

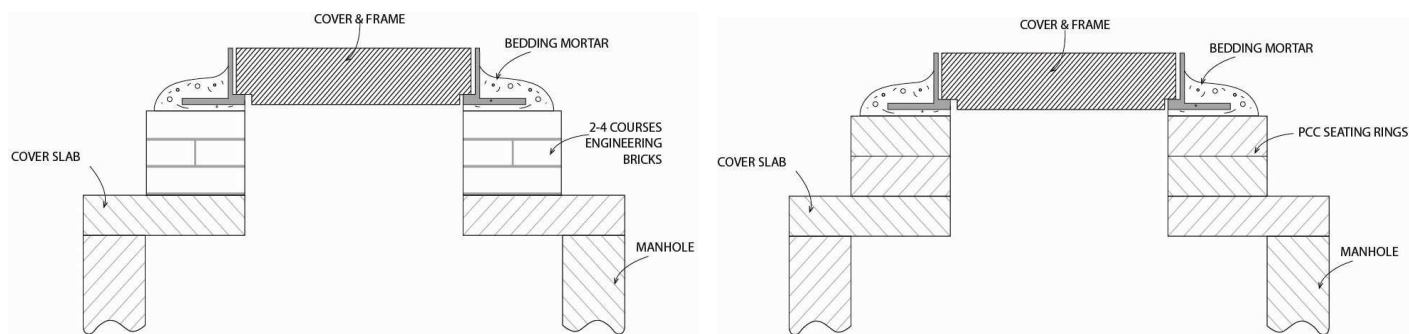
Clark-Drain D400 Ductile Iron Manhole Cover & Gully Grate Installation Guidelines

General advice:

1. Before commencing works, ensure that the correct Clark-Drain product has been chosen in terms of:
 - a. Clear-Opening size (measure *before* ordering)
 - b. Depth
 - c. Loading class
 - d. Specification (non-Carriageway, Carriageway or High-Max specification)
2. Manhole cover and gully grate replacement/installation should only be attempted by qualified and experienced contractors. If in doubt, seek advice.
3. The placement of manhole covers and gully grates directly onto a concrete 'biscuit' (i.e. without bedding mortar) is not recommended.
4. Exposed ironworks are vulnerable to damage by vehicles so should be protected at all times and not trafficked until such time as the final road course has been laid and all construction works has been completed. Ensure that ironworks are not directly trafficked by site construction machinery or vehicles at any time.
5. The orientation of hinged gully grates in their frames should be checked in accordance with intended traffic flow direction and corrected if needed before installation (all Clark-Drain gully grates are marked with an arrow and "Traffic Flow" to indicate correct installation orientation).
6. Please note that the bitumen painted coating used on all Clark-Drain ductile iron products is a temporary coating only and is intended to wear off quickly once the product is being trafficked. Any surface oxidization of the iron that occurs has no detrimental effect upon the product's strength or its performance in service.

For New Installations:

Ensure the general work area is as clean as possible and free from debris. The manhole cover or gully grate frame should be placed on top of a layer of bedding mortar, which in turn is laid on top of 2-4 courses of 'blue' or 'red' *solid* engineering bricks or pre-cast concrete seating rings, as per the diagrams below:



The bedding layer material may be of a conventional cementitious/mortar type with a minimum compressive strength of 21N/mm^2 in 2 hours, but for faster results mortar complying to HD27/04 (compressive strength of 22N/mm^2 within 1 hour) can be used. For areas where extra strength is required, such as fast-moving or heavily trafficked roads, a thermosetting polymer resin based or cement based bedding mortar complying to HA104/09 (Tensile strength of $>5\text{N/mm}^2$ at 3 hours) should be used. Please note that resin-based mortars should only be used in dry conditions; in wet conditions the performance and durability of such mortars is affected dramatically. In all cases mixing should be carried out mechanically to ensure a thorough and consistent mix, and it is highly recommended that mixed batches of mortar are no greater than can be used in the time before the material starts to set. Always follow the manufacturer's instructions when mixing mortar, taking note of any PPE required when handling (gloves, goggles, etc.). Do not 'guess' the amount of water required for cementitious mortars, measure accurately as incorrect amounts can affect performance and durability significantly. Please note that the performance of such bedding materials is severely affected if the mating surfaces are not clean and dry. Any unused mortar should be disposed of appropriately according to COSHH regulations.

The bedding material should be placed as soon as it is mixed, at a depth approximately 5-6mm greater than the required bedding thickness, and across the full width of the brick or concrete bedding area. The top surface of the mortar should be smooth and even, with no deep trowel marks.

The frame should then be placed as soon as possible, having been separated from its covers/grate and using mechanical lifting aids where appropriate, onto the bedding layer such that it is fully supported around the full perimeter of the frame flange and there are no voids at any point. The frame can then be tamped down to the required level, using surrounding road surfaces or other height markers as guides. Take care to ensure that the top edge of the frame is level with the intended final road surface, as failure to do so will result in excessive noise in service and/or potentially early failure of the manhole cover/gully grate. Ensure that bedding material is not obstructing the cover seatings, cleaning off excess material where needed.

Any holes in the frame flange should be filled with bedding material and the top face of the flange should be then covered in at least 10mm of the same. More may be added, if desired, to use up excess bedding material as long as it will not affect the placement of any subsequent surfacing courses. Clean up any exposed areas of bedding material on the *inside* of the frame by pointing to a smooth finish.

The covers/grate should not be placed into their frame until such time as the bedding has achieved full cure. When doing so, use mechanical lifting aids where appropriate. Surrounding surface courses can be laid only when the bedding has achieved full cure. The use of bitumen-based sealant/tack spray between the vertical face of the manhole cover frame and surrounding tarmac is highly recommended.

