Artificial Turf Football Fields

Regulations for the Construction of a New Generation Artificial Turf Field

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INTRODUCTION

The Federal Sports Facilities Commission – Artificial Turf Department ("CISEA") of the National Amateurs' League (LND) of the Italian Football Association (FIGC) approved these Regulations during its session of January, 31st 2008.

All artificial turf fields which are to host competitions of the FIGC – LND Tournaments and of the Youth and Scholastic Sector, shall meet the regulatory and technical requirements in line with the standards and parameters laid down in these Regulations, and shall obtain LND type-approval.

Those fields which already have acquired a valid type-approval, issued according to provisions prior to January, 30th 2008, are excluded from application of the legislation laid down in these Regulations.

These Regulations supersede and replace the legislation on the subject issued on June, 5th 2006 and following modifications.

The Italian National Amateurs' League, in compliance with its founding principles of promotion of sport, safeguard of the health of the athletes and environmental protection, sets through these Regulations, standards for the development of artificial turf football fields and for related materials, setting standards and procedures for the design of such fields. LND fosters the development of artificial turf football fields complying with these Regulations, and provides advisory services to Public and Private bodies, on the matter of projects design and technical and economic specifications, for the purpose of implementing the proper procedures for the construction works of the fields, to be contracted or conducted directly.
The validation and testing technical services of the artificial turf fields, as laid down in these Regulations, as well as the advisory and support services which may be requested by those interested in the design of the projects and of the technical specifications related to the development of such fields, are performed with the technical structures of LND Servizi S.r.l., a LND's single-member company. In these Regulations, the National Amateurs' League and LND Servizi S.r.l., are referred to as "LND" for brevity, each with its jurisdiction.

BASIC ELEMENTS FOR THE PREPARATION OF THE PROGRAM OF ARTIFICIAL TURF FOOTBALL FIELDS

The basic elements for the preparation of the program of artificial turf football fields are:

- Performance features with specific tests to be conducted in laboratory and on field;
- Identification of the basic technical requirements for third and/or new generation artificial turf surfaces;
- Identification of the mandatory basic technical requirements for the infill products (silica sand, elastomer granule and organic products);
- Description of the subbase preparation works;
- Types of subbases;
- Artificial turf surface;
- Types of infill.

The evaluation criteria adopted by the Federal Sports Facilities Commission (CFIS) and later implemented and transformed into regulations by the Federal Sports Facilities Commission – Artificial Turf Department (CISEA) of the National Amateurs' League, on data sheets, samplings and suitability validations performed according to the results of laboratory tests and analysis, and of technical tests conducted on the fields of play, are:

1) **TESTS TO BE CONDUCTED AND COMPLIANCE TO THE REGULATORY FRAMEWORK;**
2) **CERTIFICATION OF THE SYSTEM COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK;**
3) **CERTIFICATION OF THE STABILIZING INFILL COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK;**
4) **CERTIFICATION OF THE PERFORMANCE INFILL COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK;**
5) **CERTIFICATION OF GLUE AND RESPECTIVE BINDING TAPE COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK (the two products are considered as an inseparable and unchangeable system);**

6) **CERTIFICATION OF THE SHOCKPAD COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK;**
7) **TECHNICAL REQUIREMENTS OF THE SUBBASE AND COMPLIANCE TO THE REGULATORY FRAMEWORK;**

Evaluation criteria in detail:

1. TESTS TO BE CONDUCTED AND COMPLIANCE TO THE REGULATORY FRAMEWORK

In its project "Quality Concept for Football Turf", with the Regulations "FIFA 1 STAR" and "FIFA 2 STAR", FIFA indicated the reference standards and parameters the employed products are to comply with; the following table indicates the procedures chosen to conduct the suitability tests.

The regulatory framework used to conduct the tests is:

STANDARD No.	TITLE
EN 12228 – 2002	Surfaces for sports areas - Determination of joint strength of synthetic surfaces
EN 12616 – 2002	Surfaces for sports areas - Determination of water infiltration rate
EN 13744 – 2004	Surfaces for sports areas. Procedure for accelerated ageing by immersion in hot water
EN 13036 – 2003	Part 7 – Irregularity measurement of pavement courses – The straightedge test
CNR UNI 10008/63	Subbases stabilized with chemical binders – Natural water content
CNR UNI 10014/64	Subbases stabilized with chemical binders – Atterberg limits
CNR UNI 10006	Subbases stabilized with chemical binders – Classification of lands
CNR B.U. 29/72	Subbases stabilized with chemical binders – Breakage test by compression of the sample mixed with the binder after 7 days maturation
ISO 8543 – 1998	Textile floor coverings – Methods for determination of mass
ISO 1763 – 1986	Carpets – Determination of number of tufts and/or loops per unit length and per unit area
ISO 2549 – 1972	Carpets – Determination of tuft leg length above the woven ground
ISO 4919 – 1978	Carpets – Determination of tuft withdrawal force
EN 430 – 1994	Resilient floor coverings – Determination of mass per unit area
EN 12230 – 2003	Surfaces for sports areas – Determination of tensile properties of synthetic sports surfaces
EN 1969 – 2000	Surfaces for sports areas. Determination of thickness of synthetic sports surfaces
EN 933 – 1997	Part 1 – Determination of particle size distribution - Sieving method
EN 14955 – 2004	Surfaces for sports areas - Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas
EN 1341 – 2000	Determination of physical properties – Apparent density in dry conditions
ISO 188 – 1982	Vulcanized rubber - Accelerated ageing and heat resistance tests
Limit of acceptable concentrations according to "Table A of attachment 1" for the purposes of the analysis of the infill materials (stabilizing and performance) in artificial grass football fields.	Toxicological tests for the protection of human health and of the environmental impact

DIN 18035-7 with LND restrictions (test in acid and aqueous solution, both values have to be met)	Toxicological tests for the protection of human health Control of the acceptability limits of heavy metals.
ISO 604 – 1993	Plastics – Determination of compressive properties
ISO 4892 Part 1 – 2001	Plastics – Methods of exposure to laboratory light sources – General guidance
ISO 4892 Part 2 – 2000	Plastics – Methods of exposure to laboratory light sources – Xenon-arc lamps
ISO 4892 Part 3 – 2000	Plastics – Methods of exposure to laboratory light sources – Fluorescent UV lamps
ISO 6487 -2002	Road vehicles – Measurement techniques in impact tests – Instrumentation
ISO 8295 – 2004	Plastics – Film and sheeting – Determination of the coefficients of friction
EN 13864 – 2004	Surfaces for sports areas – Determination of tensile strength of synthetic fibers
EN 20105-A02 – 1994	Tests for colour fastness of textiles. Grey scale for assessing change in colour
EN 12235 – 2004	Determination of vertical ball rebound
M010L	Determination of angle ball rebound
EN 12234 -2003	Determination of ball roll
pr EN 14808	Determination of shock absorption
pr EN 14809	Determination of vertical deformation
WI 217 059	Determination of rotational resistance
FIFA 07/05-01	Determination of linear friction and deceleration
FIFA 08/05-01	Determination of skin-surface friction
FIFA 09/05-01	Determination of skin abrasion
WI 217 049	Procedure for the mechanical simulation of the wear of the artificial carpet
FIFA 12/05-01	Determination of the deformation of the granules, residual compression and change in appearance
Project FIFA F.4	Energy restitution

- If the laboratory tests conducted on the system comply with ALL necessary requisites, they allow for the acquisition of the SYSTEM's suitability certification, issued by LND, which is the only entity entitled to it. SYSTEM refers to the INSEPARABLE set of products, presented as the set of parameters related to the declared amounts per square meter. Any variation of one of the products, in kind or amount, makes the system DIFFERENT and consequently not TYPE-APPROVABLE (except for the sand - as long as it is Certified - after performance laboratory tests have established that replacing - within the same System - that type of sand with other Certified sands, no significant variations to performance results have been registered. Consequently, Certified sands are interchangeable). Only certified SYSTEMS can be used for the construction of football fields in artificial grass. On LND's website, a list of the SYSTEMS and their manufacturers can be found.
- If the laboratory tests conducted on the STABILIZING INFILL (silica sand) comply with ALL necessary requisites, they allow for the acquisition of the certification, issued by LND, which is the only institution entitled to it. Only certified stabilizing infills can be used for the construction of football fields in artificial grass. On LND's website a list of the STABILIZING INFILLS and their manufacturers can be found.
- If the laboratory tests conducted on the PERFORMANCE INFILL (virgin thermoplastic elastomer granule, virgin EPDM elastomer granule, vulcanized rubber from old processed truck and light truck tires and organic products, as in tables "E" and "G") comply with ALL necessary requisites, they allow for the acquisition of the certification, issued by LND, which is the only entity entitled to it. Only certified performance infills can be used for the construction of football fields in artificial grass. On LND's website a list of the PERFORMANCE INFILLS and their manufacturers can be found.

To start the certification procedure, the artificial turf manufacturer shall comply with the following:

FOR THE CERTIFICATION OF THE SYSTEM (the word SYSTEM referring to the inseparable set of products, submitted for certification in the amounts per square meter declared when the certification was requested. Each variation in contrast with the required inseparability of the submitted products, if such products are not submitted for a new certification, may not build up a system according to definition):

- Artificial grass carpet, rubber or organic products granules **(RUBBER: OF ONE TYPE ONLY, MIXTURES OR STRATIFICATIONS OF RUBBERS OF DIFFERENT NATURES ARE NOT ALLOWED; ONLY THE EXTERNAL COLOUR OF THE GRANULE MAY VARY, WHEREAS THE BASIC GRANULE SHALL BE KEPT UNCHANGED AS REGARDS TYPE AND NATURE; ORGANIC: A SET OF ORGANIC FIBERS, ALSO OF VARIOUS KINDS, MIXED WITH ONE TYPE OF RUBBER ONLY; STRATIFICATIONS OF THE VARIOUS MATERIALS ARE NOT ALLOWED)** and/or sand **(OF ONE TYPE ONLY, MIXTURES OR SAND STRATIFICATIONS ARE NOT ALLOWED)** and or shockpad, in the amounts indicated in the "System Certification Procedure" **(Form no. 8)**, in case of variation (same carpet) with different rubber or organic granules but same sand "System Certification Procedure with variation of the performance infill" **(Form no. 9)**, in case of variation (same carpet) with same rubber or organic granules but different sand "System Certification Procedure with variation of the stabilizing infill" **(Form no. 10)**, and in case of variation (same carpet) with different rubber or organic granules and different sand "System Certification Procedure with variation of the stabilizing and performance infill" **(Form no. 11)**;

- "Application Form for System Certification", completely filled in and signed. Incomplete applications will not be processed "Application Form for System Certification" **(Form no. 8a)**, in case of variation (same carpet) with different rubber or organic granules but same sand "Application Form for System Certification with Variation of the Performance Infill" **(Form no. 9a)**, in case of variation (same carpet) with same rubber or organic granules but different sand "Application Form for System Certification with Variation of the Stabilizing Infill" **(Form no. 10a)**, and in case of variation (same carpet) with different rubber or organic granules and different sand "Application Form for System Certification with Variation of the Stabilizing and Performance Infill" **(Form no. 11a)**;

- Data sheets describing ALL system components, also indicating the relevant amounts per square meter. In case one of the documents is missing and/or incomplete, the application will not be processed.

- System components certifications already issued by LND.

FOR THE CERTIFICATION OF THE STABILIZING INFILL (silica sand):

- Stabilizing infill (silica sand) and artificial grass carpet (to be used as support for the tests) in the amounts indicated in the specific procedure "Certification Procedure of the Stabilizing Infill" **(Form no. 12)**;

- "Application Form for the Certification of the Stabilizing Infill", completely filled in and signed. Incomplete applications will not be processed "Application Form for the Certification of the Stabilizing Infill" **(Form no. 12a)**;

- Data sheets describing the stabilizing infill and the artificial grass carpet to be used for the abrasion test; in case one of the documents is missing and/or incomplete, the application will not be processed.

FOR THE CERTIFICATION OF THE PERFORMANCE INFILL (virgin thermoplastic elastomeric granule, virgin EPDM elastomeric granule, vulcanized processed rubber from old truck and light truck tires and organic products, as in tables "E" and "G"):

- Performance infill (virgin thermoplastic elastomer granule, virgin EPDM elastomer granule, vulcanized processed rubber from old truck and light truck tires and organic products, as in tables "E" and "G") in the amounts indicated in the specific procedure "Certification Procedure of the Performance Infill" **(Form no. 13)**;

- "Application Form for the Certification of the Performance Infill", completely filled in and signed. Incomplete applications will not be processed "Application Form for the Certification of the Performance Infill" **(Form no. 13a)**;

- Data sheets describing the performance infill and the artificial grass carpet to be used for the abrasion test; In case one of the documents is missing and/or incomplete, the application will not be processed.

<u>FOR THE CERTIFICATION OF THE GLUE AND RESPECTIVE BINDING TAPE</u> (the two products are considered as an inseparable and unchangeable system);

- Artificial carpet samples glued according to the procedures and the amounts indicated in the specific procedure "Certification Procedure of the Gluing System" **(Form no. 14)**;

- "Application Form for the Certification of the glue and respective binding tape", completely filled in and signed. Incomplete applications will not be processed "Application Form for the Certification of the Gluing System" **(Form no. 14a)**;

- Data sheets describing the glue, the tape and ALL artificial grass carpets used for the tests; in case one of the documents is missing and/or incomplete, the application will not be processed.

<u>FOR THE CERTIFICATION OF THE SHOCKPAD</u> (in rolls, interlocking plates and cast-in-situ):

- Shockpad samples in the amounts indicated in the specific procedure "Certification Procedure of the Shockpad" **(Form no. 15)**;

- "Application Form for the Certification of the Shockpad", completely filled in and signed. Incomplete applications will not be processed "Application Form for the Certification of the Shockpad" **(Form no. 15a)**;

- Data sheets describing the shockpad and ALL artificial grass carpets used for the tests; in case one of the documents is missing and/or incomplete, the application will not be processed.

For each performed certification, the laboratory appointed by LND shall register on a "Test report" all the data from the tests and/or analysis which have been conducted, and shall submit such report exclusively to LND – Sports Facilities Commission - Artificial Turf Department, in Rome. If all tests due for each trial are passed, LND shall issue a new document – "System Certification" or "Product Certification" – to be sent by registered mail with receipt of delivery exclusively to the applicant indicated on the certification application.
The certification shall be valid for 3 years, unless modifications are made to the Regulations, following which the certified system or the certified products do not comply with the new standards or parameters included in the regulations. In that case, the holder of the certification shall adjust the system to the new regulations.
Regardless of the regulatory modifications, the holder of the certification, within three years since the certification was issued, shall apply to LND no later than three months before the certification's expiry date, for the renewal of the certification, in case both the system and the products are unchanged. In case of any modifications to the system, the holder shall apply for the release of a new system certification no later than five months before the certification's expiry date. Both in case of a renewal and of a new certification, the whole procedure laid down in these Regulations shall be followed.

2. CERTIFICATION OF THE SYSTEM COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK. The application for certification can be submitted ONLY by artificial turf surfaces manufacturers:

The SYSTEM certification consists of two stages.
1) In the first stage, all laboratory tests provided for in the Regulations are conducted, in order to assess the suitability of the system to develop football fields in artificial grass, according to the requirements laid down in these Regulations. After all requirements are met, the SYSTEM, univocally identified by ALL products it consists of, receives LND certification.

1a) In case the certification applied for regards the performance infill, whose materials have never been tested previously by LND, the time required for validations shall not be less than five months.

1b) In case the certification applied for regards the performance infill, whose materials have already been tested by LND, the time required for validations shall not be less than two months.

2) The second stage consists of the validation of the field; if it complies with the declared and certified system, the field will be type-approved by LND.
The SYSTEM is acknowledged as valid, and consequently type-approved, ONLY if all components declared during the certification procedure have actually been employed for the construction of the field. Otherwise, that is to say if even ONE component ONLY has changed, the field **WILL NOT BE TYPE-APPROVED**.

3. CERTIFICATION OF THE STABILIZING INFILL COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK (silica sand). The application for certification can be submitted both by Stabilizing Infill manufacturers, and by artificial turf surfaces manufacturers:

The stabilizing infill shall have the characteristics laid down in table "D" of these Regulations.
The suitability of the product, and whether the product meets the minimum criteria required, is determined by means of laboratory tests. After all due tests are passed and all criteria are met, the stabilizing infill receives LND certification.

