



ARENA
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LLC "ARENA Waterproofing Manufacturing Plant"
MANUFACTURER OF WATERPROOFING MIXTURES ARENA FORCE®

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WATERPROOFING, PROTECTION AND REPAIR OF CONCRETE

TECHNICAL RULES for waterproofing and corrosion protection of monolithic and precast concrete and reinforced concrete constructions

Yekaterinburg 2018



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1. INTRODUCTION

The Technical Rules are a practical guide for the design, waterproofing, corrosion protection and repair of monolithic and precast concrete and reinforced concrete constructions. The Technical Rules have been developed taking into account the latest scientific achievements in the field of waterproofing, protection and repair of building concrete and reinforced concrete constructions. These Technical Rules include the following articles:

- Description and manual for waterproofing materials of the ARENAFORCE brand;
- Description and manual for repair materials of the ARENAFORCE brand;
- Description and manual for special materials of the ARENAFORCE brand;
- Description and manual for concrete compounds of the ARENAFORCE brand.



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2. Regulations and technical documentation

For the drawing up of these Rules the following regulations and technical documentation were used:

- GOST 10060-2012 "Concretes. Methods for the cold-resisting quality measurement. General requirements";
- GOST 10180-2012 "Concretes. Methods for the strength measurement by the companion specimens";
- GOST 10181-2014 "Ready-mix concrete. Test methods";
- GOST 12730.0-78 "Concretes. General requirements for methods of measurement of the density, humidity, water saturation, porosity and waterproofing qualities";
- GOST 12730.3-78 "Concretes. Methods for the water saturation measurement;
- GOST 12730.5-84 "Concretes. Methods for the waterproofing qualities measurement";
- GOST 22690-2015 "Concretes. The strength measurement by mechanical methods of non-destructive inspection";
- GOST 28570-90 "Concretes. Methods for the strength measurement by the specimens sampled from the constructions";
- GOST 310.3-76 "Cements. Methods for measurement of the standard consistency, setting time and uniformity of the volume change";
- GOST 310.4-81 "Cements. Methods for measurement of the modulus of rupture in bending and compressive resistance";
- GOST 31189-2015 "Dry mix mortars. Classification";
- GOST 5802-86 "Building mortars. Test methods";
- GOST P 56703-2015 "Dry waterproofing penetrating capillary mix mortars on an asphaltic binder. Technical conditions";
- GOST 7473-2010 "Ready-mix concrete. Technical conditions";
- GOST 8735-88 "Sand for building and construction works. Test methods";
- CS 28.13330.2012 "Corrosion protection of building constructions. Revised edition of SNiP 2.03.11-85";
- CS 63.13330.2012 "SNiP 52-01-2003. Concrete and reinforced concrete constructions. Revised edition of SNiP 2.03.01-84";
- CS 70.13330.2012 "The code specification. Bearing and enclosing constructions. Revised edition of SNiP 3.03.01-87";
- SNiP 3.04.01-87 "Insulating and finishing coatings";
- SNiP 12-03-2001 "Construction safety requirements. Part 1. General requirements";
- SNiP 12-04-2002 "Construction safety requirements. Part 2. Construction operations";
- PS 77956721-001-2017 "Description and application technology for waterproofing materials of the "ARENAFORCE" brand";
- TS 23.64.10-001-35155041-2017 "Waterproofing materials of the "ARENAFORCE" brand"



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3. The Technical Rules purpose

These Technical Rules are used at the design and works aimed at improving the waterproofing properties and corrosion resistance of concrete and reinforced concrete products and constructions, industrial and civil buildings, transportation facilities, hydraulic engineering facilities, as well as repair of concrete and reinforced concrete constructions.

4. Brief overview of the materials

The products of the ARENAFORCE brand are a group of materials used for solving comprehensive problems concerning waterproofing, protection and repair of concrete and reinforced concrete constructions.

- **ARENAInMixPN** is a waterproofing material of deep penetration, used to significantly improve the concrete waterproofing qualities and to prevent the moisture loss through the concrete capillaries and pores.

- **ARENAPolyElastPE** is a waterproofing material that forms an elastic waterproof coating on the surface, it's used for waterproofing of concrete, brick and stone surfaces from the direct exposure to water, as well as wooden, metal, asphalt and gypsum plasterboard sub-bases.

- **ARENASeamMasterPT** is a waterproofing material used for waterproofing of seams, cracks, joints, communications inlets and abutting joints.

- **ARENAPlugMixPW** is a waterproofing material used for elimination of active leaks.

- **ARENAEcoMix** is an admixture for concrete used for improvement of its waterproofing qualities and cold-resisting quality.

- **ARENABiMixNS/PC** is a complex admixture for concrete, used for enhancement of a number of properties, such as strength, crack resistance, waterproofing qualities, cold-resisting quality, cement hardening time and Flowability.

- **ARENATopSL** is a membrane-forming impregnating compound for concrete.

- **ARENADryDeform** is a hydrophile braid intended for airtight packing of construction joints at concrete casting of new and existing constructions.

- **ARENARepairMasterR300** is a thixotropic makeup for the repair of concrete and reinforced concrete constructions.

- **ARENARepairMasterR500** is a high-grade makeup for the repair of concrete and reinforced concrete constructions.

- **ARENAFastMixHot30** is a fast-hardening, self-heating, all-purpose compound, it is used to solve comprehensive problems at freezing temperatures.

- **ARENAFastMixEasyHot8** is a fast-hardening, self-heating, all-purpose compound, it is used to solve comprehensive problems at positive temperatures.



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5. Brief manufacturer's profile

The production of a wide range of high-grade mix mortars under the ARENA FORCE brand is the main line of work of the multibusiness company LLC "ARENA Waterproofing Manufacturing Plant". We started with the extraction, processing and supply of quartz sand to building contractors 7 years ago, nowadays our plant succeeded in the asserting itself on the market and establish fruitful cooperation with a number of leading companies in the Russian building industry. In the course of the resource base enhancement and additional production facilities commissioning we reached a new next level by offering mix mortars of the ARENA FORCE brand to our partners. Cement-based waterproofing and outstanding by its properties ARENA BiMix NS/PC admixture for concrete, strong and frost-resistant concrete repair compounds, floor mixes, a range of high-tech adhesives for tiles and porcelain stoneware, various types of plaster - all of our new products have successfully passed the testing period and are approved by experts.

Currently the mix mortars of the "ARENA FORCE" brand are used by building companies in many regions of Russia. Engineering services of the company continue to improve the range, develop new brands of compounds and technical conditions for their production. Together with the quality department the developers carry out the engineering support of the manufacturing process and are responsible for the products compliance with current standards. We develop a dealer network and value long-term partnership. Each of our trade and production partners can count on our highest quality of products and maximum attention to the processing and packaging of their orders. The perfect warehousing facilities and cooperation with the best transport companies allows to ship even very large batches within the shortest possible timeframe. We guarantee the perfect quality, efficiency and competitive price of all products in the range of the ARENA FORCE mix mortars brand. We are looking forward for the long-term and mutually beneficial cooperation!

6. Materials description and purpose

6.1 ARENA InMix PN

Description: dry waterproofing mix mortar of penetrating type, it consists of Portland cement, fractionated quartz sand and complex ionogenic soluble admixture capable to penetrate into the concrete pores and capillaries and come into chemical interaction with the products of the Portland cement hydration in concrete.

Purpose: the dry mix mortar is used for waterproofing of the concrete and reinforced concrete surfaces, the capillary moisture leakage cut-off and for the concrete corrosion resistance improvement by the pores and capillaries filling with hardly soluble compounds.

Also, as an auxiliary material, **ARENAInMixPN** is used for waterproofing of seams, joints, abutting joints and cracks in combination with the **ARENASeamMasterPT** material, as well as for elimination of the pressure leaks in combination with the **ARENAPlugMixPW** material.

Particularities: the material is applied to a wetted surface on either side (external or internal) regardless of water pressure (direct or reverse). The use of the **ARENAInMixPN** material makes it possible to prevent the penetration of water through the concrete construction with cracks having the opening up to 0.4 mm. The use of the material makes it possible to effectively protect the concrete from aggressive environments.



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6.2 ARENA PolyElast PE

Description: the dry waterproofing upperbound coating elastic mix mortar, it consists of a mixture of mineral and polymeric binders, as well as fractionated quartz sand. After hardening - a thin multi-layer elastic waterproofing coating with a thickness of 2-5 mm, it is applied on the surface of an insulated construction with a brush or spatula.

Purpose: The dry mix mortar is used for waterproofing of concrete, stone and brick constructions, as well as wood, metal, asphalt and gypsum plasterboard by creating waterproof layers on the surface to be insulated.

Particularities: the material is applied to a wetted surface. It forms an elastic membrane with high durability and crack resistance during hardening. The material can be applied manually or by mechanical means.

6.3 ARENA SeamMaster PT

Description: dry waterproofing upperbound mix mortar with compensated shrinkage, it consists of Portland cement, fractionated quartz sand and a complex of admixtures intended to compensate for shrinkage, adhesion improvement and waterproofing qualities of mix mortar. Also in its composition it contains reinforcing fibers to improve the crack resistance of the solution.

Purpose: dry mix mortar is used for waterproofing of cracks, seams, communications inlets, abutting joints due to high waterproofing qualities and lack of shrinkage. It has high adhesion to concrete.

Particularities: the material is applied to a wetted surface. It has fast setting times and also does not contain chlorides and sulphates, which can provoke the corrosion of reinforcement and concrete.

6.4 ARENA PlugMix PW

Description: dry upperbound mix mortar for active leaks stopping, it consists of a mixture of alumina and Portland cement, fractionated quartz sand and a complex of admixtures for setting and hardening accelerators, as well as admixtures preventing the mixture from wash-out when applying.

Appointment: dry mix mortar is used for an instant stop of pressure leaks due to fast setting and strength development. It is used to eliminate water pressure leaks through concrete when other materials are washed out with water before they begin to set.

Particularities: does not require any equipment, could be applied to any concrete, stone or brick surface, quickly sets and develops strength.

6.5 ARENA EcoMix

Description: dry waterproofing admixture for concrete, it consists of cement and special admixtures of properties modifying agents.

Purpose: a dry mix mortar is used as addition to concrete at the stage of its manufacturing for the production of hydraulic concrete. Significantly improves the waterproofing qualities of concrete and reinforced concrete constructions at the stage of concrete casting and production. It improves the cold-resisting quality of concrete. It provides protection of constructions against aggressive environments: acids, alkalis, waste and groundwater, sea water.

Particularities: significantly improves the waterproofing qualities and cold-resisting quality of monolithic and precast concrete and reinforced concrete constructions that have pores and cracks with opening of up to 0.4 mm. The material is compatible with other admixtures used in the concrete



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manufacturing. The admixture is environmentally friendly and radioactively safe, free of chlorides and sulphates which can provoke the corrosion of reinforcement and concrete.

6.6 ARENA BiMix NS/PC

Description: complex admixture, it consists of a mixture of micro cement, active mineral fillers and modifying admixtures.

Purpose: increased strength and durability of cement, acceleration of concrete hardening, mushy self-consolidating ready-mix concretes, improvement of waterproofing qualities, cold-resisting quality and corrosion resistance of concrete.

Particularities: is a complex admixture that improves a number of concrete properties. The admixture is environmentally friendly and radioactively safe, free of chlorides and sulphates which can provoke the corrosion of reinforcement and concrete.

6.7 ARENA TopSL

Description: membrane-forming impregnating compound for polymer-based concrete.

Purpose: compacting of the surface of immature concrete by forming a thin, wear-resistant film that effectively protects against moisture loss to complete the concrete hydration process.

Particularities: the material is easy and quick to use. It prevents the dust generation from the concrete surface. It increases the surface resistance to wear and abrasion. It prevents the appearance of efflorescence. It does not require prior preparation.

6.8 ARENADryDeform

Description: Bentonite-based waterproofing expanding braid.

