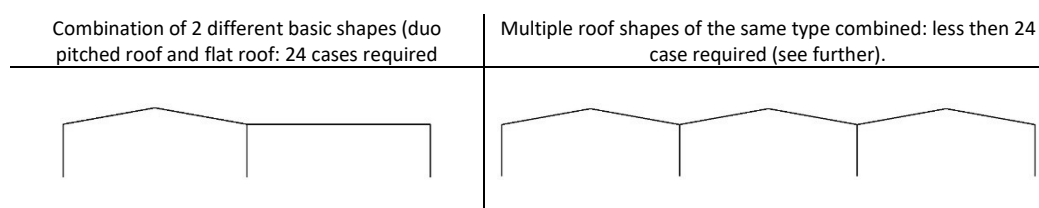


WIND LOAD CASES ON BUILDINGS IN DIAMONDS

Diamonds can generate **up to 24 load cases for wind**:

- 8 cases wind from left to right
- 8 cases wind from right to left
- 4 cases wind from front to back
- 4 cases wind from back to front

But for basic roof shapes (a flat, a mono pitched or duo pitched roof) you don't need all 24 cases. For a combination of different basic roof shapes, you do need all 24 cases.



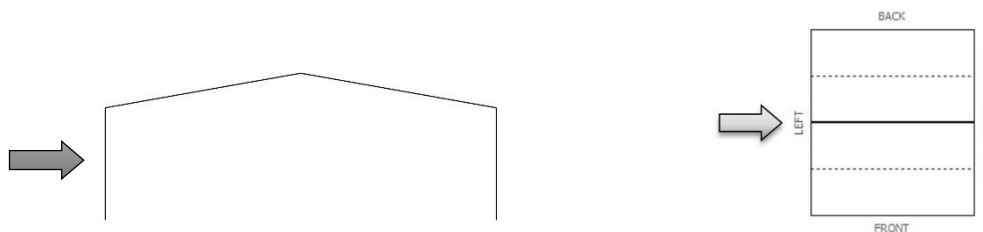
If you don't know how many cases you really need, you cannot do wrong by generating 24 cases. You'll notice that maybe some cases contain the same loads as other case, but that doesn't affect the final results. The double cases only cause the model to calculate longer. Especially in larger structures, the additional calculation time becomes noticeable.

The tables below give an overview of the required cases according to EN 1991-1-4 depending on the shape of the roof. In the tables:

- is c_{pe} **the external pressure coefficient**
This coefficient takes the shape of the roof into account. The external pressure coefficient can have one or two values depending on the roofs shape and both situation need to be taken into account.
- is c_{pi} **the internal pressure coefficient.**
This coefficient takes the size and the distribution of the opening in the structure into account.
 - If the distribution of the openings is unknown, Eurocode states that two values for the internal pressure coefficient c_{pi} should be considered (EN 1991-1-4 §7.2.9. (6)), namely -0.3 and +0.2.
 - If the distribution of the openings is known, Eurocode states that the value of the internal pressure coefficient c_{pi} should be calculated. If that's the case, you may uncheck the alternative c_{pi} . The number of cases is then divided by two.
- All cases are numbered as they appear in Diamonds.
- The cases that will load to load cases contain the same loads, ~~are crossed-out~~. Those cases shouldn't be generated.

