MONIER™

CONSTRUCTION REQUIREMENTS
FOR YOUR MONIER TILED ROOF

UNDERSTANDING CONSTRUCTION REQUIREMENTS

INTRODUCTION

All roofs shall be sufficient to withstand the wind loading requirements of AS/NZS 1170.1, AS/NZS 1170.2 (or AS 4055 for housing) and AS 1170.3.

Monier has developed this guide to provide the designer or the main contractor with specific advice as it relates:

(i) The minimum pitch of the tiled roof.
(ii) The need for sarking.
(iii) The maximum rafter length.
(iv) The minimum headlap.
(v) An appropriate tile installing system.

At the time of estimation, the following information is to be supplied by either the building designer or the main contractor, so that the appropriate roof installation system can be specified:

(i) Wind classification.
(ii) Rafter or truss spacing and material.
(iii) Roof pitch.
(iv) Roof bracing.
(v) Corrosion potential of the site.
(vi) The need for sarking.
(vii) Specific statutory or regulatory requirements.
(viii) Bushfire Classification
(ix) Exposed rafter, Zero eave and Boundary wall requirements.

It should also be noted that the installation recommendations entailed in this document only relate to Monier tiled roofs of buildings that are intended for domestic, commercial or light industrial purposes for wind classifications N1-N4 and C1-C3 inclusive, with a roof pitch of 12 degrees or greater (depending on profile).

For projects outside the scope of these guidelines, your Monier office should be contacted for specific advice.

FACTORS TO **CONSIDER**

The following is a list of the critical factors that will determine the installation standard required for your roof tile:

01. SELECTING THE MATERIAL

For most people, your home is the greatest single investment you will make during your life. Visually, your roof contributes significantly to the overall appeal of your home. Choosing will reward you by adding beauty, character and value to your home.

TERRACOTTA'S ADDITIONAL APPEAL

Monier terracotta tiles are not only a sustainable product of natural beauty because other roofing products including metal, your terracotta roof colour never fades. The enduring colour is created during the firing process to leave you with a roof that will never require retreating and very little maintenance over its life. This makes terracotta roof tiles the ultimate roofing choice.

CHOOSING ANY ROOF TILES FROM MONIER'S EXPANSIVE RANGE OF PROFILES GIVES YOU THE FOLLOWING BENEFITS:

- BETTER COLOUR PERFORMANCE
- NO RUST OR CORROSION
- SALT SAFE
- THERMAL INSULATION
- ACOUSTIC INSULATION

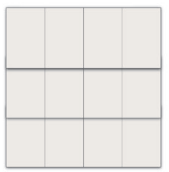
Ensuring you pick the right roof can make or break the look of your home. With the roof making up to 30% of the façade of your home, it's no wonder making the right choice is important. First impressions definitely count in increasing the value of your home.

So whether it is a look you want to achieve, the best possible material or building within a budget, we have put together a simple guide to help pick the right roof for you.

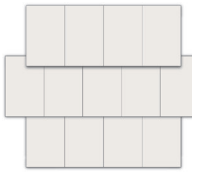
After all, at Monier it is about being Strong & Beautiful!

02. SELECTING THE PROFILE

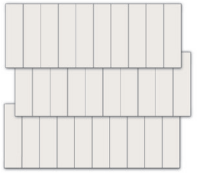
Profile refers to the roof tiles, shape and design. It is what gives your roof its distinct and unique character. Monier offers a large range of profiles, from sleek contemporary flat profiles, to the more traditional and classic profiles.



STRAIGHT

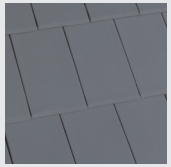


CROSS



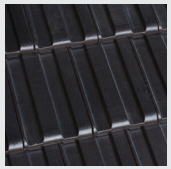
1/4 BOND

TERRACOTTA



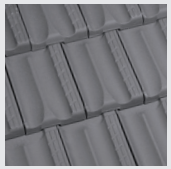
Recommended Bonding
Cross
Feature
Flat
Colour Application
Natural/Glazed

NULLARBOR



Recommended Bonding
Cross (Optional Straight)
Feature
Modern
Colour Application
Natural/Glazed

NOUVEAU



Recommended Bonding
Cross
Feature
Traditional
Colour Application
Natural/Glazed

MARSEILLE

CONCRETE

Recommended Bonding
Cross
Feature
Flat with slate look nose
Colour Application
Colour Through

CAMBRIDGE

Recommended Bonding
1/4 Bond
Feature
Flat with single middle line
Colour Application
Colour Through

