CONCRETE BLOCK PAVING

Book 3 – Specification and Installation

A walk-over in cost, looks and durability for Concrete Block Paving
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The quality of paving depends on the care taken in all aspects of construction from subgrade preparation, to laying of paving blocks and final compaction. Good segmented paving depends just as much on good construction as on good blocks and design. Requirements for quality of blocks is given in SANS 1058 Concrete paving blocks, while SANS 1200 MJ is the standardised specification for civil engineering construction of segmented paving.

This book is intended for assisting in the preparation of construction specifications for paving roads, industrial hardstanding, and other areas with concrete paving blocks laid on a sand bed, the joints between the units being filled with jointing sand. It provides extracts from SANS 1200 MJ with accompanying commentary where appropriate. The clauses are typical of those, which should be incorporated in a contract specification, while the commentary gives background information to be considered in formulating them. Reference is also made to the Concrete Manufacturers Association Paving Manual Books 2 and 4.

**EXTRACTS FROM SANS1200 MJ – 1984 AND COMMENTARY**

**COMMENTARY NOTE:** Text shown in italics refers to work, which is the responsibility of the earthworks contractor and not the paviour.

### 3 MATERIALS

#### 3.1 UNITS

##### 3.1.1 GENERAL

The units as supplied shall be free from cracks that detract from their general appearance. At the point of manufacture no unit shall have any chip of dimension exceeding 15 mm or covering more than 3% of the periphery of the surface that is intended to be exposed. No units shall have any protuberance of height exceeding 3 mm.

The surface texture and colour of the units shall fall within the range of texture and colour represented by the manufacturer’s approved samples. The colour shall penetrate to a depth of at least 5 mm below the wearing surface of each unit and the coloured layer shall be integrally bound to the body of the unit.

**COMMENTARY**

**Colour** Various block manufacturers use trade names to describe the colour of their blocks. Basic pigment colours are black, brown, red and tan. Reference samples showing range of colours agreed upon should be kept by purchaser. Non-pigmented blocks also may vary in colour due to cement and aggregate colour variation.

**Texture** The texture of blocks varies, depending on the manufacturing operation and the materials used. Smoother blocks are aesthetically more pleasing while rougher blocks provide better skid resistance. The texture should be consistent and reference samples approved.

#### 3.1.2 CLASS, STRENGTH AND TYPE

Except when the blocks are:

a) required for paving subject to wheel loads exceeding 30kN (see 5.6.2) or

b) required in terms of the project specification to be of class 35 and are so scheduled; or

c) required to comply with both a) and b) above, the blocks used shall be Class 25.

Class 25 blocks when tested in accordance with 7.4.1, shall have an average wet strength of at least 25 MPa. Blocks shall be of the type (S-A, S-B or S-C) scheduled or given on the drawings or required in terms of the project specification, as applicable, and shall comply with the relevant requirements of SANS 1058.

**COMMENTARY**

The specifier must decide on the type, class and thickness of paving block. The following is a guide to these characteristics:

**Type:** Type refers to the plan shape of the block whether interlocking (types S-A & S-B) or non-interlocking (S-C).

**Block type S-A** allows geometrical interlock between all faces of adjacent blocks. When keyed together these blocks resist the spread of joints by their plan geometry. Generally, these blocks can be laid in herringbone pattern parallel to both the longitudinal and transverse axes of the joints. Block type S-A is used in roads and heavy-duty pavements.

**Block type S-B** allows geometrical interlock between some faces of adjacent blocks which, when keyed together, resist the spread of joints parallel to the longitudinal axes of the blocks.
Block type **S-C** allows no geometrical interlock between adjacent faces and relies on its dimensional accuracy and the accuracy of laying to develop interlock.

**Class:** Two classes i.e. compressive strengths are specified.

**Class 25** has an average compressive strength of at least 25 MPa. Research has shown that the structural performance of the pavement is dependent on the degree of interlock, which spreads the load and is virtually independent of the strength of paving blocks, provided it is above a certain minimum level. Class 25 blocks should be specified for most uses. The specifying of an unnecessarily high class will only increase the cost of paving without improving its performance.

**Class 35** has an average compressive strength of at least 35 MPa and should be specified where exceptional loads may be encountered or where severe service or environmental conditions are known to exist or are expected.

It is important to note that the strength as required by SANS 1058 is based on day of despatch and not 28 day strength.

