



Abu Dhabi Guideline

دليل الإرشادي أبوظبي



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الإصدار الأول

Interlocking Concrete Pavers

معايير مواد البناء

Installation Guideline

البلاط المتشابك (إرشادات التركيب)

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About the Abu Dhabi Quality and Conformity Council

The Abu Dhabi Quality and Conformity Council (QCC) was established by law No. 3 of 2009, issued by His Highness Sheikh Khalifa Bin Zayed Al Nahyan, President of the UAE.

QCC is responsible for the development of Abu Dhabi Emirate's Quality Infrastructure, which enables industry and regulators to ensure that products, systems and personnel can be tested and certified to UAE and International Standards.

Products certified by QCC receive the Abu Dhabi Trustmark. The Trustmark is designed to communicate that a product or system conforms to various safety and performance standards that are set by Abu Dhabi regulators.

1 Foreword

The QCC Working Group for Building Materials was established with a view to improve the quality of building materials used in Abu Dhabi's built environment. This would be achieved by reviewing the existing standards & draft standards relevant to various building materials, recommending the use of particular standards and, if necessary, preparing guidance documents for the special conditions and requirements found in the Emirate of Abu Dhabi.

2 Scope

This Abu Dhabi Guideline recommends the use of particular methods during installation and other relevant activities to help ensure quality of interlocking pavers, a common hardscape surface for pedestrian and vehicular areas in Abu Dhabi.

This document should be used on conjunction with Abu Dhabi Specification ADS 15/2015, which recommends the use of particular standards for helping to ensure quality of interlocking pavers.

3 Acknowledgements

QCC would like to thank the members of the Working Group for their contributions.

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8 Bilal Farhan	Abu Dhabi Urban Planning Council (UPC)

4 General

Interlocking concrete pavers shall comply with the requirements specified herein.

- A. Pavers for vehicular areas shall be manufactured in a single or double mix as required by the purchaser. Single mix shall be preferred for vehicular load applications and double mix for pedestrian areas or where decorative appearances are requested.
- B. The thickness of the paving blocks shall be selected in light of the sub base material, the sub grade soil, the expected load, load frequency, and shape of the blocks as indicated on the contract document/ as applicable.
- C. An edge chamfer around the wearing surface is standard. Blocks without chamfers are possible, but must be requested by the purchaser.
- D. The project contractor shall provide a 10-year performance guarantee for the single and double mix paving blocks against de-lamination and colour fading beyond normal wear and tear in the emirate of Abu Dhabi environment. The 10-year (see Appendix 1) guarantee shall be back-to-back from the concrete paving block manufacturer.

5 Products & Execution

5.1 Curing & Handling

- A. Following the manufacturer curing process, all consignments delivered to project site shall comply with performance criteria required on ADS 15.

5.2 Installation

The installation of interlocking concrete pavers shall comply with the requirements specified herein, and elsewhere in these specifications.

- A. The subgrade and/or aggregate base course for pedestrian and vehicular concrete paving blocks shall be prepared as per the particular specifications and Contract documents, as applicable. Moreover, in absence of these document, the subgrade shall follow ASTM, ASHTO, or EN standard.
- B. Installation teams are to be properly trained and to have previous experience in the installation of interlocking pavers and shall follow the requirement/ specification recommended by manufacturers, as approved by the Owner.

- C. After preparation of the subgrade or aggregate base course for the concrete paving blocks, as applicable, the Contractor shall place 50mm of bedding sand complying with the grading limits specified in the table below. The bedding sand shall be crushed material.

Table 1: Grading for Bedding Sand for Less Aggressive Zone⁽¹⁾	
Sieve Size	Percent Passing for Each Sieve⁽²⁾
5 mm	89 to 100%
2.36 mm	65 to 100%
1.18 mm	45 to 100%
600 µm	25 to 80%
300 µm	5 to 48%
150 µm	0 to 15%
75 µm	0 to 5%

Notes: 1) Less aggressive exposure zones have deeper water tables, comprising more fresh water. This type of zone is generally found in regions of Al Ain and Al Gharbia.
2) As per BS 7533 Part 3 Category IV for pedestrian surface.

Table 2: Grading for Bedding Sand for Aggressive Zone⁽¹⁾	
Sieve Size	Percent Passing for Each Sieve⁽²⁾
14mm	100%
10mm	98 to 100%
6mm	85 to 99%
2mm	0 to 15%
1mm	0 to 2%
63 µm	0 to 1%

Notes: 1) Aggressive exposure zones are those areas where a shallow water table is known to be present. This underground water is generally brackish, where salt and other mineral content is capable of attacking Interlocking Concrete Pavers. This type of zone is generally found in Abu Dhabi City and other coastal areas throughout the Emirate.
2) According to BS EN 13043, category 2.8/6.3 Gc80/15.

