

RAINWATER SOLUTIONS

NEW SOUTH WALES

LYSAGHT



RAINWATER SOLUTIONS

Water overflow in domestic rainwater systems

Under the Environmental Planning and Assessment Act 1979 and its Regulations, all building work must be carried out in accordance with the ABCB National Construction Code 2016 (NCC). In addition to referring to Australian Standards AS/NZS 3500.3:2015 Plumbing and Drainage – Stormwater Drainage, the NCC also contains requirements for the disposal of surface water in Volume One, in Performance Requirements FP1.2 and FP1.3, and in Volume Two, in Part 3.5.2, namely, Performance Requirements P2.2.1 and Clauses 3.5.2.1 and 3.5.2.4.

The most common means to satisfy these requirements for roof drainage (i.e. guttering) installations is via compliance with the AS/NZS 3500.3.

Furthermore, in each state and territory it is necessary to satisfy the relevant regulation. For example, the NSW Code of Practice for Plumbing and Drainage (2006) adopts AS/NZS 3500.3 and associated amendments.

In the design and detailing of a roof drainage system consideration must be given to a range of the factors such as rainfall intensity, roof catchment area, gutter size/capacity, gutter fall, gutter outlets (sumps, rainheads, nozzles), downpipe size, quantity and placement, overflow consideration, material selection, jointing, etc.

It is the responsibility of designers and installers of roof drainage systems to ensure compliance with these requirements.

IMPORTANT INFORMATION ON OVERFLOW MEASURES

For residential roof drainage systems, high fronted gutters are a popular aesthetic choice to hide the lower edge of tiles or roof cladding. Where high-fronted gutters are installed, the NCC (and AS/NZS 3500.3) requires that provision must be made to avoid any overflow back into the roof or building structure.

Some simple overflow control methods that can be employed on high fronted gutters are listed below. It is important to note that it may be necessary to use more than one of these measures to achieve the necessary result:

A) Methods related to the design and installation of roof drainage systems:

- Slotted front of gutter – simple and popular choice which allows for water overflow through the slots visible on the front face of the gutter;
- Specifically located non-continuous overflows as permitted in the NCC i.e.:
 - Inverted downpipe drop/pop at high points in the gutter but set at a level below the fascia top,
 - Stop ends cut down to a lower level to act as a weir (stop end weirs could be hidden at the high point of the gutter and designed as part of an expansion joint),
 - Rainheads with overflow weir,
 - Holes, slot, or weir at downpipes;
- Gap between the fascia and the gutter back – a packer is inserted between the gutter back and the fascia; or
- Any of a number of other proprietary systems and trade solutions.

B) Methods related to alternative building designs methods:

- Unlined eaves – eliminates the issue where the house design suits.
- Gutter installed such that the gutter front is fully and sufficiently below the top of the fascia (freeboarding).
- Design for a higher rainfall intensity, as used for internal box gutters.
- Back flashing – where gutter support brackets allow back flashing installation (e.g. external brackets).

The following illustrations show some typical continuous and non-continuous overflow measures that may be used in combination with each other or with other overflow measures to meet the necessary requirements.

Please note that non-continuous measures may become blocked anywhere along their length, so non-continuous overflow measures may not be sufficient to prevent water from flowing back into a building.

Slotted gutters may also provide an overflow measure, however slots must be of sufficient size. For this reason, slots alone may not be a sufficient overflow measure in all circumstances. When designing a roof drainage system with slotted gutter, consideration should be given to additional overflow measures.



Typical overflow from slotted gutter.

(Gutter shown is not available in all areas).

DESIGN AND INSTALLATION OF DOMESTIC ROOF DRAINAGE SYSTEMS

The detailing and sizing of the selected overflow method/s is normally completed by the designer/installer, but must be adequate for the situation and must meet the relevant performance requirements of the NCC and Australian Standards, including the requirements noted above.

While there may be some variations from state to state, contractors who install guttering systems are generally required to hold an appropriate licence. In NSW, for example, a licence in the category of Builder, Plumber or Roof Plumber issued by the Office of Fair Trading is required and it is an offence to undertake this work without an appropriate licence. The work is required to comply with the appropriate codes and standards.