4. CERTIFICATION OF THE PERFORMANCE INFILL COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK (virgin thermoplastic elastomer granule, virgin EPDM elastomer granule, vulcanized processed rubber from old truck and light truck tires **and organic products). The application for certification can be submitted both by Performance Infill manufacturers, and by artificial turf surfaces manufacturers:**

The performance infill shall have the characteristics laid down in tables "E" and "G" of these Regulations.
The suitability of the product, and whether the product meets the minimum criteria required, is determined by means of laboratory tests. After all due tests are passed and all criteria are met, the performance infill receives LND certification.
The time required for validations will not be less than five months.

5. CERTIFICATION OF GLUE AND RESPECTIVE BINDING TAPE COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK (the two products are considered as an inseparable and unchangeable system). The application for certification can be submitted both by Gluing Systems manufacturers, and by artificial turf surfaces manufacturers:

The "gluing system" shall withstand the mechanical stress occurring in the uses it is intended for, in order to avoid any problems arising from failures of the joints.
The suitability of the product, and whether the product meets the minimum criteria required, is determined by means of laboratory tests. After all due tests are passed and all criteria are met, the "gluing system" receives LND certification.

6. CERTIFICATION OF THE SHOCKPAD COMPLYING WITH THE REGULATIONS' REGULATORY FRAMEWORK;

The shockpad shall meet the dimensional stability and characterization criteria laid down in these Regulations. After all due tests are passed and all criteria are met, the shockpad receives LND certification.

7. TECHNICAL REQUIREMENTS OF THE SUBBASE AND COMPLIANCE TO THE REGULATORY FRAMEWORK

The following basic criteria for the subbase structures, which shall be met during construction, have been set out.

- Slope, Flatness and number of construction pitches (see table no. 2.1 – 3.1);
- Superficial Drainage (see table no. 2.1 – 3.1);
- Vertical and Horizontal Drainage (see table no. 2.2 – 3.2);
- Stratigraphy (see table no. 2.3 – 2.4 - 3.3 – 3.4 – 3.5 – 3.6);

See attached drawings, which are an integral part of these Regulations.

LABORATORY TESTS FOR THE CERTIFICATION OF THE SYSTEM
system refers to artificial grass surface + stabilizing infill + performance infill + shockpad
(stabilizing infill and/or shockpad if employed)
TABLE "A"

TECHNICAL REQUIREMENTS OF THE ARTIFICIAL TURF	REQUIREMENTS OF THE NATIONAL AMATEURS' LEAGUE AND OF THE YOUTH AND SCHOLASTIC SECTOR
Identification of the primary fiber:	
▪ Fiber material;	Non abrasive, lubricated PE, NY
▪ Fiber colour;	Green (mandatory) max 2 shades
▪ Yarn in Dtex;	Min.9.000Dtex – Compliant with statement± 5%
▪ Pile weight per square meter;	Compliant with statement ± 5%
▪ Fiber thickness in micron;	Min. 100µ - Compliant with statement ± 5%
▪ Number of tufts per square meter;	Compliant with statement ± 5%
▪ Number of piles per tuft (prefibrillated – monofilament);	Compliant with statement
▪ Tuft pattern (lines – zigzag – wavy);	Compliant with statement
▪ Total fiber height excluding support (fibrillated and monofilament);	Min. 45 mm max 60 mm only for 11-a-side football. Allowed between 65 mm and 75 mm only for mixed fields 11-a-side football / rugby. ± 4% tolerance (for curled fiber, the calculation of tolerance must be applied to the extended tuft)
▪ Fiber type (prefibrillated – monofilament);	Compliant with statement
▪ Fiber structure (smooth);	Compliant with statement ± 4%
▪ Free pile height;	10 to 15 mm
▪ Tuft withdrawal;	≥ 35 Nm
Identification of the secondary fiber:	
▪ Fiber material;	Non abrasive, lubricated PE, NY
▪ Fiber colour (green mandatory);	Green (mandatory) max 2 shades
▪ Yarn in Dtex;	Min.8.800Dtex – Compliant with statement± 5%
▪ Pile weight per square meter;	Compliant with statement ± 5%
▪ Fiber thickness in micron;	Min. 100µ - Compliant with statement ± 5%
▪ Number of tufts per square meter;	Compliant with statement ± 5%
▪ Number of piles per tuft (prefibrillated – monofilament);	Compliant with statement
▪ Tuft pattern (lines – zigzag – wavy);	Compliant with statement
▪ Total fiber height excluding support;	For straight fiber, maximum height shall not exceed the primary fiber. With ± 4% tolerance. For curled fiber, maximum height shall not exceed 50% of primary fiber. With ± 4% tolerance.
▪ Fiber type (prefibrillated – monofilament);	Compliant with statement
▪ Fiber structure (curled – smooth);	Compliant with statement
▪ Tuft withdrawal;	≥ 35 Nm
Identification of the fiber of line markings: (the fiber shall be identical to that of the surface on which the fiber will be woven or glued)	
▪ Fiber material;	Non abrasive, lubricated PE, NY
▪ Fiber colour;	White (mandatory)
▪ Yarn in Dtex;	Min.9.000Dtex – Compliant with statement± 5%
▪ Pile weight per square meter;	Compliant with statement ± 5%

▪ Fiber thickness in micron; ▪ Number of tufts per square meter; ▪ Number of piles per tuft (prefibrillated – monofilament); ▪ Tuft pattern (lines – zigzag – wavy); ▪ Total fiber height excluding support (fibrillated and monofilament); ▪ Fiber type (prefibrillated – monofilament); ▪ Fiber structure (smooth); ▪ Free pile height; ▪ Tuft withdrawal;	Min. 100µ - Compliant with statement ± 5% Compliant with statement ± 5% Compliant with statement Compliant with statement Min. 45 mm max 60 mm only for 11-a-side football. Allowed between 65 mm and 75 mm only for mixed fields 11-a-side football / rugby. ± 4% tolerance (for curled fiber, the calculation of tolerance must be applied to the extended tuft) Compliant with statement Compliant with statement ± 4% 10 to 15 mm ≥ 35 Nm
Identification of the performance infill:	
▪ LND certification; ▪ Chemical entity of the product; ▪ Granulometric curve of synthetic chemicals; ▪ Form of the granules of synthetic chemicals; ▪ Size of the particles of organic products; ▪ Form of organic particles; ▪ Form of organic particles; ▪ Granulometric curve of granules of organic products, or coated granules; ▪ Form of the granules of organic products; ▪ Colour of synthetic chemicals; ▪ Aspect of the surface of synthetic chemicals; ▪ Apparent density of synthetic chemicals; ▪ Amount per square meter in the system in Kg; ▪ Thickness in millimeter related to the amount in the system;	Mandatory presentation Compliant with statement d ≥ 0.5 D ≤ 2.5 mm Irregular but with rounded corners – round shape, between an ellipsis and a cylinder Ground: 0.0 mm. to 0.315 mm. presence 0% tolerance + 8% 0.316 mm. to 1.0 mm. max. presence ≤ 20% tolerance ± 8% 1.01 mm. to 3.15 mm. max. presence ≤ 70% tolerance ± 8% 3.16 mm. to 25.0 mm. max. presence ≤ 10% tolerance ± 8% Irregular (0.0 mm. to 3.15 mm.) Filamentous (3.16 mm to 25.0 mm) d ≥ 0.5 D ≤ 3.4 mm. Irregular, round shape Green, brown, mix of the two colours and grey, non-staining Not smooth but rather porous Compliant with statement ± 5% Compliant with statement Compliant with statement ± 5%
Identification of the primary backing:	
▪ Chemical entity of the product; ▪ LND Certificate; ▪ Thickness of primary backing; ▪ Weight per square meter; ▪ Type of impregnating agent (latex or polyurethane resins); ▪ Weight per total square meter (primary backing + impregnating agent in grams).	Compliant with statement and in line with "Table A of attachment 1" If available Compliant with statement ± 5% Compliant with statement ± 5% Compliant with statement and in line with "Table A of attachment 1" Compliant with statement ± 5%
Identification of the elastic shockpad (if available):	

▪ Chemical entity of the product; ▪ LND Certificate; ▪ Thickness of the shockpad; ▪ Weight per square meter in Kg; ▪ Type (rolls, interlocking plates and cast-in-situ); ▪ Dimensional stability.	Compliant with statement and in line with "Table A of attachment 1" If available ≤ 25 mm Compliant with statement ± 5% Compliant with statement ± 5% Compliant with statement ≤ 0,5%
Identification of the tape for glued joints: ▪ Type (film – geotextile); ▪ LND Certificate; ▪ Thickness of the tape in millimeters; ▪ Weight per square meter in grams; ▪ Width of the tape in millimeters;	 Compliant with statement If available Compliant with statement ± 5% Compliant with statement ± 5% Min. 400 mm ± 5%
Identification of the glue: ▪ Chemical entity of the product; ▪ LND Certificate; ▪ Amount per linear meter used in the system in Kg.	 Compliant with statement and in line with "Table A of attachment 1" If available Compliant with statement ± 5%
System analysis by means of performance and mechanical strength laboratory tests: ▪ System's permeability (grass + sand + rubber); ▪ Thickness of the shockpad; ▪ Weight of the shockpad per square meter; ▪ Mass of the shockpad per square meter; ▪ Shock absorption of the shockpad; ▪ Vertical deformation of the shockpad; ▪ Ball roll on dry surface in the direction of the pile; ▪ Ball roll on dry surface against the direction of the pile; ▪ Ball roll on wet surface in the direction of the pile; ▪ Ball roll on wet surface against the direction of the pile; ▪ Resistance to studs and abrasion using Lisport; ▪ Effects of vibrations during impact; ▪ Shock absorption on the system before Lisport without studs on dry surface; ▪ Shock absorption on the system before Lisport without studs on wet surface; ▪ Shock absorption on the system after Lisport without studs on dry surface; ▪ Shock absorption on the system after Lisport without studs on dry surface; ▪ Vertical deformation on the system before Lisport without studs on dry surface; ▪ Vertical deformation on the system before Lisport without studs on wet surface; ▪ Vertical deformation on the system after Lisport without studs on dry surface;	 >360 mm/h ≤ 25 mm Compliant with statement ± 5% Compliant with statement ± 5% Compliant with statement ± 5% Compliant with statement ± 5% Compliant with statement ± 5% 4 ÷ 10 mt. 4 ÷ 10 mt. 4 ÷ 10 mt. 4 ÷ 10 mt. Assessment of surface wear The accelerations' amplitudes shall comply with the following values: ≤ 20m/s² within the range 0 ÷ 10 Hz ≤ 8 m/s² within the range 10 ÷ 20 Hz ≤ 4 m/s² within the range 20 ÷ 50 Hz 55 ÷ 70% 55 ÷ 70% 55 ÷ 70% 55 ÷ 70% 4 ÷ 9 mm. 4 ÷ 9 mm. 4 ÷ 9 mm.

▪ Vertical deformation on the system after Lisport without studs on wet surface;	4 ÷ 9 mm.
▪ Energy return on the system before Lisport without studs on dry surface;	30 ÷ 50%
▪ Energy return on the system before Lisport without studs on wet surface;	30 ÷ 50%
▪ Energy return on the system after Lisport without studs on dry surface;	30 ÷ 50%
▪ Energy return on the system after Lisport without studs on wet surface;	30 ÷ 50%
▪ Vertical ball rebound on the system before Lisport on dry surface;	60 ÷ 85 cm equal to 30 ÷ 42.5%
▪ Vertical ball rebound on the system before Lisport on wet surface;	60 ÷ 85 cm equal to 30 ÷ 42.5%
▪ Vertical ball rebound on the system after Lisport on dry surface;	60 ÷ 85 cm equal to 30 ÷ 42.5%
▪ Vertical ball rebound on the system after Lisport on wet surface;	60 ÷ 85 cm equal to 30 ÷ 42.5%
▪ Rotational tensile on the system before Lisport on dry surface;	30 ÷ 45 Nm. (optimum values 37 ÷ 43)
▪ Rotational tensile on the system before Lisport on wet surface;	30 ÷ 45 Nm. (optimum values 37 ÷ 43)
▪ Rotational tensile on the system after Lisport on dry surface;	30 ÷ 45 Nm. (optimum values 37 ÷ 43)
▪ Rotational tensile on the system after Lisport on wet surface;	30 ÷ 45 N/m. (optimum values 37 ÷ 43)
▪ Angle ball rebound on the system before Lisport on dry surface;	45 ÷ 60%
▪ Angle ball rebound on the system before Lisport on wet surface;	45 ÷ 80%
▪ Angle ball rebound on the system after Lisport on dry surface;	45 ÷ 60%
▪ Angle ball rebound on the system after Lisport on wet surface;	45 ÷ 80%
▪ Validation of the amount of fiber lost after the abrasion cycle;	≤ 0,5%
▪ Validation of the fiber fading after the abrasion cycle;	No fading allowed
▪ Validation of the fibrillation of the free tuft after the abrasion cycle (in case of prefibrillated tuft);	Proper fibrillation; not compliant if no fibrillation takes place
▪ Validation of unthreading and consequent fiber damage after abrasion cycle;	Non-compliant if fibrillation is excessive and the tape can be cut over the natural construction width.
▪ Validation of the shortening for fiber damage after the abrasion cycle;	Up to a maximum of 5%
▪ Tuft withdrawal force of the tuft from the primary backing;	
▪ Tuft withdrawal force of the glued joint;	≥ 35N
▪ Joints disjunction resistance (tape – primary backing);	≥ 15N/mm.
▪ Withdrawal force of the primary backing in both directions (horizontal and vertical);	≥ 1.2N/mm. ≥ 20N/mm.
▪ Validation of the dimensional stability of the artificial carpet;	
▪ UV resistance, according to test method, of green and white fibers. N.B.: whenever a RAL change of the two colours takes places, the UV resistance test shall be conducted again.	≤ 0,5% 3000 hours exposure by means of 313 nm lamps. The reduction of the tensile value after UV exposure shall not exceed 50% of the tensile value registered before UV exposure.

TEST ON THE SUBBASE TO APPROVE THE DEVELOPMENT AND THE LAYING OF THE ARTIFICIAL CARPET
(Draining aggregates – Non draining compacted aggregates)
TABLE "B"

TECHNICAL REQUIREMENTS FOR THE DEVELOPMENT	REQUIREMENTS OF THE NATIONAL AMATEURS' LEAGUE AND OF THE YOUTH AND SCHOLASTIC SECTOR
Permeability of the subbase	> 360mm/h
Validation of the number of pitches	4 pitches as in pitches no. 2.1 2 pitches as in pitches no. 3.1
Construction slopes	(4 pitches) 0.3 ÷ 0.5 % tolerance ± 0.05 % (2 pitches) 0.58 to 0.63 % tolerance ± 0.00 %
Evenness of the playing surface for vertical drainage Evenness of the playing surface for horizontal drainage	± 1.0 cm. on 3.0 mt. ± 0.5 cm. on 3.0 mt.
Dynamic module of deformation of the compaction of the subbase	Evd ≥ 30 MN/mq
Draining aggregates for vertical drainage	Stratigraphy as in tables no. 2.3 – 2.4
Non draining aggregates (for horizontal drainage under the carpet)	As in tables no 3.3 – 3.4 – 3.5 – 3.6

FIELD TESTS FOR THE FINAL TYPE-APPROVAL OF THE PLAYING SURFACE
TABLE "C"

PERFORMANCE TECHNICAL REQUIREMENTS	REQUIREMENTS OF THE NATIONAL AMATEURS' LEAGUE AND OF THE YOUTH AND SCHOLASTIC SECTOR
Shock absorption (with and without studs)	55 ÷ 70%
Vertical deformation (with and without studs)	4 ÷ 9 mm.
Energy return (with and without studs)	30 ÷ 50%
Vertical ball rebound	60 ÷ 85 cm equal to 30 ÷ 42.5%
Angle ball rebound	45 ÷ 60% dry or 45 ÷ 80% wet
Rotational tensile	30 ÷ 45 Nm (optimum values 37 ÷ 43)
Ball roll	4 ÷ 10 mt.
Construction slopes	(4 pitches) 0.3 ÷ 0.5 % tolerance ± 0.05 % (2 pitches) 0.58 to 0.63 % tolerance ± 0.00 %
Surface evenness for vertical drainage Surface evenness for horizontal drainage	± 1.0 cm. on 3.0 mt. ± 0.5 cm. on 3.0 mt.
Validation of the measurements of the field markings	Compliant with the markings approved by the Sector Regulations; as in tables no. 1.1 -1.2

LABORATORY TESTS FOR THE CERTIFICATION OF THE

STABILIZING INFILL MATERIALS
(silica sand)
TABLE "D"