**Extract from SANS 1058-1985**

**Table 1 Compressive strength of blocks**

<table>
<thead>
<tr>
<th>Class of block</th>
<th>Compressive strength, MPa, min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>Individual</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

The compressive strength test details are stated in SANS 1058. Blocks are immersed in water for a period of 24 ± 1h, tested between 3mm thick plywood sheets and the compressive strength is calculated on the wearing surface of the blocks i.e. the area of block between chamfers provided that the wearing face area is 65% or more of the bed face area. Blocks of 50, 55, 60 and 80 mm thickness are readily available ex stock. The thickness of the block to be used should be based on site conditions, design requirements and cost. The specifying of unnecessarily thick blocks will only increase cost without improving service performance.
**COMMON KERB & CHANNEL SECTIONS**

![Diagram of kerb and channel sections](image)

**KERBS**

- Fig. 3: Half-battered
- Fig. 5 (a): Half-battered
- Fig. 5 (b): Half-battered
- Fig. 7: Mountable
- Fig. 8 (a)-(d): Mountable
- Fig. 9: Mountable

**CHANNELS**

- Fig. 10: Rectangular
- Fig. 11: Rectangular
- Fig. 12: Half-round
- Fig. 13: Rectangular
- Fig. 14: Tapered

**EDGINGS**

- Fig. 15: Rectangular

<table>
<thead>
<tr>
<th>Size</th>
<th>Y1</th>
<th>Y2</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>b</td>
<td>75</td>
<td>175</td>
</tr>
<tr>
<td>c</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>d</td>
<td>125</td>
<td>225</td>
</tr>
</tbody>
</table>

See Appendix for kerb detailing.
3.2 KERBS AND CHANNELS
Kerbs and channels shall be of the sections shown on the drawings (see opposite page) and shall comply with the relevant requirements of SANS 927 and, when applicable, SANS 1200 MK.

3.3 SAND FOR BEDDING AND JOINTING
Sand for bedding and jointing shall be free from substances that may be deleterious to blocks. In addition, the grading of the sand shall conform to that given in a) or b) below, as applicable, except that, where evidence satisfactory to the engineer has been provided to the successful previous use of sand having another grading, sand of such other grading may be used.

a) Bedding sand

<table>
<thead>
<tr>
<th>Nominal Sieve size, (mm)</th>
<th>% passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.52</td>
<td>100</td>
</tr>
<tr>
<td>4.75</td>
<td>95-100</td>
</tr>
<tr>
<td>2.36</td>
<td>90-100</td>
</tr>
<tr>
<td>1.18</td>
<td>50-85</td>
</tr>
<tr>
<td>0.800</td>
<td>25-60</td>
</tr>
<tr>
<td>0.300</td>
<td>10-30</td>
</tr>
<tr>
<td>0.150</td>
<td>5-15</td>
</tr>
<tr>
<td>0.075</td>
<td>0-10</td>
</tr>
</tbody>
</table>

b) Jointing sand
Jointing sand shall pass a 1.18 mm sieve and shall contain 10-50% of material that passes a 0.075 mm sieve.

COMMENTARY
In mining areas, the use of mine sand for bedding is generally acceptable. Similarly, experience has shown that certain relatively fine Cape Flats sands and sand from the Port Elizabeth area are acceptable. Such sands are the most economical as they are readily available.

Both the bedding and jointing sands should be free of deleterious soluble salts or other contaminants in order to avoid halo efflorescence which is unsightly and which may lead to a reduction in the skid resistance of the pavement.

Occasionally, the specifier may have the choice of several sands all of which meet the requirements set out above. Considerations should then be given to the particular shape and angle of shearing resistance, of the materials. Generally preference should be given to sands having sharp, angular particles and exhibiting high values of internal angle of friction because tests have shown that such materials yield better performance under traffic loads than sands yielding low values of internal angle of friction. If the angle of shearing resistance is not known, preference should normally be given to crusher sands or dune sands over river sand.
5 CONSTRUCTION

5.1 PREPARATION

5.1.1 NEW WORK

5.1.1.1 GENERAL
Where the paving is to be laid on newly constructed earthworks or an existing subgrade that is too low, the subgrade and subbase shall be constructed in accordance with the requirements of SANS 1200 DM and SANS 1200 ME, respectively, and shall conform to the tolerance requirements of 6.2.

COMMENTARY
Where a paviour is responsible for the laying of the paving only, it is advisable that he checks that the levels of the earthworks conform to the specifications and drawings and where necessary gets the contractor to take remedial action. However, the main contractor is responsible for the strength and the line and level of the layerworks.

