



# Section 6

Installation



# Cover, grating & surface box

## Reinstatement at existing site

### Site assessment

#### Stage 1

Before beginning any reinstatement work it is recommended that a site assessment is carried out. This can often save considerable time on site through improved planning. The assessment should identify:

1. Type of reinstatement required
2. Whether or not a new cover or grating is required. If a new unit is required then the size and type of unit should be identified. This should include the frame depth of the existing unit as it is quicker and more cost effective to replace the old unit with one of equivalent frame depth. This will save having to build up the chamber in order to bring the cover to road height
3. The extent of work required. This should include any repairs required to the brick chamber, the urgency of the work required, whether a short-term emergency repair is required and an estimate of how long the work will take.

### Material selection

#### Stage 2

There are currently many different bedding materials available in the market place. The factors governing the choice of material are:

- Long-term strength properties
- Resistance to shrinkage
- Optimum working properties
- Early site opening
- Consistency of performance.

To meet all of the necessary requirements Saint-Gobain PAM UK recommends the use of LTS Polyester Resin Manhole Bedding Mortar. This recommendation arises from a three year research programme in conjunction with Nottingham University, Scott Wilson Pavement Engineering Ltd and the Department for Transport (DfT), to investigate the premature failure of road ironwork installations.

The research revealed that the main cause of premature failure was the cracking of the bedding material, causing the ironwork to become loose. In order to remedy this problem, a greater understanding of the load transfer mechanism, and the interaction between the ironwork, mortar and surrounding ground was first developed.

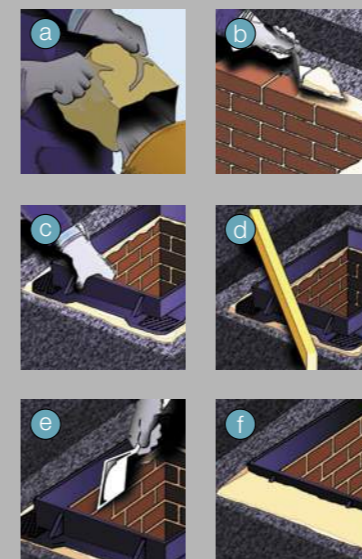
From this the revised performance specifications were defined.



#### Preparation Stage 3



#### Installation Stage 4



# Cover, grating & surface box

## Preparation

### Stage 3

#### a. Excavate ironwork

Remove old ironwork ensuring that all cracked asphalt is removed from surrounding area.

#### b. Clear and repair brickwork

Clear brickwork of all debris and old bedding material. Check the access chamber for loose brickwork and crumbling mortar. Replace any loose bricks and repoint as necessary. Check that the access frame will seat evenly.

When installing access covers with a 100mm deep frame, rebuild the brickwork chamber to a minimum level of 115mm below the carriageway surface using at least Class B engineering bricks (165mm below surface using 150mm deep frame). Any bricks used should have a compressive strength of not less than 20N/mm<sup>2</sup>.

## Installation

### Stage 4

#### a. Mix material

Material is pre-blended in controlled quantities. Pour the liquid polyester resin into a suitable container followed by the powder hardener component. Using a mechanical mixer ensure that the material is thoroughly mixed (wetted).

#### b. Bedding layer

Place layer of bedding mortar on brickwork approximately 25mm to 40mm in depth. Ensure that enough coverage is available to make contact with the entire flange of the casting.

#### c. Seat casting

Position casting frame over the access chamber and tamp down to ensure that the mortar keys to the casting. For optimum performance units are designed to be supported under the entire flange area, up to the edge of the clear opening. Failure to provide bedding over this area will detrimentally affect the performance and longevity of the unit.

#### d. Level casting

Ensure that the casting is level with the road surface by placing a straight edge across the corners of the casting onto the road. The frame can be made level by tamping the frame into the bedding material.

#### e. Check gaps under flange

Ensure that there are no visible gaps under the flange and smooth bedding material with trowel both inside and outside of chamber.

#### f. Envelope flange

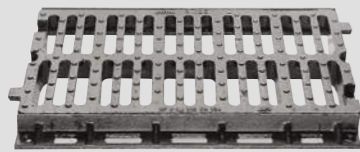
Use the remaining mortar to envelope the flange, paying particular attention to the corner areas. Smooth out the mortar with a trowel to ensure good bonding with the casting and to avoid any initial cracks in the bedding material.

#### g. Backfill

Check that the bedding material has hardened, then backfill with asphalt. Ensure that the asphalt is properly compacted.

