HAHN
PLASTICS

TECHNICAL GUIDE

HANPAVE®



Hanpave is a high-quality porous paving system made from 100% recycled plastic. It's easy to install, compliant with LID (Low Impact Development) and can bear very high loads.

Hanpave comes pre-assembled in 10.8 ft² sections. These are placed on a porous bedding and simply clicked together with the interlocking system. With a grass or gravel finish, Hanpave lets rainwater drain through and is strong enough for vehicle use. Hanpave will:

- **Minimize surface water run-off**
- **Reduce flood risk**
- **Improve water quality**
- **Encourage biodiversity**

OVERVIEW

Material	**100% recycled polyolefins**
Nominal size	**13" x 13" x 1⅝"**
Unit weight	**1.26 lbs** (11.3 lbs per 39" x 39" panel)
Coverage	**1.18 ft² per unit**
Compressive strength *max. load/unit	**360 psi** (empty), **60,840 lbs*** **580 psi** (topsoil), **98,020 lbs*** **810 psi** (gravel), **136,900 lbs***
Connection type	**Integral T connector and slots**
Color	**Black or green**
Parking markers	**White circular inserts**
Surface finish	**Gravel or grass**
Infiltration rate	**196" /hr for gravel**
Pallet size	**40" x 40" x 91"** (54 layers of 9 units)
Pallet details	**486 units, 660 lbs** (30 pallets/load)
Compliant with	USA: **Americans with Disabilities Act** Canada: **Charter of Rights and Freedoms & The Canadian Human Rights Act**

TRIED & TESTED

Some porous paving systems quote maximum load capacities of say 250 or 375 psi (36,000/54,000 lbs) but this is only half the story. To withstand repeated vehicle use, a paving system needs strength and flexibility. Strength without flexibility leads to cracks, breakages and ultimately product failure.

Hanpave has been tested in accordance with the European DIN EN 124 to maximum capacity and achieves 360–810 psi (60,840–136,900 lbs) depending on the fill material.

Hanpave has also been tested to tough European Copro PTV 828 standards that were specially developed for paving grids. Here are some of the things that PTV 828 test for:

» Strength and flexibility

This is done according to European DIN EN 124 and strength is measured at 15% deformation. Grids must be strong enough to bear a direct load of at least 148 psi for general use and emergency fire trucks when applied through a 10" loading plate. For heavy duty use, this increases to a minimum of 221 psi. The flexibility of the system under load requires a minimum deformation of 2% when measured at 118 psi.

✓ **Hanpave surpassed these values.**

» Strength of the interlocking system

Vehicle movement is not a static force. Cars and trucks apply considerable pressure, particularly when using power steering. The interlocking system must be strong enough to withstand this pressure and the PTV 828 standard specifies a minimum strength of 205 lbs/ft length to ensure a secure connection.

✓ **Hanpave surpassed these values.**

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HAHN Plastics Canada Ltd.
J101–155 Frobisher Drive
Waterloo, ON N2V 2E1

(519) 218-8800
info@hanit.ca
www.hanit.ca

HANPAVE & SUSTAINABILITY

SUSTAINABILITY, LID & HAHN

We are serious about sustainability. It's at the heart of what we do. We recycle thousands of tons of plastic every year and our products contribute to sustainability and Low Impact Development (LID).

LID uses or mimics natural processes like infiltration. One of the aims of LID is for rainwater to flow and infiltrate on a development at the same rate as it did before the development took place. This helps to minimize rainwater run-off, reduce flood risk, remove pollutants, improve water quality and encourage biodiversity.

When used as a porous load-bearing surface, **Hanpave** can help a development comply with environmental law and address the reduction of non-point source pollution from rainwater runoff (NPDES Phase II).

LEED (LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN)

LEED certification began in the 1990s and is the most widely used green building rating system in the world. The US Green Building Council has used LEED for designing and certifying sustainable, high performance green buildings and LID since 2000.

LEED ASSESSMENT METHOD (LEED V4.1)

LEED assesses eight different building design and construction areas: from construction of general developments like housing, to specific developments like schools, retail and healthcare.

Within each type of development, LEED looks at aspects of the development process. It awards credits for specific categories within defined areas (some being mandatory) and these contribute to a sustainable development.



