

Terrain Above Ground Drainage Systems



A Guide to Thermal Movement

Terrain Above Ground Drainage

Having pioneered the development of solvent-weld systems, Terrain soil & waste products are produced using the latest plastics manufacturing technology, backed by the highest levels of customer service and technical support.

The Terrain above ground drainage systems include an extensive range of soil & waste products for commercial, industrial, housing and public sector developments, all built on the strength of our Terrain brand. Systems include solvent-weld and push-fit options for both soil & waste drainage; overflow, WC pan connectors and trap systems; a comprehensive range of adaptors and accessories. Products are available in a range of colours.

- Industry leading range of solvent and push-fit soil and waste solutions
- Simple to install
- Unique products offer unrivalled installation options
- Suitable for all types of commercial and domestic installations
- Extensive technical experience to support and advise on all aspects of design and installation
- Fully accredited product systems

As you would expect from a market leader our products come with all relevant standards including:

Manufacturing Standards

BS 5255:1989 Specification for Thermoplastics Waste Pipe and Fittings

BS 4514:2001 PVC Soil and Ventilation Pipes, Fittings and Accessories

BS EN 1329:2000 Plastic Piping Systems for Soil and Waste Discharge

BS EN 1566:2000 Plastic Piping Systems for Soil and Waste Discharge (Chlorinated)

BS EN 12380 A1 Air Admittance Valve

Quality Management Systems Standards

EN ISO 9001:2015 Management System

EN ISO14001:2015 Management System

BS OHSAS 18001:2007 Management System

PASS 99:2012 Integrated Management Registration

For further information see contact details on the back cover of this brochure.



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Terrain Above Ground Drainage

Introduction

Terrain PVCu and MuPVC pipework systems expand with changes in temperature, both from ambient temperature and from the temperature of the waste discharge through the pipework.

This guide describes the principals of expansion design and provides advice covering assembly and jointing techniques.

The advice and guidance is based on typical situations only. For further information refer to the Terrain soil and waste installation guide or contact the Terrain Technical Services Department.



Calculate Expansion

The co-efficient of linear expansion of Terrain PVC-u is small, however, the cumulative effects of thermal movement on an installed system can be considerable if not compensated. The first step in mitigating these effects is to calculate the theoretical thermal movement distances to enable the pipework system to be designed to accommodate expansion.

Calculate the expansion on straight lengths between anchors using:

$$DL = a LDT$$

Where:

DL - expansion (mm)

a - co-efficient of linear expansion (mm/m/°C)
• Terrain PVCu, 0.04

L - length of the pipe (m)

DT - temperature difference (°C)

Example 1.

A 10 storey foul drainage stack will collect and convey domestic waste (temperature 60°C) and connect directly to drain. Each storey is 3.5 m high.

$$\begin{aligned} DL &= a LDT \\ DL &= 0.04 \times 35 \times 60 \\ &= 84\text{mm} \end{aligned}$$

NB. For waste discharges ΔT should always be calculated from 0°C, so if the temperature of the water in the pipe is to be 60°C, then ΔT is 60°C.

Example 2

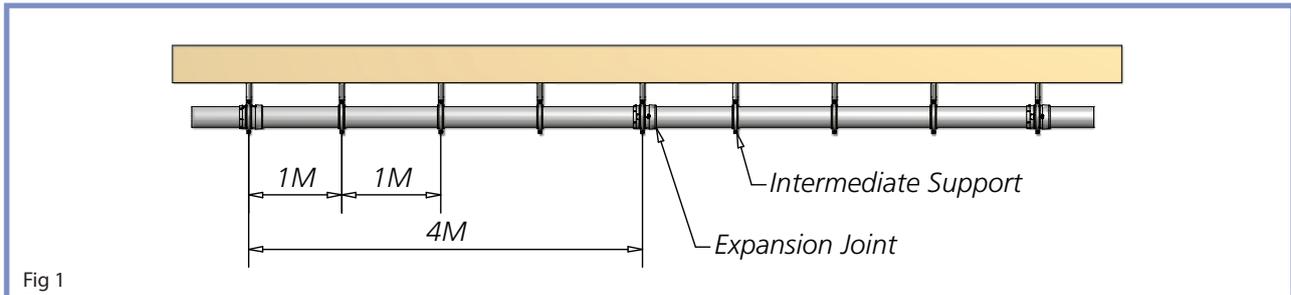
A 20 metre high branch drain has been designed in an open car park area, the ambient air temperature will vary from 10°C to 45°C

