

# Clark-Drain B125, C250, D400, E600 and F900 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 (B125, C250, D400, E600 or F900)
  - d. Specification (e.g.DMRB CD 534-compliant, PSRV value, etc)
2. **For D400 manhole cover products, ensure the correct specification (non-Carriageway, Carriageway or High-Max specification) has been chosen/sourced.**
3. Manhole cover and gully grate replacement/installation should only be attempted by qualified and experienced contractors. If in doubt, seek advice.
4. The placement of manhole covers and gully grates directly onto a concrete 'biscuit' (i.e. without bedding mortar) is not recommended.
5. Exposed ironworks are vulnerable to damage by vehicles so should be protected at all times and not trafficked while they are proud of the surrounding surface. Ideally, manhole covers and gully grates should not be 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.
6. 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).
7. Covers and grates should not be mixed & matched from one frame to another; doing so will have a detrimental effect on product performance.
8. 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.

## Bedding Mortar:

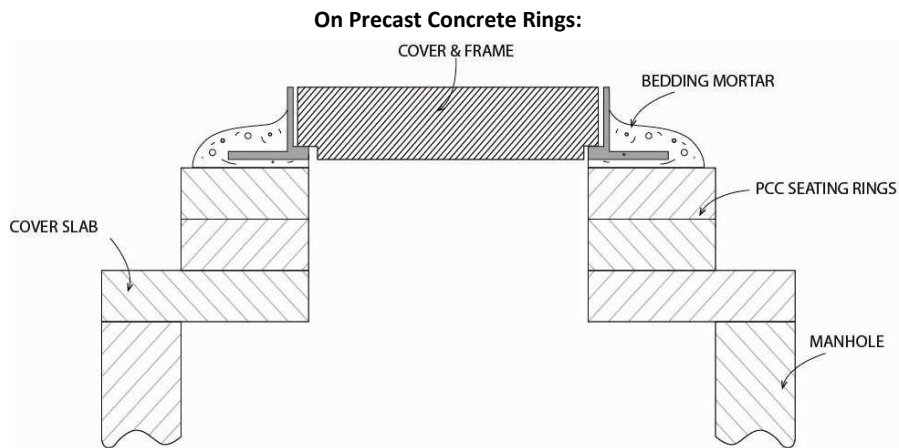
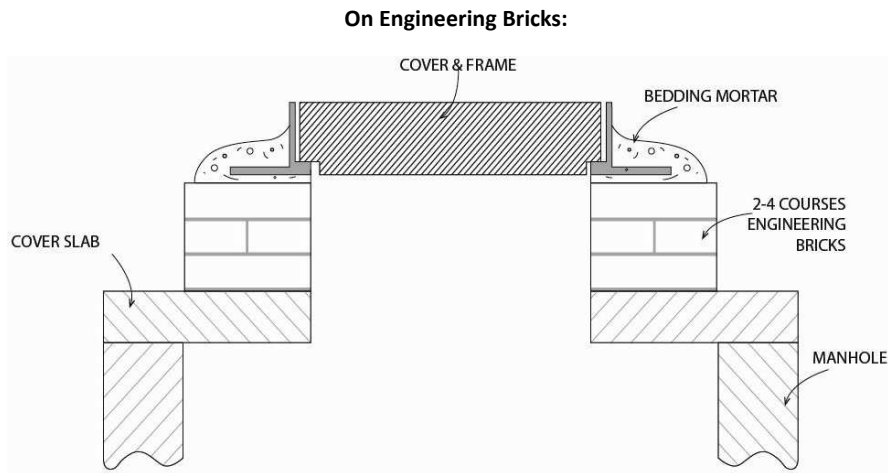
Whether carrying out a new or replacement installation the use of proprietary purpose-specific bedding mortar, such as those offered in the Instarmac Ultra-Crete range, is strongly recommended. Mixing up mortar on-site with an assumed sand/cement ratio is not recommended and likely to lead to early manhole failure. Two types of bedding mortar are recommended, depending on use:

