC pipes should be treated with sandpaper in order to become rough.
- Surface irregularities can be filled with the appropriate HYGROSMART® products.
- For concrete levelling or sloping the appropriate HYGROSMART® products must be used.
- For more information about surface preparation please contact our technical assistance team.

MANDATORY DISCLAIMER BEFORE APPLICATION:

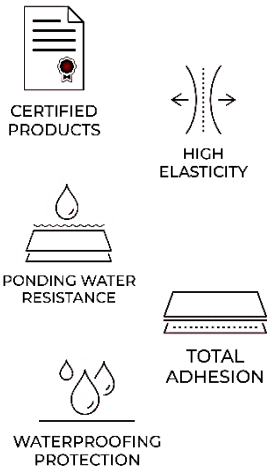
Testing the products to be used in this build-up application on the specific substrate and conducting mock-up tests are essential steps to ensure good adhesion. Mock-up tests replicate real-world conditions and provide a practical way to evaluate the performance of the products in situ. Pull-out tests conducted on these mock-ups help assess the bond strength between the products and the substrate, giving valuable insights into their adhesion capabilities.

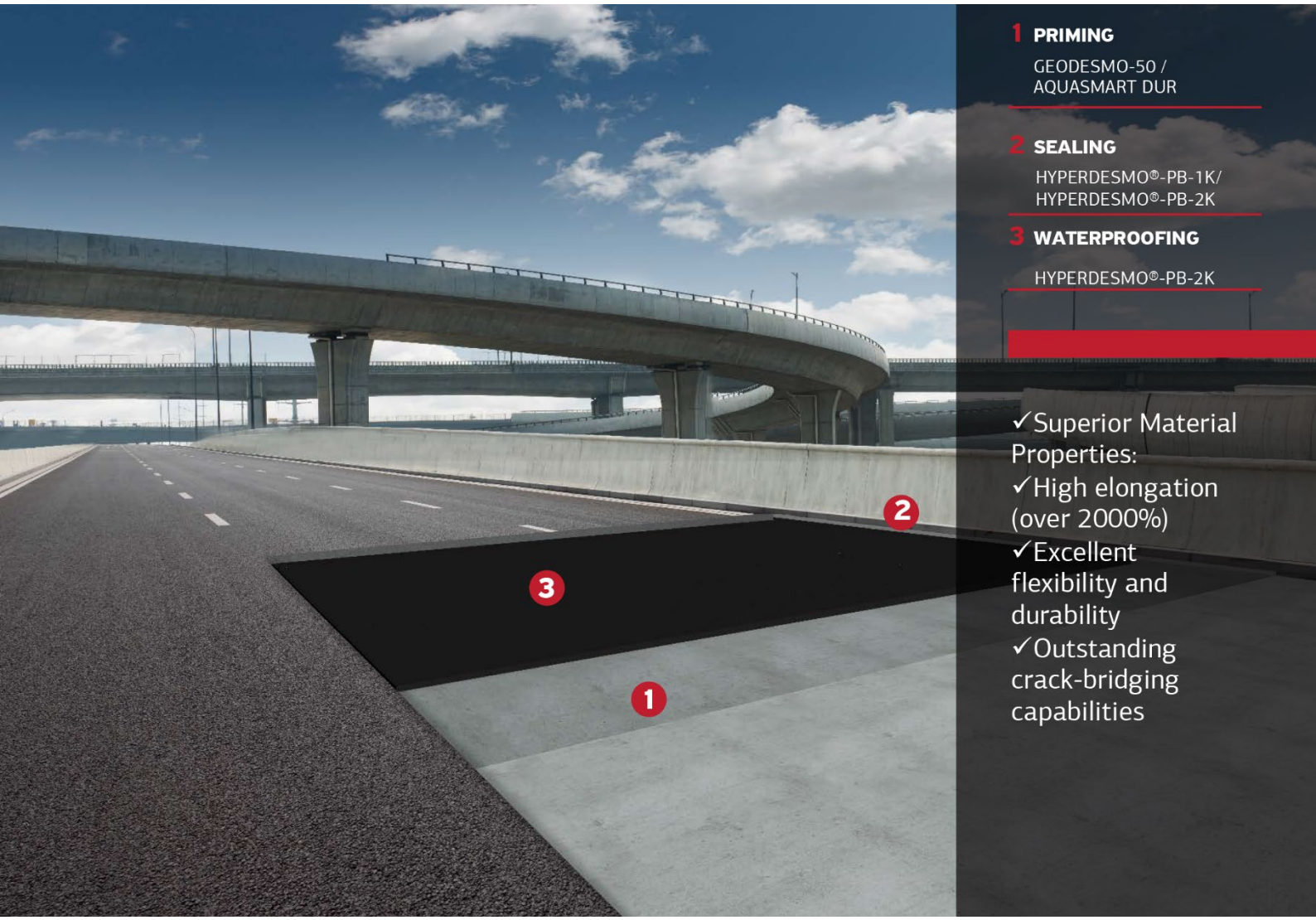
By testing the products on the specific substrate and conducting mock-up tests, any potential issues or concerns regarding adhesion can be identified and addressed before full-scale implementation. This proactive approach helps mitigate risks associated with poor adhesion, ensuring the long-term durability and effectiveness of the build-up system.

