

This guide addresses the acceptable methods and details for installation of STAKKAbox™ and RapidSTACK™ Access Chambers. The purpose is to serve as a guideline, and is not intended for any specific construction project. It is understood there are alternative ways that might be required and/or recommended based on site or project conditions. NAL Ltd reserves the right to alter these guidelines and encourages contact with the factory or its representatives to review any possible modification to these notes prior to commencing installation. NAL Ltd makes no express or implied warranty or guarantee of the techniques, construction methods or materials identified herein.

The customer shall comply with all laws, regulations, codes and orders of any authority having jurisdiction over the customer and which relate to the customer's installation, maintenance and use of NAL products. If the customer's installation or use of any products contravenes any such laws, regulations, codes or orders of such authorities, the customer shall be responsible for the violations thereof and shall bear the costs, expense and damages attributable to its failure to comply with the provisions of such laws, ordinances, rules, regulations, codes or orders.

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Notes On Application

This installation guide is for STAKKAbox™ and RapidSTACK™ chambers being installed in areas classed as Groups 1, 2, 3, or 4 in accordance with European Standard EN 124 :1994.



Group 1: A15 Classification Areas which can only be used by pedestrians and pedal cyclists.



Group 2: B125 Classification Footways, pedestrian areas and comparable areas, car parks or parking decks.



Group 3: C250 Classification Areas which when measured from the kerb edge extend a maximum of 0.5m into the carriageway and a maximum of 0.2m into the footway.



Group 4: D400 Classification Roadways, carriageways and areas used by fast moving vehicular traffic.

Equipment And Additional Materials

In addition to the access chambers supplied, in order to complete an installation you will need the following:

Equipment

1. The means of excavating a hole; mechanical digger, pneumatic hammer etc. depending on the ground conditions and size of chamber being installed.
2. Shovel or spade.
3. Means of compacting base and surrounding material.
Please refer to the "Specification for the Reinstatement of Openings in Highways - Appendix A8"
4. Builders trowel.
5. Straight edge/level.
6. Handsaw.
Furthermore if duct entries are to be cut on site:
7. Hole saw (Sized to the outside diameter of the duct to be installed).
8. A power drill (Compressed air, battery or 110v).
9. Bracing if type and size of chamber requires (See Table 1).

Materials

1. Base materials (See Table 1).
2. Backfill material (See Table 1).
3. Bedding mortar/resin epoxy mortar.

Frame And Cover

A frame and cover must be installed, specified to the correct loading as dictated by European standards or any other relevant authority.

NAL Ltd supply a range of covers and frames engineered to work in conjunction with its chambers. Covers and frames that are not supplied by NAL Ltd should be agreed to be fit for purpose prior to installation as this might adversely affect the quality of the installation.

This document is a general installation guide for the following product ranges: STAKKAbOX™ Ultima and RapidSTACK™ access chambers.

Installation Procedure

Area of Excavation

1. Mark the extremity of the excavation on the ground. Placing the bottom section of the chamber on the ground mark around it, allowing either the minimum thickness of backfill as stated in Table 1, or the width of the compaction plant, whichever is the greater.



The Hole

2. Excavate the hole to the correct depth. The depth of the hole should measure from finished ground level minus the thickness of the frame & bedding mortar according to the level specified by the frame and cover installation, chamber depth and the required base depth (see Table 1 for base depths).

The Base

3. Compact the bottom of the excavation using a suitable compaction device, making sure that it is level. If there are any "soft areas" these should be excavated and filled with MOT1 stone or other approved materials, compacted as per the requirements of "Specification for the Reinstatement of Openings in Highways - Appendix A8" or equivalent national standard.
4. Construct the base using the necessary materials.
 - 4.1. If a drain is required in the chamber it should now be installed as per the client's specification.
 - 4.2. For compacted stone, level the stone with the shovel and compact as per the requirements of "Specification for the Reinstatement of Openings in Highways - Appendix A8".
 - 4.3. For a concrete base, level the C40 concrete and compact as per the requirements of "Specification for the Reinstatement of Openings in Highways - Appendix A8". For bases that require reinforcing mesh the base should be constructed in 2 levels, with the mesh being placed in the middle.
5. The bottom ring section is now carefully positioned on the base. If the chamber system does not have a preformed base, then the ring should be gently tapped so that it beds down into the base by approximately 10mm. The correct orientation of the chamber ring is with the horizontal lip to the bottom. Check that the ring is level and at the correct depth. If a concrete base is being used, the concrete can be floated to give a smoother finish.

The Chamber Walls

6. The additional wall sections are then installed. Make sure that each section is properly inserted to ensure there are no gaps between.

