


**IRISH AGRÉMENT BOARD  
CERTIFICATE NO. 23/0438**

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## Protech Radon 400

**NSAI Agrément (Irish Agrément Board)** is designated by Government to issue European Technical Approvals.

NSAI Agrément Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with TGD Part D of the second schedule of the **Building Regulations 1997 and subsequent revisions**.



### PRODUCT DESCRIPTION:

This Certificate relates to the Protech Radon 400 radon membrane, which is a laminate of two outer polyethylene films with an interlayer mesh of polypropylene scrim reinforcement. This Certificate certifies compliance with the requirements of the Building Regulations.

### USE:

Radon (incl. RN-222, RN-220, RnD) is a naturally occurring radioactive gas, which enters buildings from the underlying soil. This 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 a suitable protection system, designed and installed by competent personnel, will reduce the risk of a building having radon activity to meet the requirements of TGD Part C to the Irish Building Regulations.

Passive control systems consist of a radon resisting membrane extending across the whole building, including the floor and walls. These systems should also incorporate an underfloor ventilated sump(s) which can be subsequently converted into an active control system by the use of suitable ventilation fans.

The Protech Radon 400 membrane, when installed in accordance with this Certificate, will also act as a damp proof membrane to protect the building against the ingress of moisture from the ground.

**Note: DPMs must be CE marked to IS EN 13967.**

### MANUFACTURE & MARKETING:

The product is manufactured on behalf of and marketed by:

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### **1.1 ASSESSMENT**

In the opinion of NSAI Agrément, Protech Radon 400 membrane, if used in accordance with this Certificate can meet the requirements of the Building Regulations, as indicated in Section 1.2 of this Irish Agrément Certificate.

#### ***Part D – Materials and Workmanship***

##### **D3 – Proper Materials**

##### **D1 – Materials and Workmanship**

#### ***Part A - Structure***

##### **A1 – Loading**

#### ***Part B – Fire Safety***

##### ***Part B Vol 2 – Fire Safety***

##### **B3 & B8 – Internal Fire Spread (Structure)**

#### ***Part C – Site Preparation and Resistance to Moisture***

##### **C3 – Dangerous Substances**

##### **C4 – Resistance to Weather and Ground Moisture**

## 2.1 PRODUCT DESCRIPTION

The Protech Radon 400 membrane is an LDPE reinforced membrane. A product specification is shown in Table 1.

	Value/Units
<b>Thickness</b>	0.4mm (effective thickness)
<b>Radon Transmittance</b>	1.8 x 10 <sup>-8</sup> (SP method 3873)
<b>Radon Permeability</b>	6.02 x 10 <sup>-12</sup> m <sup>2</sup> /s
<b>Water Vapour Permeability</b>	
<b>Weight</b>	400g/m <sup>2</sup>
<b>Tensile Strength</b>	≥ 310N/50mm-1 MD ≥ 210N/50mm-1 CD
<b>Elongation at Max Tensile Force</b>	MD 17% TD 20%
<b>Tear Resistance</b>	≥200N MD ≥230N CD
<b>Low Temperature Flexibility</b>	Pass at -45°C
<b>Standard Roll Width</b>	2m
<b>Standard Roll Length</b>	50m
<b>Colour</b>	Red

**Table 1: Product Specification**

### 2.1.1 Ancillary Products

Other ancillary products which are outside the scope of this Certificate include:

- Protech GM Tape
- Protech GM Starterband
- Protech GR DPC
- Protech SAGM (Self Adhesive Gas Membrane )
- Protech GM Flashing Tape
- Protech Sump
- Protech Protection Board
- Protech Protection Fleece

## 2.2 MANUFACTURE

The Protech Radon 400 membrane is manufactured by a polythene extrusion process.

### 2.2.1 Quality Control

Quality control checks are carried out on the incoming raw materials, during production and on the finished product. These checks include dimensions, tensile strength, impact strength, elongation, weight.

## 2.3 DELIVERY, STORAGE AND MARKING

The rolls are supplied on pallets, with an identification label showing manufacturer's name, product description, NSAI Agrément Identification, CE/UKCA marks and website details for installation and storage guidance.

## 2.4 INSTALLATION

### 2.4.1 General

Guidance on the design of radon protection systems for new and existing buildings is given in the DoELG document *Radon in Buildings* and in the BRE (UK) document *Radon – Guidance on protective measures for new dwellings*. It is essential that the product is laid in accordance with the recommendations of IS EN 1996-1-1, BS 8102, and with this Certificate. Additional guidance on the use of damp proof membrane materials is given in BS 8000-4.