MADISON

Recommended Bonding
Cross
Feature
Flat with lines
Colour Application
Colour Through

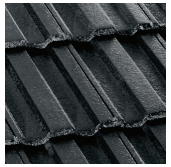
GEORGIAN

Recommended Bonding
Cross
Feature
Flat
Colour Application
Colour On

HORIZON

Recommended Bonding
Straight
Feature
Low wave
Colour Application
Colour On

ATURA



Recommended Bonding
Straight
Feature
Square
Colour Application
Colour On

TUDOR

Recommended Bonding
Straight
Feature
High roll
Colour Application
Colour On

ELABANA

C-LOC™ TECHNOLOGY ENSURING YOUR HOME LOOKS BETTER FOR LONGER
Independent testing shows Monier's C-LOC™ technology provides 8x better gloss performance than Colorbond® Steel and outperforms other tile coatings
Get the facts at monier.com.au

Colour never fades: Despite all sorts of weather conditions, Monier terracotta roof tiles will never fade.

03. CONSIDER YOUR ROOF FINISH

Like many things, the finish of a product can make all the difference. It's the same for roofing. Therefore, if it is a more contemporary, minimalist look you are trying to create, consider A-line Ridging. Please note that A-line Ridge is not available in C2-C4 wind classifications.

Monier recommends A-line ridging for any flat profile. At the time of estimation, please confirm the roof finish quoted with your plan. The ridge finish recommended by profile is indicated in bold in the table below.

TABLE 1 – RIDGING SELECTION

PROFILE	RIDGE FINISH	MATERIAL TYPE	
		TERRACOTTA	CONCRETE
Nullarbor	A-line or Lapped	•	
Nouveau	A-line or Lapped	•	
Marseille	Lapped	•	
Cambridge	A-line or Lapped		•
Madison	A-line or Lapped		•
Georgian	A-line or Lapped		•
Horizon	A-line or Lapped		•
Traditional	A-line or Lapped		•
Elabana	Lapped		•
Tudor	Lapped		•
Centurion	Lapped		•

04. ROOFING ESSENTIALS

Used together, insulation, ventilation and sarking can significantly reduce the amount of energy required for heating and cooling your home, while also saving money on energy bills and ensuring more pleasant and enjoyable living conditions all year round.

INSULATION

Insulation products slow the transfer of heat and cold through your ceiling, resulting in the regulation of temperature within living spaces all year round.

VENTILATION

The final component of an effective roofing system is roof ventilation. A wind powered ventilation system plays the key role of minimising temperature build up in the roof space by extracting trapped hot air and replacing it with cooler, ambient air from outside. Ventilation is recommended if sarking is used.

THE BENEFITS OF VENTILATION

- Expels hot air from your roof space in summer
- Exhausts damp air in winter
- Reduces air conditioning load
- Helps reduce energy costs

SARKING

You only get one chance to install sarking and that is when you install a new roof. At Monier, we believe the benefits of sarking far outweigh the incremental cost of the product. Sarking is a flexible membrane that is laid under the roof battens during the installation of a new roof. Monier recommends the use of sarking for all new roofs irrespective of roof pitch, terrain category or location for the following reasons:

- Reflects up to 95% of radiant heat entering your roof space, contributing a reflective R-Value which improves the overall thermal insulation value of the roof structure
- Reduces air leakage from inside the roof structure, allowing insulation to work more effectively which ultimately improves the energy efficiency of your home
- Additional protection for your home from wind driven rain and dust ingress
- Provides compliance to BAL bush fire ember attack requirements in accordance AS3959 by providing a secondary form of ember protection for the roof space

05. WIND CLASSIFICATION*

Critical to ensuring that the roof installation standard is appropriate for a particular site, the building designer or main contractor must supply the relevant wind classification at the time of estimation.

The wind classification relates to gust wind speed that affecting a given site. The determination of a wind classification is critical in ensuring that a building is designed and constructed to the level appropriate to withstand the wind forces it will be subjected to. Please refer to the note in italics for details on how a wind classification can be determined.

