

**SUBSECTION 4.22****ROLLING**

- I. Description:** Compact embankment, subgrade, base, surface treatments, broken concrete pavement, or asphalt pavement using rollers. Break up asphalt mats, pit run material, or base materials.
- II. Equipment:** The Contractor may use any type of roller to meet the production rates and quality requirements of the Contract unless otherwise shown on the plans or directed. When specific types of equipment are required, use equipment that meets the requirements of this Subsection. The ODR may allow the use of rollers that operate in one direction only when turning does not affect the quality of work or encroach on traffic.

**Table 1**  
**Roller Requirements<sup>1</sup>**

<b>Roller Type</b>	<b>Materials to be Compacted</b>	<b>Load (tons)</b>	<b>Contact Pressure</b>	<b>Roller Speed (mph)</b>
Steel wheel	Embankment, subgrade, base, asphalt concrete	$\geq 10$	$\geq 325$ lb. per linear inch of wheel width	2-3
Tamping	Embankment, subgrade, base	–	125-550 psi per tamping foot	2-3
Heavy tamping	Embankment, subgrade, base	–	$\leq 550$ psi per tamping foot	2-3
Vibratory	Embankment, subgrade, base, asphalt concrete	Type A < 6 Type B > 6 Type C as shown on plans	Per equipment specification and as approved	As approved
Light pneumatic	Embankment, subgrade, base, surface treatment	4.5-9.0	$\geq 45$ psi	2-6
	Asphalt Concrete			4-12
Medium pneumatic	Same as light pneumatic	12-25	$\geq 80$ psi, as directed	Same as light pneumatic
Heavy pneumatic	Embankment, subgrade, base, previously broken concrete pavement, other pavements	$\geq 25$	$\leq 150$ psi	2-6
Grid	Embankment, base, breaking up existing asphalt mats or base	5-13	–	2-3

1. Unless otherwise specified in the Contract.

**A. STATIC Steel Wheel Rollers:** Furnish single, double, or triple steel wheel, self-propelled power rollers weighing at least 10 tons capable of operating in a forward and backward motion. Ensure all wheels are flat. When static steel wheel rollers are required, vibratory rollers in the static mode may be used. For single steel wheel rollers, pneumatic rear wheels are allowed for embankment, subgrade, and base. For triple steel wheel rollers, provide rear wheels with a minimum diameter of 48 in., a minimum width of 20 in., and a minimum compression of 325 lb. per inch of wheel width.

**B. Tamping Rollers:** Furnish self-propelled rollers with at least 1 self-cleaning metal tamping drum capable of operating in a forward or backward motion with a minimum effective rolling width of 5 ft. For rollers with more than 1 drum, mount drums in a frame so that each drum moves independently of the other. Operate rollers in static or vibratory mode.

**1. Tamping Roller (Minimum Requirement):** For all tamping rollers except for heavy tamping rollers, provide tamping feet that exert a static load of 125 to 550 psi and project at least 3 in. from the surface of the drum.

**2. Heavy Tamping Roller:** Provide tamping rollers that have: 2 metal tamping drums, rolls, or shells, each with a 60-in. minimum diameter and a 5-ft. minimum width, or 1 rear and 2 forward drums, each with a 60-in. minimum diameter. Arrange drums so that the rear drum compacts the space between the 2 forward drums and the minimum overall rolling width is 10 ft. Equip drums with tamping feet that:

- a) project at least 7 in. from the drum surface,
- b) have an area of 7 to 21 sq. in.,
- c) are self-cleaning,
- d) exert a static load of at least 550 psi, and
- e) are spaced at 1 tamping foot per 0.65 to 0.70 sq. ft. of drum area.

