

TECHNICAL BOARD FOR CONSTRUCTION

Technical Agreement 004-07/964-2007

Waterproofing structures ARMEX BRIDGE for bridges, viaducts and road passages

PRODUCER:

SC ARCON SRL

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**DEVELOPER OF THE TECHNICAL:
AGREEMENT**

**RESEARCH INSTITUTE IN TRANSPORTS-
SC INCERTRANS SA**

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**SPECIALIZED GROUP NO.7: Roads, Bridges,
Ports and Airports**

OWNER:

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The present Technical Agreement is valid until 25.07.2010 only together with the TECHNICAL NOTIFICATION of the National Committee for Technical Agreement in Buildings and does not substitute the quality certificate.

TECHNICAL BOARD FOR CONSTRUCTION

The specialized group no.7 “Roads, Bridges, Ports and Airports” from SC INCERTRANS SA analyzing the request documentation for technical agreement, presented by SC ARCON SRL and registered under no. 742 from 14.05.2007 relating to the product “Waterproofing structures type ARMEX BRIDGE for bridges, viaducts and road passages” manufactured by SC ARCON S.R.L., remits the present Technical Agreement no. 004-07/964-2007, in accordance with the technical Romanian documents related field of reference.

1. Brief definition

1.1. Brief description

The waterproofing structure ARMEX BRIDGE is obtained from the following products:

- *waterproofing membrane ARMEX BRIDGE;*
- *bituminous primer PRIMERTEC.*

The bituminous membrane ARMEX BRIDGE is made of distilled bitumen modified with plastomer polymers (APP) and polyester reinforcement type “spunbond”.

The membrane is protected on the upper face with sand or non woven polypropylene mat (TNT). The lower face of the membrane is protected by a polyethylene burn-off film which prevents the melting of the membrane.

The bituminous membrane ARMEX BRIDGE has a thickness of 4 mm and is applied by using heat (gas torch) on the bituminous primer PRIMERTEC layer which waterproofs and makes compatible the support layer. The bituminous primer PRIMERTEC is black fluid product based on oxidized bitumen and solvents, and facilitates the adherence of membrane to the support layer.

1.2. Identification of products

The bituminous membrane ARMEX BRIDGE is delivered in rolls with weight of 46.5 kg, having length of 10 m and width of 1.0 m.

The bituminous primer PRIMERTEC is a black liquid and is delivered in airtight drums.

Each product is identified by the quality certificate and by the label having the following inscriptions:

- *commercial product name;*
- *date of manufacture;*
- *warranty period;*
- *transport and storage conditions;*
- *batch number;*
- *size and weight.*

2. Technical Agreement

2.1. Domains accepted for use in construction

The waterproofing structure ARMEX BRIDGE is used to:

- Waterproofing of the bridges, viaducts, road passages and new railways made from concrete, reinforced concrete, precompressed concrete;
- restoring damaged waterproofing of bridges, viaducts, road passages and existing railways.

2.2. Appreciations on product

2.2.1. Ability of operation in construction

The waterproofing structure ARMEX BRIDGE is according to the quality requirements from Law no.10 dated 1995, as follows:

- strength and stability – **the waterproofing structure ARMEX BRIDGE** contribute to increase sustainability of works due its fundamental characteristics: tensile strength (longitudinal = 1080 N/5cm and transversal = 830 N/5cm, static puncture resistance (unperforated at 30 kg, flow resistance (+150⁰C, impermeability).
- safety in operation – **the waterproofing structure ARMEX BRIDGE** it's safe due to membrane's adherence at support layer (1.07 N/mm²). The waterproofing structure ARMEX BRIDGE has a good behavior both during the execution of sitting works of membrane (at direct building site traffic on the applied membrane's surface to the vertical pressures, braking, accelerations of movement which enables the movement of low-speed transport equipments, continuously laying (spreading) and compaction of the asphalt) and during operation of the bridge.
- fire safety – **the waterproofing structure ARMEX BRIDGE** makes part of combustibility class C2, according to Norm P 118.
- hygiene, health, protection and restoration of environment – **the waterproofing structure ARMEX BRIDGE** does not influence this requirement.
- Thermo waterproof insulation and energy saving:
- **the waterproofing structure ARMEX BRIDGE** ensure impermeability to water of the protected surface.
- Protection against noise:
- **the waterproofing structure ARMEX BRIDGE** applied does not influence this requirement.