The wind classifications defined in the standards are summarised by the map, Figure 1, and Table 2 as follows:

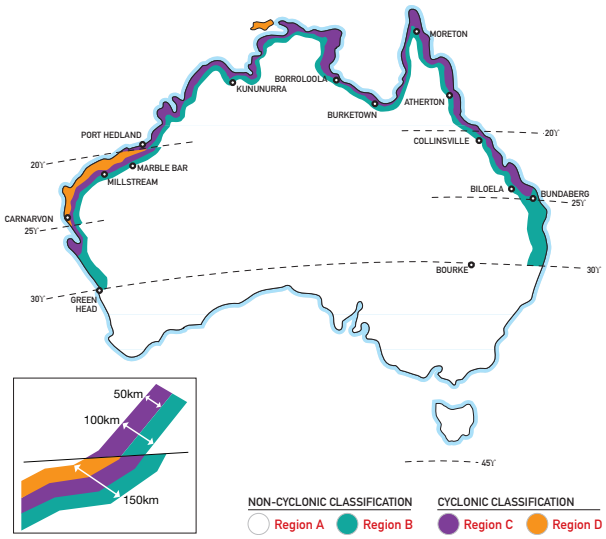


TABLE 2 – WIND CLASSIFICATION AND MAXIMUM DESIGN WIND GUST SPEED

WIND CLASSIFICATION		GUST WIND SPEED (M/S)
Regions A and B	REGIONS C AND D	
N1 (Non-Cyclonic)	N/A	W28
N2 (Non-Cyclonic)	N/A	W33
N3 (Non-Cyclonic)	C1 (Cyclonic)	W41
N4 (Non-Cyclonic)	C2 (Cyclonic)	W50
N5 (Non-Cyclonic)	C3 (Cyclonic)	W60
N6 (Non-Cyclonic)	C4 (Cyclonic)	W70

Source : AS2050 - 2002 Table 3

In a roofing sense, the most significant outcome determined from the wind classification is the need for sarking to be installed. Table 3 indicates the need for and the grade of sarking recommended for each wind classification.

TABLE 3 – REQUIREMENT FOR SARKING

WIND CLASSIFICATION	SARKING	GRADE OF SARKING RECOMMENDED
N1 and N2	Sarking recommended but not mandatory.	N1 and N2: Rooftile
N3 and C1	Sarking mandatory	N3: Rooftile plus C1: Safety
N4 and C2/C3	Sarking mandatory	N4: Rooftile plus C2/C3: Safety

To determine the appropriate wind classification for your site, please consult a suitably qualified building engineer. Monier's Guide to Wind Classification has been developed to provide a lay person with an understanding of how a wind classification is determined. While a handy guide, Monier Roofing does not accept liability for any loss or damage suffered as a result of any errors in the interpretation or application of this design guide are made.

06. REGIONAL EXPERIENCE

Monier Roofing has been installing roofs in Australia for over 100 years. During that time we have amassed literally decades of experience on the impact of differing weather conditions on roofs in various regions across Australia and New Zealand. Below are some situations that capture that experience and trigger the additional need for sarking.

ADDITIONAL SARKING CONSIDERATIONS IN N1 OR N2

NEAR WATER

If an open field or a body of water of a width greater than 200m is visual from the roof level of your site, sarking is required. Examples of an open include undeveloped land sites, large park, golf course, open sea coast and lakes, flat and treeless plains, and open snowfields.

Visible from the roof level of your site, is there an open field or a body of water of a width greater than 200m?	YES ☐	NO ☐

If Yes, sarking is required.

BUSH FIRE PRONE AREA

Bush Fire is an increasing risk in our dry continent. If you are in a designated Bushfire Prone Area (BPA), you must construct to a minimum BAL 12.5. The BALs (Bushfire Attack Levels) are based exposure of a site to ember attack and to radiant-heat thresholds, expressed as kW/m2. For example BAL-29 is primarily concerned with protection from ember attack and from radiant heat up to and including 29 kW/m2. As indicated in Table 4, if your site is in a BAL area of 12.5 or greater, additional materials including sarking are required to be installed with your roof.

TABLE 4 – BAL REQUIREMENTS

	SARKING APPLICABLE	OTHER ROOFING MATERIALS RECOMMENDED
BAL EXEMPT	N/A	N/A
BAL Low	Confirm if the BAL is BAL12.5 or BAL-EXEMPT	
BAL 12.5	Roof or Roof Plus Grade of Sarking	Anti-ponding board
BAL 19	Roof or Roof Plus Grade of Sarking	Anti-ponding board
BAL 29	Roof or Roof Plus Grade of Sarking	Anti-ponding board, valley seal and mechanically fix every tile
BAL 40	Roof or Roof Plus Grade of Sarking	Anti-ponding board, valley seal and mechanically fix every tile
BAL FZ (Fire Zone)	Roof or Roof Plus Grade of Sarking	Refer to your regional Monier office for specific details

As such, if your site is in a Bushfire Attack Level of BAL 12.5 or greater, sarking is mandatory.