Purpose: airtight packing of vertical and horizontal concrete casting construction joints of new and existing concrete constructions, uneven surfaces, as well as inter-wall holes for the utilities passage.

Particularities: the material is highly resistant to hydrostatic pressure, as after the moisture penetration it expands by 300%. Its properties remain unchanged during the time of operation, and the service lifetime is not limited. The material is easy to install and has no special requirements for special equipment.

6.9 ARENA RepairMaster R300

Description: dry repair upperbound mix mortar of medium grade, it consists of Portland cement, fractionated quartz sand, reinforcing fibers and a complex of admixtures of properties modifying agents.

Purpose: recovery of the geometric and operational characteristics of the construction by means of surface recombination. It can be applied by dry and wet pneumatic concrete placing.

Particularities: the material is applied to a wetted surface. Its characteristics often exceed those of the site being repaired, which also becomes hydroengineering. It is possible to repair not only concrete and reinforced concrete constructions but also brick and stone surfaces.

6.10 ARENA RepairMaster R500

Description: dry high-grade repair upperbound mix mortar, it consists of rapid-hardening Portland cement, fractionated quartz sand, reinforcing fibers and a complex of admixtures of properties modifying agents.



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Purpose: recovery of the geometric and operational characteristics of the construction by means of surface recombination. It can be applied by dry and wet pneumatic concrete placing.

Particularities: the material is applied to a wetted surface. Its characteristics often exceed those of the site being repaired, which also becomes hydroengineering. It is possible to repair not only concrete and reinforced concrete constructions but also brick and stone surfaces.

6.11 ARENA FastMix Hot30

Description: dry rapid-hardening repair mix mortar, it consists of a mixed binder, quartz sand and a complex of admixtures of properties modifying agents.

Purpose: the all-purpose compound is able to solve multidiscipline tasks at various construction projects that require the compliance with the unique characteristics of the material.

Particularities: the material is applied to a wetted surface. It has high resistibility at the early strength development (2 hours), self-heating due to which it can be used at temperatures down to -25°C, high flowability.

6.12 ARENA FastMix EasyHot8

Description: dry rapid-hardening repair mix mortar, it consists of a mixed binder, quartz sand and a complex of admixtures of properties modifying agents.

Purpose: the all-purpose compound is able to solve multidiscipline tasks at various construction projects that require the compliance with the unique characteristics of the material.

Particularities: the material is applied to a wetted surface. It has high resistibility already at the early strength (6 hours), self-heating and high flowability.

7. The operating principle of the ARENAFORCE brand materials

7.1 Concrete waterproofing principles.

The concrete produced by traditional technologies is not a completely compact structure and is permeated with pores, capillaries and microcracks. These drawbacks are caused by a number of different factors: evaporation of water during concrete casting, excess air during concrete casting, insufficient concrete consolidation, improper selection of the ready-mix concrete components, internal stresses inside the concrete during hardening, etc.

To ensure the concrete construction waterproofing qualities it is necessary to treat the concrete with the **ARENAInMixPN** material or to add one of the **ARENAEcoMix** or **ARENABiMixNS/PC** materials to the ready-mix concrete. As a result of using these materials the pores, capillaries and microcracks in concrete are filled with insoluble chemical compounds. The use of **ARENAInMixPN** material and **ARENAEcoMix** and **ARENABiMixNS/PC** admixtures makes it possible to improve the waterproofing qualities index by at least 4 levels.

7.2 ARENAInMixPN: OPERATING PRINCIPLE

When applying the **ARENAInMixPN** material to a wetted concrete surface a high chemical potential is created, while the internal concrete structure retains a low chemical potential. As a result the osmotic pressure is created and the active chemical components penetrate deep into the concrete body. The presence of moisture in the concrete structure makes this process more efficient. The depth of penetration is varied from one to several tens of centimeters. After concrete structure penetration the chemical components begin to interact with the ions, oxides, and salts contained in the concrete. As a result more complex salts appear, which create insoluble crystalline hydrates by the interaction with water. These compounds fill the pores, capillaries and microcracks with the opening of up to 0.4



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mm. The concrete structure becomes more resistant to water penetration even under high hydrostatic pressure, because of these crystals.

7.3 **ARENAPolyElastPE: OPERATING PRINCIPLE**

When hardening the **ARENAPolyElastPE** material forms on the surface an elastic extra-strong concrete membrane which is able to withstand high direct hydrostatic pressure of water. The material has high adhesion and can be used for waterproofing of concrete, stone and brick surfaces, as well as wood, metal, gypsum plasterboard surfaces and asphalt. Due to the content of polymer components and reinforcing fibers in its composition the **ARENAPolyElastPE** material can withstand high compression loads and has high crack resistance.

7.4 **ARENASeamMasterPT: OPERATING PRINCIPLE**

The operation of **ARENASeamMasterPT** is based on the waterproofing qualities, unshrinkability, high strength and high adhesion to concrete, stones, bricks and metal surfaces.

7.5 **ARENAPlugMixPW: OPERATING PRINCIPLE**

The operation of the material is based on the possibility of rapid setting at the interaction with strong water pressure and the possibility of rapid expansion. Also the material is not washable, therefore, retains its functions under water.

7.6 **ARENAEcoMix: OPERATING PRINCIPLE**

The operation of the material is based on the uniform distribution of chemical components throughout the ready-mix concrete volume and interaction with ions, oxides and salts contained in concrete. As a result more complex salts appear and at the interaction with water they create insoluble crystalline hydrates. These compounds fill the pores, capillaries and microcracks with the opening of up to 0.4 mm. Thanks to these crystals the concrete structure becomes more resistant to water penetration even under high hydrostatic pressure.

7.7 **ARENABiMixNS/PC: OPERATING PRINCIPLE**

The operation of the material is based on the uniform distribution of chemical components and micro cement throughout the ready-mix concrete volume and interaction with ions, oxides and salts contained in the concrete. As a result more complex salts appear and at the interaction with water they create insoluble crystalline hydrates. These compounds fill the pores, capillaries and microcracks with the opening of up to 0.4 mm. A self-compaction of the concrete crystal lattice takes place. Because of these crystals the concrete structure becomes more resistant to water penetration even under high hydrostatic pressure and the flowability of the mixture upon laying increases.

7.8 **ARENATopSL: OPERATING PRINCIPLE**

The operation of the material is based on the creation of a polymer wear-resistant membrane, that prevents the moisture loss, on the concrete surface.

7.9 **ARENADryDeform: OPERATING PRINCIPLE**

The operation of the **ARENADryDeform** material is based on a strong expansion in contact with water and the formation of a waterproof gel that forms a barrier against the moisture penetration.

7.10 **ARENA RepairMaster R300 and RepairMaster R500: OPERATING PRINCIPLE**

The operation of materials is based on waterproofing qualities, unshrinkability, high strength and high adhesion to concrete, stones, bricks and metal surfaces.

7.11 **ARENAFastMixHot30 and ARENAFastMixEasyHot8: OPERATING PRINCIPLE**

The operation of materials is based on high flowability, accelerated setting time, high strength, self-heating and high adhesion to concrete, brick and stone surfaces.



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8. Particularities of ARENAFORCE brand materials

- the materials of the ARENAFORCE brand are used only on a wetted surface;
- there are no requirements for preliminary drying of the surface, which significantly reduces the cost and time of works;
- the technology of the ARENAFORCE brand materials application is not complicated and does not require long surface preparation;
- materials of the ARENAFORCE brand are easy to use, just follow the application instructions;
- the use of the ARENAFORCE brand materials is equally effective both on the inner and on the outer surfaces of the construction regardless of the water pressure (except for the **ARENAPolyElastPE** material, which works only at the direct water pressure);
- the use of the ARENAFORCE brand materials results in a significant improvement in the concrete grade according to the waterproofing qualities, cold-resisting quality and strength;
- in cases of mechanical damage the improved waterproofing and protective properties of the concrete construction remains on the processed surface;
- the processed concrete surface acquires the ability of "self-healing";
- the use of the ARENAFORCE brand materials allows to ensure reliable waterproofing for the whole service lifetime of the concrete construction;
- the use of the ARENAFORCE brand materials is the most effective and economical, compared to other types of waterproofing;
- concrete processed with **ARENAInMixPN**, **ARENAEcoMix** and **ARENABiMixNS/PC** materials maintains water vapor permeability and also acquires corrosion resistance to aggressive environments;
- use of the ARENAFORCE brand materials allows to prevent reinforcement corrosion in reinforced concrete;
- preliminary processed concrete and reinforced concrete constructions keep their waterproofing properties even in conditions of increased radioactivity background;
- the materials of the ARENAFORCE brand are certified and can be used in tanks with drinking water;
- the materials of the ARENAFORCE brand are not toxic, ignitable, explosive and are safe from the point of view of the radiation monitoring;
- the materials of the ARENAFORCE brand have a long storage period: 12 months from the date of manufacture, provided that the original packaging remains unimpaired.

9. Adaptability of the ARENAFORCE brand materials

The materials are used for waterproofing, protection and repair of being built and existing concrete and reinforced concrete constructions. Examples of usage:

- hydraulic engineering facilities:
 - tank cisterns;
 - basins for water;
 - wells;
 - docks;
 - gantry berths;
- Constructions of water treatment facilities (aerating reservoirs, potential reservoirs, sanitary drain pipes, pumping stations, etc.);
- Concrete barrages, dams;
- civil engineering facilities:



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- foundations;
- underground accommodations;
- subsurface facilities (parking areas, garages, vegetable storehouses, etc.);
- balconies;
- roofs (in operation and unused)
- elevator hoistways;
- industrial and agricultural facilities:
 - production area;
 - cooling tower reservoirs;
 - storage premises;
 - chimneys;
 - mines;
 - batchers;
 - Concrete constructions exposed to corrosive effects;
 - bomb shelters;
 - pumping stations, etc
- transportation facilities:
 - tunnels;
 - highways;
 - railways;
 - underground railways
 - components of bridges and roads.

10. Preliminary surface preparation before application of the ARENAFORCE brand materials

It is necessary to clean the concrete surface from dust, dirt, oil products, cement slurry, efflorescence, structurally weak concrete, plaster, paint or other materials that prevent the penetration of the chemical components of the **ARENAInMixPN** material or the adhesion of other materials of the ARENAFORCE brand with the base. Cleaning can be carried out using a high-pressure hydroblaster or other suitable mechanical equipment (for example, a metal brush). Excess water should be removed from the surface, as it should be wet but not sopping. Along the perimeter of all seams, joints, abutting joints and cracks with the opening of more than 0.4 mm there should be made indentings with the cross-section of 25x25 mm. In the case of active water filtration the crack must be braced depthward at least to 60 mm in the form of a "dovetail". At uncovering of the reinforcement it must be cleaned of corrosion and residual concrete.

Before using the materials of the ARENAFORCE brand it is necessary to make sure that the concrete construction is thoroughly water-soaked.

11. Preparation of materials for operation

11.1 **ARENAInMixPN: SOLUTION PREPARATION**

It is necessary to prepare a volume of mortar mix that can be worked out within 20 minutes from the moment of adding water to the dry mix mortar.

Blend the dry mix mortar with water in the following proportions: 0.35-0.45 l of water per 1 kg of the dry mix mortar or by volume 1 part of water to 2 parts of the dry mix mortar. Stir the mixture for 1-2 minutes manually or using a low speed drill.



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When used, the mortar mix should be stirred regularly to keep the original consistency. Repeated addition of water to the mortar mix is not allowed.

11.2 ARENAPolyElastPE: SOLUTION PREPARATION

0.15-0.16 l of water is required per 1 kg of dry mix mortar. The best is mixing with a low speed drill. Mix for 3 minutes to form a homogeneous plastic mass without clots.

When used, the mortar mix should be stirred regularly to keep the original consistency. Repeated addition of water to the mortar mix is not allowed.

