Construction Tolerances for ICP

PAV-MAN-006-20

MASONRY & HARDSCAPES

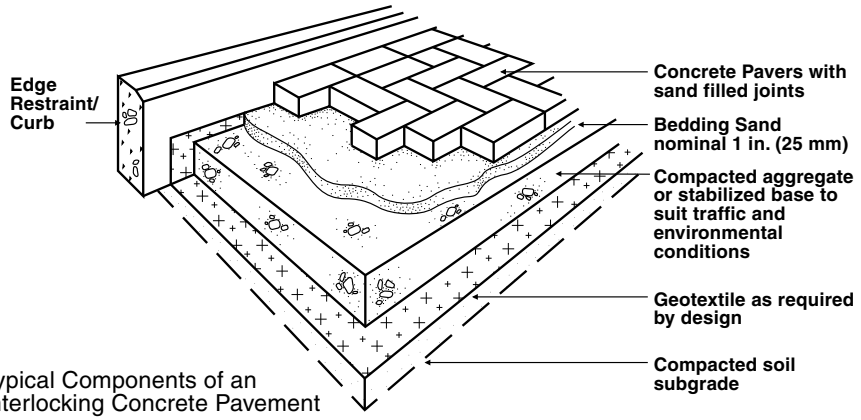
masonryandhardscapes.org

Construction Tolerances and Recommendations for Interlocking Concrete Pavements

Note: This guide does not apply to permeable interlocking concrete pavements

icpi
Interlocking Concrete Pavement Institute®

These are the basic guidelines. Review related Tech Specs for specific details. These tolerance and recommendations are applicable to most products, but allowances may be required for tumbled, embossed or other unique products. Consult manufactures recommendations.



Typical Components of an Interlocking Concrete Pavement

Paver and bedding layer

Attribute	Tolerance*
Paver joint width	1/16 in. (2 mm) to max. 3/16 in. (5 mm)
Paver surface flatness	±3/8 in.(10 mm) in 10 ft. (3 m) (non cum.)
Lippage at catch basins/drains	1/8 in. to 3/8 in. (3 to 10 mm) (non ADA)

Lippage between individual pavers maximum 1/8 in. (3 mm) for pedestrian access routes

Attribute	ICPI recommendation
Paver aspect ratio (l:t)	max. 4:1 for pedestrian & driveways
(length divided by thickness)	max. 3:1 for street/parking
Joint fill depth	max. depth of 1/4 in. measured from the bottom of the chamfer or the top surface of the paver if there is no chamfer at the time of final inspection
Bond lines[1]	±1/2 in. (13 mm) max. over 50 ft. (16 m)
Slope for drainage	min. 2%
Cut pavers[5]	No less than 1/3 for vehicular application No less than 3/8 in. (10 mm) for all other applications
Paver laying pattern[2]	Acceptable for application
Minimum paver thickness	3 1/8 in. (8 cm) for street/parking 2 3/8 in. (6 cm) for pedestrian & driveways
Bedding layer thickness	1 in. (25 mm) nominal
Joint sand gradation	ASTM C144 or C33 CSA A23.1 FA1 or CSA A179
Bedding sand gradation	ASTM C33 or CSA A23.1 FA1

Base and subbase layer

Attribute	Tolerance*
Top of base surface variation	± 3/8 in. (10 mm) over 10 ft. (3 m) (non cumulative)

Attribute	ICPI recommendation
Base thickness variation[3]	+ 3/4 in. to -1/2 in. (+20 mm to -13 mm)
Compaction	min. 98% standard Proctor
Base Extensions	

Base Thickness in. (mm)	Base Extension in. (mm)
Up to 6 (150)	6 (150)
6 to 10 (150 to 250)	equals base thickness
10 to 20 (200 to 500)	10 (250)
20 (500) or greater	1/2 base thickness

Geotextile — as needed

Minimum base thickness[4]

