

LIVERPOOL ROAD – LBC CONDITION 9

Liverpool Road Rainwater Goods

Information contained within this document, any appendices and/or attachments are intended for submission to discharge an LBC Condition for 123-125 Liverpool Road, Manchester, M3 4JN application reference 137547/LO/2023 in particular:

Condition 9

Prior to the commencement of works reinstate rainwater goods (downpipes and gutters) to the listed building, a detailed method statement, specification and location of rainwater goods including material (cast iron) how they will be fixed to the listed fabric, shall be submitted for approval in writing by the City Council, as Local Planning Authority. The installation of the rainwater goods shall be carried out in accordance with this method statement and be completed prior to the first occupation of the development.

Reason - To ensure the rainwater goods are of an acceptable appearance and there is no resulting harm to the Listed building pursuant to policy EN3 of the Manchester Core Strategy (2012).

Rainwater Goods Proposal

DOMIS Construction propose to use cast aluminium rainwater goods shown in Appendix A - Alumasc Product Data Heritage Cast Aluminium, items are summarised below:

Alumasc Heritage – Moulded Gutter

Gutter Size: 125x100 (5 x 4")

Colour: Black Ral 9005 semi-Gloss or heritage textured finish in 9005 semi-gloss

Sample Image:



Image 1: Alumasc Heritage – Moulded Gutter Sample

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Heritage - Circular Pipe

Pipe Size: 76mm

Colour: Black Ral 9005 semi-Gloss or heritage textured finish in 9005 semi-gloss



Image 2: Heritage - Circular Pipe Sample

Alumasc Heritage Cast Aluminium Flat Back Fluted Rainwater Head

Size: 200mm x 170mm x 170mm

Colour: Black Ral 9005 semi-Gloss or heritage textured finish in 9005 semi-gloss



Image 3: Alumasc Heritage Cast Aluminium Flat Back Fluted Rainwater Head Sample

The proposal reflects the existing rainwater goods onsite which will be removed and replaced with the Alumasc Heritage Cast Aluminium products.

Fixing and installation information can be found in Appendix B - Alumasc Heritage Installation.

Justification for Cast Aluminium

Lee Hutchings from Stephen Levrant: Heritage Architecture Ltd comments on the proposal:

From a heritage point of view, we are happy with the design of the new rainwater goods, and that these closely match the existing cast iron examples at eaves level of No. 125. Although cast iron is preferable, the use of cast aluminium instead will not visually alter the desired aesthetic.

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Benefits of Cast Aluminium – Provided by supplier:

Not only does the project currently have Cast Aluminium already on the building we are finding more and more architects/planners/conservation officers are leaning towards Cast Aluminium on both Graded listed buildings and Heritage projects due to the points highlighted below.

1. Poured within a foundry using the same Castings as you would with Cast Iron so almost identical.
2. Cast aluminium is less brittle when subjected to low temperatures, unlike cast iron which is brittle at low temperatures.
3. In terms of tensile strength, cast aluminium is stronger than cast iron.
4. Can be powder coated unlike Cast Iron that requires painting and therefore inevitably doesn't last as long and continued maintenance required.
5. The carbon footprint of cast aluminium is significantly lower thanks to it being lightweight. This means that less energy is required for its production and transportation.
6. Cast aluminium does not rust, meaning that no energy is needed to maintain it or for repairs. All these properties prove that it is an environmentally friendly option.
7. You are limited to bespoke offsets/corners when using Cast Iron and a pattern/sandcast for any bespoke items can cost in excess of £5,000 per item. Cast Aluminium can be welded, and bespoke gutter/pipe items rarely exceed a cost of £150.

Recent and current projects where Cast Aluminium has been preferred to Cast Iron on listed projects include:

- The Coach House – Bolton
- Binswood Hall – Leamington Spa
- West Brom Town Hall (live project)
- Backford Old Hall – Warrington
- Gorton Monastery – Manchester
- York Royal Theatre to name a few.



Image 4: Heritage RWG's Coach House, Bolton



Image 5: Heritage RWG's Binswood Hall, Leamington Spa



Image 6: Heritage RWG's Gorton Monastery – Manchester



Image 7: York Royal Theatre

Samples

Samples are available onsite for review by Manchester City Council Planning Officer's.