$$\begin{aligned} DL &= a LDT \\ DL &= 0.04 \times 20 \times 35 \\ &= 28\text{mm} \end{aligned}$$

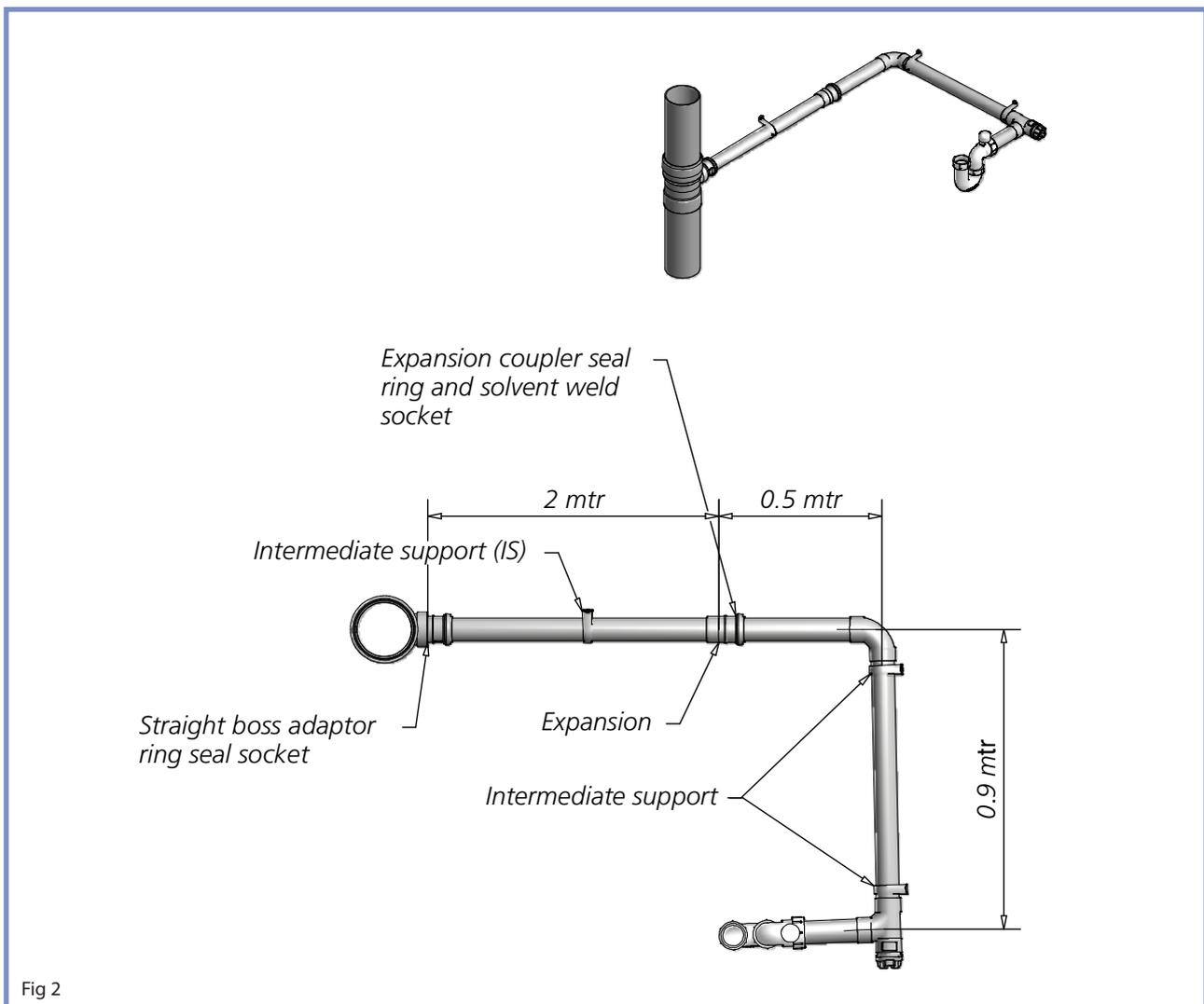
Support and Expansion Distances

Unless there is an alternative provision for thermal movement, pipework should be fitted with expansion joints in the following locations:

