



Installation Manual

Artificial Grass Pitches

Torchgrass Sports System

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1, Introduction

This document is intended as guidelines for installers to install Torchgrass' artificial grass. It covers all aspects of installation of artificial grass pitches.

This manual has been created by Torchgrass' Customer's Service Department and the FIFA team. Implementation of this installation manual will help guarantee a comprehensive, excellent-quality product for our customers. Using the 'Torchgrass Quality System', we can fix and guarantee the quality of our field installations. Furthermore, it is important that installation of the sports field is completed according to the FIFA requirements.

The manual describes situations encountered during installation both nationally and overseas.

2, Preparation

It is important to go through the installers' checklist (see Appendix 1) prior to departure. Essential information about the location (address) and type of field to install should be made known.

Request a seaming plan and determine which installation equipment is needed for the project (see Appendix 2). Moreover, find out whether the sub-base has been approved by the official organisations (ISA Sport/Labosport), whether drawings are available, and which adhesive and adhesive tape must be supplied.

2a, Field inspection

It is essential that the site and field situation be surveyed before starting work. The field inspection involves checking the field's dimensions and positioning it correctly. The field's dimensions should be checked using a tape measure and marker by measuring the distance between the curbs in at least three different places. You should also check whether the dimensions correspond with the seaming plan.

According to the requirements for the construction of football pitches, the corners should be perpendicular. The 30/40/50 method is used to verify whether the corners are in fact perpendicular. This measurement is taken at each corner of the field, at the location of the curb/drainage, to check whether the curb/drainage line is perpendicular. First 30 and 40 metres are measured from the corner. If the corner is perpendicular, the diagonal will always be 50 metres.

The sub-base should also be verified during this field inspection. Take note of any unevenness of the sub-base. Stretch a wire from the axis of the field to the curb/drainage line to verify whether the sub-base surface is level and the slope correct, and to expose any long depressions in the surface. The difference between the sub-base surface and wire can be measured with a measuring wedge or steel tape. This is an extremely important measurement. Deviation of more than 1 cm is not acceptable and must be remedied.

Because deviations in the sub-base particularly occur in the areas featuring lines, sidelines, and goal lines, the goal and penalty areas need to be checked more closely and with particular care. In addition to this measurement, the straight edge of 3 or 4 metres should be used to determine

similar deviations and reveal short depressions in the sub-base surface, while the wire reveals the long depressions. Not all unevenness can be detected with the straight edge because the slope can deviate over a distance of more than 3 or 4 metres. Put the straight edge on the surface every 5 metres and check the height difference. The space between the straight edge and the surface cannot be more than 1 cm.

If the planimetry of the sub-base is inadequate, this must be remedied before continuing work. Always contact Torchgrass if in doubt.

2b, Drawing lines on the sub-base

Paint or draw markings at the curbs where the sidelines, goal lines and centre line should be positioned. Always check the length of the run-off areas too. Every marker line must be drawn in two lines.

2c, Unloading the materials

During unloading, the materials should be inspected for any damage and delivery of the correct quantities verified. Report any shortages directly to the supplier.

When working with silos of infill sand, determine a strategic location where they can be placed when the sand arrives. Decide where to deposit any BigBags with rubber or sand. The closer they can be to the field, the less transport is required during installation.



When the grass arrives at the site, it is most efficient to place the rolls directly beside the field. Depending on the equipment available and specific situation, the rolls can be placed along the field with machinery such as a shovel or forklift or manually using a carpet trolley. Take the following into account when placing the rolls along the field:

- Start at the correct side (seaming plan!!!);
- When using machinery, take care to ensure pathways, the sub-base and fences are not damaged;
- All rolls should be rolled out towards one side;

2d, Unrolling geo-textile and shock-pad

Depending on the customer's preferences, a layer of geo-textile or shock-pad is installed under the grass. Geo-textile is more commonly used and helps distribute loads more evenly. However, in some cases they are meant to form an impermeable layer to ensure water cannot enter.

3, Installing the grass

It is important to involve the workers, who are going to be responsible for the field and

maintenance, in the installation process. Explain aspects they should take heed of and how to repair the field, how to use the tractor and brush the field.

3a, Rolling out the grass rolls

The first step in installation is to roll out the rolls of grass. Depending on the situation, this is either done by machine or manually. Machinery such as a small wheel loader or winch is often available. When using a wheel loader, care should be taken that suitable (wide) tires are used to prevent damage to the sub-base. Use of a winch that pulls to unroll the roll over the field is preferable.

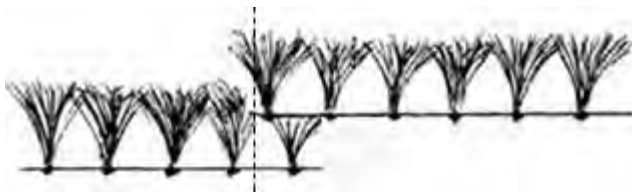
In some countries, rolls are unrolled manually. An experienced person should supervise the work and provide guidance during unrolling of the grass.