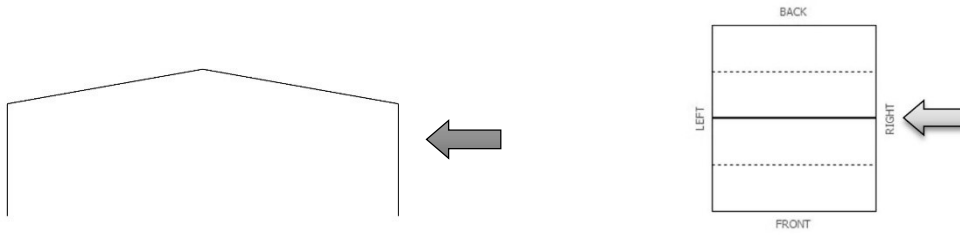
For a DUO pitched roof: 20 cases

WIND FROM LEFT TO RIGHT



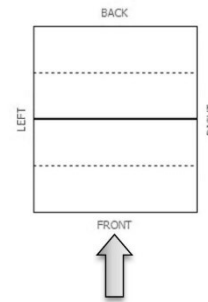
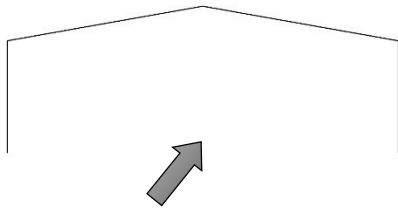
External pressue c_{pe}	Internal pressure c_{pi}	Possible name for the load case
	$c_{pi} -$	= 1. left upward → right upward ($c_{pi} -$)
	$c_{pi} -$	= 2. left upward → right downward ($c_{pi} -$)
	$c_{pi} -$	= 3. left downward → right upward ($c_{pi} -$)
	$c_{pi} -$	= 4. left downward → right downward ($c_{pi} -$)
	$c_{pi} +$	= 5. left upward → right upward ($c_{pi} +$)
	$c_{pi} +$	= 6. left upward → right downward ($c_{pi} +$)
	$c_{pi} +$	= 7. left downward → right upward ($c_{pi} +$)
	$c_{pi} +$	= 8. left downward → right downward ($c_{pi} +$)

WIND FROM RIGHT TO LEFT



External pressure c_{pe}	Internal pressure c_{pi}	Possible name for the load case
 $c_{pe} -$ $c_{pe} -$	$c_{pi} -$	= 9. right upward → left upward (c_{pi}^-)
 $c_{pe} -$ $c_{pe} +$	$c_{pi} -$	= 10. right upward → left downward (c_{pi}^-)
 $c_{pe} +$ $c_{pe} -$	$c_{pi} -$	= 11. right downward → left upward (c_{pi}^-)
 $c_{pe} +$ $c_{pe} +$	$c_{pi} -$	= 12. right downward → left downward (c_{pi}^-)
 $c_{pe} -$ $c_{pe} -$	$c_{pi} +$	= 13. right upward → left upward (c_{pi}^+)
 $c_{pe} -$ $c_{pe} +$	$c_{pi} +$	= 14. right upward → left downward (c_{pi}^+)
 $c_{pe} +$ $c_{pe} -$	$c_{pi} +$	= 15. right downward → left upward (c_{pi}^+)
 $c_{pe} +$ $c_{pe} +$	$c_{pi} +$	= 16. right downward → left downward (c_{pi}^+)

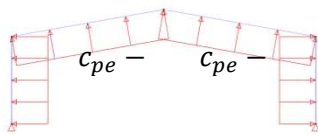
WIND FROM FRONT TO BACK



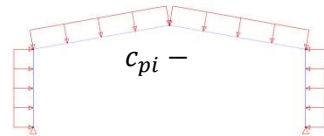
External pressure c_{pe}

Internal pressure c_{pi}

Possible name for load case

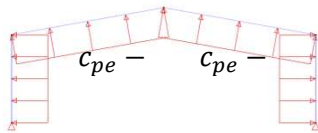


+

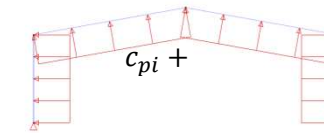


=

17. front → back upward (c_{pi-})
18. front → back downward (c_{pi-})