Do not allow the product to be trafficked in any way until the final tarmac road course is laid and cured. Failure to follow this advice could result in damage to the manhole cover/gully grate.

For Replacement Installations:

Before commencing work, remove the existing covers from their frame and inspect the chamber below to assess size and condition. Do not commence work until it is assured that the correct-sized replacement manhole cover plus all tools and materials to affect any necessary chamber repairs have been brought to site.

Start by using a disk-cutter to cut a 'picture frame' around the manhole cover that is to be replaced that is at least 300mm larger than the visible size of the existing manhole cover. Excavate around the existing manhole cover to remove all old material, taking care not to damage the chamber below when doing so. Remove the existing covers from the frame then the frame itself. Remove all old bedding materials using hand-tools only. Inspect the existing chamber top (brick or pre-cast concrete) for signs of damage or failure and repair as needed. When replacing engineering bricks use 'red' or 'blue' *solid* types. The same bedding mortar that will be used for the new manhole cover can be used for replacing engineering bricks.

The bedding layer material may be of a conventional cementitious/mortar type with a minimum compressive strength of 21N/mm^2 in 2 hours, but for faster results mortar complying to HD27/04 (compressive strength of 22N/mm^2 within 1 hour) can be used. For areas where extra strength is required, such as fast-moving or heavily trafficked roads, a thermosetting polymer resin based or cement based bedding mortar complying to HA104/09 (Tensile strength of $>5\text{N/mm}^2$ at 3 hours) should be used. Please note that resin-based mortars should only be used in dry conditions; in wet conditions the performance and durability of such mortars is affected dramatically. In all cases mixing should be carried out mechanically to ensure a thorough and consistent mix, and it is highly recommended that mixed batches of mortar are no greater than can be used in the time before the material starts to set. Always follow the manufacturer's instructions when mixing mortar, taking note of any PPE required when handling (gloves, goggles, etc.). Do not 'guess' the amount of water required for cementitious mortars, measure accurately as incorrect amounts can affect performance and durability significantly. Please note that the performance of such bedding materials is severely affected if the mating surfaces are not clean and dry. Any unused mortar should be disposed of appropriately according to COSHH regulations.

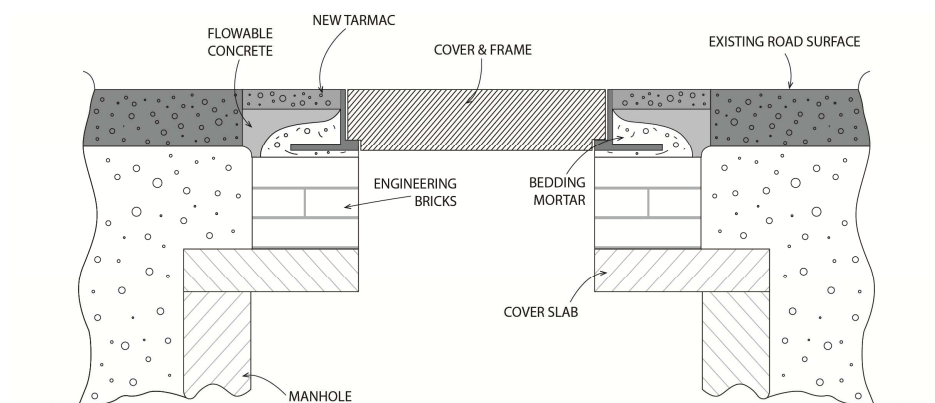
The bedding material should be placed as soon as it is mixed, at a depth approximately 5-6mm greater than the required bedding thickness, and across the full width of the brick or concrete bedding area. The top surface of the mortar should be smooth and even, with no deep trowel marks.

The frame should then be placed as soon as possible, having been separated from its covers/grate and using mechanical lifting aids where appropriate, onto the bedding layer such that it is fully supported around the full perimeter of the frame flange and there are no voids at any point. The frame can then be tamped down to the required level, using surrounding road surfaces or other height markers as guides. Take care to ensure that the top edge of the frame is level with the existing road surface, as failure to do so will result in excessive noise in service and/or potentially early failure of the manhole cover/gully grate. Ensure that bedding material is not obstructing the cover seatings, cleaning off excess material where needed.

Any holes in the frame flange should be filled with bedding material and the top face of the flange should be then covered in at least 10mm of the same. More may be added, if desired, to use up excess bedding material as long as it will not affect the placement of any subsequent surfacing courses. Clean up any exposed areas of bedding material on the *inside* of the frame by pointing to a smooth finish.

The use of a flowable concrete to surround the new frame and create a strong concrete ring is strongly recommended. A product that achieves a compressive strength of at least 20N/mm^2 in 2 hours should be used. Mix and pour according to the manufacturer's instructions to a depth of at least 60mm, but ensuring that a depth of at least 40mm remains to the top road surface to allow for tarmac. Once the flowable mortar has cured the final layer of tarmac can be laid and compacted, although the use of bitumen-based sealant/tack spray between the vertical face of the manhole cover frame and surrounding tarmac is highly recommended before doing so. Ensure that the newly-laid tarmac is well compacted and that any loose debris is cleared away. Ensure that the top edge of the manhole cover frame is not proud of the tarmac and hence exposed to impact from passing traffic as this will damage and shorten the life of the product considerably.

The finished result should be as per the diagram below:



This document is provided as guidance only – if in any doubt, consult an experienced professional contractor for further advice before commencing works.