**C. Vibratory Rollers:** Furnish self-propelled rollers with at least 1 drum equipped to vibrate. Select and maintain amplitude and frequency settings per manufacturer's specifications to deliver maximum compaction without material displacement or shoving, as approved. Furnish the equipment manufacturer's specifications concerning settings and controls for amplitude and frequency. Operate rollers at speeds that will produce at least 10 blows per foot unless otherwise shown on the plans or approved. Pneumatic rear wheels are allowed for embankment, subgrade, and base. Equip each vibrating drum with:

1. separate frequency and amplitude controls,
2. controls to manually start and stop vibration, and
3. a mechanism to continuously clean the face of the drum.
4. For asphalt-stabilized base and asphalt concrete pavement, furnish a roller that also has the ability to:
5. automatically reverse the direction of the rotating eccentric weight,
6. stop vibration before the motion of the roller stops, and
7. thoroughly moisten the drum with water or approved asphalt release agent.
  - a) Drum (Type A). Furnish a roller with a static weight less than 6 tons and a vibratory drum.
  - b) Drum (Type B). Furnish a roller with a minimum static weight of 6 tons and a vibratory drum.

c) Drum (Type C). Furnish a roller as shown on plans.

**D. Pneumatic Tire Rollers:** Pneumatic tire rollers consist of rubber tire wheels on axles mounted in a frame with either a loading platform or body suitable for ballast loading. Arrange the rear tires to cover the gaps between adjacent tires of the forward group. Furnish rollers capable of forward and backward motion. Compact asphalt pavements and surface treatments with a roller equipped with smooth-tread tires. Compact without damaging the surface. When necessary, moisten the wheels with water or an approved asphalt release agent. Select and maintain the operating load and tire air pressure within the range of the manufacturer's charts or tabulations to attain maximum compaction throughout the lift, as approved. Furnish the manufacturer's chart or tabulations showing the contact areas and contact pressures for the full range of tire inflation pressures and for the full range of loadings for the particular tires furnished. Maintain individual tire inflation pressures within 5 psi of each other. Provide uniform compression under all tires.

1. Light Pneumatic Tire. Furnish a unit:

2. with at least 9 pneumatic tires,
3. with an effective rolling width of approximately 5 ft.,
4. capable of providing a total uniform load of 4.5 to 9 tons, and
5. with tires capable of maintaining a minimum ground contact pressure of 45 psi.

6. Medium Pneumatic Tire. Furnish a unit:

7. with at least 7 pneumatic tires,
8. with an effective rolling width of approximately 7 ft.,
9. capable of providing a total uniform load of 12 to 25 tons, and
10. with tires capable of maintaining a minimum ground contact pressure of 80 psi or 90 psi as directed.

**E. Heavy Pneumatic Tire:** Furnish a unit:

1. with at least 4 pneumatic-tired wheels mounted on axles carrying at most 2 wheels,
2. with wheels arranged to carry approximately equal loads on uneven surfaces,
3. with a width between 8 and 10 ft. that can turn 180° in the crown width,
4. capable of providing a total uniform load of at least 25 tons,
5. with tires capable of maintaining a maximum ground contact pressure of 150 psi, and
6. with liquid-filled tires inflated to such a level that liquid will flow from the valve stem when the stem is in the uppermost position.

**F. Grid Rollers:** Furnish rollers that have 2 cylindrical cages with a minimum diameter of 66 in. and a minimum width of 32 in. Mount cages in a rigid frame with weight boxes. Use a cage surface of cast or welded steel fabric grid with bars 1-1/2 in. wide, spaced on 5-in. centers in each direction, that undulate approximately 1 in. between the high and low points.

1. Furnish rollers capable of providing a total load of 5 to 13 tons and capable of being operated in a forward or backward motion.

**G. Alternate Equipment:** Instead of the specified equipment, the Contractor may, as approved by the ODR or Engineer, operate other compaction equipment that produces equivalent results. Discontinue the use of the alternate equipment and furnish the specified equipment if the desired results are not achieved.

**III. CONSTRUCTION:** Perform this work in accordance with the applicable Items using equipment and roller speeds specified in Table 1. Use only rubber-tired equipment to push or pull compaction equipment on base courses. Use equipment that does not damage material being rolled.

**IV. MEASUREMENT AND PAYMENT:** The work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly but will be subsidiary to pertinent Items.