Shedeye Investigation

Shedeye Investigation 100589

By Shedeye

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Regulations – Gutters and Downpipes in Class 10a Buildings

Summary

The requirements in shed construction seem to have omitted any regulations in regard to gutter and downpipe installation. This has been bought up by some members of Shedeye forum see - http://forum.shedeye.com.au/showthread.php?5-Gutter-amp-Downpipe-Regulataions-for-Sheds&p=14#post14 and it requires investigation as to this omission in the regulations.

To highlight this, the first task was to investigate the ASI design handbook as per item 1 below, followed by examining the SEPP new regulations and finally to the BCA regulations.

1. The shed design handbook published by the ASI titled "***The Australian Steel Institute Design Guide Portal Frame Sheds and Garages***" (2010)

2. SEPP regulations – refer Shedeye Article "Garden Shed Exempt Developments http://blog.shedeye.com.au/2011/03/garden-shed-exempt-developments/

3. BCA regulations.

There is no reference in this guide of gutter or downpipe sizes in the construction of Class 10a buildings. These buildings are predominately steel portal frame structures with metal roof and cladding sheets attached. There are as many designs available as there are shed suppliers and manufacturers. The main type of gutter utilised is the square-line style sold by the majority of shed suppliers and also most are attached at the top of the roof sheets without any eaves.

Within these guidelines there is no data collected in regard to the location of the shed and the one in twenty year rainfall estimates. This is a problem where small high front gutters attached to the wall sheets will not cope with above average rainfall and will cause water damage to the interior of the shed if the gutters overflow and inadequate downpipes cannot discharge at the rate required.

Shedeye advises that gutter and downpipe regulation must be applied to all Class 10a structures and recommends the following.

This means that the following must apply to all Class10a Buildings in Australia.

a) That The Installation Code for Metal Roofing and Wall Cladding be applied to this class of building.

b) The current Handbook HB-39-1997 Installation Code to be applicable until the Standards Australia release the significant revision due out soon.

c) All shed suppliers to investigate rainfall areas in relation to gutter and downpipe sizing prior to design.

The assumption by shed suppliers, manufacturers and designers that all gutters and downpipes are irrelevant on Class10a buildings is solely because of the lack of regulations enforcing these considerations.

Similar treatment of Class 10a buildings should be in line with other domestic classes of building especially relevant in residential areas.

Acknowledgements

Support from many Shed owners, Shedeye Forum Members and some Shed Designers has been invaluable in compiling this report.

Contents

Introduction

The main reasons for the investigation of gutters and downpipes can be broken into four distinct areas and are explained below and then dealt with individually.

1. Gutter Installation.
2. Gutter Design & Size.
3. Downpipe Installation.
4. Downpipe Design & Size.

Gutter Installation

A quick review of the most common type of gutter installation on Class 10a buildings is required to explain the potential problems of water discharge into the shed itself. As per the following figures below, they show the installation situation in three example construction methods.

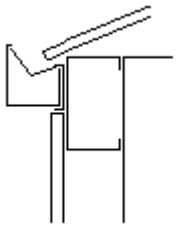


Figure 1

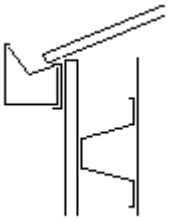


Figure 2

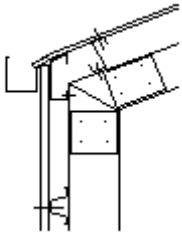


Figure 3

In all three cases the rear of the gutter is lower than the front and also water if overflows will gain access to the interior shed space. In Figure 1, the situation is compounded by the fact that the wall sheets run up to the underside of the gutter and increases the water channel to the interior of the shed space if overflow occurs. In figures 2 & 3 the wall sheets pass behind the gutter but the top lip of the sheets are below the front edge of the gutter. Also very rarely is a roof to gutter flashing installed to prevent water flow back into the inside. This basic flashing is shown in Figure 4.

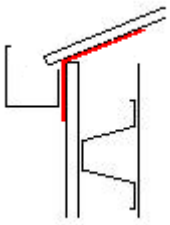


Figure 4 – under-roof to gutter flashing.

This flashing would prevent water flow back if installed in most steel sheds today without changing the gutter, brackets or structure. The only condition on this flashing is that the height it projects back up under the roof sheet must be at least 50mm higher on the vertical plane than the front edge of the gutter.

Gutter Design & Size

Designs of gutter do vary greatly but the overall feature of most are that the front height of the gutter is greater than the rear. One advantage that this does – is to hide the front edge of the roof sheet from being seen. Also many of gutters are variations of Figure 5 below with the first one being a Quad Gutter and the second one a Square Gutter.

Figure 5 quad and square Gutter.

The shed industry uses mainly the square gutter (which the balance of this discussion s based on) and some also the Quad gutter (which has similar characteristics and can be evaluated in the same method).

The gutter is available in slotted and un-slotted. If the gutter has no slots then backflow of water will occur if the downpipes cannot discharge the volume of water. These slots are for overflow and they should be located approximately 10mm below the rear top most section of the gutter.