The standard tolerance on subgrade and subbase in both SANS 1200 and CASRA specification is not sufficient for good quality paving. The engineer must amend the specifications if concrete block paving is to be laid on the surface (see table 6.2 of SANS 1200 MJ).

5.1.1.2 DEPRESSIONS
Depressions shall be filled with material that has the physical properties specified for subbase material in SANS 1200 ME, and the material shall be compacted to 98% of modified AASHTO maximum density.

Bedding sand shall not, under any circumstances, be used for this purpose.

COMMENTARY
Any shallow depression will require scabbling of the subbase to ensure a minimum 50mm filling.

5.1.1.3 FALL AND LEVEL
The top of the subbase shall be so constructed that surface water cannot pond and shall have a longitudinal fall of at least 1% and a transverse fall of at least 2%. The level after compaction shall be the designated level of the top of the subbase ± 10 mm [see 6.2. (b)].

COMMENTARY
The entire subgrade should be so prepared as to ensure adequate drainage and protection against rainfall and ground water by means of piped or channelled storm water and sub-soil drainage.

All piped and subsoil drainage construction located...
beneath the pavement should be completed in
conjunction with subgrade preparation before the
commencement of subbase construction. All drainage
and new service trenches within the pavement area
should be backfilled to subgrade level with approved
granular material.

The location of existing public utilities should
be confirmed with the relevant authorities and
adjustments arranged where there is insufficient
cover. All utility trenches should be backfilled and
compacted as required by the relevant authorities.

5.1.2 EXISTING SUBBASE SUBSTANDARD
OR TOO HIGH

5.1.2.1 SUBSTANDARD LAYERS
Substandard layers and soft and unstable areas in the
subbase (or subgrade or formation, as applicable) shall
be replaced or strengthened as specified in 5.1.2.2 or
5.1.2.3, as applicable.

COMMENTARY
The subgrade shall be compacted to not less than
the project specification requirements. Under no
circumstances should further pavement construction
proceed until the subgrade has been inspected
and approved.

5.1.2.2 SUBBASE NOT STABILISED
Any portion of an existing subbase that has not
been stabilised and is too high shall be lowered,
harrowed and reconstructed to such depth that, after
compaction, the subbase layer is of the same standard
and thickness throughout or it shall comply with the
requirements of the project specification and, in
addition, the fall and level shall comply with 5.1.1.3.

5.1.2.3 STABILISED SUBBASE
Any portion of an existing stabilised subbase that is too
high shall be lowered, harrowed and reconstructed to
such depth that, after compaction, the subbase layer
is of the same standard and thickness throughout or it
shall comply with the requirements of the project
specification and, in addition, the fall and level shall
comply with 5.1.1.3.

5.2 EDGE RESTRAINTS
Edge restraints consisting of kerbs or channels (see
3.2) or other approved edge strips, as scheduled or
given on the drawings, shall be constructed on the
subbase (or other formation) before any units are laid.

COMMENTARY
The function of the edge restraint is to retain the sand
bedding and to ensure that units at the edge of the
pavement do not creep outwards or rotate under load
with consequent opening of joints and loss of interlock.
A separate edge restraint is unnecessary where
an interlocking concrete block pavement joins an
existing concrete pavement, or in the case of a flexible
pavement having an asphaltic concrete surface not
less than 100 mm thick.

Various designs of edge restraints are illustrated and
the choice of which design to use is decided by factors
for service loading, service life, aesthetic appeal and
cost. Each type shown has been used successfully
in particular applications. Various types of edge
restraints are shown in the Appendix.

5.3 PLACING AND COMPACTING OF
SAND BED
Bedding sand shall be spread over the subbase and
evenly screeded in the loose condition so as to achieve
a compacted thickness of 25 ± 10mm. When the
sand is spread, its moisture content shall be 6 ± 2%.
The sand bed shall be laid slightly in advance of the
placement of the units but only to the extent that the
particular area of pavement can be completed on
the same day. Where the sand bed is accidentally
compacted before the units are laid, it shall be raked
and evenly rescreeded in a loose condition.

COMMENTARY
The depth of the sand bed must be adjusted according
to the amount of compaction, which will occur when the paving is vibrated. To determine this depth, a test area of paving should be laid on 30 mm of loose sand and compacted with three passes of the plate vibrator used to compact the finished pavement. The extent of settlement — the surcharge — should be noted and from this the precise depth of loose sand necessary to achieve a 25 mm thickness of compacted sand in the finished pavement can be determined.