The next step involves placing the rolls in the correct position starting at the goal line and continuing towards the goal line at the other end of the field. During this process, the roll's alignment should be checked continuously with the set marks.

3b, Seaming

When the rolls are laid out, the additional seaming material is cut, the edges of the roll turned over, and the additional material at both sides of the first roll cut. Cutting off one back stitch of grass if necessary. With subsequent rolls, the additional material is only cut on one side (on the side you are working towards).

All rolls will have a small overlap with the adjoining roll. It is important to make this overlap in such a way that the back stitches are not positioned above one another!! This will facilitate the subsequent cutting process and render it more accurate.



When overlapping the rolls of grass, take the direction of the wind into account to prevent the field from being vulnerable to being blown away.



When the grass has been correctly positioned, the seams are cut straight with the long knife. When the whole field has been aligned correctly and all seams cut, the gluing process can begin.

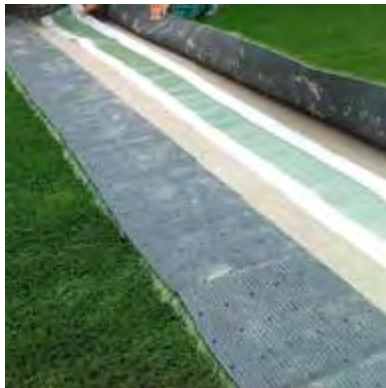
Fold back the edges of each side of the seam to expose a 40-50 cm opening and position the adhesive box at the start of the seam.



Once the seam is ready for gluing, fill the adhesive box with the adhesive. One person will stay with the adhesive box and guide, while the second person pulls the seaming tape through the adhesive in the box in the seam opening. (When using a two-component glue, one person will work on mixing the adhesive during the gluing process.)

When the seaming tape with adhesive is correctly positioned, the turf is carefully closed and pressed into the adhesive.

Take care that the seaming tape is placed in the middle of the seam. After this a “foot” is slid along the seam to ensure all fibres are straight and not lying in the adhesive. It is important to press the seam down firmly to ensure the turf is set well.



To achieve this, put pressure on the seams, or get someone to walk over these. This process is repeated for each seam. Ensure that there is sufficient adhesive on the seaming tape for the back of the turf to be securely fixed. Do not wait too long to press the seams down in the adhesive: in warm conditions, the adhesive will harden quickly so do not open more than one can of adhesive at a time.

3c, Markings



Once the whole field has been done, the position of the inlay lines can be marked according to seaming plan. On a football pitch, start with the goal and Penalty areas.

First measure where the lines have to be positioned and mark those points with wire or pins. Inlays are cut with a double cutter. Ensure the cutter is about 1 cm wider than the line. This will make it easier to install the lining material. When cutting along the wire, take care to ensure that the cutter is not touching the wire at all, as the wire is easily distorted.



After cutting, the same gluing method is used as with the seams. The only difference is that for inlay lines, a wider adhesive box is used. This is to ensure that the inlay and grass are sufficient affixed to the adhesive. After the goal and penalty area, the sidelines, centre circle and penalty areas can be done.

Cutting circles is a specialist job that needs to be done



very exactly. Measure the radius from the centre of the circle. Once the turf is 100% complete, check all seams and inlays, and seal with adhesive where necessary.

4, Installing the goals and corner flags

Holes have to be dug to fix the goal and corner pots for installation of the goals and corner flags. Measure exactly where the goals and corner pots are to be positioned first.

Depending on the available equipment, an auger can be used to dig the holes and install the pots. If there is no auger available, carefully cut open the grass in a U shape and dig the necessary hole for the pot approximately 1 m². Ensure the pot is standing on a stable sub-grade. Prepare the concrete and pour it into the hole around the pot.

Carefully insert the goal/corner pole and check whether it is standing straight. The cut grass can be laid again once the concrete has set and the goals have been installed.

Check carefully whether the pot is at the same level as the infill material, as the goal height is measured from the infill level to the inside of the crossbar.

The goal legs are often 12 cm wide while the lines are 10 cm wide. Take care to ensure that the extra 2 cm are always positioned inside the playing field.



5, Infilling sand and rubber

A Infilling machine is generally used to scatter the sand and rubber on sports field. Before beginning the infill process, arrange a forklift or truck with lifting device to lift the BigBags over the Infilling.

Before starting, check whether the Infilling machine is complete and workable.



Install the platform and brushes on the machine and perform a test run to check everything is functioning. Always perform this test run next to the field to prevent any possible damage to the field through oil leakage.

The Infilling is always used across the width of the field. Therefore, calculate the number of runs needed

to cover the whole field first. Take the length of the field and divide this by the width of the Infilling machine to determine the number of runs that will need to be made to cover the field.