» Location and transportation (LT)	Up to 16 credits
» Sustainable sites (SS)	Up to 10 credits
» Water efficiency (WE)	Up to 11 credits
» Energy and atmosphere (EA)	Up to 33 credits
» Material and resources (MR)	Up to 13 credits
» Indoor environmental quality (EQ)	Up to 16 credits
» Innovation (IN)	Up to 6 credits
» Regional priority (RP)	Up to 4 credits

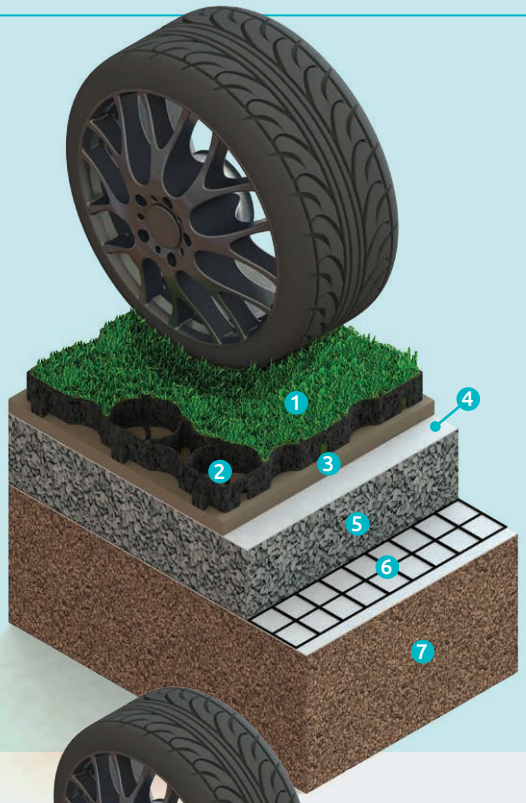
Credits given for areas within these categories count towards a score of up to 110 points. A development is then given one of the following awards:

Cerfied: 40 to 49 points; **Silver:** 50 to 59 points;
Gold: 60 to 79 points; **Platinum:** 80 to 110

Hanpave can earn valuable LEED credits and can be used as sediment control, tree root protection, slope stabilization, rainwater management (in both volume and treatment), ground compaction prevention, green roof design and reduced maintenance.

TYPICAL INSTALLATION EXAMPLES

Hanpave infiltration with grass



1 Seeded or turf finish

2 Havpave
Filled with good quality 60:40 root-zone (allow 0.31 yd^3 of topsoil per 100 ft^2).

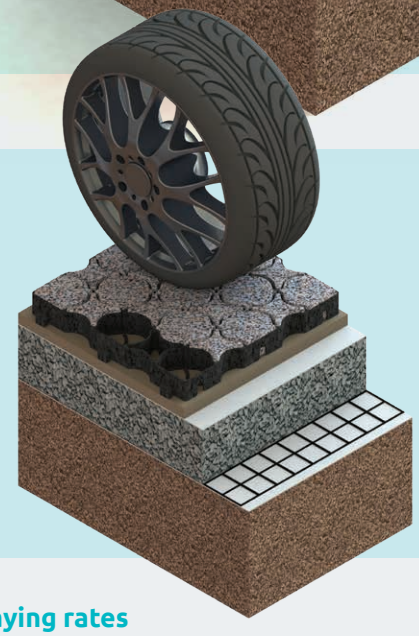
3 Sharp sand
Compacted to 1¼" depth with topsoil (2:1) bedding.

4 Geotextile filtration layer
Non-woven needle-punched

5 Free-draining sub-base
Typically min. 4" layer of a compacted free-draining engineered base. NB. Standard engineered bases are normally **not** suitable for infiltration LID schemes.

6 Geotextile separation layer
Non-woven needle-punched c/w optional geogrid.

7 Sub soil
Typically min. CBR 5%. For weaker sub-soil use a geogrid at base of sub-base



Hanpave infiltration with gravel

Filled with ⅜" angular gravel – **not** rounded or river washed (allow 0.31 yd^3 per 100 ft^2). Grit can be used as an alternative bedding to compacted sharp sand.

Hanpave attenuation with gravel

Install a sealed geomembrane layer between the geotextile and the subgrade to prevent infiltration. Water should be directed to a suitable outlet.

» Laying rates

Hanpave units are supplied pre-assembled in 3 x 3 units (10.8 ft^2) for fast and easy installation. A three-person team can lay up to 3,000–4,000 ft^2 in a day.