- D. The bedding sand shall be uniformly spread over the compacted subgrade or aggregate base course, as applicable for pedestrian or vehicular areas, and screed uniformly to grade approximately 5 to 10 mm higher than required. Actual height to be determined from site trial.
- E. The sub base/ subgrade below the bedding aggregates to a depth of 30 cm shall have maximum acid-soluble total salt content $\leq 1\%$ (according to BS 1377 Part 3)
- F. Where utilities are present, preparation of subgrade and sub base should be in accordance with utility providers' requirements, including minimum depth of cover.
- G. Concrete paving blocks in the approved pattern should be placed as close together as possible such that the spaces of the joints are between approximately 3 mm and 5 mm. It is important that the spaces be consistent so that the pattern will remain constant.
- H. Utility chamber access openings should be integrated with the paving pattern.
- I. Paving blocks should be laid from a mix of pallets to avoid any significant colour banding due to variation in batches.
- J. Any necessary cutting of concrete paving blocks shall be done with a mechanical block splitter or a purpose built proprietary diamond saw. In all such situations, only cut paving units with true, even and undamaged edges shall be laid. Cut paving with ragged edges and producing voids shall not be installed. Cut pieces to be laid shall not be less than 30% of a full paving unit and where necessary the cut shall be shared uniformly with the next complete unit.
- K. Dimensional accuracy, uniformity of joint gaps, alignment and squareness shall be checked after laying the first three rows of blocks and thereafter at regular intervals. If joints begin to open the blocks shall be knocked together using a rubber mallet.
- L. After each 100m², or such area that has been agreed with the Owner, has been laid the blocks shall be compacted to the required levels using a plate vibrator.
- M. Interlocking concrete paving blocks should be tamped with a mechanical plate vibrator equipped with a rubber pad on the tamping face (to minimize damage to the finished surface and appearance of the paving blocks), until pavers are uniformly levelled, true to grade and free of any movement. The mechanical plate vibrator shall have a plate area of 0.20 to 0.35m² and have a compaction

force of 12-24 KN and a frequency of approximately 75 to 100 Hz. Compaction above and around underground chambers requires particular attention.

- N. The joints in the paving blocks shall be filled with sand complying BS 7533-3:2005+A1:2009 by sweeping in the jointing sand, unless otherwise approved by project Owner. The grading limits for the jointing sand specified in BS 7533-3:2005+A1:2009 are indicated in the table below.

Table 3: Grading for Jointing Sand	
Sieve Size	Percentage Passing Each Sieve
2.36 mm	100%
1.18 mm	95-100%
600 µm	50-100%
300 µm	15-60%
150 µm	0-15%
75 µm	0-3%

- P. No paving shall be left uncompacted overnight except for the 1m strip at the temporary unrestrained edge.
- Q. Upon completion, the finished surface level, shall be within 5mm of the design level and the maximum deviation within the compacted surface, measured by a 3m straight edge shall not exceed 2mm. The level of any two adjacent blocks shall not differ by more than 1mm. Any areas of paving which do not comply with these tolerances shall be removed, the aggregate bedding laying course adjusted and the paving blocks re-laid to the correct levels.
- R. The Contractor shall submit shop drawings indicating various patterns to the Owner for review and approval. No interlocking concrete paving blocks shall be fabricated and delivered before a specific pattern has been approved.

6 References

- 1) ASTM C88
- 2) ASTM C150
- 3) ASTM C293
- 4) ASTM C418

- 5) ASTM C936
- 6) BS 812
- 7) BS 1377
- 8) BS 6717
- 9) BS 7533
- 10) BS EN 933
- 11) BS EN 1097
- 12) BS EN 12620
- 13) BS EN 1744
- 14) AASHTO T 96-02

7 Definitions

µm	Micrometre
AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society of Testing and Materials
BS	British Standard
BS EN	British Standard European Norm
Hz	Hertz
Kg	Kilogram
m	Meter
mm	Millimetre
MPa	Mega Pascal
Owner	Projects owner or his representative
QCC	Abu Dhabi Quality and Conformity Council
T	Tonnes

Appendix 1 - Suggested Delivery, Storage & Handling

A. Requirements of On-Site Delivery:

1. The receipts for pavers delivered for use on the Project must state the name of the Contractor, the Contract Number and the identification number of each batch/bundle delivered to the site.
2. Each delivery shall also be accompanied by copies of the In-house Certification and reports on the testing relevant to the batches delivered. The

certificate shall confirm that raw material used in the mixes and finished products comply with ADS 15. On delivery of pavers to the site, originals or certified copies of these documents must be transmitted to the Owner.

3. No pavers shall be laid on site until the Owner receives and approves the aforesaid documentation.
 4. The Owner shall be notified 24 hours in advance of pending paver deliveries. No truck shall be offloaded until inspected by the Owner.
 5. At the Owner's option, test samples may be taken from the loaded truck and immediately checked for compressive and flexural strength at the site lab, prior to permission to off-load.
 6. As per the Owner's determination, truck loads may be rejected based on visual and immediate test observations.
 7. Approval by the Owner to off load the pavers is a conditional approval, subject to the final result of the manufacture, independent and site laboratory testing, proper handling, installation, and performance.
- B. Removal and Replacement of Removable Pavement: For reasons beyond the control of the Contractor, it may become necessary to remove and then replace interlocking pavers (either vehicular or pedestrian) or precast tile blocks that are in a present condition acceptable to the Owner. In such cases, the Contractor shall carry out the removal and replacement of the removable pavement in such a way that the replaced pavement meets the exact same specification requirements that governed the original placement of that pavement, including the requirements for the subgrade and base courses.
- C. Removal and Transportation of Interlocking Concrete Pavers to the Owner Stores: Where existing interlocking concrete pavers in vehicular or pedestrian areas require removal to facilitate the proposed works, and are not to be reinstated, the Contractor shall carefully remove the pavers and transport them to a designated Owner storage area off the island of Abu Dhabi.
1. The work shall consist of, but not be limited to, preparing shop drawings indicating the removal limits, removal, on-site storage, loading, transporting, and unloading of the pavers selected for storage.
 2. During all operations, the Contractor shall proceed with due care and attention so as not to damage the pavers. Any pavers made unsuitable for future use due to the Contractor's actions or operations shall be deducted from the measurement for this item.

3. Pavers identified as unsuitable for future use prior to commencement of the works shall be removed and disposed of in accordance with the relevant division of these specifications.