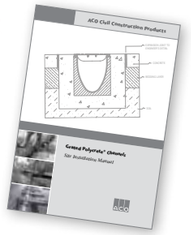
Installation support

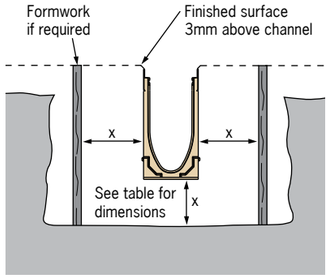


Channel units are installed in a continuous trench, and are encased with concrete. Full installation instructions are available in the Site Installation Manual. Contact ACO or visit **www.acodrain.com.au**

1. Trench excavation

Excavate trench to accommodate trench drain. Excavation should be around centre line of trench. Excavation must be sufficient enough to accommodate each of the following:

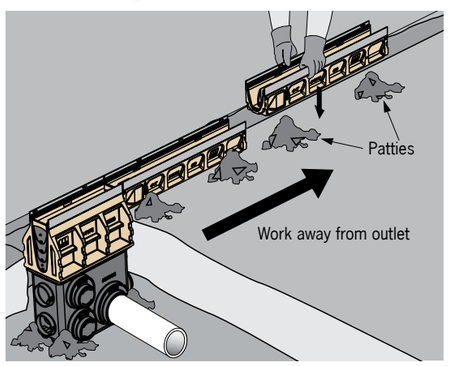
- Channel and inline pit width and depth dimensions.
- Concrete encasement dimensions – 100mm to 200mm. Specific loading and ground conditions will increase the excavation size. See page 128 for further guidelines.
- For sloped systems, excavate base to follow the fall of the trench run.



Dimension for:	X
AS 3996 Class A–B	100mm
AS 3996 Class C–D	150mm
AS 3996 Class E–G	200mm

2. Outlet installation

- Determine type of outlet and position.
- Install outlet or inline pit.
- Install channels starting at the outlet, then working away from the deepest (highest channel number) to shallowest channel.

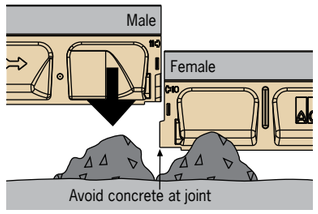


3. Trench drain installation

Channel units need to be supported at correct height and held securely in place to avoid movement during concrete pour. There are a number of options available.

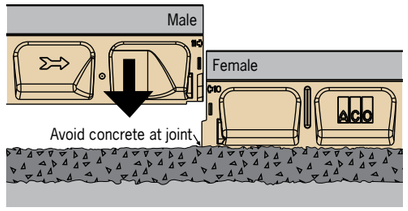
Patty method

Channels are set up on concrete patties with a stiff, low slump to support the weight of the channel.



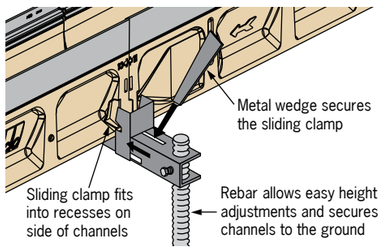
Continuous wet base method

A wet concrete base suitable to support the weight of the channel.



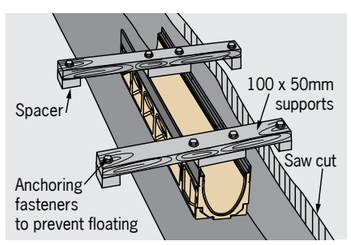
Installation device for KlassikDrain and PowerDrain

A clamping system that fits around the channel joints, supported on rebars to achieve correct height. One device per joint is required. This allows for a single concrete pour.



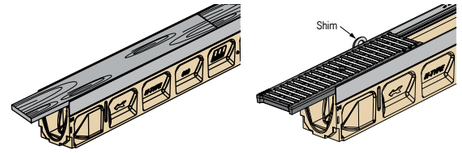
Hanging method for PowerDrain and SlabDrain HSK

Channels can be hung from existing slab or formwork.



4. Channel bracing

To prevent channel walls and joints being distorted by pressure of concrete, grates (or plywood cut to a snug fit) should be installed in channel prior to concrete pour. Shims or washers placed along each side allow easy removal of the grates. Grates should be suitably wrapped to protect from concrete splash.



5. Concrete pour

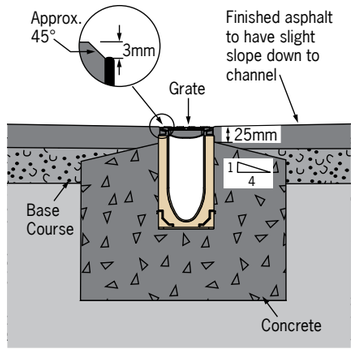
Concrete should have compressive strength of minimum 25MPa to provide the encasement for the channel. Concrete should be poured evenly (both sides of channel) and carefully to avoid dislodging channels. A wand-type vibrator should be used to ensure concrete distributes evenly underneath and around channels.

6. Pavement finishing

The top of the adjacent pavement or concrete encasement must be above the top of the grate by approximately 3mm.

Brick pavers should be set approximately 3mm above the trench edge with the first paver course set on mortar or concrete.

Care should be taken with asphalt rolling machines to avoid damage to trench edge.



7. Complete the installation

- Remove grates and remove protective wrapping.
- Remove any debris in channel and grate rebate. Ensure outlet pipes are clear.
- Install the rubbish baskets into inline pits, if required.
- Flush trench drain to check for pipe blockages; unblock if required.
- Empty rubbish baskets and clean out pipe connections. Re-install rubbish baskets.
- Install grates ensuring they are securely locked down.

Drainage system is now ready for use.

Maintenance

Regular inspections of the trench drain system are recommended. Frequency will depend on local conditions and environment, but should be carried out at least annually.

Inspections should cover:

- Grates and locking devices.
- In-line pits and rubbish baskets.
- Concrete encasement and adjacent paving.

All items should be inspected for damage, blockage or movement. Compare with site drawings if necessary.

Maintenance guidelines

1. Remove grates and clear slot openings of dirt and debris.
2. Remove debris from channel either by shovelling, water jetting or vacuum pump.
3. Flush channels with water or pressure washer.
4. Repair damaged channel surfaces, if necessary, with ACO repair kit (Part No. 02163).
5. Renew joint seals as required.
6. Empty rubbish baskets and clean out pipe connections.
7. Re-install rubbish baskets.
8. Re-install grates, ensuring they are securely locked down.

Oxidation of iron grates over time

Most ductile iron grates have a black coating applied to protect the grate for a short period after manufacture. It is not intended to be either a long term or architectural finish.

Oxidation on the surface of ductile iron products is a natural process that does not affect the structural integrity of the product and produces a rustic look, see pages 90 to 91.

If a black finish is required, it would be recommended to paint the grates with a black rust inhibitor from time to time.

Product design life

If properly maintained, ACO products installed in the correct application and according to ACO's installation instructions, will hold their integrity for as long as the adjacent pavement will.

For example, if the pavement is designed for 30 years and is not damaged during this time, the ACO product will last for 30 years.

Unforeseen and adverse conditions out of ACO's control may affect the life of the product.

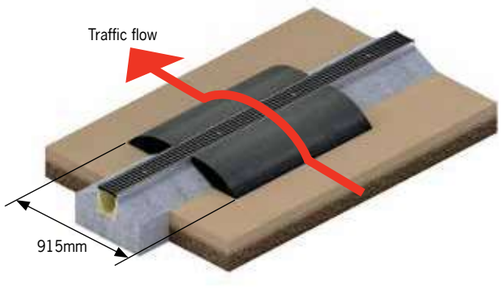
Site specific solutions

Ground conditions

Specific ground conditions or contaminated ground may require a deeper and/or wider concrete encasement than the minimum recommendations. If in doubt, seek engineering advice.

Temporary installation

During site work and after trench run is laid, the trench top can be vulnerable to damage. Site traffic should be routed away from the trench. If temporary crossings are required, a base course of minimum width 915mm should be installed either side of the trench for protection. Loose boards or plates are inadequate.

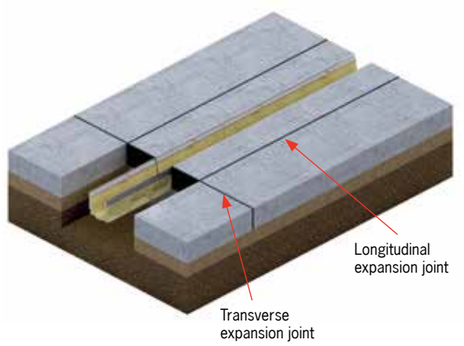


Thermal movement

Longitudinal expansion joints, which for some slabs may be dowelled horizontally and de-bonded, will isolate the trench and concrete encasement from thermal movement from adjacent large concrete slabs.

Transverse expansion joints in the concrete slab should be positioned to coincide with channel-to-channel joints. Alternatively the channel may be cut to align with the slab joint and resealed with a suitable flexible sealant.

Engineering advice should be sought for specifying expansion and/or isolation joints.



Shrinkage movement / cracking

A good curing regime along with the addition of control joints will ensure concrete provides adequate support and protection for the channel run. Engineering advice should be sought for specifying shrinkage control provisions.

Joint sealing

ACO's channels are installed with a concrete encasement, which will provide a basic seal around the channel. If required, all channel-to-channel and channel-to-fitting joints can be further sealed.

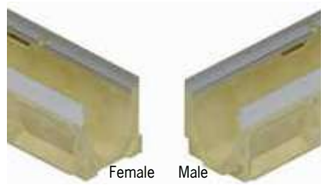
ACO channels are supplied with a Sealant Groove as standard. This provides a groove that can be filled with an appropriate flexible sealant to create a watertight joint. This is particularly important with elevated slabs and where liquids may contain chemicals or oils.

Sealant should be resistant to the same chemicals that are in contact with the trench material and be flexible to allow for any slab movement from temperature changes. Surfaces should be correctly prepared prior to applying sealant to ensure good adhesion.

Connection options

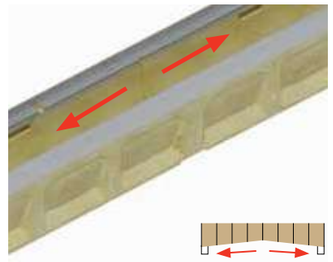
Male-female connection

Interconnecting end details allow easy and effective joining of channels. It also helps with height and sideways alignment between channels. A groove provides positive placement for appropriate sealant.



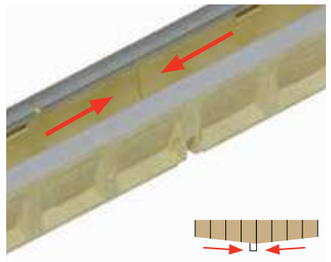
Female-female connection

Creation of a direction change and high point, requires an outlet at start and end of run. To create, grind off female end details and butt channels together and mortar in place.



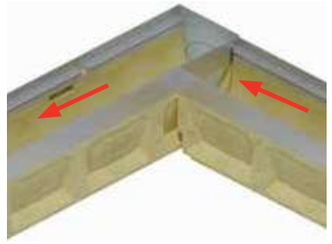
Male-male connection

Enables a creation of a low point that is usually installed with a bottom outlet where an in-line pit is not required. To create, butt male channel ends together, fill gaps and mortar in place.



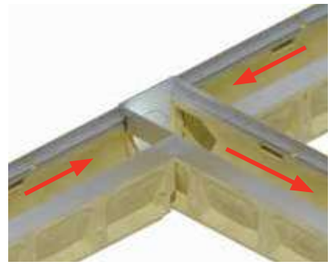
Corner

Junction details on sides of half metre neutral channels allow on-site creation of corners. Edge rails and grate seats remain intact for structural integrity.



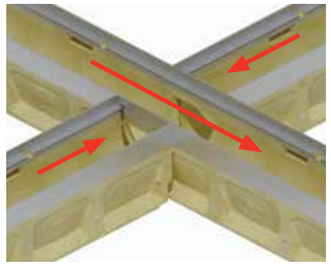
Tee junction

Junction details on sides of half metre neutral channels allow on-site creation of tees. Edge rails and grate seats remain intact for structural integrity.



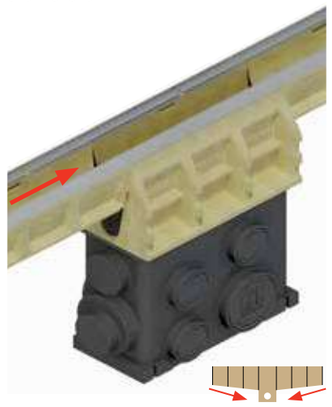
X–cross

Junction details on sides of half metre neutral channels allow on-site creation of x-cross. Edge rails and grate seats remain intact for structural integrity.



In-line pits

The in-line pit is typically the low point and has female connections at each side for easy connection to the deeper male channel end.



Blanking end plates

For in-line pits a blanking end plate is supplied to prevent concrete ingress during concrete pour. It also provides an aesthetic finish at the end of the channel.

Cutting, drilling and grinding

ACO strongly recommends wet cutting, wet drilling and/or wet grinding of polymer concrete products in a well ventilated area with the use of personal protective equipment including masks, gloves and eye protection.

Note: → Arrow depicts direction of channel slope and flow.

Installation sections

An installed ACO Drain System will incorporate the following:

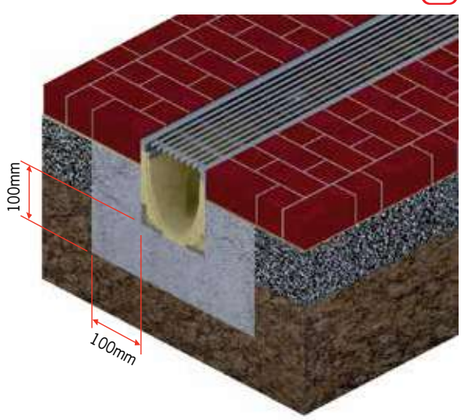
- Correct grate type.
- Correct channel type and size.
- A minimum grade 25MPa compressive strength cement concrete encasement.

It is recommended that the cement concrete encasement be durable and conform to minimum strength requirements.

Poor site conditions and low load bearing pavements will require an increase in the dimensions shown in the illustrations to meet both the vertical and lateral loads. It is the customer's responsibility to ensure that the complete design and construction of the encasement is suitable for the application. If in doubt, seek engineering advice.

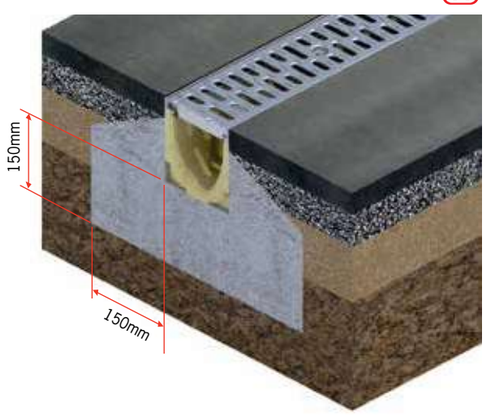
The following illustrations are a guide only.
A complete library is downloadable from **www.acodrain.com.au**

Class A to B
100mm channels for BLOCK PAVER installation
(Maximum 2,670kg approximate wheel load)



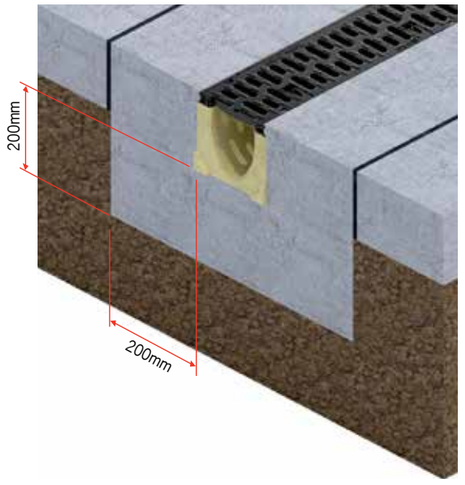
Note:
1. Grate should be 3mm below pavement surface.

Class C to D
100mm channels for ASPHALT to edge installation
(Maximum 8,000kg approximate wheel load)



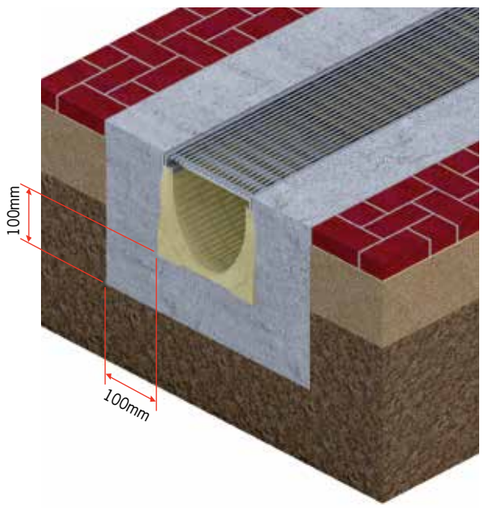
Note:
1. Grate should be 3mm below pavement surface.
2. Care should be taken with asphalt rolling machines to avoid damage to channel edge and grate.

Class E to G
100mm channels for CONCRETE installation
(Maximum 30,000kg approximate wheel load)



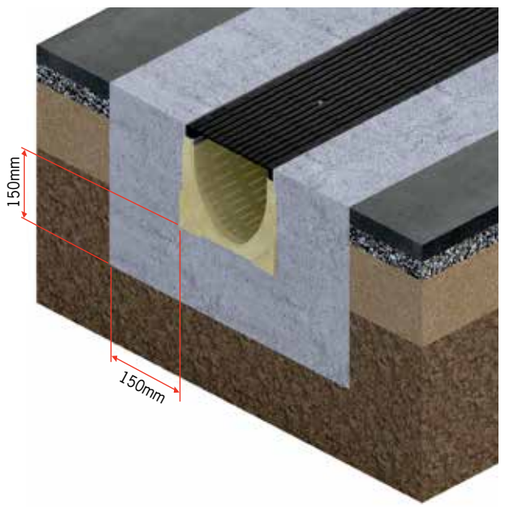
Note:
1. Grate should be 3mm below pavement surface.

Class A to B
200mm channels for BLOCK PAVER installation
(Maximum 2,670kg approximate wheel load)



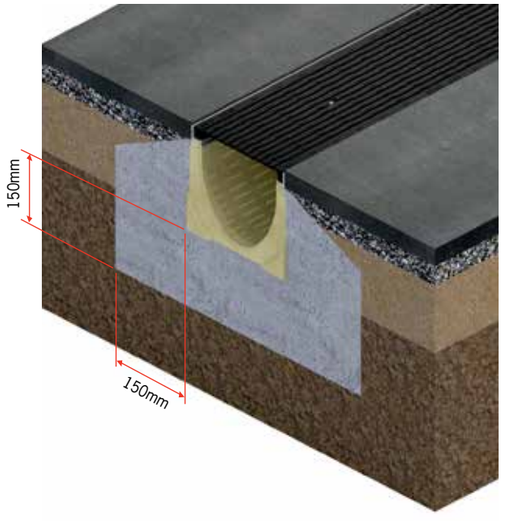
Note:
1. Grate should be 3mm below pavement surface.
2. Paver to edge option, refer to previous page.

Class C to D
200mm channels for ASPHALT installation
(Maximum 8,000kg approximate wheel load)



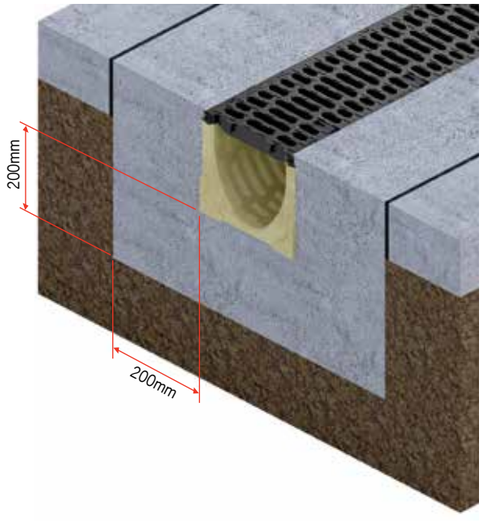
Note:
1. Grate should be 3mm below pavement surface.

Class C to D
200mm channels for ASPHALT to edge installation
(Maximum 8,000kg approximate wheel load)



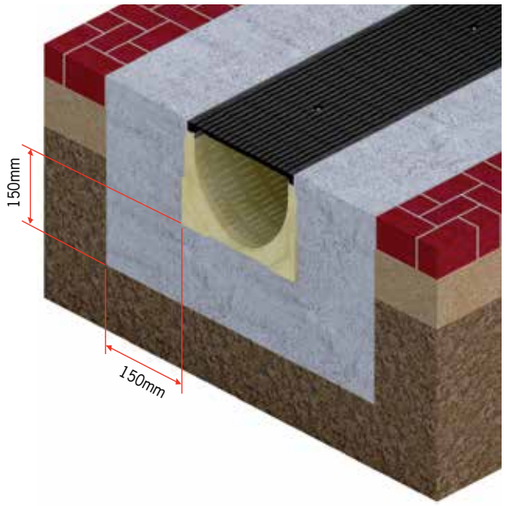
Note:
1. Grate should be 3mm below pavement surface.
2. Care should be taken with asphalt rolling machines to avoid damage to channel edge and grate.

Class E to G
200mm channels for CONCRETE installation
(Maximum 30,000kg approximate wheel load)



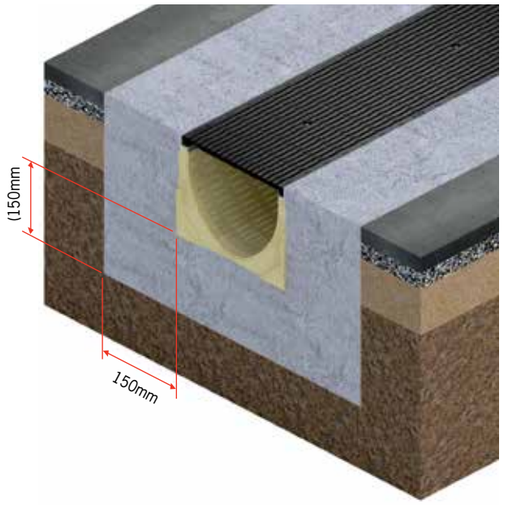
Note:
1. Grate should be 3mm below pavement surface.

Class C to D
300mm channels for BLOCK PAVER installation
(Maximum 8,000kg approximate wheel load)



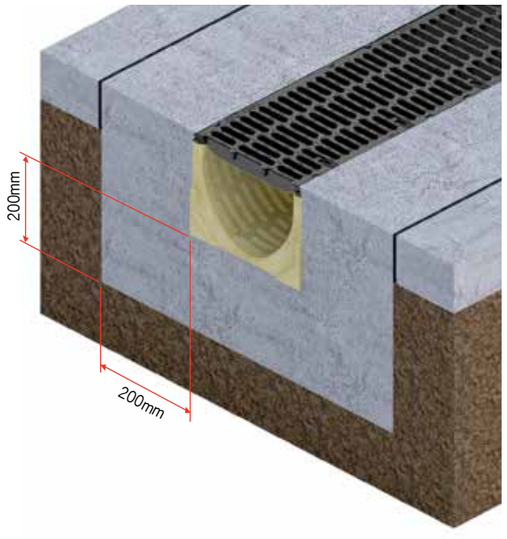
Note:
1. Grate should be 3mm below pavement surface.

Class C to D
300mm channels for ASPHALT installation
(Maximum 8,000kg approximate wheel load)



Note:
1. Grate should be 3mm below pavement surface.

Class E to G
300mm channels for CONCRETE installation
(Maximum 30,000kg approximate wheel load)



Note:
1. Grate should be 3mm below pavement surface.

Glossary

Anti-shunt lugs – interlocking mechanism on grate and edge rail of channel to prevent longitudinal movement of the grates.

AS 1428.2 – Australian Standard for the *Design for Access and Mobility* requirements for buildings.

AS 3996 – Australian Standard for *Access Covers and Grates*.

AS 4586 – Australian Standard for *Slip Resistance Classification of New Pedestrian Surface Materials*.

Bicycle safe – grates with slot sizes that are safe for bicycle wheels.

Cast-in-situ – a trench drain that is constructed during a concrete pour with removable formwork.

Catchment area – paved area that will collect liquids.

Channel – individual modular unit.

Chemical resistance – ability to withstand specified chemicals.

Corrosion resistance – ability to withstand weathering.

Cut-outs – shaped plastic inserts cast in the ends of polymer concrete channels to enable easy removal of material for channel connection.

DrainLok – ACO's patented barless and boltless locking system for KlassikDrain and SlabDrain HK Series.

Drill-outs – shaped recesses in a polymer concrete unit to enable easy removal of material for pipe or channel connection.

Ductile iron – pig iron with magnesium added to provide durability and strength is also referred to as spheroidal graphite (SG) iron.

Edge protection – metal edge rail to protect the edge of the trench body from general impact or damage.

EN 1433 – European Standard for *Drainage Channels for Vehicular and Pedestrian Areas*.

Female – the end of a channel with a rebate to interconnect with the protrusions of a male end of a channel to enable a tight connection.

Free area – area for water flow, calculated by clear opening width and space beneath the grate.

Freestyle – ACO's semi-custom iron grates.

Galvanised steel – black steel with protective galvanised coating.

GIC – ACO's proprietary software program to calculate grate intake performance.

Grade – angle of pavement slope.

Grated pit – large basin to collect liquid into underground pipe work.

Grate hydraulics – performance of liquid entering grate openings.

Groundslope – percentage of surface slope.

Heelsafe® *Anti-slip* grates – ACO's trademark for pedestrian friendly grates.

Hydro – ACO's proprietary software program to accurately calculate trench drain performance.

Hydrological cycle – cycle of water from oceans to rainfall and back to the ocean.

In-line pit – same width basin connected to trench drain that acts as an exit point to the underground pipe work.

Invert depth – depth from top of grate to inside base of channel.

kN – kilonewton – measurement of force, 1kN = 102kg of force.

Lateral intake – liquid entering the trench drain from surrounding paved area.

Male – the end of a channel with protrusions to interconnect with the rebate of a female end of a channel to enable a tight connection.

Manning's equation – an equation for calculating steady and uniform flow in pipes or culverts. Does not account for lateral intake of liquids.

Manning's roughness coefficient – the hydraulic measure of a material's surface roughness.

Non-uniform flow – changing flow velocity in a trench due to continuous lateral intake.

Overall depth – depth from top of grate to underside/bottom of channel.

Pavement – the hard surface material of a road or street surrounding a trench drain.

Polycrete® – ACO's trademark for polymer concrete products.

Polymer concrete – material created with mineral aggregates mixed with resin binding agents used to produce channels.

Ponding analysis – computer calculations to ascertain the temporary ponding in a short lived flood situation, which is deemed acceptable for certain projects.

PowerLok – ACO's patented barless and boltless locking system consisting of a sliding clip that locks onto the edge rail.

QuickLok – ACO's patented boltless locking system consists of a shaped stud and spring clip that locks to a bar inserted in the channel.

R rating – classification defined by AS 4586 for the Oil-Wet Inclining platform test to be applied in commercial and industrial areas where surfaces are contaminated with oil and grease, for example commercial kitchens.

SA HB 198 – Australian Standard Handbook: *Guide to the Specification and Testing of the Slip Resistance of Pedestrian Surfaces*.

Scheduler – ACO's proprietary software program to illustrate trench layouts.

Sealant groove – void at channel joint to allow application of a sealant if required.

Slip resistance – measure of coefficient of friction of grate surface.

Spoon drain – cast-in-situ dish in a pavement with little depth and no grate.

Stainless steel – a mild steel with a minimum of 11% chromium added to provide enhanced corrosion resistance. There are a wide number of stainless steels available, each with differing properties. ACO grates are Grade 304 austenitic stainless steel. Grade 316 available on request.

Steady uniform flow – constant flow velocity in a trench and pipe based on Manning's Equation.

Sustainable drainage – Water Sensitive Urban Drainage (WSUD) is the design for the collection, treatment and reuse of rainwater for low environmental impact.

Trench drain – a long, narrow ditch for the collection of liquid.

Wet pendulum test – prescribed in AS 4586 for pedestrian areas that can become wet with rainwater. This test is designed to be applied to urban stormwater grates. P rating classification is used.