### 2.4.2 Design Details

The Protech Radon 400 membrane can be used in most common floor constructions. It is installed in a similar way to damp proof membranes, but with much greater attention to sealing, detailing and workmanship. The radon barrier will also perform the same function as a damp proof membrane.

To be fully effective, a radon barrier must bridge cavities in walls to the exterior of the building. Where necessary, narrow strips of membrane can be used to seal walls and cavities. All designed cavities must be properly closed.

To avoid creating slip planes in masonry walls, a damp proof course should not be laid on the same course of blockwork as the Protech Radon 400 membrane (see the recommendations in I.S. EN 1996-1-1).

Consideration must be given to the positioning of a radon barrier in relation to thermal insulation. The recommendations contained in IS EN 1996-1-1. and the BRE Report *Thermal Insulation – avoiding risks* should be followed.

The integrity of a radon barrier must be maintained during installation. The Protech Radon 400 membrane is resistant to puncturing and tearing, but where damage occurs this must be repaired by covering with a second layer of membrane, overlapped by at least 150mm, sealed with double sided tape and secured with single sided jointing tape.

Sheets must be clean and free from dirt and grease before application, and in view of the difficulty of achieving gas tight seals under wet or dirty site conditions it is recommended that special care be taken with this aspect of the installation.

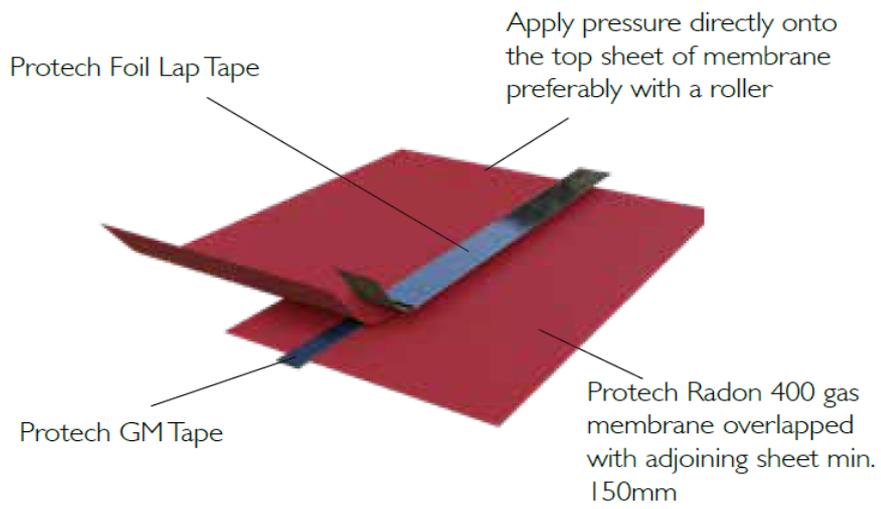
### **2.4.3 Installation Procedure**

Where sub floor depressurisation is required, then a radon sump should be used, located as close to the centre of the building as possible. All pipe work connecting to the sump should fully sealed using the jointing tape system. A venting pipe should be connected to the sump, which needs to leave the building. Until such time as a fan is installed, the pipe should be capped (Note: a sump is only installed as a fallback measure and does not provide any radon removal until a fan is installed or is connected to a passive stack system).

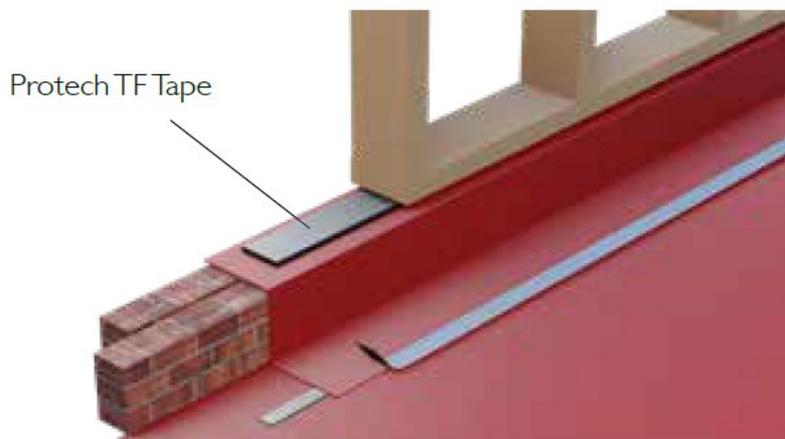
A screed or other suitable protective layer should cover The Protech Radon 400 membrane as soon as possible after installation. Care should be taken to ensure that the membrane is not punctured, stretched or displaced when applying the screed or concrete. A minimum thickness of 50mm screed is recommended.

