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# BDAQ Member Alert

No 4 – February 2011 APPENDIX No 1

## EAVES GUTTERS & DOWNPIPES FOR CLASS 1 & 10 BUILDINGS APPENDIX No 1 (Australian Standard – v – 2010 BCA Volume 2

### INTRODUCTION:

There are many discrepancies between AS/NZS 3500.3:2003 – Plumbing and Drainage and BCA 2010 Volume 2. *(Note: Manufacturers' information for gutters and downpipes is generally in keeping with AS/NZS 3500.3:2003 – Plumbing and Drainage.*

The BCA 2010 Volume 2 calls up AS/NZS 3500.3:2003 in PART 3.5.2 Gutter and Downpipes. It is recommended that great care be taken if BCA 2010 Volume 2 is used to establish the eave gutter and downpipes requirements for Class 1 & 10 projects.

***A.*** ***Acceptable construction manuals:***
***Clause 3.5.2.0***
*Performance Requirement P2.2.1 is satisfied for gutters and downpipes if they are designed and constructed in accordance with AS/NZS 3500.3*

### General procedure for selecting gutters and downpipes:

Establish the roof catchment area (m²) to be serviced. *(Plan view)*
Establish the roof pitch. *(Slope.)*
Establish the *(Rainfall intensity 1: 20 Years storm with 5 minute duration)* for the location.
Establish the eaves gutter slope (I.e. steeper than 1:500 or less than 1:500)
Select gutter type and establish its cross sectional area to suit roof catchment area.
Select type of downpipe and establish its cross sectional area. *(The downpipe size relates to the cross-sectional area of the gutter chosen.*
Calculate the required number of downpipes to suit eaves gutter.
Calculate the required number of stormwater pipes to suit the No of downpipes.

### Roof drainage design:

Try to have approximately equal catchment areas draining to each down pipe, with high points at the edge of the catchment area and downpipes midway of the catchment area. The BCA requires downpipes at or within 1200mm of a valley gutters. However the AS/NZS 3500.3 allows downpipes at any point along the gutter as long as it suits the roof catchment area. It is suggested that the eaves gutter at the valley gutters be a High Point for the eaves gutter. Where there are no stop ends in the gutter, water will flow between catchments with excess water continuing to the next downpipe or overflowing.

Any size, or shape eaves gutter may be used, as long as the cross sectional area is equal to, or greater than the size required. An extra downpipe may be required to be installed to discharge the roof water from the gutter and prevent overflowing.

The number of downpipes required is the theoretical number required. This is not always a whole

number. So the number may have to be rounded up, if the fraction of a downpipe is greater than 0.1 then round up to the next hold number. If the fraction of a downpipe is less than 0.1 you may rounded down.

### Water flow:

The flow of water in a downpipe is restricted by the entry size. The greater the depth of water over the downpipe, the greater the volume of water carried by the downpipe. This is why we sometimes have a rainwater head over some downpipes, to increase the depth of water over the entry and hence force more water into the downpipe. Rainwater heads are mainly used in Class 2 and 3 residential buildings and commercial buildings where box or tapered gutters are used.

### Downpipes:

A 90 diameter down pipe is equivalent to a 5175 mm² rectangular downpipe in cross sectional area.
A 100 diameter downpipe is equivalent to a 6409 mm² rectangular downpipe.
A 150 diameter downpipe is equivalent to a 14,365 mm² rectangular downpipe.

A rectangular downpipe cross sectional area must be approx 1.23 times the area of a circular down pipe to carry the same flow. This is because a rectangular section is a less efficient cross section than a circular downpipe.

If you wish to use a circular downpipe section, the reverse applies. Find the area of the rectangular section required then divide by 1.23 to find the equivalent circular cross sectional area. Then find the equivalent circular diameter. The way water enters a downpipe and its shape affects the flow rate. Circular downpipes are more efficient than rectangular downpipe. By introducing a rainwater head improves the flow rate of the downpipe further.

## GIVEN CRITERIA FOR ROOF DRAINAGE EXERCISES:

* **Rainfall intensity 1: 20 Years in Mackay = 273mm/h**
  *(AS/NZS 3500.3:2003 – Figure E10 - AREA 5) (or) ( BCA Vol 2 - Table 3.5.2.1)*
* **Roof Pitch = 22.5°** *(Given)*
* **Roof Area in Plan = 150 m²** *(Given)*
* **Roof Area multiplier for roof pitches between 22° & 23° pitch = 1.21**
  *(AS/NZS 3500.3:2003 – Table 3.2)*

☞ **Roof Catchment Area = 150 m² x 1.21 = 181.5 m²**

## MANUFACTURER'S INFORMATION — Stramit® Gutters

| STRAMIT® GUTTERS – CROSS SECTIONAL AREA (mm2) | |
|---|---|
| ***Stramit® M Pattern*** Gutter | 7900 |

Sizing of downpipe relates to the cross-sectional area of the chosen gutter. The table below gives the minimum round and rectangular downpipe size for the *Stramit M Pattern* Gutter.

## ☞ MINIMUM DOWNPIPE SIZE TO SUIT SELECTED GUTTER

| STRAMIT DOWNPIPES MINIMUM SIZES (mm) | | |
|---|---|---|
| **Gutter** | **round* (diameter)** | **rectangular*** |
| ***Stramit® M Pattern*** Gutter | 100 | 100 x 75 |

## ☞ AREA OF SELECTED DOWNPIPE

**STRAMIT® DOWNPIPES – SIZES & AREAS**

| rectangular | | | round | |
|---|---|---|---|---|
| width-A (mm) | depth-B (mm) | area ($mm^2$) | diameter-D (mm) | area ($mm^2$) |
| 100 | 75 | 7500 | 100 | 7850 |

**NOTE:**
Using the AS/NZS 3500.3:2003 – Plumbing and Drainage is the option recommended when establishing the gutter and downpipe requirements for Class 1 and 10 buildings.