ALCHIMICA advises the thorough testing of the system to be performed prior to proceeding with full surface application in order to determine the suitability of the system based on project requirements.

SYSTEM PRODUCTS BUILD-UP

	PRODUCT	CONSUMPTION
1. PRIMER	AQUASMART-DUR/AQUADUR GEODESMO-50	200-400 gr/m² Subject to porosity
2. DETAILS TREATMENT	HYPERDESMO®-PB-1K HYPERDESMO®-PB-2K	Subject to project needs
3. MAIN MEMBRANE	HYPERDESMO-PB-2K	Total consumption: 2-2,5 kg/m²





SUBSTRATE PRIMING

PRIMER	AQUASMART-DUR / AQUADUR	GEODESMO-50
CONSUMPTION	- 150-200 gr/m^2 - water/humidity barrier – three coats with total cons. of 500-600 gr/m^2	- 150-200 gr/m^2 per coat - 100-500 gr/m^2, subject to substrate porosity.
COMPOSITION	WATER BASED EPOXY	SOLVENT-BASED PU
APPLICATIONS METHODS	brush, roller	brush, roller
TACK FREE TIME, @ 77 °F (25°C) & 55% RH	3-5 Hours	1-3 Hours
RECOAT TIME OF PRODUCT WHEN NEEDED	When the material has hardened to the degree where it can no longer be punctured by fingernail 6-24 Hours	1-3 Hours
NEXT COAT TIME (HYPERDESMO® MEMBRANE)	Once the colour on the current coat goes from milky white to transparent 6-24 Hours	2-24 Hours
RECOMMENDED DILUTION	10% WATER	X
ADDITIVES	X	X
COLORS	TRANSPARENT	TRANSPARENT
POT LIFE	1 Hour	X
COMPONENTS	TWO COMPONENTS	SINGLE COMPONENT

Choose a suitable primer for your project needs and requirements:

■GEODESMO-50 is a low viscosity, fast curing, polyurethane based primer. Its fast-curing profile makes it suitable for colder climates and unpredictable rain. It is a single component with excellent wetting, impregnation, and paint-over time properties. It is used for sealing and stabilizing substrates, ensuring good adhesion of the main coat. GEODESMO-50 is the faster curing version of MICROSEALER-50 and is ideal for extreme porosity in concrete surfaces where multiple coats of primer may be required. It can be used on both dry and wet concrete, even green concrete, as a primer and low-cost sealing solution, increasing substrate durability and adhesion strength. It can be used successfully on both porous and non-porous substrates.

