

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*

Date: January 2023

Version: v1.2

550	INTRODUCTION	3
551	SCOPE OF APPLICATION	3
552	REFERENCE STANDARD	3
553	SAFETY AND HEALTH RISKS	3
554	CHAMBER INSPECTION	3
555	CHAMBER INTERVENTION WORKS FOR FAILED SURFACING AND IRONWORKS	4
556	FRAME BEDDING MORTAR FOR CHAMBERS IN CARRIAGEWAYS	4
	FOR ROAD CLASSES IV TO VI (NON-ARTERIAL, NON-DISTRIBUTOR ROADS)	4
557	FRAME INFILL MORTAR FOR CHAMBERS IN CARRIAGEWAYS	5
558	CHAMBER COVER AND/OR FRAME IN CARRIAGEWAYS – GENERAL	6
559	CHAMBER COVER AND/OR FRAME IN CARRIAGEWAYS (ROAD CLASS IV TO VI)	6
560	FOR ROAD CLASSES HD TO IV	7
561	OTHER REQUIREMENTS	8
562	SURFACING MATERIAL - GENERAL	8
563	SURFACING MATERIAL ALTERNATIVE A - HOT APPLIED SURFACING MATERIAL	9
564	SURFACING MATERIAL ALTERNATIVE B – CEMENTITIOUS OR RESIN-BASED GROUT SURFACING	13
565	GUARANTEE	14
566	TESTING	14
567	ALTERNATIVE SYSTEMS	14

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 Corporations'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 and reducer slab.
- 1 The inspection shall include:
 - a) confirmation of the loading category EN 124-1 and EN 124-2;
 - b) the condition of any ironworks seals (including non-rocking and other seals);
 - c) the integrity and the non-rocking tightness of fit of the cover and frame;
 - d) confirmation of the remaining service life for the traffic class;
 - e) the verification and reporting on the remaining serviceability 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 Frame Bedding Mortar for Chambers in Carriageways

For Road Classes IV to VI (Non-Arterial, Non-Distributor Roads)

1 The bedding material shall have the following specifications:

- a) Produced as a proprietary 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 containers for the bonding component.
- d) The bedding and infill system shall be guaranteed to perform in the presence of high moisture and water-saturated road pavements and pavement substrates.

Table 550- 1 Bedding Materials Strength

MPa	Compressive Strength	Tensile Strength	Flexural Strength
1 hour	≥ 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



557 Frame Infill Mortar for Chambers in Carriageways

1 Placement of the infill and surfacing material (normally a self-compacting high-flow grout or mortar) shall be to a level below the carriageway surface required by the proprietary surfacing material (normally 40mm).

Table 550- 2 Flowable Infill and Surfacing

MPa	Compressive Strength	Tensile Strength	Flexural Strength
1 hour	≥ 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- 2 Infill Material



558 Chamber Cover and/or Frame in Carriageways – General

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;
- b) The depth of the frame shall be 150mm and 100 mm for Road Class HD to IV and Road Class IV and VI respectively.

Minimum Weight

- c) 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 600 x 600 mm double triangular frame and cover shall be as follows:

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

559 Chamber Cover and/or Frame in Carriageways (Road Class IV to VI)

2 The following performance requirements shall apply:

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



- a) UK DMRB, CD 534 compliant.
- b) The chamber cover and frame shall be proprietary and have a researched and test proven design for non-rocking in normal traffic;
- c) It shall be a patented double-triangular design with a load transfer 3 point system and must permit the complete removal.
- d) The cover shall house sufficient and secure lifting points and have security locking.
- e) The cover shall feature a bitumen coating to a PSRV > 60 where required.

560 For Road Classes HD to IV

- 1 The following performance requirements shall apply for the frame and cover:
- a) UK DMRB, CD 534 compliant.
 - b) The chamber cover and frame shall be proprietary and have a research-based and test proven design for heavy and intensive dynamic loading;
 - c) It shall be designed to BS 7903 (gussets) or equivalent and manufactured to resist movement, deformation and flexure and distortion under dynamic loading and reduce the stress transmitted through the frame onto the sub- structure;
 - d) It shall be a patented double-triangular design with a load transfer 3-point system and must permit the complete removal. The cover support geometry shall prevent wear at the cover to frame interface.
 - e) It shall have a large surface area over the supporting structure and the bedding mortar;
 - f) 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;
 - g) The cover shall be bitumen-coated to a PSRV > 60

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



561 Other Requirements

- 1 The cover and frame should not be exposed to any load or disturbance until the bedding and infill material has attained sufficient strength;
- 2 After installation the frame and cover should be flush with the road surface;
- 3 The joint between the reinstated and existing materials should be sealed with the same proprietary material certified by the British Board of Agreement (HAPAS-BBA) or equivalent as part of the system.

562 Surfacing Material - General

- 1 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.
- 2 The sealing / tack coat shall be applied to all vertical surfaces (including ironwork surfaces)
- 3 Sealing / tack coating over the horizontal plane shall only be used with bituminous surfacings.
- 4 The thickness shall be within the range of 40mm to 50mm.

Figure 550- 5 Sealing and Tack Coat



563 Surfacing Material Alternative A - Hot Applied Surfacing Material

- 1 The hot-applied surfacing material shall be a proprietary or a designed mixture as follows:
 - a) 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 .
 - b) polymer modified asphalt concrete installed using an asphalt mix heating mixer.
 - iv. The material shall comply to the requirements of EN 13108-1.
 - v. The aggregate used in the mixture shall have a minimum polished stone value ≥ 57 .
 - c) 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 – Generic Hot Surfacing Hot Mixer (Illustrative Only)



Figure 550- 7 Alternative A – Proprietary Hot Surfacing Mixer (SMA and AC)
(Illustrative Only – Source Roadmender (UK))



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



Figure 550- 9 Alternative A – Hand-levelling of Hot Material (Mastic)



Figure 550- 10 Alternative A – Permitted: Placing of Hot Surfacing (Mastic Blocks) onto Mastic Base



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

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

Road Class 4 to 7 Roads (Normal Duty)

Table 550- 3 Alternative B Normal Duty Mortar

MPa	Compressive Strength	Tensile Strength	Flexural Strength
3 hours	≥ 30	≥ 1.2	≥ 2
1 day	≥ 45	≥ 1.5	≥ 6
7 days	≥ 55	≥ 1.8	≥ 8
28 days	≥ 60	≥ 2.0	≥ 9

Road Class 1 to 3 (Heavy Duty)

Table 550- 4 Alternative B Heavy Duty Mortar

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

2 Due to high ambient temperatures especially during the hotter months the resin-based proprietary products will require cooling to the temperature recommended by the producer. Ice coolers will be required for this purpose.



Figure 550- 11 Common Ice Coolers for Resin-based Mortars

565 Guarantee

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

566 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 Mastic	40 x 40 x 160mm prism Visual and levels	Per 3 manholes	
5		Visual and levels	Per manhole	

567 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.