2.2.2. Durability and maintenance

The durability of waterproofing works with **the waterproofing structure ARMEX BRIDGE** is 20 years, respecting strictly the technology for application.

Being used for waterproofing constructions (hidden works) is not possible and is not recommended its maintenance.

2.2.3. Manufacture and control

Manufacture of membrane ARMEX BRIDGE and bituminous primer PRIMERTEC is realized by **SC ARCON SRL** certified in terms of quality by EN ISO 9001:2000 and CE mark. Achievement of quality is made by continuous checking of production in their

own quality checking laboratories and through supervising continuously the manufacturing process.

2.2.4. Application

Application of waterproofing products is made in accordance with the operation project endorsed by supervisors of certified projects, with the technology recommended by the producer as well as specialized and certified unities for these works.

Application of waterproofing membrane on a continuous support is made by sticking with torch (thermo welding) all over the surface.

Application of the **waterproofing structure ARMEX BRIDGE** is made following the main stages:

- Preparation of concrete support surface. The support surface must be dry, smooth, without fats, moisture, without non-adherent particles or cracks;
- All sharp edges which are outside the surface must be removed and the top edges will be rounded in order to avoid the perforation effect of membrane;
- The surface must be cleaned of dust and after that is applied in continuous pellicle the bituminous primer PRIMERTEC, in the proportion of 0.2-0.5 l², depending on the kind of support.
- For complete drying of the primer layer (minim. 12 hours) the bituminous membrane rolls are unrolled; the thermo-welding side of membrane is the protected side with a polyethylene film and in contact with the flame it melts and disappears, signaling that the material was heated enough in order to make a good adherence.
- The membranes are overlapping longitudinal approx. 10 cm, the marked area on the roll and 15 cm transversal.
- The ARMEX BRIDGE membrane sticking on the support layer is made by using heat (160⁰C), by heating it with the flame and pressing it immediately and uniform.
- Over this waterproofing structure can be directly continuously laid (spread) the asphalt mixture or poured asphalt, provided that the mixture is at 180⁰C.

2.3. Terms of technical prescriptions

2.3.1. Design conditions

The design conditions of the **waterproofing structure ARMEX BRIDGE** belong to producer and are guaranteed by that through the constitutive materials physical-chemical characteristics (presented in tables no.1 and 2) by quality certificates accompanying the deliveries of final product.

Table no. 1

No.	Technical characteristics Bituminous membrane ARMEX BRIDGE	UM	Values according to Technical Sheet	Accepted (Romanian) Norms Conditions ind AND 577-2002
1.	Thickness	mm	4±5%	-
2.	Tensile strength on direction:	N/5cm		

	- longitudinal - transversal		1300±20% 1000±20%	≥800 ≥800
3.	Ultimate elongation on direction: - longitudinal - transversal	%	50±20% 50±20%	>40 >40
4.	Cold flexibility on metal mandrel Φ 50 mm	°C	-10±2	Without cracks at -10°C
5.	Flow resistance	°C	min. +150	min. +120
6.	Static puncture resistance	kg	min. 30	-
7.	Water tightness	Kpa	min. 60	-

Table no. 2

No.	Technical characteristics Bituminous primer PRIMERTEC	UM	Values according to Technical Sheet
1.	Density	g/cm ³	1.13±0.06
2.	Un-volatile substance content	%	48±5
3.	Viscosity at 25°C	sec	16±3
4.	Drying time at 25°C superficial	minutes	Approx 30
5.	Drying time at 25°C whole pellicle	hours	Approx 12

2.3.2. Manufacturing conditions

The water sealing products (the bituminous membrane ARMEX BRIDGE and the bituminous primer PRIMERTEC) are produced by the company SC ARCON SRL, certified in compliance with EN ISO 9001.