- 1) At spacing's no greater than 4m for pipework 82mm and above (fig 1)



- 2) At spacing's no greater than 2m for pipework 50mm and below (fig 2)



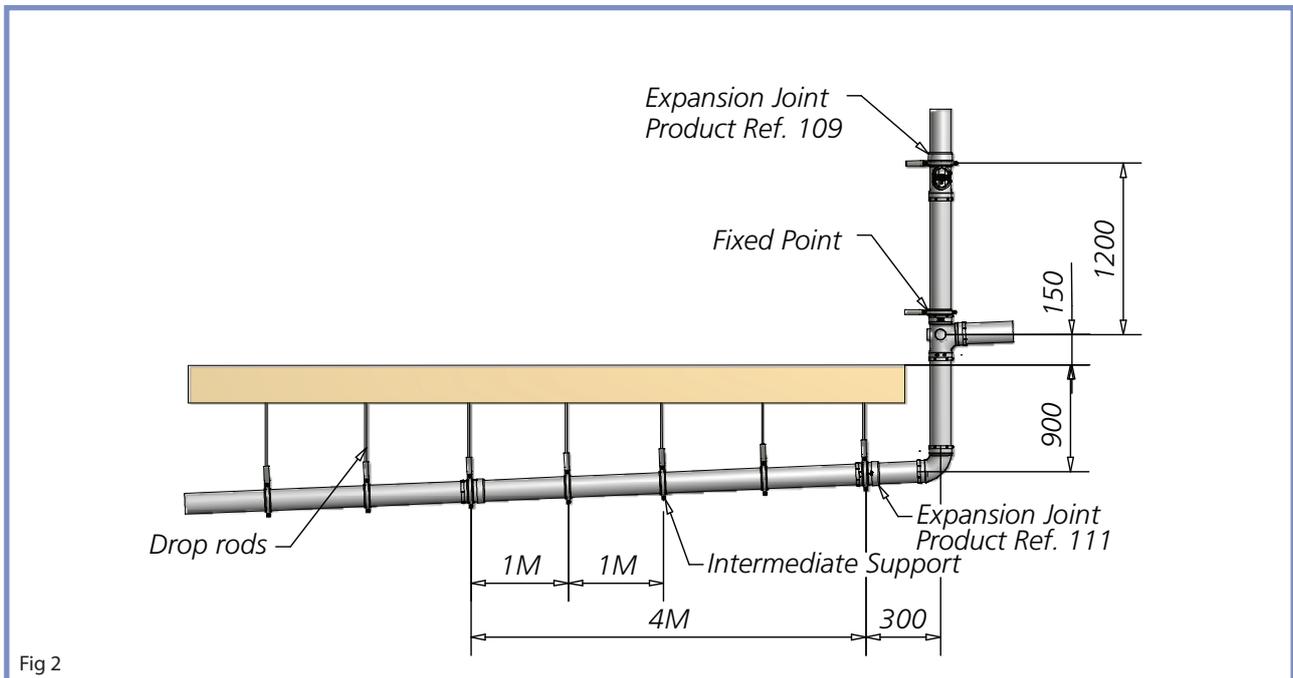
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Support and Expansion Distances

