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Techniques d'irrigation - Installations avec arrosage automatique intégré des espaces verts - Partie 4: Mise en place et réception

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Foreword

This document EN 12484-4:2002 has been prepared by Technical Committee CEN/TC 334 "Irrigation techniques", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

In this European Standard the annexes A and B are informative.

Within its programme of work CEN/TC 334 “Irrigation techniques” charged CEN/TC 334/WG 4 "Automatic turf irrigation systems" to prepare the following standard:

— EN 12484-4, *Irrigation techniques - Automatic turf irrigation systems - Part 4: Installation and acceptance.*

The other parts of this standard are:

— EN 12484-1, *Irrigation techniques - Automatic turf irrigation systems - Part 1: Definition of the programme of equipment by the owner.*

— EN 12484-2, *Irrigation techniques - Automatic turf irrigation systems - Part 2: Design and definition of typical technical templates.*

— EN 12484-3, *Irrigation techniques - Automatic turf irrigation systems - Part 3: Automatic control and system management.*

— EN 12484-5, *Irrigation techniques - Automatic turf irrigation systems - Part 5: Testing methods of systems.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the installation methods and the automatic turf irrigation system handover.

Annex A should be used as a check list for system handover (excluding pump stations).

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 12484-2:2000*, Irrigation Techniques – Automatic turf irrigation systems – Part 2: Design and definition of typical technical templates.*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
contractor
individual or legal entity described by this term in the contract documents and responsible for completing the work or works under the terms defined in the contract

3.2
flexible swing pipe mounting
length of non rigid pipe to connect the sprinkler to the lateral pipe allowing grade setting and three dimensional movement and adjustment

3.3
swing joint mounting
system of elbows and pipe to connect a sprinkler to the lateral pipe allowing grade setting and three dimensional movement and adjustment

3.4
staking
operation consisting of planting stakes in the ground to indicate location of irrigation system components

4 Turf irrigation system installation method

4.1 Installation schedule

The project manager and contractor shall establish an installation schedule to co-ordinate the work with other parties involved.

Annex B provides guidelines for establishing a diagram of typical successive tasks.

4.2 Contractor storage area

4.2.1 Pipe storage

Plastic pipes require special transport, handling, unloading and storage conditions, as specified by the manufacturer.

4.2.1.1 Basic rules

a) For handling and transport, direct contact with chains, slings or with salient metal objects shall be avoided. Pipes shall be carried and not rolled or dragged over the ground;

b) Storage: Pipes shall be stored on a smooth, flat surface. Any contact with petroleum products or heat shall be avoided;

c) Recommendation: Seal pipe outlets with tight fitting plastic caps or adhesive tape to keep out stones, other debris and animals.

4.2.1.2 PVC pipes

PVC pipes are made of easy to handle light weight material.

At temperatures lower than 0 °C the impact strength of PVC pipes is reduced. PVC pipes can however be satisfactorily handled and laid, when adequate care is taken.

To maintain their geometric shape, pipes shall not be stacked higher than the maximum height specified by the manufacturer.

When PVC pipes and fittings are stored outside in direct sunlight, the manufacturer's instructions for providing shading shall be followed.

4.2.1.3 Storage of materials

Lubricant, solvent cement and cleaner containers shall be stored away from any heat source.

4.2.1.4 Polyethylene pipes

Coil stacking shall not exceed the height specified by the manufacturer.

4.2.2 Electrical equipment storage

Electrical equipment (cabinets, controllers, etc.) shall be stored in a covered and dry place.

4.3 Staking

Irrigation system staking and implementation shall be made in accordance with the layout plan prepared during the design phase.

Accurate measurements shall be taken with appropriate topographic equipment adapted to the size of the project.

Stakes shall be large enough to permit good visibility.

Colour-coded stakes shall be dedicated to each system component.

Whenever the location of a component on the plan is open to interpretation or requires on-site modification, staking shall be checked and approved by the project manager.

4.4 Trenches

4.4.1 Locate and protect other works

Prior to any trenching work, the route of the trenches shall be marked out in accordance between the contractor, the owner and the project manager.

The location of existing services shall be determined by the main concessionaires, available documents, carrying out surveys, and using detection equipment.

The choice and the size of the excavating machines shall be chosen so as to best preserve vegetation and existing structures.

4.4.2 Trench specification

4.4.2.1 Timing

Trenching shall be phased with other underground installations to avoid them remaining open for too long and possibly collapsing. Ideally, trenches shall be opened and back filled on the same day.

4.4.2.2 Sizing

a) Width:

Trenches shall have a width adapted for laying or the pipes without excessive excavation.

This width shall not exceed 2 times the outside diameter of the pipe;

b) Depth:

Trenches shall be deep enough to avoid any damage due to soil preparation and maintenance work.

Trench depth shall allow minimum cover above the pipe of 0,60 m for main pipes and 0,50 m. for lateral pipes unless ground conditions dictate otherwise.