2.3.3. Delivery conditions

At delivery, the product must be accompanied by the Declaration of Conformity and Quality Certificate, issued for the respective batch. Also at delivery, the product must be accompanied by instructions for use.

2.3.4. Applying conditions

The applying must be done in favorable atmospheric conditions, through the fact that the water from the rainfall, generally the excessive humidity and the temperatures below +5°C can reduce the adhesion to the substrate.

The support surface must be dry, smooth, without cracks, dust and the concrete must be aged minimum 28 days after its apply. This surface must be cleaned with brushes and blown with compressed air.

The application of the membrane is done only after the complete drying of the bituminous primer between +5°C and +35°C. The special details of sealings (water outlets, perforations, connections) are solved according to the technical prescriptions or according to the project issued for this purpose.

Specific consumptions:

- 0,2 – 0,5 l/m² bituminous primer;

- 1,15 m²/ m² membrane;
- 1 liquefied gas cylinder for 50-80 m².

Conclusions – Global assessment

- The use of the “**waterproofing structure ARMEX BRIDGE for roads, viaducts and road passages**”, for the accepted field of use, is **considered favorable**, in compliance with the specific norms in Romania, if are respected the provisions of this agreement

Conditions

- The quality of the product and the manufacturing method were inspected and found satisfactory and must be maintained at this standard at the entire period of validity of this agreement
- By issuing this agreement, the TECHNICAL BOARD FOR CONSTRUCTIONS does not involve into the existence and/or the absence of the legal rights of the company for marketing, applying or maintenance operating the product.
- Any recommendation relative to the use in safe conditions of this product, procedure or equipment, which is content or refers in this technical agreement, represent minimal requirement necessary for its application.
- INCERTRANS BUCURESTI is responsible for the accuracy of the submitted data in the Technical Agreement and for the tests that were the basis of these data. The Agreement does not exonerate the suppliers and/or the users of their responsibilities under the legal regulations in force.
- The inspection of the usage capacity maintenance of the product will be done by half-yearly laboratory tests regarding the technical characteristics (shown in table no. 3).
- The activities included into the program and their method of achieve will respect the normative acts and the technical regulations in force.
- INCERTRANS BUCURESTI will inform the TECHNICAL BOARD FOR CONSTRUCTIONS about the test's results, and if these not prove the usage capacity maintenance, will inform the BOARD to suspend the technical agreement.
- The suspending of the agreement is started also in the event of non-compliance of the usage capacity and manufacturing conditions, ascertained by inspections of the qualified persons.
- If the owner of the agreement does not comply with these regulations, the suspending process of the agreement will be started.

Validity: 25.07.2010

The extension of validity or the revision of the present technical agreement shall be done with at least 3 months before the date of expiry. In case of non extension of the validity, the agreement is canceled by itself

For specialized group no. 7
President GS 7
Ing. Razvan NOVASELIV

GENERAL MANAGER
Ing. Daniel George COSTACHE

3. Complementary remarks of specialized group no. 7
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- *The specialized group no. 7 from INCERTRANS Bucharest assess that **the waterproofing system ARMEX BRIDGE** used in the accepted fields of use, will have a good behavior in exploitation;*
- *The technical characteristics of the membrane and the quality assurance system allow the achievement of appropriate insulation works;*
- *In order to inspect the behavior at the working sites, in Romanian's conditions, checking shall be made at minimum 3 work sites.*
- *For the hidden works, minutes or protocols shall be concluded prior the installations of the waterproof system.*
- *The synthesis of the test reports is presented in the following table :*

