

+Paving Installation Guide

to NZS 316:2022



**0800 FIRTH 1 (347841)
FIRTH.CO.NZ**

GETTING STARTED

CHOOSING THE RIGHT PAVER FOR YOU SITUATION

Pathways & Patios

- Forum 50, Piazza 50, Manhattan 80, Chancery 50, Courtyard Flagstone 50, Holland 50, Walkway Paver 50

Single Residential Driveways

- Holland 50, Holland 80, Holland 80 Sett

Multi use Residential Driveways and Parking lots

- Holland 80, Holland 80 Sett, Piazza 80mm

TERMINOLOGY

Subgrade: The natural soil that is exposed at the excavated level.

Basecourse: The layer of compacted granular material placed on top of the natural soil e.g., GAP20 or GAP40 and can be blinded off with a thin layer of GAP7 to help get a level surface.

Bedding Sand: The sand layer (nominally 20mm thick) that the pavers are bedded in.

Jointing Sand: The sand that is placed in the vertical joints between the pavers.

Haunching: Concrete that is laid along the edge of the paving to provide lateral (edge) restraint for the paved area.

NZ Standard: Reference NZS 3116:2002 Concrete segmental paving.

Screeeding: The process of leveling the bedding sand or concrete mix using a screed, which is a straight edge.

Compaction: The process of making the base course and other layers dense and stable to create a solid foundation.

Surface Drainage: Ensuring the finished surface has a slight fall or slope to direct excess water to approved stormwater systems.

BASIC TOOLS NEEDED

- Tape measure
- String lines
- Spirit level
- Spade
- Shovel
- Rake
- Float
- Yard broom
- Screed boards 100 x 25mm x 2.8m long
- Screeding rails (25mm Ø pipe x 2-3m long)
- Plate Compactor (hire)
- Block splitter / diamond blade drop saw
- Weed matting (optional)

INSTALLATION / LAYING GUIDE

1. SETTING OUT & DRAINAGE

Set a string line to a height to correspond to the finished level of the pavers, making allowance for the various depths of the basecourse, bedding sand and paver thickness.

The top surface of the paving needs to have slope or fall so that rainwater runs off and does not pond on the surface. Allow for a fall of at least **25mm per metre** and ensure any paved area falls away from buildings.

A paved area must have a sufficient number of drainage collection points i.e. (channels, kerbs and cesspit sums) to collect the rainwater and discharge it to a suitable stormwater disposal system.

Depth of excavation = thickness of paver + 20mm bedding sand + thickness of basecourse

2. EXCAVATION & SUBGRADE

All organic material e.g. (vegetation, topsoil etc.) should be removed and the soil excavated down to a depth allowing for the thickness of basecourse, bedding layer and pavers.

At this level, otherwise known as the subgrade, the soil needs to be assessed for strength. It is important that the subgrade is of uniform strength, so any soft, loose material or existing fill areas will need to be undercut, removed and replaced with dense compacted material.

Measure down from the string lines using a tape measure to check the correct level of the subgrade has been reached. The subgrade will need to be shaped and trimmed accurately.

It is desirable that the subgrade slopes to prevent ponding of water at that level. If the soil is wet, then a drain may be needed that is piped to a suitable discharge position.

3. BASECOURSE

The thickness of basecourse that is required will depend on both the strength of the subgrade soil and the type of loading anticipated on the pavers. Generally, 100mm to 150mm thick for residential driveways, and 50mm to 75mm thick for patios and pathways.

Note: These thicknesses refer to the final compacted depth of basecourse and are a guide only. For more comprehensive recommendations, refer NZS 3116:2002 Table 2 Basecourse Thickness.

The basecourse shall be a well-graded, granular material with durable particles, free from organic material. GAP20 or GAP40 aggregate are suitable materials.

Spread, shape and thoroughly compact the basecourse to a uniform dense condition using a vibrating plate compactor. Dampen the aggregate whilst plate compacting to get the best result.

It is **VERY** important to get the top surface of the basecourse to the right height and within tight tolerance for levels and falls. Do not rely on the bedding sand to compensate for any out of tolerance basecourse levels as the bedding layer will compact unevenly and in time will result in an uneven paved top surface.

A thin layer of GAP7 may be spread and compacted to fill in any open textured areas and assist with final levels in the top surface of the basecourse, prior to spreading the bedding sand.