11.3 ARENASeamMasterPT: SOLUTION PREPARATION

It is necessary to prepare a volume of mortar mix that can be worked out within 30 minutes from the moment of adding water to the dry mix mortar.

The dry mix mortar is blended with water in the following proportions: 0.16-0.17 l of water per 1 kg of dry mix mortar or by volume 1 part of water approximately 4-4.5 parts of the dry mix mortar. Stir the mortar mix within 1-2 minutes manually or using a low speed drill before receiving a dense semifluid consistency.

When used, the mortar mix should be stirred regularly to keep the original consistency. Repeated addition of water to the mortar mix is not allowed.

11.4 ARENAPlugMixPW: PREPARATION OF MIX MORTARS

It is necessary to prepare a volume of mortar mix that can be worked out within 20-30 seconds.

The optimum temperature of the water of mixing is 20 degrees. When the temperature decreases, the mortar mix setting time increases. At slightly positive temperatures it is recommended to use warm water.

Blend the dry mix mortar with water in the following proportions: 0.15 l of water per 1 kg of the dry mix mortar, or by volume 1 part of water to 6 parts of the dry mix mortar. The consistency of the resulting mortar mix ready for use is "dry earth".

11.5 ARENAEcoMix: APPLICATION

The weight of the material is 1% of a weight of the binder contained in the ready-mix concrete.

The material is brought into the ready-mix concrete in the form of a solution with a proportion of 0.6-0.7 l of water per 1 kg of dry admixture (1 part of water per 1.5 parts of dry admixture). The prepared solution of the admixture needs to be brought into the ready-mix concrete within 10 minutes. The ready-mix concrete after bringing of the admixture should be stirred for at least 10 minutes at increased speed.

11.6 ARENABiMixNS/PC: APPLICATION

The weight of the material is 3-6% of a weight of the binder contained in the ready-mix concrete.

The material is brought into the ready-mix concrete in a dry form or in the form of a suspension (1.8 l of water per 1 kg of dry mix mortar). The ready-mix concrete after bringing of the admixture should be stirred for at least 10 minutes at increased speed.

11.7 ARENATopSL: PREPARATION FOR OPERATION

The impregnation is supplied being ready to use.



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11.8 ARENADryDeform: PREPARATION FOR OPERATION

The material is ready for use and does not require prior preparation.

11.9 ARENARepairMasterR300: SOLUTION PREPARATION

The optimum temperature of the water of mixing is 20 ± 2 degrees.

0.18 l of water is required per 1 kg of dry mix mortar. The best is mixing with a low speed drill. Mix for 3 minutes to form a homogeneous plastic mass without clots.

When used, the mortar mix should be stirred regularly to keep the original consistency. Repeated addition of water to the mortar mix is not allowed.

11.10 ARENARepairMasterR500: SOLUTION PREPARATION

The optimum temperature of the water of mixing is 20 ± 2 degrees.

When the temperature decreases, the mortar mix setting time increases and the final strength of the solution decreases. At the temperature increase the setting time decreases. At temperatures close to zero it is recommended to use the dry mix mortar **ARENARepairMasterR500 winter**.

0.16 l of water is required per 1 kg of dry mix mortar. The best is mixing with a low speed drill. Mix for 3 minutes to form a homogeneous plastic mass without clots.

When used, the mortar mix should be stirred regularly to keep the original consistency. Repeated addition of water to the mortar mix is not allowed.

11.11 ARENAFastMixHot30: SOLUTION PREPARATION

Prepare a volume of mortar mix that can be worked out within 45 minutes from the moment of mixing with water.

0.19 liters of water of mixing is required per 1 kg of dry mix mortar. It is necessary to mix thoroughly with a low speed drill or mortar mixing machine for 3 minutes to form a homogeneous plastic mass without clots. Break off for a technological pause for 3-5 minutes and perform the remixing.

When used, the mortar mix should be stirred regularly to keep the original consistency. Repeated addition of water to the mortar mix is not allowed.

11.12 ARENAFastMixEasyHot8: SOLUTION PREPARATION

Prepare a volume of mortar mix that can be worked out within 60 minutes from the moment of mixing with water.

0.19 liters of water of mixing is required per 1 kg of dry mix mortar. It is necessary to mix thoroughly with a low speed drill or mortar mixing machine for 3 minutes to form a homogeneous plastic mass without clots. Break off for a technological pause for 3-5 minutes and perform the remixing.

When used the mortar mix should be stirred regularly to keep the original consistency. Repeated addition of water to the mortar mix is not allowed.



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12. Works with of the ARENAFORCE brand materials

12.1 Waterproofing of concrete and reinforced concrete structural items

Before using the **ARENAInMixPN** material it is necessary to wet the concrete surface carefully. Vertical and horizontal surfaces should be treated with the **ARENAInMixPN** material to remove and prevent filtration of capillary water. Carry out a complete surface treatment (cl. 10) and apply the **ARENAInMixPN** material (cl. 11.1) evenly with a brush or a mortar mix sprayer over the entire surface in two layers. The first layer is applied on the wet concrete, the second - on the fresh, but already set first layer. It is necessary to moisten the surface before applying the second layer.

The consumption of the dry mix mortar for 2 layers is 0.8-1.0 kg/m² of the concrete surface. All joints, seams, abutting joints and cracks with the opening of more than 0.4 mm are waterproofed using the **ARENASeamMasterPT** material (cl. 12.2). If it is necessary to eliminate active leaks, it is necessary to use the **ARENAPlugMixPW** material (cl. 12.4).

12.2 Waterproofing of seams, joints, cracks and abutting joints

Works should be performed at a temperature not lower than +5 degrees. Along the perimeter of all joints, seams, cracks and abutting joints there are made indentings with the cross-section of 25x25 mm respectively (cl. 10). The prepared indentings are filled with the prepared mortar mix (cl. 11.3). The consumption of dry mix mortar is 1.4-1.6 kg/lm taking into account treatment losses when laying the mixture. With the cross section increase the material consumption increases proportionally.

12.3 Waterproofing of concrete, stone, brick, wood, metal and gypsum plasterboard surfaces

Works should be performed at a temperature not lower than +5 degrees. The finished coating should have a thickness of at least 2-4 mm. Even if using a spatula, it is possible to apply a layer 2 mm thick and then it is necessary to apply another layer perpendicular to the first one in order to qualitatively overlap possible pores and micro cracks formed during the hardening of the first layer. Depending on the amount of works the mortar mix can be applied with a spatula or a brush.

12.4 Elimination of pressure leaks

Works should be performed at a temperature not lower than +5 degrees. The prepared mortar mix (cl. 10) must be impressed with force into the area of the leak and held for 40-60 seconds. Regardless of the amount of material used the remaining part of the cavity must be filled with the **ARENASeamMasterPT** material. The cavity filled with the **ARENASeamMasterPT** material and the adjacent surfaces should be treated with the **ARENAInMixPN** material (cl. 12.1) in two layers.

12.5 Concrete protection against moisture loss

The material is applied on fresh concrete approximately 12 hours after laying or on concrete with the freshly laid concrete floor hardener **ARENA BiTop** immediately after the last mechanical rubbing. Works should be performed at a temperature not lower than + 5°C. Membrane-forming impregnation for concrete is applied with a velour roller or mortar mix sprayer evenly over the entire surface in one layer.

12.6 Laying of the hydrophile braid

Primarily it is necessary to remove the protective paper from the braid. Lay it down and press it firmly to the surface of the construction, fixing it from displacement by raw plugs 4-5 cm long and



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fastening brackets. Raw plugs pitch is 25-30 cm. When applying the braid on a cylindrical surface, the ends of the braid, cut at an angle of 45 degrees, are abutted together and are sealed against. Mount the conjugation constructions. When laying the braid on fresh concrete it is necessary to make sure that there is no lentic water and cement slurry on the foundation and that the distance to the edges of the timbering is at least 50 mm.

12.7 Repair of monolithic and precast concrete and reinforced concrete constructions

Works should be performed at a temperature not lower than +5 degrees. It is necessary to carry out the surface preparation (cl. 10). Depending on the amount of works the mortar mix (cl. 11.8 and cl. 11.9) can be applied with a hand trowel, putty knife manually or mechanically by pneumatic concrete placing. The optimum applied material layer thickness is 10 mm. The subsequent layers are applied after 60-120 minutes on the preliminary moistened first layer. Application of the mixture on large areas must be made on the coil mesh.

12.8 Use of special compounds

Works should be performed at temperatures not lower than -25 degrees and not lower than +5 degrees, for winter and summer special compounds respectively. It is necessary to carry out the surface preparation (cl. 10). Depending on the amount of works the mortar mix (cl. 11.10 and cl. 11.11) can be applied with a hand trowel, putty knife manually or mechanically.

12.9 Waterproofing of concrete constructions at the stage of concrete casting

The use of **ARENAEcoMix** and **ARENABiMixNS/PC** admixtures for waterproofing of the concrete and reinforced concrete constructions at the stage of concrete casting allows to obtain hydraulic concrete, and in the second case also an increase in a number of parameters. The materials are dosed before adding them to the mixture (cl. 11.5 and cl. 11.6).

All joints, seams and connections must be insulated using the **ARENADryDeform** or **ARENASeamMasterPT** materials. All cracks must be insulated with the **ARENASeamMasterPT** material (cl. 12.2).

13. Maintenance of the processed surface

It is necessary to ensure that the processed surfaces remain wet for 3 days. To do this, it is necessary to moist the surface 2-3 times a day.

At freezing temperatures it is required to cover the exposed surface with a waterproof heat-insulating material for a period of at least 3 hours.

14. Final surface finishing

For the **ARENAInMixPN** material the use of paint, plaster and other finishing materials on the processed surfaces is recommended after 28 days. This time can be adjusted depending on the requirements of a particular type of finishing material. Before applying a decorative coating on surfaces treated with the **ARENAInMixPN** material to improve the adhesion it is necessary to clean the surfaces mechanically using a hydroblaster or a metal brush.



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15. Methods and equipment for quality control of work performed

In accordance with the principle of ensuring the unity of test and measurement methods the quality control of the waterproofing and repair works must be carried out in accordance with SNiP 12-01-2014. The control must be carried out by technical supervision service personnel with the required qualifications. The quality control of the repair and waterproofing works includes the following types of control: - incoming inspection; - operation monitoring; - functional inspection; - supervisory control; - acceptance control. Before starting the waterproofing and repair works at the specific site a visual inspection should be carried out together with the customer and the general filtration sites lay-out should be drawn; the description of the defects detected on the concrete surface should be made, and the nature and intensity of water leaks should be evaluated. The results of the assessment should be documented together with the photographic materials of the defects detected and the general state of the object.

The main method of quality control of the waterproofing works performed is the measurement of the concrete waterproofing qualities improvement by an accelerated method of non-destructive testing using an AGAMA-type device in accordance with GOST 12730.5-84 "Concretes. Methods for the waterproofing qualities measurement". For the accelerated measurement of the concrete waterproofing qualities in accordance with GOST 12730.5-84 there can be used the VIP-1.2 and VIP-1.3 devices, whose usage is possible on vertical surfaces and in places with limited access. Measurements of the concrete waterproofing qualities in the laboratory is carried out in accordance with GOST 12730.5-84 "Concretes. Methods for the waterproofing qualities measurement by the "wet spot". The instruments used in the work must have state verification certificates or calibration certificates.

16. Packing, storage and transportation

The materials of the ARENAFORCE brand are packed into sealed metal buckets and multilayered paper bags. Each packaging unit has a label with the following information: manufacturer, material name, batch number, net weight, date of manufacture.

The guaranteed shelf life and instruction sheet.

The guaranteed shelf life is 12 (twelve) months from the date of manufacture, provided that the original packaging remains sealed. Storage in premises with humidity is allowed at temperatures from -80°C to + 80°C. Transportation by any kind of transport is allowed.

