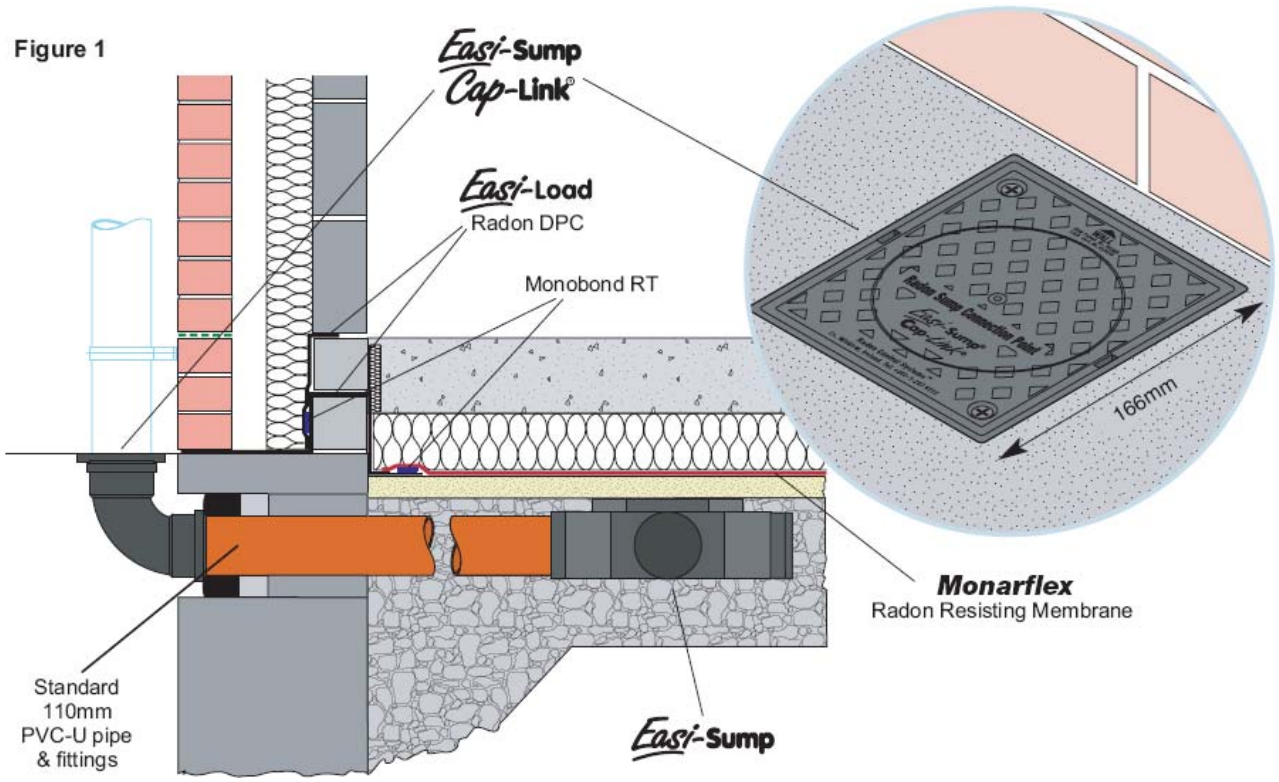
NSAI Agrément

Easi-Sump® & Easi-Sump® Cap-Link®

Figure 1



PRODUCT & ASSEMBLY DESCRIPTION:
This Detail Sheet relates to the *Easi-Sump*® and *Easi-Sump*® *Cap-Link*®. Both products, when assembled, are used as part of a radon protection measure in buildings and enable sub-floor depressurisation or pressurisation to be introduced with ease, if required at a later date.

This Detail Sheet replaces NSAI Certificate No.01/0130.

SUPPLY, MANUFACTURE & MARKETING:
Both products are supplied and marketed by:
Necoflex Ltd., ECS House,
Willsborough Industrial Estate, Clonshaugh,
Dublin 17.
T: +353 (0)1 802 3333, F: +353 (0)1 803 6060

Easi-Sump® is manufactured under contract by:
Titan Environmental Limited.
Easi-Sump® *Cap-Link*® is manufactured under contract by:
MFP Plastics Ltd., Lucan, Co. Dublin.

INTENDED USE:
Radon (incl. Rn-222, Rn-220, RnD) is a naturally occurring radioactive gas which enters buildings from the underlying soil. The gas can accumulate within a building to such a concentration as to constitute a health hazard.