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4. BEDDING SAND

The bedding sand shall be a well-graded, granular material with hard durable particles, free from organic material.

Lay screed rails (25mm pipe) on the compacted basecourse approximately 1.0m apart. Loosely spread the bedding sand over the area and screed off across the screed rails (A).

It is important to lay bedding sand with uniform thickness /density/looseness and consistent moisture content.

Remove the rails, fill in and trowel smooth the gaps left behind (B).



A



B

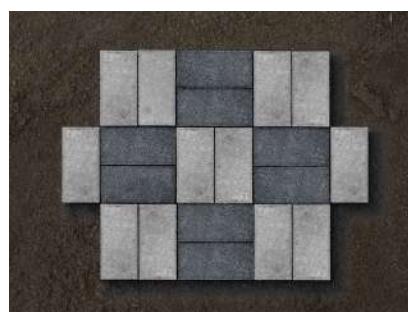
5. BASIC LAYING PATTERNS



Stretcher Bond



Herringbone (90°)



Basket Weave

INSTALLATION / LAYING GUIDE

6. LAYING PAVERS

Once you have selected a laying pattern, start placing the pavers from a corner or along a straight edge or at the bottom of a slope and lay upslope.

Lay the pavers up against each other engaging the spacer nibs on the sides of the paving to get a consistent joint width.

By working on top of the already laid pavers you can avoid walking on the screeded bedding sand.

Check for line and level at regular intervals visually or using a string line.



7. CUTTING PAVERS

Cutting pavers for the infills is best left to last and can be done with a bolster and hammer, block splitter or diamond drop saw. Make sure protective glasses, earmuffs and gloves are worn.

There are wet diamond saws and dry dust extraction saws.

Dust control saw



Wet saw



INSTALLATION / LAYING GUIDE

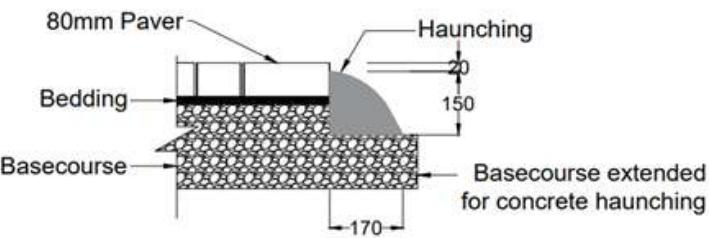
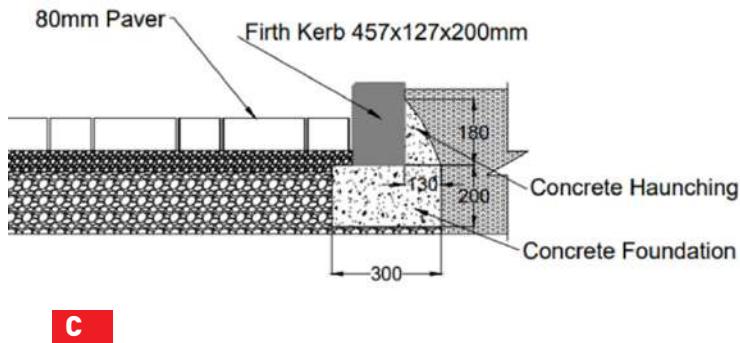
8. EDGE RESTRAINTS

Edge restraints must be provided at the perimeter of the paved area to confine the paving and prevent outward migration of pavers. Kerbs (see cross section C below), kerb and channel, timber held with steel pegs and concrete haunching are some of the common means of providing edge restraints.

Edge restraints should extend at least 50mm below the bedding sand and with the exception of concrete haunching, should be constructed prior to laying the pavers.

When setting out the base course allow an extra 150-170mm for the concrete haunching/kerb to sit on (see cross section D below).

Plate compacting the pavers should occur after 2-3 days later to give the haunching time to cure.



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9. JOINT SAND AND COMPACTION OF PAVERS

Sweep DRY jointing sand into all joints between pavers. The pavers themselves must be absolutely dry otherwise the sand will not fully make its way to the bottom of the joint.

Note: For stabilised jointing sand products, it is important to carefully follow the manufacturers clean-up instructions otherwise discolouration marks may result on the surface of the pavers.