17. Quality assurance

The LLC "ARENA Waterproofing Manufacturing Plant" guarantees the compliance of materials of the ARENAFORCE brand with the specifications of TS 23.64.10-001-35155041-2017, as well as all modern standards. The company guarantees that the materials of the ARENAFORCE brand contain all the components in proper proportions. The use of materials of the ARENAFORCE brand should strictly comply with the Technical Rules concerning waterproofing and corrosion protection of monolithic and precast concrete and reinforced concrete constructions.

18. Work safety

During the waterproofing works it is necessary to follow the accident prevention rules given in SNiP 12-04-2002 "Construction Safety Requirements", part 2. When working with materials it is necessary to use the protective goggles, chemical rubber or cotton gloves, a breathing mask inhaler, working clothes made of strong fabric, rubber boots. In case of contact with the open skin rinse it



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thoroughly with water. In case of contact with eyes it is necessary to rinse them well with water and consult a doctor.

Workplaces for waterproofing at high altitude should be equipped with work sites supplied with hand railings and stairs for lifting in accordance with the requirements of SNiP 12-03-2002 "Construction Safety Requirements", part 1.

Annex 1. Technical characteristics of the **ARENAFORCE** brand materials

ARENA InMix PN

	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.35-0.45	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.3%	GOST 31376-2008
4	Bulk density	1200±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.63 mm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 3.5%	GOST 56703-2015
7	Percentage of chloride ions	Not more than 0.004%	GOST 56703-2015
8	Time of initial setting	Not earlier than in 20 minutes	GOST 310.3, section 2
9	Time of final setting	Not later than after 150 minutes	GOST 310.3, section 2
10	Density	1900±100 kg/m ³	GOST 5802
11	Increase of the concrete grade according to the waterproofing qualities	Not less than 3 levels	GOST 12730.5
12	Increase of the concrete cold-resisting quality	Not less than 100 cycles	GOST 5802
13	Crack bridging	Up to 0.4 mm	GOST 56703-2015

ARENA PolyElast PE

№	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.15-0.16	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.3%	GOST 31376-2008
4	Bulk density	1250±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.63 mm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 0,5%	GOST 56703-2015
7	Flowability	Pk1-Pk2	GOST 56703-2015
8	Time of initial setting	Not earlier than 60 minutes	GOST 310.3, section 2
9	Time of final setting	Not later than 210 minutes	GOST 310.3, section 2
10	Density	2100±100 kg/m ³	GOST 5802
11	Compression strength after 1/28 days	Not less than 15/45 MPa	GOST 5802
12	Bending resistance after 1/28 days	Not less than 8/10 MPa	GOST 310.4

13	Grade according to the waterproofing qualities	Not less than W18	GOST 12730.5
14	Grade according to the cold-resisting quality	Not less than F400	GOST 5802
15	Adhesion at the age of 3/28 days	Not less than 1/2 MPa	GOST 31356
16	Shrinkage at the age of 28 days	Not more than 0.1%	TS 23.64.10-001-35155041-2017

ARENA SeamMaster PT

	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.16-0.17	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.3%	GOST 31376-2008
4	Bulk density	1300±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.63 mm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 3.5%	GOST 56703-2015
7	Flowability	Pk1	GOST 56703-2015
8	Time of initial setting	Not earlier than 25 minutes	GOST 310.3, section 2
9	Time of final setting	Not later than 150 minutes	GOST 310.3, section 2
10	Density	2200±100 kg/m ³	GOST 5802
11	Compression strength, after 6/8/24 1/28 days	Not less than 23/40 MPa	GOST 5802
12	Grade according to the waterproofing qualities	Not less than W14	GOST 12730.5
13	Grade according to the cold-resisting quality	Not less than F400	GOST 5802
14	Adhesion at the age of 28 days	Not less than 2 MPa	GOST 31356

ARENA PlugMix PW

	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.15-0.20	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.3%	GOST 31376-2008
4	Bulk density	1300±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.63 mm	GOST 56703-2015
6	Percentage of grains of the largest	Not more than 0.3%	GOST 56703-2015

	fineness		
7	Time of initial setting	Not earlier than 18 seconds	GOST 310.3, section 2
8	Time of final setting	Not later than 120 seconds	GOST 310.3, section 2
9	Density	1700±100 kg/m ³	GOST 5802
10	Grade according to the waterproofing qualities	Not less than W14	GOST 12730.5
11	Grade according to the cold-resisting quality	Not less than F300	GOST 5802

ARENA EcoMix

	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.6-0.7	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.6%	GOST 31376-2008
4	Bulk density	1100±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.63 mm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 0.5%	GOST 56703-2015
7	Air resistance increase	Not less than 3-5 levels	GOST 5802
8	Increase of the grade according to the waterproofing qualities	Not less than 3 levels	GOST 12730.5
9	Increase of the cold-resisting quality	Not less than 100 cycles	GOST 5802

ARENA BiMix NS/PC

	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio для суспензии	1.8	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.5%	GOST 31376-2008
4	Bulk density	1100±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.63 mmmm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 0.5%	GOST 56703-2015
7	Air resistance increase	Not less than 3-5 levels	GOST 5802
8	Increase of the grade according to the waterproofing qualities	Not less than 3 levels	GOST 12730.5
9	Increase of the cold-resisting quality	Not less than 300 cycles	GOST 5802
10	Flowability increase	Not less than 2 levels	GOST 56703-2015

11	Strength increase	Not less than 30%	GOST 5802
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ARENA TopSL

	Technical characteristics	Parameter	Measurement method
1	Appearance	Semi transparent liquid	TS 23.64.10-001-35155041-2017
2	Dry residue	20-25% by weight	TS 23.64.10-001-35155041-2017
3	Density	1.03±1.05 kg/l	GOST 5802
4	Drying out time at +20°C	24 hours	TS 23.64.10-001-35155041-2017

ARENA DryDeform

№	Technical characteristics	Parameter	Measurement method
1	Density	Not more than 1.5 g/cm ³	TS 23.64.10-001-35155041-2017
2	Cubical dilation at 24 hours 7 days 14 days	140 200 300	TS 23.64.10-001-35155041-2017
3	Homogeneity	Homogeneous mass with inclusions not more than 0.35 mm	TS 23.64.10-001-35155041-2017
4	Manner of installation	Raw plug - nail/adhesive	TS 23.64.10-001-35155041-2017
5	Maximum pressure	7.0 bar	TS 23.64.10-001-35155041-2017
6	Resistance to solutions of HCl, H ₂ SO ₄ acids	Resistive	CMEA St. 5852
7	Resistance to NaOH alkali	Resistive	CMEA St. 5852
8	Resistance to petroleum products	Resistive	CMEA St. 5852
9	Ultraviolet	Has no impact	TS 23.64.10-001-35155041-2017
10	Water absorption capacity	Not less than 50%	TS 23.64.10-001-35155041-2017
11	Acidity of the environment of application, pH	3-11 pH	CMEA St. 5852
12	Application: Surface temperature Operation temperature	From -15°C to +50°C From -40°C to +100°C	TS 23.64.10-001-35155041-2017
13	Material storage conditions	In closed areas at any	TS 23.64.10-001-

		humidity at temperatures from -60°C to +50°C	35155041-2017
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ARENA RepairMaster R300

	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.18	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.3%	GOST 31376-2008
4	Bulk density	1400±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.315 mm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 3.5%	GOST 56703-2015
7	Flowability	Pk1-Pk2	GOST 56703-2015
8	Time of initial setting	Not earlier than 40 minutes	GOST 310.3, section 2
9	Time of final setting	Not later than 180 minutes	GOST 310.3, section 2
10	Density	2100±100 kg/m ³	GOST 5802
11	Compression strength after 1/7/28 days	Not less than 20/40/50 MPa	GOST 5802
12	Bending resistance after 1/28 days	Not less than 5.0/7.0 MPa	GOST 310.4
13	Grade according to the waterproofing qualities	Not less than W12	GOST 12730.5
14	Grade according to the cold-resisting quality	Not less than F300	GOST 5802
15	Adhesion at the age of 28 days	Not less than 1.5 MPa	GOST 31356
16	Shrinkage at the age of 28 days	Not more than 0,1%	TS 23.64.10-001-35155041-2017

ARENA RepairMaster R500

	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.16	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.3%	GOST 31376-2008
4	Bulk density	1400±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.63 mm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 3.5%	GOST 56703-2015
7	Flowability	Pk1-Pk2	GOST 56703-2015

8	Time of initial setting	Not earlier than 60 minutes	GOST 310.3, section 2
9	Time of final setting	Not later than 240 minutes	GOST 310.3, section 2
10	Density	2100±100 kg/m ³	GOST 5802
11	Compression strength after 1/7/28 days	Not less than 23/50/70 MPa	GOST 5802
12	Bending resistance after 1/28 days	Not less than 7.0/9.0 MPa	GOST 310.4
13	Grade according to the waterproofing qualities	Not less than W14	GOST 12730.5
14	Grade according to the cold-resisting quality	Not less than F400	GOST 5802
15	Adhesion at the age of 3/28 days	Not less than 0.9/3.0 MPa	GOST 31356
16	Shrinkage at the age of 28 days	Not more than 0.1%	TS 23.64.10-001-35155041-2017

ARENA FastMix Hot30

	Technical characteristics	Parameter	Measurement method
1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.19	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.3%	GOST 31376-2008
4	Bulk density	1200±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.315 mm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 3.5%	GOST 56703-2015
7	Flowability	Pk4	GOST 56703-2015
8	Application life	Less than 45 minutes	GOST 310.3, section 2
9	Density	2100±100 kg/m ³	GOST 5802
10	Compression strength, MPa, at least, after 6/8/24 hours and at the age of 28 days at the temperature above +5°C	Not less than 19/22/27 and 45 MPa	GOST 5802
11	Compression strength, MPa, at least, after 6/8/24 hours and at the age of 28 days at the temperature from -25°C to +5°C	Not less than 15/17/22 and 45 MPa	GOST 5802
12	Grade according to the waterproofing qualities	Not less than W10	GOST 12730.5
13	Adhesion at the age of 28 days	Not less than 2,8 MPa	GOST 31356
14	Self-heating	Up to 60° C	TS 23.64.10-001-35155041-2017

ARENA FastMix EasyHot8

	Technical characteristics	Parameter	Measurement method
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1	Appearance	Grey powder	TS 23.64.10-001-35155041-2017
2	Water solid ratio	0.19	TS 23.64.10-001-35155041-2017
3	Mass humidity	Not more than 0.3%	GOST 31376-2008
4	Bulk density	1200±100 kg/m ³	GOST 8735, section 9
5	Maximum aggregate size	0.315 mm	GOST 56703-2015
6	Percentage of grains of the largest fineness	Not more than 3.5%	GOST 56703-2015
7	Flowability	Pk4	GOST 56703-2015
8	Application life	Less than 60 minutes	GOST 310.3, section 2
9	Density	2100±100 kg/m ³	GOST 5802
10	Compression strength, MPa, at least, after 6/8/24 hours and at the age of 28 days	Not less than 13/15/24 and 45 MPa	GOST 5802
11	Grade according to the waterproofing qualities	Not less than W10	GOST 12730.5
12	Adhesion at the age of 28 days	Not less than 1.5 MPa	GOST 31356
13	Self-heating	Up to 20°C	TS 23.64.10-001-35155041-2017

Annex 2. Recommended equipment, tools and personal protective equipment

Equipment:

- high pressure hydroblaster (voltage – 220V; power – 3100 W; pressure – 20–150 bar);
- high pressure hydroblaster (voltage – 380V; power – 8400 W; pressure – 20–230 bar);
- chisel hammer (voltage – 220V; power – 1050 W; frequency – 900–2000 bpm);
- air pick hammer (voltage – 220V; power – 1000 W; frequency – 900 –2000 bpm);
- low speed drill (voltage – 220V; power – from 1000 W; frequency – 250–500 rpm);
- wall chaser (voltage – 220 V; power – 2200 W; frequency – 6000–10000 rpm);
- angle grinder (voltage – 220 V; power – 1200 W; frequency – 11000 rpm);
- industrial vacuum cleaner (voltage – 220 V; power – 1100 W);
- wet sump pump (voltage – 220 V; power – from 2100 W);
- wet sump pump (voltage – 380 V; power – 6000–8000 W);
- gravity mixer (voltage – 220 V(380 V); power – 1100–2200 W);
- auger-type grout injection pump (voltage – 380 V; power – 1900 W; maximum feed pressure

2.0 MPa);

- compressor (voltage – 380 V; power – 2200 W; productivity 250 l/min).