GEODESMO-50 is dry to touch on cement after 1-2 hours. This dry-to-touch time allows the application of HYPERDESMO®-PB-2K after 2-24 hours, depending on conditions. The material also has good adhesion “memory”, allowing for application up to 48 hours after application.

Mixing: Mix the product well manually or using a low speed (300 rpm) mixer.

Application: You choose this primer if the concrete surface is extremely porous. GEODESMO-50 has a very fast curing profile (same-day primer), which allows it to be used more successfully in colder climates and when rain is not very predictable because 2-3 hours after this primer application, you can apply the main membrane. Although

the material has such a fast-curing profile, it has a good memory also. Application over it, is possible even the next day and up to 48 hours.

■ AQUASMART-DUR is a medium viscosity epoxy-based primer. It is a water-based epoxy primer and humidity barrier, suitable for application in closed spaces too. It is a two-component product with a 1:1 mixing ratio by volume with zero VOC, low odor, and non-flammability. It has a long pot life while being fast curing, easy to clean, and suitable for concrete and humid concrete too.

Mixing: Mix the two components well manually or using a low speed (300 rpm) mixer.

Application: You choose to apply this primer over a sound concrete surface. AQUASMART-DUR primer will create a slight film sealing the concrete and increasing the adhesion. After the AQUASMART-DUR application, you should wait at least 12 hours to apply the main membrane. The main membrane application has to be done within 48 hours after the AQUASMART-DUR application. AQUASMART-DUR is a completely solvent-free and low VOC primer. If a negative pressure humidity barrier is required, increase total consumption of AQUASMART-DUR at a minimum of 500 gr/m^2 in 3 successive layers (150-200gr/m^2 per coat)

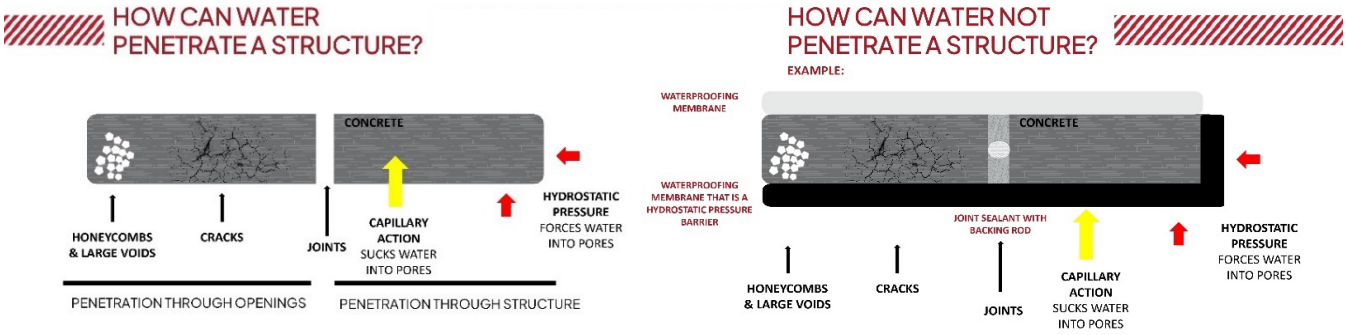
Notes:

1. If it rains after the primer and before the main coat application, you may need to apply one coat of primer again.
2. More primers are available for special cases, surfaces, and weather conditions.
3. For more information about surface preparation please contact our technical assistance team.

