

## **WARNING UPRIGHT RAMMERS**

Any piece of equipment can be dangerous if not operated properly. **YOU** are responsible for the safe operation of this equipment. The operator must carefully read and follow any warnings, safety signs and instructions provided with or located on the equipment. Do not remove, defeat, deface or render inoperable any of the safety devices or warnings on this equipment. If any safety devices or warnings have been removed, defeated, defaced or rendered inoperable, **DO NOT USE THIS EQUIPMENT!!!**

### **REGULAR GAS ONLY**

**⚠️ WARNING:** Operating, servicing and maintaining this equipment can expose you to chemicals including engine exhaust, carbon monoxide and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize your exposure, avoid breathing exhaust, do not idle the engine except as necessary, operate and service your equipment in a well-ventilated area and wear gloves or wash your hands frequently when servicing your equipment. For more information go to [www.P65warnings.ca.gov](http://www.P65warnings.ca.gov)

Use extreme caution whenever operating, moving, loading or unloading this equipment. During and after operation the Muffler and other components are Extremely Hot and will cause Serious Burns.

Never operate power equipment of any kind if you are tired or if you are under the influence of alcohol, drugs, medication or any substance that could affect your ability or judgment. Be alert! If you get tired while operating this equipment, take a break. Tiredness may result in loss of control.

Provide adequate ventilation when operating this equipment. Internal combustion engines consume oxygen and give off deadly carbon monoxide gas.

**DANGER: This equipment has multiple pinch points that can cause dismemberment or death. Keep hands, feet and all other body parts clear at all times.**

### **IMPORTANT SAFETY RULES TO FOLLOW**

1. Do not smoke while operating or refueling this machine.
2. Always operate the machine with all the safety devices in place and in working condition.
3. Always guide the machine so that hands do not get caught in obstacles. Keep both hands firmly in contact with the guide handle while operating this rammer.
4. Stop the engine when leaving the machine or refueling.
5. Do not refuel the rammer while engine is running. Allow engine to cool before refueling.
6. Always keep hands, feet and clothing away from moving parts.
7. Always wear protective shoes or shoe guards when operating this rammer. Wear snug fitting clothing hardhat and ear protection. No jewelry. Wear safety glasses and leather gloves.
8. Be aware of surface condition and use special care when working on uneven ground or when compacting coarse material.
9. Never allow bystanders to stand close to the machine while it is being started or while it is running.
10. Transport the rammer in an upright position only. Fuel will leak out of tank causing a fire hazard.
11. Do not use gasoline-powered equipment in deep trenches or other closed in areas without ventilation. Lack of ventilation could cause fatal carbon monoxide poisoning.

If the person receiving this handout will not be the user of the equipment, forward these instructions to the operator. If there is any doubt as to the operation or safety of the equipment,

**DO NOT USE!!! CALL A TOOL SHED IMMEDIATELY!!!**

**FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN INJURY OR DEATH**

## Cohesive soils

Cohesive soils have the smallest particles. Clay has a particle size range of .00004" to .002". Silt ranges from .0002" to .003". Clay is used in embankment fills and retaining pond beds.

### Characteristics

Cohesive soils are dense and tightly bound together by molecular attraction. They are plastic when wet and can be molded, but become very hard when dry. Proper water content, evenly distributed, is critical for proper compaction. Cohesive soils usually require a force such as impact or pressure. Silt has a noticeably lower cohesion than clay. However, silt is still heavily reliant on water content.

### Granular soils

Granular soils range in particle size from .003" to .08" (sand) and .08" to 1.0" (fine to medium gravel). Granular soils are known for their water-draining properties.

### Characteristics

Sand and gravel obtain maximum density in either a fully dry or saturated state. Testing curves are relatively flat so density can be obtained regardless of water content.

## GUIDE TO SOIL TYPES

What to look for	Appearance/feel	Water movement	When moist...	When dry...
<b>Granular soils,</b> fine sands and gravel.	Coarse grains can be seen. Feels gritty when rubbed between fingers.	When water and soil are shaken in palm of hand, they mix. When shaking is stopped, they separate.	Very little or no plasticity.	Little or no cohesive strength when dry. Soil sample will crumble easily.
<b>Cohesive soils,</b> clays, silts and mixed soils.	Grains cannot be seen by naked eye. Feels smooth and greasy when rubbed between fingers.	When water and soil are shaken in palm of hand, they will not mix.	Plastic and sticky. Can be rolled.	Has high strength when dry. Crumbles with difficulty. Slow saturation in water.

### RECOMMENDED EQUIPMENT FOR COHESIVE SOILS



Rammer

### RECOMMENDED EQUIPMENT FOR GRANULAR SOILS



Vibratory Plate

## Compaction Equipment

### Applications

The desired level of compaction is best achieved by matching the soil type with its proper compaction method. Other factors must be considered as well, such as compaction specs and job site conditions.

- Cohesive soils—clay is cohesive; its particles stick together\*. Therefore, a machine with a high impact force is required to ram the soil and force the air out, arranging the particles. A *rammer* is the best choice, or a *pad-foot vibratory roller* if higher production is needed.
- Granular soils—since granular soils are not cohesive and the particles require a shaking or vibratory action to move them, vibratory plates (forward travel) are the best choice.

\*The particles must be sheared to compact.