Mark the runs that the Infilling will make, and stretch a wire to guide the Infilling machine along the right track. Use the rotary broom at a moderate speed. The brushes will need to be adjusted for each layer so that they graze the sand/rubber. This is particularly important when a sand infill has been used – to prevent the sand and rubber from mixing. Check the Dosage of infill

material as Appendix 3.



After the first run, return the Infilling machine to the other side of the field brushing the first run. After the second run, return the Infilling, brushing the gap between the first and second run. Continue this overlapping brushing method for all the runs. This will guarantee the sand and rubber level is uniform across the entire surface area.

Once the first runs have been filled with sand, they can already start to brush the field with the tractor + triangular brush. Check the depth of the infill material frequently during this process.

If working with fibrillated fibers, take care not to fibrillate excessively.

6, After installation

After well installed the whole field, please check whether the planimetry of the field is correct (with straight edge of 3 metres), the dimensions of the field and whether the lines are straight and all confirm with the drawing. Ensure that there are no visible seams, and quartz sand or rubber granules shall be filled uniformly, no obviously uneven can be seen. The field and area around it should always be kept clean and tidy, especially when the field is ready. The further maintenance should follow the Torchgrass' maintenance manual.

7, Records and photos

It's better to keep report during the installation, and it should contain information about daily

activities, such as:

- * The installation process
- * The quantities of materials (sand, rubber) used and left over
- * The hours of machinery usage and labour registered
- * Problems at site

The photos are also necessary, the sub-base, during installation of the grass, and from different angles after installation is complete. Emphasis should be placed on taking plenty of photos when installation is complete. These photos are extremely important as records for customers.

8, Special notice

8a, In order to complete the installation soon, please perform the preparation work and install the field with two or more persons. And divide up tasks, e.g. while one person is helping to determine the optimal location of the silo, the other can already start inspecting the field.

8b, During installation period, the leader of the working team should notice the weather condition every day. This is helpful to adjust working schedule accordingly. Notice the dry status of the glue. It is prohibited to use the glue in rainy days or use the glue not according to the directions.

8c, Turf installation in temperatures below 10°C is strictly not recommended. Or it can lead to numerous problems due to faults and expansion of the turf in warmer temperatures.

8d, A special technique should be used to cut the additional material at both sides of the roll. It is very important to cut the line straight and exactly, so please ensure to install with good equipment and sharp Stanley knives. Avoid cutting the seams too wide, as these will remain visible after installation, or cutting the seams too tight, as this can lead to an elevation on the seam and reduce the strength of the seam.

8e, Pay attention to the dosage of the glue. When using one component glue, it is recommended that use 15kg for 70m of 20cm wide joint tape and 15kg for 50m of 30cm joint tape.

8f, Be sure that the quartz sand is dry.

8g, The workers must pay much attention to the safety when using the utility knives. Do NOT throw the waste blade into the field after changing it.

8h, The material such as glue is flammable, so smoking is prohibited during installation.

8i, Never use heavy machinery on an unprotected sub-base made of lava/rubber or Cushed stone.

Appendix 1

Installers' checklist

Prior to departure, it is important to go through the checklist below. Essential information about the location (address) and type of field to install should be known.

- () Complete installers equipment
- () Photo camera (not a mobile phone!)
- () Field details (seaming plan, field dimensions, construction drawings)
- () Contact details of local people
- () Sub-base checklist
- () Maintenance manual
- () Handover form
- () Installation manual

Appendix 2 Checklist Installers' Equipment

Determine which installation equipment is needed for the project.

- 2 Stanley knives
- Pressure knife
- 150 m rope
- Circle cutter + wire
- Adhesive box, wide and small
- Long knife, small (low grass)
- Long knife, wide (high grass)
- Box of latex gloves
- Working gloves
- 2 grass grippers
- Scissors
- 2 metal pins
- Wasco, marker or paint
- Red pins
- 100 m tape measure
- 5 m steel tape
- Hammer
- Chalk line reel
- Foot (to close the seams)

Appendix 3 Dosage of Infill material

Pile height (mm)	Quartz sand (kg/m ²) Dia 0.5-1.5mm	Rubber granule (kg/m ²) Dia 1-3mm	Infill height (mm)	Extruded pile height (mm)
11	7.7		Quartz sand height: 5.5	5.5
15	14		Quartz sand height: 10	5
	19		Quartz sand height: 13	7
20			Quartz sand height: 4	
	6	4.4	Rubber granule height: 9	8
	23		Quartz sand height: 17	
25			Quartz sand height: 6	
	8	5.5	Rubber granule height: 11	11
32	10	7	Quartz sand height: 7	
			Rubber granule height: 14	
40	12	9	Quartz sand height: 9	13
			Rubber granule height: 18	
50	16	11	Quartz sand height: 11	17
			Rubber granule height: 22	
55	17	12	Quartz sand height: 12	19
			Rubber granule height: 24	
60	19	13	Quartz sand height: 13	20
			Rubber granule height: 27	

The above data are only for reference.