Statutory warranties normally apply and consumers have a right to lodge a complaint and have it dealt with by the appropriate authority. In NSW, for example, the statutory warranty is up to 6 years under the Home Building Act.

In the installation of the roof drainage system, particular focus should be given to the following;

- Attention to the use of compatible materials for drainage system components, leaf-guard type system components and compatible fasteners/sealants to connect and seal the components.
- The position of the gutter in relation to the fascia (particularly, whether there is a gap between the fascia and the gutter back and whether the gutter front is below the top of the fascia).
- Installation of the specified gutter and downpipes, ensuring that downpipes are installed in the correct locations and numbers.
- Gutter fall, ensuring sufficient fall and that it is in the direction of the downpipes.
- Overflow has been considered and specific details are installed where required as described above (such as when the gutter front is higher than the top of the fascia).

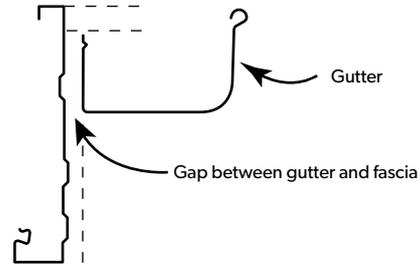
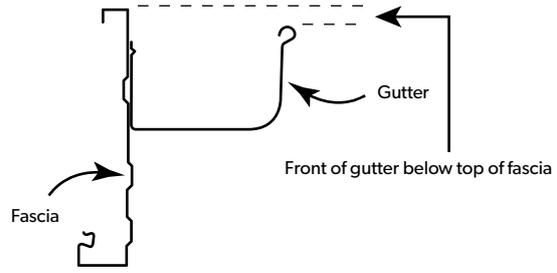
During the installation all debris and loose waste materials (swarf, fasteners, etc.) must be cleaned off at the end of each day and at the completion of the installation to prevent blockages of the drainage system or deterioration of the individual components. Any protective films should also be removed as part of the installation process.

MAINTENANCE OF DOMESTIC ROOF DRAINAGE SYSTEMS

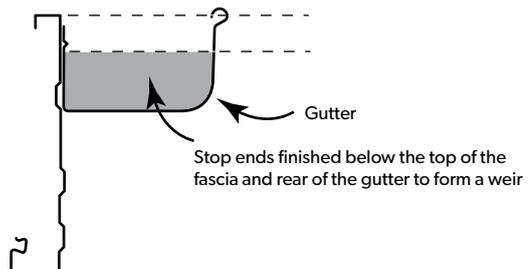
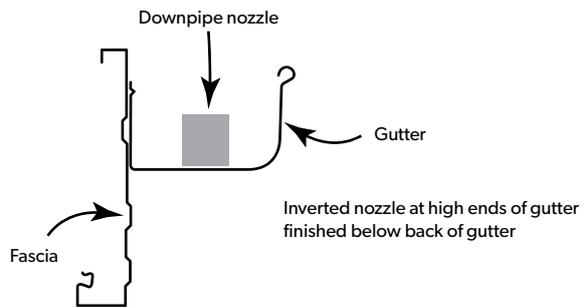
In the longer term, the ability of a roof drainage system to handle overflow will also depend on the regular cleaning of the system. For example the removal of plant or animal matter (leaves, fungal growth, dropping, nests, etc.) and debris from gutters, leaf-guard type systems and the gutter overflow devices to ensure free drainage of water.

To ensure the long life of the roof drainage system, the maintenance requirements of the roof drainage system should be forwarded to the occupier/owner of the building and should be fulfilled. Adequate maintenance is a requirement of rainwater goods warranties.

Continuous (full length) overflow measures



Non-continuous (specifically located) overflow measures



Information on designing a perimeter drainage system for a domestic roof

Roof drainage systems can be affected by a number of variables and must be designed and detailed by a suitably qualified trade or professional. The design of roof drainage aims to protect people, property and the building. The designed drainage system must be installed under the supervision of a qualified trade or professional. The steps of the design process are illustrated below.

1. Determine average recurrence interval (ARI).
2. Obtain rainfall intensity of site.
3. Work out roof dimensions.
4. Determined catchment area with slope.
5. Determine area for proposed eaves gutter.
6. Determine catchment area per downpipe.
7. Determine number of downpipes required.
8. Determine location of downpipes and high points.
9. Check catchment area for each downpipe.
10. Determine downpipe size.
11. Determine overflow measures.