Duct Entries

7. Chambers can either have the duct entries factory drilled or can be formed on site.
 - 7.1. For factory drilled chambers remove the duct caps as required.
 - 7.2. Site formed duct entries are best created using a hole-saw and drill, if these tools are not available then the opening can be formed by using a hand saw or disc cutter to form a square hole. When the duct is fitted the gap between the cut and the duct should be filled using mortar.
 - 7.3. If using pre-formed bell mouths or chamber entry connectors these can be fitted now.
 - 7.4. Insert the ducts into the holes.
 - 7.5. Duct entries should not be formed in the bottom section or the top two sections without prior approval of NAL Ltd.
 - 7.6. Duct entries should not be cut within 50mm from the corner.
 - 7.7. The distance between duct entries should be a minimum of half the duct diameter from edge to edge.
 - 7.8. The accumulative diameter of all of the ducts should not constitute more than 20% of the total circumference of the access chamber section.
 - 7.8.1. In the event of duct entries constituting more than 20% of the total circumference of a section, a structural C40 surround should be installed up to the uppermost duct entry section ring.



Overbuilding Existing Services

8. Where chambers are required to be built over existing services, STAKKAbOX™ and RapidSTACK™ can easily accommodate this by either:
 - 8.1. Cutting a duct entry in the appropriate ring section as previously described and then with a hand saw cutting from the bottom of the ring to make an open ended arch.
 - 8.2. Alternatively, after the duct entry has been formed, the ring can be cut longitudinally and reassembled around the existing duct.
 - 8.3. In both cases it is important that a complete ring is installed either side of the cut ring section.



Wall Furniture & Security Systems

9. Wall furniture can be installed at this stage if not already factory fitted.
- 9.1. Mark the position of the furniture as required by the clients' specification on the chamber walls, drill 11mm holes and fix the furniture with the bolts supplied.
- 9.2. If using Footway Fortress, the wall bears simple hang in the preformed slots.
- 9.3. Wall furniture and security systems can be retrofitted at a later date on most chambers. For specific details please contact NAL Ltd directly.



Bracing

10. On certain chambers cross bracing is required. See Table 1 for details.
- 10.1. If timber bracing is required this should be supplied with the chamber. Make sure that the bracing is vertical and plumb and located in the correct position.
- 10.2. On larger chambers "Acrow" props are used as bracing. These are not supplied by NAL Ltd. Timber footplates should be used to disperse the loads evenly over the chamber. See Table 1 for spacing details.



Backfilling

11. With the chamber installed to its finished depth, duct entries formed, furniture fitted and if required suitable bracing installed, the backfill surround of the chamber can now take place. Backfilling is formed in layers and should be completed to the top of the chamber, or in the case of a roadway construction to the underside of the blacktop construction. Refer to Table 1 for the recommended backfill material and required width of material.

Refer to "Specification for the Reinstatement of Openings in Highways - Appendix A8" for the depth of layers and number of passes required for the selected material and compaction method.
- 11.1. If timber bracing is being used, this should be raised along with the backfilling to ensure that there is adequate support for the chamber wall section that is being compacted against.

- 11.2. If Acrow props are required these can be left in position until the backfill and compaction are completed and the material has adequately cured.



Final Adjustment

12. If the chamber height has been miscalculated and the levels can not be altered by adjusting the bedding of the frame, it is possible to cut the top section of the chamber horizontally to correct the level.
- 12.1. Simply mark the chamber section that requires adjustment and cut by either using a handsaw or a disc cutter.
- 12.2. The required section can then be bedded onto the next section using the standard processes.
- 12.3. The voids in the top section should now be filled with lean mix concrete to give a solid base for the frame to be bedded on.



Frame and Cover

13. Once the chamber is backfilled the frame and cover can be fitted.
- 13.1. Place the frame on top of the chamber to check that there is adequate space for a mortar bed. The depth of acceptable bed can vary between client so referral to the appropriate requirements should be taken. Generally mortar beds can range from 10 to 40mm in thickness. Pack the frame to the required height using suitable approved materials and check that the frame is in a coplanar state.
- 13.2. Remove the frame and apply the mortar bed. This should be approximately 10mm higher than required and 25mm greater than the spread of the underside of the frame.
- 13.3. Carefully position the frame on to the mortar bed, taking care that the inside faces of the frame line up with the edges of the chamber. If using a rising frame this should happen automatically.
- 13.4. Gently tap the frame into the mortar bed until the correct level is achieved, always checking that the frame is in a coplanar state.
- 13.5. Remove any excess mortar that has squeezed into the chamber and trowel mortar over the exterior flanges/grout bars at a 45° angle away from the frame.
- 13.6. After the mortar has sufficiently cured the covers can be installed. (The use of epoxy resin mortars can be used and these can have a dramatic effect at reducing curing times. Please check with client about approval before use).