Sidewalks, patios, pedestrian	4 in. (100 mm)
Residential driveways	6 in. (150 mm)
Parking lot/residential street	8 in. (200 mm)

Edge restraint/curb edge

Attribute	ICPI recommendation
No movement	firmly in place
Proper restraint	acceptable for application (see "Guide References" on reverse)

Notes:

[1]Bond lines: Unless it is deemed that the pavement is not adequately restrained at the edges the bond line tolerance is considered cosmetic

[2]Paving layer pattern: ICPI recommends herringbone laying pattern for all vehicular applications

[3]Base thickness variation: An example of an acceptable variation is 7 1/2 in. to 8 3/4 in. (190 to 220 mm) for an 8 in. (200 mm) required total base thickness. The excavated cut should have the same slope and contouring as the final surface profile.

[4]Minimum base thickness: These are for well drained soils. Increase thickness in colder climates or weak soils.

[5]The contractor should have the discretion on cuts less than 1/3 paver size. Sometimes it is not possible to adjust the cuts to less than 1/3 paver size without adjusting laying pattern, and sometimes it is not possible to adjust laying pattern with certain shapes.

**See reverse for tolerance measurement guidance*

Interlocking Concrete Pavement Institute • 14801 Murdock Street, Suite 230 • Chantilly, VA 20151
Tel: (703) 657-6900 • Fax: (703) 657-6901 • Email: icpi@icpi.org • Web: icpi.org

Guide References

Specification and design references

ASCE 58-16 Structural Design of Interlocking Concrete Pavements for Municipal Streets and Roadways

ICPI Tech Spec 4–Structural Design of Interlocking Concrete Pavement for Roads and Parking Lots

ICPI Tech Spec 9–Guide Specification for the Construction of Interlocking Concrete Pavement

Pavement system references

ASTM C936 Standard Specification for Solid Interlocking Concrete Paving Units

CSA A231.2 Precast Concrete Pavers

ICPI Tech Spec 1–Glossary of Terms for Segmental Concrete Pavement

ICPI Tech Spec 2–Construction of Interlocking Concrete Pavements

ICPI Tech Spec 4–Structural Design of Interlocking Concrete Pavement for Roads and Parking Lots

ICPI Tech Spec 5–Cleaning, Sealing and Joint Sand Stabilization of Interlocking Concrete Pavement

Bedding and joint sand references

ASTM C33 Standard Specification for Concrete Aggregates

CSA A23.1 Concrete Materials and Methods of Construction

ASTM C144 Standard Specification for Aggregate for Masonry Mortar

CSA A179 Mortar and Grout for Unit Masonry

ICPI Tech Spec 17–Bedding Sand Selection for Interlocking Concrete Pavements in Vehicular Applications

Base, subbase and subgrade layer references

ASTM D 2940 Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports

ICPI Tech Spec 2–Construction of Interlocking Concrete Pavements

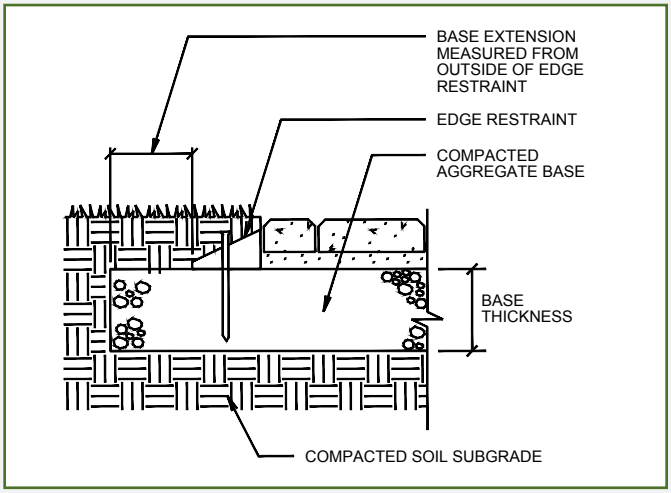
ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