Levels should be checked at regular intervals as laying proceeds. If levels change due to variation in the sand type or its moisture content, then the surcharge will change and blocks may have to be lifted and the sand raked and rescreeded to new levels before the blocks are relaid.

5.4 LAYING OF UNITS

The principal lines of the paving unit pattern as laid shall be as specified in the project specification or given on the drawings, and as agreed with the engineer before laying commences. If the said principal lines are not so specified, given or agreed upon, the units shall be laid in a herringbone pattern if the block shape permits and, where units cannot be so laid, they shall be laid with the long axis at right angles to the line of traffic. Except where curved patterns are required, the lines of the unit pattern shall be visually straight and parallel to major kerbs or buildings or other structures, as most appropriate and as approved.

Where appropriate, lines shall be set up at right angles to each other to control the alignment of the units. Joint widths shall be between 2 mm and 6 mm.

Whole units shall be laid first. Full depth closure units of special size or cut or part units split from whole units, shall be fitted into gaps around the perimeter and around service installations such as manholes.

Where plant has to be moved over an uncompacted newly laid pavement, boards shall be laid to prevent disturbance of the units.

**COMMENTARY**

It is essential that spaces between blocks be provided to avoid direct contact. Bonding is achieved by means of sand vibrated into the joints. A 3 mm space is considered to be the optimum but in practice is very difficult to achieve consistently. Blocks should be positioned without attempting to space them with absolute accuracy. With practice, blocks being laid can be bounced off those already laid to approximately the required distance. After vibration, settlement of the blocks into the bedding sand occurs. Joints should not be filled with sand until the initial vibration of the laid blocks has been completed and the levels checked. Once joints have been filled, it is difficult to make adjustments to pavement profiles or to individual paving units. At the end of the day, the laid blocks should be vibrated and sanded to within one metre of the uncompleted face. When more than one operator is placing blocks especially on long laying faces, the operators should be rotated to avoid irregular spacing of blocks.

It is essential to ensure adequate joint widths in completed paving. Joints, which are too narrow, can result in edge and corner spalling under load while spaces, which are too great, prevent ‘lockup’ and load transfer between blocks. A good rule of thumb is that joint width should be as uniform as possible and should average 3 mm over 20 blocks.

Constant reference to string lines, and frequent adjustment to these lines will promote even joint width.

It should be recognised that progressive wear in the mould used for the production of the paving units will result in some increase in the plan area of units within nominated tolerances. Thus on major works where sections of pavement may require matching up during the construction programme, either matching deliveries should be stockpiled or sections of pavement separated by the provision of an edge restraint, or a contrasting section of paving units (e.g. a row of rectangular units).

5.5 FILLING GAPS IN UNIT PATTERN

Each gap where a closure unit cannot be used, shall be filled, after thorough pre-wetting of all units bounding the gap, with concrete that has a 24 hour cube strength of at least 15 MPa and contains aggregate of maximum nominal size 9.5 mm. Filling shall be kept to an absolute minimum and shall be to full unit depth in all cases. The concrete shall be cured for at least 24 hour by covering it with moist sand or approved plastic sheeting or hessian firmly held down at the edges. Where concrete is used for filling gaps, no compaction shall be carried out within 1m of such filling unit 24 hour after the filling has been completed or until the specified cube strength of 15 MPa has been attained, whichever occurs first.

**COMMENTARY**

Infill concrete should be avoided wherever possible. Refer to Detail P-PA-07

Where infill concrete is necessary, this process should only be undertaken once all compaction is completed.
Cutting paving units for infilling against edge restraints, etc., should be deferred until sufficient work has been completed to allow for a reasonably continuous operation. Hydraulic or mechanical guillotine block cutters or power saws are typically used for this purpose. The use of cut units smaller than about 25% of full unit size is not recommended, as these small units can be dislodged under traffic. Where herringbone pattern is used, it is recommended that the pattern be reoriented along the edge restraint. This will eliminate the need to cut blocks longitudinally. See detail P-PA-07 It is important to note that the gap between blocks and the edge restraint should comply with the joint width tolerances of 2-6 mm.

5.6 COMPACTION OF UNITS

5.6.1 GENERAL

The manner of compaction of units shall be such that damage to the units is prevented. At least two compaction passes shall be made over the paving as soon as practicable after laying, and before the introduction of any jointing sand. By the end of each day, compaction shall be completed to not closer than 1 m from any free edge. A uniform even surface shall be obtained over the paved area.

COMMENTARY

A temporary restraint should be installed against the free edge before compaction.