Designers must keep in mind that Australian Standards are minimum requirements and not best practice.

Let's review four (4) of the 5 Options at your disposal for determining size and number of gutter and downpipes.

- No 1 AS/NZS 3500.3:2003 – Plumbing and Drainage.
- No 2 Using 2010 BCA Volume 2 – PART 3.5.2 Gutters and Downpipes.
- No 3 Roof Rainwater Drainage Design Checklists.
- No 4 Gutters & Downpipes using "Stramit" Information.
- No 5 Gutters & Downpipes using the "SteelSelect" Calculator
  (Option 5 Not covered HERE) http://www.roof-gutter-design.com.au/Downp/applet.php

# OPTION No 1 USING AUSTRALIAN STANDARD AS/NZS 3500.3:2003 - Plumbing and Drainage

**SELECTED GUTTER FOR PROJECT - Stramit Gutter "M Pattern" - ECSA 7900 mm²**

**Refer: TABLE 3.2 – CATCHMENT AREA – SLOPE FACTOR *(F)***
**EAVE GUTTER ONLY**

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TABLE 3.2

CATCHMENT AREA—SLOPE FACTOR (*F*) (FOR EAVES GUTTERS ONLY)

| Roof slope (degrees) | Factor for increased surface area of roof (*F*) | Roof slope (degrees) | Factor for increased surface area of roof (*F*) | Roof slope (degrees) | Factor for increased surface area of roof (*F*) |
|---|---|---|---|---|---|
| 0 | 1.00 | 22 | 1.20 | 44 | 1.48 |
| 1 | 1.01 | 23 | 1.21 | 45 | 1.50 |
| 2 | 1.02 | 24 | 1.22 | 46 | 1.52 |
| 3 | 1.03 | 25 | 1.23 | 47 | 1.54 |

**Refer:** **FIGURE 3.1 – COMPONENTS OF THE CATCHMENT AREA**

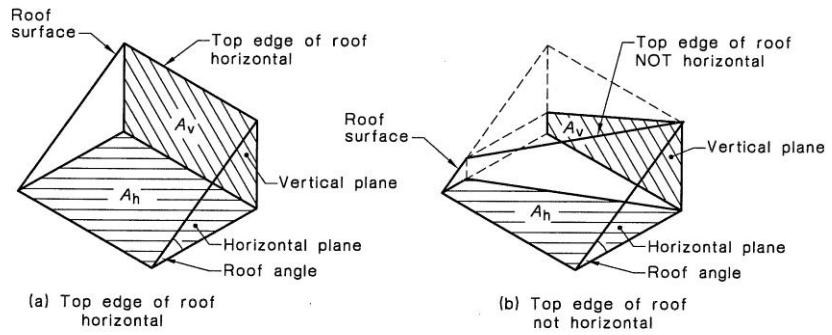


FIGURE 3.1 COMPONENTS OF THE CATCHMENT AREA

**NOTE:**
**BUILDING DESIGNERS MUST INCLUDE VERTICAL WALL AREAS IN THE CATCHMENT AREA WHEN USING SKILLION ROOFS AND PARAPETS ON FLAT ROOF DESIGNS.**

**Refer:** **TABLE 3.3 EAVE GUTTER – REQUIRED SIZE OF VERTICAL DOWNPIPE**

**GIVEN** Gradient of **1:500**
ECSA of **7900 mm²**

**Refer:** **AS/NZS 3500.3:2003 - TABLE 3.3 BELOW:**

TABLE 3.3

EAVES GUTTER—REQUIRED SIZE OF VERTICAL DOWNPIPE

| Maximum effective cross-sectional area of an eaves gutter ($A_e$), see AS/NZS 2179.1. (Required effective cross-sectional area is obtained from Figure 3.5) Nearest 100 mm² | | Internal size of vertical downpipe mm | |
|---|---|---|---|
| Gradient | | Cross-section | |
| 1:500 and steeper | Flatter than 1:500 | Circular | Rectangular or square |
| 3 500 | 4 700 | 65 | 65 × 50 |
| 4 200 | 5 600 | 75 | 65 × 50 |
| 4 600 | 6 200 | 75 | 75 × 50 |
| 4 800 | 6 400 | 80 | 75 × 50 |
| 5 200 | 7 000 | 80 | 100 × 50 |
| 5 900 | 7 900 | 85 | 100 × 50 |
| 6 400 | 8 600 | 90 | 100 × 50 |
| 6 600 | 8 900 | 90 | 75 × 70 |
| 6 700 | 9 000 | 100 | 75 × 70 |
| 8 200 | 11 000 | 100 | 100 ×75 |
| 9 600 | 12 900 | 125 | 100 ×75 |
| 12 800 | 17 100 | 125 | 100 × 100 |
| 12 800 | 17 200 | 150 | 100 × 100 |
| 16 000 | 21 500 | 150 | 125 × 100 |
| 18 400 | 24 700 | 150 | 150 × 100 |
| 19 200 | 25 800 | — | 150 × 100 |
| 20 000 | 26 800 | — | 125 × 125 |