This depth shall also be adapted to climatic conditions and specific requirements as defined by the owner. The trench bottom shall be properly levelled so those pipes are supported along their entire length.

4.4.2.3 Trench backfilling

The excavation material that may be used for trench backfilling shall be kept on the sides of the trench. If not, it shall be partially or totally removed.

a) Bedding: Pipes and wires shall be laid on a 5 cm sand bedding if the trench bottom is not smooth, levelled and free of stones, rocks or other debris ;

b) backfilling around the pipes: Pipes shall be covered with excavation material on condition that it does not contain stones larger than 10 mm, in their dimension.

If such is not the case, pipes shall be covered with 5 cm to 7 cm of sand above the top of the pipe.

4.4.2.4 Compacting

Backfilling shall be carried out with successive compacted layers of 20 cm in order to prevent the subsequent collapse of trenches.

4.4.2.5 Warning mesh

The colour-coded warning mesh corresponding to the type of material to be protected shall be installed 20 cm above the top of the work.

4.5 Trenches under roads and similar areas

Trenches shall be constructed and reinstated according to the specifications and standards laid down by statutory national authorities.

4.6 Pipe installation

4.6.1 General

Thermoplastic pipes are normally used for automatic turf irrigation systems. Other pipe materials are not covered by this standard.

4.6.2 PVC pipes

4.6.2.1 Cutting

For pipes cut on site, the end to be jointed shall be cut square and chamfered to produce a finish equivalent to that of the pipes and fittings supplied by the manufacturer.

4.6.2.2 Push-fit pipe joints with automatic sealing (mechanical joints)

The satisfactory completion of a push-fit insertion joint normally requires a chamfer on the pipe end and the correct lubrication of the spigot and socket before the joint is made.

In any given installation, only those sealing rings supplied by the manufacturer of the pipe and/or fittings shall be used.

Jointing instructions shall include but not be limited to the following but in any case shall always follow the manufacturer's instructions:

a) the spigot, the socket of the pipe and the ring groove shall be clean and the sealing ring shall be flat and correctly fitted into its location;

b) the lubricant, which should not be harmful to the PVC or to the elastomeric seals, should be applied over the whole chamfered end;

c) the pipe should be carefully aligned with the adjoining pipe socket and pushed to the required insertion depth. When a lever is used to push the pipe in the socket, a block of wood shall be inserted between the lever and the end of the pipe to prevent damage to the pipe. Where mechanical aids are used to assist jointing, care shall be taken to avoid damage to the pipes;

d) ideally pipe should be assembled in the trench. However where this is not possible because of the width of the trench, pipes may be assembled on the ground. When lowering the pipes into the trench care should be taken to maintain the integrity of the assembly and avoid impact damage.

4.6.2.3 Pipe assembled with solvent cement joints

4.6.2.3.1 General

This method of jointing shall only be used for PVC pipe with a diameter of up to 63 mm.

The nominal working pressure of PVC pipe assembled by solvent cements joints shall be reduced to the next lowest class.

Jointing instructions should include but not be limited to the following but in any case shall always follow the manufacturer's instructions :

a) the pipe spigot end and the socket shall be roughened using abrasive paper and cleaned with cleaning solvent recommended by the pipe or fitting manufacturer;

b) the solvent cement recommended by the pipe and/or fittings manufacturers shall only be applied on dry surfaces firstly over the whole spigot and then within the socket using a clean brush. It is prohibited to assemble solvent cement joints whilst it is raining or under the temperatures limits as specified by the solvent cement manufacturer;

c) the spigot should be assembled promptly and the assembly should be held in position to allow the solvent cement to harden sufficiently before applying stress on the assembly;

d) the pipe shall not be pressurised before the hardening period specified by the manufacturer.

4.6.2.4 Concrete thrust block calculation and installation

The concrete thrust block works by distributing the thrust generated by the pipe system over an area of soil able to withstand the thrust, i.e. action and re-action forces are balanced.

To size the concrete thrust block the following formula shall be used:

a) the action force (*F*) is calculated using the following formula:

$$F = K \cdot p \cdot S \qquad (1)$$

where

K is the coefficient that varies according to the geometrical shape of the fitting:

- *K* = 1 for end caps and tees;
- *K* = 1,414 for 90° elbows;
- *K* = 0,766 for 45° elbows;

p is the testing pressure of the system in MPa (Megapascal);

S is the internal section of the pipe or of the side inlet for reduced tee or the difference of sections for cone reductions, in cm²;

b) the reaction force (*B*) is calculated using the formula:

$$B = K_1 \cdot \varpi / 2 \cdot \left(H^2 - h^2\right) \cdot L \qquad (2)$$

where

*K*1 is coefficient related to the type of soil:

- K_1 = 3 for loam soil with a volumic mass of ϖ = 1 800 to 1 900;
- K_1 = 4,5 for rocky soil with a volumic mass of ϖ = 2 000;

H in metres is the depth of the trench;

h in metres, is the height measured from the top of the trust block to the level of the soil surface;