

Roofing and Cladding in Windy Conditions

4th Edition



Roofing & Cladding in Windy Conditions

FORWARD

Roofers must always be made aware of and understand the hazards which can overtake them whenever work is attempted or continued in windy conditions. This applies particularly when working upon industrial buildings where large area rigid sheeting materials are being handled. The risks are increased considerably when gusts occur during periods of high average wind speeds. Edge protection provides very little security for operatives or unfixed materials in these conditions.

It is not only on industrial buildings when care must be taken in windy conditions. A slater and tiler for example cannot work safely when installing a roll of roofing underlay in a high wind, as the sheet of underlay could get caught by the wind and can become like a sail—extremely mobile, flexible and very dangerous. In flat roofing, sheets of reinforced bitumen membranes and single ply are equally affected in the same way. Furthermore, the likelihood of getting burnt or splashed when using hot bitumen or liquid applied products increases significantly in windy conditions.

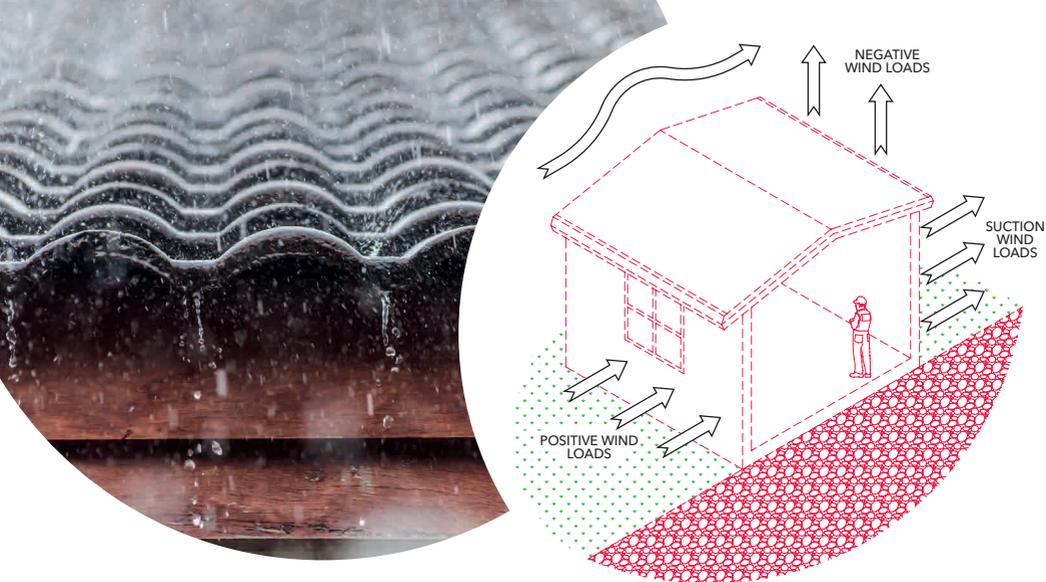
The responsibility placed upon the roofing contractor is not always easily understood when it is necessary to stop or prevent certain roofing activities from taking place. For the roofing contractor, there has always been a requirement for a code of practice or a practical guide, to which reference could be made to assess the effects of high wind when working at heights.

**WE RECOMMEND THAT
A REFERENCE TO THIS
PUBLICATION IS MADE IN
THE COMPANY SAFETY POLICY.**



CONTENTS

1 APPRECIATION OF THE PROBLEM	5
2 PURPOSE OF THE PUBLICATION	5
3 ROOFING WORK	53.1
Knots or m.p.h or m/s	
3.2 Sheeting and decking	3.5 Mastic asphalt
3.3 Slating and tiling	3.6 Single-ply roof membranes
3.4 Reinforced Bitumen Membranes (RBM)	3.7 Liquid applied waterproofing
	3.8 Rigid insulation boards
4 VERTICAL WORK	7
4.1 Cladding	4.2 Slating and tiling
5 SAFETY ASPECTS	8
5.1 Wind speed variations at height	5.5 The Principal Contractor
5.2 Wind speed readings taken at place of work	5.6 Working with one common aim
5.3 Wind direction	5.7 The Beaufort Scale of mean wind speeds
5.4 Gusting	
6. PRACTICAL ASPECTS	10
6.1 Handheld wind meters	6.4 Obtaining average (mean) wind speed
6.2 Readings at place of work	6.5 Gusting
6.3 Taking wind speed readings	6.6 Local weather forecasts
7 GENERAL SAFETY	10
7.1 Other trades	
8 RECORDS	11
8.1 Keeping of records	8.2 Daily records to Principal Contractor
9 CONCLUSION	11
9.1 All Working Together	