Radon is excluded from buildings using passive and active systems. The provision of an active sub-floor radon soil gas control system, designed and installed by competent personnel, will further reduce the risk of a building having radon activity above a recommended target health level of 10-40 Bq/m^3 (USA).

All new buildings should be designed and constructed with features which facilitate post-construction radon removal from interior spaces and superstructure construction cavities (see Figure 1). Should radon levels increase, because of time-dependent or other factors during the lifecycle of a building, the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly is specifically designed to be converted, with ease, into an active protection measure.

The most important passive radon protection measure consists of a properly installed radon resisting membrane extending across the whole of a building, including the ground floor and all walls. This measure also ensures a necessary degree of separation in a floor construction, so that:

a) prior to activation of the sub-floor radon soil gas control system, the likelihood of radon entry into the building is not increased due to the presence of a gas permeable layer at foundation level;

b) in the event that the control system is activated, there will be no effects on heat producing appliances or the patterns of natural ventilation in interior spaces, and heat losses will not be increased.

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly is not intended to deal with:

(i) soil gases other than radon, e.g. volatile organic compounds from underground storage tanks, or the range of gases from landfill sites;
(ii) radon activity in a building which is caused by radon emissions from the building's water supply, or from construction products used in the building's superstructure.

Part One / Certification 1

1.1 ASSESSMENT

In the opinion of NSAI Agrément, the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly is suitable, and fit, for the intended use defined above. It meets the requirements of the Building Regulations 1997 - 2009 as indicated in Section 1.2 of this Detail Sheet. When activated, the Assembly also meets the relevant requirements of Health & Safety Legislation 1989 to 2006.

1.3 BUILDING REGULATIONS 1997 to 2009 REQUIREMENT:

Part D – Materials and Workmanship

D3 – The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, as certified in this Detail Sheet is comprised of 'proper materials' which (as an assembly) are fit for their intended use in Ireland.

D1 – The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, as certified in this Detail Sheet, meets the requirements of the Building Regulations for the use of 'proper materials'. The Certificate contains guidance on proper workmanship.

Part A – Structure

A1 – Loading

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly when installed as shown in this Detail Sheet, has adequate strength and robustness to withstand normal construction loading.

A2 – Ground Movement

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, when installed as shown in this Detail Sheet, will accommodate a limited degree of the normal ground movement to be expected over the lifecycle of a building.

Part B – Fire Safety

B2, B3 & B4 – Internal & External Fire Spread

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, when installed as shown in this Detail Sheet, is completely separated from the internal spaces, superstructure construction cavities and the external surfaces of a building; it therefore meets these requirements of the Building Regulations. As a precaution against tampering and unauthorised interference, the cover of the *Easi-Sump Cap-Link* is secured with stainless steel screw fixings.

Part C – Site Preparation and Resistance to Moisture

C3 – Dangerous Substances

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, when installed as shown in this Detail Sheet, is a necessary and reasonable precaution to be taken in order to avoid the risk of danger to human health caused by radon soil gas; it therefore meets this requirement of the Building Regulations.

C4 – Resistance to Weather and Ground Moisture

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, when installed as shown in this Detail Sheet, does not penetrate or interfere in any way with the radon resisting membrane or damp resisting membrane in a building.

Part F – Ventilation

F1 – Means of Ventilation

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, when installed as shown in this Detail Sheet, is completely separated from interior spaces; it will therefore not affect the patterns of natural ventilation in a building.

Part J – Heat Producing Appliances

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, when installed as shown in this Detail Sheet, is completely separated from the internal spaces of a building and will therefore not affect the operation of heat producing appliances; it will also not prejudice the fire protection of buildings local to fireplaces or flues.

Part L – Conservation of Fuel and Energy

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, when installed as shown in this Detail Sheet, is completely separated from the internal spaces of a building; system activation will not result in increased heat losses.

Part M – Access for People with Disabilities

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, when installed as shown in this Detail Sheet, will facilitate access to, and egress from, buildings; it therefore meets the requirements of this Part of the Building Regulations.

1.3 HEALTH & SAFETY LEGISLATION 1989-2006

When activated in an occupied building, the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, as certified in this Detail Sheet, meets the relevant requirements of the following legislation:

- Safety, Health & Welfare at Work Act, 1989;
- Regulations (1993-2006), made under the above 1989 Act – which implement the 'safety at work' European Directives;
- Radiological Protection Act, 1991 (Ionising Radiation) Order, 2000 – which implements European Council Directive 96/29/Euratom at national level.

