

**Introduction**

Cover height is one of the determining factors when calculating the load carrying capacity of the installation. The two most common cover height concerns are the minimum cover height in areas exposed to vehicular traffic and the maximum cover heights. These two cover heights are considered the worst case scenarios from a loading perspective, depending on the project conditions.

The information in this document is intended to provide quick access to many cover height questions with a degree of conservatism. This data is not intended to be used for project design. Refer to Prinsco’s *Structures Design Guide* for detailed information for analyzing the intended design conditions.

**Minimum Cover Heights in Trafficked Conditions**

Pipe with diameters of 4- to 48-inch installed subjected to AASHTO HL-93, H-25 or HS-25 traffic loads must have at least one foot cover over the pipe crown, while 60-inch diameter pipe must have at least 18 inches of cover. Table 15 below summarizes these minimum burial depth recommendations. These minimum cover heights are measured from the top of the pipe to the bottom of flexible paving or from the top of the pipe to the top of rigid paving. Structural backfill should be placed as directed by the design engineer. However, structural fill should extend (at a minimum) from the top of the pipe to 6-inches above the pipe. See Prinsco’s *Installation Guide* for additional information.

| Inside Diameter, ID, in.(mm) | Minimum Cover, H, ft. (m) |  | Inside Diameter, ID, in.(mm) | Minimum Cover, H, ft. (m) |
|------------------------------|---------------------------|--|------------------------------|---------------------------|
| 3 (75)                       | 1 (0.3)                   |  | 18 (450)                     | 1 (0.3)                   |
| 4 (100)                      | 1 (0.3)                   |  | 24 (600)                     | 1 (0.3)                   |
| 6 (150)                      | 1 (0.3)                   |  | 30 (750)                     | 1 (0.3)                   |
| 8 (200)                      | 1 (0.3)                   |  | 36 (900)                     | 1 (0.3)                   |
| 10 (250)                     | 1 (0.3)                   |  | 42 (1050)                    | 1 (0.3)                   |
| 12 (300)                     | 1 (0.3)                   |  | 48 (1200)                    | 1 (0.3)                   |
| 15 (375)                     | 1 (0.3)                   |  | 60 (1500)                    | 1.5 (0.46)                |

**Table 1: Minimum Trafficked Burial Depth**

Note: Minimum covers for AASHTO HL-93, H-25 or HS-25 traffic loads, Class III backfill material compacted to 90% standard Proctor density around the pipe and a minimum of 6-inches over the pipe crown.

In cases where temporary construction traffic is necessary for paving or other special construction operations, Table 2 summarizes the minimum allowable covers based on the surface ground pressure.

| Vehicular Load At Surface, psi (kPa) | Temporary Minimum Cover, in. (mm) for 4” – 48” diameters | Temporary Minimum Cover, in. (mm) for 60” diameter |
|--------------------------------------|--|--|
| 75 (517)                             | 9 (230)  | 12 (300)   |
| 50 (345)                             | 6 (150)  | 9 (230)  |
| 25 (172)                             | 3 (80)   | 6 (150)  |

**Table 2: Minimum Temporary Cover**

Note: Temporary minimum cover should only be employed during construction when the vehicle load is less than 75 psi.

**Maximum Cover**

The maximum burial depth is significantly influenced by the type of backfill and level of compaction. Other factors influencing the burial depth includes the pipe diameter and pipe section properties. Table 3 summarizes the maximum allowable burial depths for Prinsco GOLDFLO and ECOFLO 100 (dual wall corrugated HDPE) based on the backfill material, compaction level, and pipe diameters.

The maximum burial depths found in Table 3 assume that the pipe was installed in accordance with Prinsco's *Installation Guide* and the requirements of ASTM D2321. The calculations used incorporate the maximum safety factors represented in Prinsco's *Structures Design Guide* and assume that the material properties are consistent with the requirements of ASTM F2306 and AASHTO M252/M294 Type S pipe as shown in Table 4. Also the calculations assume zero hydrostatic loading and assume that the native soils are of adequate strength and are suitable for installation. For applications requiring fill heights greater than those listed in Table 3, contact your local Prinsco Representative.