DESIGN AND PLANNING OF ROOFING WORKS

A fundamental principle behind good roofing design is the resistance against wind forces. When wind strikes a building, it creates a positive pressure on the windward face and negative pressure over the roof and in the lee of the building. Distribution of pressure over a complete roof is far from uniform; both on a building under construction and also one that has been completed. Designers should give particular consideration to relating the roof system to the terrain, location and sometimes the season in which roof construction is anticipated to take place so that the roof can be constructed in a safe and efficient manner.

When designing a roof structure or covering, the issue of 'buildability' must be raised. At the design stage, designers have a legal duty to reduce all risks that may be imposed upon operatives who construct, maintain, or demolish roof structures.

The responsibility placed upon the roofing contractor is not always easily understood, especially when compared to other building trades that may be able to continue working safely even though roofing activities have been called to a halt.

Valuable assistance has been provided by the Met Office, Building Research Establishment (BRE) and the Health & Safety Executive (HSE) in the formulation of this guidance document.

HSE publication HSG33 'Health and Safety in Roofwork' provides industry guidance and valuable information to anyone involved in roofwork; whether a designer, contractor or roofer. The guidance provides suggested courses of action when planning and undertaking roofing work.

Additional guidance can also be found in the NFRC Profiled Sheet Roofing and Cladding Guide to Design and Best Practice, which provides further advice relevant to industrial sheeting projects.

1 APPRECIATION OF THE PROBLEM

Numerous problems can arise when a roofing contractor is expected to continue working during windy conditions, which are not always appreciated during the pre-construction phase of the project by the architect, engineer, principal contractor, developer, tenant or client.

2 PURPOSE OF THE PUBLICATION

The purpose of this publication is to give guidance on wind speeds and conditions when working may not be practicable or possible, and has the potential to cause harm or injury to roofing operatives, other operatives working nearby and members of the public if work does commence or continue.

3 ROOFING WORK

3.1 Miles Per Hour, Knots, Metres Per Second and the Beaufort Scale

The **Table 1** below gives comparable speeds.

M.P.H	KNOTS	METRES/ SEC	FORCE
17	15	7.7	4
23	20	10.3	5
26	23	11.8	6
29	25	12.9	6
35	30	15.5	7

3.2 Sheeting and decking

- a) All laying or handling of profiled single skin or composite sheets at roof level should cease when the (average) mean wind speed reaches 23 mph (*gusting to 35 mph or over*). 
- b) All laying or handling of single skin or composite sheets longer than five metre, at roof level should cease when the (average) mean wind speeds reach 17 mph (*gusting to 26 mph or over*). 
- c) Where built-up cladding systems are in progress, all laying or handling of lightweight materials such as glassfibre, insulation boards, liner trays, should cease when the mean wind speed reaches 17 mph (*gusting to 26 mph or over*). 
- d) Special consideration must be given to the laying and handling of profiled single skin sheets or composite panels that exceed 20 m in length during the above maximum wind speeds.

3.3 Slating and tiling

- a) All laying or handling of slates, tiles, battens and underlays at roof level should cease when the (average) mean wind speed reaches 23 mph (*gusting to 35 mph or over*). 
- b) When handling rolls of underlay at roof level, extreme care should be taken when the mean wind speeds are in the region of 17 mph (*gusting to 26 mph or over*). 

3.4 Reinforced Bitumen Membranes (RBM)

a) All laying or handling of membranes and hot bitumen at roof level should cease when the mean wind speeds reach 23 mph (gusting to 35 mph or over).

23
MPH

b) When handling rolls of lightweight membranes and/or working with 'hot bitumen' extreme care is necessary when the wind speeds are in the region of 17 mph (gusting to 26 mph or over).

17
MPH

3.5 Mastic asphalt

a) All laying or handling of mastic asphalt at roof level should cease when the mean wind speed reaches 23 mph (gusting to 35 mph or over).

23
MPH

b) All laying or handling of felt, insulation boards or timber battens at roof level should cease when the mean wind speed reaches 23 mph (gusting to 35 mph or over).

23
MPH

c) When handling rolls of lightweight felt and /or working with hot asphalt, extreme care is necessary when the mean wind speed is in the region of 17 mph (gusting to 26 mph or over).