BASIC MANDATORY MINIMUM REQUIREMENTS OF THE STABILIZING INFILL PRODUCT	REQUIREMENTS OF THE NATIONAL AMATEURS' LEAGUE AND OF THE YOUTH AND SCHOLASTIC SECTOR
Chemical entity of the product	Compliant with statement and in line with "Table A of attachment 1"
Silica content of the product	≥ 85%
Geometric form of the granules under microscope	Irregular but with rounded corners – roundish
Apparent density	Compliant with statement ± 5%
Resistance to abrasion using Lisport	The product shall not undergo any modification caused by mechanical abrasion
Granule distribution before tests	d ≥ 0.4 D ≤ 1.25 mm
Granule distribution after abrasion cycle	d ≥ 0.4 D ≤ 1.25 mm
Product permeability	> 360 mm/h
Coefficient of sand friction	< 20%
Product dustiness	Free from dust (max 0.5% less than 0.08µ)

LABORATORY TESTS FOR THE CERTIFICATION OF THE PERFORMANCE INFILL MATERIALS
(virgin thermoplastic elastomeric granule, virgin EPDM elastomeric granule (raw material cannot be less than 22% of the total weight of the compound), organic products and vulcanized rubber granule from old processed truck and light truck tires)
TABLE "E"

BASIC MANDATORY REQUIREMENTS OF THE PERFORMANCE INFILL PRODUCT	REQUIREMENTS OF THE NATIONAL AMATEURS' LEAGUE AND OF THE YOUTH AND SCHOLASTIC SECTOR
Chemical entity of the product (ATG)	Compliant with statement and in line with "Table A of attachment 1"
Geometric form of the synthetic chemical granules (irregular but with rounded corners – roundish, between an ellipsis and a cylinder)	Compliant with statement
Geometric form of the organic products (particles, filaments and roundish irregular granules)	Compliant with statement
Aspect of the surface of synthetic chemicals	Not smooth but rather porous
Colour of synthetic chemicals	Green, brown, mix of the two colours and grey, non-staining
Apparent density of synthetic chemicals	Compliant with statement ± 5%
Resistance to abrasion using Lisport	The product shall not undergo any modification caused by mechanical abrasion: the test consists of 15˙200 cycles for the vulcanized rubber granule from old processed truck and light truck tires; the test consists of 12.200 cycles for all other products of the synthetic

	chemicals. For organic products (particles, filaments and granules): test consisting of 5˙200 cycles
Granule distribution before the tests of synthetic chemicals	d ≥ 0.5 D ≤ 2.5 mm
Granule distribution after the abrasion cycle of the synthetic chemicals	d ≥ 0.5 D ≤ 2.5 mm
Colorimetric analysis (grey scale) on the product before the tests of synthetic chemicals	≥ 3
Resistance of the product to UV exposure of the synthetic chemicals	The product shall not undergo any modification caused by ultraviolet light
Colorimetric analysis (grey scale) on the product after UV exposure of synthetic chemicals	≥ 3
Quantitative analysis after UV exposure cycle (ATG) of the synthetic chemicals	No variation compared to the initial analysis
Resistance of the product to hot air/water exposure of the synthetic chemicals	The product shall not undergo any modification caused by weather exposure
Granule distribution after the hot air exposure cycle of the synthetic chemicals	d ≥ 0.5 D ≤ 2.5 mm
Granule distribution after the hot water exposure cycle of the synthetic chemicals	d ≥ 0.5 D ≤ 2.5 mm
Colorimetric analysis (grey scale) after the hot air exposure cycle of synthetic chemicals	≥ 3
Colorimetric analysis (grey scale) after the hot water exposure cycle of synthetic chemicals	≥ 3
Quantitative analysis after hot air/water exposure cycle (ATG) of the synthetic chemicals	No variation compared to the initial analysis
Analysis to determine the presence of heavy metals (MEB) of synthetic chemicals	The presence of heavy metals is not allowed
Toxicological chemical analysis of the granule to assess the amounts of Organic carbon in solution, Lead, Cadmium, Chrome, Hexavalent chrome, Mercury, Tin and Zinc.	In line with "Table A of attachment 1"
DIN 18035-7 with LND restrictions (test in acid and aqueous solution, both values have to be met)	Toxicological tests for the protection of human health Control of the acceptability limits of heavy metals.
Validation of the quantity of EOX	≤ 100mg/Kg
Validation of the presence of HAP	NONE

LABORATORY TESTS FOR THE CERTIFICATION OF THE GLUING SYSTEM

(glue + binding tape)

TABLE "F"

BASIC MANDATORY MINIMUM REQUIREMENTS OF THE GLUING SYSTEM	REQUIREMENTS OF THE NATIONAL AMATEURS' LEAGUE AND OF THE YOUTH AND SCHOLASTIC SECTOR
Chemical entity of the product (glue)	Compliant with statement and in line with "Table A of attachment 1"
Minimum amount per linear meter of the product (glue)	Compliant with statement ± 5%
Joint withdrawal force	≥ 15N/mm
Tags ungluing resistance	≥ 120Nm
Identification of glue	Compliant with statement
Identification of tape	Compliant with statement
Width of binding tape (both to connect two sheets and to insert markings)	≥ 400 mm.

BASIC MANDATORY TECHNICAL REQUIREMENTS FOR THE STABILIZING AND PERFORMANCE INFILL MATERIALS

TABLE "G"

STABILIZING INFILL MATERIALS **MIXTURES OF CERTIFIED PRODUCTS ARE NOT ALLOWED**	
Amount of silica	Silica, washed, cleaned and dried with a minimum silica amount of 85% with granules of irregular form but with rounded corners – round shape (in order to avoid artificial turf damage)
Geometric form of the granules under microscope	Irregular but with rounded corners – round shape
Friability index	< 20%
Granule distribution (mm)	d ≥ 0.4 D ≤ 1.25 mm
PERFORMANCE INFILL MATERIALS	
Characteristics	1) Extruded compounds made up of granules consisting of virgin thermoplastic rubber, free from recycled components and/or wastage deriving from manufacturing related to other use sectors; also extruded plates, properly cut off on the top with blades and consequently not crushed; 2) Compounds based on virgin EPDM rubber (raw material shall not be less than 22% of the total weight of the compound), extruded compounds made up of granules and/or plates, later crushed into particles, free from dust and recycled components and/or wastage deriving from manufacturing related to other use sector. 3) Organic products: set of particles and fibers and/or granules of organic products, also of various kind,

	mixed with one type of rubber only. The mixture shall comply with precise percentages, which vary according to the rubber granules being used (processed rubber granules, virgin thermoplastic elastomer granules and virgin EPDM rubber granule) referring to the weight per square meter. The percentage breakdown between organic fibers and rubber granules, also depending on the kind of carpet being used, shall be indicated on each "System Certification" issued by LND. A limited percentage of certified silica sand can also be added to the mixture. Stratifications of the various materials are not allowed. The products shall comply with the requirements of the standards included in these Regulations for the infill products, as well as with any new regulations which may be necessary, to which the LND refers. 4) Coated organic products: properly coated organic product granules, then encapsulated in a film made of a special polyurethane resin, flexible and resistant, and free from pollutants. This coating shall comply with the above mentioned toxicological regulations. 5) Vulcanized rubber from old truck and light truck tires, ground in tiny particles, washed, free from dusts, metal parts and ply, varnished, coated and then encapsulated with harmless virgin products (processing), flexible and resistant, obtained in particular and specific processings. The particles or granules, before the varnishing and coating operations, shall comply with the above mentioned toxicological regulations. The granules derived from this procedure are called "processed rubber granules" by LND.
Geometric form of the synthetic chemical granules (irregular but with rounded corners – round shape, between an ellipsis and a cylinder)	Compliant with statement
Geometric form of the organic products (particles, filaments and round shape irregular granules)	Compliant with statement
Aspect of the surface of synthetic chemicals	Not smooth but rather porous
Colour of synthetic chemicals	Green, brown, mix of the two colours and grey, non-staining
Odour	Absence of unpleasant odour
Granule distribution of synthetic chemicals (mm)	d ≥ 0.5 D ≤ 2.5 mm.
Granule distribution of the particles of organic products (mm)	Ground: 0.0 mm. to 0.315 mm. presence 0% tolerance + 8% 0.316 mm to 10 mm max. presence ≤ 20% tolerance ± 8% 1.01 mm to 3.15 mm max. presence ≤ 70% tolerance ± 8% 3.16 mm to 25.0 mm max. presence ≤ 10% tolerance ± 8%
Granule distribution of granules of organic products, or coated granules (mm)	d ≥ 0.5 D ≤ 3.4 mm

The infill can either be performed with a combination of a layer of sand (on the ground) and a layer of rubber or organic granules (on the surface), or exclusively with rubber granules, organic granules, or specific materials, if certified by LND.

The free-standing fiber (not covered by infill) shall be between 10 and 15 mm. (once the infill has "settled").

In any case, a mixture of the stabilizing infill - if available - (silica sand) with the performance infill (virgin thermoplastic elastomer granule, virgin EPDM elastomer granule, vulcanized processed rubber or organic products) shall be avoided, in order to prevent any damage to the system and the consequent loss of the initial performance.

LABORATORY TESTS FOR THE CERTIFICATION OF THE ELASTIC SHOCKPAD

TABLE "H"

BASIC MANDATORY MINIMUM REQUIREMENTS OF THE ELASTIC SHOCKPAD	REQUIREMENTS OF THE NATIONAL AMATEURS' LEAGUE AND OF THE YOUTH AND SCHOLASTIC SECTOR
Chemical entity of the product	Compliant with statement and in line with "Table A of attachment 1"
Weight per square meter	Compliant with statement ± 5%
Weight per cubic meter	Compliant with statement ± 5%
Withdrawal force	≥ 2N/mm.
Dimensional stability	≤ 0,5%
Thickness in millimeters	≤ 25 mm Compliant with statement ± 5%
Shock absorption	Compliant with statement ± 5%

Shockpad
Draining shockpad, whose thickness has been stated in the system certification, to be placed between the surface of the subbase (whichever that is) and the artificial grass carpet. The shockpad shall only be used if, once the product has been certified and accepted by LND, it has been certified as a component of the "Carpet System", and consequently uniquely in conjunction with the type of carpet of the system it is part of. This layer can be: 1) made from prefabricated material, 2) laid with finishing machine, cold mixing a polyurethane resin with 1÷6 mm thick rubber granules, leveling the small unevennesses of the top subbase layer, ensuring the proper evenness of the surface where the carpet is to be laid, as laid down in these Regulations. In any case, all products employed to this end shall be compliant with "Table A of attachment 1".

Subbase Draining (on field)

All performance criteria, laid out in the previous paragraphs, relating to the suitability of the playing field to the required use, shall be fulfilled also in case of rain.
According to the standard, it should be determined whether a playing field is capable of absorbing a minimum amount of water in a set period of time. Permeability is determined directly, on the playing field, when the subbase is finished but before the grass carpet is laid . Two types of drainage are possible, as indicated below:

Subbases with vertical drainage:
water is to be absorbed VERTICALLY and not horizontally, in order to avoid jeopardizing the installation's performance, through the removal of rubber granules or on the basis of the stabilizing sand.
A double ring infiltrometer is used, inserted on the surface of the subbase, with the draining aggregates layers, so that water is forced to penetrate vertically and not to flow horizontally because of the slope. The test is conducted on different spots of the field.
Subbases with horizontal drainage under the carpet:
In such subbases water is to be transported HORIZONTALLY under the carpet, and not vertically, in order to avoid jeopardizing the installation's performance, through the removal of rubber granules or on the basis of the stabilizing sand.
A double ring infiltrometer is used, inserted on the surface of the subbase, in those types of subbases in which aggregates are laid on the land drainage, so that water is forced to penetrate vertically and not to flow horizontally on the impermeable membrane because of the slope. The test is conducted on different spots of the field.
The infiltrometer will not be used with the types of subbases in which the land drainage is directly in contact with the carpet, as this material has already been tested for this purpose.
The land drainage is a 'product' consisting of a kind of 'sandwich structure', with a minimum thickness of 10 mm and a maximum thickness of 25 mm, with an internal channel allowing for the horizontal flow of water and ensuring a resistance to compression of at least 0.2 kg/cmq; it also consists of modified draining shockpads, where channels have been inserted to allow for the horizontal flow of the drainage. However, all these products have to be "Certified" by LND either individually or within the "Carpet System", before being employed in the construction of the field. In these Regulations, the definition "land drainage" refers to this type of products.

MANDATORY TECHNICAL REQUIREMENTS FOR THE DEVELOPMENT OF THE SUBBASE
(Draining aggregates – Non draining compacted aggregates)
TABLE "I"

TECHNICAL REQUIREMENTS FOR THE DEVELOPMENT	REQUIREMENTS OF THE NATIONAL AMATEURS' LEAGUE AND OF THE YOUTH AND SCHOLASTIC SECTOR
Permeability of the subbase	> 360 mm/h
Validation of the number of pitches	4 pitches as in table no. 2.1 2 pitches as in table no. 3.1
Development slope	(4 pitches) 0.3 ÷ 0.5 % tolerance ± 0.05 % (2 pitches) 0.58 to 0.63 % tolerance ± 0.00 %
Evenness of the playing surface for vertical drainage Evenness of the playing surface for horizontal drainage	± 1.0 cm. on 3.0 mt ± 0.5 cm. on 3.0 mt
Dynamic module of deformation of the compaction of the subbase*	Evd ≥ 30 MN/mq
Draining aggregates for vertical drainage*	Stratigraphy as in tables no. 2.3 – 2.4
Non draining aggregates* (for horizontal drainage under the carpet)	Stratigraphy as in tables no 3.3 – 3.4 – 3.5 – 3.6

* According to the regulations laid down in CNR B.U., Year VII N. 36-21/02/73 Part IV Technical Standards, in order for a soil to be suitable for lime stabilization, it should consists of a clay-loamy soil, and have a plasticity index normally higher than 10 (type A6 and A7 as laid down in standard CNR-UNI 10006). Also clay gravelly soils (type A2-6 and A3-7) can be lime stabilized, in case they contain soil separates, sieving 0.4 UNI ≥ 35%. This standard also indicates the reference envelope within which the granule curve of the material to be processed shall fall. On the contrary, the lands that do not fall into this envelope, in which aggregates are the prevailing component, improve their mechanical characteristics by adding lime and cement in varying percentages, to the point of completely replacing lime

with cement. Moreover, a breakage test by compression of the sample mixed with the binder after 7 days maturation, is to be conducted. In order for the right compaction, hardness and impermeability to be achieved, the percentage of the chemical binder shall be set by a specialized laboratory, following the tests that have to be conducted on the samples from the land which is to be processed. All these elements have to be determined before drawing up the project in which a subbase stabilized by means of chemical binders is used.

REQUIRED WORKS IN A FOOTBALL FIELD FOR THE CONSTRUCTION OF THE DIFFERENT ALLOWED TYPES OF SUBBASE

1) Subbase type with aggregates and vertical drainage (See table no. 2.1 – 2.2 – 2.3 – 2.4 – 2.5)

The subbase shall be developed according to the project, following its approval by LND - Sports Facilities Commission - Artificial Turf Department, given to the owner of the sporting field; any following modification shall be in any case approved before implementation. In any case, changes to the subbase type are not allowed, and no subbase other than the approved one can be developed.

1.1) Excavation. Construction of an eased frame by excavating and removing the superficial part of the soil, until the excavation bottom, whose depth is set in the project, to be properly rolled, corrected and consolidated, if required, according to the regular slopes achieved by means of laser-controlled equipment. Set size trench will also be performed for the primary perimeter piping, for the secondary piping parallel to each other between 10.00 and 12.00 m and inclined with respect to the field, and for the pits where the two pipes meet.

1.2) Geotextile. Geotextile of 250gr/mq laid on the bottom of the benching and in the set size piping excavations, transversally with respect to the field's main axis, overlapping 30 cm between the sheets, to achieve a homogeneous resistance to pressure loads.

1.3) Piping and pits. Primary and secondary drainage pipes, laid to collect the infiltrated rainwater; for the primary piping, a pipe type of at least Ø 160 shall be used, in which the pipe's lower ½ is whole, and the upper ½ contains micro-holes; for the secondary pipe, a pipe type of at least Ø 90 shall be used, in which the pipe's lower ¼ is whole, and the pipe's upper ¾ contains micro-holes. Concrete inspection pits, internal section 40x40, placed outside the run-offs, laid at the junction of the pipes for water collection; the last inspection pit, before connection to the sewer, must be 100x100 cm in size, provided with baffle and running trap.

1.4) Ex novo aggregates stratigraphies. All used material must be crushed into sharp edged cruser stones, washed and free from dust; rounded gravel is not allowed.

