

Tech Note 15: Load & Slip Ratings

TN.15

Applicable Products:

- AusPress Stainless Floor Gullies
- AusPress Stainless Channels

Items designed to be installed at floor level, driven over or stood on are specified with an expected performance criteria in mind. Often this is nominated by two common ratings:

- Load Rating – the ability to successfully resist a force (load) in kilonewtons (kN), and
- Slip Rating – a measured surface resistance to friction movements.

Consideration is required at the design and planning stage to determine which type of activity is expected and how this may affect the rating accordingly. The specification may need to nominate both a high load rating and high slip rating, or simply one or the other.

Load Ratings

Determining the suitable load rating classification is based on the loads applied and loads required to be resisted. Consideration is to be given to:

- Actual Weight – dead (kerb) weight plus any carried weight (ie pallets).
- Movement – are loads moving across, turning, stopping, dropping?
- Wheel Type – an inflated wheel will behave differently to a solid narrow wheel type.
- Weight Distribution – cars generally spread the weight over 4 wheels where a pallet lifter may be unequally over three wheels.
- Contact Area – the weight applied from a small diameter narrow tyre will apply more force over a smaller area, perhaps entirely onto the grating.
- Item Area – the area of the grating that the load is applied over. Is it only one wheel or can two wheels be on the grating at the same time?
- Surface Type – is the item and surrounds adequately supported, reinforced, suitable and resistant to change (such as compacted gravel)?
- Previous Examples – are similar examples successful with the same loads or require a higher rating applied?

Simplified Examples	Overall Weight	Distributed Weight	Contact Area
Standard Car Vehicle	1,800kg	450kg per wheel	Medium
Semi-Trailer Truck Vehicle	40,000kg	1,950kg per wheel	Medium
Large Horse	900kg	225kg per hoof	Medium
Electric Sit-Down 3.5t Forklift 4-Wheel (with load)	8,300kg	2,075kg each back 2,700kg each front	Medium
Electric 1.2t Pallet Lifter (3-wheel) (with load)	3,500kg	1,210kg back wheel 720kg each front	Small

Comparing Load Standards

For our drainage items there are two key standards applicable; AS 3996 “Access Covers and Grates” and EN 1433 “Drainage Channels for Vehicular and Pedestrian Areas”.

Simplified to replicate real world scenario of a large pneumatic (car) tyre, classifications are designed to standardise different products to suit common situations in the built environment. Testing is completed by applying incremental vertical load amounts onto the item over a calculated surface area until a maximum deflection is reached, or the item fails. The classification is deemed from the last successful load applied without issue.



Both AS 3996 and EN 1433 share the same *nominal wheel loading* values, but do not correlate for their load classifications. It is important to ensure the standard is referred to when specifying load classifications.

Ultimate Limit:	10kN	80kN	150kN	240kN
Design Load:	6.7kN	53kN	100kN	160kN
Wheel Load:	330kg	2,670kg	5,000kg	8,000kg
AS 3996:2019	A	B	C	D
EN 1433:2002	A	B	C	
Ultimate Limit:	15kN		125kN	250kN
Design Load:	10kN		83kN	167kN
Wheel Load:	330kg		2,670kg	5,000kg

Class	Nominal Pneumatic Wheel Load	Nominal Solid Wheel Load	AS 3996		EN 1433	
			Design Load	Ultimate Limit	Design Load	Ultimate Limit
A	330kg	N/A	6.7kN	10kN	10kN	15kN
B	2,670kg	500kg	53kN	80kN	83kN	125kN
C	5,000kg	750kg	100kN	150kN	167kN	250kN
D	8,000kg	1,000kg	160kN	240kN	267kN	400kN

Static Load vs Moving (Live) Load

Testing is completed by applying a vertical load onto the item over a nominal surface area. Similar to driving very slowly over the item with a car tyre, the same item will yield a different result when driven over quickly with a narrow solid wheel where vertical and horizontal loads are applied.

Additional loads and the position of floor items is important to avoid undue forces such as turning, stopping, drops or bumps as these forces are not considered suitable. In situations where turning is likely, avoiding placement of drainage items is preferred or if not possible, a smooth solid grate may offer a better solution that may allow the wheel to turn easily and transfer less forces into the grating.