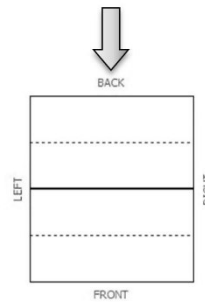
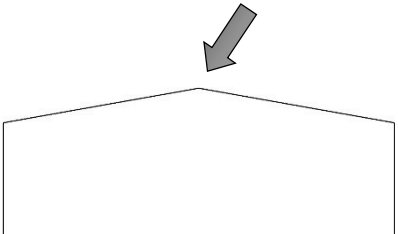
+



=

19. front → back upward (c_{pi+})
20. front → back downward (c_{pi+})

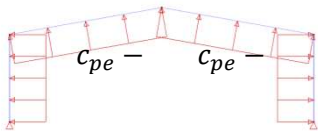
WIND FROM BACK TO FRONT



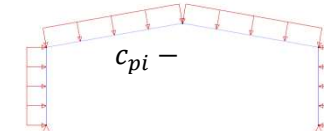
External pressure c_{pe}

Internal pressure c_{pi}

Possible name for load case

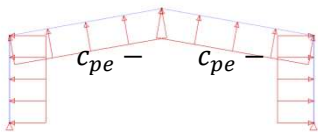


+

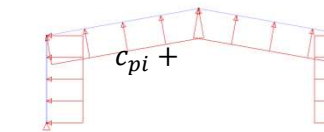


=

21. back → front upward (c_{pi-})
22. back → front downward (c_{pi-})



+

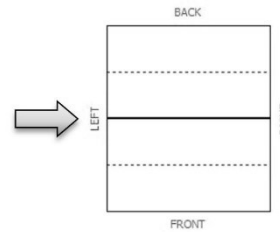
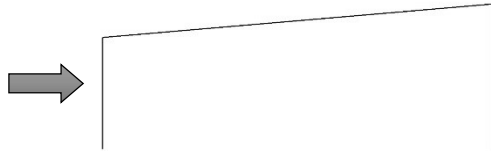


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23. back → front upward (c_{pi+})
24. back → front downward (c_{pi+})

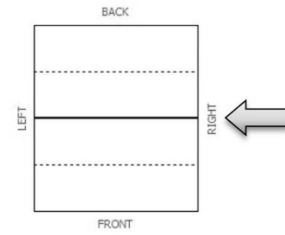
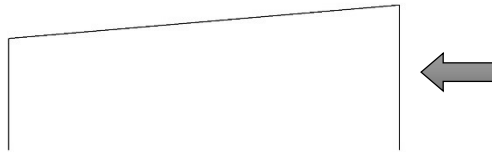
For a MONO pitched roofs: 10 cases

WIND FROM LEFT TO RIGHT



External pressure c_{pe}	Internal pressure c_{pi}	Possible name for load case
 $c_{pe} -$	$+$ $c_{pi} -$	$=$ 1. left upward \rightarrow right upward ($c_{pi} -$)
 $c_{pe} +$	$+$ $c_{pi} -$	$=$ 4. left downward \rightarrow right downward ($c_{pi} -$) 2. left upward \rightarrow right downward ($c_{pi} -$) 3. left downward \rightarrow right upward ($c_{pi} -$)
 $c_{pe} -$	$+$ $c_{pi} +$	$=$ 5. left upward \rightarrow right upward ($c_{pi} +$)
 $c_{pe} +$	$+$ $c_{pi} +$	$=$ 8. left downward \rightarrow right downward ($c_{pi} +$) 6. left upward \rightarrow right downward ($c_{pi} +$) 7. left downward \rightarrow right upward ($c_{pi} +$)

