RWDI Anemos
CONSULTING ENGINEERS

Reputation Resources Results

BS6399-2 Wind loading

How can we help?

- Expert advice
- Desk studies
- Wind tunnel testing
- Failure investigation
- Software design
- Training / Seminars

We're on the web
www.rwdi-anemos.com

"...negative public comment about BS6399-2 has been mostly ill informed..."

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BS6399 Loading for Buildings
Part 2 Code of practice for wind loads

Friend or foe?

There has been a lot of negative public comment about BS6399-2 since it was first introduced in 1995 - mostly ill-informed and caused by misapplication of CP3:ChapterV:Part 2 over many years. This is not all the fault of users, CP3 was badly worded in places. Fortunately, the old code is now withdrawn and should not be used.

There is a lot more useful information in the new code, and it is described in a less ambiguous way. This helps to avoid too many arguments about interpretation. Equally, there is less scope for misunderstanding and misapplication. Much more background information on wind speeds and pressure coefficients was available to be included. All of this is good.

Nevertheless, like all codes, BS6399-2 can only cover basic shapes and when it moves into more intricate arrangements the clauses do get more complex, or perhaps don't exist - which is where we can help you.

How does it compare with CP3?

It may be several years since BS6399-2 was introduced but this is still a popular question. Reported perceptions are that design loads are significantly higher with the new code but extensive calibrations show this to be untrue. One calibration based on a 10km grid covering the whole of Great Britain (Figure 1), showed that, on average, the design wind pressure was 8% lower for inland sites and 15% for coastal sites. A separate study, using 9167 postcode sector centroids showed -8% to +4%, depending on the assumptions.

Naturally, there is a range around these average figures but the perception of higher loads is wrong. A major reason for this is the misapplication of CP3 in two main areas -

- applying terrain categories incorrectly
- not using the topography rules of CP3

The second calibration showed that with misapplied terrain categories in CP3, BS6399 would appear to give design pressures up to 25% greater.

UK location facts

To show you how important the altitude corrections and topography are, look at Table 1. This shows the percentage of postcode sectors on the GB mainland that have high altitude and/or significant slopes within +/-1km of their centroid. It also shows the distribution of terrain roughness, using a parameter called z_0. For open country, z_0 is about 0.03m, in town z_0 is 0.3m or more.

There are many locations where slope and altitude are significant, and yet it is surprising how many designers have not routinely used the topography rules that were introduced into CP3 in more than 17 years ago.

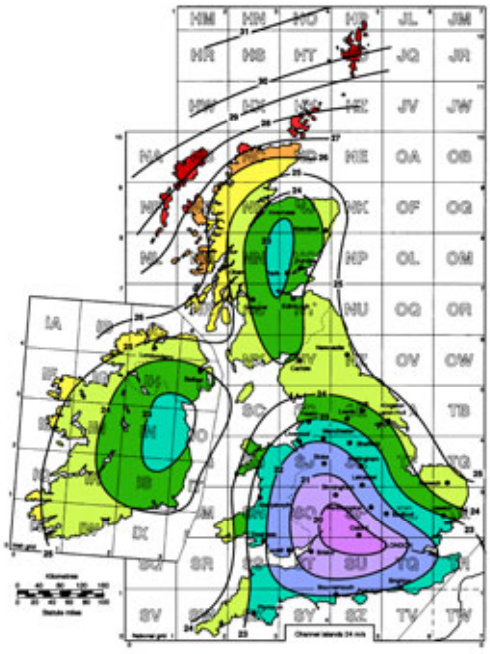
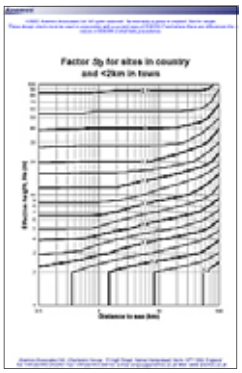


Figure 1 - BS6399-2
Basic mean wind speed contours with 2% risk of exceedence per annum

Screen shots from BREVe2

"...RWDI-Anemos have developed a series of design aids to help reduce your workload..."



Free design aids from www.rwdi-anemos.com

Conservatism

Often the enemy of the client, if not the designer, conservatism is a necessary part of any codified approach to design. BS6399-2 gives two methods for calculating wind loads - standard and directional. The simpler method contains conservatism that depends on site location and terrain. It arises when the worst case for the various parameters contributing to the wind speed (distance to coast, distance in town, terrain roughness, altitude, slope, etc) do not occur for the same wind direction.

There is a smaller amount of conservatism in the pressure coefficients. Both of these sources of conservatism were also inherent in CP3. Both sources can be minimised with intelligent use of the code.

Expert interpretation

To get the best of the code in complex situations, you need a clear understanding of the detail and the underlying behaviour of wind around structures.

RWDI-Anemos are probably the most experienced consultants in this field and can advise on where the conservatism lies. Nicholas Cook was principal author of the code and knows it inside out. He was also responsible for writing the only effective piece of software used to automate the estimation of design wind speeds - including the effects of terrain and topography. BREVe2 has established an excellent reputation, along with its sister BRECp that provides validated pressure coefficients. BREVe2 is now built into a number of other well-known structural design packages.

Paul Freathy has presented more than 40 training courses on the use of the Code, many in combination with Nick Cook. He has also been responsible for developing bespoke applications with BREVe2 embedded, such as a roof tile fixing specifier and design package for conservatories.

Audits and advice

You can harness our expertise in several different ways, very cost-effectively. Of course, we are happy to do the calculations for you and present a detailed report of our assumptions and findings. But perhaps you just need reassurance and guidance.

- Ask for advice before you start and we will spend a short time with your design team to advise them how best to approach the wind load calculations. Then carry out the calculations in-house.
- Increase confidence in your design by asking us to audit wind loading calculations. We will advise on errors, how to correct them, remaining conservatism and whether the calculations lie within the acceptable range of interpretation for the code.

The audit option can be especially useful when the calculations must be justified to a licensing or regulatory authority, such as a nuclear safety review or public enquiry.

Free design aids

RWDI-Anemos have developed a series of free design aids to help reduce your workload. Interpolation for the terrain and building factor, S_b, is a good example. Often needing a 4-way interpolation, and strictly a logarithmic interpolation, a quick solution should be very welcome. On the RWDI-Anemos web site, there are a set of printed design charts that reduce the task to reading from a graph. If you prefer a high-tech solution, try out our simple Windows utility to calculate S_b automatically. It uses the approach that minimises conservatism, but gives you the Standard Method value for comparison as well.

Sector altitude		Sector max slope over 1km		Sector terrain roughness (z_0)	
Altitude (m)	% of sites	Slope (%)	% of sites	z_0 (m)	% of sites
<25	28.1	<2	76.8	<0.025	0.7
25-75	36.7	2-4	16.9	0.025-0.1	18.7
75-125	20.4	4-6	4.2	0.1-0.3	30.8
125-200	11.8	6-8	1.3	0.3-0.6	44.0
>200	3.0	>8	0.8	>0.6	5.8

Table 1 - Distribution of altitude, slope and terrain type over the GB mainland