3) Where the maximum distance between fixed points exceeds 1m

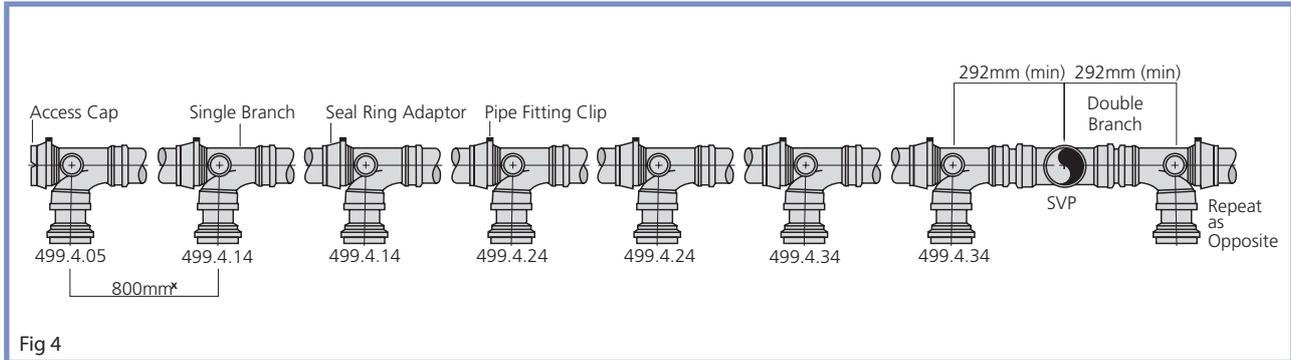
Pipe Size - Soil	Maximum Distance Between Expansion Joints
82mm	4 metres
110mm	4 metres
160mm	4 metres
Pipe Size - Waste	Maximum Distance Between Expansion Joints
32mm	2 metres
40mm	2 metres
50mm	2 metres

4) Any point where pipework passes through a floor or wall and is made good or fire stopped; it must be treated as a fixed point when determining positions of expansion joints. (fig 3)