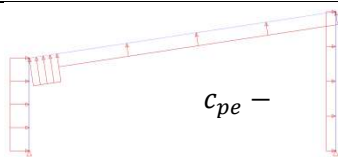
WIND FROM RIGHT TO LEFT



External pressure c_{pe}

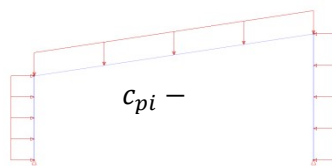
Internal pressure c_{pi}

Possible name for load case



$c_{pe} -$

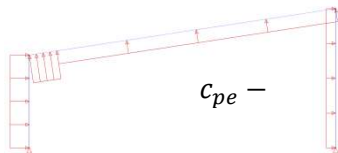
+



$c_{pi} -$

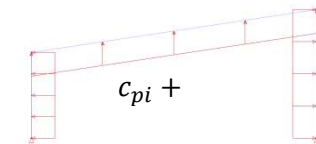
=

- 9. right upward → left upward ($c_{pi} -$)
- 10. right upward → left downward ($c_{pi} -$)
- 11. right downward → left upward ($c_{pi} -$)
- 12. right downward → left downward ($c_{pi} -$)



$c_{pe} -$

+

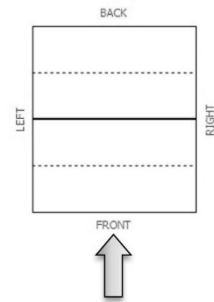
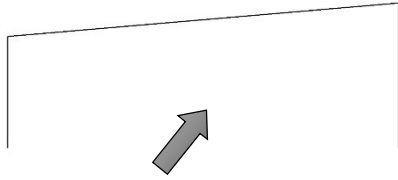


$c_{pi} +$

=

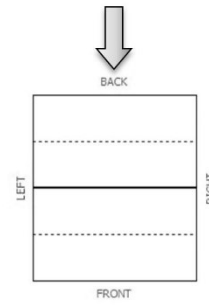
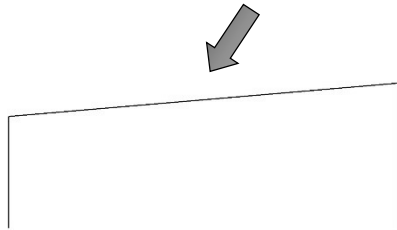
- 13. right upward → left upward ($c_{pi} +$)
- 14. right upward → left downward ($c_{pi} +$)
- 15. right downward → left upward ($c_{pi} +$)
- 16. right downward → left downward ($c_{pi} +$)

WIND FROM FRONT TO BACK



External pressure c_{pe}	Internal pressure c_{pi}	Possible name for load case
<p>$c_{pe} -$</p>	<p>+</p> <p>$c_{pi} -$</p>	<p>=</p> <p>17. front → back upward ($c_{pi} -$) 18. front → back downward ($c_{pi} -$)</p>
<p>$c_{pe} -$</p>	<p>+</p> <p>$c_{pi} +$</p>	<p>=</p> <p>19. front → back upward ($c_{pi} +$) 20. front → back upward ($c_{pi} +$)</p>

WIND FROM BACK TO FRONT



External pressure c_{pe}

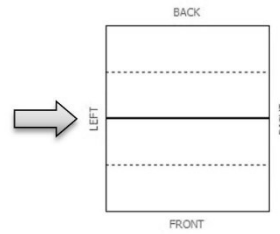
Internal pressure c_{pi}

Possible name for load case

<p>$c_{pe} -$</p>	<p>+</p> <p>$c_{pi} -$</p>	<p>=</p> <p>21.back → front upward ($c_{pi} -$) 22.back → front downward ($c_{pi} -$)</p>
<p>$c_{pe} -$</p>	<p>+</p> <p>$c_{pi} +$</p>	<p>=</p> <p>23.back → front upward ($c_{pi} +$) 24.back → front downward ($c_{pi} +$)</p>

