

## **Installation Instruction Manual**

**For**

### **American Ground Screw (AGS) products**

#### **Pre-Installation**

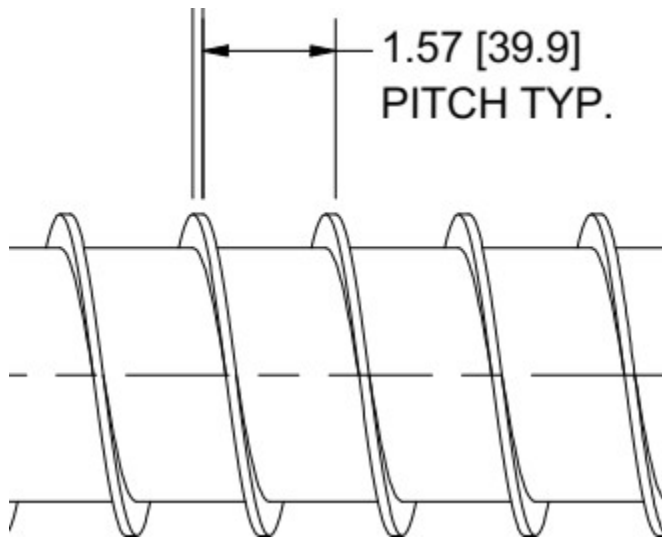
- Know your soil composition: If you don't take time to determine your soil composition you must use the minimum allowable loads for the particular screw you are using when planning your structure. Determine as cohesive (high clay) vs. non-cohesive (low clay or high sand) to determine load capacity as listed in Table 5 on page 11 of the ICC-ES Report, ESR-4226, found linked on the Code Compliance section of the AGS website.
- Safety equipment/PPE: Use adequate safety equipment while mechanically installing ground screws, i.e., steel toe shoes, safety glasses, gloves, hard hat, etc.
- Dial 811 call before you dig to ensure a clear path from utilities for the screw to penetrate into the subsurface.
- Be sure of above ground clearance of obstructions and nonessential personnel.
- Locate your desired screw positions with flags.

Pilot holes to improve accuracy of location and maintenance of plumb are helpful for very hard soil, but not necessary. Should you choose to do so; the pilot hole should be no more than 1/3 the diameter of the ground screw. You can use a drill bit or driven rod/stake. For example, for a 76mm/3" OD ground screw, the pilot hole should be no more than 1".

#### **Installation**

- The product may be used as a foundation system to support various structures, provided that it is installed according to these instructions and within the scope of ICC ES AC443, "limited to support structures constructed from steel or wood".
- Follow safe handling instructions laid out by the mechanized driver manufacturer
- Confirm that the adapter connecting the drive shaft of the mechanical driver to the screw that is being installed lines up and seats properly.
- If using a Model 3 (open top with 3 welded nuts) ground screw, install the bolts so they are flush with the inside of the ground screw before installation to help maintain the integrity of the nut during installation.
- If using a screw with a pre welded flange, make sure that the flange face and adapter face match and are bolted tight prior to attempting the install.

- Ground screws must be installed in a clockwise rotation and uninstalled in a counterclockwise rotation.
- During installation the rotation of the ground screw must be accompanied with appropriate downward pressure (crowd) to advance the screw one thread pitch per rotation. For example, the thread pitch is 40mm (1 1/2-1 5/8") on all ICC approved ground screws. Therefore, the screw should advance downward approximately 40mm or 1 1/2-1 5/8" per rotation.



If the screw is advancing at a significantly slower rate than the thread pitch there is not enough downward pressure. This causes the screw to churn (spin without advancing downward). Churning may cause the load capacity to be reduced or not meet established correlations. Conversely, if the screw is advancing at a significantly faster rate than the thread pitch there is too much downward pressure causing the screw to auger (advance downward like a drill bit vs. allowing the threads to engage the soil). This also puts undesired torque on the screw. Torque on the screw should not exceed the maximum torque of the screw as shown in the Tab 3 of the ESR Torque Data. Both of these errors will be apparent because soil cuttings will rise next to the screw. There should be no cuttings surfacing around the screw as shown below.



Should churning or auguring occur without immediate correction, the screw should be removed and repositioned. If using the same hole is required, 3/8" "chip" gravel can be poured into the hole to re-establish the load-ability following the installation procedures described above. A maximum of 20 RPMs is advised and only with a mechanical driver capable of enough crowd to advance the screw as described above.

- Rotation must be used during installation. Simply pressing or pounding the screw into position does not allow the threading to engage the soil. This will lessen the tension (uplift) loading.
- If a void is encountered during installation, the screw should be removed and repositioned or removed and 3/8 chip gravel poured into the hole. This re-establishes the product's load capacity.
- To obtain any screw's full load capacities they should be embedded in the soil until the welded nuts are at grade, a total of 3" remaining above grade. Leaving any additional portion of the screw above grade could potentially lessen the performance capacity of the screw versus published load capacities. This should only be considered after consultation with American Ground Screw or any other product installation instructions that specifically require such installation.

#### **Obstructions and refusal**

- An obstruction causing refusal is when something in the subsurface does not allow the screw to continue its downward motion. At this point the soil will begin to churn and rise to the surface. At this point you can relocate the screw or predrill the hole as described below.
- It's possible that ground screws can be installed through cobbled rock and fractured shale without predrilling. However, large stone and bedrock require pre-drilling at a diameter slightly larger than the maximum diameter of the threads. Drill the hole to the final embedment depth needed and lower the ground screw into the hole. Turn the screw counter clockwise while putting the cuttings back in the hole and/or adding gravel. The screw basically acts like a grain auger, forcing the gravel into the bottom of the hole. As the hole fills, the screw will begin to raise out of the hole. Once the screw is approximately 10-12" out of the hole, drive the screw back down into the gravel to depth. In order to achieve needed load capacity, actual depth the screw needs to rise and then be re-embedded may vary due to backfill material, hole size, and other site conditions.

### A Note on Screw Length, Thread Length and Frost Heave

- Frost depth must be considered when determining the appropriate screw length and its thread length for any site. Below is a guide to the how recommendations for these specifications are made. This guide assumes installation to 3" above grade and ensures 2/3rd of the total thread length is installed below frost level to resist heaving.

<b>Ground Screw Length Based on Frost Depth</b>			
**Assumes Installation to 3" Above Grade**			
<b>Thread Length 880mm/35"</b>		<b>Thread Length 610mm/24"</b>	
<b>Frost Depth</b>	<b>Minimum Ground Screw Length</b>	<b>Frost Depth</b>	<b>Minimum Ground Screw Length</b>
0-35"	1550mm/61"	0-32"	1300mm/51"
36-37"	1600mm/63"	33-44"	1600mm/63"
38-53"	2000mm/79"	45-60"	2000mm/79"
54-55"	2050mm/81"	>60"	Consult AGS
>53/55"	Consult AGS		

- Frost deeper than 60" is not considered here and will require longer screws.  
\*\*Though it may occur, we do not claim any additional increase in loads as the screw length increases.