**7900 mm²**

**FINDINGS** **Requires an Internal Size of Vertical Downpipe to be:**

(a) **100 mm Diameter *(or)***
(b) **100mm x 75mm Rectangular minimum.**

**Refer:** **FIGURE 3.5(A) REQUIRED SIZE OF EAVES GUTTER FOR GRADIENTS FOR 1:500 AND STEEPER.**



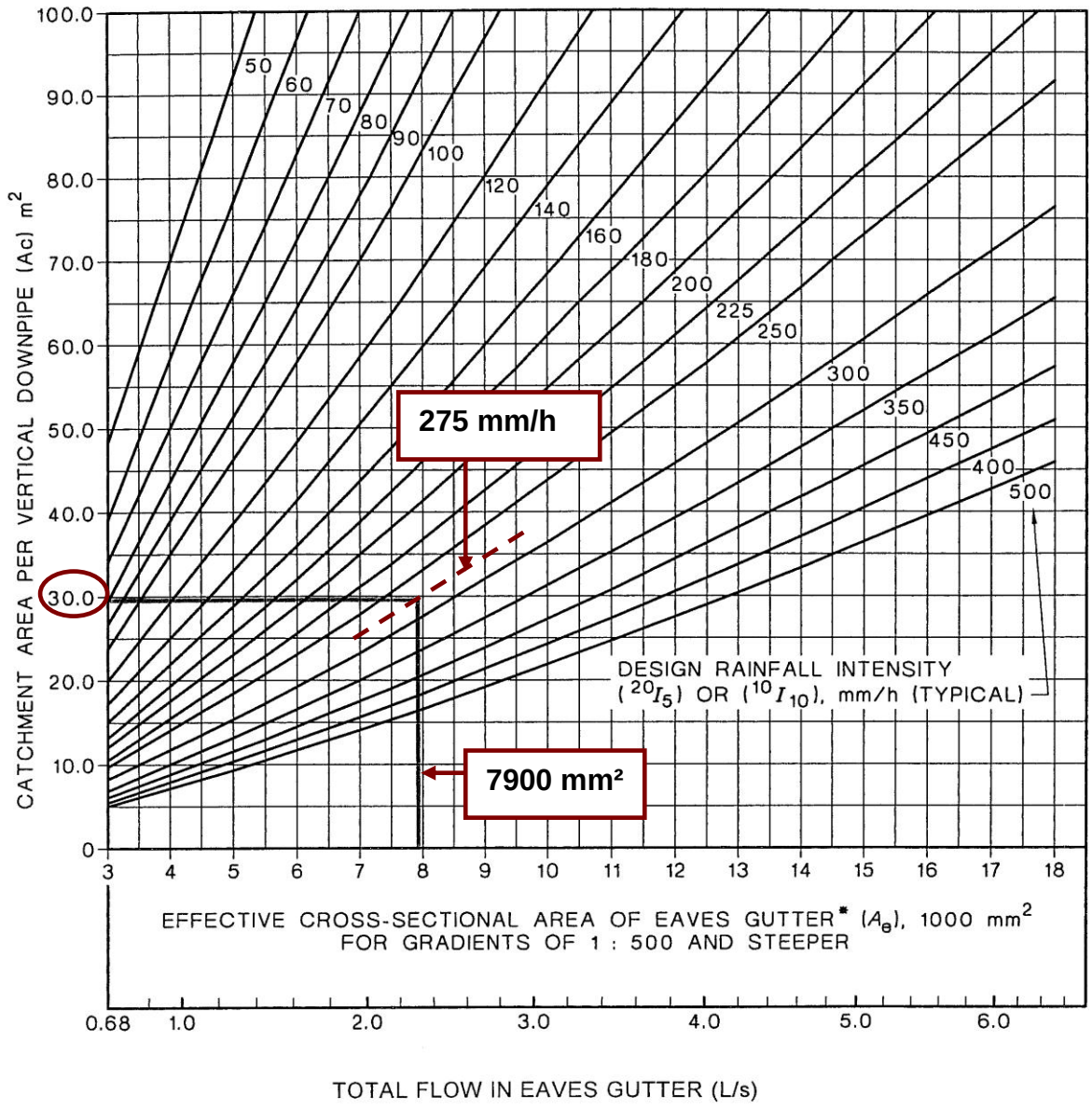


FIGURE 3.5(A) REQUIRED SIZE OF EAVES GUTTERS FOR GRADIENTS FOR 1:500 AND STEEPER

**FINDINGS:** *Using an **ECSA of 7900 mm²** and a DESIGN RAINFALL INTENSITY OF **273mm/h** the graph gives a CATCHMENT AREA PER VERTICAL DOWNPIPE of about **30 m²***

## NUMBER OF DOWNPIPES

**No** = ROOF CATCHMENT AREA ÷ CATCHMENT AREA PER DOWNPIPE

= 181.5 m² ÷ 30 m²

= **# 6** *(NOTE: The Designer should always round up.)*

# OPTION No 2 USING 2010 BCA VOLUME 2 – PART 3.5.2 GUTTERS AND DOWNPIPES in Lieu of AS/NZS 3500.3

## A. Acceptable construction manuals

### 3.5.2.0

*Performance Requirement* P2.2.1 is satisfied for gutters and downpipes if they are designed and constructed in accordance with AS/NZS 3500.3 — Stormwater drainage, or AS/NZS 3500.5 — Domestic installations, Section 5 — Stormwater.