Tools:

- synthetic pile “flat brush”;
- brush with metallic pile (for manual and mechanical use);
- stopping knife;



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- wash basin (bucket) of 5–7 l made of soft plastic;
- hammer;
- chisel;
- smoothing-trowel;
- trowel;
- grout pan;
- steelyard balance;
- measuring container for water;
- diamond blade for reinforced concrete;
- chisel for the chisel hammer.

Personal protective equipment:

- chemical rubber gloves;
- cotton gloves;
- breathing mask inhaler;
- protective goggles;
- working clothes made of strong fabric;
- rubber boots.



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Annex 3. Typical units of ready-made solutions

First appl.	<h3 style="margin: 0;">Abutting joint</h3> <div style="text-align: center; margin: 20px 0;"> </div> <div style="margin-top: 20px;"> <p>1. Construction joint</p> <p>2. ARENA InMix PN</p> <p>3. ARENA Seam Master PT</p> </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - Arrangement of the U-shaped indenting, in size of 25x25 mm - Indenting cavity treatment with the ARENA in Mix PN material on two separate occasions - Indenting cavity airtight packing with the ARENA SeamMaster PT material - Processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions </div>									
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date							
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 1. Abutting joint			Stage	Page	Pages
Approved								TP	29	30
Developed								LLC "ARENA Waterproofing Manufacturing plant"		

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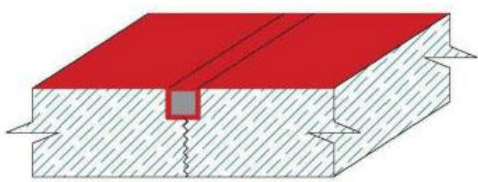
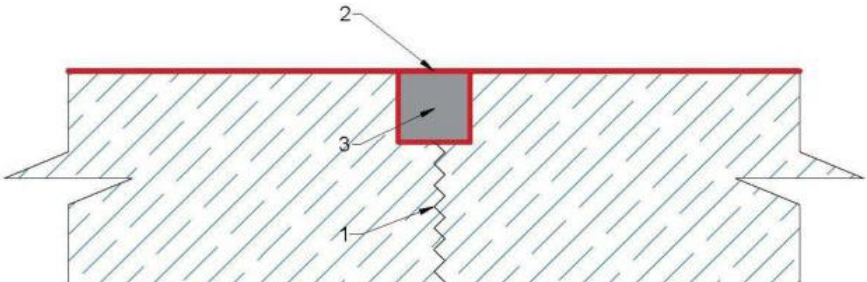
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First appl.	<h2 style="margin: 0;">Construction joint</h2> <div style="text-align: center; margin: 20px 0;">  </div> <div style="text-align: center; margin: 20px 0;">  </div> <div style="margin-top: 20px;"> <p>1. Construction joint</p> <p>2. ARENA InMix PN</p> <p>3. ARENA Seam Master PT</p> </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - Arrangement of the U-shaped indenting, in size of 25x25 mm - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - Indenting cavity airtight packing with the ARENA SeamMaster PT material - Processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions </div>											
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 2. Construction joint					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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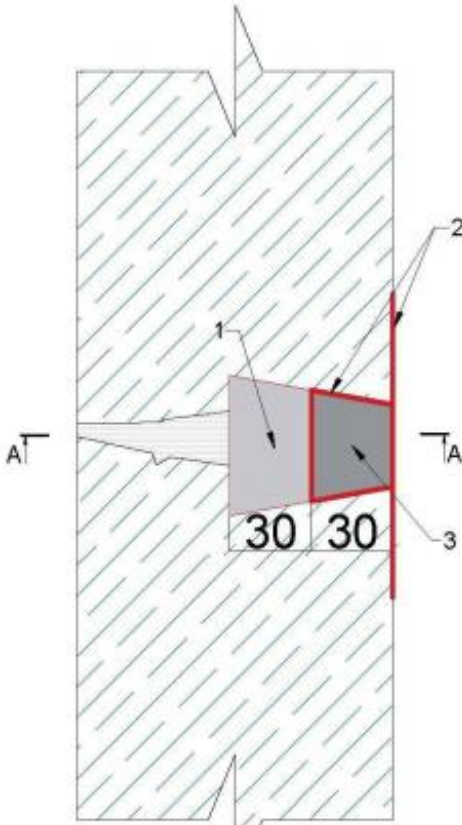
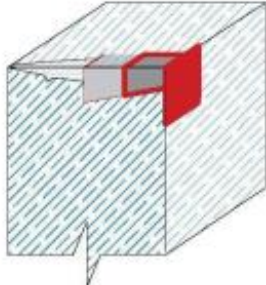
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First appl.	<h2 style="margin: 0;">Elimination of pressure leak</h2> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: right;"> <p>Section A-A</p>  </div> </div> <div style="margin-top: 20px;"> <p>1. ARENA PlugMix PW</p> <p>2. ARENA InMix PN</p> <p>3. ARENA SeamMaster PT</p> </div> <ul style="list-style-type: none"> - an increase in the cavity of a leak to the width of at least 25 mm and to the depth of at least 60 mm with expansion depthward (if possible in the form of a cone ("dovetail")) - impress the ARENA PlugMix PW material with force into the area of the leak - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - Indenting cavity airtight packing with the ARENA SeamMaster PT material 												
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date	Ch. sheet	Document	Signature	Date	<h3>Unit 3. Elimination of pressure leak</h3>			Stage	Page	Pages
Inv. No prep.	Approved	Developed	TP	29	30								
<p>LLC "ARENA Waterproofing Manufacturing plant"</p>													

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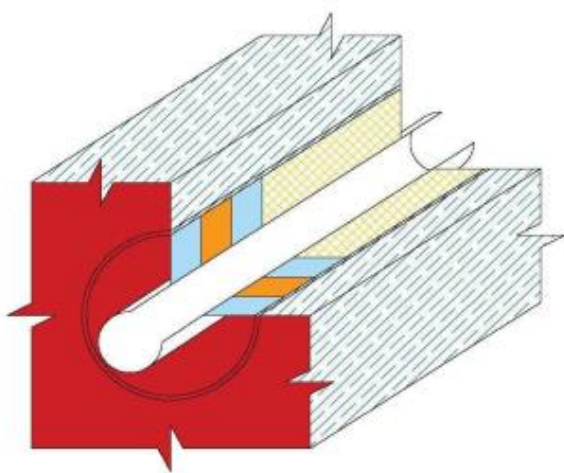
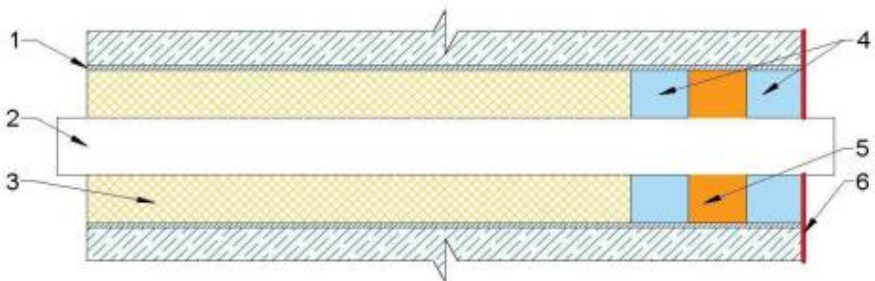
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First appl.	<h3>Communications inlets airtight packing (existing construction)</h3> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: left;"> <ol style="list-style-type: none"> 1. Metal case 2. Plastic pipe 3. Expanded plastic 4. ARENA RepairMaster R300 5. ARENA DryDeform 6. ARENA InMix PN </div>  </div> <div style="text-align: center; margin-top: 20px;">  </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - cleaning the walls working surfaces around the perimeter of communications inlets from dust - expanded plastic laying at the required depth to form the indenting of the required size - filling the indenting part around the perimeter of communications inlets with the ARENA RepairMaster R300 material - laying the concrete ARENA DryDeform braid around the perimeter of communications inlets - filling of the indenting with the ARENA RepairMaster R300 material over the laid ARENA DryDeform braid </div>										
Sign. and date											
Copy inv. No.											
Inst. inv. No.											
Sign. and date											
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 4. Communications inlets airtight packing						
	Approved										
	Developed										
					Stage	Page	Pages				
					TP	29	30				
					LLC "ARENA Waterproofing Manufacturing plant"						

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First appl.	<h3 style="margin: 0;">Waterproofing of ceiling panels</h3> <div style="text-align: center; margin: 20px 0;"> </div> <ol style="list-style-type: none"> 1. Crack in the panel 2. Sealing foam 3. Hairline joint of the hollow slabs 4. ARENA InMix PN 5. ARENA Seam Master PT <p style="margin-top: 20px;"> - Arrangement of the U-shaped indenting, in size of 25x25 mm in the places of abutting joints, joints and air voids with cracks - filling the voids of the cracked ceiling panels with the sealing foam - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions </p>										
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date	Ch. sheet	Document	Signature	Date	Unit 5.1. Waterproofing of ceiling panels from the inside		
Inv. No prep.	Approved	Developed									
					Stage	Page	Pages				
					TP	29	30				
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First appl.	<h2 style="margin: 0;">Waterproofing of ceiling panels</h2> <div style="text-align: center; margin: 20px 0;"> </div> <ol style="list-style-type: none"> 1. Crack in the panel 2. Sealing foam 3. Hairline joint of the hollow slabs 4. ARENA InMix PN 5. ARENA Seam Master PT <p style="margin-top: 20px;"> - Arrangement of the U-shaped indenting, in size of 25x25 mm in the places of abutting joints, joints and air voids with cracks - filling the voids of the cracked ceiling panels with the sealing foam - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions </p>												
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date	Ch. sheet	Document	Signature	Date	Unit 5.2. Waterproofing of ceiling panels from the outside			Stage	Page	Pages
Inv. No prep.	Approved	Developed	Inv. No prep.	TP	29	30							
							LLC "ARENA Waterproofing Manufacturing plant"						