Image 8: Heritage Moulded Gutter



Image 9: Heritage Circular Pipe



Image 10: Alumasc Heritage Cast Aluminium Flat Back Fluted Rainwater Head

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Appendix A - Alumasc Product Data Heritage Cast Aluminium

Gutter Centre Heritage Cast Aluminium Rainwater System Product Summary



Heritage - Half Round Gutter



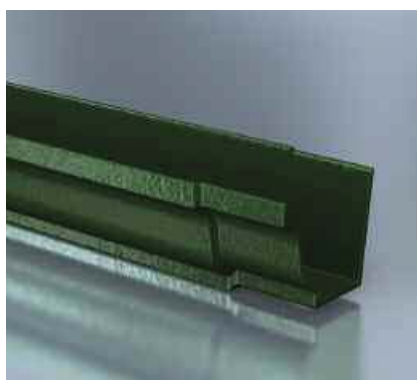
Heritage - Beaded Half Round Gutter



Heritage - Beaded Deep Run Gutter



Heritage - Victorian Ogee Gutter



Heritage - Moulded Gutter



Heritage - Circular Pipe



Heritage - Square Pipe



Heritage - Rectangular Pipe

Heritage Cast Aluminium Rainwater System - Product Summary

Heritage is a comprehensive range of traditional gutter profiles, round, square and rectangular pipes and all associated fittings and accessories. Designed to provide all the essential architectural features appropriate to traditionally designed buildings, the Heritage range is also fully in tune with modern fast track building contracts.

Applications

- Ideal for traditionally designed buildings, in both new build and refurbishment applications
- Can be used as a direct replacement of cast iron
- For both flush and projecting eaves applications

Features & Performance

- 5 gutter and 3 downpipe profiles available in a choice of sizes
- Pipes available in 1, 2 and 3 metre lengths
- Lightweight, durable and non-corrodible
- Life expectancy of aluminium: 40 years (rural/suburban areas); up to 25 years (industrial/marine areas)
- Easy to handle and fix
- BBA approved
- Aluminium is 100% recyclable

Colours & Finishes

- BBA approved polyester powder coatings, factory applied at Alumasc
- 26 standard colours with additional BS or RAL colours available to special order
- Can be supplied to resemble cast iron surface texture (black only)
- Also available in plain mill finish for on-site painting

Manufacture

- UK manufactured by Alumasc
- Gutters and fittings made from commercial LM2 and LM6 grade aluminium alloy
- Gutters are gravity diecast, fittings are pressure diecast and downpipes are extruded aluminium
- Manufactured in accordance with BS 8530 (formerly BS 2997)

Installation & Fixing

- Gutters are wet sealed with bolted joints, with a range of fixing options
- Gutter joints are secured with screws or bolts through integral holes/slots
- Victorian Ogee and Moulded gutters provided with slots in rear for direct fixing
- Brackets and fittings provided with fixing holes where appropriate
- Circular pipe jointing up to 100mm diameter is by separate sockets giving maximum flexibility for installation. 150mm circular pipes and all square and rectangular pipes have welded on sockets
- Simple fixing to wall by eared sockets or by a choice of pipe clips
- Minimal maintenance requirements



Gutter Profiles & Sizes



Half Round
100mm (4")
113mm (4.5")
125mm (5")



Beaded Half Round
113 (4.5)
125mm (5")



Beaded Deep Run
113 x 75mm (4.5 x 3")



Victorian Ogee
100mm (4")
113mm (4.5")
125mm (5")



Moulded
100 x 75mm (4 x 3")
125 x 100mm (5 x 4")
150 x 100mm (6 x 4")

Pipe Profiles & Sizes



Circular Pipe
63mm (2.5")
75mm (3")
100mm (4")
150mm (6")



Square Pipe
75 x 75mm (3 x 3")
100 x 100mm (4 x 4")



Rectangular Pipe
100 x 75mm (4 x 3")

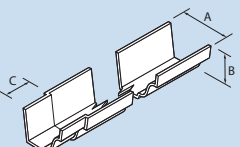
Gutter Centre -Heritage Moulded Gutters and Fittings



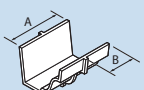
Heritage Moulded gutters are available in 3 sizes and 2 gutter lengths, together with a complete range of fittings. A socketed system, which can be finished to replicate cast iron or with BBA certificated powder coatings in a choice of colours. Ideal for restoration or contemporary applications.

Notes: All dimensions are in mm unless shown otherwise.
Gutter sizes shown are nominal.

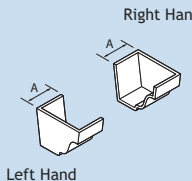
Gutters

	Gutter Size	Gutter Length	A	B	C	T	Weight (kg)	Product Code
	100 x 75 (4" x 3")	1830mm	108	76	50	4	4.0	MG2/217
	125 x 100 (5" x 4")	"	140	102	50	4	5.4	MG1/196
	150 x 100 (6" x 4")	"	162	102	50	4	5.6	MG3/259
	100 x 75 (4" x 3")	610mm	108	76	50	4	1.4	MG2/220
	125 x 100 (5" x 4")	"	140	102	50	4	1.8	MG1/199
	150 x 100 (6" x 4")	"	162	102	50	4	1.9	MG3/262
Note: 100 x 75 and 125 x 100 moulded gutters are left hand spigot. 150 x 100 moulded gutter is right hand spigot T = Gutter Thickness (nominal +/- 1mm)								