DILATATION JOINTS, INNER ANGLES & SMALL CRACKS

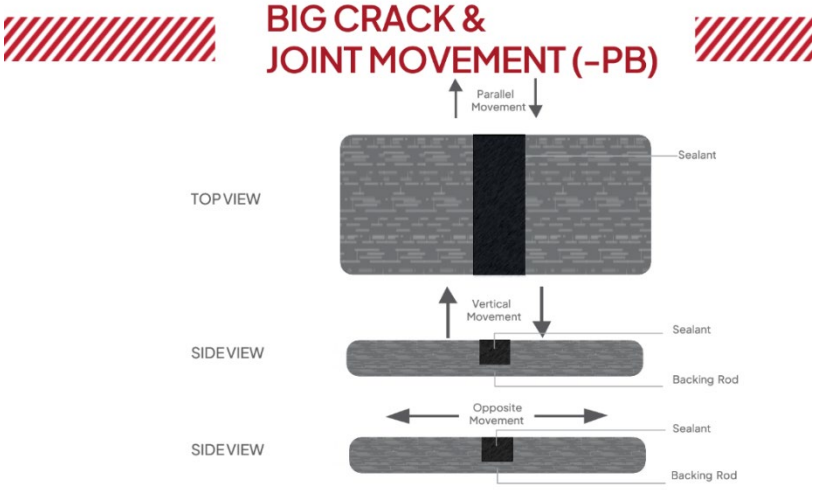
Concrete expansion joints are crucial elements in external foundation structures below ground, where they function to prevent cracking by absorbing stresses and allowing for soil movement. These joints facilitate independent movement and thermal expansion of the concrete, which is inherently non-elastic and prone to cracking. Strategically placed, these joints are designed to prevent structural failure. However, in below-ground applications, such structures with expansion joints are particularly vulnerable to water ingress. To combat this, robust waterproofing and the application of durable sealants are imperative to maintain joint flexibility and ensure proper functionality. It's essential to address all dilatation joints, inner angles, wall-floor connections, visible cracks, and drainage systems. Additionally, elements such as pipes and any mechanically installed equipment on the foundation need thorough waterproofing treatment to prevent leakage and protect the structural integrity.

Dilatation joints, large cracks and inner angles should be treated with HYPERDESMO®-PB-1K-FC, HYPERDESMO®-PB-Mono, HYPERDESMO®-PB-1K Or HYPERDESMO®-PB-2K.



Clean joints thoroughly, and ensure that no dust, oil, grease, wax contaminants, or silicone remains are present. While a primer may not always be necessary in detailstreatment, it becomes essential on porous or wet substrates to prevent air bubbles from forming due to rising substrate temperatures. Once the primer has cured, apply HYPERDESMO®-PB-1K or HYPERDESMO®-PB-2K. Apply HYPERDESMO®-PB-2K (or HYPERDESMO®-PB-1K) locally over any cracks larger than 1 mm before the main coat.

Choose one of the following methods, depending on your preference and needs:



FOR HORIZONTAL AND VERTICAL SURFACES: HYPERDESMO®-PB-1K

Teat joints, small cracks and details with HYPERDESMO®-PB-1K using a brush or small roller. For reinforcement then apply a piece of GEOTEXTILE (strips 0.17x100m, non-woven geotextile of 50-100gr/m^2) cut in proper size, wet on wet, for better protection from cracks in these specific points, if movement happens in the future. Immediately, cover the details areas with the sufficient consumption of HYPERDESMO®-PB-1K to cover completely the GEOTEXTILE. If an anti-slippery effect is required, natural dry quartz sand can be broadcasted over the fresh coat. Remove any excess sand with a vacuum. Alternatively, use HYPERDESMO®-PB-1K-FC or HYPERDESMO®-PB-Mono.

FOR HORIZONTAL SURFACES: HYPERDESMO®-PB-2K

Using HYPERDESMO®-PB-2K to treat joints, cracks, and intricate areas before applying the main waterproofing membrane is crucial for establishing a robust system. Ensure surfaces are clean and dry, then apply the product to these vulnerable spots. Its flexibility and strong adhesion make it ideal for sealing joints and detailed areas.

Follow with the main waterproofing layer while the initial application is still wet, ensuring a strong and seamless bond.