1.4.1) Decreasing particle size stratigraphy.

a) Ballast. Filling layer with 30 cm finished thickness and particle size varying between 4 and 7 cm made from quarry aggregates which have been laid, rolled and compacted with a roll of proper weight, in accordance with the proper slopes provided for in these Regulations, achieved by means of a laser-controlled equipment (motor-grader).

b) Crushed stone. Filling layer with 7 cm finished thickness and particle size varying between 2.8/3.2 cm made from quarry aggregates which have been laid, rolled and compacted with a roll of proper weight, in accordance with the proper slopes provided for in these Regulations, achieved by means of a laser-controlled equipment (motor-grader).

c) Grit. Filling layer with 4 cm finished thickness and particle size varying between 1.2/1.8 made from quarry aggregates which have been laid, rolled and compacted with a roll of proper weight, in accordance with the proper slopes provided for in these Regulations, achieved by means of a laser-controlled equipment (motor-grader).

d) Crusher sand. Final filling layer of the project gradient, with 3 cm finished thickness and particle size varying between 0.2/0.8 mm, made from fine quarry aggregates, which have been laid, rolled and compacted with a roll of proper weight, in accordance with the proper slopes provided for in these Regulations, achieved by means of a laser-controlled equipment (motor-grader); manual finishing of the superficial layer consisting of watering, rolling and brushing.

1.4.2) Single layer stratigraphy.

a) Single layer. ***To be determined***

1.5) Gutter. Perimeter concrete gutter, placed outside the run-offs, laid for the collection of superficial drainage water, equipped with metal safety grid, aligned with the main drainage inspection pits or connected to them with a pipe, for superficial rainwater disposal.

1.6) Pitches and slope. The finished subbase layer must consist of four pitches, up to the end of the run-offs or to the gutters. The pitches must have one single slope, to be declared in the project papers, and to be chosen between a min. value of 0.3% and a max. value of 0.5%, with a construction tolerance of ± 0,05%.

2) Subbase type with horizontal drainage under the carpet (See table no. 3.1 – 3.2 – 3.3 – 3.4 – 3.7)

The subbase shall be developed according to the project, following its approval by LND - Sports Facilities Commission - Artificial Turf Department, given to the owner of the sporting field; any following modification shall be in any

case approved before implementation. In any case, changes to the subbase type are not allowed, and no subbase other than the approved one can be developed.

2.1) Compaction and excavation. Leveling of the field's ground, with the necessary corrections to the existing material, as set in the project, performing set size trench for the primary perimeter piping and the pits.

2.1.1) Compacted existing ground. The surface should be properly leveled, rolled, compacted, evened and consolidated, and a layer of proper material should be added (max. 10 cm), so as to consolidate the surface up to the project value, according to the regular slopes achieved by means of laser-controlled equipment.

2.1.2) Ground stabilized by means of chemical binders. The field's surface, in case of clay-loamy soil, difficult to compact, with a plasticity index higher than 10 (soil type A6 and A7 or type A2-6 and A3-7), should be stabilized with lime or cement for a 20 cm thickness, and finished according to the regular slopes achieved by means of laser-controlled equipment.

2.2) Impermeable membrane. Polyethylene LDPE (first choice) impermeable membrane (cladding), 1.0 mm thick, laid in sheets glued together, on the compacted existing soil or on the soil stabilized by means of chemical binders (and in the piping set size trench), to prevent water from passing to the underlying soil and to transport it, with the slopes already being set, sideways directly into the gutter. The sheets should be laid along the short side of the field, and anchored between the gutter and the .gutter's grid.

2.3) Land drainage. Drainage system with longitudinal gullies structure, laid on the impermeable membrane on the compacted existing soil or on soil stabilized by means of chemical binders, and in the piping set size trench. In its longitudinal gullies, the system shall transport water sideways to the side gutters. The sheets should be laid along the short side of the field, joined by gluing the overlapping selvage.

2.4) Piping and pits. Primary perimeter drainage pipes laid to collect the infiltrated rainwater, transported sideways by the membrane-land drainage system, with a pipe of min. Ø 250, with micro-holes at 180°. Concrete inspection pits, internal section 40x40, placed outside the run-offs, in the amount of six, three for each long side, two at the extremities and one in the middle; the last inspection pit before connection to the sewer, must be 100x100 cm in size, provided with baffle and running trap.

2.5) Gutter. Concrete gutter, only along the longer sides, placed outside the run-offs, for the collection of superficial drainage water, equipped with metal safety grid, aligned with the main drainage inspection pits or connected to them with a pipe, for superficial rainwater disposal. Along the shorter sides, a curb following the slope of the field's two pitches should be built.

2.6) Pitches and slope. The finished subbase layer must consist of two pitches towards the longer sides, to the end of the run-offs or to the gutters. The pitches must have one single slope, to be declared in the project papers, and to be chosen between a min. value of 0.58% and a max. value of 0.63%.

3) Subbase type with aggregates and horizontal drainage (See table no. 3.1 – 3.2 – 3.5 – 3.6 – 3.8)

The subbase shall be developed according to the project, following its approval by LND - Sports Facilities Commission - Artificial Turf Department, given to the owner of the sporting field; any following modification shall be in any case approved before implementation. In any case, changes to the subbase type are not allowed, and no subbase other than the approved one can be developed.

3.1) Excavation. Construction of an eased frame by excavation and removal of the superficial part of the soil, until the excavation bottom, whose depth is set in the project. Set size trenching will also be performed, for the primary perimeter piping and the pits.

3.1.1) Compacted existing ground. The bottom surface of the excavation shall be properly rolled, evened and consolidated, if necessary, according to the regular slopes achieved by means of laser-controlled equipment.

3.1.2) Ground stabilized by means of chemical binders. The field's surface, in case of clay-loamy soil, difficult to compact, with a plasticity index higher than 10 (soil type A6 and A7 or type A2-6 and A3-7), should be stabilized with lime or cement for 20 cm thickness, and finished according to the regular slopes achieved by means of laser-controlled equipment.

3.2) Impermeable membrane. Polyethylene LDPE (first choice) impermeable membrane (cladding), 1.0 mm thick, laid in sheets glued together, on the bottom of the trench excavation or on the soil stabilized by means of chemical binders and in the piping set size trenching, to prevent water from passing to the underlying soil and to transport it, with the slopes already being set, sideways into the piping. The sheets shall be laid along the short side of the field.

3.3) Land drainage. Draining system with monofilament polypropylene longitudinal gullies structure, with filtering geotextile thermally sealed on top and below the structure, laid on the impermeable membrane on the bottom of the trench excavation and in the piping set size trenching. In its longitudinal gullies, the system shall transport water sideways to the pipes. The 4.00 m large sheets should be laid along the shorter side of the field, joined by gluing the overlapping selvage.

3.4) Piping and pits. Primary perimeter drainage pipes laid to collect the infiltrated rainwater, transported sideways by the membrane-land drainage system, with a pipe of min. Ø 250, with micro-holes at 360°. Concrete

inspection pits, internal section 40x40, placed outside the run-offs, in the amount of six, three for each longer side, two at the extremities and one in the middle; the last inspection pit before connection to the sewer, must be 100x100 cm in size, provided with baffle and running trap.

3.5) Aggregates single layer stratigraphy. Filling layer with 15 cm finished thickness and particle size varying between 0.4/1.2 cm made from quarry aggregates which have been laid, rolled and compacted with a roll of proper weight, with the proper slopes provided for in these Regulations, achieved by means of a laser-controlled equipment (motor-grader). All used material must be crushed into sharp edged quarry stone pieces, washed and free from dust; rounded gravel is not allowed.

3.6) Gutter. Concrete gutter, only along the longer sides, placed outside the run-offs, for the collection of superficial drainage water, equipped with metal safety grid, aligned with the main drainage inspection pits or connected to them with a pipe, for superficial rainwater disposal. On the two shorter sides, a curb following the slope of the field's two pitches should be built.

3.7) Pitches and slope. The finished subbase layer must consist of two pitches towards the longer sides, to the end of the run-offs or to the gutters. The pitches must have one single slope, to be declared in the project papers, and to be chosen between a min. value of 0.58% and a max. value of 0.63%.

4) Irrigation. (See table no 4)

Development of an irrigation system, suitable to the needs of the field, in which the sprinklers (both gun and underground sprinklers) are to be placed outside the run-offs and as far as possible from the boundary markings of the field. The purpose of field irrigation is mainly to cool the surface during hot months, to stabilize the infill after maintenance operations, and if this is considered necessary, to accelerate the surface for a better ball roll and consequently a faster play, and last to remedy to the lack of rainfall during hot and/or dry months.

MAINTENANCE OF ARTIFICIAL TURF FIELDS

WEEKLY ROUTINE MAINTENANCE

(performed by the Owner of the field, or the Sporting Club managing the field)

a) brushing of the carpet by means of proper device, pulled by a small tractor equipped with garden tires to prevent damaging the carpet, to redistribute the rubber or organic granule. Such operation should be performed at middle-high speed, in circles all over the field's surface, and in particular on the most trampled areas of the field (goalkeepers' areas and longitudinal midfield area).

b) Irrigation of the field in hot and/or dry and sunny periods, to stabilize the rubber granule during play, and to speed up the field's surface, allowing the ball to glide as on natural grass. Irrigation is also required to lower temperature on the field in the most sunny periods.
Irrigation should be performed at least half an hour before the game starts.

c) Control of the spots with most drainage of rainwater, after significant rain falls, with possible refilling of rubber or organic granules.

d) Removal of contaminating agents (leaves, seeds, dust, etc.) by means of proper sweeper, to prevent the field from hardening.

e) Control of missing spots of rubber granules, brushing (as in point a), with possible refilling of granules to even the surface.

f) Daily monitoring of the penalty spot and surrounding area of 1.00 m, refilling the performance infill and checking if the spot is properly glued.

g) Inspection of the drainage system (check whether the gutters and the drainage pits are in perfect state).

h) Never use the playing surface for other events or purposes, such as shows, concerts, camping, fairs, markets, parking space, eating out, etc.

i) Do not use football cleats with irregular studs and/or running spikes.

j) Do not throw blunt or sharp objects (such as athletic gear or similar), and do not leave heavy material on the carpet for a long time.

k) Do not throw lighted cigarettes or cigarette ends, bengal lights or any other flammable product.

l) Do not trace any other marking on the grass carpet for whatever reason, as such products always damage the polyethylene.

EXTRAORDINARY MAINTENANCE

(at least twice a year, to be performed by the manufacturer)

m) Accurate control of the most trampled areas of the field, with particular attention to the performance infill (rubber or organic granule), refilling granules and brushing the surface as in point a).

n) Control of any possible detachment of the overlapping sheets, also where markings were inserted.

o) Inspection of the irrigation system

p) Inspection of the drainage system (check the operation of all pipes, bleeding them if necessary, and whether the gutters and the drainage pits are in perfect state)

q) Decompaction and cleaning of the surface by means of specific equipment.

r) Refilling of infill material and final brushing of the surface.

s) Disinfection of the playing field, and where artificial grass is laid within the field fences.

NB : It should be noted that once the Contracting company has delivered the field for its employment, the Owner of the facility, or the Sporting Club managing the facility, should apply for a Derogation in order to use the facility, in the time until the Type-approval tests are conducted. This procedure is necessary, as the performance infill needs to settle down properly, in order to comply with the required playing performance laid down in these Regulations; to this end, it is necessary to play intensely all over the field for at least 60 to 80 (sixty to eighty) days. When the Derogation is issued, a document concerning the routine and extraordinary maintenance operations will be enclosed, and the facility's Owner or Manager shall produce, within the validity period of the derogation, a copy of a three-year maintenance contract signed with a specialized company. In case of failure to submit this document within the validity period of the Derogation, the field will not be able to be used for official F.I.G.C. – LND matches.

THE SPORTING FACTOR

The Third Generation and/or New Generation artificial grass carpet is considered as an alternative to natural grass. Thanks to the new development systems, this product shows the same performance and appearance characteristics as a natural grass field, while ensuring the playability and evenness of the playing field under any weather conditions.

The artificial grass carpet is made up of a filament sheet, in which the artificial grass tufts (imitating natural grass tufts), whose height ranges between 45 and 60 mm are inserted; the filament sheet is fibrillated and/or monofilament, filled with rubber granules, or rubber granules or organic granules (mixed with rubber) and sand. In infills made with rubber granules or organic granules (mixed with rubber) and sand, the infill should be made up of overlapping layers, in which sand should be laid at the basis of the grass tuft, while the rubber granules or organic granules (mixed with rubber) should be laid above the sand, making up the surface coming into contact with the players and the ball. The components should not be mixed for any reason:

Fiber type:
The fiber employed for the construction of the artificial grass carpet consists of anti-scuffing, lubricated polyethylene (main fiber) and anti-scuffing, lubricated nylon (exclusively as secondary fiber), wear- and weather-resistant, allowing for a “natural grass” sensation. Anti-scuffing fiber is used to retain the infill, and typically consists of short and curled tufts.

Silica sand:
In this system, the silica sand is used mainly to stabilize the carpet, lying at the basis of the grass tuft and constituting the lower layer of the infill. The rubber granules are then inserted, holding the pile fibers in upright position; the fiber standing above the ground shall be no longer than 15 mm. The sand particle size is set between 0.4 and 1.25 mm, suitable for water drainage. In addition, sand particles with rounded corners are used, to allow for a better durability of the artificial grass carpet fibers, which would otherwise be worn off in a short period of time, at the basis of the sharp corners of the granules, in case of sharp edged granules.

Rubber granule:
Many studies and trials on the elasticity and flexibility of the surface have come to the conclusion that the particle size of this material should range between 0.5 and 2.5 mm, which has resulted as the most indicated for a regular and homogeneous ball behaviour and for the player’s performance.
Thanks to the particular elasticity and flexibility qualities of this type of material, the surface’s characteristics are similar to those of a natural grass carpet, and may even perform better in bad weather conditions.

Installation of the artificial grass carpet:
The implementation procedure is as follows:
After the necessary works for laying the drainage system have been performed, and after laying the different subbase layers according to the proper slopes, the artificial grass carpet shall be laid on the last subbase layer.
The flatness of the upper subbase layer and, in any case, of the surface on which the carpet rests, may not present irregularities of more than 2 mm out of 300 mm, and of 10 mm out of 3000 mm; if that is the case, the trial of the subbase will be void.
After performing the specific marking out of the playing field (measurement of the boundary markings, positioning of the goals and the corner flags), the rolls of artificial grass carpet are laid, normally about 4.10 m wide, to allow for the least amount of joints on the playing surface.
Once all carpets are laid, the joints are stuck using a 40 cm large specific plastic tape, on which the selvages of the rolls are glued, using a bi-component polyurethane based glue. After the selvages have been glued and have completely dried, the line markings are traced, by inserting on the artificial grass carpet white coloured lines, of a fixed width, with the same characteristics as the grass carpet. For the joints, the same procedure applies as for the joints of the rolls’ selvages.
For the first infilling stage, the silica sand is introduced, if required for this type of carpet. The sand is filled using an especially designed equipment, able to apply the exact amount – in kg – of silica sand per square meter of artificial grass carpet (set by the test report following the system certification); this is a very important aspect, as in case of an uncontrolled filling, the final result of the playing surface might be compromised (see following remark on the subject).
The amount of silica sand introduced for this filling layer is intended to prevent the carpet from moving, keep markings perfectly straight, and contribute to the achievement of the shock absorption requirements. The sand filling operations should be performed when both sand and grass carpet are dry, and preferably in sunny weather.
Then the whole surface is brushed, for an even distribution of the sand, and to proceed to the laying of the rubber granules.

Once preventive brushing is completed, the rubber or organic granules are introduced, using an especially designed equipment, able to apply the right amount of kilograms per square meter. The right amount (set by the test report following the system certification) shall provide the perfect elasticity and flexibility response of the system for the carpet's performance and consequently for the players' performance.
Once the filling operations are completed, the whole surface is brushed using proper equipment, and the installation of the artificial grass carpet is complete.
It is recommended that this operation be performed in a dry environment and when the product is dry.
The amount of rubber or organic granules inserted in this infilling stage amounts to about 2/3 of the total required amount. This should allow for the infill to settle, leaving room for the introduction of the remaining amount. Once the filling operations are definitely completed, the infill will have to be used intensely all over the field for at least 80 to 90 days, in order for the carpet to pass the type-approval tests.