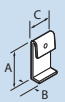
Union Clips

	Gutter Size	A	B	Product Code
	100 x 75	100	46	MG2/231
	125 x 100	100	46	MG1/213
	150 x 100	100	46	MG3/269

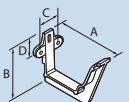
Stop-Ends

	Gutter Size	Type	A	Product Code
	100 x 75	External Left Hand	50	MG2/233
	125 x 100	"	50	MG1/215
	150 x 100	External Right Hand	50	MG3/271
	100 x 75	Internal Right Hand	50	MG2/232
	125 x 100	"	50	MG1/214
	150 x 100	Internal Left Hand	50	MG3/270

Fixing Supports

	Gutter Size	A	B	C	Product Code
	100 x 75	70	10	36	MG2/373
	125 x 100	94	12	36	MG1/374
	150 x 100	94	12	36	MG3/375

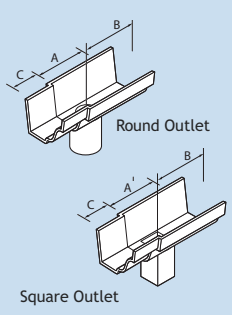
Fascia Brackets

	Gutter Size	A	B	C	D	Product Code
	100 x 75	136	135	38	38	MG2/234
	125 x 100	135	136	38	39	MG1/216
	150 x 100	162	125	38	39	MG3/268

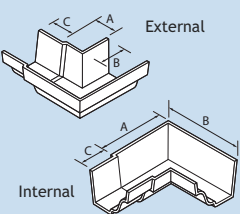
Note: See footer on page 33.

Heritage - Moulded Gutters and Fittings

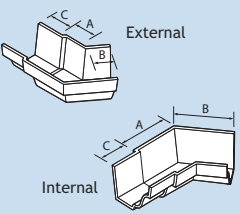
Running Outlet - with Single Spigot

 Round Outlet Square Outlet Note: Designed to fit Heritage socketed aluminium pipes. Add suffix /F to product code to fit Flushjoint or Guardian pipes	Gutter Size	Pipe Size	A	B	C	Spigot	Product Code
	100 x 75	63 dia	190	120	50	Left Hand	MG2/225
	125 x 100	"	190	120	50	Left Hand	MG1/205
	150 x 100	"	190	120	50	Right Hand	MG3/267
	100 x 75	75 dia	190	120	50	Left Hand	MG2/370
	125 x 100	"	190	120	50	Left Hand	MG1/204
	150 x 100	"	190	120	50	Right Hand	MG3/266
	125 x 100	100 dia	190	120	50	Left Hand	MG1/253
	150 x 100	"	190	120	50	Right Hand	MG3/265
	100 x 75	75 x 75	190	120	50	Left Hand	MG2/356
	125 x 100	"	190	120	50	Left Hand	MG1/358
	150 x 100	"	190	120	50	Right Hand	MG3/361
	100 x 75	100 x 75	190	120	50	Left Hand	MG2/357
	125 x 100	"	190	120	50	Left Hand	MG1/359
	150 x 100	"	190	120	50	Right Hand	MG3/362
	125 x 100	100 x 100	190	120	50	Left Hand	MG1/360
	150 x 100	"	190	120	50	Right Hand	MG3/363

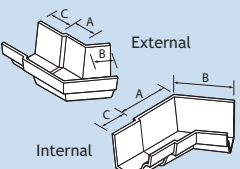
90° Angles

 External Internal	Gutter Size	Type	A	B	C	Spigot	Product Code
	100 x 75	External	25	75	50	Left Hand	MG2/221
	125 x 100	"	25	75	50	Left Hand	MG1/200
	150 x 100	"	25	75	50	Right Hand	MG3/263
	100 x 75	Internal	127	183	50	Left Hand	MG2/222
	125 x 100	"	158	215	50	Left Hand	MG1/201
	150 x 100	"	185	238	50	Right Hand	MG3/264

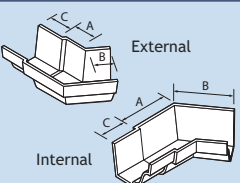
135° Angles

 External Internal	Gutter Size	Type	A	B	C	Spigot	Product Code
	100 x 75	External	25	75	50	Left Hand	MG2/223
	125 x 100	"	25	75	50	Left Hand	MG1/202
	150 x 100	"	25	75	50	Right Hand	MG3/272
	100 x 75	Internal	62	120	50	Left Hand	MG2/224
	125 x 100	"	79	130	50	Right Hand	MG1/203
	150 x 100	"	90	144	50	Right Hand	MG3/273

145° Angles

 External Internal	Gutter Size	Type	A	B	C	Spigot	Product Code
	125 x 100	External	25	75	50	Left Hand	MG1/329
	150 x 100	"	25	75	50	Right Hand	MG3/333
	125 x 100	Internal	97	47	50	Left Hand	MG1/330
	150 x 100	"	118	68	50	Right Hand	MG3/334

150° Angles

 External Internal	Gutter Size	Type	A	B	C	Spigot	Product Code
	125 x 100	External	25	75	50	Left Hand	MG1/331
	150 x 100	"	25	75	50	Right Hand	MG3/335
	125 x 100	Internal	94	44	50	Left Hand	MG1/332
	150 x 100	"	118	68	50	Right Hand	MG3/336

Note: The products are available in a plain mill finish or with a BBA accredited polyester powder coated finish. Product codes in the tables refer to the mill finish. For polyester powder coated finish please add the suffix /PPC.