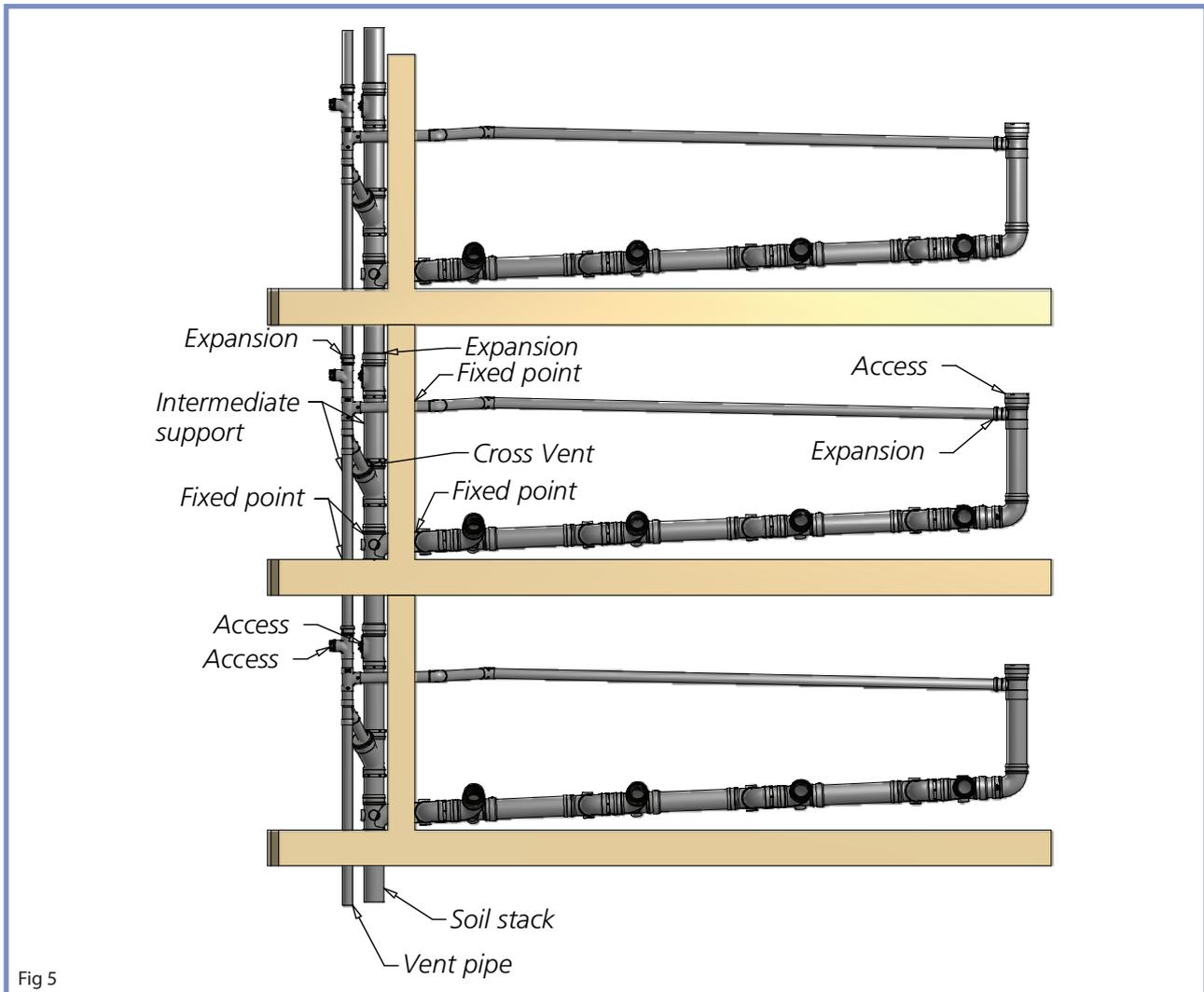


Support and Expansion Distances

- 5) Low level WC manifolds incorporate seal ring adaptors at each branch connection to compensate for expansion and also allow the branch to be 'turned' to the correct angle to allow connection to the WC (fig 4).



Note: If a secondary ventilation system is being installed then expansion must also be provided to the secondary ventilation stack in the same location as the expansion provided for the soil & waste stack (fig 5).



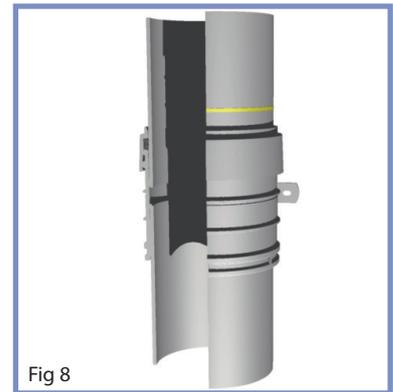
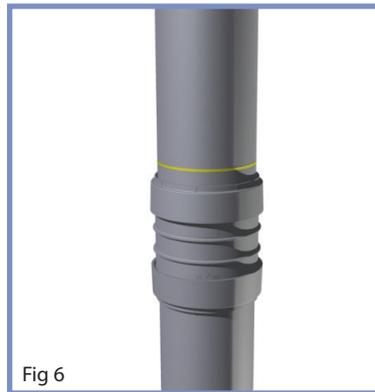
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Expansion Joints