Reinstatement

14. The finished surface can now be reinstated around the chamber.

Other Notes

15. STAKKAbOX™ and RapidSTACK™ access chambers can be supplied as a fixed-depth unit which will require suitable lifting requirements if planned to be lifted as a single unit. Lifting eyes, frames or other arrangements can be installed in-factory to accommodate mechanical lifting.



Table A8.1 Compaction Requirements for Granular, Cohesive and Cement Bound Materials

Compaction Plant and Weight Category	Cohesive Material (less than 20% granular content)			Granular Material (20% or more granular content including cement bound material)		
	Minimum Passes/Lift for compacted thickness up to			Minimum Passes/Lift for compacted thickness up to		
	100mm ¹	50mm	200mm ¹	100mm ¹	50mm	200mm
Vibrotamper						
50 kg minimum	48	#N	P4		8N	P
Vibrating Roller						
Single Drum						
1000-2000 kg/m ²		NP	NP	6N	PN	P
2000-3500 kg/m ²	36N		P3		57	
Over 3500 kg/m ²	346		#	346		
Twin Drum						
600-1000 kg/m ²	NP	NP	NP	6N	PN	P
1000-2000 kg/m ²	48N		P	36N		P
Over 2000 kg/m ²	235		#	234		
Vibrating Plate						
1400-1800 kg/m ² N	PN	PN	P5		NP	NP
Over 1800 kg/m ²	36N		P3		57	

Alternative Compaction Plant for Areas of Restricted Access (including small excavations and trenches less than 200 mm width)	
Vibrotamper 25kg minimum	Minimum of 6 compaction passes Maximum of 100mm compacted lift thickness
Percussive Rammer 10kg minimum	

Notes:

- ¹ NP = Not Permitted
- ² # = Not permitted on wholly cohesive material i.e. clay and/or silt with no particles > 75 micron (µm)
- ³ Single drum vibrating rollers are vibrating rollers providing vibration on only one drum
- ⁴ Twin drum vibrating rollers are vibrating rollers providing vibration on two separate drums

Table 1

RapidSTACK™ / STAKKAbox™ Ultima	EN124 group 2 locations
Minimum excavation footprint (from outer side of the chamber wall)	150mm or width of compacting equipment
Base material	100mm of compacted MOT type 1 and optional 4/10mm pea shingle to aid levelling OR suitable existing compacted base and/or 4/10mm pea shingle* OR C40 concrete
Backfill material type / width of backfill	MOT type 1 or Suitable as dug compactable material or 4/10mm pea shingle or C30 concrete*