### 3.5.2.3 Selection of guttering

The size of guttering must—

(a) be in accordance with Table 3.5.2.2; and

(b) be suitable to remove rainwater falling at the appropriate rainfall intensity listed in Table 3.5.2.1 as follows—

(i) for eaves gutters — 20 year *average recurrence interval*;

### 3.5.2.4 Installation of gutters

(a) Gutters must be installed with a fall of not less than—

(i) 1:500 for eaves gutters, unless fixed to metal fascias;

***NOTE:*** ***The fall provided for metal fascias may be less than 1:500 therefore more downpipes will be required Refer to AS/NZS 3500.3:2003 - FIGURE 3.5(B)***

**Refer: FIGURE 3.5(B) REQUIRED SIZE OF EAVES GUTTER FOR GRADIENTS FLATTER THAN 1:500.**



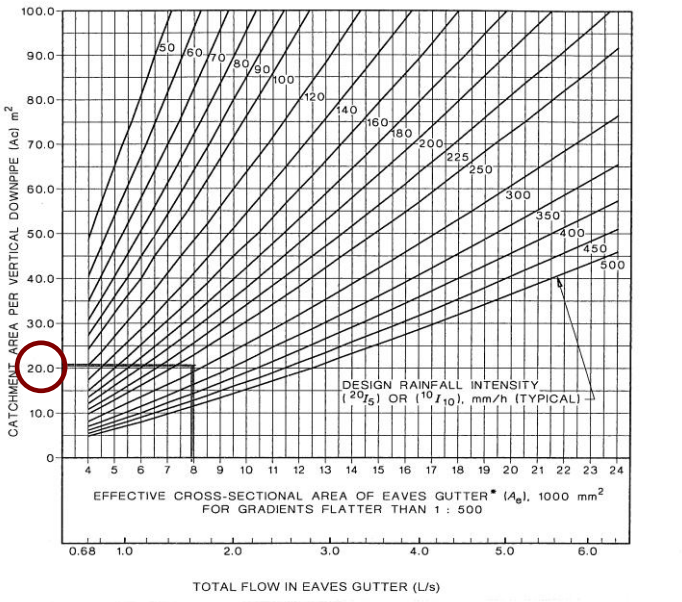


FIGURE 3.5(B) REQUIRED SIZE OF EAVES GUTTERS FOR GRADIENTS FLATTER THAN 1:500

**FINDINGS:** ***Using an ECSA of 7900 mm² and a DESIGN RAINFALL INTENSITY OF 273mm/h the graph gives a CATCHMENT AREA PER VERTICAL DOWNPIPE of about 21 m²***

**BCA VOL 2 - Clause 3.5.2.5 Downpipes — size and installation**

Downpipes must—

(a) not serve more than 12 m of gutter length for each downpipe

b) be located as close as possible to valley gutters and, if the downpipe is more than 1.2 m from a valley, provision for overflow must be made to the gutter; ….

***NOTE:*** ***2010 BCA Volume 2 - Clause 3.5.2.5(b) does not comply with AS/NZS 3500.3:2003***

**FINDINGS:** ***The gutter at the valley may be the High Point. See figure H3 below.***

**Refer: AS/NZS 3500.3:2003 - FIGURE H3: ROOF PLAN – BELOW**



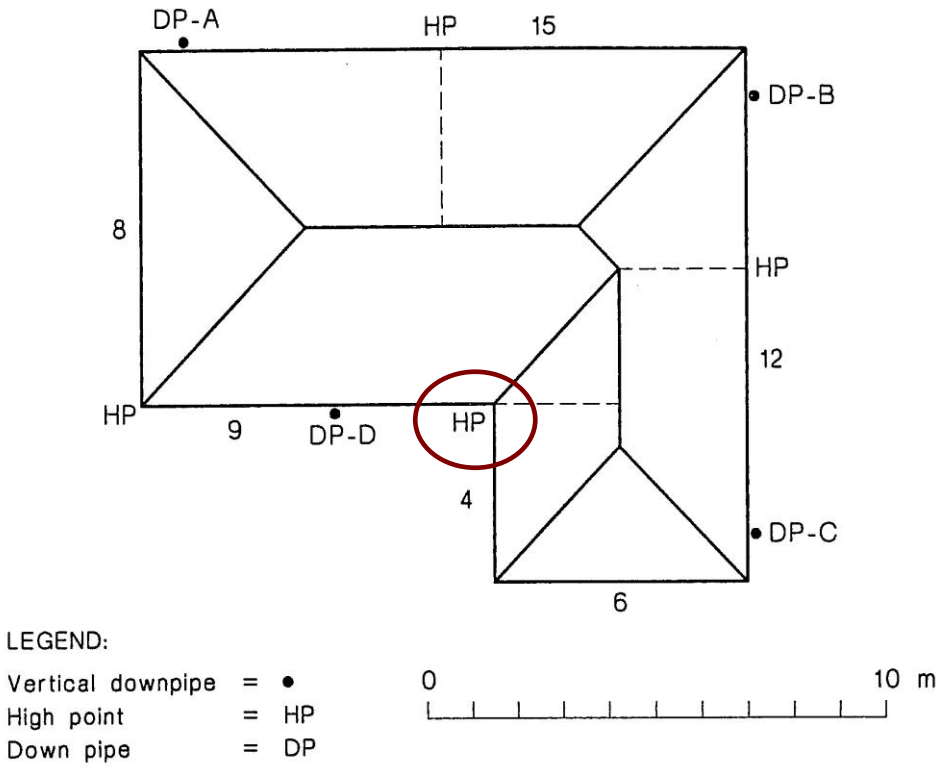


FIGURE H3 ROOF PLAN—CASE 1

**Refer:** **AS/NZS 3500.3:2003 - FIGURE 3.4 - Note # 6 regarding location of vertical downpipes which states that downpipes can be located at any point.**



NOTES:

1 The letter in a bracket at the head of each symbol refers to the corresponding step in the example (see Paragraph H2.2, Appendix H).

2 Appendix D gives guidelines for the determination of rainfall intensities.

3 $A_e$ to be in the range for gradients of—

(a) 1:500 and steeper, 3000 $mm^2$ to 18 000 $mm^2$; or

(b) flatter than 1:500, 4000 $mm^2$ to 24 200 $mm^2$.