5.6.2 PAVING SUBJECT TO WHEEL LOADS EXCEEDING 30 kN

Paving that is likely, in terms of the project specification, to be subjected regularly to wheel loads exceeding 30kN shall, after joint filling (see 5.7) be finally locked up with at least five passes of a heavy pneumatic-tyred roller over the entire area of paving. The manner of compaction shall be as specified in 5.6.1.

COMMENTARY

Compaction with heavy-duty plate compactors (weight 300-600kg, plate area 0,5 — 0,6 m² and centrifugal force 30-65 kN) ensures that the pavement is in a 'locked up' condition; where very high loads are expected in the early life of the pavement, proof rolling should be carried out.

5.6.3 DAMAGED UNITS

Damaged units shall be replaced and compacted before joint filling is carried out.

5.6.4 NO TRAFFIC UNTIL JOINTS FILLED

No vehicular traffic shall be allowed over the paving until all joints have been filled with sand (see 5.7).

5.7 JOINT FILLING

The joints shall not be filled until all closure units have been inserted, all the necessary adjustments to line and level have been made and the pavement has been subjected to at least two passes of the compactor.

Sand that complies with 3.3 (b) shall be broomed into the joints until they are full, and sufficient passes of a plate compactor shall be made to settle the joint filling. The procedure shall be repeated until the joints remain full after compaction.

On completion of compaction, all excess sand shall be broomed off and disposed of. Damage caused during compaction shall be made good by the contractor at his own expense.

COMMENTARY

Both the sand and the paving units should be as dry as possible when sand is spread. Due to the narrowness of the joints, damp sand may bridge across them and resist compaction without this being obvious at the surface. Fully filled joints are essential for the achievement of the full structural performance of the pavement throughout the service life of the pavement.

If construction work is still in progress, excess jointing sand can be left in place after completion and swept off at a later stage.

The sand should be brushed and not washed into the joints.

6 TOLERANCES

6.1 GENERAL

6.1.1 PAVING AS LAID

In addition to compliance with 6.2 (c), the finished surface of the paving shall, in the opinion of the Engineer, present a regular and smooth appearance to the eye.

6.1.2 METHOD OF MEASUREMENT OF DEVIATIONS

Any deviation from flatness of a plan surface will be measured as the maximum deviation of the surface from any straight line of length 3 m joining two points on the surface, determined by means of a straight-edge the ends of which are supported on identical blocks of suitable thickness placed over each of the points.
### 6.1.3 FREQUENCY OF CHECKS ON SMOOTHNESS

The frequency of checks on smoothness carried out by the Contractor shall, in the case of roads, conform to the relevant requirements of Subclause 6.3 of SANS 1200 M and, where an area other than a road is being paved, a check shall be carried out on every 300m² (max.) of area paved.

### 6.2 PERMISSIBLE DEVIATIONS

The permissible deviations shall be as given in the table below:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PERMISSIBLE DEVIATION, (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DEGREE OF ACCURACY</td>
</tr>
<tr>
<td></td>
<td>III</td>
</tr>
</tbody>
</table>

#### a) Units as Manufactured
- 1) Deviation of length from nominal length * ± 2
- 2) Deviation of width from nominal width * ± 2
- 3) Deviation of depth (or thickness) from nominal depth (or thickness) * ± 3
- 4) Deviation of squarness (measured as specified in SANS 1058) * ± 2

- As stated in the project specification, if required.

#### b) Foundation layers
- 1) Deviation of top subbase layer from designated level * ± 10
- 2) Smoothness of top subbase layer measured on a 3m straight line in any direction * ± 10
- 3) Thickness of 25 mm compacted sand bedding layer * ± 10

#### c) Finished paving. The finished surface of the paving shall, 3 months after opening to traffic, be accurate to within the following limits:
- 1) Line of pattern
  - i) Deviation from any 3 m straight line maximum * 10
  - ii) Deviation from any 20 m straight line maximum * 20
- 2) Vertical deviation from 3 m straight line
  - i) at kerbs, channels, gullies, manholes and other edge restraints * +3, —0
  - ii) elsewhere (subject to adjustment as necessary for vertical curve) * +10, —15
- 3) Surface levels of adjacent units, difference not to exceed * 3
- 4) Deviation of finished surface level from designated level, subject to compliance with 6.1.1 and 7.6 * +10, —15

### 7 TESTING

#### 7.1 GENERAL

#### 7.1.1 CHECKING

The Contractor shall carry out sufficient checks to satisfy himself that the materials used and the workmanship (construction, tolerance and strength) attained comply consistently with the specified requirements. Checks will be carried out by the Engineer and the results made available to the Contractor.