Part Two / Technical Specification and Control Data 2

2.1 PRODUCT DESCRIPTION

This Detail Sheet relates to the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly. The *Easi-Sump* is a robust, medium density polyethylene product. The *Easi-Sump Cap-Link*, and standard drainage pipes and fittings, are all unplasticized polyvinyl chloride products. General descriptions of the *Easi-Sump*, the *Easi-Sump Cap-Link*, and drainage pipes and fittings are provided below.

The *Easi-Sump* is a three-dimensional, shallow, octagonal, and hollow product; it has a solid roof, with an upstand; it has solid sides, with projecting spigots from four opposing sides (each suitable for the insertion of 110mm diameter drainage pipe); and it has an open base. The *Easi-Sump* is supplied with one spigot open and three blanked-off, but a clearly visible groove in each spigot shaft guides cutting for easy removal of additional blanks on site, as required. See Figure 3.

The *Easi-Sump Cap-Link* is a compact product with two functions:

- it 'caps' the sub-floor network at an appropriate external location, facilitating a gas tight connection with a standard 100mm diameter pipe;
- it 'links' the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly, with ease and convenience at any later time in the lifecycle of a building, to a system activation kit.

For security, the *Easi-Sump Cap-Link* cover is retained in position with stainless steel screw fixings.

Standard drainage pipe (PVC-U), which has a nominal diameter of 110mm, is used throughout. Standard pipe fittings complete the assembly.

Easi-Sump:
(See Figure 3 and Table 1 for more information)

Product Weight:	1.85 kg	
Colour:	black	

Easi-Sump Cap-Link:
(See Figure 2 for a detailed specification)

Product Weight:	ESCL01	0.61kg
	ESCL02	0.92kg
Colour:	black	

Drainage Pipes and Fittings:
Underground, the drainage pipes and fittings used in this assembly must be manufactured in accordance with European Standard EN 1401-1:1998 *Plastics piping systems for non-pressure underground drainage and sewerage – Unplasticized polyvinyl chloride (PVC-U) – Part 1: Specifications for pipes, fittings and the system*.

Above ground, pipes and fittings used for system activation must be manufactured in accordance with European Standard EN 1329-1:1999 *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure – Unplasticized polyvinyl chloride (PVC-U) – Part 1: Specifications for pipes, fittings and the system*.

2.2 MANUFACTURE

The *Easi-Sump* is manufactured by a rotational moulding process from medium density polyethylene.

The *Easi-Sump Cap-Link* is manufactured by an injection moulding process from unplasticized polyvinyl chloride (PVC-U).

2.2.1 Quality Assurance & Product Quality Control

Appropriate quality assurance procedures, which conform to EN ISO 9001:2000 *Quality management systems – Requirements*, are operated by both manufacturers.

Easi-Sump
Quality control checks are carried out on raw materials, during production, and on the final products where appearance, colour, dimensions, thickness, weight, and freedom from defects are continually checked.

Easi-Sump Cap-Link
Quality control checks are carried out on raw materials, during production, and on the final products where appearance, colour, dimensions, freedom from defects, impact strength, and water tightness are continually checked.

2.3 DELIVERY, STORAGE AND MARKING

The *Easi-Sump* is supplied on pallets. The product name, supplier's name, address and contact information, together

with the NSAI Agrément Certificate Number, recycle logo, material code and production batch code are moulded into the polyethylene. Each product is supplied with an installation instruction leaflet.

The *Easi-Sump Cap-Link* is supplied in boxes. The product name, supplier's name, address, and contact information, together with the NSAI Agrément Certificate Number are moulded into the cover. Each product is supplied with an installation instruction leaflet.

Standard drainage pipes and fittings are supplied from hardware suppliers and builders' merchants throughout Ireland.

Easi-Sump and *Easi-Sump Cap-Link* should be stored in clean, dry conditions, and within an ambient temperature range of –10°C to +35°C. They should also be protected from extended exposure to ultraviolet light, i.e. sunlight.

2.4 ASSEMBLY INSTALLATION PROCEDURES

2.4.1 General

Installation of the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly should be strictly in accordance with this Certificate, and with the supplier's instructions. The design and installation of a Radon Soil Gas Control System should be carried out, supervised and controlled by competent personnel only.