4 Consideration needs to be given to the criteria for thermal variation (see Clause 4.3).

A1 5 For eaves gutters of domestic buildings with hipped and/or gable roofs of constant slope with no flat roofs or walls contributing to the catchment area, the catchment area calculations may be based entirely on Equation 3.4.3 (2) using $F$ determined by the roof slope and $A_h$ determined from a plan. If Equation 3.4.3 (2) is used, it is not necessary to take account of wind direction. Examples of the use of this method are shown in Appendix H and in HB114.

6 The vertical downpipe and any horizontal bends in an eaves gutter may be located at any point along the length of the catchment. Where this occurs, the whole catchment to that downpipe shall be used with Figure 3.5a or Figure 3.5b (gutters less than 1:500) to size the eaves gutter to ensure that the vertical downpipe size is sufficient.

FIGURE 3.4 (in part) FLOW CHART—GENERAL METHOD FOR DESIGN OF EAVES GUTTER SYSTEMS

## BCA VOL 2 - Clause 3.5.2.5(c) Downpipes - size and installation *(Contd.)*

(c) be selected in accordance with the appropriate eaves gutter section as shown in Table 3.5.2.2.

## Table 3.5.2.1 RAINFALL INTENSITIES

**FINDINGS:** From the Table 3.5.2.1 it is established that Mackay has an average recurrence intensity in 20 years of: **273 mm/h.**

## *Table 3.5.2.2 GUTTER AND DOWNPIPE SELECTION*

**Table a. Gutter sizes for various rainfall intensities and roof catchment areas per downpipe**

| Design Rainfall Intensity (mm/h) (as per Table 3.5.2.1) | Roof Catchment Area per Downpipe — $m^2$ | | | | |
|---|---|---|---|---|---|
| | 30 | 40 | 50 | 60 | 70 |
| | Size of gutter required to drain roof catchment area into one (1) downpipe (A, B, C, D, E and F defined in Table b.) | | | | |
| 273 mm/h (Mackay) | A or C *(No)* | A or D *(No)* | B or E *(No)* | F | F |

***NOTE:*** ***TABLE 3.5.2.2 does not comply with AS/NZS 3500.3:2003.***

***RECOMMENDED REPLACEMENT FOR:***

***Table 3.5.2.2 GUTTER AND DOWNPIPE SELECTION***

*(Revised by Glen Place to be in keeping with **AS/NZS 3500.3:2003.** 28/02/11)*

**Table a. Gutter sizes for various rainfall intensities and roof catchment areas per downpipe**

| Design Rainfall Intensity (mm/h) (as per Table 3.5.2.1) | Roof Catchment Area per Downpipe — $m^2$ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 20 | 25 | 30 | 40 | 45 | 50 | 55 | 60 | 70 |
| | Size of gutter required to drain roof catchment area into one (1) downpipe (A, B, C, D, E and F defined in Table b.) | | | | | | | | | |
| 273 mm/h (Mackay) | A or C | A or C or D | B or E | B or E | F | F | F | F | F | F |

**FINDINGS:** ***A gutter with an Established Cross Sectional Area of 7900mm$^2$ and with 100 mm Diameter (or) 100mm x 75mm Rectangular downpipes is to service a Roof Catchment Area per Downpipe of 30 m$^2$***

**Table b. Gutter sizes for various rainfall intensities**

| Gutter Type (as per Table a.) | Gutter description | Minimum Cross Sectional Area $mm^2$ |
|---|---|---|
| **A** | Medium rectangular gutter | 6500 |
| **B** | **Large rectangular gutter** | **7900** |
| **C** | 115 mm D gutter | 5200 |
| **D** | 125 mm D gutter | 6300 |
| **E** | 150 mm D gutter | 9000 |
| **F** | Gutter must be designed in accordance with AS/NZS 3500.3.2 *or Section 5 of AS/NZS 3500.5* | |

***NOTE:*** ***A Stramit Gutter "M Pattern" has an ECSA 7900 mm² (GUTTER TYPE B)***

## SUITABLE DOWNPIPE SIZE TO SUIT GUTTER SIZE:

| Table c. Downpipe selection | | | | | |
|---|---|---|---|---|---|
| **Downpipe Section** | **Gutter Sections — (as per Table b.)** | | | | |
| | **A** | **B** | **C** | **D** | **E** |
| **75 mm dia.** | Yes ***(No)*** | Yes ***(No)*** | Yes ***(No)*** | Yes ***(No)*** | No |
| **100 mm × 50 mm** | Yes | Yes ***(No)*** | Yes | Yes | Yes ***(No)*** |
| **90 mm dia.** | Yes | Yes ***(No)*** | Yes | Yes | Yes ***(No)*** |
| **100 mm × 75 mm** | Yes | **Yes *(Yes)*** | Yes | Yes | Yes |
| **100 mm dia.** | Yes | **Yes** | Yes | Yes | ***(No)*** |
| **Legend:** | Yes—downpipe is suitable for the eaves gutter selection; and | | | | |
| | No—downpipe is not suitable for the eaves gutter selection. | | | | |

***NOTE:*** ***TABLE c for Downpipe Selection does not comply with AS/NZS 3500.3:2003***

***FINDING:*** ***In accordance with AS/NZS 3500.3:2003 a gutter with a Cross Sectional Area of (B) 7900 mm$^2$ requires a downpipe of 100 mm Diameter (or) 100mm x 75mm Rectangular.***

