

IMPLEMENTATION SPECIFICATION FOR ROAD **WORKS**

SERIES IM/550 (IMPLEMENTATION) **REPAIR OF FAILED CHAMBER SURFACING AND** **IRONWORKS**



*This Specification Series implements the requirements in
Subsidiary Legislation 499.57, Part II (New Roads and Road
Works Regulations) in accordance with the Agency for
Infrastructure Malta ACT XXVIII, CAP. 588, Part I*

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550 Introduction

- 1 This Series is part of the Specification for Road Works. Whilst this Series is particularly relevant to the subject matter in its title it must be read in conjunction with the general requirements in Series 000 and 100 and with other Series relevant to the specification of the particular works to be undertaken.

551 Scope of Application

- 1 This Series is applicable to all chambers (chambers, manholes, gullies) positioned in the trafficked section of the carriageway.

552 Reference Standard

- 1 The reference standard shall be the UK DMRB, CD 534 Chamber Tops and Gully Tops for Road Drainage and Services

553 Safety and Health Risks

- 1 Operatives opening and entering chambers (especially manholes) should ensure they act in accordance with the current Health and Safety Regulations relevant to working in confined spaces and in the presence of hazardous gaseous vapour and contamination.
- 2 Sewer chambers require the authorization of the Water Services Corporation prior to opening and access and may require the Corporation's direct supervision. Particular care must be taken to avoid damaging any apparatus, pipes or cables when opening, entering or leaving the chamber (manhole).

554 Chamber Inspection

- 1 The chamber shall be opened and inspected from the inside to ascertain the structural integrity of the foundations, walls, reducer slab (if any) and ironworks.
- 1 The inspection shall include a visual check of the following:
 - a) the correct loading category for the road traffic class (EN 124-1 and EN 124-2);
 - b) the integrity of ironworks seals (if any);
 - c) the integrity of fit of the cover and frame;
 - d) the "non-rocking" condition;
 - e) the structural integrity of the chamber base, benching and walls – checking for cracks, settlement, jointing loss, rendering failure, watertightness (leaks), pipe entries / exits;
 - f) the structural integrity of the chamber concrete reducer cover slab (where installed);

555 Chamber Intervention Works for Failed Surfacing and Ironworks

1 The following shall apply:

- a) Marking of the failed chamber perimeter comprising the extent of the required intervention.
- b) Saw cutting through the full depth of the bound layers of pavement of the marked area perimeter surface. These cuts must be located at a minimum distance of 250 mm away from the estimated outside edges of the frame. If any cracks or signs of failure in the pavement materials extend beyond this distance, the cut positions should be adjusted such that they are at least 100 mm beyond the extent of any such cracking.
- c) Excavation and removal of material between the position of the cut and the frame to reveal the frame, the frame support mortar and the chamber frame surround area up to the outer cut edges;
- d) Extraction and removal of the manhole cover and frame (including temporary storage if approved for re-use);
- e) Removal of all infill, bedding and packing material and cleaning from debris and loose materials; Fine-trimming and regulating of the excavated area. The regulating shall
- f) be executed using proprietary bedding mortar as specified hereunder. Where structural failure has occurred removal of the topmost part of the chamber support wall to a minimum depth of 205mm. Installation of formwork and reinstatement with C25/30 concrete to the required fine-level ready for the mortar bedding under the chamber frame.
- g) Inspection of the frame and cover for integrity and fitness for re-use. If defective the complete frame and cover units must be replaced using new approved units. The use of new covers in old frames shall not be permitted.
- h) Initial levelling check of the frame to ensure it corresponds to the surrounding road surface;
- i) Placement of the frame bedding material and distributing along the frame contact area;
- j) Placement of the frame and accurate adjustment for level and orientation to correspond with the level of the surrounding carriageway.
- k) Final fine-levelling of the frame to its permanent position.

556 Material for Bedding and Infill of Frame for Chambers in Carriageways

1 The bedding and infill material shall have the following specifications:

- a) Produced as a proprietary ready-to-use mix;
- b) Non-shrink (and may be fibre-reinforced);
- c) Minimum workability life of 25 minutes in Malta ambient and pavement temperatures including high summer temperatures (prolonged and intensive pavement surface heat up to 60°C) – This may require the use of cooling for the bonding component.

- d) The infill will normally be a self-compacting high-flow grout and installed to the required level below the carriageway surface to allow for the surfacing (normally, 40mm).
- e) The bedding and infill material may be installed either in one (1) or in two (2) stages.