When reinforced concrete is to be laid over the barrier, the wire reinforcements must be prevented from contacting the barrier. It is recommended that the barrier is covered with screed before positioning the reinforcement.

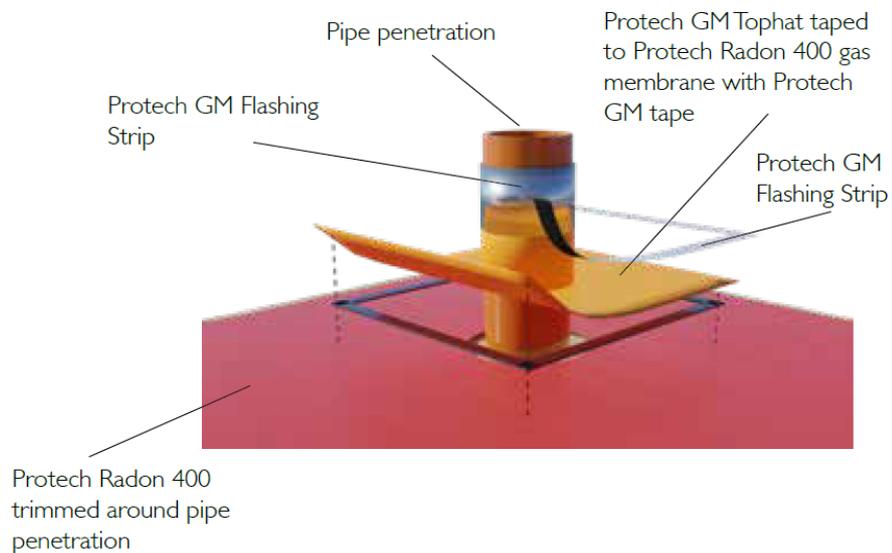
When underfloor heating is being installed, it is recommended that the Protech Radon 400 membrane is positioned between the blinded hardcore and the insulation to protect the installation from moisture and to avoid any risk of overheating the membrane. External and internal corners should be rounded.