***If the designer uses a downpipe from Table c which has a Cross Sectional Area less than is required by AS/NZS 3500.3:2003 the BCA does not nominate the extra number of downpipes required to service the gutter.***

## OTHER OPTIONS

**OPTION No 3 ROOF RAINWATER DRAINAGE DESIGN CHECKLIST**
**Refer to Building newsflash number 136 -**
**Stormwater and on site drainage design for Class 1 & 10.**
*(Revised by Glen Place to suit a rainfall intensity of 273mm/h. 24/01/11)*

## BCA VOLUME 2 – TABLE 3.5.2.1 & AS/NZS 3500.3- 2003

*** Rainfall intensity 1: 20 Years in Mackay = 273mm/h** *(BCA Vol 2 - Table 3.5.2.1)*
*** Roof Pitch = 22.5°** *(Given)*
*** Roof Area in Plan = 150 m²** *(Given)*

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**A simplified step-by-step method is provided to assist building certifiers in assessing the suitability of the stormwater design of Class 1 and Class 10 buildings.**
***(Building newsflash number 136 Amended to suit example by Glen Place.)***

**STEP 1: CALCULATE PLAN ROOF AREA FROM FLOOR PLAN:**

**Say 150 m² (Plan view.)**

**STEP 2: DETERMINE TOTAL EFFECTIVE ROOF CATCHMENT AREA BY APPLYING THE SLOPING FACTOR (F) - ROOF PITCH:**

**When the Pitch is 22.5º**

**Roof Area multiplier for roof pitches of 22.5° = 1.21**

*For information refer to AS/NZS 3500.3:2003, TABLE 3.2 (Page 24)*

**Total effective roof Catchment Area = 150 m² x 1.21 = 181.5 m²**

**STEP 3: DETERMINE 5-MINUTE RAINFALL INTENSITY FOR ARI 20 YEARS.**

For Mackay area the Rainfall Intensity is **273 mm/h.**

For other areas refer to AS/NZS 3500.3:2003 - FIGURE E 10 AREA 5.

**STEP 4: SELECT EAVES GUTTER AND GUTTER SLOPE:**

Gutter size 123mm x 90 mm nominal (rectangular gutter) *(Capacity Size: 123mm x 65 mm)*

Slope 1:500 minimum

Stramit Gutter "M Pattern" - ECSA 7900 mm²

Maximum Downpipe Catchment Area for Mackay Using Stramit Gutter "M Pattern" is **30 m²**

**STEP 5: DETERMINE NOMINAL SIZE OF VERTICAL DOWNPIPE:**

From TABLE 3.3 (AS/NZS 3500.3:2003)

Downpipe Size: 100 mm Diameter (or) 100mm x 75mm Rectangular

**STEP 6: DETERMINE ALLOWABLE MAX. CATCHMENT AREA PER DOWNPIPE:**

From Figure 3.5(A), the allowable maximum catchment per downpipe is 30 m².

**STEP 7: MINIMUM NUMBER OF DOWNPIPES:**

**Downpipes:** (Using 100 mm Diameter (or) 100mm x 75mm Rectangular.)

**No of Downpipes** = *Roof Catchment Area ÷ Downpipe Catchment Area*

= 181.5 m² ÷ 30 m²

= No # 6.05 *(6.05 is less than 6.1 therefore adopt 6)*

**FINDINGS: No of Downpipes Required = # 6 minimum**

**STEP 8: AVERAGE CATCHMENT PER DOWNPIPE:**

Roof Catchment Area ÷ Number of Downpipes = m² / downpipe

**181.5 ÷ 6 = 30.5 m²**

**STEP 9: DIVIDE THE ROOF AREA INTO APPROXIMATE EQUAL CATCHMENT AREAS AND LOCATE DOWNPIPE POSITIONS:**

Check that the actual catchment areas are less than or equal to the allowable maximum catchment per downpipe.

## SURFACE (STORMWATER) WATER DRAINAGE SYSTEM:

· Effective **Roof Area:** **181.5 m²**

· 5 minute rainfall intensity for Mackay - ARI 20 years = **273 mm/hr**
· Pipe capacity if laid at 1/100:
· a) for PVC DN 90 = 360 L/min
· b) for PVC DN 100 = 450 L/min
*(Refer to AS 2200: 2006 - Design charts for water supply and sewerage)*

**Total rainfall intensity:** **Effective Roof Area x Rain Intensity ÷ 60 min. = L/min**
**181.5 x 273 ÷ 60 = 826 L/min**

**No of surface drainage pipes required for DN 90 = 826 ÷ 360 = # 3 *(or)***
**No of surface drainage pipes required for DN 100 = 826 ÷ 450 = # 2**

**NOTE:** *Surface drainage system must be designed that DN100 shall not carry more than 450L/min if laid at grade 1: 100.*

# OPTION No 4 GUTTERS & DOWNPIPES USING "STRAMIT" INFORMATION

## GUTTER CAPACITIES FROM STRAMIT (Stramit® Gutters)

| STRAMIT® GUTTERS – CROSS SECTIONAL AREA (mm2) | |
|---|---|
| ***Stramit® Quad 125*** Gutter | 6200 |
| ***Stramit® Quad 150*** Gutter | 8600 |
| ***Stramit® Quad 175*** Gutter | 14500 |
| ***Stramit Compact Gutter®*** | 6550 |
| ***Stramit® M Pattern* Gutter** | **7900** |
| ***Stramit Queenslander Quad®*** Gutter | 8100 |