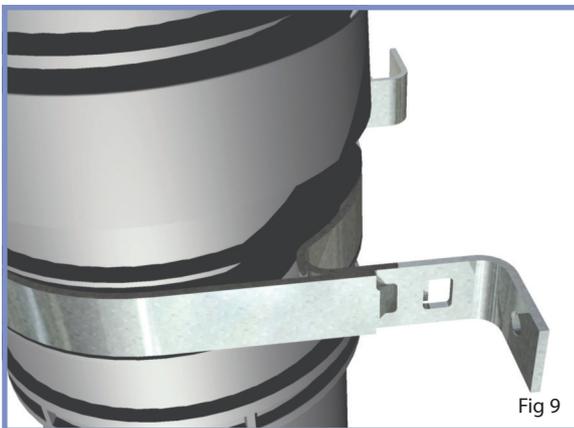
Pipe brackets must be used to anchor expansion joints. The anchor point can be made directly in the bracket grooves provided on pipework fittings or alternatively directly onto the pipe.

When anchoring the pipework using a solvent weld fitting a ring seal adaptor (code 109) needs to be connected to the fitting to accommodate expansion. It is important to lubricate the ring seal adaptor with silicone grease (code 9136.250)

The pipe connecting into the ring seal adaptor should be inserted fully into the socket and marked. To create the expansion gap withdraw the pipe 12mm from the socket. This gap will allow the pipe to expand sufficiently without distorting the pipework. (fig 6,7& 8)



Anchor points directly onto the pipe can be made using a packing piece (code 9104). The anchor point must be within one metre of the proposed point of anchorage. (fig 9)



Note: On internal pipework systems subject to fire requirements it is recommended that only steel support brackets (code 140) are installed.

Intermediate support must also be provided.

Expansion Joints

Pipework supports shall be provided in accordance with the following table and either side of bends.

Pipe Material	Pipe Size (mm)	Vertical Pipes (m)	Low Gradient Pipes (m)
MuPVC (modified unplasticized polyvinyl chloride)	32-40	1.2	0.5
	50	1.2	0.9
PVC-u (unplasticized polyvinyl chloride)	32-40	1.2	0.5
	50	1.2	0.9
	75-100	2.0	1.0
	150	2.0	1.0

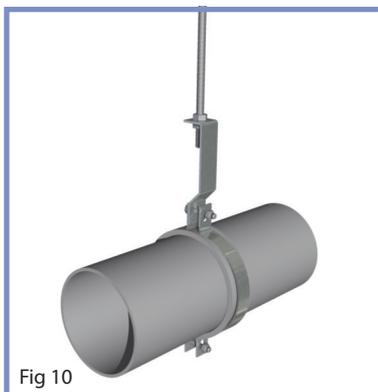
Multiple pipe supports for pipes of differing sizes shall be spaced at intervals required for the smallest pipe

On relatively short horizontal suspended runs, expansion can be accommodated using a ring seal adaptor, Fig 10.

On longer suspended runs, expansion joints should be made using a product (reference 190) thermal movement limiter (tml) (Fig 11). The tml prevents the pipe from pulling out of the ring seal adaptor and causing a leak.

It will also be necessary to install an intermediate support bracket product (reference 191).

We would recommend that cross bracing is incorporated where branches enter a main run, the bracing is necessary to stabilise the pipework (fig12)