FORMS

All forms regarding the applications and the procedures referred to in these Regulations are available on the LND website: http://www.lnd.it/index.php?page=pub_pgshow&pc=22

TABLES

TABLE NO. 1.1
FIELD OF PLAY

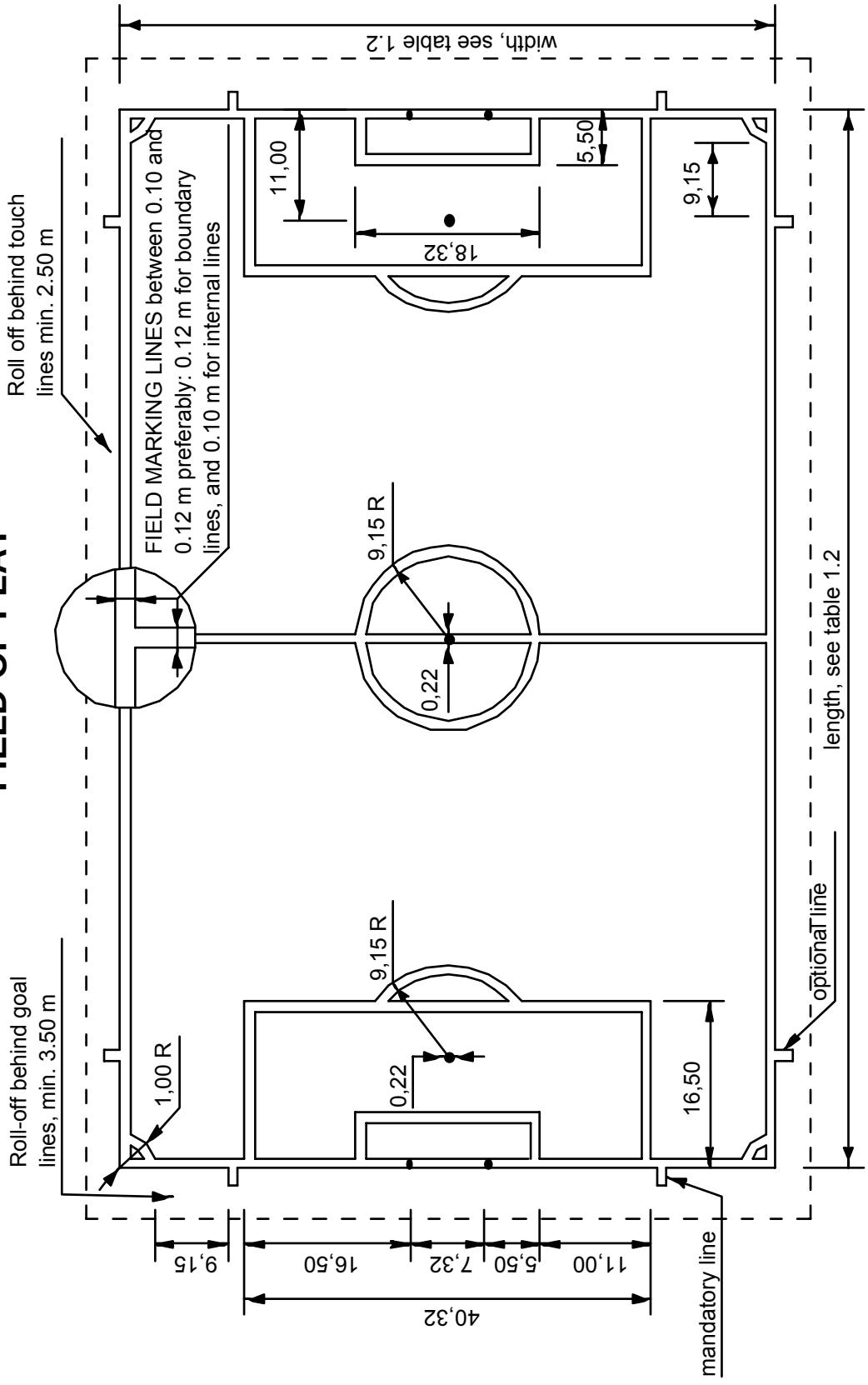
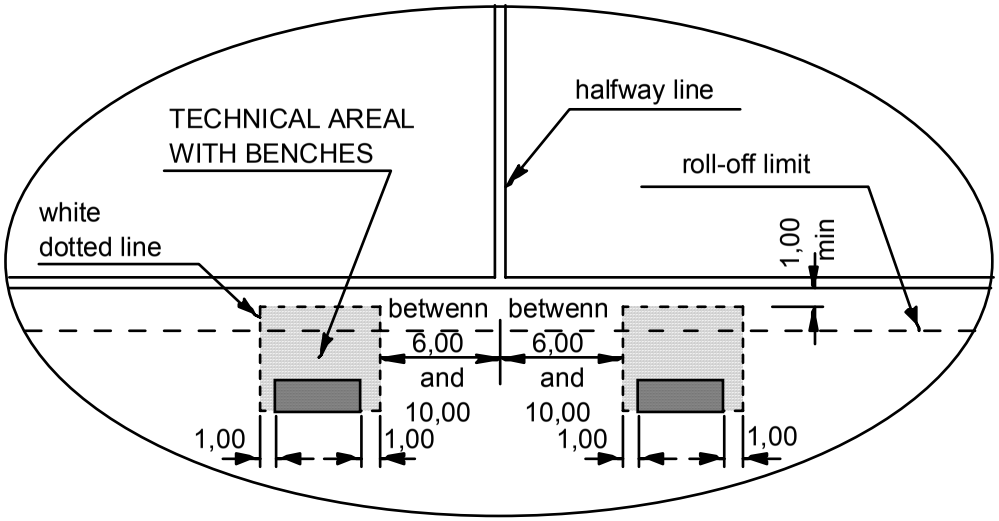
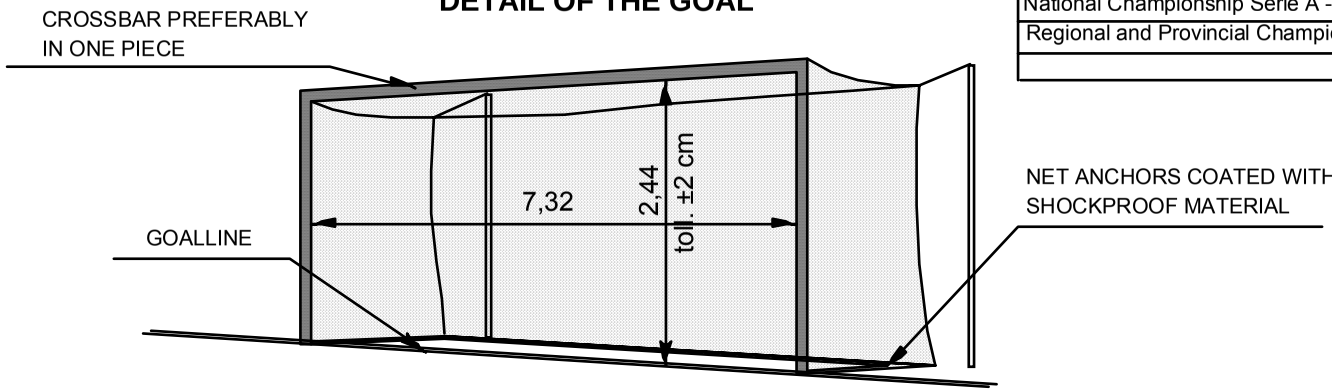


TABLE NO. 1.2
FIELD OF PLAY - DETAILS

DETAIL OF THE TECHNICAL AREA



DETAIL OF THE GOAL

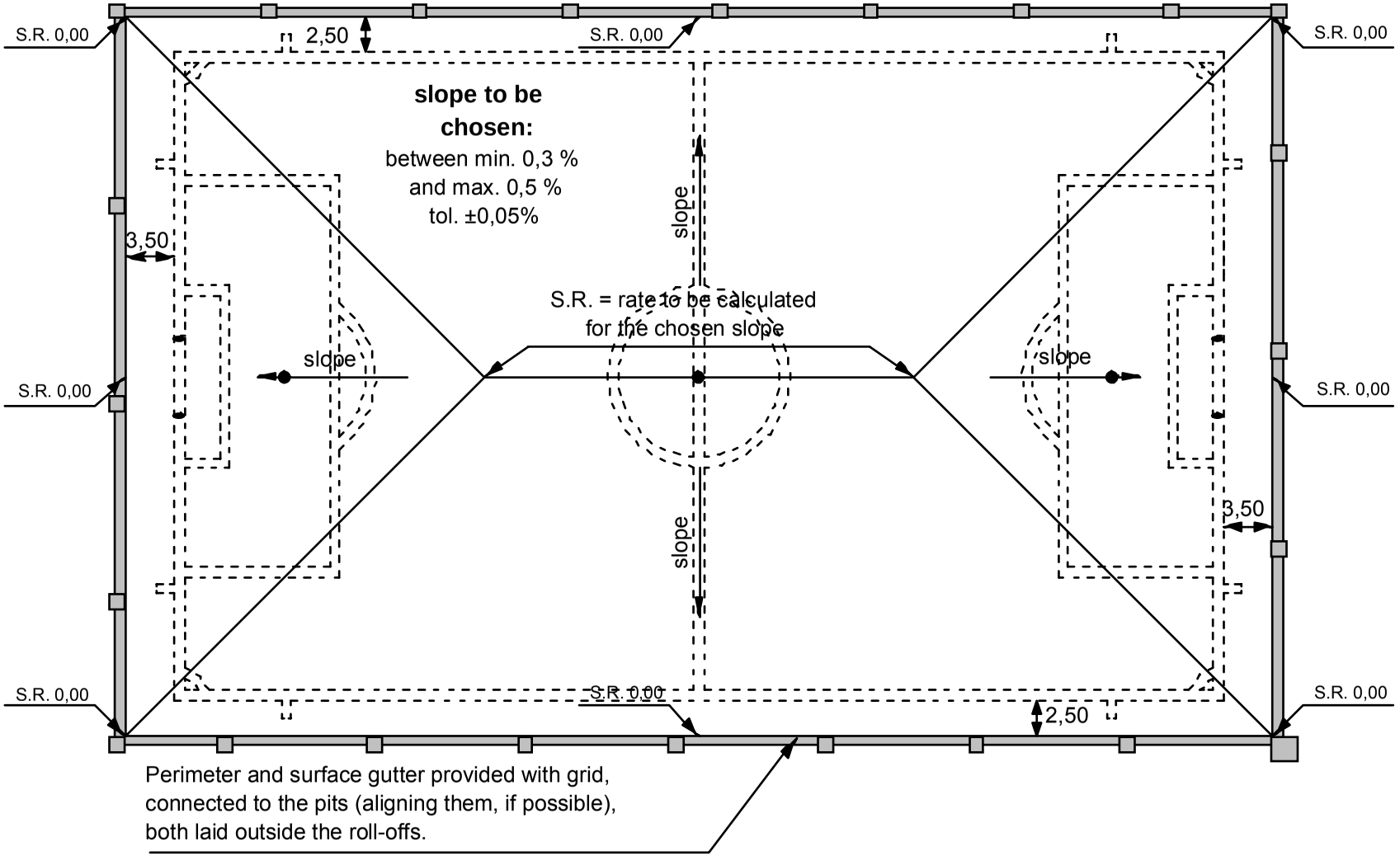


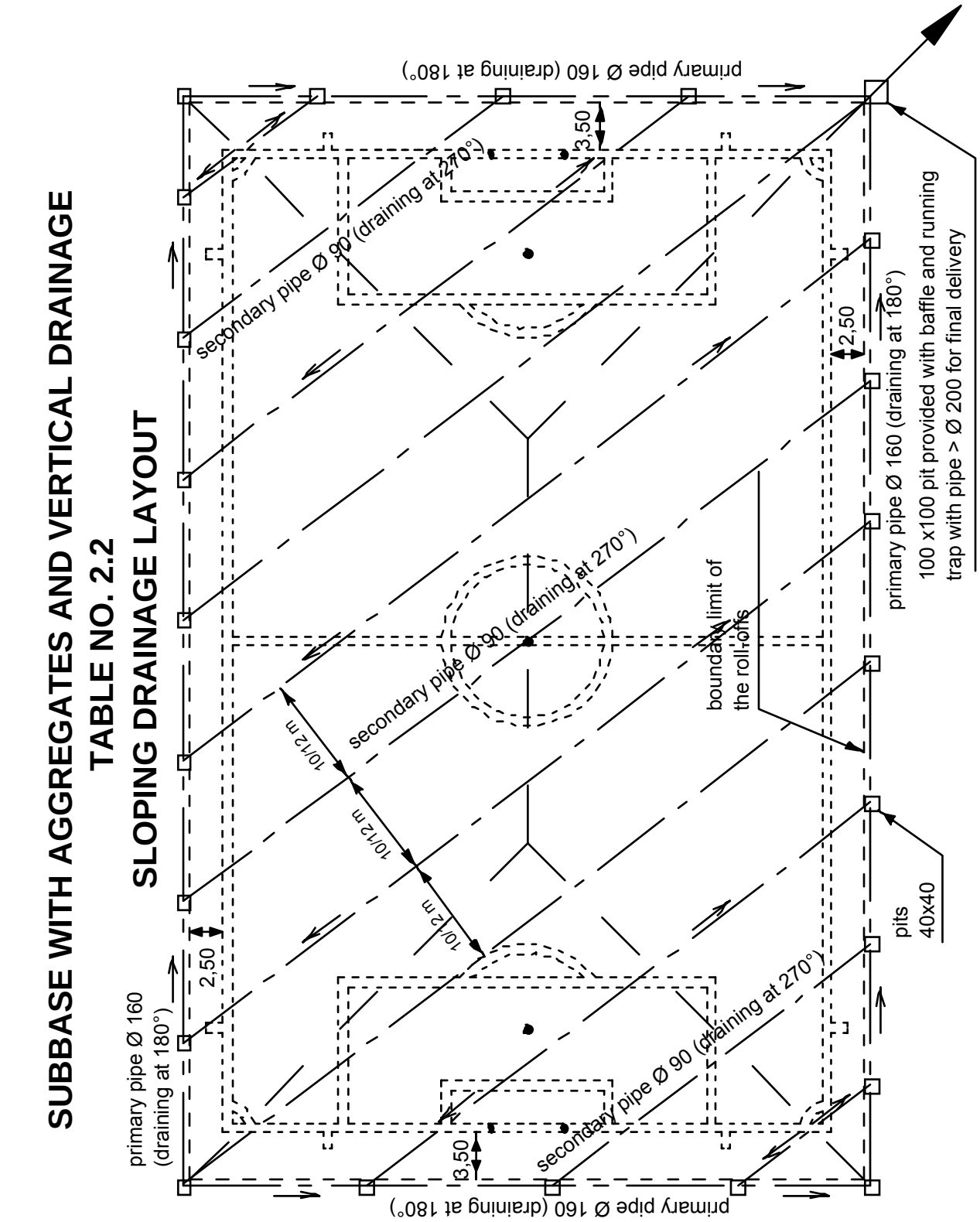
FIELD SIZE FOR EACH DIVISION

DIVISIONS	lenght	width
IFAB and FIGC for international matches	max 110	max 75
	min 100	min 64
Professional League - Serie A and B (Primavera Championship)	max 105	max 68
	min 105	min 65
Professional League - Serie C (Berretti Championship)	max 105	max 68
	min 100	min 60

National AmateursÕ League		
Serie D	max 105	max 65
	min 100	min 60
Eccellenza	min 100	min 60
Promozione		
National Juniores		
1a Categoria	min 100	min 50
2a Categoria		
tol. 2%	min 98	min 49
3a Categoria	min 90	min 45
Regional and Provincial Juniores		
Amatori		
tol. 4%	min 86,40	min 43,20
WomenÕs Football Division		
National Championship Serie A - A/2 - B	min 100	min 60
Regional and Provincial Championship	min 90	min 45
tol. 4%	min 86,40	min 43,20