Table 1

Design rainfall intensities adapted from NCC, Volume 2, Table 3.5.2.1.

	ARI once in 20 years mm/hr	ARI once in 100 years mm/hr
ACT		
Canberra	143	193
Gungahlin	137	179
Tuggeranong	148	210
New South Wales		
Albury	139	180
Broken Hill	143	219
Goulburn	121	156
Kiama	226	319
Newcastle	226	316
Orange	142	186
Sydney	200	262
Avalon	206	278
Campbelltown	167	222
Penrith	180	244
Windsor	175	233
Tweed Heads	252	330
Wollongong	217	308

DESIGN PROCEDURE

The steps in the design process are for a perimeter drainage system using the standard roll-formed rainwater products (gutters) installed at the building eaves. Drainage systems for larger roofs use box gutters at the perimeter and internally. Box gutter systems are thoroughly treated in AS/NZS 3500.3 and HB114:1998.

Diagrams, charts and data extracted from other publications (such as NCC, AS/NZS 3500.3, etc.) are indicative only. Reference should be made to these other publications for the most recent information.

Install gutters with a suitable fall to avoid ponding and to allow water to easily flow away. Steeper falls are preferred for prolonged life of the gutter. Refer to the NCC and the Australian Standards for guidance. Eaves gutters must have a gradient of 1:500 or steeper.

1. Decide on the average recurrence interval (ARI). Where significant inconvenience or injury to people, or damage to property (including contents of a building), is unlikely (typical of an eaves-gutter system) a minimum ARI can be 20 years. If these conditions are likely (typical of box gutters) 100 years is recommended.
2. Determine rainfall intensity for the site from Table 1. More data are in AS/NZS 3500.3.
3. Sketch a roof plan showing dimensions in plan view, pitch of roof, layout of ridges and valleys and large roof penetrations.
4. Calculate the catchment area of the roof from the plan. To allow for the slope of the roof, increase the plan area. Refer to AS/NZS 3500.3 for the increased area. As a 'rule of thumb' allow 1% for every degree of pitch up to 36°.
5. Get the effective cross-sectional area of the gutter you intend to use from Table 2.
6. Using the cross-sectional area of the gutter on the graph in Figure 1, determine the catchment area per downpipe.
7. Calculate (as a first test) the minimum number of downpipes required for the selected gutter using the equation:

$$\left. \begin{array}{l} \text{Number of} \\ \text{downpipes (min.)} \end{array} \right\} = \frac{\text{Total catchment area of the roof}}{\text{Catchment area (determined in 6)}}$$

Round the number of downpipes up to the next whole number.

8. On the plan, select locations for the downpipes and the high points in the gutters. Where practical, the catchments for each downpipe should be about equal in area. When selecting the location of high points and downpipes, consideration should also be given to proximity to high concentrations of water flow (e.g. valley gutters, diversions around large roof penetrations, dormers, etc.). More guidance is given in AS/NZS 3500.3, HB114:1998 and NCC. Calculate the area of each catchment for each downpipe.
9. With the area of your eaves gutter, check that the catchment area for each downpipe, calculated in Step 8, is equal to or less than the catchment area shown by the graph. If a catchment area is too big then you can:
 - Increase the number of downpipes;
 - Reposition the downpipes and/or the high points;
 - Choose a gutter with bigger effective cross-sectional area, then repeat the above from Step 6.
10. Decide on the downpipe size. Recommendations in AS/NZS 3500.3 on downpipe sizes. Table 2 gives the standard size downpipes available to suit the requirements given in AS/NZS 3500.3.
11. Consider measures to counter potential overflow of gutters into the building (see pages 2 and 3). Consideration of overflow at high concentrations of water flow may need to be given. Guidance on this matter is given in NSW Dept of Fair Trading bulletin FTB40 (January 2009).

Overflow capacity of slots in the LYSAGHT® gutters are provided in Table 3.

Table 2

LYSAGHT® gutter areas and downpipes.