17
MPH

3.6 Single-ply roof membranes

a) All laying or handling of single-ply membranes should cease when the mean speed reaches 23 mph (gusting to 35 mph or over).

23
MPH

b) Laying or handling of lightweight vapour control layers, insulation and (*inverted roofs only*) water-flow reducing layers should cease when the roof level mean wind speeds reach 17 mph (gusting to 26 mph or over).

17
MPH

Decking panels of steel or timber composite (*plywood or Oriented Strand Board*) must not be laid when the roof level mean wind speeds reach 23 mph (gusting to 35 mph or over).

23
MPH

Note that the load on a 2.4 m x 1.2 m sheet of plywood at 14 m/s (31 mph) is approximately 38 kg.

3.7 Liquid applied waterproofing

All laying or handling of liquid applied systems at roof level should cease when the roof level mean wind speeds reach 17 mph (gusting to 26 mph or over).

17
MPH

3.8 Rigid insulation boards

The handling of rigid insulation boards on a roof in windy conditions is especially dangerous as the board will act as a sail to catch the wind and could cause serious injury to the operative and to members of the public if they blow off the roof. Work involving the handling of rigid insulation boards should cease as soon as the boards become difficult or dangerous to handle. This may well be lower than the 17 mph that applies to other materials.

17
MPH

4 VERTICAL WORK

4.1 Cladding

- a) All fixing or handling of sheets more than two metres above ground level should cease when the mean wind speed reaches 23 mph (*gusting to 35 mph or over*). 
- b) All fixing or handling of sheets longer than five metres when more than two metres above ground level should cease when the mean wind speeds reach 17 mph (*gusting to 26 mph or over*). 
- c) Where built-up cladding systems are in progress all fixing or handling of lightweight materials such as glassfibre, insulation boards, or liner trays more than two metres above ground level should cease when the mean wind speeds reach 17 mph (*gusting to 26 mph or over*). 

- d) Special consideration must be given when fixing or handling cladding sheets that are of exceptional length. The maximum wind speed noted may be too high, due to the surface area of the sheet which may make the cladding unwieldy in lower wind speeds.

4.2 Slating and tiling

- a) Provided that this work is carried out from a safe working platform it should be possible to afford additional protection at the position of work which can mitigate the risks associated with working in windy conditions. Although every situation should be considered individually as local conditions may increase the hazards.
- b) Where work is exposed and protection is not possible, then it will be necessary to apply the recommendations given under sections 3.3(a) and (b).



5 SAFETY ASPECTS

5.1 Wind speed variations at height

Operatives must be fully briefed of the variations of wind speeds relative to the height at which work is being carried out, as it is quite normal for wind speeds at ground level to be relatively low compared with wind speeds at other heights.

5.2 Wind speed readings taken at place of work

Due to the point made in 5.1 above, wind speed readings must be taken at the actual place of work (*for example, at the eaves, at the ridge or 20 m high up the side elevation of a high structure.*) and the decision to commence or continue work should be taken in view of the conditions that prevail at that location.

5.3 Wind direction

Particular attention should also be given to the wind direction; there are many instances where surrounding buildings can create particular wind conditions due to:

- a) additional wind pressure.
- b) additional wind suction.
- c) gusting winds higher than normal.
- d) eddies or whirlpool effects.
- e) aircraft vortex effects in proximity to airports, (*for example, greater vigilance required when landing and take-off patterns change.*)

In these situations consideration should be given to assessing the wind speeds at the place of work and to ensuring constant monitoring throughout the working day.

5.4 Gusting

Companies must ensure that their operatives are fully briefed that gusts of wind can be significantly higher than the average wind speed (*up to 1½ times the average speed in open, level country and as much as twice the average speed in city centres.*)

5.5 The Principal Contractor

Companies should also advise the Principal Contractor that before any work commences, the sequence of the works may be dictated by the prevailing wind.

5.6 Working with one common aim

It is in the very best interest of the industry and in particular for the safety of the operatives, that everyone works together with one common aim to apply these minimum standards, which are agreed as reasonable by the HSE and the BRE.

5.7 The Beaufort Scale of mean wind speeds

For general information, set out in Table 2 are the relationships and descriptions of wind forces on The Beaufort Scale, at 10 m above ground level. These relate to mean wind speeds.

