Stone Resin Surfacing
Permeable Paving Solutions

20 YEAR WARRANTY

TECHNICAL GUIDE

HEAVY DUTY GROUND GRID (HDGG)

HDGG is a high-quality porous paving system made from 100% recycled plastic. It's easy to install and designed for extreme loads such as truck parking, access routes and loading areas.

HDGG is designed for trucks, buses and forklifts. Fully LID compliant, it lets rainwater drain through to the groundwater below. Extensively tested and proven, HDGG will:

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

OVERVIEW

Material	**100% recycled polyolefins**
Nominal size	**23⅝" x 15¾" x 3⅛"**
Unit weight	**19.8 lbs** (79.2 lbs per 10.7 ft², 4 panels)
Coverage	**1 grid = 2.58** ft²
Compressive strength	**388,800 psf** (2,700 psi)
Connection type	**Tongue and groove**
Cell wall width	**1⅝"**
Color	**Gray**
Parking markers	**Standard roadway white lining**
Infiltration rate	**298"/hr** for gravel
Pallet size	**45" x 46" x 91"** (27 layers of 5)
Pallet details	**135 grids, 2,673 lbs** (16 pallets/load)
Compliant with	USA: **Americans with Disabilities Act** Canada: **Charter of Rights and Freedoms & The Canadian Human Rights Act**

Permeable design

A rigid but open cellular design allows the grids to provide both exceptional support and water management.

Lightweight

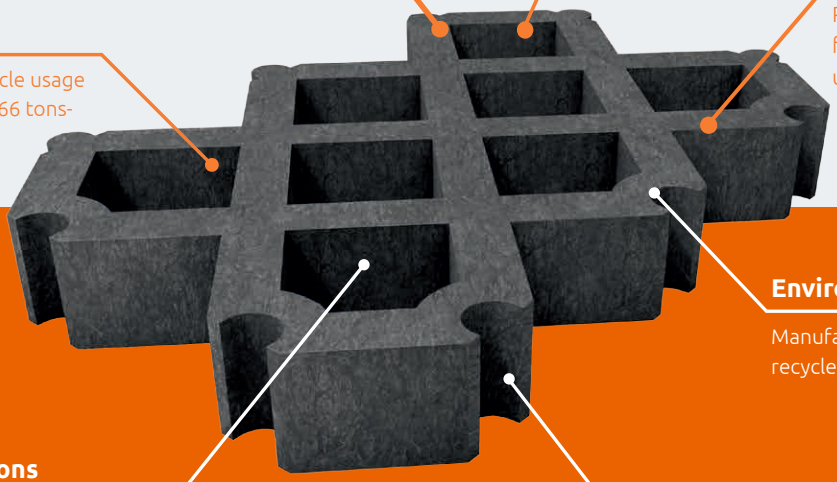
Complies with HSE manual handling guidelines.

Flexible

Polymer construction is semi flexible and resistant to cracking unlike concrete.

High load

Meets high SLW vehicle usage specifications, up to 66 tons-DIN 1072.



Environmentally friendly

Manufactured from 100% recycled plastic.

Application options

Open cells can be filled with either gravel or soil and seed depending on your application.

Stable

Location fit connection improves stability once units are in position.

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THE BASICS

HDGG comes ready to be installed on a level layer of grit over a porous granular base. The tongue and groove makes it easy to create a porous surface that's strong enough for trucks, buses and forklifts. **HDGG** can have a gravel or grass finish, in keeping with the surroundings.

Low Impact Development (LID)

When used as part of a LID, **HDGG** is an integral part of any sustainable development with a porous base that allows rainwater to drain naturally. LIDs are designed to keep drainage levels similar to those that occurred naturally before development. LIDs help minimize water run-off, reduce flood risk, improve water quality, encourage biodiversity and are an increasing method of urban design.

HDGG is self-draining, has a low environmental impact and contributes towards LEED credits.

Introducing hanit®

hanit® is an exceptionally strong, versatile and durable material made from 100% recycled plastic.

Unlike wood, concrete or steel, weather isn't a problem for **hanit®**. It's also lighter than concrete and cheaper than steel. **hanit®** will never rot or rust. It won't splinter with age or crack in extreme cold. It's easy to work with, looks good all year round and needs little or no maintenance.

hanit® is completely moisture-repellent and loves wet or damp conditions. It is produced without preservatives, is non-toxic and non-polluting. Best of all, it reduces the strain on landfill and is 100% recyclable.

Full testing information available on request

TRIED & TESTED

Porous paving is increasingly used in North America and worldwide for access, parking lots, truck parking and bus terminals. The first porous paving systems were made of concrete, but concrete has weight, flexibility and durability limitations. This is why grids made of 100% recycled plastic are so effective.