» Installation on slopes

Hanpave can be installed on slopes of up to 15° without additional staking. For steeper slopes, drive a 12" ground stake into the center of the grid and hook over the base reinforcement or cell wall at 3' centers.

EXAMPLES

Installations, parking space layouts, disability parking demarcations and specifications can be downloaded from **www.hanit.ca**

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SUBGRADES & SOIL TYPES

Depending on the porosity of the subgrade, **Hanpave** can work as an infiltration or attenuation system. In most cases, a free-draining surface that can bear the load of vehicle use is required. However, if there is very low porosity, or the subgrade is contaminated, a sealed geomembrane between the engineered base and subgrade can be used to direct water to an outlet.

Subgrade strength is measured by the Californian Bearing Ratio (CBR). The table below shows strengths/CBRs of some typical soils.

The table also shows which soils are suitable for LID infiltration schemes using an engineered porous base. The soils shown as **not** suitable for LID can still be used for non-infiltration schemes using sealed geomembrane to direct water to an outlet. The commonly used traditional granular bases are **not** suitable for LID due to high fines content which makes infiltration impossible. An open textured granular crushed stone with limited fines will provide good infiltration for LID.

Soil classification	Coefficient of permeability (m/s)	Relative permeability	Typical CBR	LID infiltration suitability
Well graded gravel	10^{-5} to 10^{-3}	Pervious	30 to 80	Yes
Poorly graded gravel	5 x10^{-5} to 10^{-3}	Pervious	20 to 60	Yes
Well graded sand	5 x10^{-6} to 10^{-4}	Pervious	10 to 40	Yes
Poorly graded sand	5 x10^{-7} to 10^{-6}	Semi pervious	10 to 40	Yes
Sandy clay	10^{-9} to 10^{-6}	Impervious	5 to 20	No
Silty clay	10^{-9} to 10^{-8}	Impervious	3 to 6	No
Heavy clay	10^{-10} to 10^{-8}	Impervious	2 to 5	No

EXPANSION

Hanpave is designed to absorb up to 1/16” of movement/expansion per unit. To compliment this, a 1” gap (filled with gravel or topsoil) should be left between **Hanpave** and any curb or hard edging.

Hanpave expands by 0.00000665” per degree of Fahrenheit temperature change. For example, a 100’ length would expand by 3½” with a change of 45°F (7°C). This 100’ length is made up of 100 **Hanpave** units, each absorbing up to 1/16”. This gives up to 6¼” of thermal movement in the laid area and removes the need for additional expansion joints.



SUB-BASE DESIGN

When the CBR of a subgrade is known and the permeability assessed, the depth of an engineered base can be calculated. The use of a suitable geogrid between the subgrade and the sub-base allows for a reduction in the overall depth of sub-base as indicated below.

For LID schemes that require attenuated storage within the engineered base, contact HAHN for advice.

The majority of **Hanpave** installations are designed for car use with occasional trucks such as garbage collection or emergency vehicles. If regular truck or coach use is expected, use HAHN HDGG (Heavy Duty Ground Grid).

The following guidance is suitable for vehicle use with occasional trucks.

Typical use	CBR (%) of subgrade	Free-draining base depth		Use of geogrid
		inc. geogrid	exc. geogrid	
• Domestic parking areas • Pedestrian access • Wheelchair access • Bridleways • Cycle routes • Golf cart paths	Not normally measured	4"	4"	n/a
• Parking lots • Mall parking • RV parks • Car showrooms • Stables • Helicopter pads • Airport parking • Sports centers	>6	4"	4"	n/a
	4–6	6"	9"	30/30
	2–4	9"	13"	30/30
	1–2	10"	15"	30/30
• Fire routes • Occasional trucks • Emergency vehicle access	>6	6"	6"	n/a
	4–6	7"	10"	30/30
	2–4	11"	16"	30/30
	1–2	19"	28"	30/30
• Shoulder reinforcement (residential roads) N.B. For shoulder reinforcement adjacent to major routes subject to regular trucks – use HAHN HDGG (Heavy Duty Ground Grid)	>6	6"	6"	n/a
	4–6	8"	12"	n/a
	2–4	12"	18"	30/30
	1–2	18"	25"	30/30

Note: If no geogrid is used the sub-base thickness above should be increased by 50%.

GROUNDWORK & SURFACING PRODUCTS BY HAHN

Paddock Slab



Heavy Duty Ground Grid



Eco Slab



Decking



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