Utilize tools like notched trowels, squeegees or rollers to apply the product in a single coat. Its self-leveling properties make application smooth and efficient. For additional reinforcement, place GEOTEXTILE strips over the treated joints while wet, and cover fully with HYPERDESMO®-PB-2K for added protection against future movement.

MAIN WATERPROOFING

For large horizontal surfaces, HYPERDESMO®-PB-2K is an excellent choice due to its self-leveling properties, which enable easy application to achieve the required thickness in a single coat.

	HYPERDESMO®-PB-2K
CONSUMPTION	2-2,5 kg/m²
APPLICATION AREA	HORIZONTAL
APPLICATIONS METHODS	notched trowel, squeegee, roller
TACK FREE TIME, @ 77 ºF (25ºC) & 55% RH	1-2 Hours
APPLICATION OVER PREVIOUS COAT (PRIMER)	Depending on the primer curing time
RECOAT TIME	Only wet-on-wet
COLORS	BLACK
POT LIFE	30-45 min at 20 ºC.
COMPONENTS	TWO COMPONENT

HYPERDESMO®-PB-2K is a high-performance, two-component, bitumen-extended polyurethane waterproofing coating designed for versatile applications. It offers durability, flexibility, and exceptional adhesion, making it ideal particularly effective in challenging non-exposed environments. This two-component material is mixed 1:1 by volume and is based on pure elastomeric hydrophobic polyurethane resin extended with chemically polymerized virgin bitumen, forming a seamless, elastic membrane. It is easy to apply using a brush, roller, spatula, conforming to irregular surfaces and intricate details. Suitable for various substrates, including roofs, balconies, terraces, foundations, and bridge decks, HYPERDESMO®-PB-2K is recommended for use under asphalt overlays for additional waterproofing protection. It can be applied in a single coat with a total consumption of approximately 2.5 kg/m², achieving a coat thickness of about 2.5 mm.

HYPERDESMO®-PB-2K exhibits high elongation (over 2000%) and flexibility, along with excellent mechanical properties, including tensile and tear strength. It has a crack bridging capability over a wide range of temperatures, remaining flexible down to -40°C and shock resistant up to 200°C. Its outstanding chemical resistance includes protection against petrochemicals, salts, and chlorine ions. Additionally, HYPERDESMO®-PB-2K is highly hydrophobic and serves as an effective water vapor barrier with anti-root properties, making it suitable for green roofs and landscaping applications. Certified by EOTA with CE certification, it provides an expected working life of at least 25 years (W3). The product is stable up to 80°C and withstands thermal shocks up to 200°C, providing strong adhesion to many types of surfaces and ensuring reliable long-term protection.

HYPERDESMO®-PB-2K is ideal for heavy-duty applications and areas where bitumen asphaltic materials are used, performing well under overlays of asphalt or concrete without needing an adhesion layer. It is suitable for both new construction and renovation projects, and its strong adhesion and crack-bridging properties make it an effective joint sealant. This versatile, high-performance waterproofing solution meets stringent demands for durability,

flexibility, and resistance to various environmental factors, ensuring reliable and long-lasting protection for a wide range of waterproofing projects.

Mixing: Use a low speed (300 rpm) mixer. HYPERDESMO®-PB-2K is straightforward to mix and use. Both components mix easily on-site with a 1:1 ratio by volume, and unmixed components can be securely stored for future use. Mixed products Pot life is 30-45 minutes, ensuring smooth application.

Application: HYPERDESMO®-PB-2K does not need any special machinery for application, so professionals can apply it fairly easily in new bridge deck waterproofing projects as well as in renovation bridge waterproofing projects .For main waterproofing membrane on bridges, you apply HYPERDESMO®-PB-2K in one single coat of total consumption +/- 2.5 kg/m^2 (total coat thickness+/- 2.2 mm).