As well as environmental benefits and the ability to take very high dynamic loads, **HDGG** flexes under pressure rather than breaking like equivalent concrete products. **HDGG** is not plagued by frost damage (unlike concrete), is lightweight by comparison and very robust when handled. **HDGG** doesn't crack if dropped, it can be carried/installed by a single person and complies with manual handling guidelines.

Strength testing

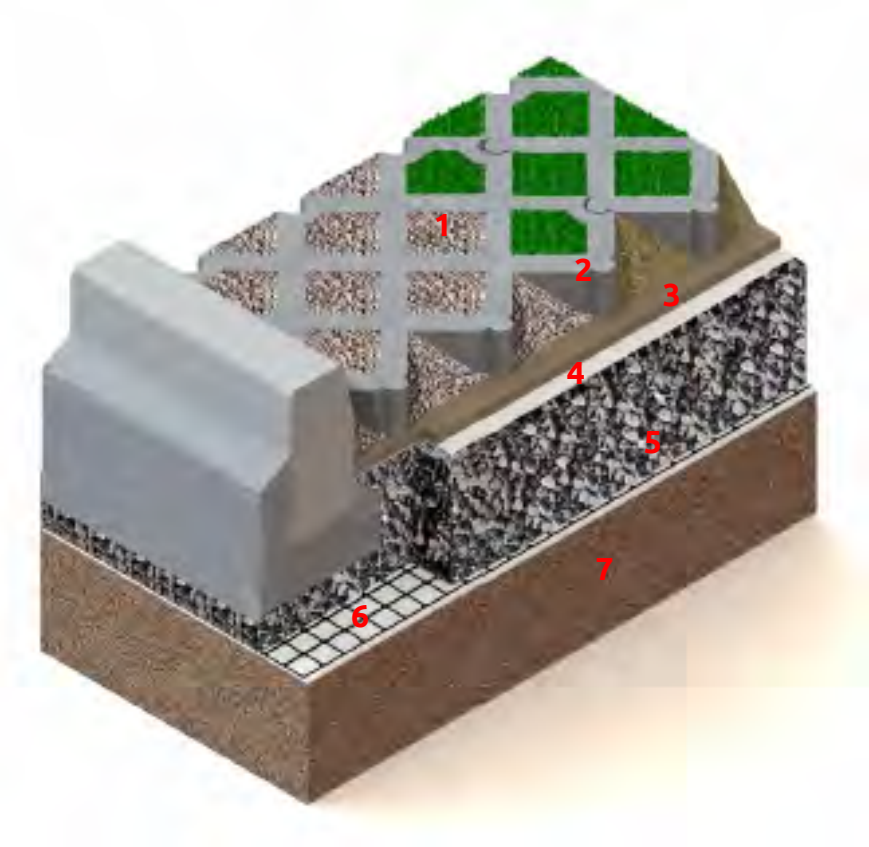
The most common testing for heavy duty loads is **SLW60**. Although useful, these tests only prove if a grid can bear the static load of a multi-axle 66 ton truck. Most plastic grid systems meet this standard. As well as meeting SLW60/HS-25 requirements, unlike most competitors, **HDGG** has been tested to DIN EN ISO Standards for:

- Bending stress at 41°, 73° and 149°F (5°, 23° and 65°C)
- Timed bending stress at 1, 24 and 100 hours
- Tensile strength (ultimate and timed)
- Compressive strength at 1, 2, 10 and 20% deflection
- Charpy impact resistance
- Shore hardness (impact)
- Ball striking hardness
- Density, water absorption, thermal expansion and screw pull-out strength

Standard concrete units have a flexural strength of at least 725 psi. **HDGG** achieves 2,200 psi so it can flex under pressure instead of cracking. Typical trucks exert a static tire load of around 120 psi. The **HDGG** crushing strength of 2,600 psi means it can bear virtually any load.

TYPICAL INSTALLATION EXAMPLE

HDGG infiltration



1 Grass seeded or gravel inish

2 HDGG

Grass

Good quality, free-draining friable topsoil, seeded at 6–10 lbs per 1,000 ft², pre-seeding fertilizer applied.

Gravel

Clean, free-draining angular crushed rock ¼–⅝". Do **not** use rounded or river washed gravel.

3 Grit bedding

Clean coarse ⅛–¼" grit compacted to ¾".

4 Geotextile iltration layer

Non-woven needle-punched, minimum 3.25 oz/yd².

5 Free-draining engineered sub-base Free-draining granular base with a depth to suit the anticipated loading. N.B. Standard granular base is **not** suitable as it's not free-draining.

6 Geotextile separation layer/ Geogrid

30/30 geogrid on a non-woven needle-punched geotextile, minimum 3.25 oz/yd².