#### Installation in new roads

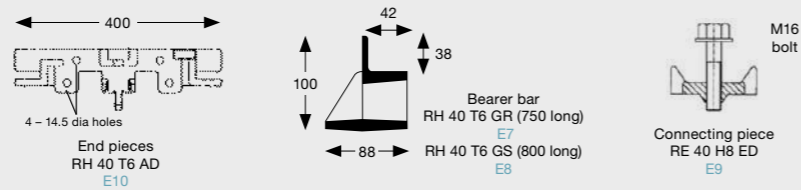
When installing covers in new roads, where the road surface has not yet been applied, embedment is made easier. Simply follow Stage 2: Material selection and Stage 4: Installation.



# Channel grating

## Translinea installation

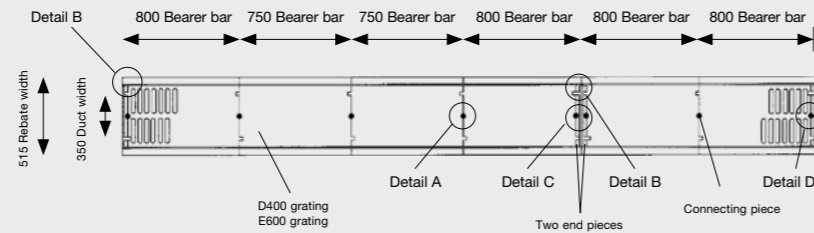
### Components



### Installation

Translinea grates should be installed using the specifically designed bearer bars and with the gratings joined together using the connecting pieces.

Translinea grates should be connected to both the frame and to each other in heavily trafficked and high security areas and cross carriageway locations at least every fourth grating (see detail C).

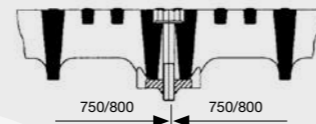


### Important notice

In all areas where there is extensive manoeuvring of HGV's or other heavy vehicles, (for example in docks, loading yards, HGV parking areas), consideration should be given to bolting down every three or four gratings. If other types of 'T' section or angle section frames are used it must be ensured that their dimensions, security and embedment are suitable for the loading and stresses to which they will be subjected.

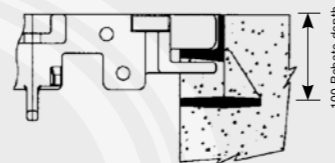
### Detail A

Grating connected to grating.



### Detail B

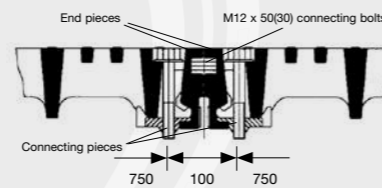
Interlocking of bearer bar and end piece.



### Detail C

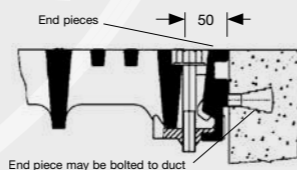
Grating connected to grating using two end pieces.

Use every fourth grating for heavy traffic and high security situations.



### Detail D

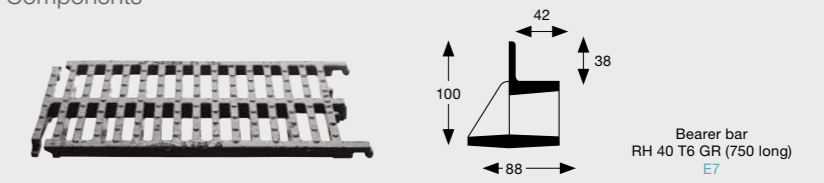
Grating and end piece.



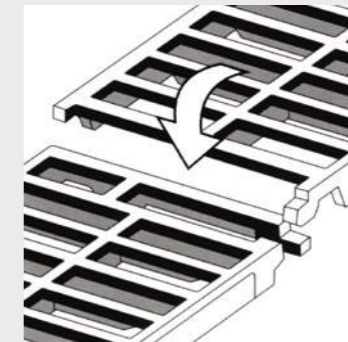
# Channel grating

## Autolinea installation

### Components



### Installation and operation



### Simple

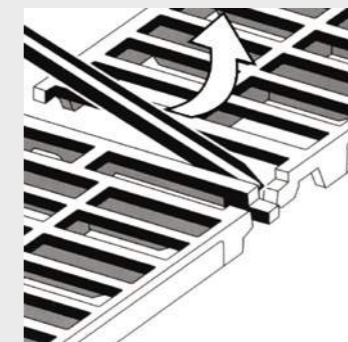
Easy to install. Gratings are simply snapped into place through a ductile spring lock. With Autolinea, no accessories are needed.