As such, moving loads de-rate the load rating and can transfer stresses to the drain or channel in a longitudinal and/or torsional motion. These forces must be considered when specifying and installing drainage items to ensure long-term suitability.

Contact Area & Point Loads

The area the weight is applied is critical in the performance as resisting loads. 1,000kg applied to a large pneumatic tyre will spread the weight over a larger surface area differently than the same 1,000kg applied to a narrow 100mm diameter solid wheel. The difference is significant with the smaller contact area applying a much higher force onto the surface than test conditions may have been conducted.

The testing replicates the load applied by a pneumatic (car) tyre and not a solid wheel, or small wheel. Equipment used in commercial and industrial settings must be considered and assessed if suitable when used with floor drainage items and placement considered to reduce or eliminate their interaction.

Note: EN 1253 is another standard that tests load ratings to replicate forces from small rubber tyres over a smaller surface area and achieve different values to EN 1433. Solid wheels are deemed not suitable for some load classes and significantly lower kN values.

Product Selection & Specification

AusPress stock a range of gratings designed to suit various load ratings, slip ratings and flow rates depending on the application.

Floor drains and channels are available with edge infill epoxy that strengthens the surrounding frame and removes the void for increased hygiene performance. The solid edging transfers the loads to the supporting concrete material below. Concrete installation methods are critical to ensure the surrounding frame is not carrying loads unsupported.

Areas with frequent or continuous forklift, trolley or pallet movements are recommended to be either avoided with drainage points or installed with solid slot gratings with epoxy infill to surround frames.

Installation and Operations

Care and attention are required to install drainage products to ensure:

- Item is installed as per the manufacturer instructions,
- Item is level and secured to prevent movement during construction and occupation stages,
- Drainage is kept clean and clear of debris and damage,
- Floor structure is integrated into the drainage with detailing giving attention to supporting and transferring loads correctly and ensuring forces and movement are controlled.
- Edges are well supported and installed without voids or gaps that will not transfer load forces and form hard to clean pockets.
- Finished surface levels are consistent and flush with no steps or transitions.
- Items are selected for the required load weights and types.
- Vehicles and equipment traversing the drainage items are assessed as suitable and maintained accordingly.

Slip Ratings

To provide safe passage and prevent falls for pedestrian areas, surfaces are subjected to laboratory testing to determine a slip rating to identify how well they perform in dry and wet situations.

- Handbooks HB 197 and HB 198 “Pedestrian Surfaces Slip Resistance” list minimum ratings recommended per room type or activity, and
- The National Construction Code (NCC) identifies required minimum ratings specifically for access ramps, stairs and related nosings for both public, commercial and residential situations.

Determining a suitable slip rating to specify depends on the environment and conditions the ground surface is subjected to prevent falls. Consideration is to be given to:

- Contact Type – bare feet, soft rubber tyres, solid wheels, stud boots, hard sole shoes, high heel shoes, entrapment possibility.
- Surface Condition – dry surface or any reason for the surface to become slippery including rain, washdown water, oil spills, fats or cleaning residues.
- Application – a commercial kitchen has different requirements than an aged care shower space.
- Surface Open Area – Grates with more solid area can have a lower slip rating than more open grates.
- Surface Bite – Higher slip ratings often result in surfaces with more undulations and extrusions to grab and may be harder to clean.
- Cleanability – Consider how and frequency cleaning may be required to maintain slip rating.

Products are tested in accordance with AS 4586 “Slip Resistance Classification of New Pedestrian Surface Materials” which offers several distinct methods to determine the slip rating of a surface:

Test Method	Lowest Rating (most slippery)	Highest Rating (least slippery)	Common Examples
Pendulum Test	P0	P5	Shoes in contact with surface.
Oil-Wet Test	R9	R13	Commercial kitchens and industrial.
Barefoot Rating	A	C	Change rooms and swimming pools

Products supplied by AusPress are tested to these requirements, with a range of options available to suit the required slip resistance identified in our product catalogue for floor grates and channel products.

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