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First appl.	<h2 style="margin: 0;">Waterproofing of solid-cast floor structures</h2> <div style="text-align: center; margin: 20px 0;"> </div> <div style="margin-left: 100px;"> <ol style="list-style-type: none"> 1. Construction joints 2. Crack in the panel 3. ARENA Seam Master PT 4. ARENA InMix PN </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - Arrangement of the U-shaped indenting, in size of 25x25 mm in the places of construction joints, concrete casting and cracks - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - Indenting cavity airtight packing with the ARENA SeamMaster PT material - processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions </div>											
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 6.1. Waterproofing of solid-cast floor structures from the inside					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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First appl.	<h2 style="margin: 0;">Waterproofing of solid-cast floor structures</h2> <div style="text-align: center; margin: 20px 0;"> </div> <div style="margin-left: 100px;"> <p>1. Construction joints</p> <p>2. ARENA Seam Master PT</p> <p>3. ARENA InMix PN</p> </div> <div style="margin-top: 20px;"> <p>- Arrangement of the U-shaped indenting, in size of 25x25 mm in the places of construction joints, concrete casting and cracks</p> <p>- Indenting cavity treatment with the ARENA InMix PN material on two separate occasions</p> <p>- Indenting cavity airtight packing with the ARENA SeamMaster PT material</p> <p>- processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions</p> </div>											
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 6.2. Waterproofing of solid-cast floor structures from the outside					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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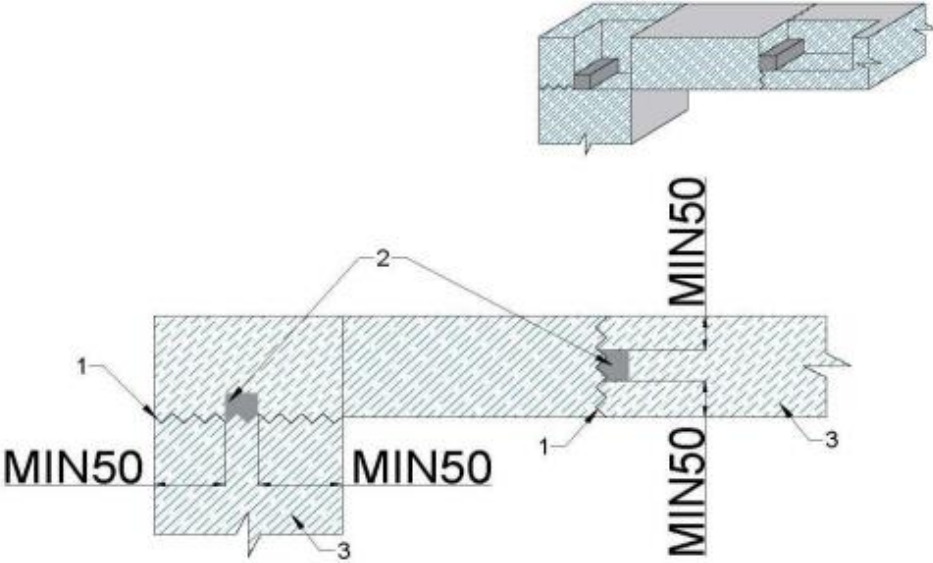
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First appl.	Construction being built			
				
	<ol style="list-style-type: none">1. Construction joints2. ARENA DryDeform3. ARENA EcoMix (1%) or ARENA BiMix NS/PC			
	<p>- use of the ARENA BiMix NS / PC admixture (3-6% of the binder) during construction - laying of the bentonite ARENA DryDeform braid on the side of the construction joints (the distance from the timbering edge is not less than 50 mm)</p>			
	Ch. sheet	Document	Signature	Date
Inv. No prep.	Approved			
	Developed			
Unit 6.3. Waterproofing of solid-cast floor structures of the construction being built				
Stage		Page	Pages	
TP		29	30	
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First appl.	<h3 style="text-align: center;">Waterproofing of the foundation</h3> <ol style="list-style-type: none"> 1. Construction joint 2. ARENA Seam Master PT 3. ARENA InMix PN 4. Building sidewalks 5. ARENA PolyElast PE in two layers, between which the reinforcing steel net is laid <p>- Arrangement of the U-shaped indenting, in size of 25x25 mm - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - Indenting cavity airtight packing with the ARENA SeamMaster PT material - processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions - application of the ARENA PolyElast PE material to the building sidewalks with the entry on the wall, on two separate occasions, as well as with the laying of reinforcing steel net between the layers</p>																
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date														
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 7.1. Waterproofing of the existing construction foundation												
	Approved																
	Developed				<table border="1"> <tr> <td>Stage</td> <td>Page</td> <td>Pages</td> </tr> <tr> <td>TP</td> <td>29</td> <td>30</td> </tr> <tr> <td colspan="3">LLC "ARENA Waterproofing Manufacturing plant"</td> </tr> </table>				Stage	Page	Pages	TP	29	30	LLC "ARENA Waterproofing Manufacturing plant"		
Stage	Page	Pages															
TP	29	30															
LLC "ARENA Waterproofing Manufacturing plant"																	

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First appl.	<h3>Construction being built</h3> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Section A-A</p> </div> <div style="text-align: center;"> </div> </div> <ol style="list-style-type: none"> 1. Construction joint 2. ARENA DryDeform 3. ARENA EcoMix (1%) or ARENA BiMix NS/PC (3%) 4. ARENA PolyElast PE 5. Building sidewalks 6. ARENA PolyElast PE in two layers, between which the reinforcing steel net is laid <p>- use of the ARENA BiMix NS/PC admixture (3-6% of the binder) during construction</p> <p>- laying of the bentonite ARENA DryDeform braid on the side of the construction joints (the distance from the timbering edge is not less than 50 mm)</p> <p>- processing of the upper part of the foundation with the ARENA PolyElast PE material on two separate occasions</p> <p>- application of the ARENA PolyElast PE material to the building sidewalks with the entry on the wall, on two separate occasions, as well as with the laying of reinforcing steel net between the layers</p>									
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date						
					Ch. sheet	Document	Signature	Date		
Inv. No prep.	Approved	Developed					Unit 7.2. Waterproofing of the foundation of the construction being built			
				Stage	Page	Pages				
				TP	29	30				
				LLC "ARENA Waterproofing Manufacturing plant"						

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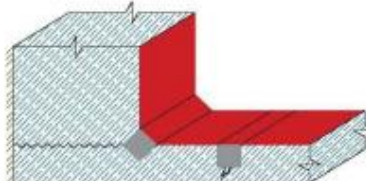
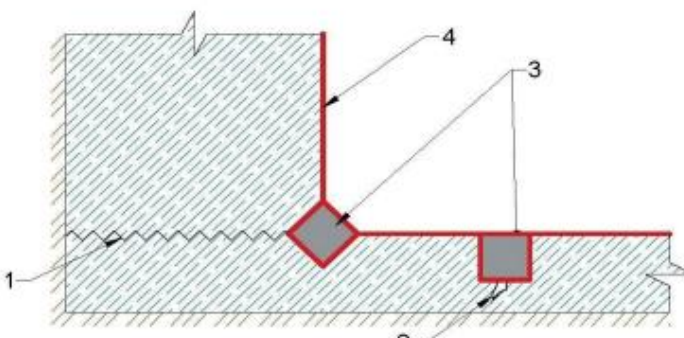
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First appl.	<h2 style="margin: 0;">Waterproofing of the monolith and concrete floor</h2> <div style="text-align: right; margin-top: 20px;">  </div> <div style="text-align: center; margin-top: 20px;">  </div> <div style="margin-top: 10px;"> <ol style="list-style-type: none"> 1. Construction joint 2. Crack in the base plate 3. ARENA Seam Master PT 4. ARENA InMix PN </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - Arrangement of the U-shaped indenting, in size of 25x25 mm in the places of construction joints, concrete casting and cracks - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - Indenting cavity airtight packing with the ARENA SeamMaster PT material - processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions </div>											
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 8.1 Waterproofing of the monolithic concrete floor of the existing construction					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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First appl.	Construction being built			
	<div><p>Section A-A</p><p>1. Construction joint 2. ARENA DryDeform 3. ARENA EcoMix (1%) or ARENA BiMix NS/PC (3%)</p><p>- use of the ARENA BiMix NS/PC admixture (3-6% of the binder) during construction - laying of the bentonite ARENA DryDeform braid on the side of the construction joints (the distance from the timbering edge is not less than 50 mm)</p></div>			
	Ch. sheet	Document	Signature	Date
Inv. No prep.	Approved			
	Developed			
Unit 8.1. Waterproofing of the monolithic concrete floor of the construction being built				
Stage		Page	Pages	
TP		29	30	
LLC "ARENA Waterproofing Manufacturing plant"				

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First appl.	<h2 style="text-align: center;">Waterproofing of block walls</h2>			
Sign. and date	<ol style="list-style-type: none"> 1. ARENA Seam Master PT 2. ARENA InMix PN 3. Building sidewalks 4. ARENA PolyElast PE in two layers, between which the reinforcing steel net is laid 			
Copy inv. No.	<ul style="list-style-type: none"> - Arrangement of the U-shaped indenting, in size of 25x25 mm - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - Indenting cavity airtight packing with the ARENA SeamMaster PT material - processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions - application of the ARENA PolyElast PE material to the building sidewalks with the entry on the wall, on two separate occasions, as well as with the laying of reinforcing steel net between the layers 			
Inst. Inv. No.				
Sign. and date				
Inv. No prep.	Ch. sheet	Document	Signature	Date
	Approved			
	Developed			
Unit 9.1 Waterproofing of the monolithic concrete floor of the construction being built				
Stage		Page	Pages	
TP		29	30	
LLC "ARENA Waterproofing Manufacturing plant"				

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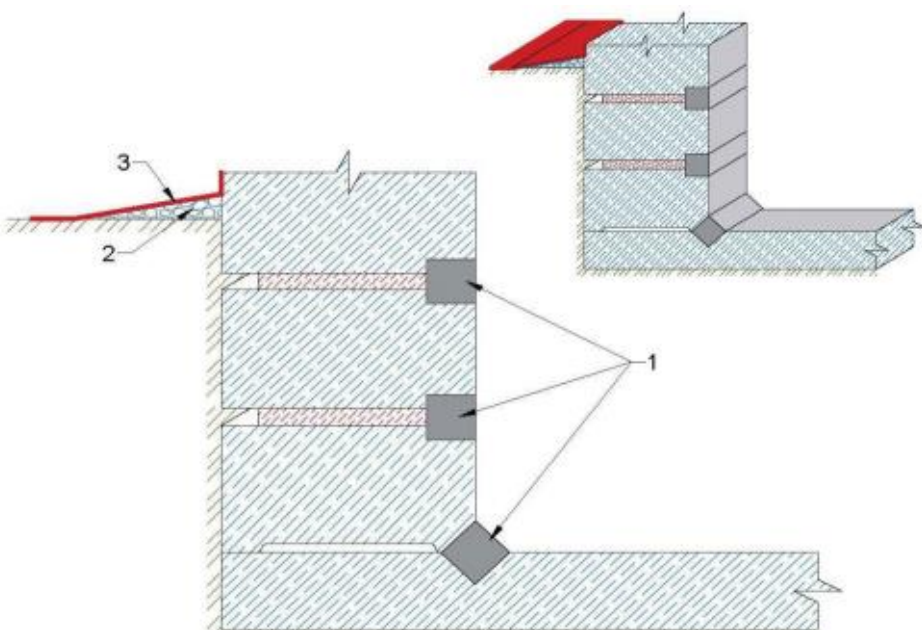
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First appl.	<h3 style="margin: 0;">Waterproofing of block walls</h3> 																		
Sign. and date	<ol style="list-style-type: none"> 1. ARENA Repair Master R300 2. Building sidewalks 3. ARENA PolyElast PE in two layers, between which the reinforcing steel net is laid 																		
Copy inv. No.																			
Inst. Inv. No.																			
Sign. and date	<ul style="list-style-type: none"> - Arrangement of the U-shaped indenting, in size of 25x25 mm - Indenting cavity airtight packing with the ARENA SeamMaster PT material - application of the ARENA PolyElast PE material to the building sidewalks with the entry on the wall, on two separate occasions, as well as with the laying of reinforcing steel net between the layers 																		
Inv. No prep.	Ch. sheet	Document	Signature	Date	<p>Unit 9.2 Waterproofing of the monolithic concrete floor of the construction being built</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 33%;">Stage</td> <td style="width: 33%;">Page</td> <td style="width: 33%;">Pages</td> </tr> <tr> <td>TP</td> <td>29</td> <td>30</td> </tr> <tr> <td colspan="3" style="text-align: center;"> LLC "ARENA Waterproofing Manufacturing plant" </td> </tr> </table>						Stage	Page	Pages	TP	29	30	LLC "ARENA Waterproofing Manufacturing plant"		
Stage	Page	Pages																	
TP	29	30																	
LLC "ARENA Waterproofing Manufacturing plant"																			
Approved																			
Developed																			