Table 550- 1 Bedding and Infill Materials Strength

MPa	Compressive Strength	Tensile Strength	Flexural Strength
2 hours	≥ 25.0	≥ 3.0	
3 hours	≥ 50.0	≥ 10.0	≥ 10.0
24 hours	≥ 60.0	≥ 1.5	
7 days	≥ 70.0	≥ 4.0	
28 days	≥ 75.0	≥ 5.0	

Figure 550- 1 Levelling of the Frame



Figure 550- 2 Infill Material



557 Chamber Cover and Frame in Trafficked Carriageways – General

IMPORTANT: This section does not apply to footway chambers. Footway chambers shall be a minimum B125 as specified in MSA EN 124-1 and as described in the Bills of Quantities.

1 The following shall apply:

- a) The Contractor shall submit details of the producer, dimensions, load class, load transfer, production special durability and anti-vibration features, technical performance and weight of the frame and cover immediately on the issue of the letter of acceptance by the Contracting Authority.
- b) The load class and depth of the frame used in trafficked carriageways shall be:
 - i. D400: 150mm for Road Classes HD to IV – Additionally, these shall have a maximum bearing pressure of 2.1 MPa;
 - ii. D400: 100mm for Road Classes IV and VI – Additionally, these shall have a maximum bearing pressure of 2.5 MPa.
- c) Frame depths of 100mm for Road Class HD to IV will also be accepted if performance data confirm conformity to this specification.

Minimum Weight

- d) The minimum self-weight of the frame and cover shall be proportional to the size and traffic load class to assist in the unit's in-built resistance to distortion and movement. In way of illustration and example the typical self-weight of a 600mm x 600 mm double triangular frame and cover shall be as follows:

Table 550- 2 Bedding and Infill Materials Strength Requirements

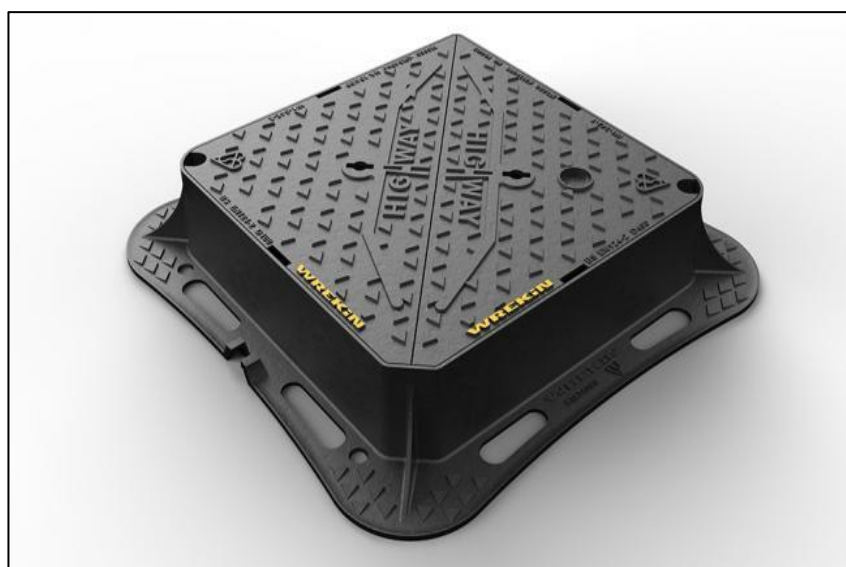
Road Class	Min. Depth of Frame (mm)	Location	Size	Min. Weight (kg), Frame and Cover
HD to IV	150	In carriageway	600 x 600	≥ 95 kg
IV to VI	100	In carriageway	600 x 600	≥ 80 kg

- e) The units shall be UK DMRB, CD 534 compliant.
- f) The chamber cover and frame shall be proprietary and have a research-based and test proven design for resistance to of heavy traffic dynamic loading without rocking.
- g) It shall be designed to BS 7903 (gussets) or equivalent and manufactured to resist movement, deformation, flexure and distortion under the dynamic loading of heavy traffic.
- h) It shall include features that reduce the stress transmitted through the frame onto the sub-structure.
- i) It shall be a double-triangular design with a load transfer three (3) point system and must permit the complete removal.
- j) The cover shall house sufficient and secure lifting points and have security locking.
- k) The cover shall feature a bitumen coating to a PSRV > 60 (where required).
- l) The cover and frame should not be exposed to any load or disturbance until the bedding and infill material has attained sufficient strength.
- m) The joint between the reinstated and existing materials should be sealed with a proprietary sealant certified by the UK BBA or equivalent.

Figure 550- 3 Chamber Frame and Cover (Class IV to VI, Illustrative)



Figure 550- 4 Chamber Frame and Cover (Road Class HD to IV, Illustrative)



558 Additional Requirements for Road Classes HD to IV

- 1 The following additional performance requirements shall apply for the frame and cover:
 - a) It shall have a large surface area over the supporting structure and the bedding mortar;
 - b) The points connecting the cover to the frame shall be of the “suspended type” for non-rocking operation and fabricated as part of a cover to frame load transfer reduction system.