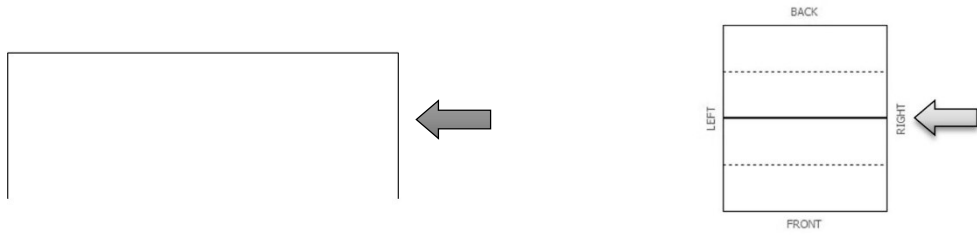
For a FLAT roof: **16 cases**

WIND FROM LEFT TO RIGHT



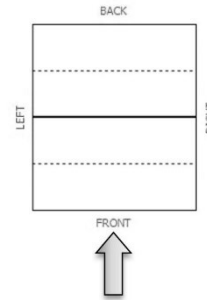
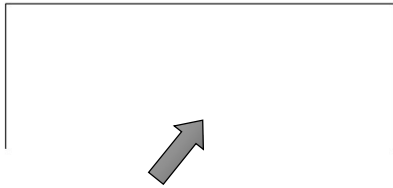
External pressure c_{pe}	Internal pressure c_{pi}	Possible name for load case
		1. left upward → right upward (c_{pi-}) 3. left downward → right upward (c_{pi-})
		4. left downward → right downward (c_{pi-}) 2. left upward → right downward (c_{pi-})
		5. left upward → right upward (c_{pi+}) 7. left downward → right upward (c_{pi+})
		8. left downward → right downward (c_{pi+}) 6. left upward → right downward (c_{pi+})

WIND FROM RIGHT TO LEFT



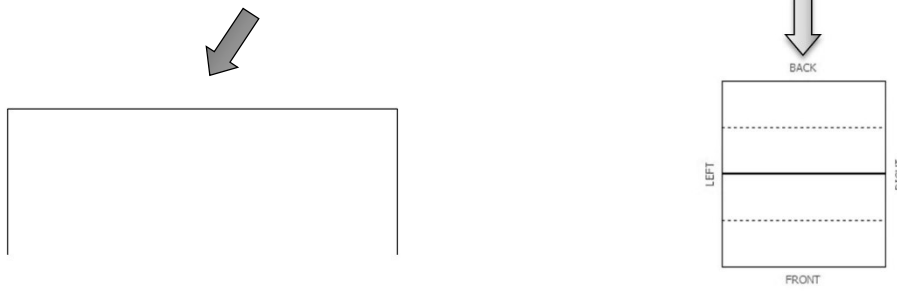
External pressure c_{pe}	Internal pressure c_{pi}	Possible name for load case
		= 9. right upward → left upward (c_{pi-})
		= 10. right upward → left downward (c_{pi-}) 11. right downward → left upward (c_{pi-}) 12. right downward → left downward (c_{pi-})
		= 13. right upward → left upward (c_{pi+})
		= 14. right upward → left downward (c_{pi+}) 15. right downward → left upward (c_{pi+}) 16. right downward → left downward (c_{pi+})

WIND FROM FRONT TO BACK



External pressure c_{pe}	Internal pressure c_{pi}	Possible name for load case
$c_{pe} -$	$c_{pi} -$	= 17.front → back upward ($c_{pi}-$)
$c_{pe} +$	$c_{pi} -$	= 18.front → back downward ($c_{pi}-$)
$c_{pe} -$	$c_{pi} +$	= 19.front → back upward ($c_{pi}+$)
$c_{pe} +$	$c_{pi} +$	= 20.front → back downward ($c_{pi}+$)

WIND FROM BACK TO FRONT



External pressure c_{pe}	Internal pressure c_{pi}	Possible name for load case
$c_{pe} -$	$c_{pi} -$	= 21.back → front upward (c_{pi}^-)
$c_{pe} +$	$c_{pi} -$	= 22.back → front downward (c_{pi}^-)
$c_{pe} -$	$c_{pi} +$	= 23.back → front upward (c_{pi}^+)
$c_{pe} +$	$c_{pi} +$	= 24.back → front downward (c_{pi}^+)