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First appl.	<h3 style="text-align: center;">Waterproofing of block walls</h3> <p style="text-align: center;">1. ARENA Seam Master PT 2. ARENA PolyElast PE</p> <p>- Arrangement of the U-shaped indenting, in size of 25x25 mm - Indenting cavity airtight packing with the ARENA SeamMaster PT material - application of the ARENA PolyElast PE material on the exterior faces of the walls made of concrete blocks on two separate occasions</p>										
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.	Ch. sheet	Document	Signature	Date	Unit 9.3 Waterproofing of block walls at the possibility of the foundation excavating	Stage	Page	Pages
Inv. No prep.	Approved								TP	29	30
	Developed								LLC "ARENA Waterproofing Manufacturing plant"		

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First appl.	<h3 style="margin: 0;">Airtight packing of the wall panels hairline joints</h3> <div style="text-align: center; margin: 20px 0;"> </div> <div style="margin-top: 20px;"> <p>1. Wall panel</p> <p>2. Prefabricated foundation</p> <p>3. ARENA Seam Master PT</p> <p>4. ARENA InMix PN</p> </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - Arrangement of the U-shaped indenting, in size of 25x25 mm - Indenting cavity treatment with the ARENA InMix PN material on two separate occasions - Indenting cavity airtight packing with the ARENA SeamMaster PT material - processing of the sealed indenting cavity and work surfaces stand back from the indenting edge by 50 mm in both directions with the ARENA InMix PN material on two separate occasions </div>											
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 10 Airtight packing of the wall panels hairline joints					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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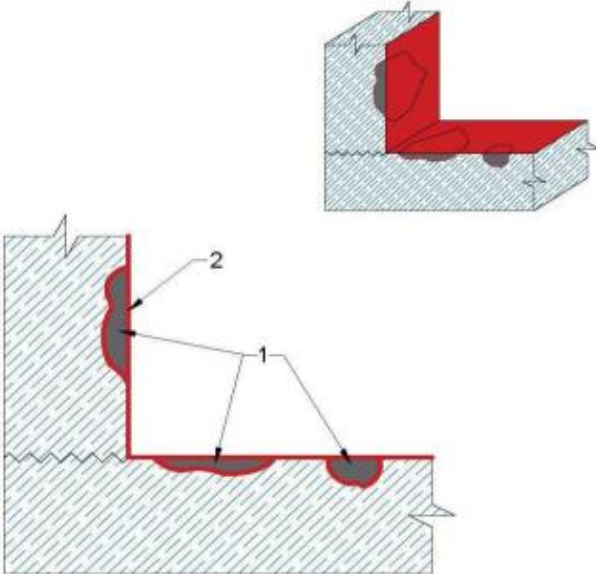
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First appl.	<h3 style="margin: 0;">Recovery of the geometric and operational characteristics of reinforced concrete constructions and products made of monolithic concrete</h3> <div style="text-align: center; margin: 20px 0;">  </div> <div style="margin-left: 20px;"> <p>1. ARENA Repair Master R300 (R500)</p> <p>2. ARENA InMix</p> </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - surface cleaning from structurally weak concrete and other dirt accumulations - application of the ARENA RepairMaster R500 material - processing of the sealed indenting cavity and work surfaces stand back from the edge of the site under repair by 50 mm in both directions with the ARENA InMix PN material on two separate occasions </div>									
Sign. and date	Inst. inv. No	Copy inv. No.	Sign. and date							
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 11. Repair of the monolithic concrete constructions			Stage	Page	Pages
Approved								TP	29	30
Developed								LLC "ARENA Waterproofing Manufacturing plant"		

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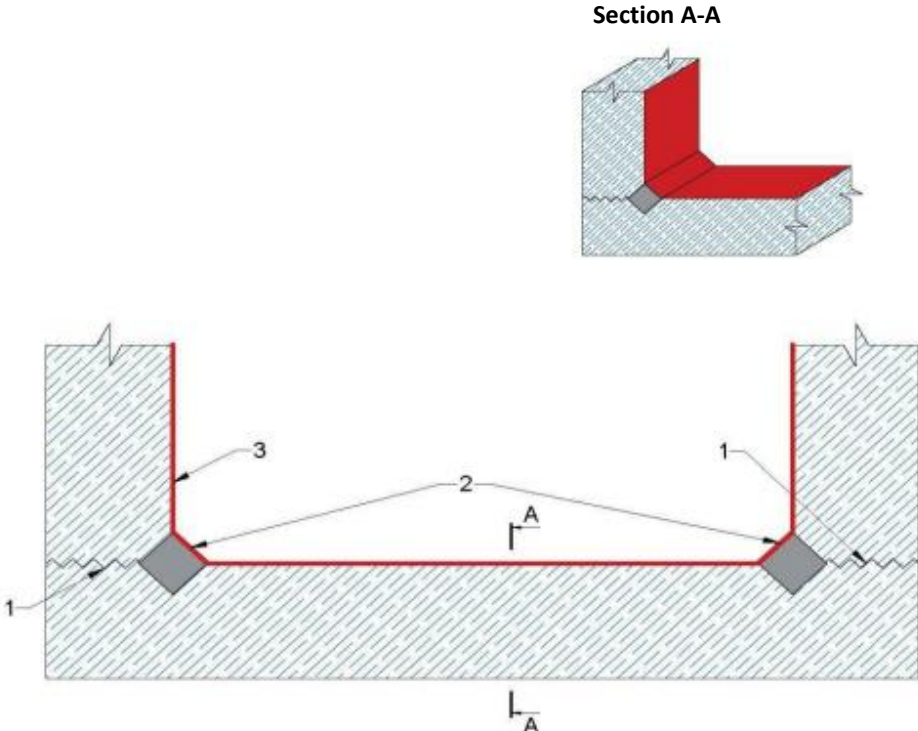
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First appl.	<h2 style="margin: 0;">Pool waterproofing</h2> <div style="text-align: right; margin-bottom: 10px;">Section A-A</div>  <div style="margin-top: 20px;"> <p>1. Construction joint</p> <p>2. ARENA Repair Master R300</p> <p>3. ARENA InMix</p> </div> <div style="margin-top: 20px;"> <p>- surface cleaning from dirt accumulations</p> <p>- Arrangement of the U-shaped indenting, in size of 25x25 mm</p> <p>- Indenting cavity airtight packing with the ARENA RepairMaster R300 material</p> <p>- application of the ARENA PolyElast PE material on the walls and the floor of the pool basin on two separate occasions</p> </div>											
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 12. Pool waterproofing					Stage	Page	Pages
	Approved									TP	29	30
	Developed									LLC "ARENA Waterproofing Manufacturing plant"		

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First appl.				
Sign. and date				
Copy inv. No.				
Inst. inv. No.				
Sign. and date				
Inv. No prep.				

Waterproofing of the concrete-asphalt hairline joint

1. Asphalt coating
2. Concrete construction
3. ARENA PolyElast PE in two layers, between which the reinforcing steel net is laid

- surface cleaning from dirt accumulations
- application of the ARENA PolyElast PE material to the asphalt with the entry on the wall, on two separate occasions, as well as with the laying of reinforcing steel net between the layers

Ch. sheet	Document	Signature	Date
Approved			
Developed			

Unit 13. Waterproofing of the concrete-asphalt hairline joint

Stage	Page	Pages
TP	29	30

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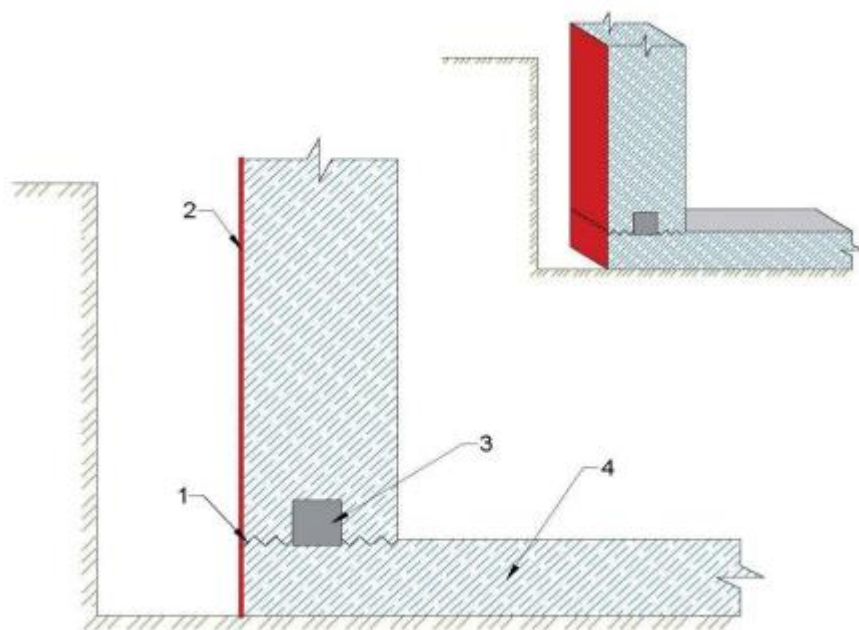
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First appl.	<h3>Waterproofing of foundation walls of the construction being built</h3>  <div style="margin-top: 20px;"> <p>1. Construction joint</p> <p>2. ARENA PolyElast PE</p> <p>3. ARENA DryDeform</p> <p>4. ARENA BiMix</p> </div> <p style="margin-top: 20px;">- use of the ARENA BiMix NS/PC admixture (3-6% of the binder) during construction</p> <p style="margin-top: 5px;">- laying of the bentonite ARENA DryDeform braid on the side of the construction joints (the distance from the timbering edge is not less than 50 mm)</p> <p style="margin-top: 5px;">- application of the ARENA PolyElast PE material on the exterior faces of the walls on two separate occasions</p>											
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 14. Waterproofing of foundation walls of the construction being built					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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First appl.	<p>Waterproofing of concrete and reinforced concrete constructions with cracks with the opening of not more than 0.4 mm. Capillary rebonding</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Water pressure</p> </div> <div style="text-align: center;"> </div> </div> <div style="margin-top: 20px;"> <p>1. Crack with the opening of not more than 0.4 mm</p> <p>2. ARENA InMix PN</p> </div> <div style="margin-top: 20px;"> <p>- surface cleaning from dirt accumulations</p> <p>- application of the ARENA in Mix PN material to the surface on two separate occasions</p> </div>									
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.							
Inv. No prep.	Ch. sheet	Document	Signature	Date	<p>Unit 15. Waterproofing of concrete and reinforced concrete constructions with cracks with the opening of not more than 0.4 mm. Capillary rebonding</p>					
Approved										
Developed					<p>Stage TP Page 29 Pages 30</p> <p>LLC "ARENA Waterproofing Manufacturing plant"</p>					

