

Playpave® Permeability and Drainage Test

Permeability testing for surfacing is most often based on ASTM F1551-03. The method was written for synthetic turf, but it is widely used to describe how bound rubber surfacing drains. Poured-in-place (PIP) systems, however, are built on site rather than in a factory, so their drainage behavior varies more from one installation to the next. The main factors are:

- Rubber granule size distribution
- Wearing-course thickness
- Bulk density
- Binder type and dosage
- Surface contamination

Most PIP playground surfaces are designed to be permeable. Rain passes down through the wearing course, which cuts runoff, helps keep the surface clean, and lets the area reopen quickly after a storm. Impervious systems are typically specified for splash pads and food-service play areas, where frequent sanitizing and controlled cleaning are required.

The following protocol was used to characterize the permeability range of a representative playground PIP system utilizing Playpave aliphatic polyurethane binder and 1–4 mm EPDM rubber granules installed over an SBR buffings base.

Test Method: ASTM F1551-03, Standard Test for the Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials; also referenced to DIN 18035, Part 6.

Volume (V): 1 gallon = 3,785.41 cm³ (or 0.003785 m³)

Diameter (d): 1.5 inches

Cross-Sectional Area (A): $\left(\frac{\pi}{4}\right) \times (1.5)^2 = 1.767 \text{ in}^2$ (or 11.40 cm² / 0.00114 m²)

Test Equipment:

Tube: 1.5", inside diameter
Tube flow head: 1 Gal
Tube index mark: 1 cm

Test Sampling:

(6) EPDM wearing-course samples at ½"
Individual samples
System thickness: 4.5 in.
Pre-test conditioning: 55°F at 90% RH

Test Procedure:

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The tube was sealed to 10" x 12". specimens using silicone cement to ensure that water drainage occurred exclusively through the wearing surface. Water was introduced into the tube at a rate exceeding the specimen's drainage capacity until the water level reached the index mark. The elapsed time was measured from the moment the water reached the index point until complete drainage to the specimen surface. The procedure was repeated seven times, with the first run serving as conditioning and the subsequent six runs recorded as timed trials. The resulting values represent system drainage rates only and do not account for the hydraulic characteristics of the underlying sub-base, whether crushed stone, asphalt, concrete, or similar construction.

Results:

Test #	Area of Drainage	Gal / Sec	Gal/Min	Gal/Hr
1	1.5" by 1.5"	0.02	1.3	80
2	1.5" by 1.5"	0.02	1.2	72
3	1.5" by 1.5"	0.017	1	60
4	1.5" by 1.5"	0.02	1.3	80
5	1.5" by 1.5"	0.02	1.17	70.59
6	1.5" by 1.5"	0.02	1.25	75

Average: 1.2 Gal/Min, 72.9 Gal/Hr

Tests were performed by Playpave LLC.

Technical Comment:

In general, a properly designed and installed PIP system remains highly permeable over time, although field performance will typically be lower than initial laboratory values. Long-term hydraulic performance is also dependent on the capacity of the supporting sub-base to convey discharge at a rate equal to or greater than the infiltration rate of the surfacing system. Accordingly, overall drainage performance should be evaluated as a composite function of the wearing course and the underlying base structure.

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