559 Surfacing Material - General

- 1 All vertical surfaces (including ironwork surfaces) shall be sealed.
- 2 The sealing / tack coating material must be a proprietary product certified by the British Board of Agreement (HAPAS-BBA) or approved equivalent as part of the system approval to the requirements of the UK DMRB HA 104/09.
- 3 Sealing / tack coating over the horizontal plane shall only be used with bituminous surfacing.
- 4 The thickness of the surfacing material shall be within the range of 40mm to 50mm.

Figure 550- 5 Sealing and Tack Coat



560 Surfacing Material Alternative A - Hot Applied Surfacing Material

- 1 The hot-applied surfacing material shall be a proprietary or a designed mixture in accordance with any one of the following:
 - c) polymer modified mastic asphalt installed using a mastic asphalt heating mixer.
 - i. The material shall comply to the requirements of EN 13108-6.
 - ii. The use of mastic blocks and recycled content (eg. Shredded tyre rubber) incorporated in the mix will be permitted.
 - iii. Anti-skid chippings or coarse fines shall be embedded in the hot surface in accordance with the mastic asphalt producer methodology and a minimum polished stone value ≥ 57 . This may entail pre-coating of the chippings.

- d) polymer modified asphalt concrete installed using an asphalt mix heating mixer.
 - i. The material shall comply to the requirements of EN 13108-1.
 - ii. The aggregate used in the mixture shall have a minimum polished stone value ≥ 57 .
 - e) polymer modified stone mastic asphalt :
 - i. The material shall comply to the requirements of EN 13108-5.
 - ii. The aggregate used in the mixture shall have a minimum polished stone value ≥ 57 .
- 2 The materials shall be designed for the highest 7-day average temperature during the months of July and August as reported by the Malta Airport Met Office in the past 10 years.
- 3 When tested in accordance with EN 12697-22 (small size, model B, air) for resistance to deformation using the wheel tracking and prepared in accordance with EN 12697-33 the values shall not be greater than those in Series IM/900, Table 900-12.

**Figure 550- 6 Alternative A – Proprietary Hot Surfacing Mixer
(Illustrative Only – Source Roadmender (UK))**



Figure 550- 7 Alternative A – Placing of Hot Material (Mastic)



Figure 550- 8 Alternative A – Hand-levelling of Hot Material (Mastic)



561 Surfacing Material Alternative B – Cementitious or Resin-Based Grout Surfacing

1 The grout surfacing material must be one of the following:

Road Class HD to VI Roads - Cementitious

Table 550- 3 Alternative B (Heavy Duty)

MPa	Compressive Strength	Tensile Strength	Flexural Strength
3 hours	≥ 30	≥ 1.2	≥ 2
1 day	≥ 45	≥ 1.5	≥ 6
7 days	≥ 50	≥ 1.8	≥ 7
28 days	≥ 60	≥ 2.0	≥ 9

Road Class HD to II Roads - Resin Based

Table 550- 4 Alternative B (Extra Heavy Duty)

MPa	Compressive Strength	Tensile Strength	Flexural Strength
1 hour	≥ 75	≥ 6	≥ 18
2 hours	≥ 85	≥ 8	
7 days	≥ 95	≥ 10	
28 days	≥ 97		

Note: Due to high ambient temperatures especially during the hotter months the resin-based proprietary products may require cooling to the maximum temperature recommended by the producer. Off the shelf insulated ice coolers are suitable for this purpose.

Alternatively, materials may be mixed and placed during the cooler night-time hours.



Figure 550- 9 Common Ice Coolers for Resin-based Mortars

562 Guarantee

1 The Contractor shall guarantee the durability of the works for a period comprising a minimum of five (5) full winter seasonal cycles from the time of installation.

563 Chambers Performance Indicators

1 The requirements in Series IM/500, clause 524 shall apply.

564 Testing

1 Testing shall be as indicated in **Table 550- 5**.

Table 550- 5 Testing

	Material	Test	Frequency	Remarks
1	Bedding material	150mm cubes	Per truckload	Jointly with Overseeing Organisation
2	Infill material	40 x 40 x 160mm prism	Per 3 manholes	
3	Surfacing (Cementitious / Resin)	40 x 40 x 160mm prism	Per 3 manholes	
4	Hot Mix - Mastic	Mix Analysis	Per 3 manholes	
5	Mot Mix – AC and SMA			
6	All	Rideability	Per manhole	

565 Alternative Systems

1 Alternative proprietary third-party certified systems and/or methodologies will also be considered if accompanied by a detailed technical submission demonstrating equivalent performance.