Is your site in a Bushfire Attack Level of BAL 12.5 or greater, then sarking is mandatory?	YES ☐	NO ☐

If Yes, sarking is mandatory

DESIGN ELEMENTS

Certain design elements of a roof trigger the need for sarking. For example where your roof change pitch mid roof, have exposed rafters or raked ceilings, sarking is mandatory.

Does your roof change pitch mid roof, have exposed rafters or raked ceilings?	YES ☐	NO ☐

If Yes, sarking is mandatory

Is the roof sarked at the property boundary?	YES ☐	NO ☐

If Yes, anti-ponding board is required at the boundary

Does your roof have zero eaves and is sarked?	YES ☐	NO ☐

If Yes, anti-ponding board is required at zero eaves

Is the roof 3 storeys or greater?	YES ☐	NO ☐

If Yes, sarking and anti-ponding board is required.

ROOF PITCH

The shallower the roof pitch, the weaker the force of gravity pulling water from the roof.
If tiles are desired in these circumstances, Monier Roofing recommends that the pitch of the roof be raised to a pitch appropriate for the rafter length of the roof.
In the following circumstances sarking and anti-ponding board will be required:

Is the pitch of your roof below 20°?	YES ☐	NO ☐

If Yes, sarking and anti-ponding board is required.

DETERMINING RAFTER REQUIREMENTS

RAFTER LENGTH

With heavy rainfall, a considerable volume of water accumulates on and down the roof. The longer the roof run or rafter length, the more water accumulates, triggering the need for sarking. The maximum rafter lengths permitted to be used is dependent on tile profile selected, the pitch of the roof and whether the roof is already required to be sarked.
Table 7 on Page 9 indicates the relationship between regions, profile selection, pitch and rafter length in determining the construction specification for your roof.

RAFTER SPACING

Rafter spacing is the distance between the centre-point of the roof rafter to the centre-point of the next rafter. As detailed in Table 5 below, the greater the distance the higher the grade of sarking required.

TABLE 5 – GRADE OF SARKING

PRODUCT	DUTY	APPLICATION
Sarking Rooftile	Heavy Duty	Minimum grade for 600 centres.
Sarking Rooftile Plus	Extra Heavy Duty	Minimum grade for 900 centres.
Sarking Safety	Extra Heavy Duty	Minimum grade for greater than 900 centres.

Roof tiles will not be installed on roofs with a rafter spacing greater than 900 centres without specific advice from your regional Monier office.

Rafters are spaced greater than 900mm apart.	YES ☐	NO ☐

If Yes, consult Regional Monier Office.

CORROSION POTENTIAL OF THE SITE

Unlike metal roofing, the structural performance of the tile is not negatively impacted by proximity to salt or chemically enriched environments such as the ocean and industrial areas. However, if your site is within 200m of breaking surf, 316 grade stainless stain clips or nails are recommended for use.

Is your site within 200m of breaking surf?	YES ☐	NO ☐

If Yes, different grades of fixing materials i.e. nails and clips may have to be considered and your regional Monier office should be consulted.

ROOF FRAME

Generally, roof frame and truss are constructed using timber. Where a metal frame and trusses are used, your regional Monier office should be consulted for specific advice.

Is there metal frame or trusses being used?	YES ☐	NO ☐

If Yes, consult Regional Monier Office.

SECURING YOUR TILES

The method of fixing specified to secure your roof tiles to the underlying frame is dependent on the Wind Classification information provided by the building designer and is summarised in Table 6 below. Please note that the use of sarking allows for the method of fixing specified to be dropped by a wind classification level.

TABLE 6 – MINIMUM INSTALLATION REQUIREMENTS

WIND CLASSIFICATION	MINIMUM MECHANICAL INSTALLATION REQUIREMENTS FOR TILES AND ANCILLARIES		
	TILE FIXING		RIDGE, HIP AND BARGE TILES
	EDGE OF ROOF*	FIELD OF ROOF	
N1 & N2	Mechanically fasten each full tile in second course and then every second tile in every course or every tile in each alternative course		Mechanically fasten each tile
N3	Mechanically fasten each full tile in second course	Mechanically fasten each second full tile in every course	Mechanically fasten each tile
N4	Mechanically fasten every full tile	Mechanically fasten every full tile	Mechanically fasten every tile
C1	Mechanically fasten every full tile	Mechanically fasten each second full tile in every course	Mechanically fasten every tile
C2 & C3	Mechanically fasten every tile	Mechanically fasten every tile	Mechanically fasten every tile