Installation should include the following tasks:

Task No.1: When deciding on an appropriate external location for an *Easi-Sump Cap-Link*, it is essential to avoid re-entry of radon gas into interior spaces should a Radon Vent Pipe (RVP) be installed at a later time in the building's lifecycle. The following constraints would apply when a Radon Soil Gas Control System is activated:

1. There should be no openings into a building, e.g. windows, vents, or vertical control joints, less than 300mm from any part of the RVP.
2. The terminal unit of the radon vent pipe should be positioned at least 300mm above the surface of the roof and 900mm above any window or other opening into the building. It should be located at least 3m away from any window or opening that is less than 900mm below the terminal unit. See Diagram 1.
3. All exposed and visible vertical radon vent pipes should be clearly identified.

Task No.2: The hardcore layer in the floor construction of a building should be clean, dry, well-compacted, and gas permeable (following the compaction process), i.e. suitable material (preferably of single size) should be used which is greater than 10mm and less than 50mm, with no fines (or to an equivalent specification which results in adequate permeability following compaction).

Easi-Sump Cap-Link

Figure 2

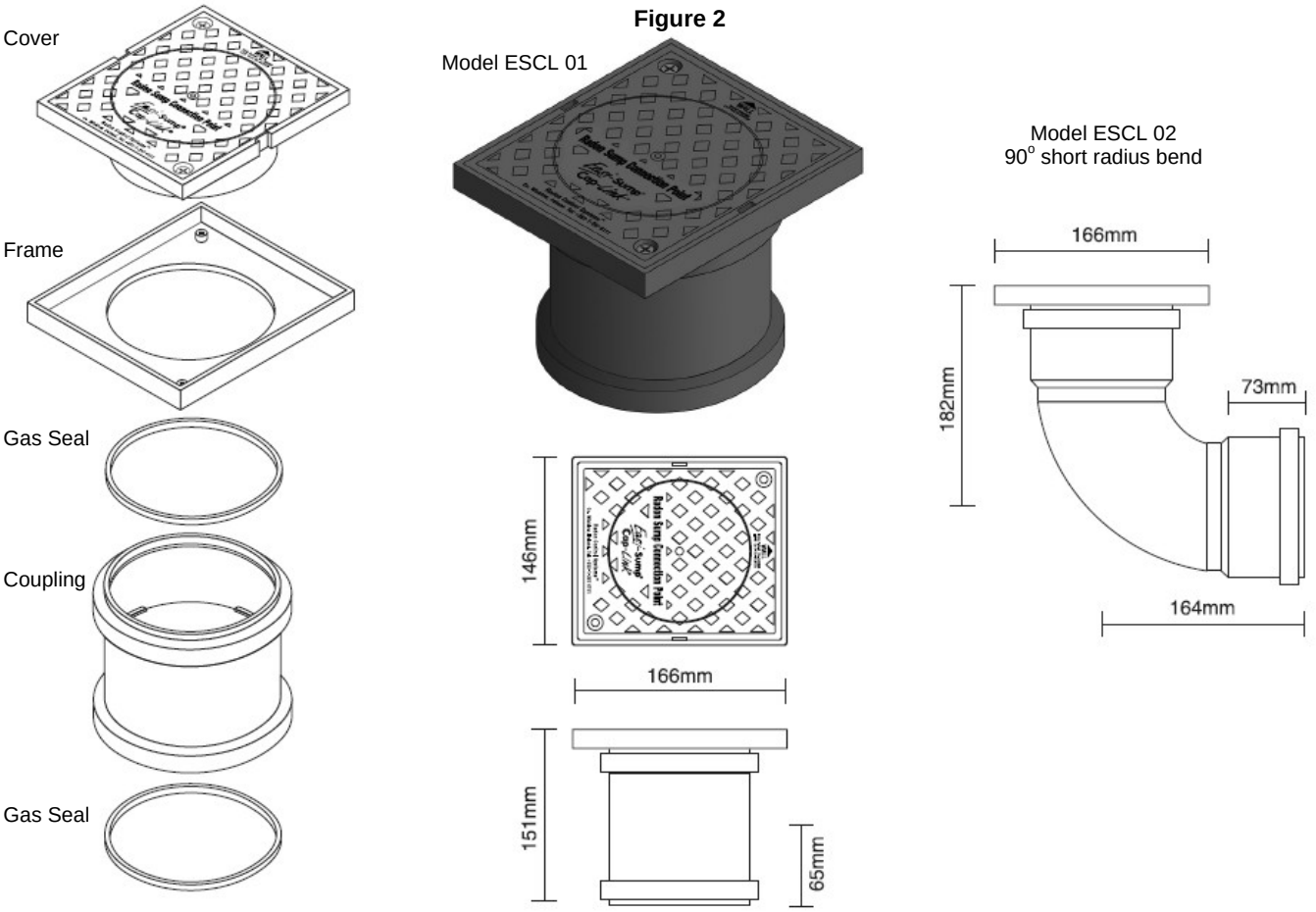
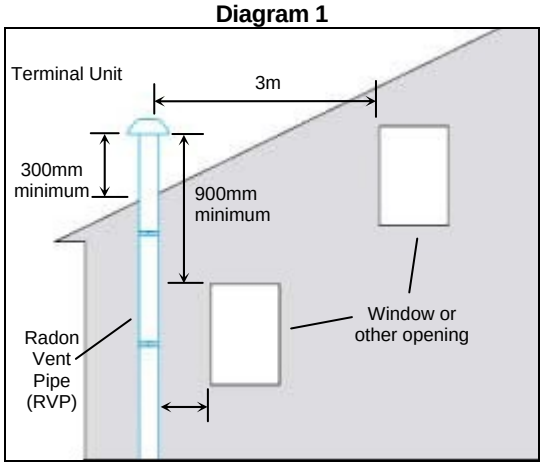