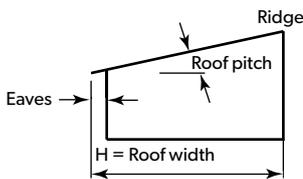
Minimum standard downpipe sizes to suit gutters (gutter gradient ≥ 1:500)				
	Slotted	Effective # cross section	Round (diameter)	Rectangular or square
	yes/no	mm ²	mm	mm
Quad Hi-front	yes	5225	90	100x50
	no	5809	90	100x50
Quad Lo-front	no	6165	90	100x50
SHEERLINE®	yes	7600	100	100x75
	no	8370	§	100x75
TRIMLINE®	yes	6244	90	100x50
	no	7800	100	100x75
150 Half Round	yes	4675	90	100x50
	no	7042	100	100x75
150 Half Round Flat Back	yes	4602	90	100x50
	no	6914	100	100x75
Half Round 100	no	4300	75	100x50*
Half Round 125	no	6300	90	100x50*
Half Round 150	no	9200	§	100x75*
Half Round 200	no	14500	§	§
Half Round 250	no	24500	§	§
Half Round 300	no	35300	§	§

Values calculated in accordance with AS/NZS 3500.3.

§ Non standard downpipe and nozzle/pop is required.

* Non standard nozzle/pop is required to suit rectangular downpipe.

SINGLE SLOPE ROOF



HIP OR GABLE ROOF

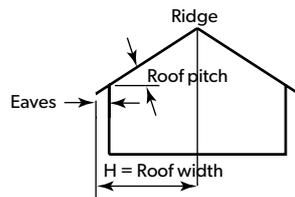


Table 3

LYSAGHT® gutter slot overflow capability.

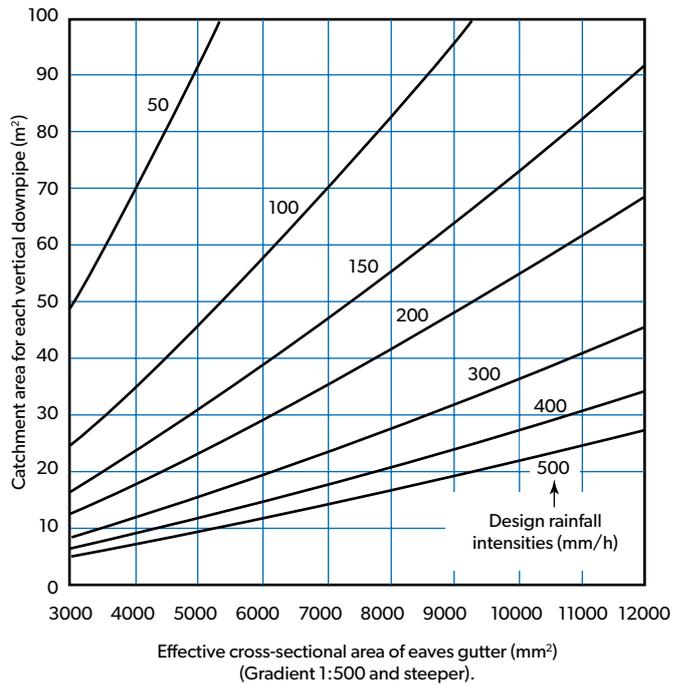
Rainfall Intensity	Rigid-fix		Flexiblefix	
	Catchment area	Domestic 22.5° pitched roof width "H"	Catchment area	Domestic 22.5° pitched roof width "H"
mm/hr	m ² perm run of gutter	m	m ² perm run of gutter	m
100	8.3	6.9	14.3	11.9
150	5.5	4.6	9.5	7.9
200	4.2	3.4	7.1	5.9
250	3.3	2.8	5.7	4.7
300	2.8	2.3	4.8	4.0
350	2.4	2.0	4.1	3.4
400	2.1	1.7	3.6	3.0

Notes:

1. Check with your local service centre for the availability of slots.
2. Slot overflow is based on test results.
3. The slot capacity is conservative and can be used for all gutters produced in NSW.
4. Flexible-fix refers to long straight runs of gutters. Rigid-fix refers to short length of gutters that are rigidly held in place by corners, downpipes, and the like.
5. The rainfall intensity is for an ARI of 1:100 years
6. No allowance has been given to drainage from upper roof or wall surfaces. No allowance has been given to roof penetrations or high concentrations of water flow

Figure 1

Cross-sectional area of eaves gutters required for various roof catchment areas (where gradient of gutter is 1:500 and steeper). (Adapted from AS/NZS 3500.3).