* Based on regional experience & tile selection, either a nailing or clipping security fixing method will be recommended.
Source: AS2050 2002 Table 4(A) & (B)

CONCRETE TILES																
	Contoured Tiles				Semi-Flat Tiles				Flat Tiles				Flat Tiles			
	Elabana, Tudor, Centurion				Atura				Horizon				Georgian, Cambridge, Madison			
Pitch	Sarking Mandatory	Max rafter w/ out sark	Recommended Head Lap mm	Max rafter w. sark	Sarking Mandatory	Max rafter w/ out sark	Recom-mended Head Lap mm	Max rafter w. sark	Sarking Mandatory	Max rafter w/ out sark	Recommended Head Lap mm	Max rafter w. sark	Sarking Mandatory	Max rafter w/ out sark	Recom-mended Head Lap mm	Max rafter w. sark
12°	#MINIMUM PITCH 15º															
15°	Yes	n/a	◊75	4.5	Yes	n/a	80	4.5	Yes	n/a	100	4.5	Yes	n/a	100	4.5
16°	Yes	n/a	◊75	5	Yes	n/a	80	5	Yes	n/a	100	5	Yes	n/a	100	5
17°	Yes	n/a	◊75	5.5	Yes	n/a	80	5.5	Yes	n/a	100	5.5	Yes	n/a	100	5.5
18°	Yes	n/a	◊75	6	Yes	n/a	80	6	Yes	n/a	100	6	Yes	n/a	100	6
19°	Yes	n/a	◊75	6.5	Yes	n/a	80	6.5	Yes	n/a	100	6.5	Yes	n/a	100	6.5
20°	No	5.5	◊75	8	No	5.5	80	7	Recom-mended*	5.5*	80	7	Yes	n/a	80	7
21°	No	5.5	◊75	8.5	No	5.5	80	7.5	Recom-mended*	5.5*	80	7.5	Yes	n/a	80	7.5
22°	No	≥6	◊75	9	No	≥6	80	8	Recom-mended*	5.5*	80	8	Yes	n/a	80	8
23°	No	6	◊75	9.5	No	6	80	8.5	Recom-mended*	6.0*	80	8.5	Yes	n/a	80	8.5
24°	No	6	◊75	10	No	6	80	9	Recom-mended*	6.0*	100	9	Yes	n/a	100	9
25° & Above	No	6	◊75	10	No	6	80	9.5	Recom-mended*	6.0*	100	9.5	Yes	n/a	100	9.5

NOTES:
In consultation with your local Monier Roofing office, tiles may be installed at rafter lengths longer than those indicated in this table.
◊ Note 1 80mm in NSW
* Note 2 whilst sarking is not mandatory above 20°, Monier highly recommends the use of sarking for additional protection. Check your terrain category, as this may have implications on whether or not sarking is required
* Note 3 Monier recommend that safety system used in construction under 15° DOES NOT penetrate or damage sarking material
* Note 4 AS 2050-2002 3.1.5 Long rafter lengths: Rafter lengths measured from the topmost point of the rafter downwards, below which sarking shall be installed over the remainder of the rafter length
* Note 5 AS 2050-2002 3.1.2 states Anti ponding shall be provided on roofs < 20° and where there is zero eaves

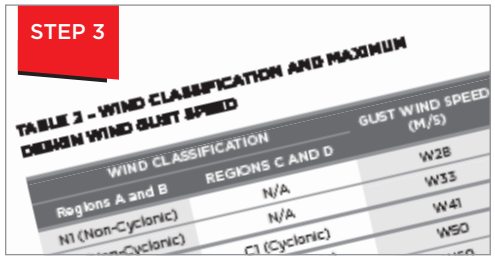
TERRACOTTA TILES									
Profiled Terracotta									
	Marseille			**Nouveau**			**Nullarbor**		
Pitch°	Sarking Mandatory	Max rafter w/ out sark	Max rafter w. sark	Sarking Mandatory	Max rafter w/ out sark	Max rafter w. sark	Sarking Mandatory	Max rafter w/ out sark	Max rafter w. sark
12°	**#MINIMUM PITCH 15°**			Yes	n/a	4.5	**#MINIMUM PITCH 25°**		
15°	Yes	n/a	4.5	Yes	n/a	4.5			
16°	Yes	n/a	5	Yes	n/a	5			
17°	Yes	n/a	5.5	Yes	n/a	5.5			
18°	Yes	n/a	6	Yes	n/a	6			
19°	Yes	n/a	6.5	Yes	4.5	6.5			
20°	No	5.5	8	No	5.5	8			
21°	No	5.5	8.5	No	5.5	8.5			
22°	No	≥6	9	No	≥6	9			
23°	No	6	9.5	No	6	9.5			
24°	No	6	10	No	6	10			
25° & Above	No	6	10	No	6	10	Yes	n/a	9.5