Diagram 1



The *Easi-Sump* is placed within this hardcore layer. See Figure 1 on the front cover of this Detail Sheet.

Each *Easi-Sump* should be placed centrally in an area of hardcore. In buildings where there may be many foundation compartments, a short length of 110mm diameter pipe (or a gap of similar size) should be inserted in all internal foundation rising walls, at centres not exceeding 1m and at approximately the same level as the *Easi-Sump*. This will ensure that the permeability of the hardcore layer remains effective throughout the extent of the building's foundations. See Figure 4.

In the event that a sub-floor radon soil gas control system is activated, it is important that heat producing appliances and the patterns of natural ventilation in interior building spaces should not be affected, or that heat losses be increased. To ensure a necessary degree of separation in the construction of a ground floor, a Radon Resisting Membrane should always be installed by competent personnel.

The *Easi-Sump* has four spigots, intended for the insertion of 110mm diameter drainage pipes. See Figure 3. Typically, one of these pipes should be laid, in accordance with standard drainage pipe installation procedures, to connect with the *Easi-Sump Cap-Link*, which is located just outside the external wall of the building. The other blanked-off spigots should be opened, as required, to accept pipe inserts coming from another part of the building's foundation, and/or another *Easi-Sump*. For reasons of condensation control, falls in pipework should be towards the *Easi-Sump*.

Depending on the quality of ground floor specification, whether or not it is accurately followed on site, the quality of workmanship, and level of technical control during this critical phase of construction, the effective pressure field of the *Easi-Sump* may extend well beyond an area of 250m^2, or fall below 50m^2.

As a general rule:

- with Category A Construction Execution, allow for one *Easi-Sump* to service an area not greater than 200m^2;
- with Category B Construction Execution, allow for one *Easi-Sump* to service an area not greater than 100m^2;
- with Category C Construction Execution, allow for one *Easi-Sump* to service an area not greater than 50m^2.

(See Clause 3.3 for classification of categories).

Extra *Easi-Sump*'s may be added, or interlinked, to a sub-floor network in order to service larger areas.

Task No.3: Before connecting the *Easi-Sump* to an *Easi-Sump Cap-Link*, however, a 110mm pipe exiting a building must be installed in a masonry opening which should:

a) be of sufficient size – to accommodate any reasonable construction settlement during the building's lifecycle which might interfere with the pipe;
b) have adequate structural support above the opening – in order to prevent any damage being caused to the pipe from masonry loading overhead;
c) have an approved flexible seal between the pipe and masonry – in order to avoid the possibility of drawing in air from the exterior thereby reducing the effectiveness of an activated radon soil gas control system. Provide 50mm to 60mm clearance around the pipe to allow for sealing.

Beyond this exit point from the building, all pipework must be gastight.

Task No.4: Complete installation by connecting the *Easi-Sump Cap-Link* to the 110mm pipe leading from the *Easi-Sump*. The cover of the *Easi-Sump Cap-Link* is supplied already in position, with stainless steel screws pre-fixed. This is to prevent:

(i) tampering and/or unauthorised interference;
(ii) rain penetration and/or vermin entry into the sub-floor network of the building.

When a Radon Soil Gas Control System is being activated, a circular section of the cover is removed to install a Radon Vent Pipe. This section is of sufficient size to accept a 110mm PVC-U pipe, with a small clearance all around. A central drill locator mark in the cover facilitates removal on site.