No	Characteristics	M.U.	Technical conditions Technical Data Sheet	AND 577- 2002 requirements	Obtained values	Method of determination	Laboratory
Physical-mechanical characteristics – bituminous primer PRIMERTEC							
1	Density	g/cm ³	1,13 ± 0,06	-	1,156	STAS 35	INCERTRANS BUCURESTI
2	Unvolatile, dry matter	%	48 ± 5	-	47	SR EN ISO 3251	
3	Viscosity at 25 ^o C	sec	16 ± 3	-	18	STAS 8877	
4	Drying time at 25 ^o C, superficial	minutes	Approx. 30		28	SR EN ISO 1517	
Physical-mechanical characteristics – bituminous membrane ARMEX BRIDGE							
1	Thickness	mm	4 ± 5%	-	4,19	STAS 588/68	INCERTRANS BUCURESTI
2	Tensile strength • longitudinal • transversal	N/5cm	1300 ± 20% 1000 ± 20%	≥800 ≥800	1080 830	SR 137	
3	Elongation • longitudinal • transversal	%	50 ± 20% 50 ± 20%	≥40 ≥40	83,6 107,4		
4	Cold flexibility on Φ50mm metallic mandrel	°C	-10 ± 2	no cracks at -10 ^o C	no cracks at -10 ^o C		
5	Heat resistance (2 hours at 150 ^o C)	°C	-	Min. 120	Stable, without movements		
6	Water tightness (72 hours)	-	watertight	Watertight	watertight		
7	Static loading	kg	min. 30	250N with Φ10mm ball	L4 (unperforated at 30kg)		
8	Tear strength • longitudinal • transversal	N	-	>200	250 230		
Physical-mechanical characteristics – waterproofing system (PRIMERTEC bituminous primer + bituminous membrane ARMEX BRIDGE)							
9	Bonding resistance (adherence to substrate)	N/mm ²	-	≥0,5 at 23 ^o C	1,07	NF P 98-282	

4. Annex

Relevant excerpt from the protocol of the no. 7 “Roads, Bridges, Ports and Airport” specialized group’s meeting

- *The applicant for the Technical Agreement, the company SC ARCON SRL has hand over to SC INCERTRANS SA the following documents :*
 - *the request for the technical agreement*
 - *the preliminary technical dossier, containing : the Technical Data Sheet for the membrane, the technical Data Sheet for the bituminous primer, instructions for put in work, ISO 9001 certificate*
- *The issued Technical Agreement contains the chapters in compliance with the TECHNICAL BOARD FOR CONSTRUCTIONS and was issued in compliance with HG no. 766/1997, for which the protocol no__ from ___ is issued.*
- *The technical dossier of the Agreement contains ___ pages and is integral part of the present Technical Agreement.*

Rapporteur for specialized group no. 7
eng. Razvan NOVASELIV

Members for specialized group no. 7
President : eng. Razvan NOVASELIV

Members : eng. Monica SANDU – AT responsible
eng. Costel GHEORGHE
eng. Nicoleta IONESCU
eng. Brandusa COCU

ROMANIA
TECHNICAL BOARD FOR CONSTRUCTION
TECHNICAL NOTIFICATION

On the base of the protocol no. **3-38** dated 10.08.2007 of the Technical Committee no.3 for technical agreements in constructions:

THE TECHNICAL BOARD FOR CONSTRUCTION
APPROVED FAVORABLE:

the technical agreement no. **004-07/964-2007**, developed by **INCERTRANS BUCURESTI**, for **WATERPROOFING STRUCTURE TYPE ARMEX BRIDGE FOR BRIDGES, VIADUCTS AND ROAD PASSAGES**, produced by **SC ARCON SRL SF.GHEORGHE**.

The present **TECHNICAL NOTIFICATION** is valid until **10.08.2009** and may be extended if the owner proves (demonstrates) to maintain the using ability of the technical agreement's subject, in accordance with the provisions mentioned at chapter "conditions" from the technical agreement.

The technical agreement is valid until **25.07.2010**, for the owner, producer and distributors from the annex at present agreement and does not substitute the quality certificate.

PRESIDENT,
Marin CRISTEA

Extended until.....	PRESIDENT	
Extended until.....	PRESIDENT	

SECRETARIATE,
THE TECHNICAL BOARD FOR CONSTRUCTION

Manager,
Radu Ioan Andronescu