



**When you try to fix a blockage duct and drill to install a new vent to re-establish one-way grouting, how do you make sure you don't damage the tendon?**

The approach for repairs will depend on the situation, and often can be quite different. A specific tailored plan for each location and situation is recommended, however some various considerations with respect to new ports are listed below:

- The key is to have an idea of where the tendon should be and work carefully. It is recommended the work be performed by someone experienced in similar types of repairs. It is good practice to first layout the anticipated duct location by measurements from plan locations, use of Ground Penetrating Radar (GPR) and/or other methods. The approximate expected depth should also be determined before drilling.
- Closely monitor the depth of the drill holes until the duct is reached then carefully measure the distance to the duct and set the drill depth to just penetrate the duct to avoid contacting the strand. Marking the drill bit or wrapping a piece of tape around the drill bit at the estimated depth to help in monitoring the depth of the hole may also be used. Drilling at the high point is often the best place to start since the strands will be in the bottom of the duct at high points and less chance of strand damage. It may be possible to drill two holes near the high point, one serving as the inlet, one as the outlet.
- It may be prudent to consider different approaches for drilling into concrete and the duct. Typically, a larger, stronger drill and bit are used to drill the concrete but those might be too robust around the tendon steel. Suggest stopping about 1/2" away from the anticipated duct location then using a smaller drill to find the actual duct. Slow is the key and using a drill with a variable clutch that will stop if the drilling gets too hard may be helpful. As mentioned above, the strand location within the duct should be considered and avoid drilling where the strands may be located. In some cases, it might be necessary, or worth considering, to excavate a larger area of concrete to expose the duct without drilling right down on top of the duct.



- One approach assuming the original outlet is still functional is as follows. Connect air at about 30 psi air pressure on the void area. Then probe with a ¼” roto-hammer bit and air will escape as soon as the duct is pierced. Often this must be done multiple times to determine the extent of the void and to pierce the duct in a place that has no strand against the wall of the duct. Then use a larger bit with the depth to the duct marked on it. Stopping just short of this, chip the remaining concrete out and open the wall of the duct by hand. Then insert a new grout port and secure with epoxy.
- There is generally a balance that must be maintained in providing adequate access for repair and inspection, but also avoiding doing too much damage by drilling excess holes or chipping more concrete than necessary.
- Vacuum grouting is a procedure that can be employed as well, but still requires at least one useable grout port.