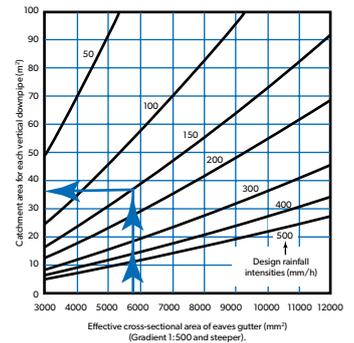


EXAMPLE

Find the minimum catchment area for each downpipe on a house in Tuggeranong using Quad Hi-front gutter.

Method

Using the gutter cross sectional area taken from Table 2 (shown across the bottom of the graph) draw a line upwards until it intersects with the Design rainfall intensity (Table 1). Draw a line at 90° to determine the catchment area for each downpipe.



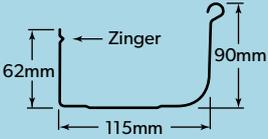
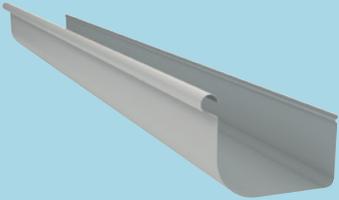
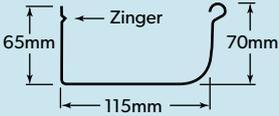
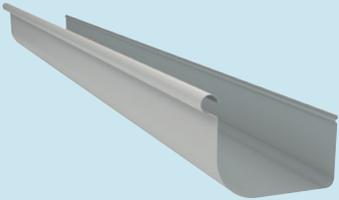
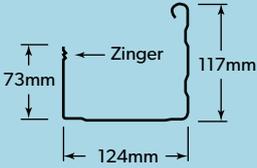
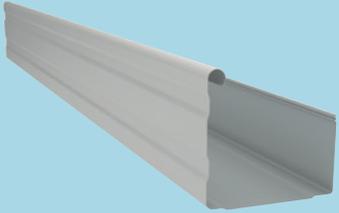
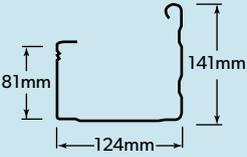
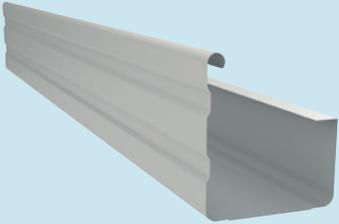
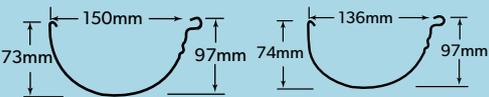
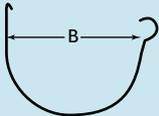
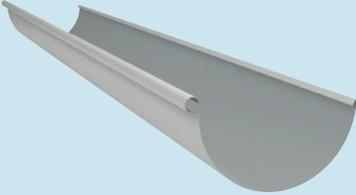
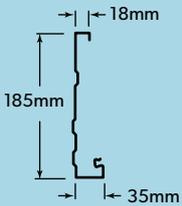
DATA

Design rainfall intensity = 148 (Table 1)
Gutter area = 5804 (Table 2)

SOLUTION (From Figure 1)

Catchment area for each downpipe = 37m²

LYSAGHT® GUTTERS, FASCIA AND ACCESSORIES

<p>QUAD Hi-Front</p>	 <p>Profile shown unslotted for clarity.</p>	
<p>QUAD Lo-Front</p>		
<p>TRIMLINE®</p>	 <p>Profile shown unslotted for clarity.</p>	
<p>SHEERLINE®</p>	 <p>Profile shown unslotted for clarity.</p>	
<p>150 HALF ROUND & FLAT BACK</p>	 <p>Profile shown slotted.</p>	
<p>HALF ROUND (Bought in)</p>		
<p>NOVALINE® Fascia</p>		

LYSAGHT® quality gutters and fascia are available in unpainted ZINCALUME® steel and in a range of COLORBOND® steel pre-painted colours to match or contrast your roof. All accessories shown below are manufactured with compatible materials. Visible accessories are available plain or coloured to match the gutter and fascia.