Appendix B – Alumasc Heritage Installation

Alumasc Rainwater Systems Aluminium Range Installation Procedures

Preparatory requirements and installation
methods for the Heritage gutter and
pipe system, Aqualine gutter system,
GX gutter system,
Flushjoint pipe system and
Guardian security pipe system.

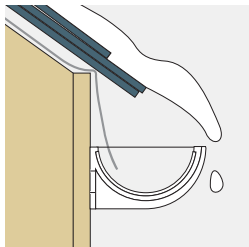


Aluminium Rainwater System Installation - Introduction

For safe and satisfactory installation of Alumasc rainwater systems, the following good practice guidelines should be reviewed before installation commences. Where unusual or special conditions arise contact Alumasc Technical Services for assistance.

General Preparation and Good Practice

Securely fixed fascia boards must be painted and capable of supporting a fully loaded gutter. Check fascia for straightness and whether shims will be necessary to align brackets without creating stress at gutter joints. Where fascia boards are not being used Alumasc provide top and side fix rafter arm brackets as well as masonry drive-in brackets.

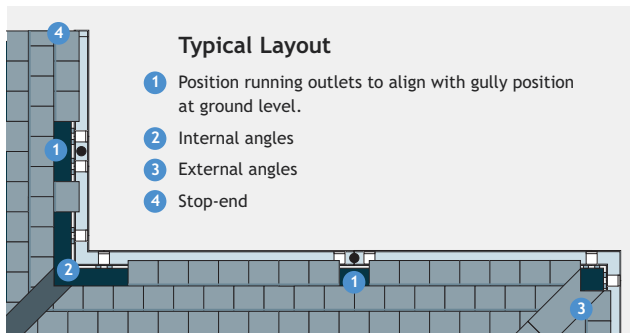


Fix brackets so as to position the gutter centrally and as close below the roof edge as possible, taking into consideration locality and roof slope finish. If there is a risk of sliding snow, adjust the bracket positions to prevent snow hitting the front of the gutter. Extra fixings, brackets and snowboards should be considered where appropriate.

Where high winds are expected, a small bead of sealant must be applied between gutter and brackets a flexible adhesive. An occasional screw, fixed through a slot in the back of the gutter and into the fascia may be preferred, at a minimum of two per length.

Alumasc advise that the designer and contractor satisfy themselves that the application is suitable.

Setting Out



After setting out angles and outlets, fit gutters and brackets according to installation procedures for the specific rainwater system being used, as detailed in this brochure.

Cutting and Drilling

Aluminium can be cut and drilled on site with regular metalworking tools. Pencil cut lines and apply masking tape either side of cut line to protect against accidental saw damage.

Site Painting

Degrease with white spirit and clean thoroughly. Prime with zinc phosphate or similar aluminium primer, followed by at least two coats of full gloss paint on all exposed surfaces. Undercoating is not required. Where powder coated materials have been cut, it is necessary to deburr exposed edges and follow the above painting procedure.

Health and Safety

Always refer to current Health and Safety legislation, safe systems of work and the relevant material safety data sheets.

Storage and Handling

Colour coated rainwater gutters and pipes must be handled with care to prevent scratches and dents. Materials should be stored on a level surface or racking, preferably under secure cover. Uneven fading or water marks on coated and mill finish surfaces may occur if water enters protective packing or goods are stored exposed to sunlight.

Mill finish goods will have manufacturing blemishes such as grinding and fettling marks, welding will be visible on fabricated items and extruded/pressed aluminium items may also be vulnerable to scratch marks or blemishes caused in-transit. It is recommended mill finish material is painted on-site.

Store seals and sealants under cover and make secure and separate provision for solvents. Dispose of packing materials responsibly.

Testing

Allow sufficient time for sealant joints to fully cure. Check all bracket and gutter fixings are secure and plug outlets. Fill up to overflow level (but not beyond). Allow 5 minutes before inspecting all joints for leaks.

Care and Maintenance

Regularly clean out rainwater heads and gutters and ensure that downpipes are clear. Check joints and fixings are secure by periodic inspection no less than twice a year, preferably at the start of Autumn and end of Winter.