**STRAMIT® DOWNPIPES – SIZES & AREAS**

| rectangular | | | round | |
|---|---|---|---|---|
| width-A (mm) | depth-B (mm) | area ($mm^2$) | diameter-D (mm) | area ($mm^2$) |
| 100 | 50 | 5000 | 85 | 5670 |
| **100** | **75** | **7500** | **100** | **7850** |
| 100 | 100 | 10000 | 125 | 12270 |
| 150 | 100 | 15000 | 150 | 17670 |

Sizing of downpipe relates only to the cross-sectional area of the chosen gutter. The table below gives the minimum round and rectangular downpipe size for each ***Stramit® Gutter***.

| STRAMIT DOWNPIPES - MINIMUM SIZES (mm) | | |
|---|---|---|
| **Gutter** | **round* (diameter)** | **rectangular*** |
| ***Stramit® Quad 125*** Gutter | 100 | 100 x 75 |
| ***Stramit® Quad 150*** Gutter | 125 | 100 x 100 |
| ***Stramit® Quad 175*** Gutter | 150 | 150 x 100 |
| ***Stramit Compact Gutter®*** | 100 | 100 x 75 |
| ***Stramit® M Pattern* Gutter** | **100** | **100 x 75** |
| ***Stramit Queenslander Quad®*** Gutter | 100 | 100 x 75 |

* Smaller downpipes may be used provided the gutter capacity is reduced in drainage calculations.

In theory any size of gutter can be used to drain any roof catchment. What controls design is the number of downpipes needed to perform within the capacity of each gutter. In practice the larger the gutter the less the number of downpipes required, as indicated in the table [below].

Normally catchment calculations must take into account the increased area due to roof slope. The required downpipe table incorporated in the Stramit manual takes account of roof slopes up to **23°**.

Therefore the roof area for use with the Stramit table requires only the simple calculation of plan area.

**FROM THE "STRAMIT" TABLE ON PAGE 14 BELOW THE FOLLOWING IS ESTABLISHED**

FOR a Plan Roof Area of 150 m² (HAVING A ROOF PITCH UP TO **23°**)

USING a Stramit Gutter "M Pattern" with an **ECSA of 7900 mm²**

Maximum Roof Catchment Area could be: **32 m²**

Number of Required Vertical Downpipes is: **# 6**

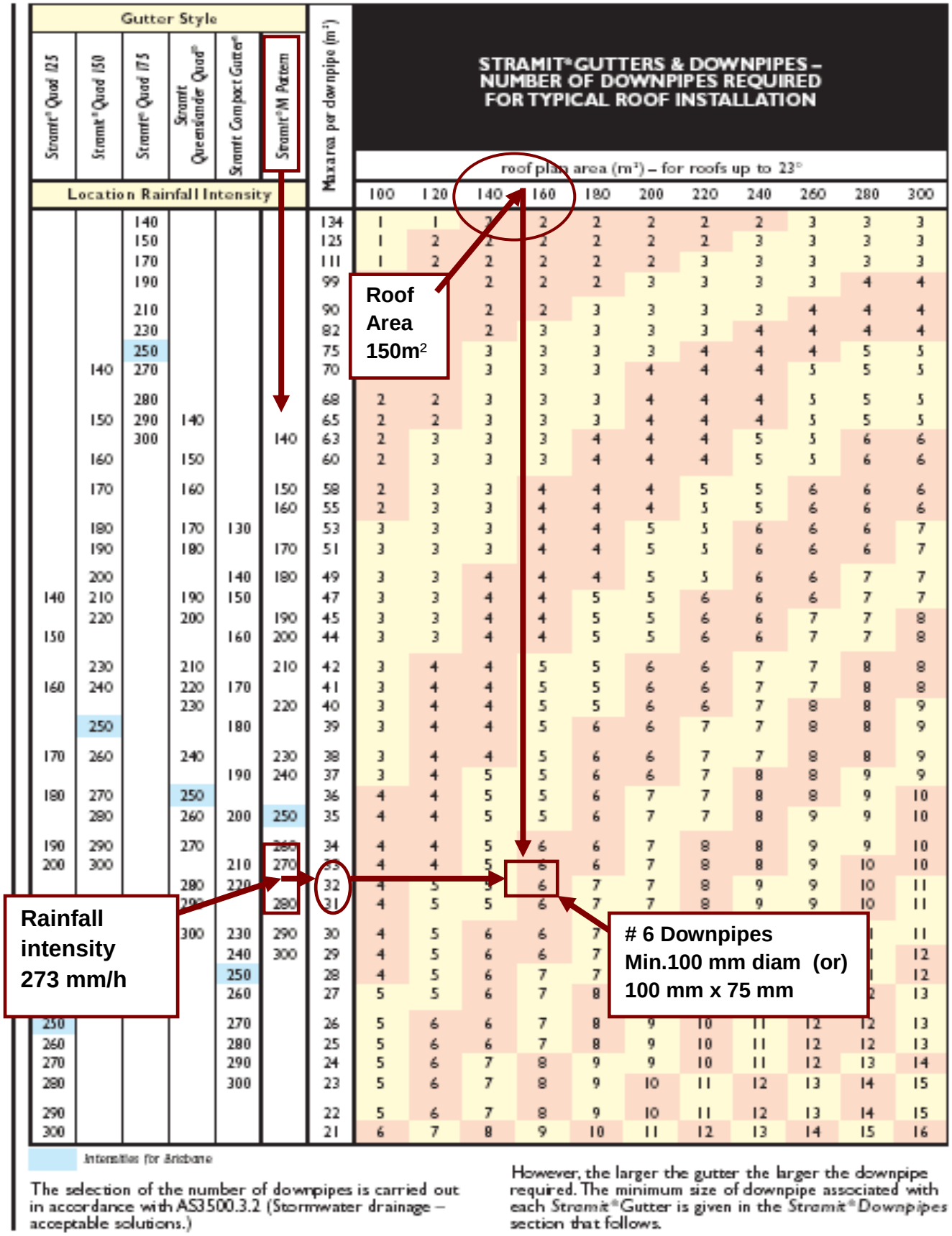
The Stramit Maximum Roof Catchment Area from the Table below *(page 14 of 14)* does correspond in general with AS/NZS 3500.3:2003.