Existing Buildings

Should the installation of an activated radon soil gas control system (with a resulting alteration to sub-floor pressure) ever be considered in an existing building, it must always be established, prior to the commencement of any works, that there is sufficient separation between the sub-floor construction and interior spaces and superstructure construction cavities. Depending on age, an existing building may or may not have a ground floor Radon Resisting Membrane, or a damp resisting membrane.

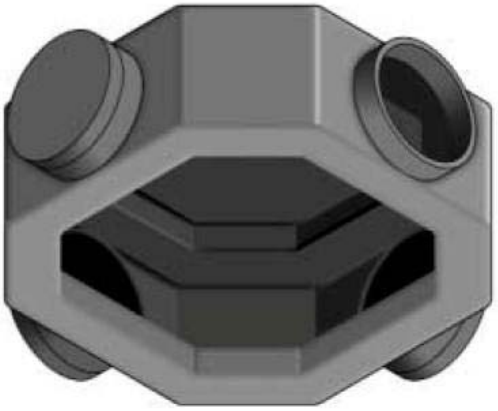
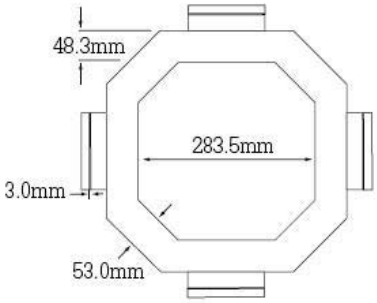
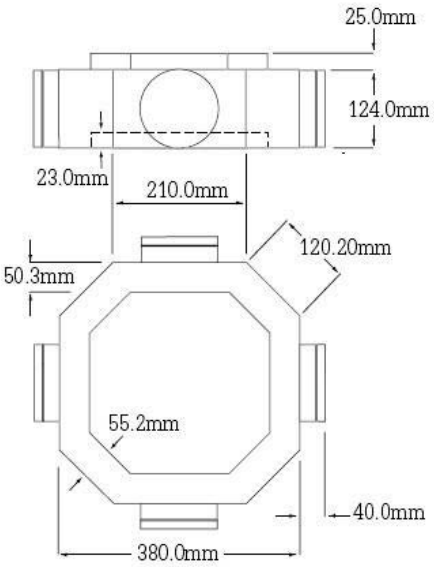


Figure 3

Top view



Side view



Bottom view

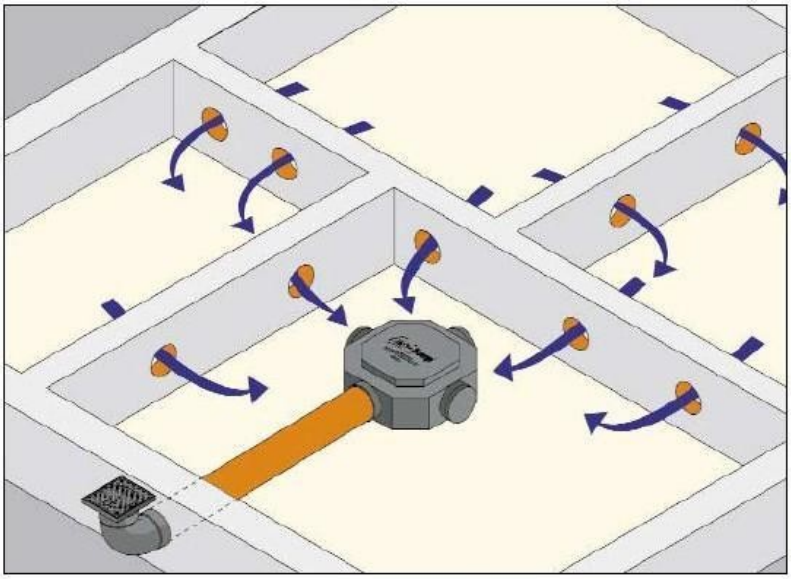
Easi-Sump has an open base area of 72,000mm^2 nominal