| Dual Wall Maximum Burial Depth, ft (m) |              |             |           |          |          |          |
|--|--------------|-------------|-----------|----------|----------|----------|
| Diameter<br>in (mm)                    | Class 1      |             | Class 2   |          | Class 3  |          |
|  | Compacted    | Uncompacted | 95%       | 90%      | 95%      | 90%      |
| 4 (100)                                | > 65 (19.8)* | 21 (6.4)    | 38 (11.6) | 21 (6.4) | 22 (6.7) | 11 (3.4) |
| 6 (150)                                | > 65 (19.8)* | 22 (6.7)    | 40 (12.2) | 22 (6.7) | 23 (7.0) | 11 (3.4) |
| 8 (200)                                | > 65 (19.8)* | 22 (6.7)    | 41 (12.5) | 22 (6.7) | 23 (7.0) | 11 (3.4) |
| 10 (250)                               | > 65 (19.8)* | 22 (6.7)    | 41 (12.5) | 22 (6.7) | 23 (7.0) | 11 (3.4) |
| 12 (300)                               | 54 (16.5)    | 19 (5.8)    | 33 (10.1) | 19 (5.8) | 20 (6.1) | 10 (3.0) |
| 15 (375)                               | 61 (18.6)    | 20 (6.1)    | 36 (11.0) | 20 (6.1) | 21 (6.4) | 10 (3.0) |
| 18 (450)                               | 56 (17.1)    | 19 (5.8)    | 33 (10.1) | 19 (5.8) | 20 (6.1) | 10 (3.0) |
| 24 (600)                               | 58 (17.7)    | 19 (5.8)    | 34 (10.4) | 19 (5.8) | 20 (6.1) | 10 (3.0) |
| 30 (750)                               | 42 (12.8)    | 17 (5.2)    | 26 (7.9)  | 17 (5.2) | 18 (5.5) | 9 (2.7)  |
| 36 (900)                               | 44 (13.4)    | 17 (5.2)    | 27 (8.2)  | 17 (5.2) | 18 (5.5) | 9 (2.7)  |
| 42 (1050)                              | 53 (16.2)    | 18 (5.5)    | 31 (9.5)  | 18 (5.5) | 19 (5.8) | 9 (2.7)  |
| 48 (1200)                              | 39 (11.9)    | 16 (4.9)    | 24 (7.3)  | 16 (4.9) | 16 (4.9) | 8 (2.4)  |
| 60 (1500)                              | 42 (12.8)    | 16 (4.9)    | 26 (7.9)  | 16 (4.9) | 16 (4.9) | 8 (2.4)  |

**Table 3: Maximum Burial Depth for Dual Wall HDPE**

## Notes:

- 1) \* Special design considerations should be made for these burial depths. Contact your local Prinsco representative for more information.
- 2) Calculations assume no hydrostatic pressure and a density of 120 pcf (1926 kg/m<sup>3</sup>) for overburden material. Hydrostatic pressure will result in a reduction of allowable cover heights.
- 3) Backfill materials as defined by ASTM D2321 and compaction levels are standard proctor densities.
- 4) Installation assumed to be a trench installation in accordance with ASTM D2321 and Prinsco's *Installation Guide* and as outlined in the *Structures Design Guide*.
- 5) Contact your local Prinsco Representative for special designs or deeper burial depths.
- 6) Cover heights for uncompacted Class 1 provide a large degree of variation and are conservatively assumed to be equivalent to Class 2, 90% SPD.



**HDPE DUAL WALL MINIMUM AND MAXIMUM BURIAL DEPTHS**

| Prinsco Product | Min. Cell Class (ASTM D3350) | Factored Tension Strain Limit $\epsilon_{yt}$ (%) | Factored Comp. Strain Limit $\epsilon_{yc}$ (%) | Initial            |                   | 50 Year            |                   | 75 Year            |                   | 100 Year           |                   |
|-----------------|------------------------------|---|---|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|
|                 |                              |   |   | Fu<br>psi<br>(MPa) | E<br>psi<br>(MPa) | Fu<br>psi<br>(MPa) | E<br>psi<br>(MPa) | Fu<br>psi<br>(MPa) | E<br>psi<br>(MPa) | Fu<br>psi<br>(MPa) | E<br>psi<br>(MPa) |
| Corrugated HDPE | 435400C                      | 5   | 4.1   | 3000<br>(20.7)     | 110000<br>(758)   | 900<br>(6.21)      | 22000<br>(152)    | 900<br>(6.21)      | 21000<br>(145)    | 800<br>(5.52)      | 20000<br>(138)    |

**Table 4: Prinsco Dual Wall Pipe Mechanical Properties**