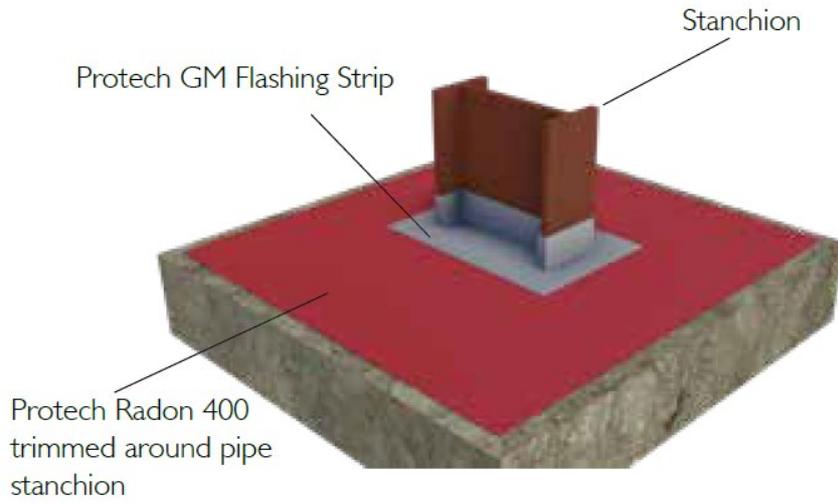
**Figure 1: Tape Joint Detail**



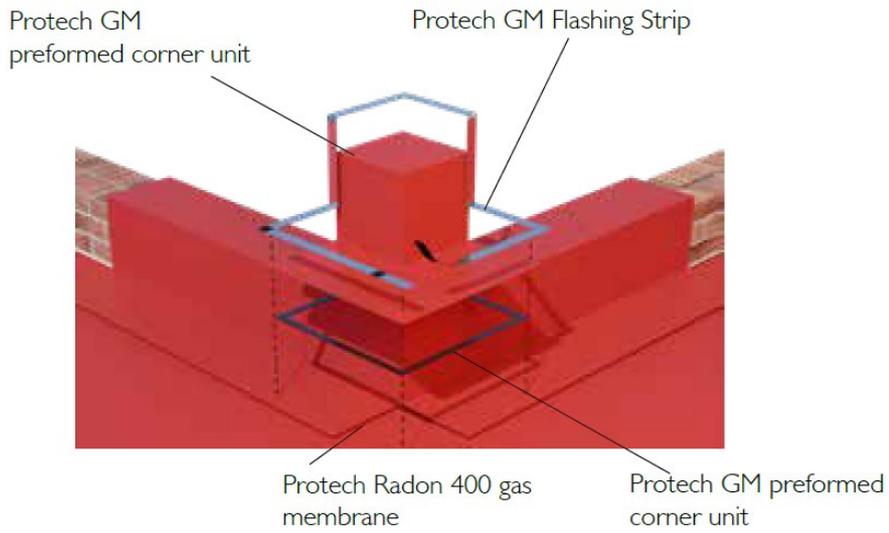
**Figure 2: Timber Frame Detail**



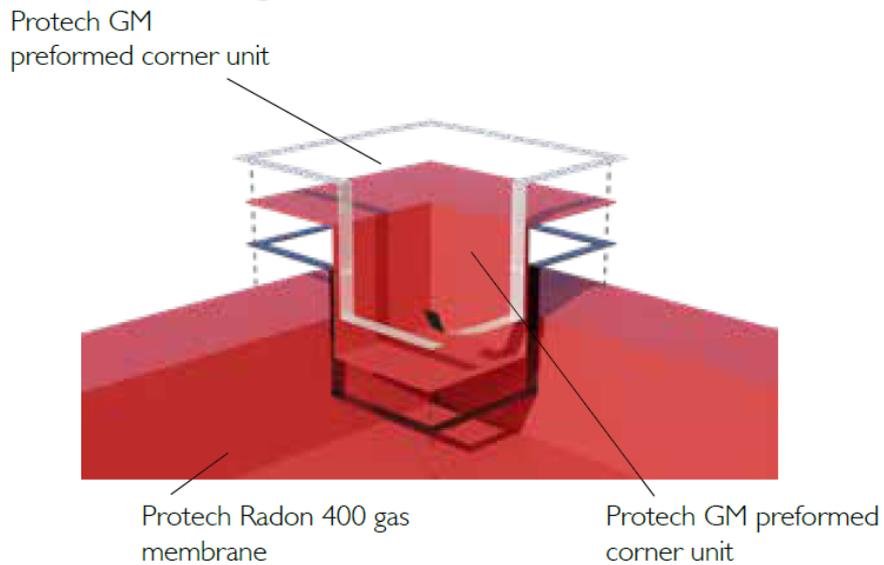
**Figure 3: Tophat Detail**



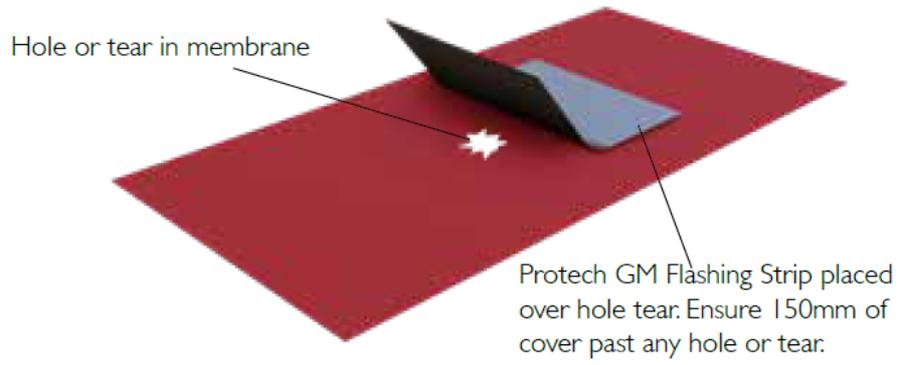
**Figure 4: Stanchion Detail**



**Figure 5: External Corner Detail**



**Figure 6: Internal Corner Detail**



**Figure 7: Repair Patch Detail**

### 3.1 GENERAL

Protech Radon 400 is suitable for use in concrete and suspended timber floors not subject to hydrostatic pressure, in accordance with the relevant clauses of IS EN 1996-1-1 and BS 8102. The product can be installed as an over-site membrane, either between a sand blinded hardcore (50mm of sand minimum) bed and the base concrete, or laid on top of high-density insulation (25kg/m<sup>3</sup>) with a concrete screed laid over it.

#### 3.1.1 Resistance to Radon, Water and Water Vapour

The membrane and methods of jointing provide an effective barrier to the passage of radon gas, liquid water and water vapour from the ground.

#### 3.1.2 Resistance to Tear and Puncture

Although the product has a high resistance to tear, care should be taken during installation, particularly when handling building materials and equipment over the surface and when placing concrete or screeds, since the membrane can be punctured by sharp objects. When installed as set out in this Certificate, there should be a minimum risk of puncture or tear damage. High-density insulation (25kg/m<sup>3</sup>) is an effective protection after laying.