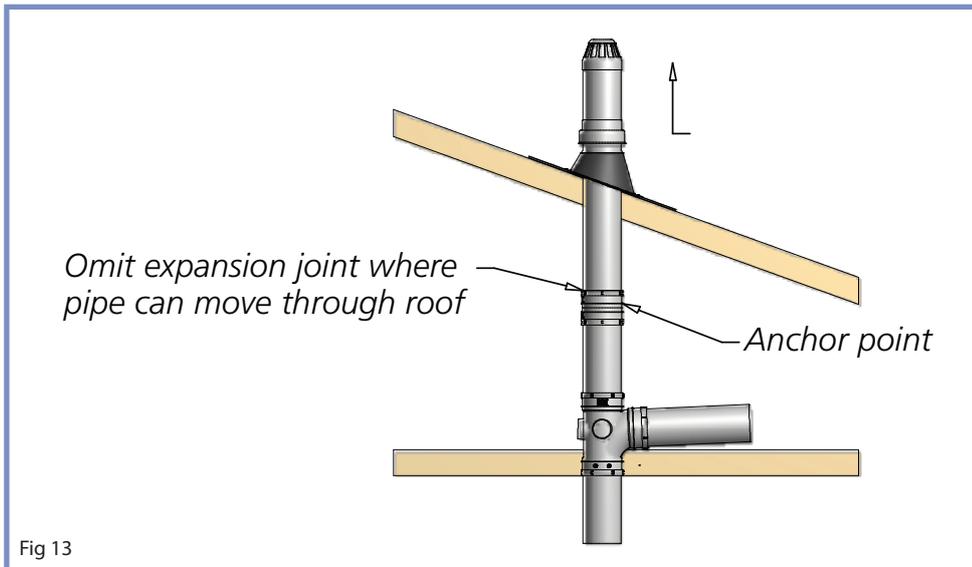


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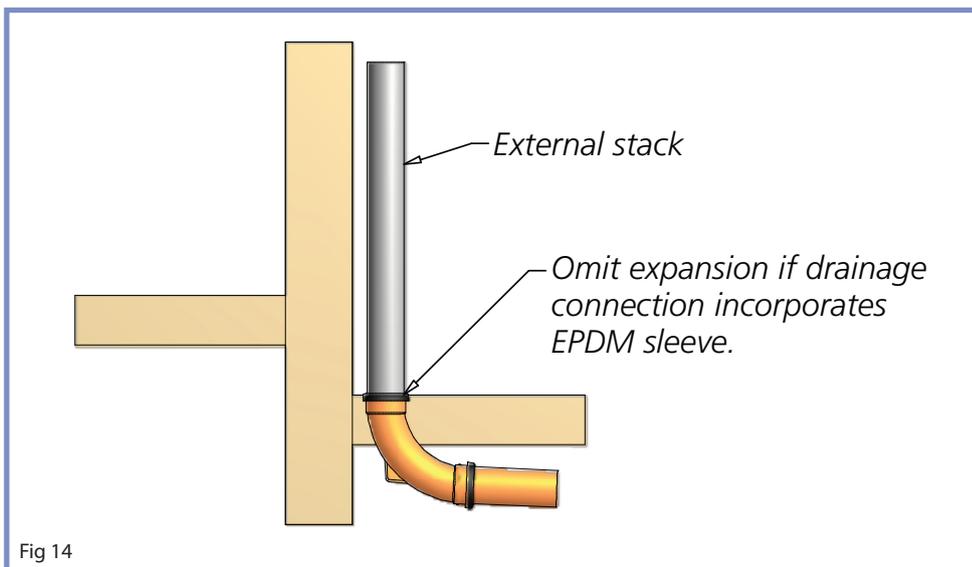
Alternative Provision for Thermal Movement

Expansion joints may be omitted if alternative provision is created in one of the following ways.

- a) Above the highest branch connection to a foul and/or waste stack is free to move through a weather proof roof sleeve. (fig 13)



- b) At the base of an external drainage stack that is connected to a drainage connection that allows movement through an EPDM sleeve. (fig 14)



Risers and Branches

It is recommended that an expansion joint is incorporated at each floor level when designing and installing PVCu stacks in multi-storey buildings.

Where a branch is taken off a main run, the expansion movement of the main run is going to affect the branch. (fig 15)

1. Establish the distance between the branch and the nearest anchor
2. Calculate the movement at the point where the branch joins the main run
3. Establish the hole size through the wall and ensure that there is enough space for the branch to naturally flex, taking into account that the movement of the branch will be limited where it passes through a wall
4. If there is not enough space for the required offset, consider adding expansion joints and anchor points to the main run to reduce the amount of movement experienced by the branch.