SUBBASE WITH AGGREGATES AND VERTICAL DRAINAGE
TABLE NO. 2.1
SURFACE SLOPE AND DRAINAGE LAYOUT



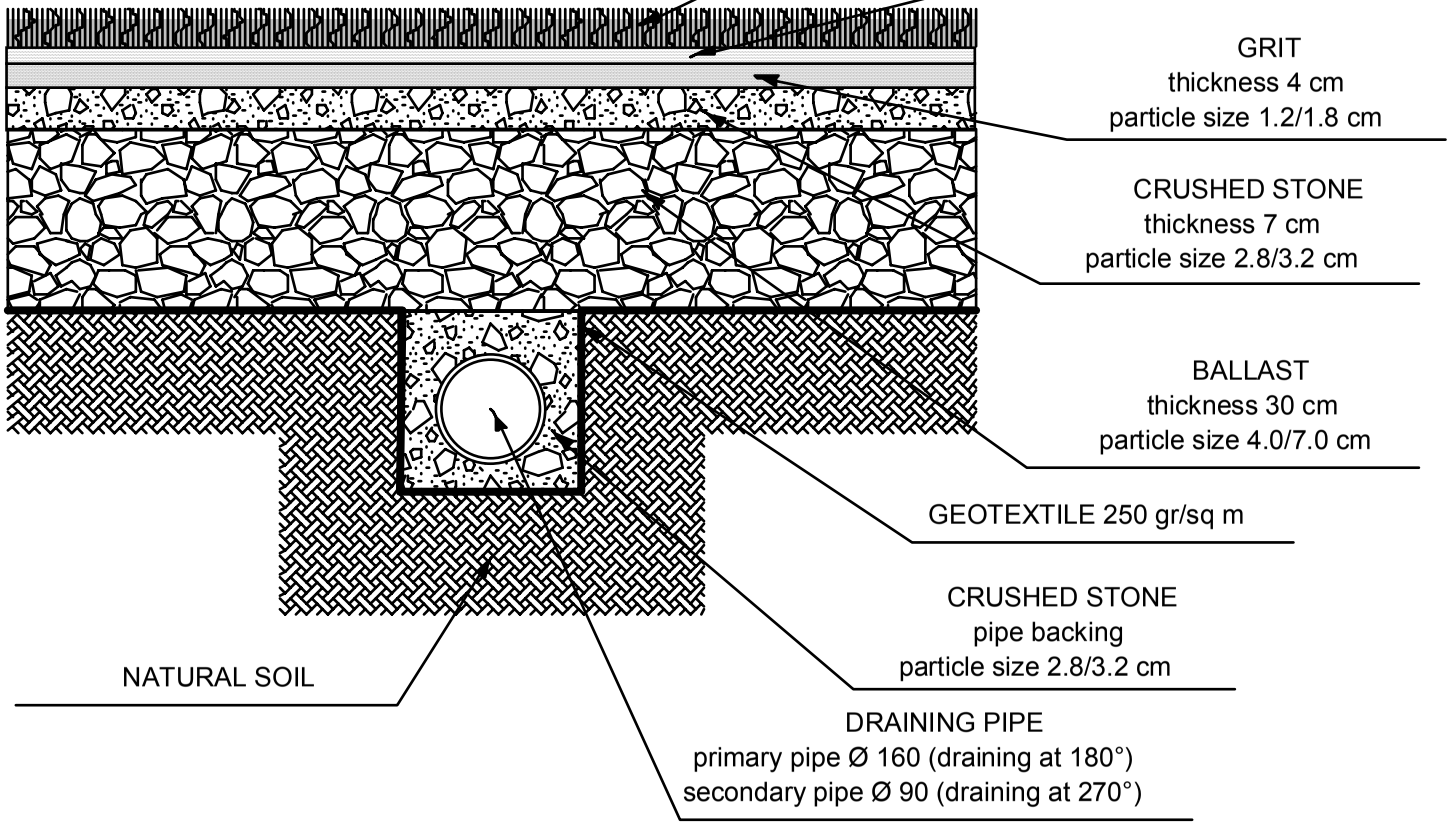


SUBBASE WITH AGGREGATES AND VERTICAL DRAINAGE

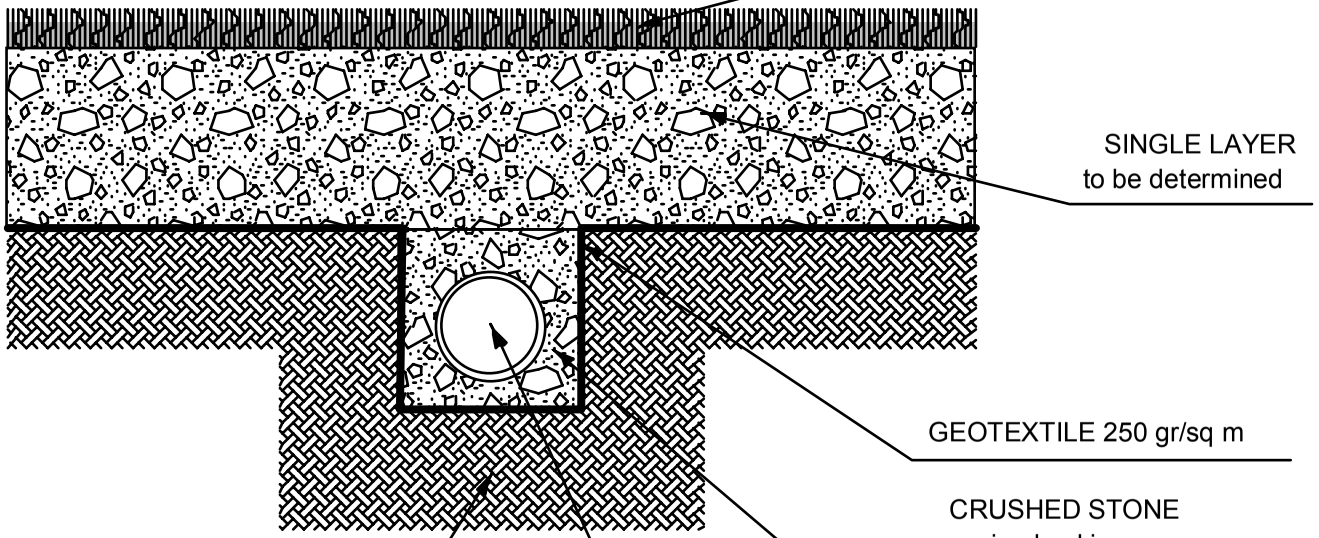
TABLE NO. 2.2

SLOPING DRAINAGE LAYOUT

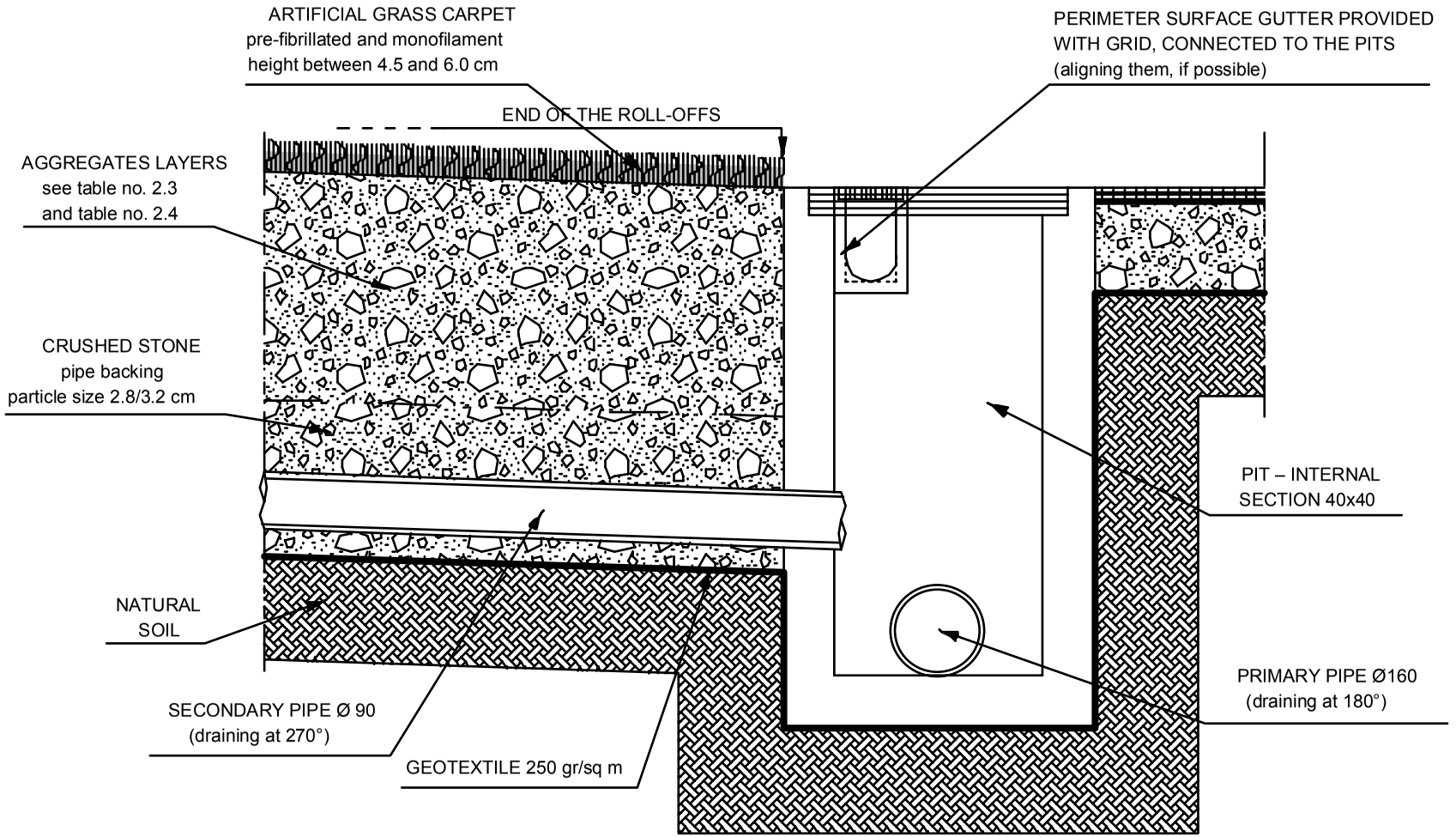
SUBBASE WITH AGGREGATES AND VERTICAL DRAINAGE
TABLE NO. 2.3
LAYERS SECTION
(in the proximity of the drainage pipe)



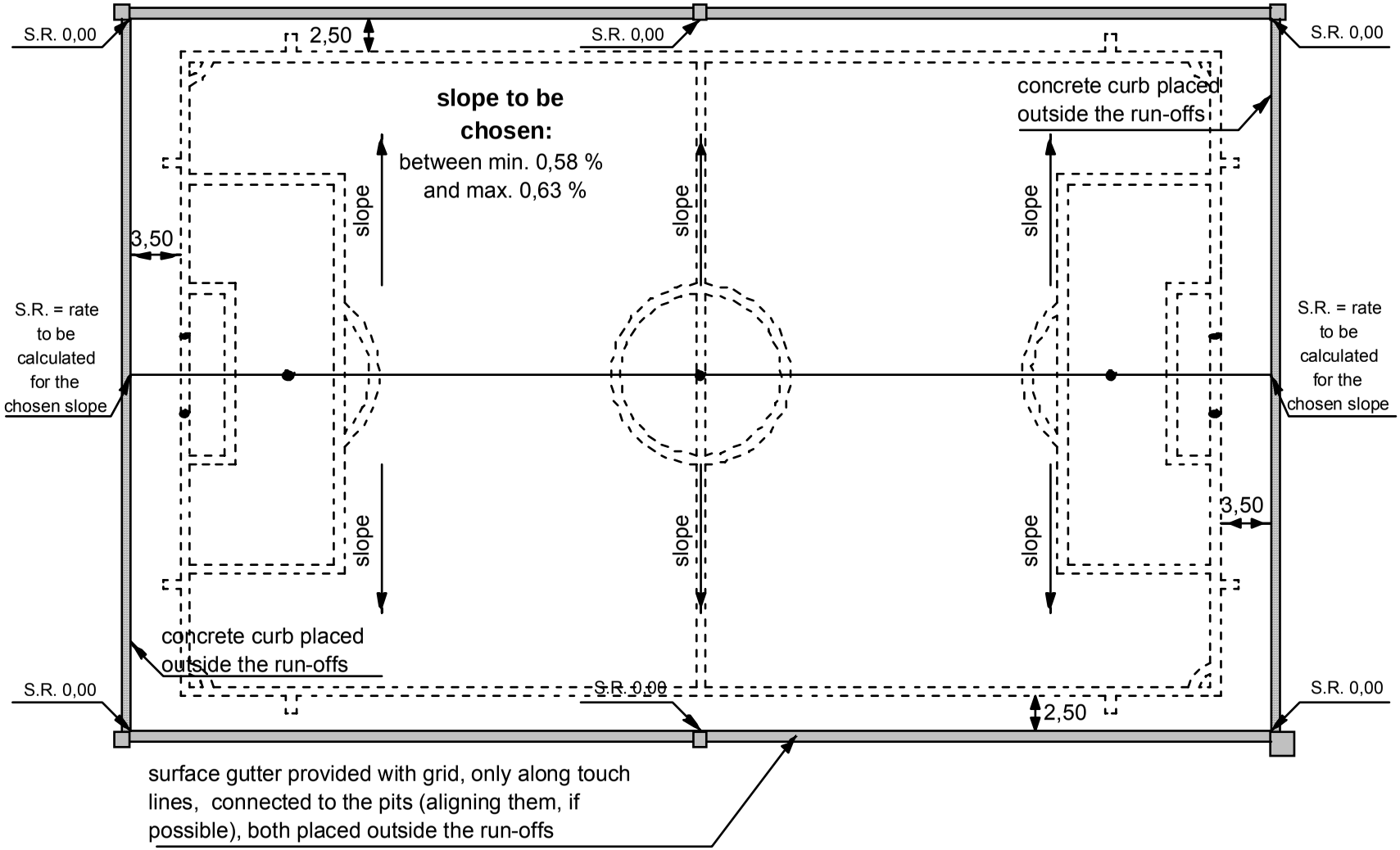
SUBBASE WITH AGGREGATES AND VERTICAL DRAINAGE
TABLE NO. 2.4
SINGLE LAYER SECTION
(in the proximity of the drainage pipe)

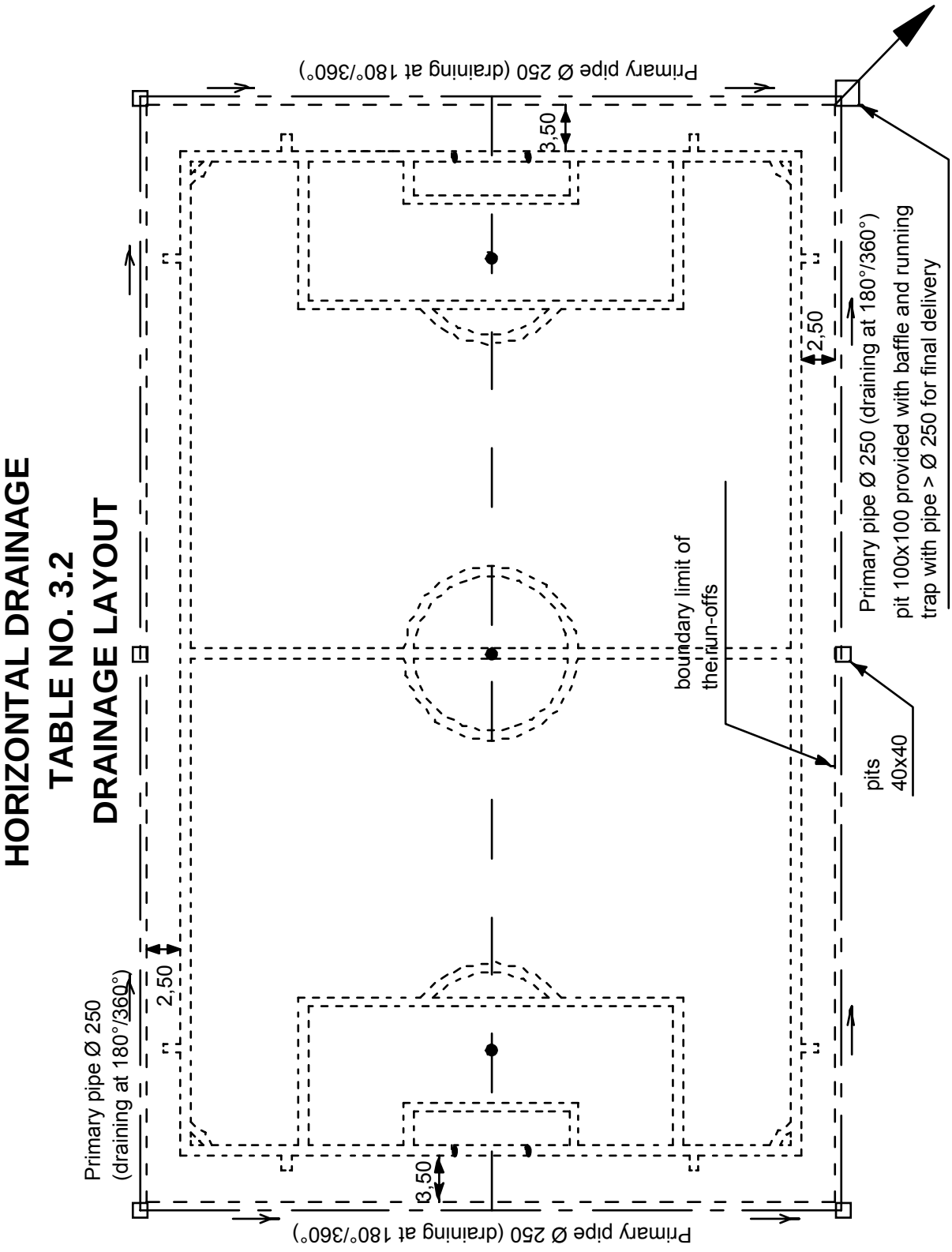


SUBBASE WITH AGGREGATES AND VERTICAL DRAINAGE
TABLE NO. 2.5
CONSTRUCTION DETAIL OF THE PERIMETER DRAINAGE
(in the proximity of the drainage pipe)