NOTES:
In consultation with your local Monier Roofing office, tiles may be installed at rafter lengths longer than those indicated in this table
* Note 1 whilst sarking is not mandatory above 20°, Monier highly recommends the use of sarking for additional protection. Check your terrain category, as this may have implications on whether or not sarking is required
* Note 2 Monier recommend that safety system used in construction under 15° DOES NOT penetrate or damage sarking material
* Note 3 Monier recommend the use of extra heavy duty sarking below 15°
* Note 4 AS 2050-2002 3.1.5 Long rafter lengths: Rafter lengths measured from the topmost point of the rafter downwards, below which sarking shall be installed over the remainder of the rafter length
* Note 5 AS 2050-2002 3.1.2 states Anti ponding shall be provided on roofs < 20° and where there is zero eaves
* Note 6 Minimum pitch for Nullarbor is 25°

SUMMARY – SPECIFICATION FOR THE INSTALLATION OF TILES

DECIDE YOUR MATERIAL AND PROFILE
Pages 3 and 4

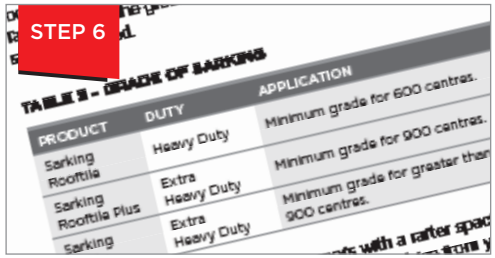
CONSIDER YOUR ROOF FINISHING
Table 1, page 5



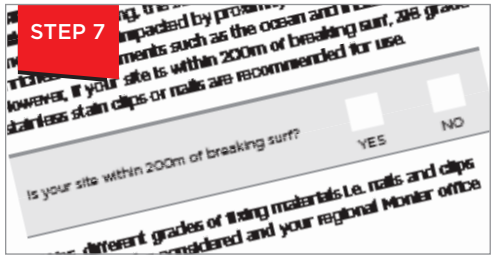
DETERMINE THE WIND CLASSIFICATION
Table 2, page 6

SARKING REQUIREMENT
Page 6

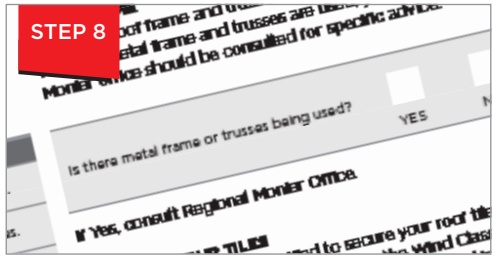
SARKING CONSIDERATIONS
Pages 7



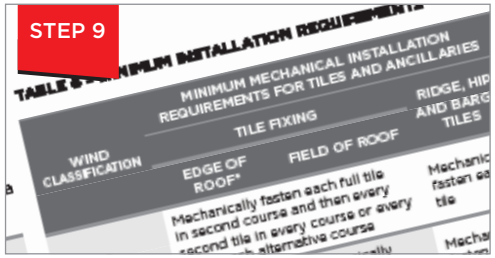
DETERMINE THE RAFTER REQUIREMENTS
Table 5, page 8



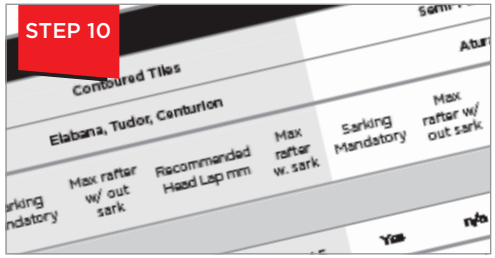
CONSIDER CORROSION POTENTIAL OF THE SITE
Page 8



DETERMINE THE ROOF FRAMES
Page 8



SECURING YOUR TILES
Table 6, page 8



TILE FIXING SPECIFICATIONS TABLE
Table 7, page 9

DISCLAIMER:
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In determining the fixing specification for any relevant roof, Monier Roofing recommends the results are validated by a detailed assessment of your roof requirements by the relevant regional Monier Roofing office.