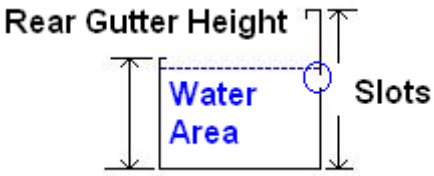


Figure 6 – Slots and rear gutter height

Figure 6 shows the approximate location requirements of the slots that should be featured in gutters fitted to Class 10a Buildings. The next Figure 7 shows the flow of water if the discharge of the downpipes cannot handle the volume of water from the roof and also the slots are too small or not installed in the gutter. The size of these slots is very important in the overflow capabilities of the gutter. The Handbook HB-39-1997 for the Installation of Metal Roofing & Cladding refers in detail regarding this feature. The total cross sectional area of all

the slots in total must exceed the total downpipe cross sectional area of the total downpipes installed in the length of gutter installed.

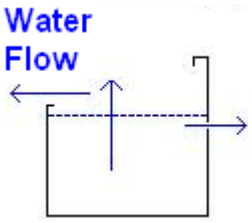


Figure 7 Water flow & slot location in gutters

All in Square Millimeters	Area each	No. of each	Total Area
Total Cross Section for each Slot	100	60	6000
Total Cross Section for each Downpipe	7857	2	15714
Sample selected was a 6 meter length of			
Square Gutter with 2 100mm round downpipes.			

TABLE 1 Workout Sheets for Slot versus Downpipe

Downpipe Installation

The installation of downpipes is fairly standard within the shed industry and it is only the number and size of these that are not calculated to suit the shed roof area. These details will be dealt with in a later section of the report.

The major fault at installation is the downpipe drop is not installed correctly and the Handbook HB-39-1997 for the Installation of Metal Roofing & Cladding states that it must be flush with the bottom surface of the gutter or installed behind the gutter base. Many are placed in the gutter with the lip above the surface and this often causes material and debris build up that affects the flow of water at discharge time. Refer Figure 8.

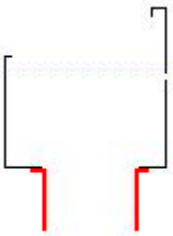
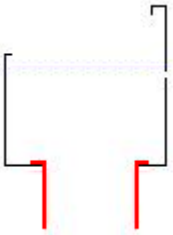


Figure 8 Correct Installation



Incorrect Installation

Downpipe Design & Size

The choice of downpipes in the shed industry also varies from supplier to supplier – but many utilise a rectangular downpipe section of 100mm x 50mm which is only 5,000 square millimetre cross sectional area.

This is approximately the same cross sectional area of an 80mm diameter round downpipe of 5,028 square millimetres. Yet the loss in volume of discharge rate in the rectangular pipe is approximately between 9 and 15% less, simply because of the shape and the efficiency of design. A round downpipe will discharge more than a square or rectangular downpipe of the same cross sectional area.

The calculations involved in this are available in the Handbook HB-39-1997 for the Installation of Metal Roofing & Cladding and in some cases are quite detailed. There are many Gutter/Downpipe calculators that can do this operation very quickly and also have databases with rainfall by area included.

Implications of Incorrect Gutter & Downpipes

Damage by water to contents of Class 10a Buildings that include garages, workshops or simply storage sheds can cost owners in increased insurance claims and lost property. The simple steps that are normally applied to domestic and residential building in regard to gutter and downpipe regulations would prevent the majority of problems currently facing the shed owner. The major problems are listed below.

1. Damage to property.
2. Reduction of floor space usability because of water damage threat.
3. Loss of water collection in to water tanks.

Shed Manufacturers

Some shed manufacturers are taking into account the choice and correct design & installation of gutters and downpipes with some even calculating the size of water tanks required to take advantage of the rainfall in the locality, average daily use and length of time that water supply will be available. Not all of this information is necessarily required – but that particular shed supplier certainly does very well with sales as well as having some very satisfied customers.

These requirements that are not currently in force in the class 10a buildings should be embraced by individual shed suppliers as a selling tool and also a responsibility to the customer expectations in this area.

Gutter & Downpipe Manufacturers

This section of the industry should provide all the details of cross sectional areas of gutters and downpipes and most of the major roll formers have these gutter calculators in their websites but only in relation to their own products. Also the large roll formers that are directly involved or own shed supply groups should have already implemented these recommendations listed at the start of this report.

Owners

It is reasonable to assume that the shed owner is not aware of these problems of gutter & downpipe size and design, and will assume that similar to a residential house, the new purchase of a garage or shed will automatically have the correct gutters and downpipes installed.

Maths in Gutter and Downpipes

The calculations involved in selecting the correct gutters and downpipes is not simple and involves some assumptions normally worked out by Hydraulic Engineers. But it is possible for many shed companies to find the correct information regarding the mathematics involved in this section of the industry and apply it to their own business.

The BCA has guidelines for gutters and downpipes that are general in their description – yet the BCA does NOT state that you have to ignore the correct installation of gutters and downpipes. Local Councils also should be contacted in regard to the discharge of water from Class 10a buildings in each area.

Conclusion

All shed suppliers, dealers and manufacturers should comply to the following recommendations.

1. **The Installation Code for Metal Roofing and Wall Cladding be applied to this class of building.**
2. **The current Handbook HB-39-1997 Installation Code to be applicable until the Standards Australia release the significant revision due out soon.**
3. **All shed suppliers to investigate rainfall areas in relation to gutter and downpipe sizing prior to design.**