7 Sub soil

Establish CBR value to calculate depth of free-draining granular base.

HDGG attenuation with gravel

A sealed geomembrane should be installed between the geotextile and the subgrade to prevent infiltration. Surface water should be directed to a suitable outlet.

Quantity calculations

Bedding grit: 820 lbs per 100 ft^2

Gravel in ill: 1,430 lbs per 100 ft^2

Topsoil in ill: 1,270 lbs per 100 ft^2

Laying rates

A three-person team can lay up to 3,230 ft^2 per day.

Installation on gradients

The maximum gradient for vehicle use is 8% (1 in 12)

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INFILTRATION OR ATTENUATION?

HDGG is designed for infiltration or attenuation. If the underlying ground is porous enough to take the anticipated rainfall, it is suitable for infiltration (see Table 1).

If there is low porosity or the subgrade is contaminated, a sealed geomembrane (between the sub-base and subgrade) can be used to create an attenuation structure with captured water being directed to an outlet. The porous sub-base can also be taken into account as an attenuation storage. This is based on the volume of sub-base with a 30% void ratio from which a figure can be calculated.

For both systems, the base course should be free-draining and able to cope with anticipated traffic. The type of the subgrade needs to be understood and its strength measured by the California Bearing Ratio (CBR). See Table 2 for typical CBR values.

Table 1 shows soils suitable for infiltration using a free-draining granular base. Soils in shaded cells are not suitable for LID and need supplementary drainage. The commonly specified granular base is not suitable because high fines content makes infiltration impossible. Instead, choose a porous granular base with a lower fines content and better infiltration.

Table 1 **Soil permeability**

Soil classification	Coefficient of permeability (m/s)	Relative permeability	Typical CBR	LID infiltration suitability
Well graded gravels	10^{-5} to 10^{-3}	Pervious	30 to 80	Yes
Poorly graded gravels	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

Table 2 **Subgrade strength**

Consistency	Indicator		Strength		
	Feel to touch	Visual	Mechanical	CBR%	*CU (kN/m²)
Very soft	Hand sample squeezes through fingers	Man standing will sink >3”	<2	<1	<25 (3.6psi)
Soft	Easily molded by finger pressure	Man walking sinks 2”–3”	2–4	Around 1	Around 25 (3.6psi)
Medium	Molded by moderate finger pressure	Man walking sinks 1”	4–8	1–2	25–40 (3.6–6psi)
Firm	Molded by strong finger pressure	Utility truck ruts 0.5–1”	8–15	2–4	40–75 (6–11psi)
Stiff	Can’t be molded, indented by thumb	1” ruts – loaded construction vehicle	15–30	4–6	75–100 (11–15psi)

The information in this document is a given as a guide only. The supplier accepts no responsibility for loss or damage resulting from the use of this guide. *CU refers to undrained shear strength and is expressed in kN/m² (psi).

EXPANSION

HDGG should be installed with a 1/32 - 1/16" gap between units. This allows the tongue and groove to fit together and gives enough thermal movement for 70–90°F (21–32°C) temperature change. We also recommend a 1" gap (filled with gravel/topsoil) between the grids and any hard edge or curb to accommodate thermal movement in excess of 90°F (32°C) temperature change.

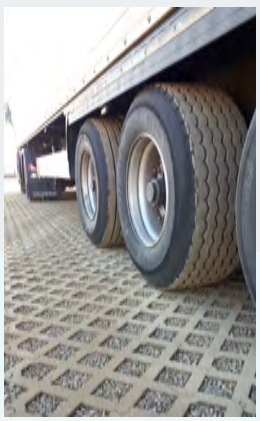
SUB-BASE DESIGN

When the CBR and permeabilty of a subgrade is known, the depth of engineered free-draining granular base can be calculated. A geogrid between the subgrade and the engineered base can reduce sub-base depth (see below).

The following guidance is for heavy duty use with standard trucks. For LID systems with attenuated storage within the engineered base, contact HAHN for advice.

Table 3 **Sub-base depths**

Typical use	CBR (%) of subgrade	Free-draining base depth inc. geogrid	Free-draining base depth exc. geogrid	Use of geogrid
• Fire routes, buses, emergency vehicles, forklifts, truck access, shoulder reinforcement next to highway, rest areas etc.	>6	4"	6"	30/30
	4–6	5"	7"	30/30
	2–4	7.5"	11.5"	30/30
	1–2	15"	23"	30/30
• Lighter duty use – occasional trucks, vehicular access and overspill parking	>6	4"	6"	30/30
	4–6	4"	6"	30/30
	2–4	5.5"	8"	30/30
	1–2	10"	15"	30/30



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