- *HYPERDESMO®-PB-2K liquid applied bridge deck waterproofing kit is not intended to receive direct vehicular traffic in service and in this case will always be used beneath overlays of asphalt (low mastic asphalt, a coarse bituminous mixture or concrete) which may have a protective character and/or additional waterproofing function.*
- *Flashing Points treatment: After applying HYPERDESMO®-PB-2K over the horizontal areas, you must treat flashing points, vertical parts and other details while it's still wet with HYPERDESMO®-PB-2K, by overlapping on horizontal HYPERDESMO®-PB-2K by 10cm.*
- *Clean tools and equipment first with a paper towel and then using SOLVENT-01.*

TYPES OF APPLICATIONS

SINGLE COAT APPLICATION	HYPERDESMO®-PB-2K is applied in only 1 single coat, with total minimum consumption of 2kg/m^2 over the total horizontal area. Due to its two components' reaction curing process, it can be applied at the desired total thickness with just one single coat. *Note:* if applying in layers, ensure each subsequent layer is applied while the previous layer is still wet to secure strong adhesion between them.

CLEANING

Clean tools and equipment first with paper towels. Tools and equipment should be cleaned immediately using SOLVENT-01 (or water for water-based materials). Rollers will not be re-usable.

REPAIR AND OVERLAPS PROCESSES

USE, MAINTENANCE AND REPAIR OF THE WORKS

For the use, maintenance, and repair of HYPERDESMO®-PB-2K waterproofing on bridges, it is crucial to follow specific guidelines. In bridges with deteriorated areas of the waterproofing layers, repairs must be initiated by removing all the deteriorated layers completely. Once the damaged layers are removed, the new HYPERDESMO®-PB-2K product should be applied according to the installation instructions provided. When applying the new coats, it is essential to ensure that they overlap at least 3 cm onto the non-deteriorated coat to secure a seamless and effective waterproofing barrier. For additional details or technical support, please contact ALCHIMICA's technical assistance department.

LOCAL REPAIRS

One of the benefits of ALCHIMICA's liquid applied waterproofing systems is the ease of reparations to be carried out when spot problems occur. Nevertheless, it is always recommended to protect the membrane by ensuring that there are no foreign objects, sharp and heavy ones mostly, that they could fall and damage the membrane, to the best possible extent.

In cases where the membrane repair is caused by an accident or assembly procedures that are not covered by the installation, the following procedures must be followed:

- Grind the affected areas or remove the affected area and/or damaged surface by cutting.
- Sanding this area for overlapping, extending it about 20-30 cm around the perimeter.
- Clean the surface around the slit at a perimeter of 20-30cm depending on the repair length. Clean up thoroughly and remove all contaminants from the elements, such as dust or chippings, by mopping and/or vacuuming.
- If necessary, solvent wipe the area with a SOLVENT-01. Allow it to dry completely. The surface must be completely dry before the next steps.
- Apply a thin layer of primer at a consumption of 50-60gr/m^2 by overlapping the membrane at the prementioned perimeter.
- Fill the area by using HYPERDESMO®-PB-1K, tool it to form a smooth patch.
- In severe situations, the coating may have to be totally removed prior to system re-application.

OVERLAPS

In cases where the recoat time (24-48 hours) has been exceeded, the waiting time between jobs has been extended, or unexpected weather conditions (rain) have stopped the application, proceed as follows:
The HYPERDESMO®-PB SURFACE should be clean and free of loose particles and dust. If it rains after the first main coat application, you may need to solvent wipe the area and apply one thin coat of primer again.

- OPTION 1: clean the area and apply primer MICROSEALER-50 at the consumption of 50-80gr/m^2 in order to secure adhesion. After 6-12h you can apply the next coat of HYPERDESMO®-PB
- OPTION 2: solvent wipe the whole area with SOLVENT-01, let it dry, and then apply HYPERDESMO®-PB.

When overlapping layers of HYPERDESMO®-PB-2K, ensure that the application is done while the existing layer is still tacky, within a maximum window of 2 hours. This will ensure a secure bond between layers for a seamless, effective waterproofing system.