Once the joints are full, and the haunching has set, cured and gained sufficient strength, compact the pavers using a suitable vibrating plate compactor.

A vibrating plate compactor **must NOT** be used on larger pavers such as 400 x 400 Forum Pavers instead use a rubber mallet on these pavers.

Good practice for normal pavers is to attach an old carpet to the plate compactor which prevents the surface of the paver from being damaged.



During compaction, keep topping up the joints with sand as it settles until all joints are completely full. This procedure initially “locks up” the pavers. Sweep off any excess sand.

At a later stage, once the pavers have had traffic on them, it may be necessary to return to the project to top up and completely fill the joints with sand.



INSTALLATION / LAYING GUIDE

10. LAYING TIPS

Colour Variation

- When laying more than one pallet make sure to “mix & match” from different alternating pallets to blend the colour variation. Order all the paving together to reduce colour variation.

Finished Paving Level

- Keep the finished level of the paving below the damp proof course of your house in accordance with your local council requirements. 100 to 150mm depending on region.

Haunching

- Concrete haunching requires a setting (curing) period of 5 - 7 days before any traffic should be allowed on the paving. Avoid driving vehicles over the edge of the paving.

Driveways

- It is best to use darker colours in driveways as tyre marks and oil stains will not be as visible. Sealing of your paving helps to prevent the absorption of oils and aids cleaning when necessary.

Minimising Joint Sand Loss

- If the loss of joint sand is a likely (steep driveways), either sealing the joints or a stabilised jointing sand e.g. Dricon Pavelock, should be considered. Read product supplier instructions carefully.



11. FOLLOW UP MAINTENANCE AND SEALING

Routine cleaning and maintenance of the paved surface is recommended. Periodic cleaning and removal of organic materials such as moss, mould and algae etc. using proprietary products and physical brushing with detergent rinsed off with water is suggested to maintain the appearance of the product.

Most paving cleaning products are acid based and remove the surface of the paver. The depth of removal is dependent on the dilution of the acid. Seek expert advice and/or carry out a small test on an inconspicuous area before undertaking cleaning or maintenance over the entire area of paving.

Other environmentally friendly cleaning methods for killing weeds and moss:

- Boiling hot water
- Steam water blast
- Flame (Propane torch weed burner)



If staining or marking of the pavers is likely e.g., leaves, berries, BBQ spills, tannin staining from outdoor furniture then sealing your paved area should be considered. You can get specialist advice from sealant suppliers. Because it is difficult to remove stains, sealing should be carried out as soon as possible following installation. Make sure all efflorescence is removed by acid washing. Remember efflorescence is transparent when wet, wait for pavers to dry before you evaluate weather to acid wash or not.

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12. EFFLORESCENCE

Efflorescence is a natural and unpredictable phenomenon that occurs with any masonry product. Persistent surface water or damp ground conditions of cement reacting with water, depositing crystals on the surface of the product. It can appear as whitening and is more visible on coloured pavers.

There are some things you can do to minimise efflorescence such as keep paving covered and dry before laying and provide good drainage to the subgrade and basecourse.

If efflorescence is left untreated for an extended period, acid washing or mechanical removal may be required. Please talk to a local sealing specialist for more information.

We strongly recommend sealing pavers with a water based acrylic sealant. As well as increasing long term durability and colour retention, sealing reduces maintenance required for stains and cleaning. Honed pavers must be sealed once laid. All pavers are delivered unsealed.

Firth recommends Dricon's range of Masonry care product to clean and help prevent efflorescence.