- Classic design that is the leading choice in new homes
- The high front design obscures the roofline for a more attractive finish
- Compatible with NOVALINE® Fascia System for quick, easy attachment to the building
- Available with optional slotting to allow overflow in conjunction with additional overflow measures, where necessary
- Suitable for steel or tile roofs

ACCESSORIES



- Traditional design that is suitable for new homes or to match existing gutters
- Popular as a replacement gutter
- Compatible with NOVALINE® Fascia System for quick, easy attachment to the building
- Suitable for steel or tile roofs

ACCESSORIES



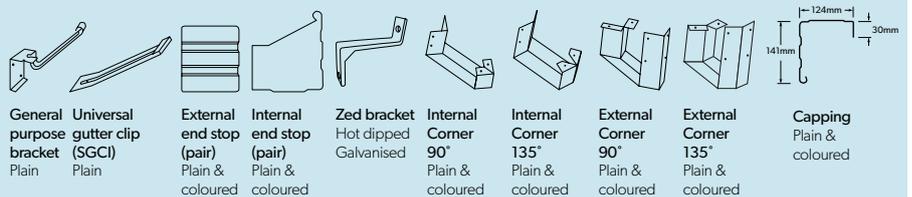
- Slim, elegant square gutter particularly suited to domestic applications that is fast and simple to install
- Concealed fixing offers clean, attractive 'trim' lines
- Compatible with NOVALINE® Fascia System for quick, easy attachment to the building
- Available with optional slotting to allow overflow in conjunction with additional overflow measures, where necessary
- Suitable for steel or tile roofs

ACCESSORIES



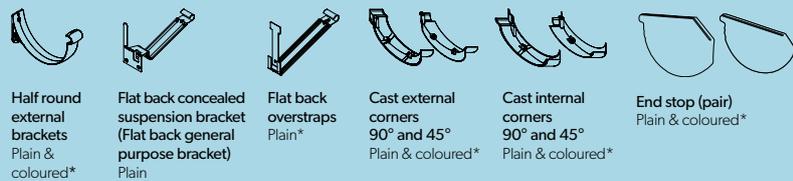
- Popular for home improvement projects like patios, pergolas and sheds and for use with high profile roofing laid at low pitches or traditional domestic roofs requiring large water carrying capacity
- Concealed fixing offers clean and seamless finish
- SHEERLINE® capping available for trimming roof edges
- Available with optional slotting to allow overflow in conjunction with additional overflow measures, where necessary

ACCESSORIES



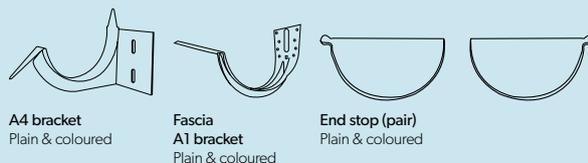
- Large water carrying capacity for high rainfall areas and large roof sizes
- Curved base provides improved self-cleaning and minimises build-up of water and dirt
- A complete range of accessories are available
- Flat Back gutter offers concealed fixing for clean and seamless finish
- Available with optional slotting to allow overflow

ACCESSORIES



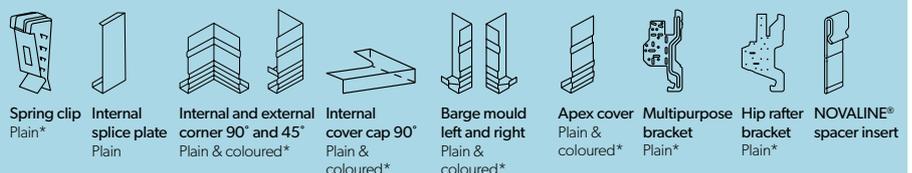
- Large water carrying capacity for high rainfall areas and large roof sizes
- Heavy duty brackets available
- Dimensions (Nominal diameter) B=100mm, 125mm, 150mm, 200mm, 250mm, 300mm

ACCESSORIES



- Perfect with Quad and TRIMLINE® gutters
- NOVALINE® Fascia replaces traditional timber fascia which reduces painting and maintenance
- NOVALINE® Fascia Cover can be used as a quick fix over existing timber fascia
- Extensive range of accessories

ACCESSORIES



*Product is available in COLORBOND® Ultra steel or Heavy Coated, designed for severe coastal and industrial environments.