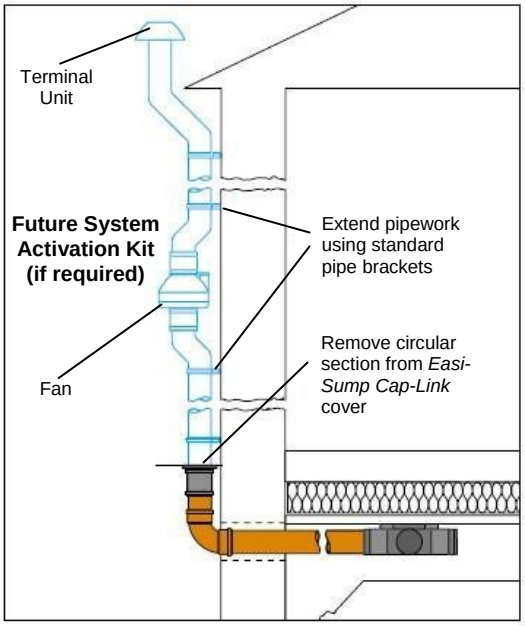
Table 1: *Easi-Sump* Technical Data

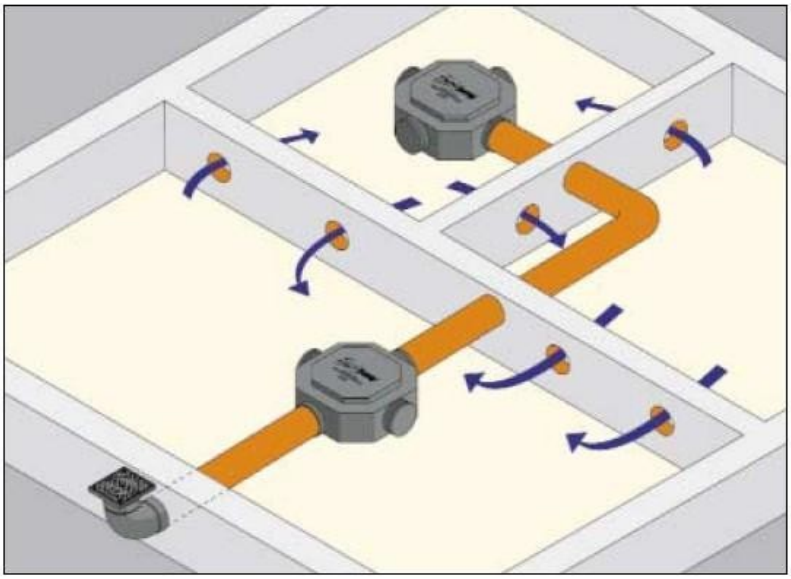
Test	Method	Results	Observations & Comments
Product Material Identification & Properties	Fourier Transform Infra-Red, in transmittance mode	Product matched to a polyethylene-based material	These materials have inherently good chemical resistance, and good low temperature toughness.
Product Relative Density	Density Gradient Column	Mean Density 0.944g/cm^3	Typical of a medium density polyethylene.
Product Weight	Calibrated Scales	Mean Weight 1856.8g	
Product Wall Thickness	Calibrated Ultrasonic Thickness Gauge	Mean Thickness 4.93mm	All wall thickness measurements above 4mm. Thickness variability typical of a rotationally moulded product.
Short Term Creep – 4 hrs (Compression Test No.5)	Lloyd LR50K Tensometer, using parallel plates	Mean Deflection at 480N (0.48kN/m^2) 6.96mm	480N, or 48kg, is equivalent to initial setting of 150mm concrete slab above product.
Compression Test No.2	Lloyd LR50K Tensometer, using parallel plates	Mean Deflection at 10,260N (10.26kN/m^2) 27.33mm	Up to 3,420N (3.42kN/m^2), there is approximate linear relationship between load and a deflection of 24mm. Above this load, the top section of the product is fully compressed into main body. A tripling of load results in only a further 3mm deflection.
Drop Tests	6 Metre Drop (2 storey height)	Some scratching, and denting (slight deformation of the product contour)	No failures or defects which might affect product performance.
Puncture Tests	Lloyd LR50K Tensometer, using (i) pointed, and (ii) blade type indentors	(i) Puncture at mean 486.5N, with mean deflection of 18.81mm; (ii) Puncture at mean 1899N, with mean deflection of 52.0mm	Product has very good resistance to puncture.

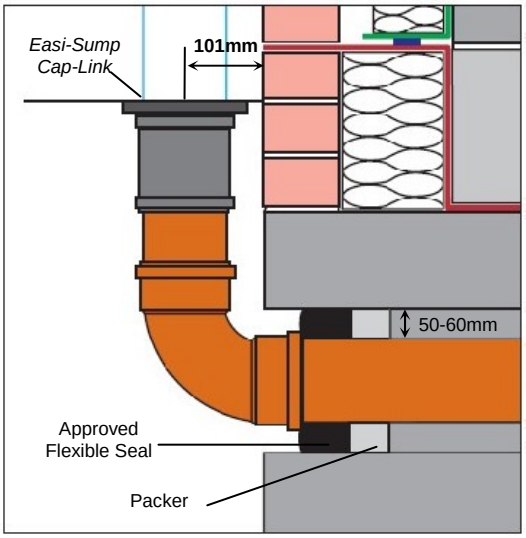
The complete test report may be inspected, upon request to the supplier

Figure 4









Part Three / Design Data 3

3.1 GENERAL

It is recommended that the design team of a building should develop a radon protection strategy which is specific to a particular construction site.

