Input 2 Beaufort wind scale

Like the Richter scale for objective assessment of earthquake severity, the Beaufort scale attempts to specify the nature of a storm using a simple linear scale. While the Richter scale is logarithmic, so a scale 5 earthquake is 10 times more severe than a scale 4 earthquake, the Beaufort scale is linear in terms of wind speed (**Table C1**).

The scale was developed by Admiral Francis Beaufort of the Royal Navy in about 1805 to provide an objective assessment of wind speed at sea, so that sailors could better judge what sails to use or when to furl them when a storm approached. He therefore provided observations about the accompanying state of the surface of the sea for each scale point.

Table C1 Specification of the Beaufort scale with equivalents of the scale

Beaufort force	Specification of Beaufort scale for use on land, based on observations made at land stations	Mean pressure (at standard density) on a disc 1 ft^2		Equivalent speed at 33 ft (10 m)		Limits of speed at 33 ft (10 m) in the open		
		millibar	lbf ft^{-2}	knot	mph	knot	mph	m s^{-1}
0	calm; smoke rises vertically	0	0	0	0	<1	<1	0–0.2
1	direction of wind shown by smoke drift, but not by wind vanes	0.01	0.01	2	2	1–3	1–3	0.3–1.5
2	wind felt on face; leaves rustle; ordinary vane moved by wind	0.04	0.08	5	5	4–6	4–7	1.6–3.6
3	leaves and small twigs in constant motion; wind extends light flag	0.13	0.28	9	10	7–10	8–12	3.4–5.4
4	raises dust and loose paper; small branches are moved	0.32	0.67	13	15	11–16	13–18	5.5–7.9
5	small trees in leaf begin to sway; crested wavelets form on inland waters	0.62	1.31	19	21	17–21	19–24	8.0–10.7
6	large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty	1.1	2.3	24	28	22–27	25–31	10.8–13.8
7	whole trees in motion; inconvenience felt when walking against wind	1.7	3.6	30	35	28–33	32–38	13.9–17.1
8	breaks twigs off trees; generally impedes progress	2.6	5.4	37	42	34–40	39–46	17.2–20.7
9	slight structural damage occurs (chimney pots and slates removed)	3.7	7.7	44	50	41–47	47–54	20.8–24.4
10	seldom experienced inland; trees uprooted; considerable structural damage occurs	5.0	10.5	52	59	48–55	55–63	24.5–28.4
11	very rarely experienced; accompanied by widespread damage	6.7	14.0	60	68	56–63	64–72	28.5–32.6
12	widespread structural damage	>8.1	>17.0	68	78	>64	>73	>32.2

Input 2 Beaufort wind scale (continued)

The scale has proved so useful that it has been adopted as an international standard both for sailors and for estimation of wind force on land (**Tables C2** and **C3**).

However, the use of the term force is misleading because the pressure exerted by the wind in fact rises as the square of wind speed, as inspection of the pressure column of **Table C1** shows. To meet the needs of the hurricane observers, the upper end of the scale has been extended by five further scale points, to 17, for winds reaching speeds of up to 118 knots.

Table C2 Beaufort scale for use at sea

Beaufort force	Description	Features at sea	Knots
0	calm	sea like a mirror	less than 1
1	light air	ripples with appearance of scales, no foam crests	1–3
2	light breeze	wave-lets, small but pronounced; crests with glassy appearance, but do not break	4–6
3	gentle breeze	large wave-lets, crests begin to break; glassy looking foam, occasional white horses	7–10
4	moderate breeze	small waves becoming longer, frequent white horses	11–16
5	fresh breeze	moderate waves of pronounced long form; many white horses, some spray	17–21
6	strong breeze	some large waves, extensive white foam crests, some spray	22–27
7	near gale	sea heaped up, white foam from breaking; waves blowing in streaks with the wind	28–33
8	gale	moderately high and long waves; crests break into spin drift,blowing foam in well marked streaks	34–40
9	strong gale	high waves, dense foam streaks in wind, wave crests topple, rumble and roll over; spray reduces visibility	41–47
10	storm	Very high waves with long overhanging crests. Dense blowing foam, sea surface appears white. Heavy tumbling of sea, shock-like. Poor visibility.	48–55
11	violent storm	Exceptionally high waves, sometimes concealing small and medium sized ships. Sea completely covered with long white patches of foam. Edges of waves blown into froth. Poor visibility.	56–63
12	hurricane	air filled with foam and spray, sea white with driving spray; visibility bad	≥64

Input 2 Beaufort wind scale (continued)

Table C3 Beaufort scale adapted for use on land, with the addition of speeds measured by modern instruments

Beaufort force	Description	Features on land	Speed	
			mph	kph
0	calm	smoke rises vertically	less than 1	
1	light air	direction of wind shown by smoke drift but not by wind vanes	1–3	1–5
2	light breeze	wind felt on face, leaves rustle, ordinary wind vane moved by wind	4–7	6–11
3	gentle breeze	leaves and small twigs in constant motion, wind extends light flag	8–12	12–19
4	moderate breeze	wind raises dust and loose paper, small branches move	13–18	20–29
5	fresh breeze	small trees in leaf start to sway, crested wave-lets on inland waters	19–24	30–39
6	strong breeze	large branches in motion, whistling in telegraph wires, umbrellas used with difficulty	25–31	40–50
7	near gale	whole trees in motion, inconvenient to walk against wind	32–38	51–61
8	gale	twigs break from trees, difficult to walk	39–46	62–74
9	strong gale	slight structural damage occurs, chimney pots and slates removed	47–54	75–87
10	storm	trees uprooted, considerable structural damage occurs	55–63	88–101
11	violent storm	widespread damage	64–73	102–117
12	hurricane	widespread structural damage	≥74	≥119