Helical Strakes For Stacks

MECA Enterprises Inc.

Helical strakes are aerodynamic stabilizers which are sometimes used to reduce the forces and deflections of the stack experienced due to vortex shedding. Strakes consist of **three (3) vanes** which are wrapped in a helical pattern on the **upper 1/3 of the stack**.

When strakes are added the drag coefficient of the stack is increased greatly. A smooth cylinder will have a shape factor of 0.7, while the same stack with strakes will increase its shape factor to 1.4. Consequently, the load on the **top 1/3** of the stack is **doubled**. Since a stack is a large cantilever beam, increasing the forces at the top by a factor of 2 will increase the loads at the base by **approximately 1.5**. Similarly, the deflections will also increase significantly.

Advantages

1. Steel fabricators can build them
2. Sometimes provide the most economical solution
3. When stack is short and/or stiff, then the additional wind drag may not cause an increase in stack weight.

Disadvantages

1. Double the wind load on the upper 1/3 of the stack, increasing stack weight significantly for tall stacks.
2. Nearly always more expensive than a vibration damper when the stack height is 150 ft [45 m] tall or greater.
3. Complex geometry make fabrication difficult
4. Can interfere with other attachments (i.e. ladders, platforms, etc.)
5. Foundation and Anchor Bolts usually increase in size
6. Does not work when other tall structures nearby.
7. Euro code does not allow their use for Scruton Number < 8 (which covers most stacks with vibration issues)

*Do Helical Strakes **always** work?*

No, Helical strakes are not always an acceptable solution. When there is **interference** effects from a nearby structure, then strakes can be ineffective due to **buffeting**. Also, if you are following the **Euro** standards they have specific **checks** for Helical strakes that must be met in order for strakes to be acceptable.

Can we use segmented strakes?

No , although it is easier to fabricate strakes that are **segmented** rather than continuous and helical; however, the testing that has been done is based upon continuous helical strakes, and so we **must** use **continuous helical**

Is it ok to break streaks at an obstruction?

Many times there is a flange, stiffening ring or some other **obstruction**. Without testing there is not any way to know how much you can break the helical strakes and they will still work; however, it is generally considered **acceptable** to **stop** a strake on one side of an obstruction (i.e. stiffening ring) and then start it again **immediately** on the other side of the obstruction.

Do I need to put Helical strakes on my flare tip?

This is very much a **grey** area. We have some guidance in standards about small obstructions; however, there is **nothing** in the standards that permit leaving helical strakes off of the type few feet of a stack. We can tell you that in our practice, helical strakes are **rarely** put on a flare tip and we are **unaware** of any major issues; however, this is definitely a grey area and it is generally recommended to **avoid** this situation when possible. One way to avoid is using a **damper** instead of helical strakes.