

ROUGHNESS CLASSES AND ROUGHNESS LENGTHS, EU

The roughness classes are defined in the European Wind Atlas on the basis of the roughness length in meters z_0 , which is the height above ground level where the wind speed is theoretically zero, according to:

$$z_0 \leq 0.03, \text{ class} = 1.699823015 + \frac{\ln z_0}{\ln 150}$$

$$z_0 > 0.03, \text{ class} = 3.912489289 + \frac{\ln z_0}{\ln 3.33333}$$

Roughness Class	Roughness Length, z_0 [m]	Energy Index [percent]	Landscape
0	0.0002	100	Water surface.
0.5	0.0024	73	Completely open terrain with a smooth surface, such as concrete runways in airports, mowed grass.
1	0.03	52	Open agricultural area without fences and hedgerows and very scattered buildings. Only softly rounded hills
1.5	0.055	45	Agricultural land with some houses and 8 meter tall sheltering hedgerows within a distance of about 1250 meters.
2	0.1	39	Agricultural land with some houses and 8 meter tall sheltering hedgerows within a distance of about 500 meters.
2.5	0.2	31	Agricultural land with many houses, shrubs and plants, or 8 meters tall sheltering hedgerows within a distance of about 250 meters.
3	0.4	24	Villages, small towns, agricultural land with many or tall sheltering hedgerows, forests and very rough and uneven terrain.
3.5	0.8	18	Larger cities with tall buildings.
4	1.6	13	Very large cities with tall buildings and skyscrapers.