Mill finish goods will develop a protective grey aluminium oxide, however it is recommended mill finish material is painted on-site. Polyester powder coated surfaces can be cleaned by washing with warm detergent solution and leathering off.

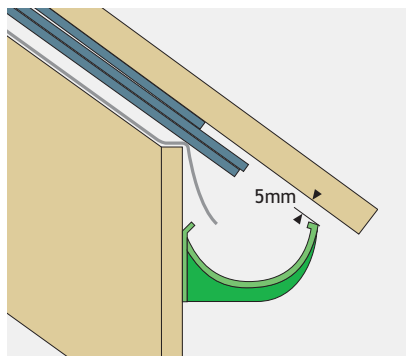
Aluminium rainwater systems installed in a coastal environment can be subject to harsh atmospheric conditions that can accelerate the oxidization process. Alumasc do not normally recommend using aluminium rainwater systems in such locations. However, applying a double coat of polyester powder coating prior to despatch, together with a strict and frequent maintenance regime, should result in the product having a life expectancy in excess of 15 years.

NB: This life expectancy depends on any installation damage being repaired immediately with appropriate touch-up paint, as should any site-cut ends exposing bare metal, which must be de-burred and then repainted in accordance with Alumasc's site painting procedure.

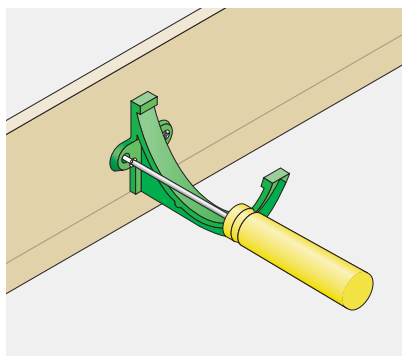
Please contact Alumasc Technical Services for further information.

Installation - Heritage Gutters

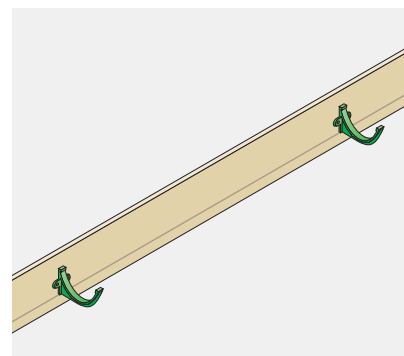
Heritage gutters are available in a choice of five profiles with a range of brackets to accommodate all types of eaves condition. Each profile range can be connected to aluminium pipework systems in either round, square or rectangular sections secured by standard and offset brackets. Assembly and installation of each profile range must be considered individually, although general aspects of preparation are common to them all as shown below.



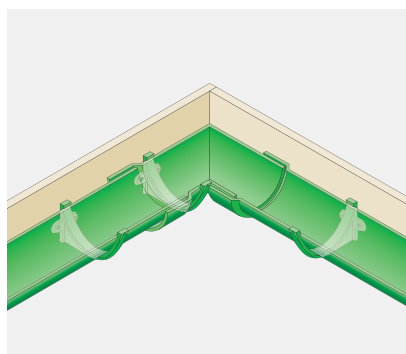
1. Using a straight edge or ruler, shim gutter brackets with 5mm clearance so that the last roof tile or slate will align with the mid point of the gutter.



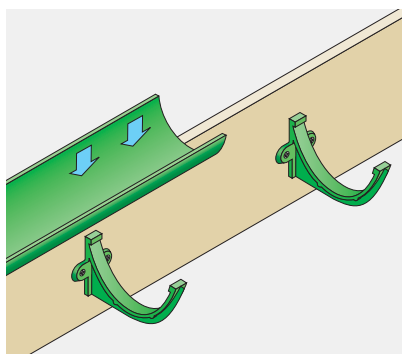
2. Generally, position brackets at 915mm centres. Allow at least 2 brackets per gutter length, 1 per angle and outlet.



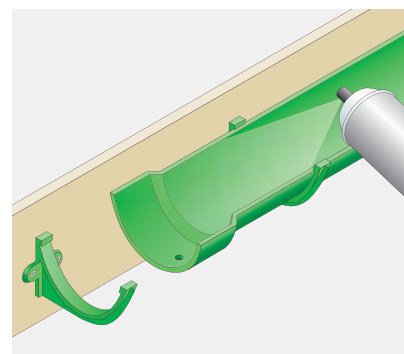
3. Use a string line to set out brackets to a fall of 1:600 to 1:350 (max) or if not possible, level.



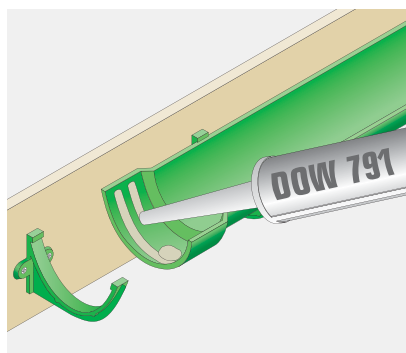
4. Plumb line outlets with gullies at ground level. Position angles, allowing an additional bracket adjacent to the joint with the gutter length.