### Safe

Autolinea provides safety in service:

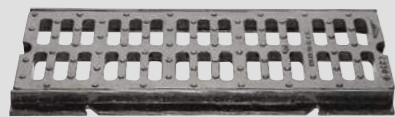
- No danger of accidental displacement
- Limited vandalism
- Anti-dilation effects.



### Quick

Removal by professionals is instantaneous, using a crowbar as a lever.

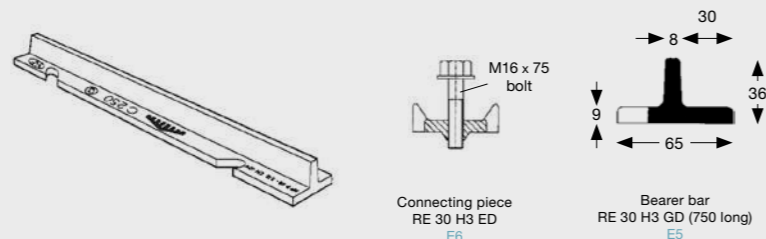
Autolinea is suitable for use at the side of highways carrying intense traffic. It should not be used in areas subject to cross traffic manoeuvring vehicles.



## Channel grating

### Mecalinea installation

#### Components



#### Installation

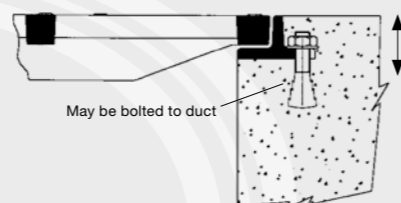
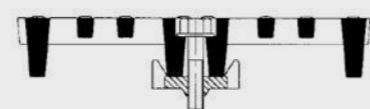
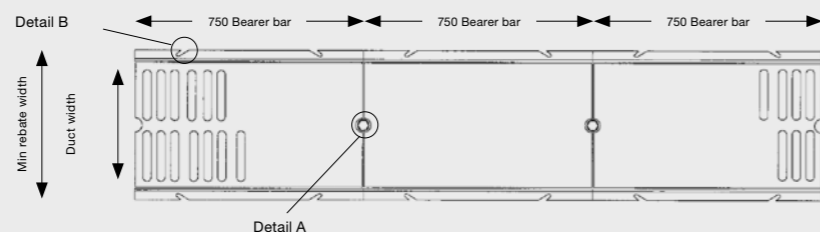
Mecalinea grates should preferably be installed using the specially designed bearer bars and with the gratings joined together using the connecting pieces where used in cross traffic areas. Typical layout for heavy use and areas subject to slow-moving traffic.

#### Detail A

Grating connected to grating (must be used if subject to cross traffic).

#### Detail B

Bearer bar seating.



## Recommended bedding mortar

Failure of the cementitious bedding mortar was found to be a principal cause of failure of road ironwork installations. Cracking of bedding material caused the ironwork to become loose. Cracking occurred due to a number of factors:

- Shrinkage of the mortar during installation
- Mortar having insufficient strength. Both compressive and tensile strain is built up during loading
- Installation opened to traffic too early
- Differential stiffness between the access chamber and the surrounding road
- Movement of the frame and flange of the casting under dynamic loading
- Failure of the bond/adhesion between the casting and mortar giving rise to separation.

An understanding of the behaviour of the ironwork under loading and the subsequent load transfer was developed along with the quantification of the strength (compressive and tensile) requirements of a bedding material.

Saint-Gobain PAM's engineers in collaboration with Weber SBD (manufacturers of specialist construction mortars) have developed the LTS feature, designed to increase the long-term performance of an ironwork installation. This includes LTS Polyester resin manhole bedding mortar which has been purpose-designed to provide:

- Long-term strength
- Resistance to shrinkage
- Long-term durability
- Optimum workable properties
- Early site opening
- Consistency of performance.

Used in combination with products that incorporate the LTS frame design feature, the polyester resin manhole bedding mortar will reduce the incidence of premature failure and improve the long-term performance of an ironwork installation.

### Strength properties

The Nottingham University research identified and quantified the required strength to withstand the dynamic loading of a vehicle wheel. LTS bedding mortar exceeds this performance level in both compression and tensile load.

### Optimum workable properties

Ease of installation is an important element in ensuring good site practice. The bedding mortar has been designed to allow enough working time to set the access cover and a 'slump' to give easy manipulation during bedding preparation.

### Durability

Resistance is excellent to environmental conditions found in the highway. The mortar is resistant to the action of frost. It will not react chemically with de-icing salts. It has a low permeability which prevents damage to ironwork by chloride ingress.