1. For general purpose installations in slow-moving (20mph or less) infrequently-trafficked areas a conventional cement-based mortar with a minimum compressive strength of 21N/mm<sup>2</sup> in 2 hours, such as Instarmac's M90 All Purpose Fast Set Mortar, should be used. For faster results a product such as Instarmac's M60 Rapid Strength Bedding Mortar (24N/mm<sup>2</sup> compressive strength in 1 hour) can be used.
2. For areas of fast-moving (above 20mph) and/or heavily trafficked (greater than 1500 vehicles per day) roads, or where bedding mortar compliant to the requirements of DMRB CD534 has been specified, a cement-based or thermosetting polymer resin based bedding mortar complying to DMRB CD 534 (Tensile strength of >5N/mm<sup>2</sup> at 3 hours), such as Instarmac's Envirobed DMRB CD534 High Performance Bedding Mortar or PY4 Polyester Resin System, 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 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.

### **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 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/gully grate frame and surrounding tarmac is strongly recommended.

Do not allow the manhole cover/gully grate to be trafficked in any way until all bedding materials used have fully cured or while the manhole cover/gully grate is proud the surrounding road surface. Ideally, the manhole cover/gully grate should not be trafficked until the final road course is laid. Failure to follow this advice will result in irreparable 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 or gully grate 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/gully grate that is at least 300mm wide all the way around of the existing manhole cover/gully grate. Excavate around the existing manhole cover/gully grate 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/gully grate can be used for replacing engineering bricks.

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.

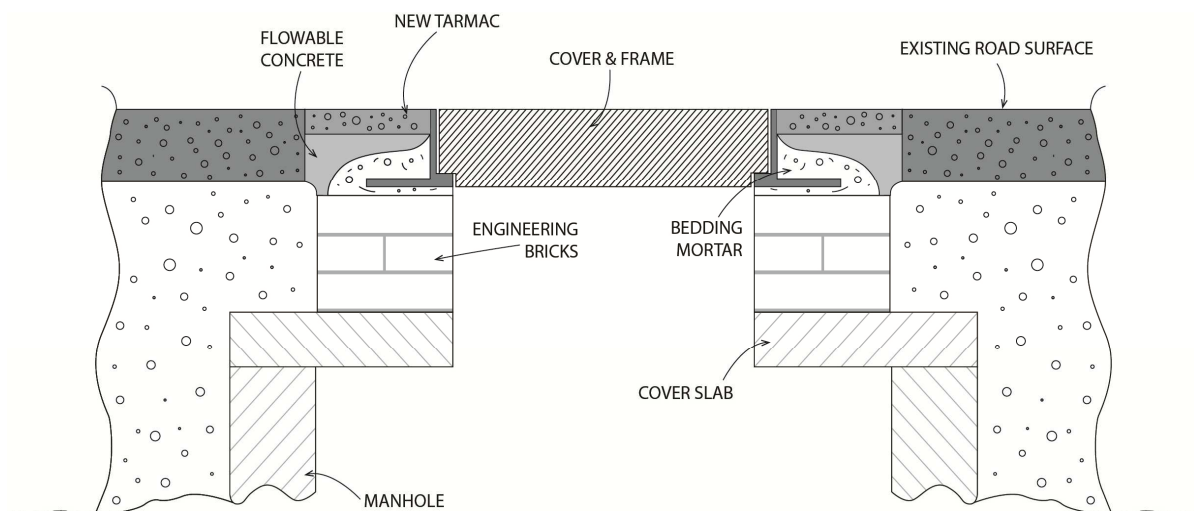
The frame should then be placed as soon as possible, having been separated from its covers/grate and using mechanical lifting aids where appropriate, onto the bedding layer such that it is fully supported around the full perimeter of the frame flange and there are no voids at any point. The frame can 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<sup>2</sup> in 2 hours, such as Instarmac's QC10F Rapid Set Flowable Concrete, 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/gully grate frame and surrounding tarmac is strongly 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/gully grate 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 manhole cover/gully grate considerably. Do not allow the manhole cover/gully grate to be trafficked until such time as all materials have fully cured.

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.***