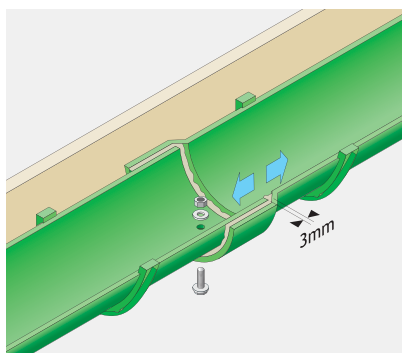
5. Lower the gutter onto the brackets ensuring sufficient clearance for the gutter joint. Clip gutter into bracket.



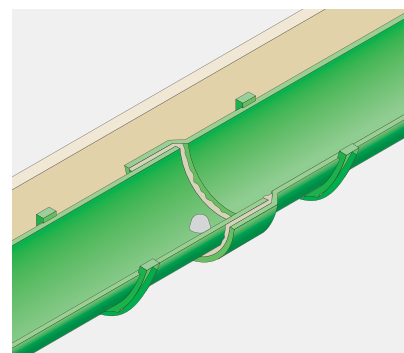
6. Cast gutters overlap at the joint with a spigot and socket. Thoroughly clean and degrease the ends that must be jointed.



7. Apply two 6mm beads of DOW 791 silicone sealant either side of, and around the fixing hole.



8. Insert the spigot end of the gutter allowing a 3mm expansion gap. Secure joint using aluminium M6 x 20mm nut, bolt and washer provided. (Bolt head preferably to underside).



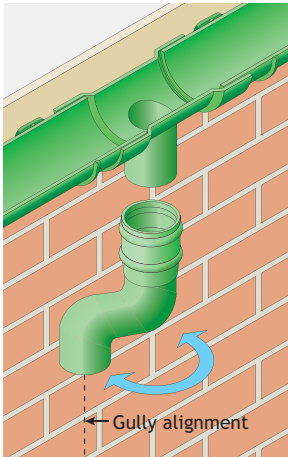
9. Finally, cone-off the exposed bolt stud and nut inside the gutter with a generous application of silicone sealant. Tool off excess silicone around the joint and from external surfaces.

Installation - Heritage Rainwater Pipe

Heritage traditional rainwater pipes have cast pipe sockets either with ears for wall fixing or without for use with pipe clips. Installation is generally from the eaves downward.

Where sockets are supplied separately these must be lightly driven home into the rainwater pipe using a softwood block or adequate protection at the pipe end to prevent damage. Saw cuts must be square and free from dents and burrs. A light application of silicone sealant must be applied to both surfaces to ensure a waterproof seal.

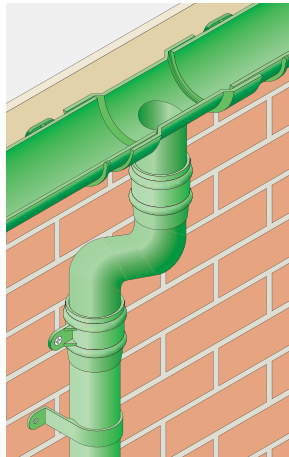
Pipe Alignment



Where square or rectangular pipes are being installed and offsets are required, alignment between the gutter outlet and gully must be exact.

Round pipe systems are more flexible to install and offsets can be adjusted and “swung” into alignment with the gully position.

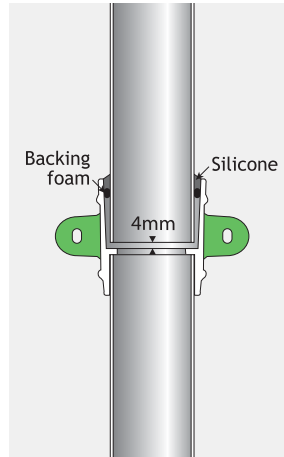
Outlets and Offsets



Commence installation from the gutter outlet by fitting and adjusting the one part or two part offsets.

Check vertical plumb line positioning and seal spigot and socket joints using DOW 791 silicone sealant.

Pipe Jointing and Fixing



Allow a 4mm expansion gap between pipe end and socket, and insert a 6mm backing foam into the pipe joint. Seal with DOW 791 silicone sealant.

Fix to wall at 2m centres using No12 x 50mm screws. Eared sockets have elongated fixing holes to permit the use of pipe nails.