Resulting radon activity in the interior spaces and superstructure construction cavities of buildings, including dwellings and workplaces, depends principally on the following factors:-

1. Concentration and pressure of radon activity in the soil;
2. Soil permeability – including moisture conditions (radon is water soluble);
3. Source of hardcore used in building foundation construction;
4. Building design;
5. Quality of building construction;
6. Operation of the completed building by its users, e.g. heating of interiors which causes pressure difference with the exterior or whether or not there is adequate fresh air ventilation;
7. Time-dependent factors, e.g. changes in wind and atmospheric pressures.

There are so many variables, that one radon protection measure, on its own, may not entirely succeed in ensuring an adequate level of human health protection from the hazard of radon. A combination of measures will usually be required. It is for this reason that a

properly installed radon resisting membrane should always be considered.

Every new building should also be designed and constructed with features which facilitate further post-construction radon removal from interior spaces and superstructure construction cavities, in the event that radon levels increase at any period during its lifecycle. The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly are specifically designed to be converted, with ease, into an active protection measure by installing a radon vent pipe and an electrically operated ventilation fan. One Radon Soil Gas Control System is recommended per building. 'Communal' or shared connection of systems from more than one property is not recommended.

3.2 SITE CONDITIONS

The *Easi-Sump* and *Easi-Sump Cap-Link* Assembly may be installed in all site conditions considered normal for Ireland. Should a building's foundations be continuously waterlogged for extended periods during the heating season, it may be necessary to install further radon protection measures.

3.3 CATEGORIES OF CONSTRUCTION EXECUTION

Category A

(a) Supervision of the works is exercised by appropriately qualified and experienced personnel from the principal construction organisation.
(b) Regular inspections, by appropriately qualified and experienced personnel familiar with the design and independent of the construction organisation(s), are carried out to verify that the works are being executed in accordance with the design.

Category B

Supervision of the works is exercised by appropriately qualified and experienced personnel from the principal construction organisation.

Category C

This level of construction execution is assumed when the requirements for Category A and Category B are not met.

3.4 POST-CONSTRUCTION TESTING FOR RADON

Upon completion of a building and again, at least, after a period of 12 months following completion, it is recommended that indoor radon levels be reliably tested in order to ensure the continued effectiveness of the radon protection strategy.

3.5 ACCESSIBILITY FOR PEOPLE WITH ACTIVITY LIMITATIONS

In detailing a ground floor construction for any building, special consideration should be given to accessibility (see Part M, Building Regulations 1997 to 2006) of entrances and fire exits for people with activity limitations. See Figure 1 on the front cover of this Detail Sheet.

Part Four / Technical Investigations 4

4.1 TESTS / ASSESSMENTS

The following is a summary of the technical investigations carried out on the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly. Detailed results from the *Easi-Sump* Test Programme are shown in Table 1.

4.2 MAINTENANCE

When installed in accordance with this Detail Sheet, no maintenance of the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly is required.

4.3 DURABILITY

When installed in accordance with this Detail Sheet, the lifecycle of the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly will match that of the building.

When installed in accordance with this Detail Sheet, the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly is protected from ultraviolet light. The cover of the *Easi-Sump Cap-Link* is adequately resistant to ultraviolet light.

4.4 BEHAVIOUR IN FIRE

When installed in accordance with this Detail Sheet, the *Easi-Sump* and *Easi-Sump Cap-Link* Assembly is completely separated from the internal spaces, superstructure construction cavities and the external surfaces of a building; it will, therefore, not contribute to the growth and development stages of a fire, or present a smoke/toxic gas hazard. As a precaution against tampering and unauthorised interference, the cover of the *Easi-Sump Cap-Link* is secured with stainless steel screw fixings.

4.5 OTHER INVESTIGATIONS

a) Date on properties of the Assembly's component products, in relation to strength and toxicity, were assessed;
b) The manufacturing processes were examined, including the procedures adopted for quality assurance and control. Information was obtained on the quality and composition of product component materials.