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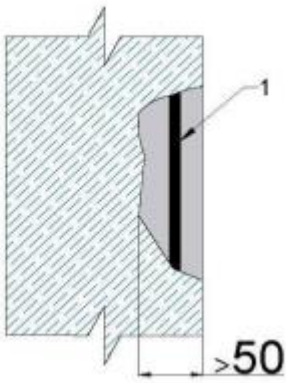
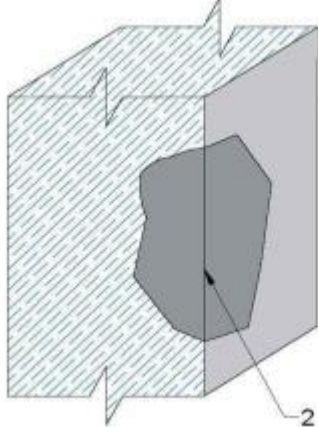
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First appl.	<h3 style="margin: 0;">Repair of the reinforced concrete product</h3> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;">   </div> <div style="margin-top: 20px;"> <p>1. Reinforcement</p> <p>2. ARENA RepairMaster R300(R500)</p> </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - surface cleaning from structurally weak concrete and other dirt accumulations - reinforcement corrosion treatment - application of the ARENA RepairMaster R300 or ARENA RepairMaster R500 material </div>											
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 16.1. Repair of the reinforced concrete products with a thickness of a repair compound applying not less than 50 mm					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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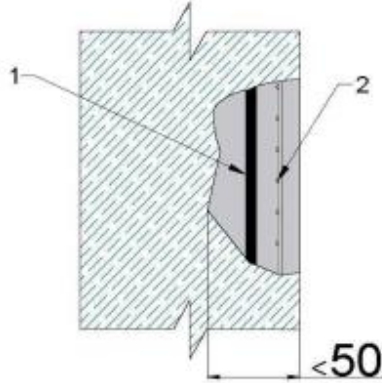
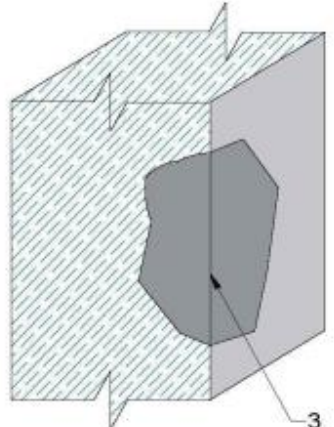
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First appl.	<h3 style="margin: 0;">Repair of the reinforced concrete product</h3> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;">   </div> <div style="margin-top: 20px;"> <p>1. Reinforcement</p> <p>2. Reinforcing steel net</p> <p>3. ARENA RepairMaster R300(R500)</p> </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - surface cleaning from structurally weak concrete and other dirt accumulations - reinforcement corrosion treatment - installation of reinforcing steel net - application of the ARENA RepairMaster R300 or ARENA RepairMaster R500 material </div>									
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.							
Inv. No prep.	Approved	Developed	Ch. sheet	Document	Signature	Date	Unit 16.2. Repair of the reinforced concrete products with a thickness of a repair compound applying not more than 50 mm			
							Stage TP	Page 29	Pages 30	
							LLC "ARENA Waterproofing Manufacturing plant"			

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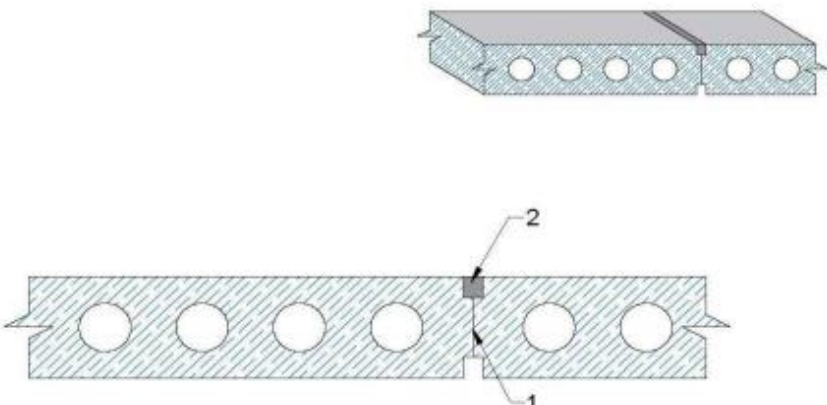
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First appl.	<h2 style="margin: 0;">Grouting of ceiling panel hairline joints</h2> <div style="text-align: center; margin: 20px 0;">  </div> <div style="margin-top: 20px;"> <p>1. Ceiling panel hairline joint</p> <p>2. ARENA FastMix Hot30 or ARENA FastMix EasyHot8</p> </div> <div style="margin-top: 20px;"> <p>- surface cleaning from different dirt accumulations</p> <p>- application of the ARENA FastMix Hot30 or ARENA FastMix EasyHot8 material</p> </div>											
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 17. Grouting of ceiling panel hairline joints					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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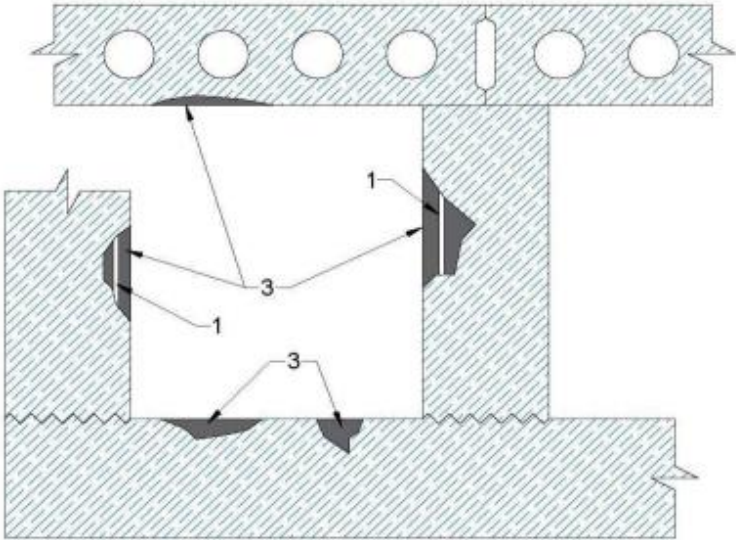
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First appl.	<h3 style="margin: 0;">Repair of the reinforced concrete products and monolithic concrete products at low temperatures</h3>  <div style="margin-top: 20px;"> <p>1. Reinforcement</p> <p>2. ARENA FastMix Hot30</p> <p>3. ARENA FastMix EasyHot8</p> </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - surface cleaning from different dirt accumulations - reinforcement corrosion treatment - installation of reinforcing steel net if necessary - application of the ARENA FastMix Hot30 material in standard and thixotropic versions </div>												
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.										
Inv. No prep.	Approved	Developed	Ch. sheet	Document	Signature	Date	Unit 18 Repair of the reinforced concrete products and monolithic concrete products at low temperatures				Stage	Page	Pages
											TP	29	30
										LLC "ARENA Waterproofing Manufacturing plant"			

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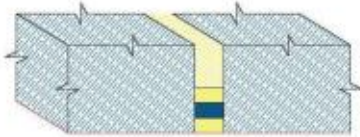
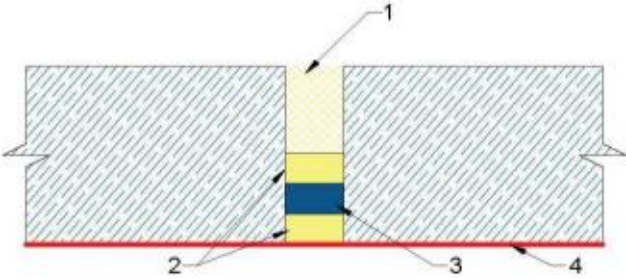
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First appl.	<h2 style="margin: 0;">Waterproofing of the contraction joint</h2> <div style="text-align: center; margin: 20px 0;">  </div> <div style="text-align: center; margin: 20px 0;">  </div> <div style="margin-top: 20px;"> <ol style="list-style-type: none"> 1. Expanded plastic 2. ARENA RepairMaster R300 3. ARENA DryDeform 4. ARENA InMix PN </div> <div style="margin-top: 20px;"> <ul style="list-style-type: none"> - expanded plastic laying - filling the indenting part with the ARENA RepairMaster R300 material - laying the concrete ARENA DryDeform braid - filling of the indenting with the ARENA RepairMaster R300 material over the laid ARENA DryDeform braid - processing of the indenting cavity with the ARENA InMix PN material on two separate occasions </div>											
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 19. Waterproofing of the contraction joint					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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First appl.	<h3>Protection of products in operation against alternate wetting and drying cycles</h3> <div style="text-align: center; margin: 20px 0;"> </div> <div style="margin-left: 100px;"> <p>1. Ceiling panel hairline joint</p> <p>2. ARENA RepairMaster R300</p> <p>3. ARENA PolyElast PE</p> </div> <div style="margin-top: 20px;"> <p>- surface cleaning from different dirt accumulations and structurally weak concrete</p> <p>- repair of the product with the ARENA RepairMaster R300 material</p> <p>- application of the ARENA PolyElast PE material on the exterior surfaces of the product on two separate occasions</p> </div>											
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 20.1 Protection of products in operation against alternate wetting and drying cycles					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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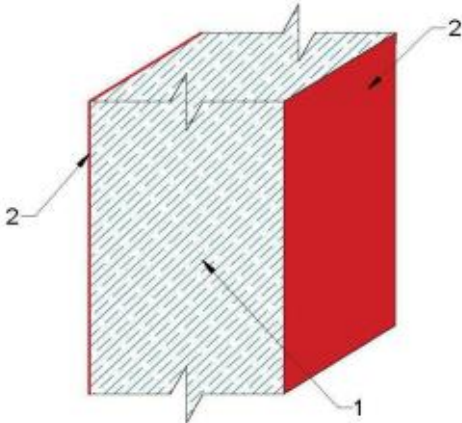
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First appl.	<h2 style="margin: 0;">Product being manufactured</h2> <div style="text-align: center; margin: 20px 0;">  </div> <div style="margin-top: 20px;"> <p>1. ARENA PolyElast PE</p> <p>2. ARENA EcoMix (1%) or ARENA BiMix NS/PC (3%)</p> </div> <div style="margin-top: 40px;"> <p>- use of the ARENA BiMix NS/PC admixture (3-6% of the binder) at the products manufacturing</p> <p>- application of the ARENA PolyElast PE material on the exterior surfaces of the product on two separate occasions</p> </div>									
Sign. and date	Sign. and date	Copy inv. No.	Inst. inv. No.							
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 20.2 Protection of products in operation against alternate wetting and drying cycles					
Approved										
Developed										
					Stage	Page	Pages			
					TP	29	30			
					LLC "ARENA Waterproofing Manufacturing plant"					

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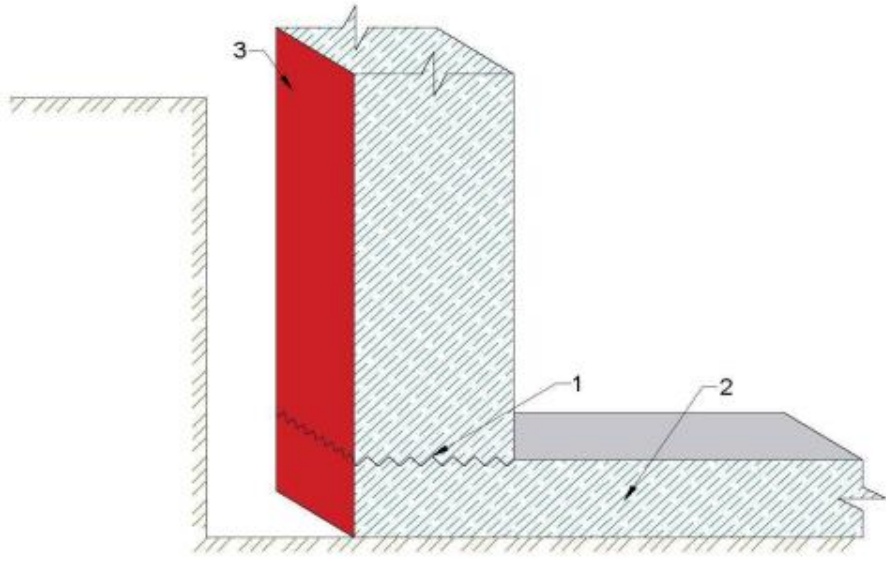
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First appl.	<h3>Waterproofing of foundation walls of the existing construction</h3>  <div style="margin-top: 20px;"> <p>1. Construction joint</p> <p>2. Hydraulic concrete</p> <p>3. ARENA PolyElast PE</p> </div> <p style="margin-top: 40px;">- application of the ARENA PolyElast PE material on the exterior faces of the walls on two separate occasions</p>											
Sign. and date	Copy inv. No.	Inst. inv. No.	Sign. and date									
Inv. No prep.	Ch. sheet	Document	Signature	Date	Unit 1. Abutting joint					Stage	Page	Pages
Approved										TP	29	30
Developed										LLC "ARENA Waterproofing Manufacturing plant"		

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