REFERENCES

ALCHIMICA throughout the years, has a collection of completed projects from around the world. On our website, you can find where we have provided a variety of solutions and expert know-how, in case studies ranging from the smallest roof to the largest project.

www.alchimica.com

https://alchimicaprojects.com/

ALL OVER THE WORLD

HEALTH AND SAFETY

The system proposal contains volatile flammable solvents. Apply in well-ventilated, no-smoking areas, away from naked flames. In closed spaces use ventilators and carbon-active masks. Keep in mind that solvents are heavier than air, so they float near the floor. The MSDS (Material Safety Data Sheet) of the products are available on request.

This handling safety advice is required for the implementation procedure as well as in the pre- and post-exposure to the loading machinery.

- Protect your lungs by using an air-purifying respirator when handling or spraying.
- Use rubber gloves to protect your skin and remove them promptly after contamination. Wear clean undergarments. After work and before eating, drinking, or smoking, thoroughly wash your hands with soap and water.
- Wear safety goggles to protect your eyes and face from splashes and airborne particles.
- Waste generation should be avoided or reduced.
- Incinerate under well-controlled conditions in line with local and national rules and regulations.
- Re-occupancy of the work site without respiratory equipment is limited to 24 hours if proper ventilation for the sprayed area is provided.
- Contractors and applicators must follow all applicable and necessary storage and safety regulations.
- In any case, review the system's material and safety data sheets.

PRECAUTIONS AND VARIATIONS.

The purchaser must determine the suitability of the products for the intended use and assume all related liabilities and risks. This information, recommendations, and any additional technical advice are given in good faith and are based on ALCHIMICA's present knowledge and experience of the products when properly stored, handled, and applied under normal conditions according to ALCHIMICA's recommendations.

However, ALCHIMICA assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third-party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. ALCHIMICA reserves the right to change at any time the properties of its products. The purchaser of the product(s) must test the product(s) suitability for the intended application and purpose before proceeding with a full application of the product(s).

The performance of the products build up described herein should be verified by testing and carried out by qualified experts.

NOTE: This method statement is offered by ALCHIMICA as a 'summary proposal' for **BRIDGE DECK WATERPROOFING SYSTEM BASED ON HYPERDESMO®-PB-2K**. For projects' particularities and more precise technical support, please contact ALCHIMICA at: alchimica@alchimica.com

Please consult the above-referred products' technical data sheets (TDS) and safety data sheets (SDS). Under any circumstances, ALCHIMICA does not assume any responsibility for the performance of the waterproofing system given the conceptual flaws of the existing build-up. Imperative for the performance of the system is the correct cleaning, inspection, and maintenance of the waterproofing system. For projects' particularities and more precise technical support, please contact ALCHIMICA at: alchimica@alchimica.com

Where alternative systems are to be used, these must be submitted to ALCHIMICA for approval. ALCHIMICA will not accept responsibility or liability for variations to the above under any other condition.

LEGAL NOTES AND CITATION

- This is a technical document, without legal value.
- No liability or warranty of product performance is created by this document.
- All the information included is collected from materials TDS, DoP, and certificates available at the moment of publishing.
- ALCHIMICA S.A. does not guarantee the accuracy of its instructions or

specifications, nor do we assume any responsibility for damages resulting from the use or reference of the information provided. The company reserves the right to change the properties of its products at any time, and the current version of the technical data sheet is available on the website www.alchimica.com/en

- Appropriate Technical Documentation and/or Specific Technical Documentation: The performance of the products identified in the DoP files conform with the set of declared performances. This declaration of performance is issued in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer.

- It is recommended to check the TDS and MSDS of all the materials before use and application.

- The use of these materials and products is beyond the scope and control of ALCHIMICA.
- Proper application is the responsibility of the Buyer and/or Contractor.

- All the above written and provided is subject to the terms and conditions of sale and marketing of ALCHIMICA S.A.

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