Table 2: The Beaufort Scale of mean wind speeds

DESCRIPTION	M.P.H		KNOTS		METRES/SEC	
	Min	Max	Min	Max	Min	Max
FORCE 0–CALM Calm; smoke rises vertical	0	1	0	1	-	-
FORCE 1–LIGHT AIR Direction of wind shown by smoke drift, but not by wind vanes.	1	3	1	3	0.5	1.8
	MEAN: 2		MEAN: 2		MEAN: 1.5	
FORCE 2–LIGHT BREEZE Wind felt on face; leaves rustle; ordinary vanes moved by wind.	4	7	4	6	1.9	3.3
	MEAN: 5.5		MEAN: 5		MEAN: 2.6	
FORCE 3–GENTLE BREEZE Leaves and small twigs in constant motion; wind extends light flag.	8	12	7	10	3.4	5.4
	MEAN: 10		MEAN: 8.5		MEAN: 4.4	
FORCE 4–MODERATE BREEZE Raises dust and loose paper; small branches are moved. Special care should be taken handling/fixing materials over 5m long—approaching critical limit. Care should be given when handling lightweight insulation materials.	13	18	11	16	5.5	7.9
	MEAN: 15.5		MEAN: 13.5		MEAN: 6.7	
FORCE 5–FRESH BREEZE Small trees in leaf begin to sway; crested wavelets form on inland water. Special care should be taken in roof and vertical work. Mean wind speed approaching critical limit when all work must cease.	19	24	17	21	8	11
	MEAN: 21.5		MEAN: 19		MEAN: 9.5	
FORCE 6–STRONG BREEZE Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty. No fixing work anywhere should be in progress.	25	31	22	27	11.1	14.1
	MEAN: 28		MEAN: 24.5		MEAN: 12.6	

6 PRACTICAL ASPECTS

6.1 Handheld wind meters (anemometer)

In order to ascertain wind speeds, it is recommended that Supervisors are provided with handheld wind meters to check and record the wind speeds during the working day.

6.2 Readings at place of work

As indicated in items 5.1 – 5.3 it is critical to ensure that wind speed readings are taken at the location where the works are going to be undertaken whether that is on the roof surface or on a vertical elevation.

6.3 Taking wind speed readings

Care must be taken to ensure that the manufacturer's Instructions are fully observed for the instrument in use.

6.4 Obtaining average (mean) wind speeds

In use, the windmeter is held with its axis vertical at arm's length and with the arm at right angles to the wind direction to ensure that the disturbance of the airflow, caused by the observer's body, is reduced as much as possible.

At least two readings of mean wind speed (*each reading being taken over at least 15 seconds*) should be taken within the overall period of observation. When the readings differ by less than 10 mph the average is recorded. Should the readings differ by more than 10 mph then a third reading should be taken and the average of all three readings recorded as the mean wind speed.

6.5 Gusting

Gusting can be 50 – 100 per cent higher than average (mean) and due allowance must be made when laying or handling materials at any height two metres or more above ground level. Maximum gusting speeds should be recorded during each reading.

6.6 Local weather forecasts

The local area weather forecast can be obtained by visiting the Met Office website: metoffice.gov.uk. The forecast can be used for guidance about prospects for the day's work (*and up to five days ahead*)

7 GENERAL SAFETY

7.1 Other trades

Operatives must be made aware that when handling materials at height in windy conditions, there is an added responsibility to make sure that materials being handled and fixed cannot be blown from the roof creating safety hazards for other persons at ground level. Additional precautions may be required; like changing a one-man lift into a two-man lift, or moving less material at any one time. Unfixed material should be secured and never be left unattended.

8 RECORD

8.1 Keeping of records

It is necessary to make sure that operatives on site keep records of the wind readings taken as described previously. It would be prudent to ensure that operatives are issued with forms, onto which can be recorded the date, the time, wind conditions at both ground and roof level and recording if the works have been suspended.

8.2 Daily records to Principal Contractor

A copy of the form referred to in 8.1 should be available to the principal contractor if required and any lost time noted within the weekly site meetings.

9. CONCLUSION

9.1 All Working Together

If the whole construction industry can work together on the subject of 'Safety in Windy Conditions', apply the precautions described, prepare the documentation suggested, then the result is bound to be fewer accidents due to windy conditions, an increase in safety awareness and a general contractual benefit for all concerned.





LEADING ROOFING EXCELLENCE

NFRC

020 7638 7663

nfrco.co.uk

NFRC is a registered trademark