DOWNPIPES & ACCESSORIES

Completing your rainwater system



Finish your roof with the distinctive style of the LYSAGHT® downpipes and accessories. These downpipes and accessories are compatible with the NOVALINE® Fascia System, and with a wide range of gutters.

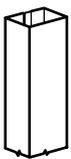
All LYSAGHT® downpipes and accessories are made from galvanised or ZINCALUME® steel, which means they are strong and made to last.

Most downpipes and accessories are available in unpainted ZINCALUME® steel and a range of COLORBOND® steel colours to

match or contrast with your roof. They are compatible with steel and tile roofs.

A wide range of rectangular, square and round downpipes available to complement all building styles. Some dimensions and availability may vary slightly from region to region.

DOWNPIPES



Rectangular or square
100x50
100x75
100x100



Round
90
100

DOWNPIPE ACCESSORIES



Astragal/brackets



Pops



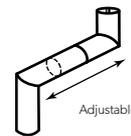
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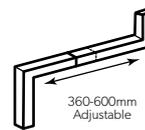
Square corner



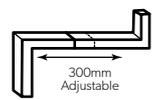
Round corner



Adjustable



360-600mm Adjustable



300mm Adjustable

Offsets

TRADEWORK & FLASHINGS

Made to order to your specifications

Refer to the NSW price list for the full range of tradework and flashing products available. Ask your technical sales representative for details.

To order your rainwater head or other trade item, supply detailed drawings or template showing front and side elevations with dimensions and we can manufacture for you. Some standard

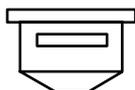
shapes and dimensions are available. For the rainwater heads, the outlet holes and nozzles are not included.

The selection, design, sizing and overflow method should be specified by a suitably qualified trade or professional in accordance with NCC and Australian standards.

TRADEWORK



LYSAGHT® standard rainwater heads
390 W x 300 H x 250 D



Tapered rainwater heads
(downpipe outlet not included)
Small: 380 x 175 x 200 mm
Large: 450 x 250 x 250 mm
Or to your dimensioned drawing.



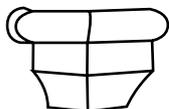
Custom made square rainwater heads
(downpipe outlet not included)
To your dimensioned drawing.



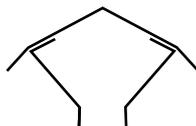
Custom made round rainwater heads
To your dimensioned drawing.



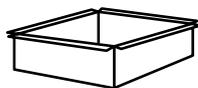
Corner OGEE® rainwater head
To your dimensioned drawing.



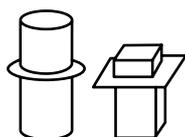
OGEE® rainwater head
Small: 310 x 200 mm
Large: 400 x 250 mm
Or to your dimensioned drawing.



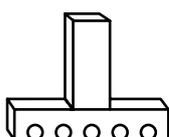
Chinaman's hat
Standard or made to order to your dimensioned drawing.
Sizes from 150-400mm.



Sump tray
To your dimensioned drawing.



Overflows
To your dimensioned drawing.

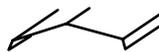


Spreaders
To your dimensioned drawing.

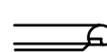
MATERIALS FOR TRADEWORK

- COLORBOND® steel
- COLORBOND® Ultra steel
- COLORBOND® Metallic steel
- ZINCALUME® steel
- GALVABOND® steel
- Stainless steel 304-2B, 316-2B
- Copper

FLASHINGS



Ridge capping



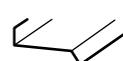
Barge roll



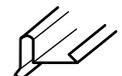
Valley flashing



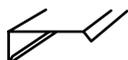
Roll top ridge capping



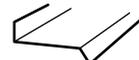
Apron flashing



Barge gutter



Barge capping



Tapered custom flashing



Box gutter custom flashing

MATERIALS FOR FLASHINGS

- COLORBOND® steel
- COLORBOND® Ultra steel
- COLORBOND® Metallic steel
- ZINCALUME® steel
- Galvanised steel

OTHER PRODUCTS

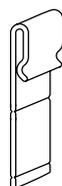
Other rainwater system products are available. Refer to the NSW price book for full details.