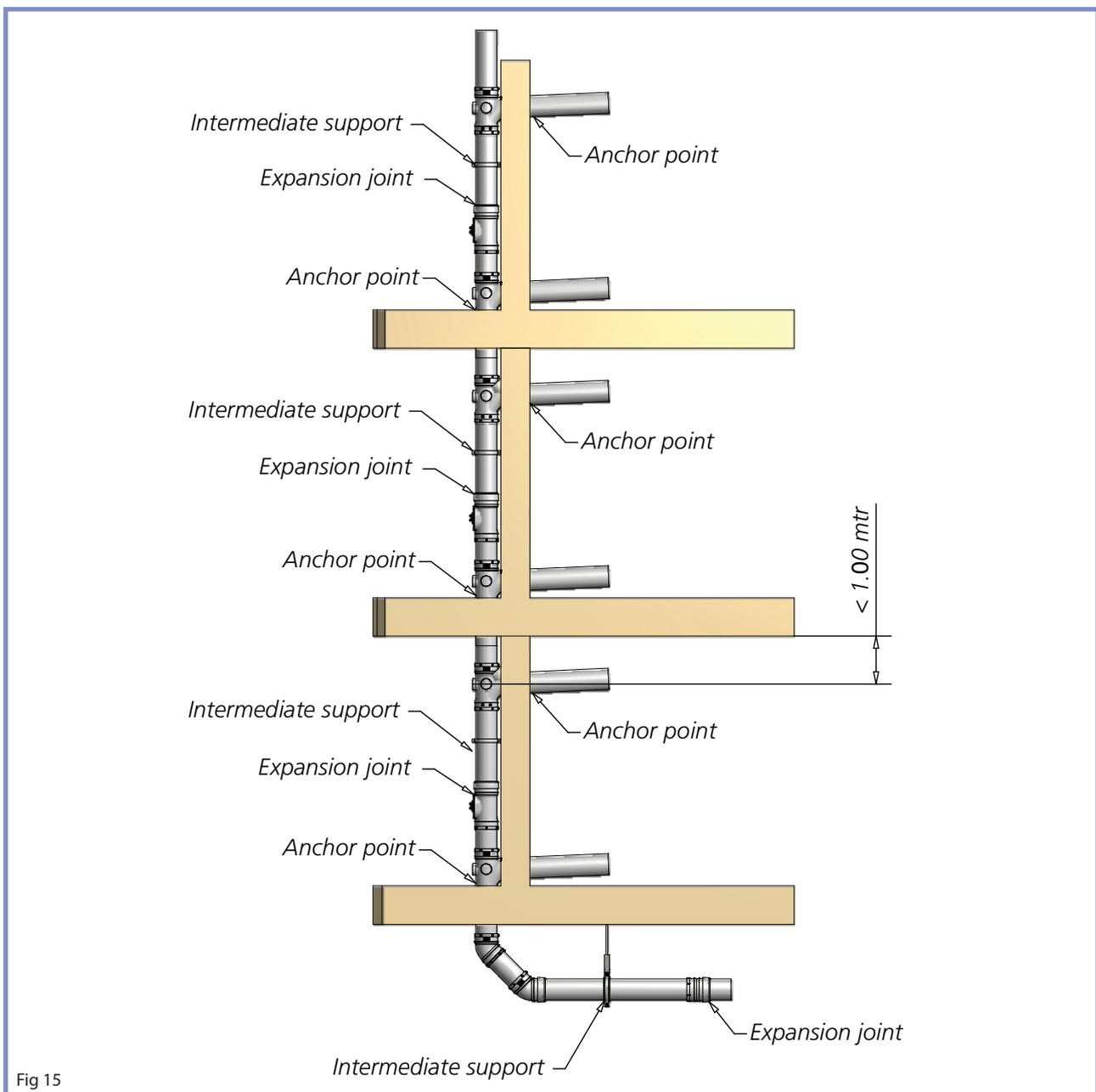


Fig 15

Refer to Terrain soil and waste installation guide or contact the Terrain Technical Services Department.

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