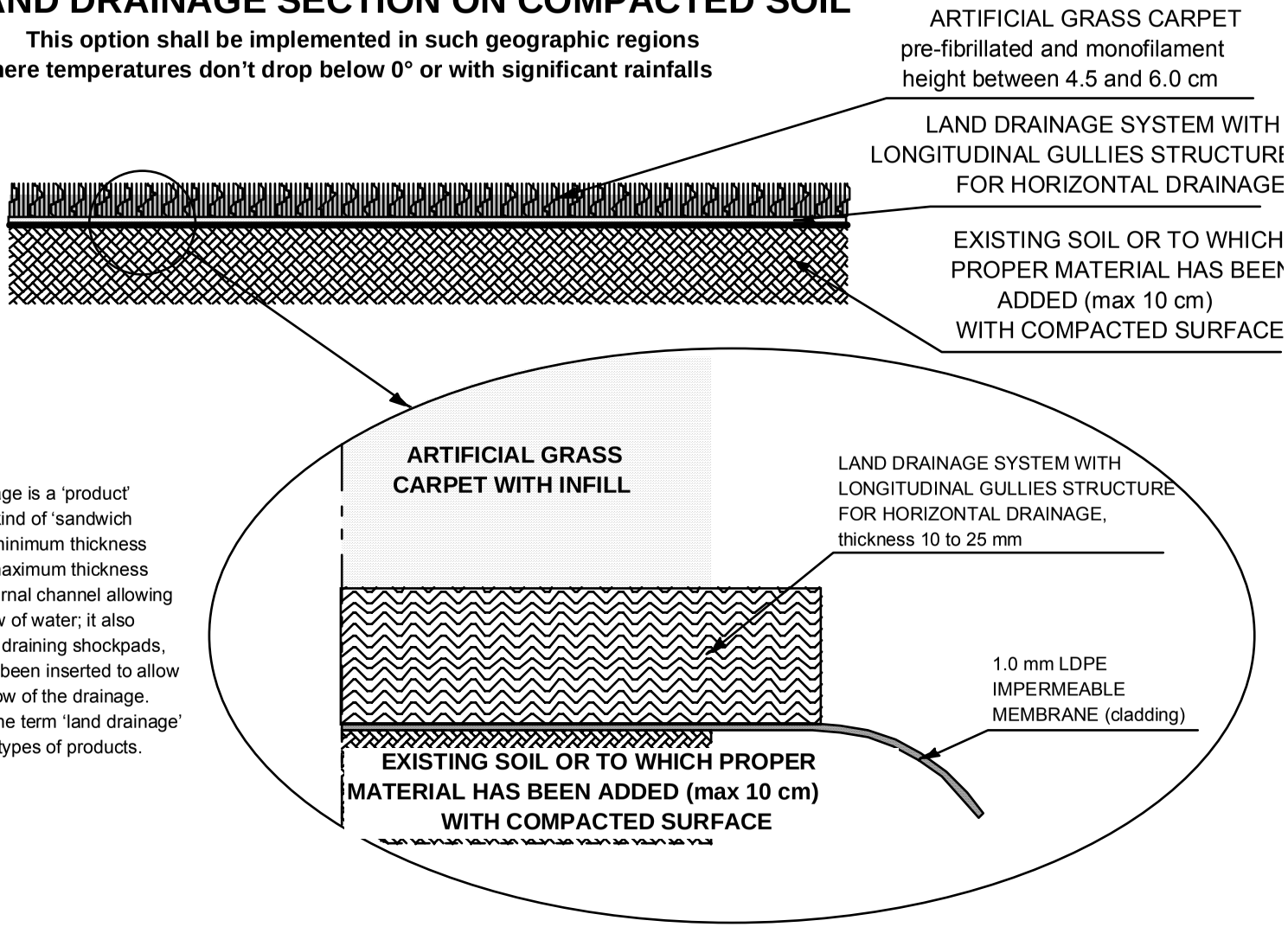
HORIZONTAL DRAINAGE
TABLE NO. 3.1
SURFACE SLOPE AND DRAINAGE LAYOUT




HORIZONTAL DRAINAGE
TABLE NO. 3.2
DRAINAGE LAYOUT
Primary pipe Ø 250 (draining at 180°/360°)
3,50
2,50
Primary pipe Ø 250 (draining at 180°/360°)
pit 100x100 provided with baffle and running trap with pipe > Ø 250 for final delivery
2,50
3,50
boundary limit of the run-offs
pits 40x40
Primary pipe Ø 250 (draining at 180°/360°)

HORIZONTAL DRAINAGE
TABLE NO. 3.3
LAND DRAINAGE SECTION ON COMPACTED SOIL

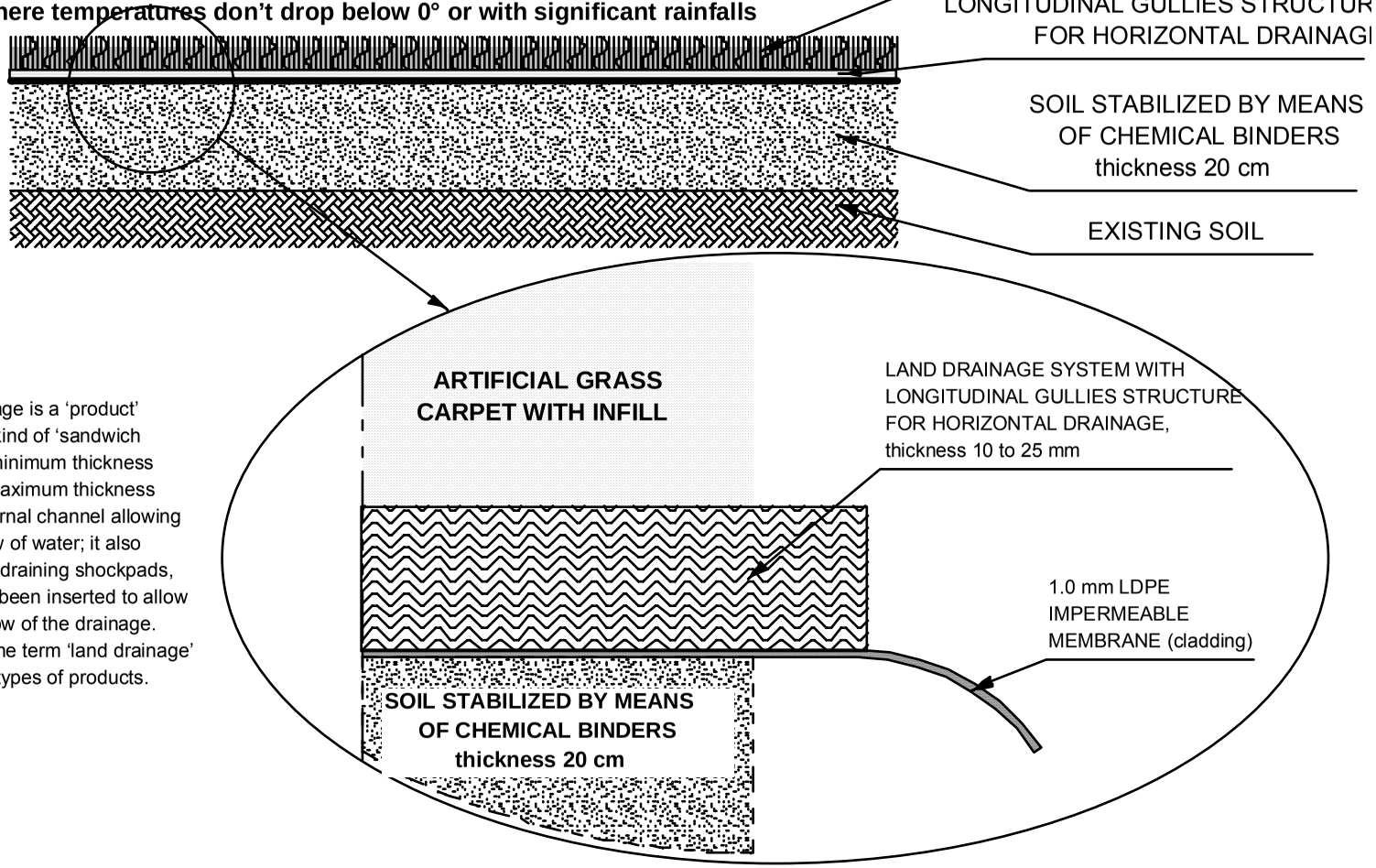
This option shall be implemented in such geographic regions where temperatures don't drop below 0° or with significant rainfalls



The land drainage is a 'product' consisting of a kind of 'sandwich structure', with a minimum thickness of 10 mm and a maximum thickness of 25 mm, with an internal channel allowing the horizontal flow of water; it also consists of modified draining shockpads, where channels have been inserted to allow for the horizontal flow of the drainage. In these Regulations, the term 'land drainage' refers to all these types of products.

HORIZONTAL DRAINAGE
TABLE NO. 3.4
LAND DRAINAGE SECTION ON SOIL STABILIZED BY MEANS OF CHEMICAL BINDERS

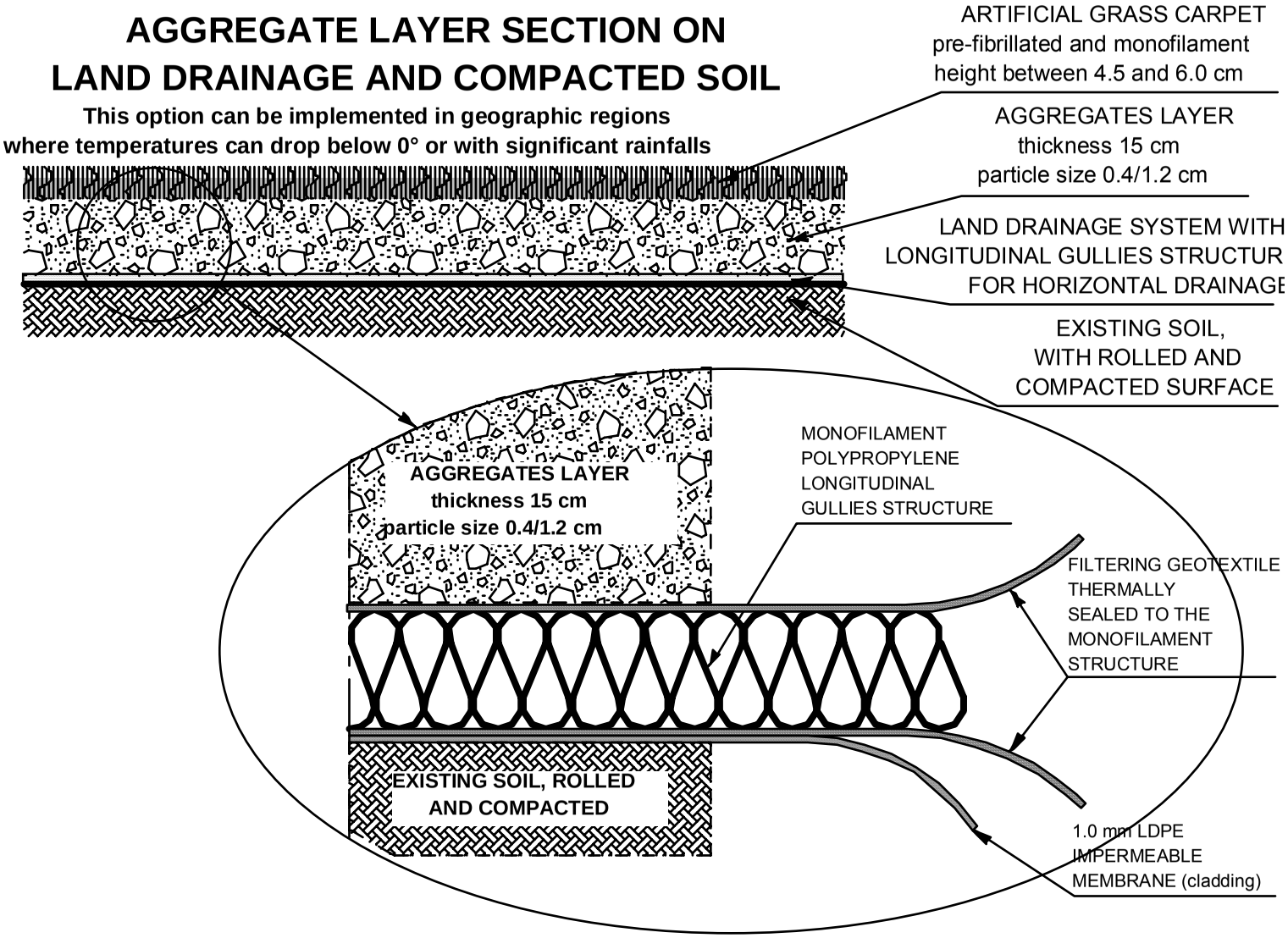
This option shall be implemented in such geographic regions where temperatures don't drop below 0° or with significant rainfalls



The land drainage is a 'product' consisting of a kind of 'sandwich structure', with a minimum thickness of 10 mm and a maximum thickness of 25 mm, with an internal channel allowing the horizontal flow of water; it also consists of modified draining shockpads, where channels have been inserted to allow for the horizontal flow of the drainage. In these Regulations, the term 'land drainage' refers to all these types of products.

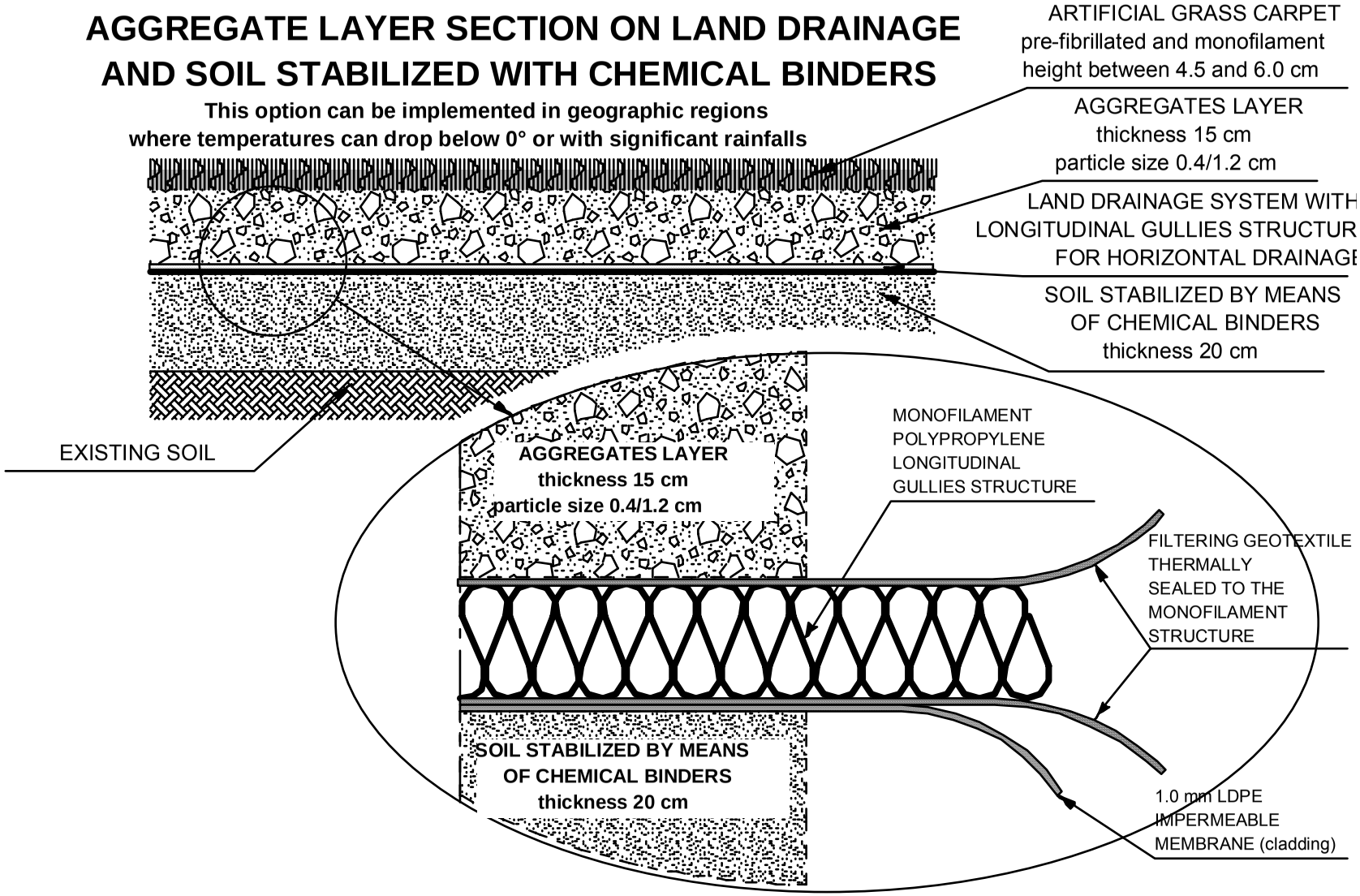
HORIZONTAL DRAINAGE
TABLE NO. 3.5
AGGREGATE LAYER SECTION ON LAND DRAINAGE AND COMPACTED SOIL