NOVALINE® fascia cover



SHEERLINE® capping



Spacer Insert

INSTALLATION ADVICE

Get it right first time with LYSAGHT® products



BRACKET SPACING

When the gutters are attached to NOVALINE® fascia, then the gutter bracket spacing should mirror the spacing of the NOVALINE® brackets (i.e. 600mm & 1200mm), and the gutter brackets should be adjacent to the NOVALINE® brackets.

However, when the gutters are fixed to other fascias then the weight of the water carried by the gutter should determine spacing required - however spacing should not exceed 1200mm maximum.

FALL

Install gutters with a suitable fall to avoid ponding and to allow water to easily flow away. Steeper falls are preferred for prolonged life of the gutter. Refer to the NCC and the Australian Standards for guidance.

METAL & TIMBER COMPATIBILITY

Lead, copper, bare steel and green or some chemically-treated timber are not compatible with this product; thus don't allow any contact of the product with those materials, nor discharge of rainwater from them onto the product. If there are doubts about the compatibility of other products being used, ask for advice from our information line.

ROOF DRAINAGE SYSTEM DESIGN

Roof drainage systems should be designed and detailed by a suitably qualified trade or professional in accordance with the NCC and the Australian Standards. Particular reference should be made to the correct sizing of gutter; quantity and placement of downpipes; and the provision of appropriate overflow devices. (Page 2-3).

ADVERSE CONDITIONS

If these products are to be used within 1km of marine, severe industrial, or unusually corrosive environments, ask for advice from our information line.

INSTALLATION ADVICE

The roof drainage system should be installed using good trade practices and by a certified installer.

For sealed joints use screws or rivets and neutral-cure silicone sealant branded as suitable for use with galvanised or COLORBOND®/ZINCALUME® steel.

CLEAN UP

Remove all plastic cover strips from product and dispose of correctly.

Sweep all metallic swarf and other debris from roof areas, gutters, downpipes, overflow devices and all other roof drainage components, at the end of each day and at the completion of the installation.

GUTTER MAINTENANCE

The roof drainage system (gutter, downpipes, overflow devices and all other components) must be cleaned out on a regular basis.

GUTTER MAINTENANCE

Getting the most from LYSAGHT® products



1) A typical suburban gutter clogged with leaf litter prior to cleaning.



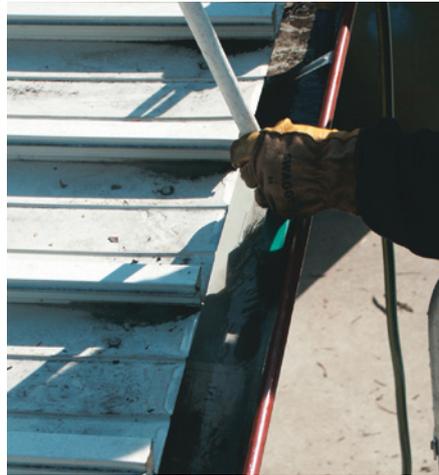
2) Wear correct protection when clearing leaves and twigs.



3) When litter is removed, the layer of hardened dirt is revealed below.



4) Rinse the gutter with water to soften and break up the dirt.



5) Use a soft bristle brush and sweep the dirt out. Rinse again.



6) When the gutter has been cleaned, it should look like this.

CLEANING GUTTERS

Twigs, dust, leaves and fungal matter (debris) should be removed regularly from gutters - as failure to do so voids your warranty.

- Sweep debris into a pile using a stiff, soft bristled brush (shovels or hard tools should not be used).
- The whole roof and gutter should then be washed down with a hose, including high ends of gutters (possibly protected by overhangs), rain heads, water spouts and overflow locations.

A well maintained gutter/downpipe will make your rainwater system provide years and years of trouble-free service.

PRODUCT DESCRIPTIONS

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FOR YOUR NEAREST SUPPLIER VISIT:

WWW.LYSAGHT.COM

FOR SALES ENQUIRIES CALL 13 30 38

FOR TECHNICAL ENQUIRIES CALL 1800 641 417

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