#### 7.1.2 STANDARD OF FINISHED WORK NOT TO SPECIFICATION

The Engineer may carry out such checks, as he deems necessary.
deems necessary at any point or at any depth or on any layer. Where the Engineer’s checks reveal that the material used or that the construction to tolerance standard achieved does not comply with the applicable requirements of the specification, or that the compaction specified has not been attained, the Contractor shall so rectify the work that the materials, construction and tolerance comply with the said requirements and the compaction specified is attained.

7.2 TRIAL SECTION
Commencing from at least one permanent edge restraint the first section of paving of length at least 20 m and of width approximately 6 m laid as part of the permanent paving will be regarded as a trial section for the purpose of assessing the Contractor’s ability to produce a paving that complies with the applicable requirements of the specification.

Full scale paving unit laying shall not commence until the trial section has been laid by the Contractor and approved by the Engineer. Subsequent laying operations shall be carried out using materials of at least the same quality and with the same standard of workmanship as in the approved trial section. The Contractor shall remove at his own expense, any trial section that is not approved.

COMMENTARY
The requirement for the construction of a trial section should not be mandatory for experienced contractors or where the size and importance of the contract does not warrant such preliminary work.

For labour-based projects, where skills training is an integral part of the training, it is recommended that construction begins on a minor or subsidiary road. This will ensure that all the teething problems are resolved before work starts on the major road.

This area must be demarcated and no traffic allowed onto it at all.

7.3 SUBBASE, FORMATION AND OTHER FOUNDATION LAYERS
The subbase, formation and other foundation layers shall be subjected to testing in terms of SANS 1200 DM and SANS 1200 ME, as applicable.

7.4 BLOCKS
7.4.1 WET STRENGTH TEST
The relevant test given in SANS 1058 shall be used to determine whether blocks comply with the requirements for wet strength given in 3.1.

COMMENTARY
The compressive strength is stated in SANS 1058 clause 6.4.

7.4.2 OTHER TESTS
Blocks shall be subjected to such other tests as are given in SANS 1058 and in The Concrete Manufacturers Association Paving Manual Book 2.

7.5 CONCRETE FOR GAP FILLING
The concrete used for gap filling shall be subjected to testing in accordance with SANS 1200 G or SANS 1200 GA, as applicable.

COMMENTARY
This practice is generally not recommended. It is preferable that the blocks are cut to fill gaps. Generally pavers alongside the edge restraint can be realigned so that small pieces are eliminated.

7.6 KERBS, CHANNELS AND OTHER DEVICES
Kerbs, channels and other devices used for edge restraints shall be subjected to testing in accordance with SANS 1200 MK.

7.7 PONDING
Where the Engineer is of the opinion that, notwithstanding compliance by the Contractor with the requirements of 5.1.1.3, ponding may occur on the finished surface, the engineer may order the whole or any part(s) of the surface to be flooded with water to determine whether ponding will occur. Rectification of areas where ponding is found to occur shall be carried out by the Contractor at his own expense. If ponding does not occur, the Employer shall bear the cost of the test.

COMMENTARY
If permissible deviations relating to the finished surface of the paving are to be allowed, then the fall of the surface for drainage should be steeper than 1 in 50.

Ponding is generally as a result of incorrect earthworks.
NOTE: Use of Computer Aided Design (CAD). The following details in this manual are available on CD Rom in Caddie. Auto CAD and DXF format. Please contact the Concrete Manufacturers Association if you require these formats.

PATTERNS – GENERAL

STRETCHER BOND

Recommended for roadways and industrial applications

P-PA-01

HERRINGBONE

PARQUET OR BASKETWEAVE

P-PA-02

P-PA-03
PATTERNS – ADAPTATION OF PATTERNS TO CHANGES IN ALIGNMENT

(A) INTERSECTION LAID IN HERRINGBONE PATTERN

(B) 90° CHANGE IN ALIGNMENT USING STRETCHER BOND

(C) USE OF HERRINGBONE PATTERN BETWEEN STRETCHER BOND PAVEMENTS

NOTE: There will be occasions when paving around a large area or building will not tie-in and a straight cut joint will be necessary. (See Detail P-PA-09)
Interlocking paving units in herringbone pattern