Tools Required

- String or plumb line
- Tape measure
- Drill
- File
- Masonry bit
- Wall fixing (e.g raw plug)
- Cleaning rags
- Marker pen
- Solvent cleaner
- Posi and plain screwdriver
- Paintbrush
- Hacksaw
- Masking tape
- Mastic gun
- Spirit level
- Protective gloves
- Adjustable spanner

General Installation Sequence

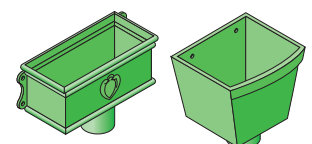
- Complete installation of gutters; alternatively, locate rainwater heads
- Position offsets, bends and branches
- Fit pipes and brackets
- Fit plinth offsets
- Fit access doors and shoes

Sealant

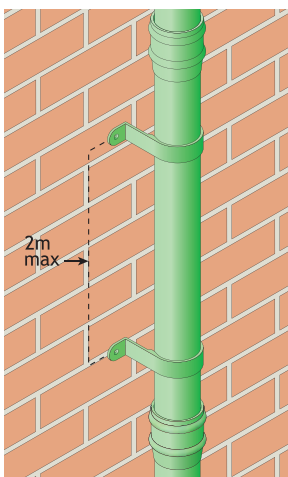
For durable all weather seals and best results, Alumasc recommend the use of DOW 791 silicone sealant.

Rainwater Heads

Fix to masonry through external lugs or preformed holes in back.



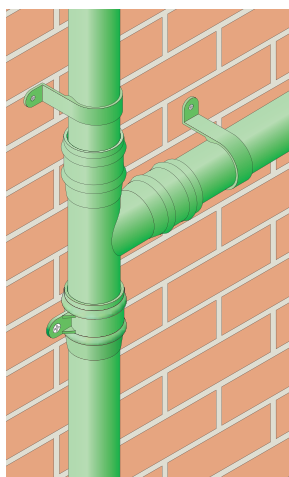
Pipe Clips



Where uneared pipework is being used it must be secured at maximum 2m centres.

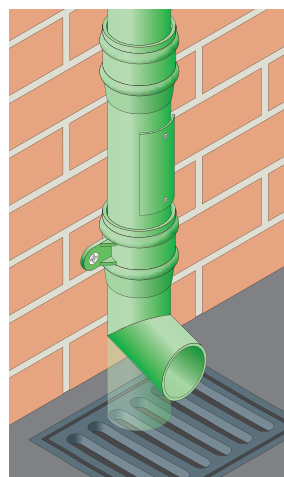
Pipe clips should be chosen according to visual or practical considerations and comprise Standard Base, Small Base and Extended Base options.

Bends and Branches



Bends and branches are secured into the pipe socket. Where additional fixing is required e.g a change of direction at a bend, use additional pipe clips.

Shoes and Access Pipes

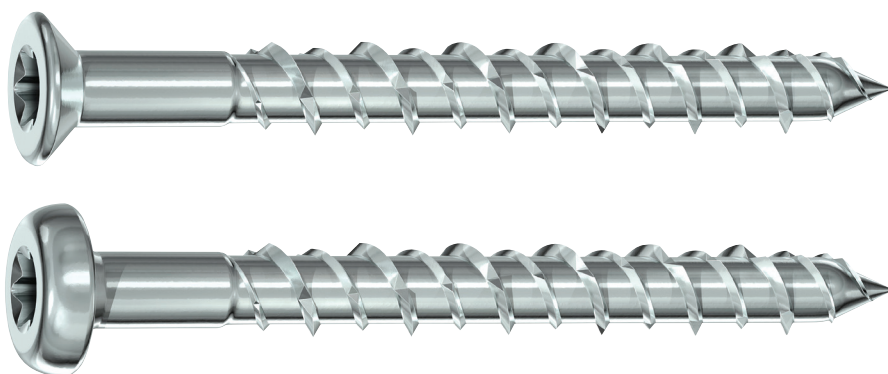


At ground level rainwater pipes can terminate with a shoe for free discharge over a gully or be directly connected into the gully.

In the case of direct connections it is recommended that an access pipe fitting is included within 750mm of ground level.

TECHNICAL INFORMATION FOR THE

^{TIMco}Multi-Fix[®] Masonry Screws

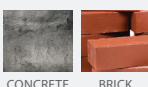
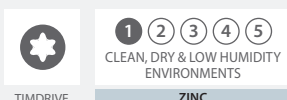
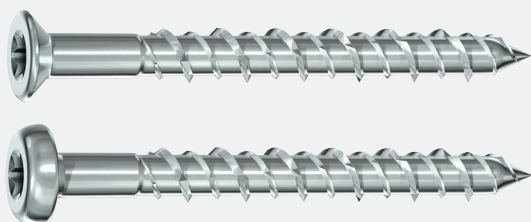