Efflorescence Remover



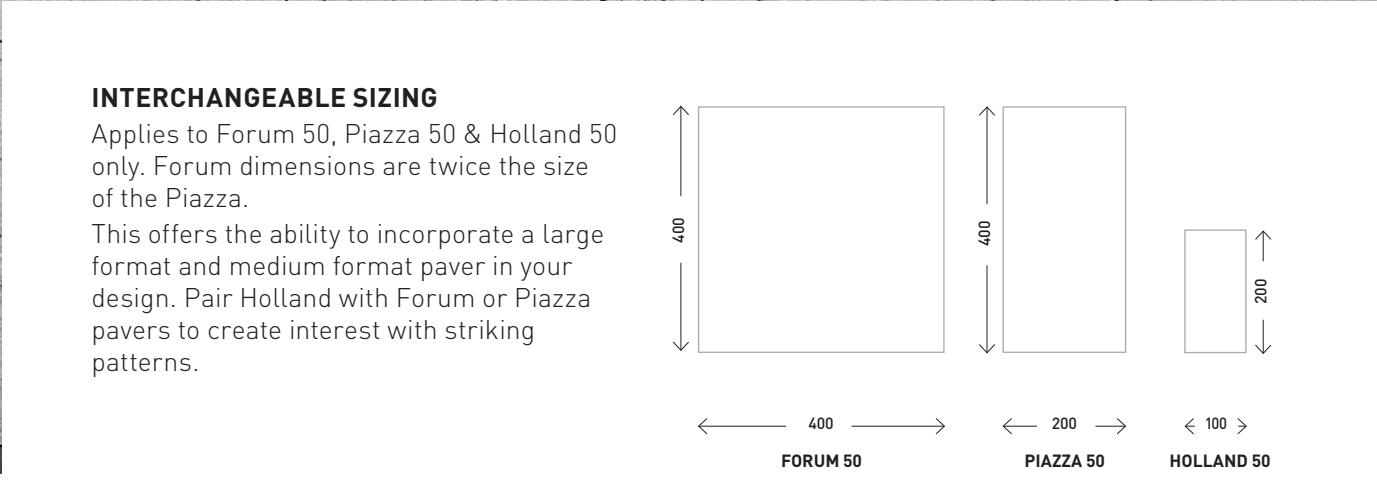
Efflorescence Treatment



A BEAUTIFULLY NATURAL PRODUCT

The appeal of concrete masonry is the natural characteristics and variation of aggregates featured within the mix. Similar to the features of real stone, our concrete products will have natural variation in colours and characteristics. So when choosing Firth concrete paving, please expect colour hue variations and regional differences due to locally sourced materials. It's all part of a beautifully natural product.

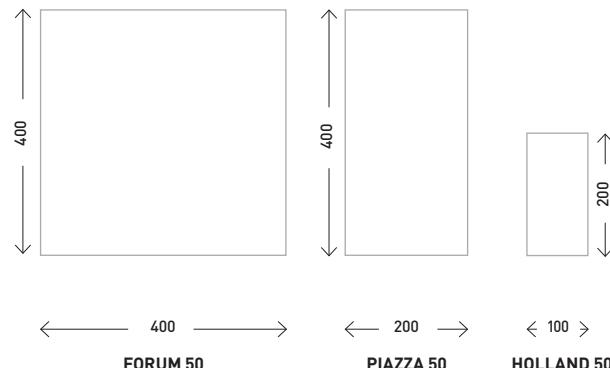
We strongly advise viewing our products before making your final decision. Contact your local merchant, they'll be happy to help.



INTERCHANGEABLE SIZING

Applies to Forum 50, Piazza 50 & Holland 50 only. Forum dimensions are twice the size of the Piazza.

This offers the ability to incorporate a large format and medium format paver in your design. Pair Holland with Forum or Piazza pavers to create interest with striking patterns.



DECLARE

We are proud to be the 1st concrete manufacturer in the world to get Declare labels for our ready-mix concrete and our concrete masonry products. Declare is an ingredients initiative for building products that is designed to shape a greener, healthier environment.



**ENVIRONMENTAL
PRODUCT DECLARATIONS**
Firth holds Environmental Product Declarations for a range of our products. Please refer to our website for full details.

CONCRETE SEGMENTAL PAVING WARRANTY

WE ARE 100% BEHIND OUR CONCRETE SEGMENTAL PAVING PRODUCTS

If any Firth Concrete Segmental Paving products fails to perform as claimed, Firth will work with the relevant parties to help resolve the issue.

YOU'RE PROTECTED WITH FIRTH CONCRETE SEGMENTAL PAVING PRODUCTS

As New Zealand's largest manufacturer of concrete masonry products, Firth products are made for local conditions and to meet or exceed New Zealand Building Code requirements. Firth manufacture its concrete segmental pavers to NZS3116 in association with AS/NZS4455 and AS/NZS4456 with an independently audited quality management system confirming to AS/NZS ISO9001.

PRODUCTS AND SYSTEMS

Concrete segmental paving are products which are combined with other products such as hardfill, bedding sand, joint sand, and sometimes coatings, to make up a system such as a paved area.