Edge restraint references

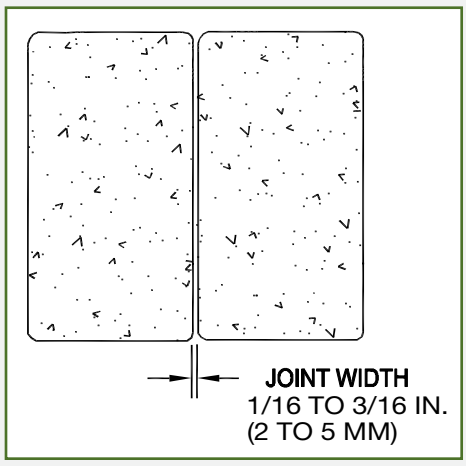
ICPI Tech Spec 3–Edge Restraints for Interlocking Concrete Pavements

Geosynthetics reference

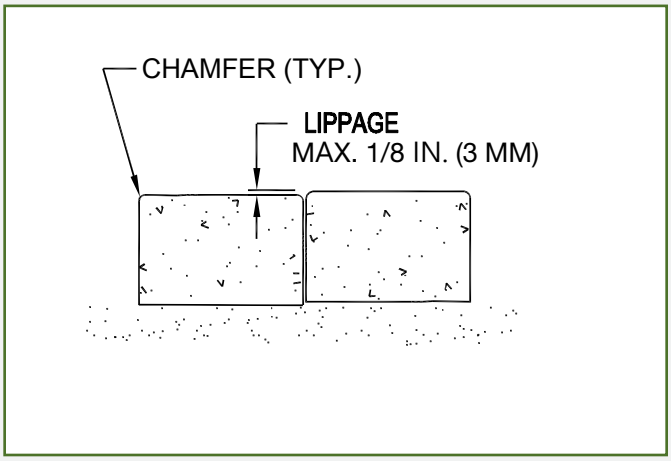
Tech Spec 22 –Geosynthetics for Segmental Concrete Pavements



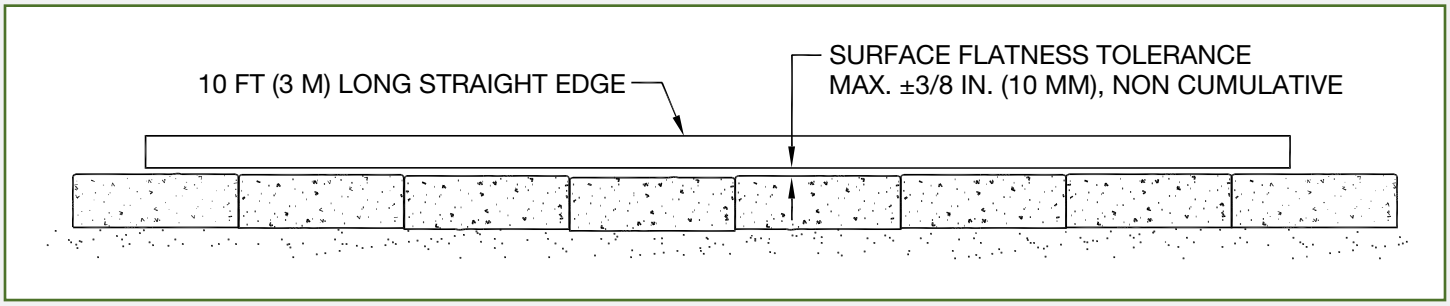
Tolerance Measurement Guidance



Joint widths are measured with a ruler from inside edge of paver to inside edge paver between adjacent pavers



Lippage is measured from the top of a paver to the top of the adjacent paver



Paver surface flatness and top of base surface variation are measured with a straight edge for simple slopes and with a transit for complex contours

Interlocking Concrete Pavement Institute • 14801 Murdock Street, Suite 230 • Chantilly, VA 20151
Tel: (703) 657-6900 • Fax: (703) 657-6901 • Email: icpi@icpi.org • Web: icpi.org