

Facet – Structural Engineers.

We have checked the 50' tower (5 x 2.5 m sections plus 2.5 m aerial support post on top) based on AS 1170.2 (the Australia Wind Code) and AS 4100 (Australian steel code), Grade 450 steel for the tube and 4.6 Grade for the M16 bolts.

We have checked it for maximum wind speed for aerial up and aerial down, assuming the aerial has the same wind area as a 2.5 m section of tower as a worst case estimate.

The table below summarises maximum design wind speeds from our design check, expressed as aerial up or down, Terrain Category 2 or 3 (i.e. in open relatively treeless terrain such as farmland, or suburbia/ forested terrain).

It is also expressed as either permissible stress design wind speed (called ASD - allowable stress design, in the USA) or ultimate limit state design wind speed (called LRFD - load and resistance factor design in the USA).

ASD is gradually changing to LRFD in the USA, so I'm not sure which one your engineer would be more conversant with.

We are ahead of them in this and made a similar change in our wind code in 1989 and in our steel code in 1990.

Maximum design wind speed:

	Aerial up		Aerial down	
	TC2	TC3	TC2	TC3
ASD kph	137	162	166	194
mph	85	100	103	120
LRFD kph	167	194	202	239
mph	103	120	125	148

In both cases the load is limited by the HD bolt capacity, but the 40 x 4 SHS capacity in the base section is very close to the HD bolt capacity for the aerial down condition.

Maximum wind speed for TC2 is lower than TC3 because TC2 is smoother terrain, thus less wind energy loss in turbulence and thus higher wind pressures on elements projecting into the air-stream for the same wind velocity.

Our wind code is based on a peak 3 sec. gust with a 5% likelihood of being exceeded in a 50 year return period.

US wind loads are derived from a 1 minute average gust intensity as I recall.

I don't have a US wind code, so I'm hoping your engineer in the US can use the wind speed data above and interpret it in terms of the US wind code requirements. In expressing the outcome in wind speed terms, it should be code independent, as a safe wind speed (ASD) should be directly usable.

This should answer the "wind rating " question and the "shear rating of the base" question. The shear strength of 8M16 4.6/s bolts is about 25 times greater than the base shear force from the wind loading.

The HD bolts fail principally in tension from overturning forces from the tower, not shear forces, and you have a sizeable reserve.

Regards.

Ron Blackwell

Facet Structural Engineering Consultants.