This option can be implemented in geographic regions where temperatures can drop below 0° or with significant rainfalls

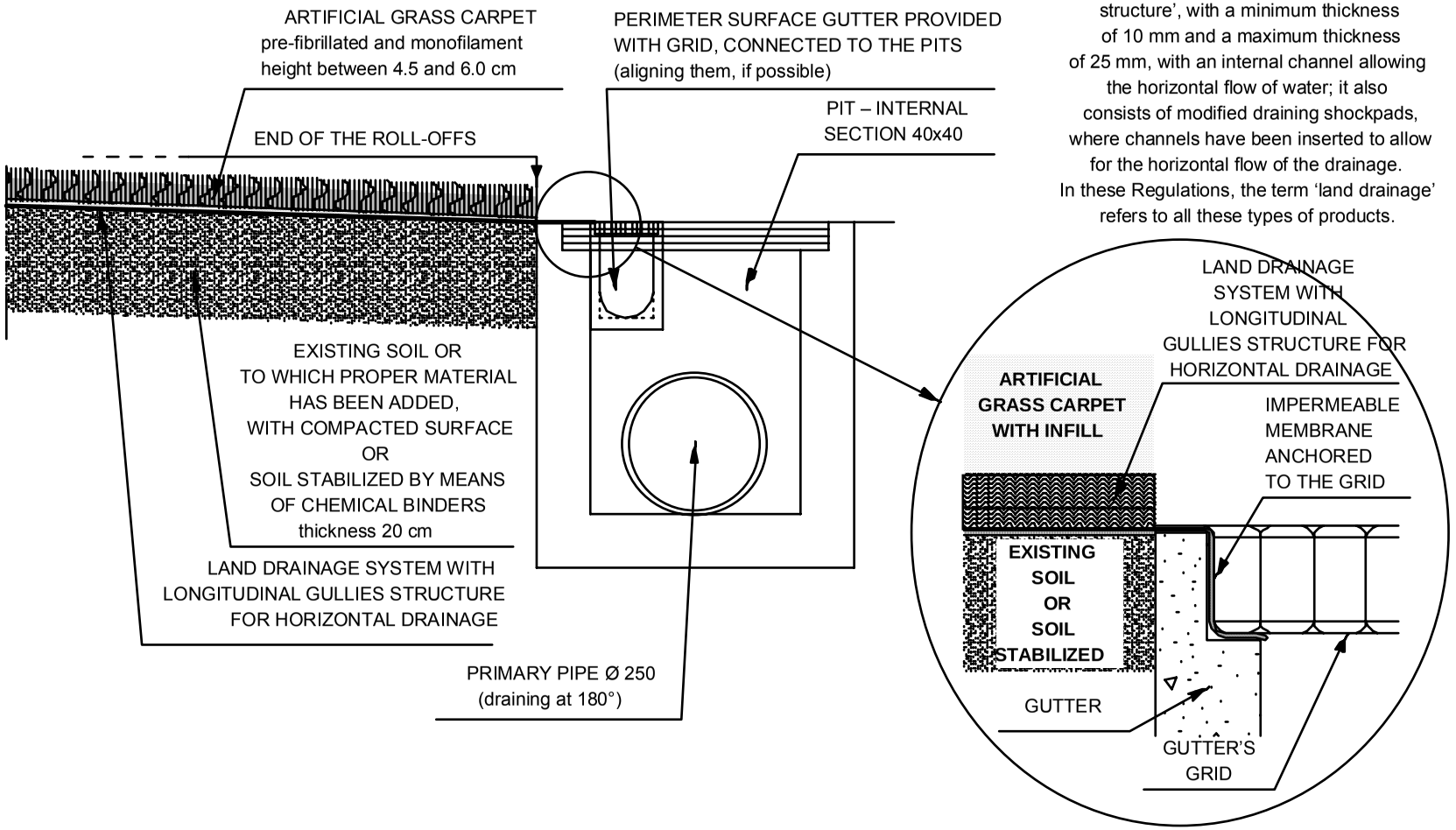


HORIZONTAL DRAINAGE
TABLE NO. 3.6
AGGREGATE LAYER SECTION ON LAND DRAINAGE AND SOIL STABILIZED WITH CHEMICAL BINDERS

This option can be implemented in geographic regions where temperatures can drop below 0° or with significant rainfalls



HORIZONTAL DRAINAGE SUBBASE
TABLE NO. 3.7
SECTION OF A CONSTRUCTION DETAIL OF THE PERIMETER DRAINAGE
LAND DRAINAGE ON COMPACTION



The land drainage is a 'product' consisting of a kind of 'sandwich structure', with a minimum thickness of 10 mm and a maximum thickness of 25 mm, with an internal channel allowing the horizontal flow of water; it also consists of modified draining shockpads, where channels have been inserted to allow for the horizontal flow of the drainage.
In these Regulations, the term 'land drainage' refers to all these types of products.

HORIZONTAL DRAINAGE SUBBASE
TABLE NO. 3.8
SECTION OF A CONSTRUCTION DETAIL OF THE PERIMETER DRAINAGE AGGREGATE LAYER ON LAND DRAINAGE

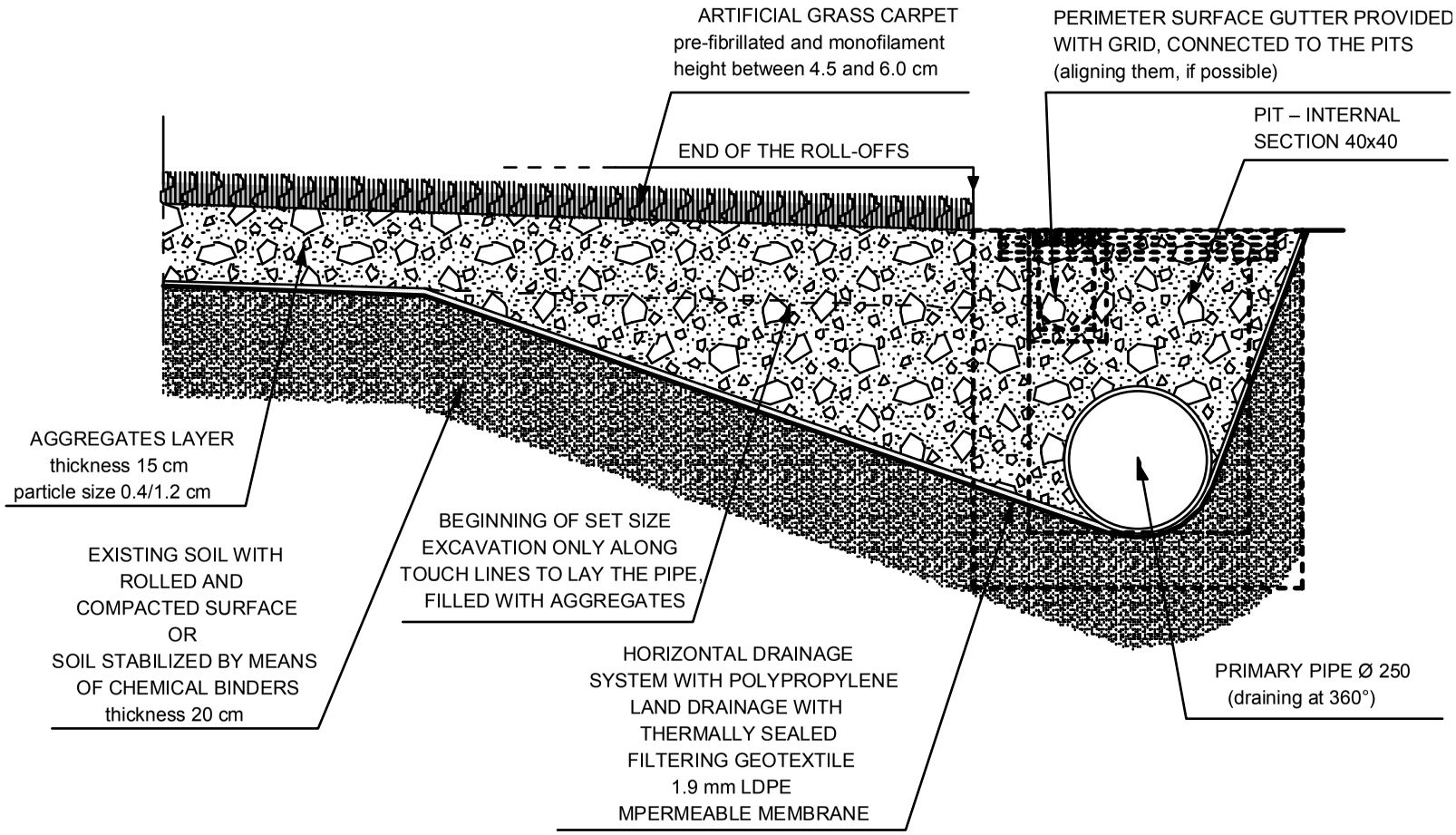
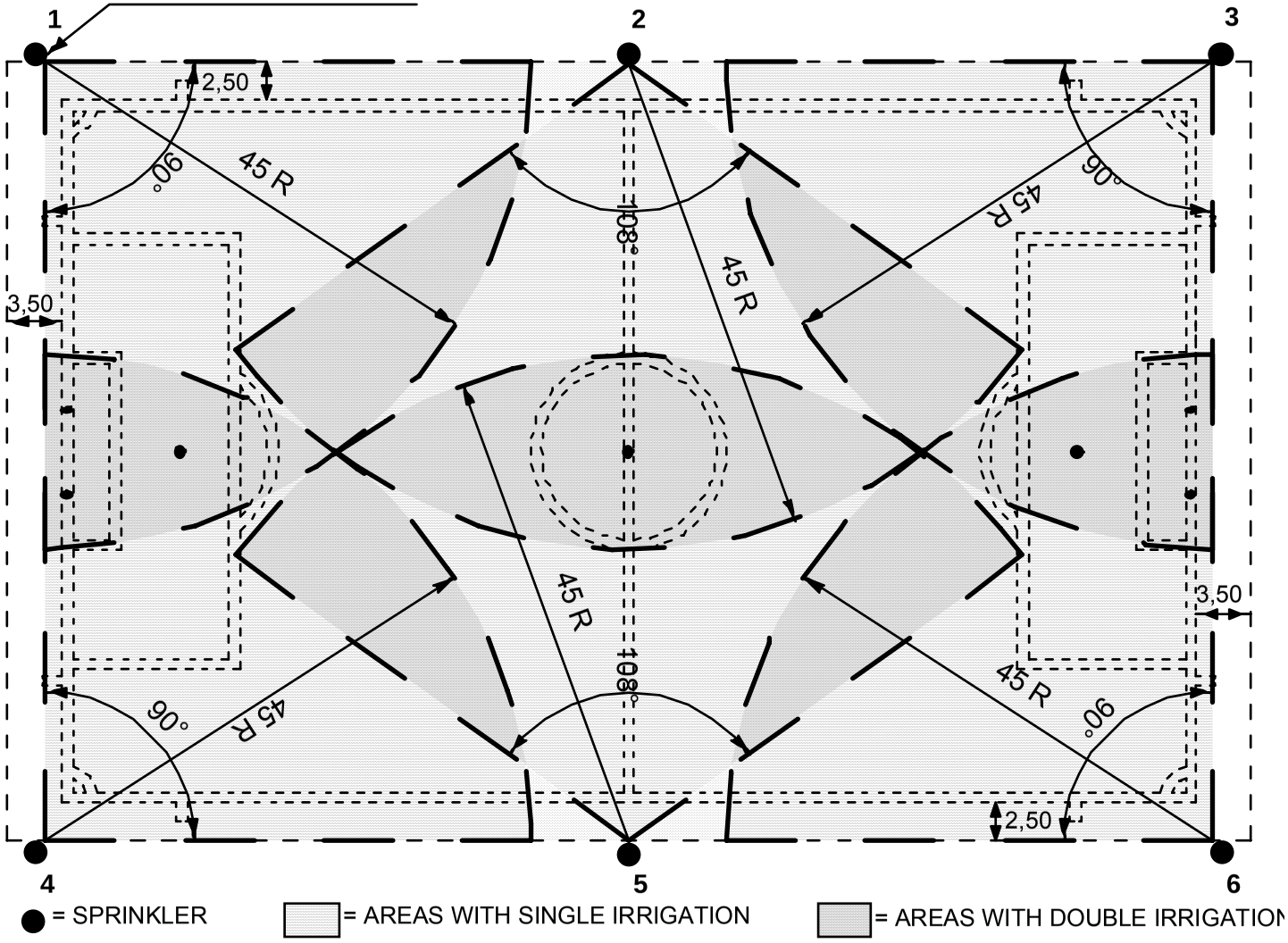


TABLE NO. 4
IRRIGATION SCHEME



ATTACHMENT 1
TABLE 1/A
Maximum concentration limits of toxic substances

TABLE 1/A

MAXIMUM CONCENTRATION LIMITS

N.	Analytes	Limits (mg/Kg ss)
	Inorganic Compounds	
	Aluminum	
1	Antimony	10
2	Arsenic	20
	Barium	
3	Beryllium	2
4	Cadmium	2
5	Cobalt	20
6	Total Chromium	150
7	Chromium VI	2
	Iron	
	Lithium	
	Magnesium	
	Manganese	
8	Mercury	1
	Molybdenum	
9	Nickel	120
10	Lead	100
11	Copper	120
	Rubidium	
12	Selenium	3
13	Tin	1
	Strontium	
14	Thallium	1
	Tungsten	
15	Vanadium	90
16	Zinc	150
17	Free Cyanide	1
18	Fluorides	100
	Aromatics	
19	Benzene	0.1
20	Ethylbenzene	0.5
21	Styrene	0.5
22	Toluene	0.5
23	Xylene	0.5
	∑ Organic Aromatics (20-23)	1
	Polycyclic Aromatics	
25	Benzo[a]anthracene	0.5
26	Benzo[a]pyrene	0.1
27	Benzo[b]fluoranthene	0.5
28	Benzo[k]fluoranthene	0.5
29	Benzo[ghi]perylene	0.1
30	Chrysene	5
31	Dibenzo[a]pyrene	0.1
32	Dibenzo(a)anthracene	0.1
33	Indenopyrene	0.1
34	Pyrene	5
35	∑ Polycyclic Aromatics (25-34)	10

N.	Analytes	Limits (mg/Kg ss)
	Carcenogenic Chlorinated Aliphatics	
36	Chloromethane	0.1
37	Dichloromethane	0.1
38	Trichloromethane	0.1
40	Vinylchlorid	0.01
41	1,2-Dichloromethane	0.2
42	1,1-Dichloroethylene	0.1
43	1,2-Dichloropropane	0.3
44	1,1,2-Trichloroethane	0.5
45	Trichloroethylene	1
46	1,2,3-Trichloropropane	0.1
47	1,1,2,2-Tetrachloroethane	0.5
48	Tetrachloroethylene (PCE)	0.5
	Non-cancerogenic Chlorinated Aliphatics	
49	1,1-dichloroethane	0.5
50	1,2-Dichloroethylene	0.3
51	1,1,1-Trichloroethane	0.5
	Nitrobenzenes	
55	Nitrobenzene	0.5
56	1,2-Dinitrobenzene	0.1
57	1,3-Dinitrobenzene	0.1
58	Chloronitrobenzenes	0.1
	Chlorobenzenes	
59	Monochlorobenzene	0.5
60	Non cancerogenic dichlorobenzenes (1,2-dichlorobenzene)	1
61	Cancerogenic dichlorobenzenes (1,4-dichlorobenzene)	0.1
62	1,2,4-Trichlorobenzene	1
63	1,2,4,5-Tetrachlorobenzene	1
64	1,2,4,5-Tetrachlorobenzene	0.1
65	Hexachlorobenzene	0.05
95	Asbestos - no. of fibers	1000