Soil Compactor Safety Meeting Kit



WHAT'S AT STAKE

Soil compaction is a process that increases the density of the soil. Before we lay asphalt or concrete, the soil is the base layer. Soil compaction increases load-bearing capacity and stability, prevents soil settlement and frost damage, and reduces water seepage.

WHAT'S THE DANGER

SOIL COMPACTION HAZARDS – OVERCOMPACTION/ UNDERCOMPACTION

Over compaction can occur if the operator makes too many passes in one direction with the compaction machine, which can reduce the soil density. Under compaction results when the operator does not make enough passes with the compactor, so the particles in the soil are too soft and don't get the cohesion they need to create the right amount of density.

Get the right amount of lift or depth of the soil layer. When filling a trench, it is important to place the correct amount of dirt and provide the right amount of compaction force to the area. As the soil becomes compacted, the impact travels less and returns more energy to the machine, making it come off the ground higher. An incorrect lift—one that has too much dirt and too much depth—will create a loose layer of dirt, resulting in under compaction.

SOIL COMPACTION OPERATIONAL INJURIES

Extended use of a vibrating soil compactor can lead to vibration syndrome, an ergonomic injury causing damage to finger circulation and nerves. Symptoms include numbness, pain, and blanching. Soil compactor instructions include vibration level ratings and maximum usage times. Most equipment has vibration isolation technology on handles and seats. Excessive vibration may indicate poor maintenance or disrepair. Wear anti-vibration gloves if needed.

HOW TO PROTECT YOURSELF

SOIL COMPACTION SAFETY PROTOCOL

1. **Use the right compaction method.** Different materials require different compaction methods and therefore different equipment.

Cohesive soils: When compacting cohesive soils such as silt and clay, you need to break the tight bonds that hold the soil particles together. This usually requires an impact or static force (the deadweight of the machine).

Granular soils: Sand, gravel and cobbles are made of larger particles that slide against each other when compacted. The best way to compact granular soils is with a vibratory or static force.

Asphalt: This mix of bitumen and aggregate reacts like a hot, molten soil. Rammers, plate compactors and rollers with a smooth drum are good compaction choices. Double drum rollers work well for compacting asphalt and subbases on small or medium-size jobs and are ideal for parking lots, driveways, road repairs and other patchworks.

1. **Monitor the material conditions.** Moisture matters when compacting soil. Water helps particles slide into place during compaction, but too much moisture saturates the soil, leading to under-compaction and potential settlement issues.

With some soils you can test the moisture by hand. Squeeze a handful in your fist. If the material crumbles without forming a ball, or it shatters when dropped, it's likely too dry, so you may need to add water. If it stays in a sticky ball, it's likely too wet. To remove moisture, disk the ground and let it air dry.

1. **Get the lift right**. Getting the lift (soil layer thickness) right is critical to successful compaction. Thick layers won't compress as easily as thinner layers, and you may end up with under-compaction no matter how many passes you make. On the other hand, if layers are too thin, the project will take all day.
2. **Start with a test section.** Try the compaction equipment on a small area to see how the material reacts to the machine. You might vary the machine speed, the rammer height if using a rammer and the vibration frequency if using a compactor with vibration.
3. **Work in layers.** Work layer by layer, noticing how the machine reacts, which hints at how dense the material has become. Make sure each layer is adequately compacted before moving on to the next one, but don't over-compact. Over-compaction could lead to cracks or break down the material, making it weaker instead of stronger.
4. **Use the right compactor for the job.**

- **Rammer –** Rammers are also known as jumping jacks and they're usually best for small and confined areas.
- **Vibrating plate compactor –** Vibrating plate compactors are suitable for compacting bigger sites.
- **Drum roller –** Drum roller designs are versatile models which are suitable for use on soil or asphalt applications.
- **Trench roller –** Trench roller compactors are designed to be used in trenches.

1. **Select compaction equipment with safety features.** Safety features can include reinforced plates at the bottom, resistant vibration features, and protection cushioning. Others include rollover protective structures.
2. **Assess site.** Always assess the site or area to be compacted for risks before you start.
3. **Review manufacturer's instructions.** Follow the manufacturer's instructions and make sure supervising staff and operators are knowledgeable about these instructions before the project starts.
4. **Operate in well-ventilated, well-lit areas.** If the compactor runs on fuel, work only in spaces that are well-ventilated. If you can't, make sure all operators wear masks that limit or eliminate exposure to exhaust fumes.
5. **Maintenance and operation.** Always clean the compactor in the manner recommended

by the manufacturer and never use cleaning solutions that are not approved.

6. **Wear appropriate clothing.** This can include masks or goggles, and earplugs or earmuffs. If operators are working with hot bitumen or other hot substances, provide them with appropriate long-sleeved clothing, gloves, boots, and other accessories to prevent skin contact.
7. **Instruction, Supervision, and Training**

- **Training –** Compactors should be operated by appropriately trained staff members. Training programs should cover how to keep risk on worksites to a minimum, and how to take steps to control risks.
- **Instructions –** Develop policies and step-by-step guides for operating compactors and provide your staff members with these, along with the manufacturer’s operating manual.
- **Supervision –** Supervisors should be aware of your safety policies and guidelines and know that they’re responsible for enforcing them.

FINAL WORD

All operators should be mindful of safety at all times to keep the machines running smoothly and to maintain a safe working environment for the equipment operator and jobsite personnel.