To ensure compliance with the NZBC, design needs to comply with NZS3116. Installation of the paving system also needs to confirm to NZS3116. The Designer Series range shall be sealed by the installer. Sealing helps to increase long term durability, aid colour retention, and reduce maintenance. The Firth documents are available for free download on the Firth Website.

It is recommended that Firth Dricon products are used with Firth Segmental Paving products to ensure compliance with NZS3116.

PRODUCT WARRANTY

Firth Industries warrants that Firth Concrete Segmental Paving Range will for a period of 15 years from the date of purchase:

- be free from defects outside the acceptable limits specified in NZS3116 and AS/NZS4455 due to factory workmanship or materials used in manufacturing the product; and
- subject to compliance with the conditions attached, that the products will perform to the extent set out in the relevant Firth Industries published literature current at the time of installation.

This warranty is subject to the storage, installation and maintenance requirements and the other warranty conditions set out in this document.

Texture and colour variation due to the natural material used can occur in masonry products and is not deemed a product defect. Minor chipping, cracking or efflorescence is also not deemed a product defect.

Nothing in this warranty shall exclude or modify any legal rights a customer may have under the Consumer Guarantees Act 1993 or otherwise which cannot be excluded or modified by law.

PRODUCT INSTALLATION, MAINTENANCE AND SUPPORT

This warranty is subject to Firth Concrete Segmental Paving Range being properly stored, installed and maintained in accordance with NZS3116 and the **Firth Concrete Segmental Paving Product Technical Statement**.

CONDITIONS OF WARRANTY

This warranty is subject to the following conditions:

1. This warranty only applies where the product is used or installed in building work in New Zealand (the "project"). This warranty will be invalidated if the project is not designed and constructed in strict compliance with all relevant provisions of the New Zealand Building Code, and in compliance with other regulations and standards that apply to the project.
2. A person claiming under this warranty must provide written proof of purchase and make a written claim either within 30 days after the defect would have become reasonably apparent or, if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation.
3. This warranty does not apply where the product has been used in any manner not in accordance with the more onerous of the product literature of Firth Industries New Zealand Standards, or best practice technical guidance that is current and publicly available at the time of purchase.
4. This warranty does not apply to normal wear or tear, or damage caused by accident, misuse, abuse, fire, earthquake, or other external cause. This warranty does not apply to any damage suffered during delivery.
5. The warranty is voided if products are not properly maintained.
6. In the event of a breach of this warranty during the 15 year warranty period Firth Industries will, at its sole option, do one of the following: (a) supply replacement masonry product; (b) rectify the defective masonry product; (c) pay for the cost of supplying replacement masonry for the defective masonry product; or (d) provide a refund of the purchase price of the defective masonry product. Firth Industries will not be liable for any losses or damages arising as a result of a breach of warranty or the defective product, other than as set out in this paragraph [5].
7. In the event of a breach of this 15 year warranty Firth Industries will not be liable in contract, tort, equity or for breach of any statute (to the fullest extent permitted by law) for any indirect losses or consequential damages of any kind, or for loss of profits, loss of use, loss of anticipated savings, loss of production, or loss of goodwill.
8. Firth Industries will not be liable under this warranty for any claims, damages, or defects arising from or in any way attributable to events outside of its control, including but not limited to: poor storage of product on site, incorrect installation or poor building work, poor design or detailing, defect or failure of other products, efflorescence, performance of paint/coating applied to the product, water ingress, normal wear and tear, growth of mould, mildew, fungi, or bacteria on the surface of the product, settlement or structural movement, combination of the product with other products, coatings or finishes not approved for use with the product, or acts of God (such as earthquakes, cyclones, floods or other severe weather conditions or unusual climatic conditions).
9. All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent permitted by law.
10. No employee or representative of Firth Industries is authorised to modify this warranty unless such modification is made in writing and is signed by an authorised officer of Firth Industries.
11. If the project is a newly constructed residential dwelling that is constructed by a developer for the purposes of sale then this warranty is assignable by the developer to the initial purchaser of that dwelling. In all other cases, this warranty is non-transferable and non-assignable.
12. The statements in this warranty may be superseded at any time by Firth Industries publishing a new warranty on its website, and in that case the new warranty will apply from that date

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