Header course optional

Edge restraints

NOTE: By making localised adjustments to the main laying pattern blocks can be re-positioned to eliminate the likelihood of having to cut slender pieces.
Paving blocks cut to suit
(refer to P-PA-07)

Saw cut to bitumen and base course

Bitumen surface

Bitumen

Jointing sand

Paving blocks

Bedding sand

Subbase

Saw cut to bitumen

Base

PATTERNS – CUT JOINT AT CHANGE IN PATTERN ORIENTATION

P-PA-09

Paving blocks cut on one side

Edge blocks or paving blocks cut on one side

Angle cut and re-orientate blocks to avoid small pieces (refer to P-PA-07)
When a straight section of road is reached, form a cut joint and realign the pattern with the straight section.
CONCRETE SLAB DETAILS DRAINAGE OF BEDDING SAND LAYER

Drain spacing typically 5-6m

Predominant fall (min 2%)

45°

To drainage gully

Main drain

Collector drain

PLAN VIEW OF FISHBONE DRAINAGE BELOW PAVING

ALTERNATIVE DETAIL

Paving blocks

Jointing sand

Waterproofing membrane

Bedding sand

Continuous geotextile deck drain

Concrete slab

Geotextile

100

flownet

Collector drain

Geotextile

200

flownet

Main drain

Paving blocks

Bedding sand

Jointing sand

Waterproofing membrane

Concrete slab

Flownet drain
CONCRETE SLAB DETAILS

**DETAIL “A”**
- Concrete slab
- Fillet
- Bedding sand
- Waterproofing membrane
- 40mm screed to fall
- Paving blocks
- Jointing sand
- Stainless steel clamp ring
- Unreinforced water-proofing
- Cementitious non-shrink grout
- Drain pipe

**DRAIN PIPE THROUGH SLAB**

**DETAIL “B”**
- Membrane terminated with sealant (polysulphide or similar)
- Hot dip galvanised casting
- Hot dip galvanised angle cast into epoxy
- Cementitious non-shrink grout
- Waterproofing membrane
- Paving blocks
- Jointing sand
- Bedding sand
- Weep hole
- 40mm screed to fall
- Fine epoxy concrete
- Clamping ring set into sealant
- Concrete slab

**FULLBORE OUTLET**
**CONCRETE SLAB DETAILS**

**P-CS-04**

- Existing masonry wall
- Paving blocks
- Flashing
- Expansion joint 26mm stone aggregate with bitumen
- Bedding sand
- Waterproofing membrane
- Concrete slab

**SLAB/WALL JUNCTION SHOWING EXPANSION DETAIL**

**P-CS-05**

- Paving blocks
- Existing masonry wall
- Flashing
- Expansion joint 26mm stone aggregate with bitumen
- Bedding sand
- Precast concrete kerb on mortar bedding
- Light-weight concrete
- Waterproofing membrane
- Concrete slab

**SLAB/WALL JUNCTION WITH EDGE RESTRAINT**
CONCRETE SLAB DETAILS

**P-CS-06**

- 100mm wide concrete upstand cast in with roof slab
- Sealant
- Paving blocks
- Jointing sand
- Bedding sand
- Waterproofing membrane
- Concrete slab

**PAVING OVER EXPANSION JOINTS IN CONCRETE SLAB-DETAIL A**

**P-CS-07**

- Paving blocks
- Sealant
- Galvanised angle iron bolted to slab to form upstand
- Bedding sand
- Bolt
- Concrete slab

**PAVING OVER EXPANSION JOINTS IN CONCRETE SLAB-DETAIL B**

Galvanised angle iron bolted to slab to form upstand
- Sealant
- Jointing sand
- Paving blocks
- Bedding sand
- Waterproofing membrane
- Concrete slab
- Bolt
Concrete infill min. 100mm thick

NOTE: Special attention to the compaction and possible stabilisation is required for the backfill near manholes to prevent subsidence.
NOTE: For ease of construction, it is recommended that the blocks are laid continuously up the gradient. Thereafter sufficient rows of blocks are uplifted at the position of the beam, the sub-base excavated to the required depth and width and the beam cast.
SURFACE DRAINAGE DETAILS

DRAINAGE DETAIL A (USING IN-SITU CONCRETE)

- Paving blocks
- Bedding sand
- Concrete base

DRAINAGE DETAIL B (USING PRECAST DRAIN)

- Precast dished concrete drain
- Paving blocks
- Bedding sand
- 1:3 cement: sand mortar bed
- Sub-base

DRAINAGE DETAIL C (USING BLOCK PAVING)