TECHNICAL DATA SHEET

Multi-Fix MASONRY SCREWS

COUNTERSUNK & PAN HEAD

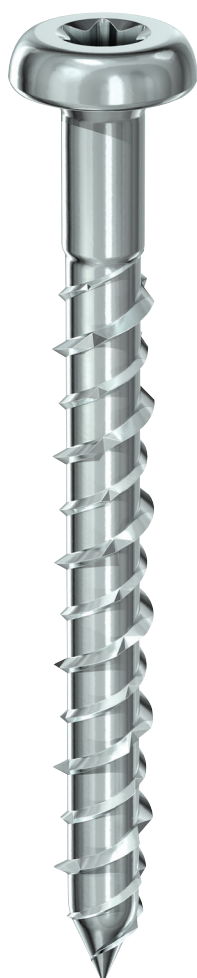
ZINC



- A rapid and effective light duty anchoring system for fixing into concrete and brick.
- One piece through fixing.
- Smaller hole diameter required, compared to other traditional light duty fixings
- All metal, non-flammable fixing.
- Non-expansion.
- Choice of Countersunk or Pan head types to suit multiple applications.



FEATURES



- Serrated V-threads to achieve optimum insertion into all masonry types
- Suitable for concrete and brick.
- Zinc plated for increased corrosion resistance.

COUNTERSUNK RANGE

ZINC

Product Code	Size Ø x L (mm)	Max. Fixture Thickness (mm)	Fixture Clearance Hole Ø (mm)	Box Qty	Carton Qty
640MFCSK	6 x 40	15	6.5	100	1,000
660MFCSK	6 x 60	35	6.5	100	1,000
680MFCSK	6 x 80	55	6.5	100	800
6100MFCSK	6 x 100	63	6.5	100	800

PAN HEAD RANGE

ZINC

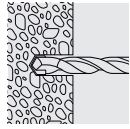
Product Code	Size Ø x L (mm)	Max. Fixture Thickness (mm)	Fixture Clearance Hole Ø (mm)	Box Qty	Carton Qty
640MFPAN	6 x 40	15	6.5	100	64,800
660MFPAN	6 x 60	35	6.5	100	43,200
680MFPAN	6 x 80	55	6.5	100	43,200
6100MFPAN	6 x 100	63	6.5	100	36,000

TECHNICAL DATA

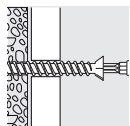


Substrate	Concrete ≥25N/mm ²	
Length (mm)	40-80	100
Rec. Tensile Load (kN) N_{rec}	1.0	1.5
Max Rec. Load (kg)	100	150
Rec. Shear Load (kN) V_{rec}	2.4	2.4

INSTALLATION GUIDELINES



Drill required diameter hole to the correct depth.



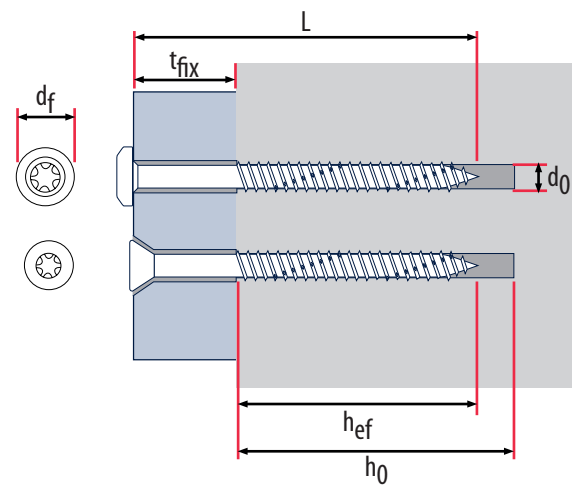
Using a power tool, tighten the fixing until secure.

INSTALLATION DATA - COUNTERSUNK

Product Code	Size Ø x Length L (mm)	Head Diameter d _f (mm)	Drill Hole d ₀ (mm)	Min. Drill Depth h ₀ (mm)	Max. Fixture Thickness t _{fix} (mm)	Min. Embedment Depth h _{ef} (mm)
640MFCSK	6 x 40	9.50	5.0	35	15	25
660MFCSK	6 x 60	9.50	5.0	35	35	25
680MFCSK	6 x 80	9.50	5.0	47	55	25
6100MFCSK	6 x 100	9.50	5.0	47	63	37

INSTALLATION DATA - PAN HEAD

Substrate	Size Ø x Length L (mm)	Head Diameter d _f (mm)	Drill Hole d ₀ (mm)	Min. Drill Depth h ₀ (mm)	Max. Fixture Thickness t _{fix} (mm)	Min. Embedment Depth h _{ef} (mm)
640MF PAN	6 x 40	10.50	5.0	35	15	25
660MF PAN	6 x 60	10.50	5.0	35	35	25
680MF PAN	6 x 80	10.50	5.0	47	55	25
6100MF PAN	6 x 100	10.50	5.0	47	63	37



L	Length
d _f	Head Diameter
d ₀	Drill Hole

h ₀	Minimum Drill Hole Depth
t _{fix}	Maximum Fixture thickness
h _{ef}	Minimum Embedment Depth