Diagram 1

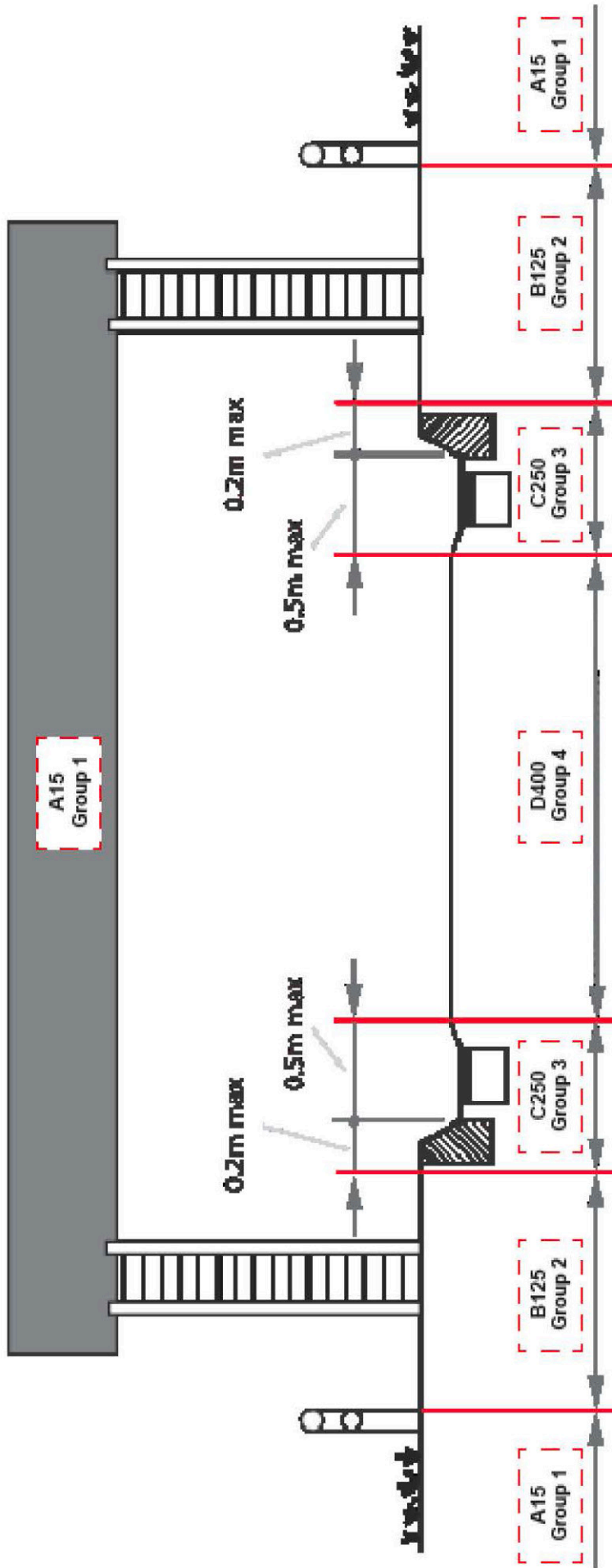
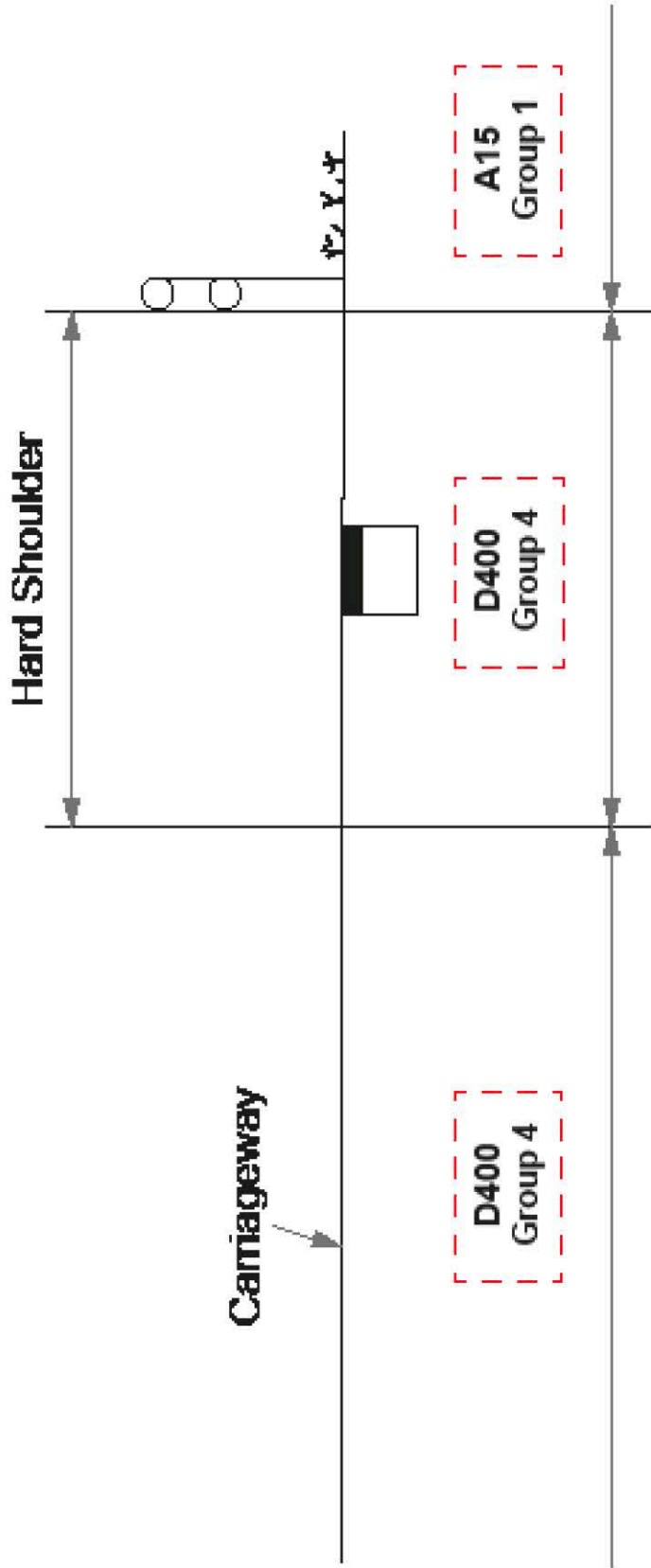


Diagram 2



Typical detail of a hard shoulder showing the location of some installation groups.