- Paving blocks
- Bedding sand
- 1:3 cement: sand mortar bed
- Concrete base
- Sub-base
NOTE: Paver thickness 50mm
Precast concrete kerbs should comply with SANS 927-2003
Kerbs are generally supplied in lengths of 0.33m or 1.0m
NOTE: Paver thickness 60mm
Precast concrete kerbs should comply with SANS 927-2003
Kerbs are generally supplied in lengths of 0.33m or 1.0m
NOTE: Paver thickness 80mm

Precast concrete kerbs should comply with SANS 927-2003
Kerbs are generally supplied in lengths of 0.33m or 1.0m
For extra heavy duty areas continuous concrete haunching should be placed behind kerb / edge restraint
**EDGE RESTRAINTS USING PAVERS**

**P-ER-11**

- Paving blocks
- Bedding sand
- 1:3 cement: sand mortar bed
- Sub-base
- Concrete base

**P-ER-12**

- Haunching
- Paving blocks
- Bedding sand
- 1:3 cement: sand mortar bed
- Sub-base
- Concrete base

**P-ER-13**

- Haunching
- Paving blocks
- Bedding sand
- 1:3 cement: sand mortar bed
- Sub-base
- Concrete base
# Paving Members (September 2009)

## Producer Members

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Phone Number</th>
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<tbody>
<tr>
<td>Bafokeng Concor Technicrete</td>
<td>014 538 0818</td>
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<tr>
<td>Baybrick</td>
<td>035 792 5218</td>
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<tr>
<td>Bosun Brick Midrand</td>
<td>011 310 1176</td>
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<tr>
<td>Brick &amp; Concrete Industries (Namibia)</td>
<td>0028 461 321 3009</td>
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<tr>
<td>Brickcast Industries</td>
<td>031 507 5555</td>
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<tr>
<td>Brickbuild T/A Panda (Botswana)</td>
<td>00267 244 2106</td>
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<tr>
<td>Cape Brick</td>
<td>021 511 2006</td>
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<tr>
<td>C.E.L. Paving Products</td>
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<tr>
<td>Cast Industries</td>
<td>011 316 2375</td>
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<tr>
<td>Columbia DBL</td>
<td>021 905 1665</td>
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<tr>
<td>Concor Technicrete</td>
<td>011 674 6940</td>
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<td>Concor Technicrete P.E.</td>
<td>041 372 2230</td>
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<tr>
<td>Conframat</td>
<td>016 987 3381</td>
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<tr>
<td>Corobrik</td>
<td>031 560 3911</td>
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<tr>
<td>Deranco Paving</td>
<td>041 933 2755</td>
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<tr>
<td>Inca Concrete Products</td>
<td>021 904 1620</td>
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<td>Inca Masonry Products</td>
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## Associate Members

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<tr>
<td>Inca (Cape)</td>
<td>021 904 1620</td>
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<tr>
<td>Smartstone</td>
<td>011 310 1161</td>
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## Contractor Members

<table>
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<tr>
<td>Daron Construction</td>
<td>034 955 1333</td>
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<tr>
<td>Galaxy Paving</td>
<td>011 815 1175</td>
</tr>
<tr>
<td>Mondo Paving &amp; Retaining Walls</td>
<td>011 708 0800</td>
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<tr>
<td>PYW Paving</td>
<td>031 763 5771</td>
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<tr>
<td>Roadstone Civil &amp; Paving</td>
<td>011 683 7080</td>
</tr>
<tr>
<td>S A Paving Gauteng</td>
<td>013 483 1350</td>
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<tr>
<td>The Paving Creations</td>
<td>031 765 4083</td>
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<td>Vesles Civils</td>
<td>012 362 3030/1</td>
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CONCRETE BLOCK PAVING
Book 1 – Introduction

A walk-over in cost, looks and durability for Concrete Block Paving

CONCRETE BLOCK PAVING
Book 2 – Design Aspects

A walk-over in cost, looks and durability for Concrete Block Paving

CONCRETE BLOCK PAVING
Book 3 – Specification & Installation

A walk-over in cost, looks and durability for Concrete Block Paving

CONCRETE BLOCK PAVING
Book 4 – Site management and laying

A walk-over in cost, looks and durability for Concrete Block Paving

CONCRETE BLOCK PAVING
Book 5 – Training Manual

A walk-over in cost, looks and durability for Concrete Block Paving

CONCRETE BLOCK PAVING
Book 6 – Facilitators Guide

A walk-over in cost, looks and durability for Concrete Block Paving

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