#### 3.1.3 Site Conditions

The product may be installed in all conditions normal to ground floor slab construction. Where there is a risk of ground becoming waterlogged, sub-soil drainage must be provided in accordance with IS EN 1996-1-1 and BS 8102.

#### 3.1.4 Underfloor Heating

When used in accordance with the conditions set out in this Certificate, there will be no adverse effect on the membrane from underfloor heating under normal conditions.

### 3.2 CONSTRUCTION DETAILING

To reduce radon gas migration/ingress into buildings the following guidelines should be followed:

- Design for controlled movement of construction (see IS EN 1996-1-1)
- Ensure that all designed cavities are effectively closed to interior spaces
- Design for grouping of services, with effective gas seal of ground slab openings and penetrations

### 3.3 CONSTRUCTION SETTLEMENT

Consideration should be given to differential and/or relative settlement of ground floor construction during the full life cycle of the building.

Where special installation detailing is introduced, i.e. folding of a radon resisting membrane at critical construction points, an elongation capability for the membrane itself may not be required. Where high concentrations of radon are likely and where a building is properly designed, detailed and constructed to take account of settlement, the installation of the Protech Radon 400 membrane represents an effective measure against radon health hazards.

### CONSTRUCTION DETAILING – PROVISION FOR SETTLEMENT

#### Situation A:

If it can be predicted with certainty that there will be no actual/real relative or differential settlement during the entire cycle of a building, Protech Radon 400 radon membrane may be installed as shown:



#### Situation B:

If it can be predicted with certainty that the actual/real relative or differential settlement during the entire life cycle of a building will not exceed 8mm, Protech Radon 400 radon membrane may be installed with an upstand as shown:



#### Situation C:

If it cannot be predicted with certainty what the actual/real relative or differential settlement will be during the entire life cycle of a building, Protech Radon 400 radon membrane should be installed with folds as shown:



#### 4.1 MAINTENANCE

No maintenance of a radon resisting membrane is required when installed in accordance with this Certificate.

#### 4.2 DURABILITY

When installed in accordance with this Certificate and subject to normal conditions of use, the membrane will provide an effective barrier, which will be substantially impervious to the transmission of radon gas, liquid water and water vapour for the life of the building.

Long periods of exposure to ultraviolet light can reduce the effectiveness of a membrane. However, during storage, and when installed in accordance with this Certificate, the membrane will be protected from such exposure.

It is important to note that alterations to the building structure subsequent to the installation of a radon protective system must take into account the integrity of the radon resisting membrane.

#### 4.3 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:

Test data was reviewed to establish the following (See also Table 1) :

- Thickness
- Mass per unit area
- Tensile strength and elongation
- Nail tear resistance
- Water vapour permeability
- Watertightness
- Resistance to static loading
- Resistance to impact
- Heat aging followed by tensile strength and elongation, nail resistance and watertightness
- Short term UV ageing, followed by tensile strength and elongation
- Radon gas transmittance

#### 4.4 OTHER INVESTIGATIONS

- (i) Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed. When stored with normal care on site prior to installation, the membrane will not present a significant fire or health hazard.
- (ii) The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

**5.1** National Standards Authority of Ireland ("NSAI") following consultation with NSAI Agrément has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid for five years from date of latest revision so long as:

- (a) the specification of the product is unchanged.
- (b) the Building and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.
- (d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.
- (f) the registration and/or surveillance fees due to IAB are paid.

**5.2** The NSAI Agrément mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the NSAI Agrément mark and certification number and must remove them from the products already marked.

**5.3** In granting Certification, the NSAI makes no representation as to;

- (a) the absence or presence of patent rights subsisting in the product/process; or
- (b) the legal right of the Certificate holder to market, install or maintain the product/process; or
- (c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

**5.4** This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

**5.5** Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act 2005, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

**5.6** The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

**5.7** Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.



## **Bibliography**

I.S. EN 13967:2012+A1:2017: *Flexible sheets for waterproofing – Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet – Definitions and characteristics.*

DoELG document *Radon in Buildings.*

BRE (UK) document *Radon – Guidance on protective measures for new dwellings.*

IS EN 1996-1-1:2005+A1:2012/NA:2010+A1:2014: *Eurocode 6 – Design of masonry structures – Part 1-1: General rules for reinforced and unreinforced masonry structures (including Irish National Annex).*

BS 8102:2009 *Code of practice for protection of below ground structures against water from the ground.*

BS 8000-4:1989 *Workmanship on building sites – Code of Practice for waterproofing.*

BRE Report *Thermal Insulation – avoiding risks.*

S.R. 21: 2014+A1:2016: *Guidance on the use of I.S. EN 13242:2002 +A1:2007 – Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction*