

ACO DRAIN
Site Installation Manual
Polymer Concrete Drain Systems



Getting Started

ACO Drain consists of a full range of modular channels with captive grates; Systems include catch basins, end caps, and other accessories.

When installed correctly, ACO Drain products are designed to withstand a variety of loadings as classified by EN 1433 (The only standards specifically for trench drain systems).

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Polymer concrete products should be handled with care as they can be damaged by impact from other products, or machinery.

Typical equipment necessary for installation may include:

- *Excavating equipment*
- *String-line and laser level*
- *Measuring tools*
- *Masonry drill, grinder and/or saw*
- *Rubber mallet*
- *Concrete - 4,000 psi recommended compressive strength*
- *Gloves, respirator and eye protection*

Health and Safety

Polymer concrete

Products are manufactured using synthetic resin, mineral aggregates and curing agents.

Main hazards include:

- Abrasive damage to hands.
- Inhalation of dust from grinding, cutting, or drilling.
- Grinding, cutting, etc. may project small fragments.

Gloves, eye protection and a respirator should be worn to avoid these hazards.

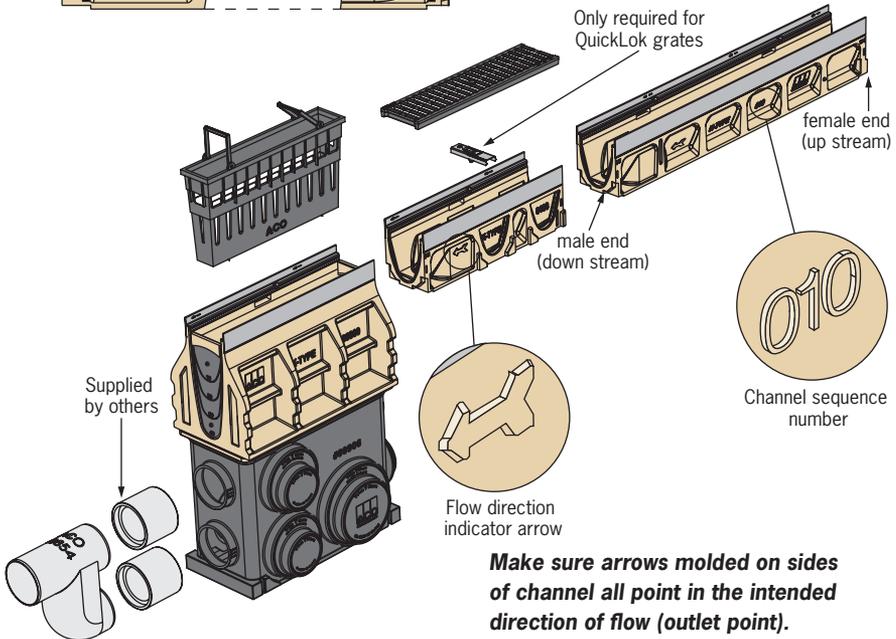
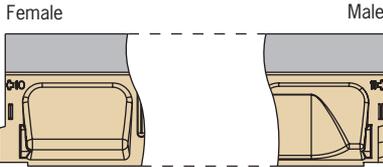
Metal grates

Grates are typically made from either cast or fabricated metals.

Main hazards include:

- Abrasive damage/cuts to hands.
- Inhalation of dust from grinding or cutting.
- Grinding, cutting, etc. may generate sparks; flammable items should be removed from area.

Gloves, eye protection, and respirator should be worn to avoid these hazards. Operations should be conducted away from areas of fire or explosion hazard.



Installation Sections

These illustrations are a guide for typical ground conditions only. Engineering advice should be taken.

Refer to www.ACODrain.us for further information.

An installed ACO Drain System should incorporate the following:

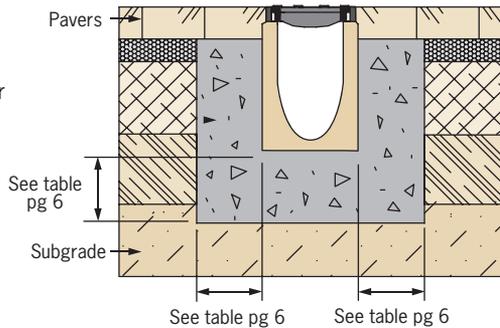
- Correct grate type.
- Correct channel type and size.
- Recommended grade 4,000 psi compressive strength cement concrete surround.
- Concrete surround dimensions are **minimum** dimensions and engineering advice should be taken to confirm appropriate for the specific project.
- Concrete surround should typically be the same thickness as the concrete slab.

Poor site conditions and low load bearing pavement will require an increase in these dimensions to meet both vertical and lateral loads.

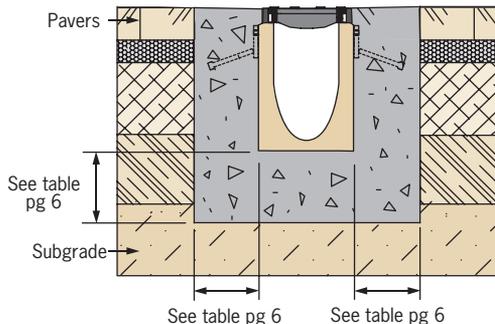
Reinforcing steel may be required within the slab and around the trench drain - engineering advice should be sought to determine bar size and configuration.

For Load class F applications, ACO recommends using the concrete anchors offered with PowerDrain.

Pavers - EN 1433 Class A - C only

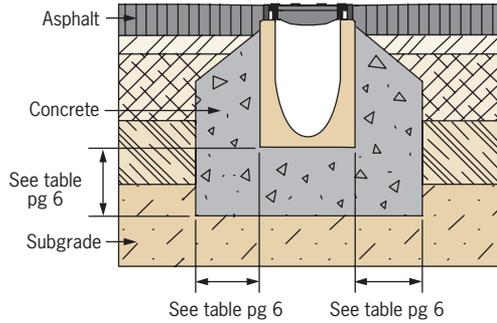


Pavers - EN 1433 Class A - F

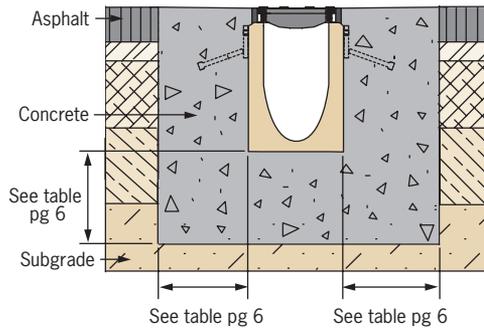


Commercial Trench Drains

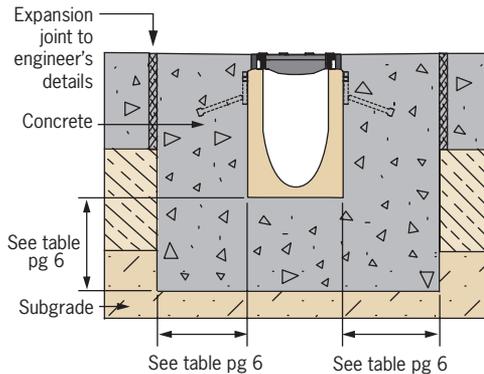
Asphalt - EN 1433 Class A - C only



Asphalt - EN 1433 Class A - F



Concrete - EN 1433 Class A - F



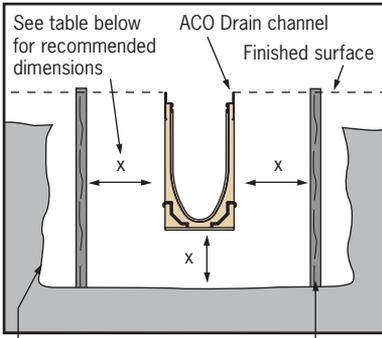
1 Excavation

Excavate trench to accommodate drain system. Excavations must be made about the center line of proposed drainage run and catch basin.

Trench must be big enough to accommodate each of the following:

- A. Channel/catch basin width and depth dimensions.
- B. Concrete surround dimensions*.

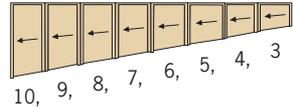
- C. For sloped systems, excavate base of trench to roughly follow fall of trench run.



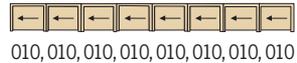
Trench profile

Form board if required

Sloped system



Constant depth system



NOTE: Check product literature for overall product depth. Add additional measurement for concrete surround from table at left.

Ensure loose material is removed from trench and base is well compacted.

Run string line, or laser, at finished surface level along full length of proposed trench run to ensure trench is installed to grade.

In concrete pavements ensure an allowance is made for expansion/isolation joints, if necessary, to allow movement due to thermal expansion/contraction.

6

Concrete Surround Dimensions* (x)

Load Cl	A	B	C	D	E	F
4" channel	4"	4"	6"	6"	8"	12"
8" channel	4"	4"	6"	8"	8"	12"
12" channel	4"	6"	6"	12"	12"	12"

* These dimensions are recommended minimums only, based on recommended 4,000psi concrete. Ground conditions will affect actual dimension required; engineering advice should be sought. Concrete surround should be same thickness as surrounding slab depth.

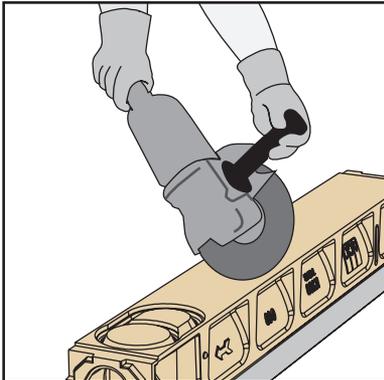
2 On-Site Fabrications

When cutting channels and/or grates, gloves, protective eye wear and respirator or mask are recommended.

Cutting channels

Required to form miters, tee junctions and non-standard lengths. Most fabrications can be completed on site. ACO offers a custom fabrication service for more complex fabrications. Contact ACO Technical Department for further information.

Channels should be cut with a masonry or diamond disc saw. Grates should be cut with band saw, or similar, with suitable blade.



A 2 - part rigid resin glue (ACO Bond) can be used to bond cut surfaces together, if required.

If corrosive liquids are transported in trench, joints should be properly sealed.

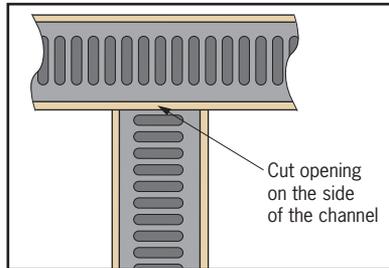
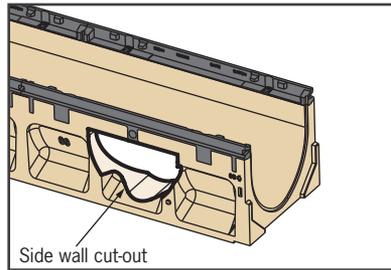
Ensure the sealant/adhesive used is chemically resistant.

Tee Junctions

Tee junctions are when an opening is cut into the side of one channel and another channel is butted up to this opening.

All half meter channels provide molded guide for side removal. Other channels; mark area in channel wall to be removed by butting channels together and marking profile of interior of channel.

NOTE: Edge rail should be left intact to provide additional strength and seating for grate.



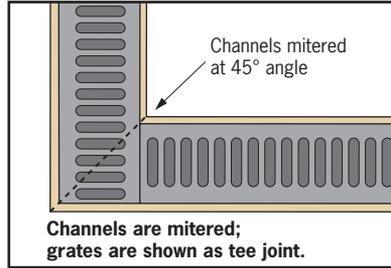
2 On-Site Fabrications

Miters

Corners

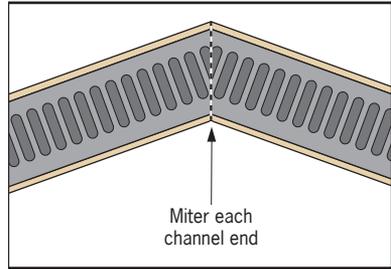
Formed by cutting channels to required angle and butting together.

For heavy duty applications (D-F), mitered grates are not recommended. A tee joint is suggested to give grate maximum support.



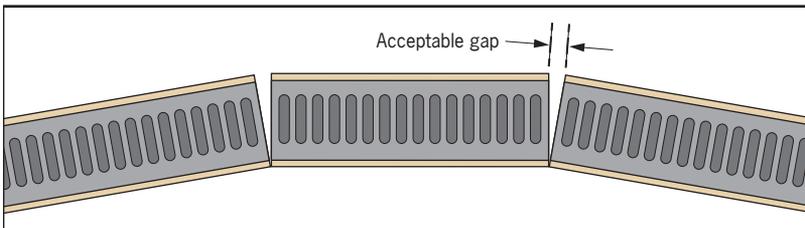
Tight curves/bends

For tight curves or bends, miter cut end of each channel and grate to required angle. Results in a neat finish at joint.



Radius

Channels can be installed to slight curves by leaving an acceptable gap at the channel joints (acceptable gap to be approved by client).



Using half meter non-sloping channels, allows more 'segments' to be added to the radius; the gap between channels is reduced, or alternatively a tighter radius can be achieved.

3 Pipe Connections

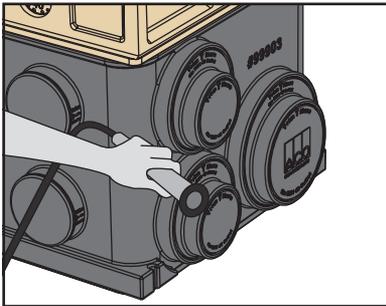
Removal of knockout, or cut hole:

1. Identify and mark area to be removed. (Bracing may be necessary).

2. Material removal:

Catch Basin - cut-out

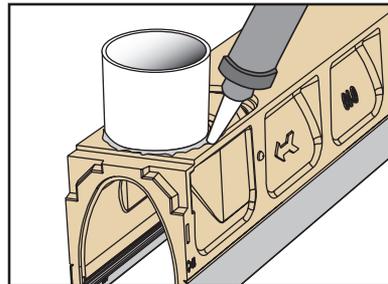
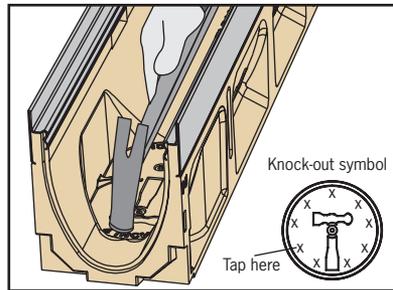
- Use cut-off tool, reciprocating saw or band saw to cut opening for required pipe size and location.



3. Attach outlet pipe using coupler, if required seal using appropriate sealant/adhesive. If corrosive liquids are transported in trench, ensure sealant or adhesive is chemically resistant.

Channel - knockout

- Stand channel upright holding outlet end in hand to absorb impact and prevent cracking. Using hammer, from inside of channel, carefully tap out required area following around inside of symbol.

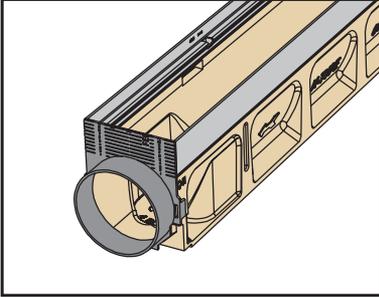


3. Use a grinder to dress or enlarge hole for proper pipe insertion.
4. A pipe may be fitted into hole using appropriate sealant/adhesive. If corrosive liquids are transported in trench, ensure sealant or adhesive is chemically resistant.

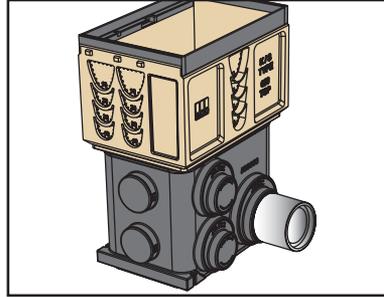
4 Connection with Underground Piping

Channels may be connected directly to underground piping via:

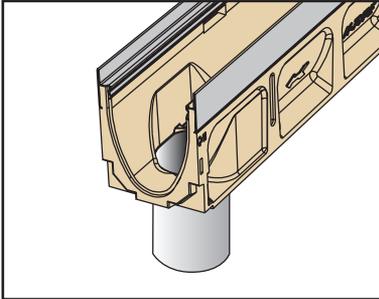
1. End cap outlets (horizontal outlet).



4. Catch basin.



2. Vertical knockouts (penetrations on underside of channel).



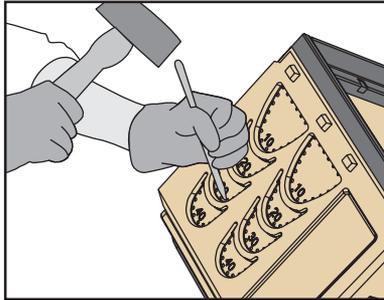
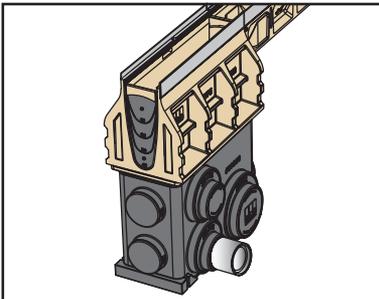
Connecting channels to catch basins

Catch basins have guides for channel connection at depths corresponding to invert level of designated channel units (10, 20, 30, 40).

In-line catch basins - cut out black end material at required channel height. Seal joint with flexible sealant. See page 15 for end blanking plate details, if required.

600 Series catch basins - stitch drill out polymer concrete panel (100 systems) or cut out black end material (200 systems) at required height. See page 15 for end blanking plate details, if required.

3. In-line catch basin.



5 Positioning of Channels

Start with outlet. Ensure string-line, or laser is set at top edge of required channel height.

Common methods of positioning channels include:

1. Patty Method
2. Hanging Method
3. Installation Device

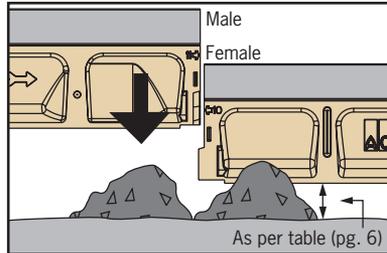
1. Patty Method

a) Set catch basin (or outlet channel) on bed of concrete to required height (see page 6 for concrete dimensions). Connect and seal outlet pipe.

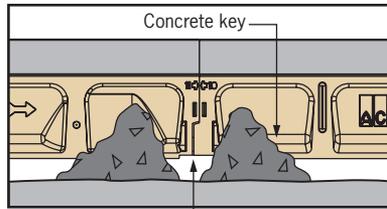
b) Using low slump concrete, create 'patties' at intervals to support channels. Allow two patties per channel, spaced such that no concrete material is trapped in joint, creating gaps.

Note: Patties should be sized to provide required concrete surround (see page 6).

c) If channels are to be sealed, roughen ends and use a flexible sealant - check chemical compatibility, if required.

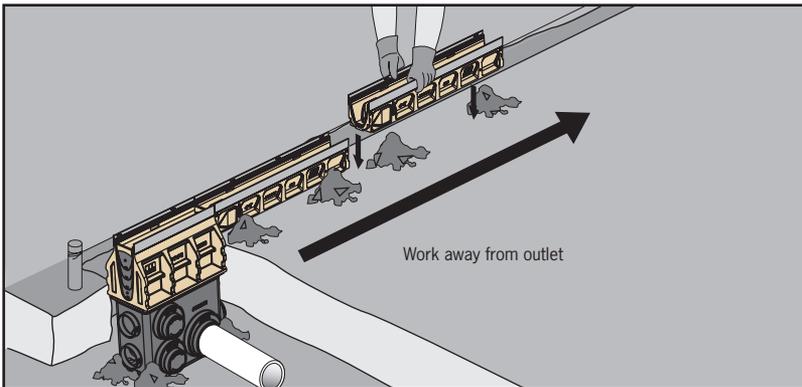


d) Lower channel vertically onto 'patties' and position to correct height and alignment ensuring 'tight' connection to previous channel.



e) Add concrete on top of 'patty' to cover concrete 'keys' on side of channel - this prevents movement, or floating, during concrete pour.

f) Continue to lay channels until end of run or next catch basin is reached.



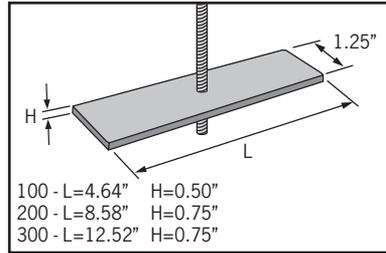
5 Positioning of Channels - Hanging Methods

Retrofit installations - use existing slab to anchor supports. Alternatively, form boards can also be used.

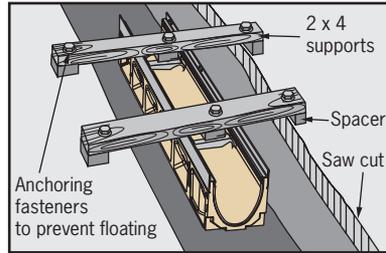
2.i Bolting Method - DrainLok/QuickLok

K100, K200, K300, H100, H100K, H200K, H300K will require a long threaded rod and cross bar to fit in the locking bar recesses.

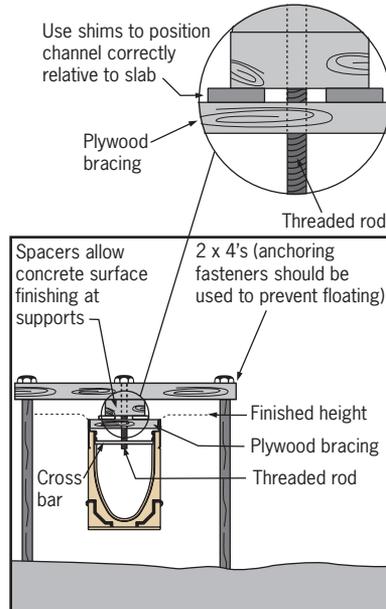
- Cut 2 x 4's to length to span excavated trench or form boards (minimum 2 per channel - K200 & K300 will require 3 - 4). Cut 'spacers' to 'lift' supports above finished level. Cut bracing to fit into grate rebate.
- Drill 5/8" diameter holes in the center of each 2 x 4 and spacer. Drill holes in center of bracing at 19.69" (500mm) centers to match locking positions.
- Tighten 5/16" x 18 threaded rod through center of each cross bar. Fit cross bars into channel recesses.
- Slide bracing, spacers and 2 x 4's over threaded rods.
- Lower channels into excavated trench, adjust to required position and height. Shims may be required beneath 2 x 4's to achieve required height and ensure channels are level.
- If channels are to be sealed, roughen ends and use a flexible sealant - check chemical compatibility, if required.
- Nail or anchor 2 x 4 supports securely to slab/form boards. This ensures channels are held securely during concrete pour.



Threaded rod and bar



Retrofit installation



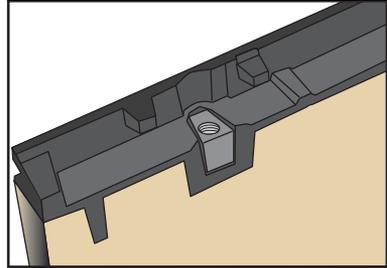
New installation

5 Positioning of Channels - Hanging Methods

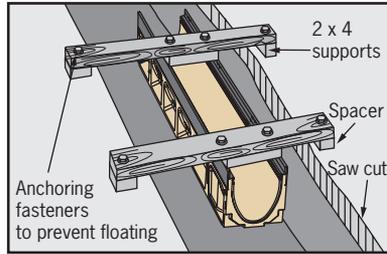
Retrofit installations - use existing slab to anchor supports. Alternatively, form boards can also be used.

2.ii Bolting Method - PowerLok
S100K, S200K, S300K, H100SK, H200SK, H300SK will require M10 - 1.5 x 120mm bolts to screw into widgets in edge rail of channel. This allows the bolt to pass through the spacers, 2 x 4's and into widget nut.

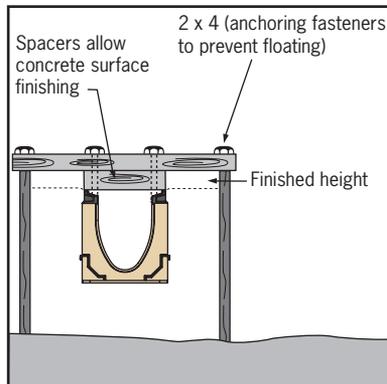
- a) Cut 2 x 4's to length to span excavated trench or form boards (minimum 2 per channel - S200K & S300K will require 3 - 4 per channel). Cut 'spacers' to 'lift' supports above finished level.
- b) Drill two 5/8" diameter holes in the 2 x 4's and spacers - width to match widgets in channel rail.
- c) Using M10 - 1.5 x 120mm bolts with washers, bolt 2 x 4 and spacer to channel - do not overtighten. If using torque wrench do not set higher than 15ft. lbs.
- d) Lower channels into excavated trench, adjust to required position and height. Packing material may be required beneath 2 x 4's to achieve required height and to ensure channels are level.
- e) If channels are to be sealed, roughen ends and use a flexible sealant - check chemical compatibility, if required.
- f) Nail or bolt 2 x 4 supports securely to slab/form boards. This ensures channels are held securely during concrete pour.



Widgets in edge rail



Retrofit installation



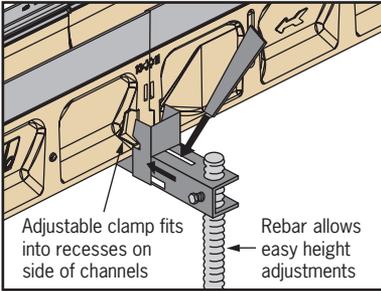
New installation

5 Positioning of Channels - Installation Devices

A clamping system that fits around the profiled end details is available to support the channel in place and allow a single pour if required.

Rebar is used to achieved correct height. One device per joint is required, including start and end of the run.

100, 200 & 300 wide versions available. Parts are supplied with a full detailed instruction sheet



1. Create required width template using timber sheet or similarly suitable rigid material. Diagrams can be printed from the ACO website. www.ACODrain.us/technical.html
2. Start at outlet. Drive #4 or #5 rebar into ground to hold three installation devices spaced using ACO template. Screw installation device to rebar at required height.
3. Set channels in position but do not lock into position until next channel is in place as this allows some flexibility and movement.
4. Move template and set rebar in place - always allow two sets of rebar to be installed before placing channels to enable template to be moved to next position.
5. When ready to lock channels in place, ensure channel is positioned such that the fixed clamp fits into recess in channel end.
6. Push adjustable clamp tight onto other side of channel.
7. Tap metal wedge into slot to lock adjustable clamp in place, locking channel joint closed.
5. Repeat for additional channels.
6. Check channels are at required level - adjust using screws on rebar.

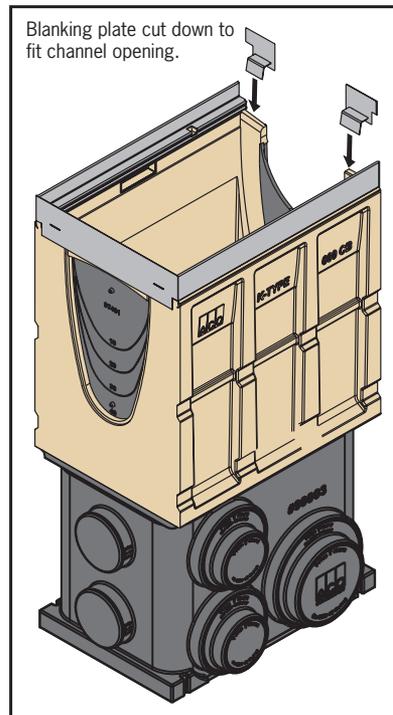
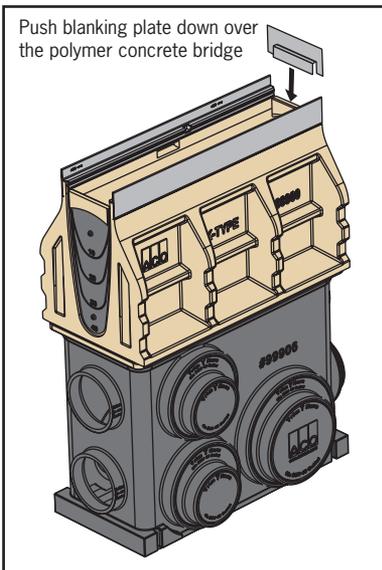
6 Catch Basin Blanking Plates

All in-line catch basin tops and the 200mm and 300mm wide 600 Series catch basin tops have open end rails to allow connection of channels both ends.

Blanking plates are supplied to prevent concrete ingress during the concrete pour when channel connection does not close end rail openings. Blanking plates match catch basin edge rail - galvanized, stainless, or coated black steel to match color of iron rails.

To close off the entire opening where no channel is connecting, simply push down over the polymer concrete bridge.

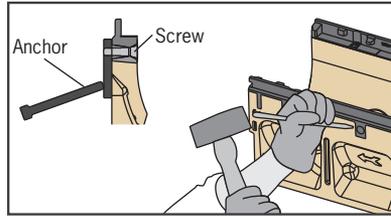
Where a channel is connecting into a Series 600 catch basin the blanking plate can be cut, removing the center where the channel connects.



7 Pouring Concrete

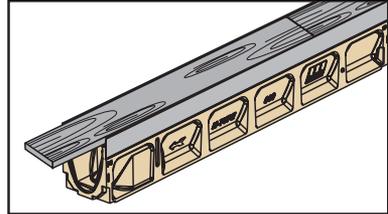
Channel Anchors

For Load class F applications, ACO recommends using the concrete anchors offered with PowerDrain. Metal anchors are attached through punched out hole in edge rail - see Technical Bulletin for details.

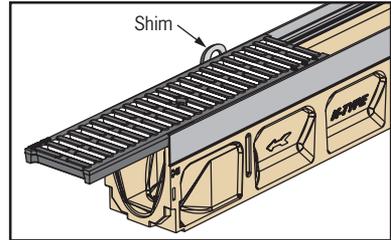


Channel Bracing

To prevent channel wall and joints from distortion by weight of concrete, grates or 3/4" plywood sections (cut to create a snug fit) should be placed in the grate rebate of channel.

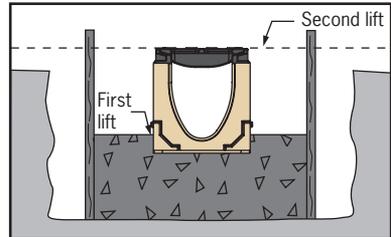


If grates are used, they should be suitably protected from concrete contamination during concreting (wrapped in plastic or masking tape) and should be laid to bridge channel joints to aid alignment. Shims (or washers) should be placed along one side to maintain a clearance gap.



Concrete Pour

If using closing/outlet end caps with channels 1-15 remove unused spigot to ensure sufficient concrete coverage.



To prevent concrete from filling channel body, cover open areas with plywood or similar. (Bracing should suffice).

Recommended that concrete have compressive strength of 4,000 psi.

If using hanging method, and channels are securely in position, first concrete lift should come approximately 2 inches (50mm) up sides of channels.

Concrete should be poured evenly (both sides of channel) and carefully to avoid dislodging channels. A wand type concrete vibrator should be used to ensure concrete distributes evenly around channels.

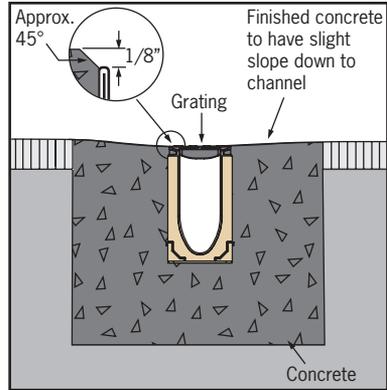
Once first lift has hardened, remaining concrete surround can be poured.

If 'cold joints' are a concern, **engineering advice should be sought** to determine single pour procedure.

8 Pavement Finishing - Concrete

To finish installation, trowel concrete flat and taper down to channel edge. The top of adjacent pavement must be above the grate level (approximately 1/8"), this ensures all liquids drain into the channel.

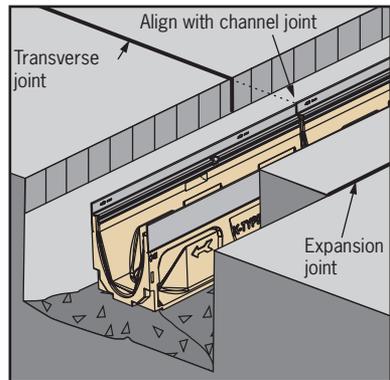
Once concrete has cured 24 hours, remove bracing and/or grate protection. Fit grates - see page 19/21.



Expansion joints

Transverse joints (perpendicular to the channel) are required to prevent surface cracking in the slab. Such joints should be positioned at channel joints to prevent channels from cracking. If such spacing is not possible, a cut must be made at the appropriate location through the channel and sealed with flexible sealant.

Longitudinal expansion/isolation joints should be continuous and flexible. They must be provided between the concrete surround and surrounding slab and may be varied to suit concrete surround width by up to a meter (3 feet) from the channel.



If the joint is dowelled, debonding should be provided. **ACO recommends seeking engineering advice.**

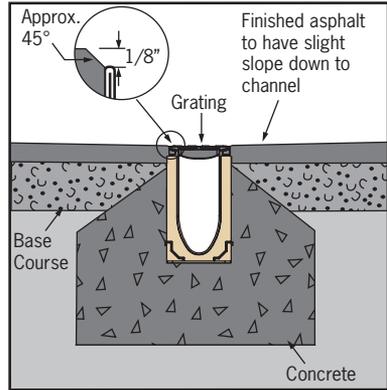
8

Pavement Finishing - Asphalt

For applications where asphalt can be applied directly up to channel edge, see appropriate channel/installation detail. ACO recommends for applications over Class C a full concrete surround be used. See page 6 for concrete haunch details.

CAUTION: To prevent damage to channels and grates, protect channel between concrete pour and application of asphalt and when rolling asphalt.

Asphalt must be above grate level by approximately 1/8", this ensures all liquids drain into channel.



Once pavement is finished, remove bracing and/or grate protection. Fit grates - see pages 19/21.

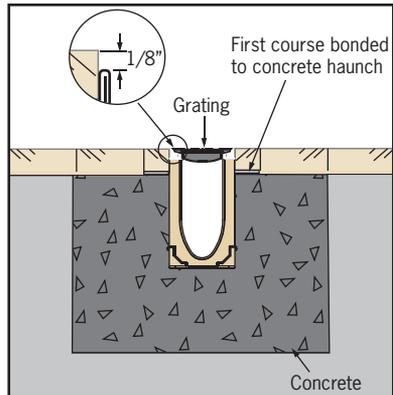
Pavement Finishing - Brick Pavers

For applications where brick pavers can be installed directly up to channel edge, see appropriate channel/installation detail. ACO recommends for applications over Class C a full concrete surround be used. See page 6 for concrete haunch details.

Brick pavers adjacent to channel **MUST** be fully bonded to concrete haunch. This prevents movement of bricks and possible damage to channel. Subsequent pavers can be bedded on compacted sand.

Bricks must be above grate level by approximately 1/8", this ensures all liquids drain into channel.

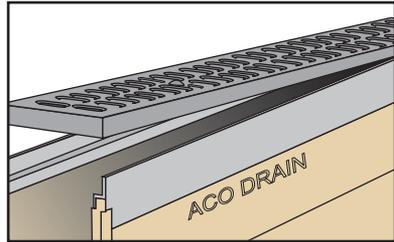
Once pavement is finished, remove bracing and/or grate protection. Fit grates - see pages 19/21.



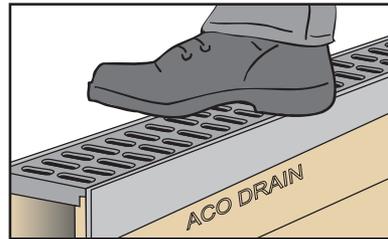
9 Fitting/Removing Grates

DrainLok Grates

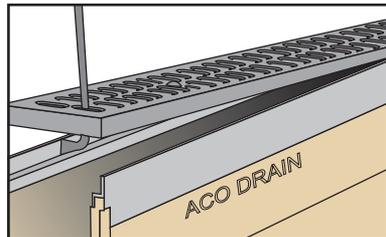
1. DrainLok does not require a locking bar - clips in the grate fit into recesses in the steel edge rail to hold grates securely in place.



2. To install grate, align clips in underside of grate with recesses in edge rail. Push down/stand on grate until clicks into position.



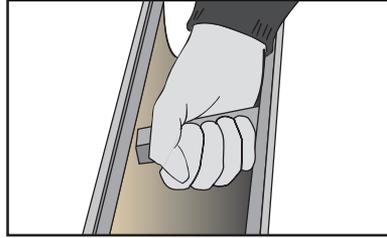
3. To remove first grate, insert removal tool under grate bar, pull up sharply. Subsequent grates can be removed by hand - Grip end of grate and lift sharply.



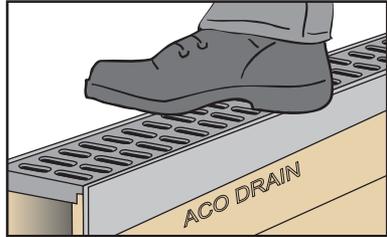
9 Fitting/Removing Grates

QuickLok Grates

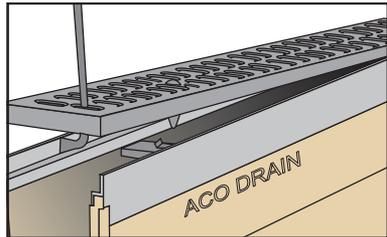
1. Fit QuickLok bar in channel wall recesses by rotating clockwise.
K100 - Use hammer to tap into place, so that serrated ends grip in recess.
K200/K300 - Use plastic safety clip to hold bar in place.



2. To install grate, align stud directly over locking bar. Push down/stand on grate until clicks into position.



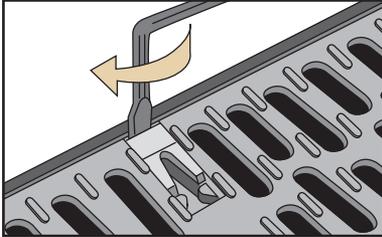
3. To remove first grate, insert removal tool under grate bar, pull up sharply. Subsequent grates can be removed by hand - Grip end of grate and lift sharply.
4. To remove K100 bar, insert screwdriver into hole at end of bar - lever back serrated section to loosen. K200/K300 - remove plastic clip to remove bar.



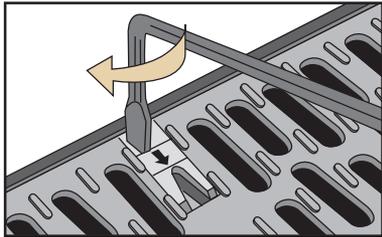
9 Fit/Remove Grates

PowerLok Grates

1. **To unlock:** Slip flat end of grate removal tool into the slot between PowerLok mechanism and edge rail as shown.

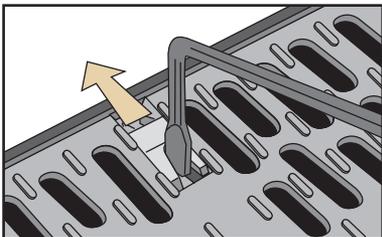


2. Rotate through 90° until lock mechanism slides across and clicks open.



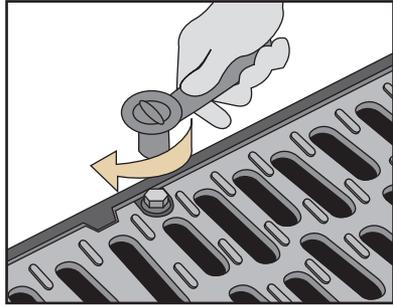
3. To remove grates, insert removal tool under grate bar and lift first grate out, sliding from beneath anti-shunt lugs. Once unlocked, other grates can be removed by hand (use gloves).

4. **To lock:** Fit one side of grate under lugs in rail and lower into position. Use hook on removal tool to push clip back to closed position, and click is heard.



PowerDrain Bolted Grates

1. **To lock:** Fit one side of grate under lugs in rail and lower into position. Align bolt into hole and use wrench or socket set to tighten. If using torque wrench, do not set to more than 15ft lbs.



2. **To unlock:** use wrench or socket set to loosen/remove bolts. Use grate removal tool to lift first grate, sliding from beneath anti-shunt lugs. Once unbolted, other grates can be removed by hand (use gloves).

10 Final Inspections & Maintenance

Final Inspections

1. Remove any debris in system and grate rebate. Ensure outlet pipes are clear.
2. Install trash buckets in catch basins, if required.
3. Flush trench run to check for pipe work blockages, unblock if necessary.
4. Empty trash buckets and clean out pipe connections, if necessary. Replace trash buckets.
5. Install grates in proper position ensuring they are securely locked down (page 19/21).

Drainage system is now ready for use.

Grate oxidation

Grates are supplied with a temporary protective coating that will eventually wear off.

Regular traffic will buff iron grate surfaces to a smooth, dark finish.

Grates that are not regularly trafficked will oxidize unless regularly painted. This oxidization is only on the surface and only affect the aesthetics, not the performance, of the grates.

Maintenance

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

Inspections should cover:

- Grates and locking devices
- Catch basins and trash buckets
- Concrete surround and adjacent paving

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

1. Remove grates - see page 19/21.
2. Remove debris from channel.
3. Flush channels with water or high pressure washer.
4. Repair damaged surfaces, if necessary, with an appropriate ACO repair kit.
5. Renew joint seals as required.
6. Empty trash buckets and clean out pipe connections.
7. Re-install trash buckets.
8. Re-install grates, ensuring they are locked in place.

Systems with grates that have wide slots may be cleaned with the use of pressured water applied through the grate - debris will be washed to catch basin for removal. (Empty and replace trash bucket).