## OPTION No 5 GUTTERS & DOWNPIPES USING THE STEELSELECT CALCULATOR

OPTION No 5 **-** Gutters & Downpipes using the **SteelSelect** calculator is not covered here. Go to the link below to access the **SteelSelect** calculator.
http://members.ozemail.com.au/~ksengs/DPcalc.html

**Note:**
There are other calculators available for determining Gutters & Downpipes for Class 1 and 10 buildings.

# OPTION No 4 GUTTERS & DOWNPIPES USING "STRAMIT" TABLE



| Gutter Style | | | | | | | STRAMIT® GUTTERS & DOWNPIPES – NUMBER OF DOWNPIPES REQUIRED FOR TYPICAL ROOF INSTALLATION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stramit® Quad 125 | Stramit® Quad 150 | Stramit® Quad 175 | Stramit Queenslander Quad® | Stramit Compact Gutter® | Stramit® M Pattern | Maxarea per downpipe (m²) | roof plan area (m²) – for roofs up to 23° | | | | | | | | | | |
| Location Rainfall Intensity | | | | | | | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 |
| | | 140 | | | | 134 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| | | 150 | | | | 125 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| | | 170 | | | | 111 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |
| | | 190 | | | | 99 | | | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 |
| | | 210 | | | | 90 | | | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| | | 230 | | | | 82 | | | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 |
| | | 250 | | | | 75 | | | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 |
| | 140 | 270 | | | | 70 | | | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 5 |
| | | 280 | | | | 68 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 5 |
| | 150 | 290 | 140 | | | 65 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 5 |
| | | 300 | | | 140 | 63 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 6 | 6 |
| | 160 | | 150 | | | 60 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 6 | 6 |
| | 170 | | 160 | | 150 | 58 | 2 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 6 | 6 | 6 |
| | | | | | 160 | 55 | 2 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 6 | 6 | 6 |
| | 180 | | 170 | 130 | | 53 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 7 |
| | 190 | | 180 | | 170 | 51 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 7 |
| | 200 | | | 140 | 180 | 49 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 |
| 140 | 210 | | 190 | 150 | | 47 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 7 | 7 |
| | 220 | | 200 | | 190 | 45 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 | 8 |
| 150 | | | | 160 | 200 | 44 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 | 8 |
| | 230 | | 210 | | 210 | 42 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 | 8 | 8 |
| 160 | 240 | | 220 | 170 | | 41 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 | 8 | 8 |
| | | | 230 | | 220 | 40 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 8 | 8 | 9 |
| | 250 | | | 180 | | 39 | 3 | 4 | 4 | 5 | 6 | 6 | 7 | 7 | 8 | 8 | 9 |
| 170 | 260 | | 240 | | 230 | 38 | 3 | 4 | 4 | 5 | 6 | 6 | 7 | 7 | 8 | 8 | 9 |
| | | | | 190 | 240 | 37 | 3 | 4 | 5 | 5 | 6 | 6 | 7 | 8 | 8 | 9 | 9 |
| 180 | 270 | | 250 | | | 36 | 4 | 4 | 5 | 5 | 6 | 7 | 7 | 8 | 8 | 9 | 10 |
| | 280 | | 260 | 200 | 250 | 35 | 4 | 4 | 5 | 5 | 6 | 7 | 7 | 8 | 9 | 9 | 10 |
| 190 | 290 | | 270 | | [illegible] | 34 | 4 | 4 | 5 | 6 | 6 | 7 | 8 | 8 | 9 | 9 | 10 |
| 200 | 300 | | | 210 | 270 | [illegible] | 4 | 4 | 5 | [illegible] | 6 | 7 | 8 | 8 | 9 | 10 | 10 |
| | | | 280 | 220 | [illegible] | 32 | 4 | 5 | 5 | 6 | 7 | 7 | 8 | 9 | 9 | 10 | 11 |
| | | | [illegible] | [illegible] | 280 | 31 | 4 | 5 | 5 | 6 | 7 | 7 | 8 | 9 | 9 | 10 | 11 |
| | | | 300 | 230 | 290 | 30 | 4 | 5 | 6 | 6 | 7 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 11 |
| | | | | 240 | 300 | 29 | 4 | 5 | 6 | 6 | 7 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 12 |
| | | | | 250 | | 28 | 4 | 5 | 6 | 7 | 7 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 12 |
| | | | | 260 | | 27 | 5 | 5 | 6 | 7 | 8 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 13 |
| 250 | | | | 270 | | 26 | 5 | 6 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 12 | 13 |
| 260 | | | | 280 | | 25 | 5 | 6 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 12 | 13 |
| 270 | | | | 290 | | 24 | 5 | 6 | 7 | 8 | 9 | 9 | 10 | 11 | 12 | 13 | 14 |
| 280 | | | | 300 | | 23 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 290 | | | | | | 22 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 300 | | | | | | 21 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

Intensities for Brisbane



The selection of the number of downpipes is carried out in accordance with AS3500.3.2 (Stormwater drainage – acceptable solutions.)

However, the larger the gutter the larger the downpipe required. The minimum size of downpipe associated with each Stramit® Gutter is given in the Stramit® Downpipes section that follows.

The selection of the number of downpipes is carried out in accordance with AS3500.3.2