

JANUARY 2009

AWWA C900 / C905

PVC PIPE BURIAL DEPTH CHART

These burial depth charts were developed using standard industry practices for predicting diametric deflection. The burial depths provided are based on the AWWA recommendation for maximum deflection of PVC pressure pipe of 5%. These charts do not apply for other values of deflection. A soil density of 120 lbs/ft and H2O highway loading was assumed. For shallow burials, the actual magnitude of the predicted deflection should be investigated to check for the possibility of road surface damage. The burial depths in these charts assume proper installation procedures.

Further information on this topic can be found in the following resources:

- JM Eagle Technical Bulletin "Depth of Burial for PVC Pipe"
- JM Eagle "Installation Guide: PVC Water Pipe"
- JM Eagle Technical Bulletin "PVC Pipe Trench Construction"
- Uni-Bell "Handbook of PVC Pipe"

APPLICABILITY AWWA C900/C905 PVC WATER PIPES				
DR 14				
SOIL CLASS	COMPACTION (% PROCTOR)	E' VALUE (PSI)	MAXIMUM BURIAL (FT)	MINIMUM BURIAL (FT)
I	> 95%	3,000	50 +	1
	85% - 95%	3,000	50 +	1
	< 85%	3,000	50 +	1
	Loose	1,000	50 +	1
II	> 95%	3,000	50 +	1
	85% - 95%	2,000	50 +	1
	< 85%	1,000	50 +	1
	Loose	200	48 +	1
III	> 95%	2,000	50 +	1
	85% - 95%	1,000	50 +	1
	< 85%	400	50 +	1
	Loose	100	45 +	1
IV	> 95%	1,000	50 +	1
	85% - 95%	400	50 +	1
	< 85%	200	48 +	1
	Loose	50	44 +	1
V	NOT RECOMMENDED			
DR 18				
SOIL CLASS	COMPACTION (% PROCTOR)	E' VALUE (PSI)	MAXIMUM BURIAL (FT)	MINIMUM BURIAL (FT)
I	> 95%	3,000	50 +	1
	85% - 95%	3,000	50 +	1
	< 85%	3,000	50 +	1
	Loose	1,000	50 +	1
II	> 95%	3,000	50 +	1
	85% - 95%	2,000	50 +	1
	< 85%	1,000	41 +	1
	Loose	200	23 +	1
III	> 95%	2,000	50 +	1
	85% - 95%	1,000	50 +	1
	< 85%	400	28 +	1
	Loose	100	21 +	1
IV	> 95%	1,000	50 +	1
	85% - 95%	400	37 +	1
	< 85%	200	23 +	1
	Loose	50	20 +	1
V	NOT RECOMMENDED			

DR 25				
SOIL CLASS	COMPACTION (% PROCTOR)	E' VALUE (PSI)	MAXIMUM BURIAL (FT)	MINIMUM BURIAL (FT)
I	> 95%	3,000	50+	1
	85% - 95%	3,000	50+	1
	< 85%	3,000	50+	1
	Loose	1,000	28+	1
II	> 95%	3,000	50+	1
	85% - 95%	2,000	50+	1
	< 85%	1,000	28+	1
	Loose	200	11+	2
III	> 95%	2,000	50+	1
	85% - 95%	1,000	38+	1
	< 85%	400	15+	2
	Loose	100	9+	3
IV	> 95%	1,000	43+	1
	85% - 95%	400	20+	1
	< 85%	200	11+	2
	Loose	50	5+	4
V	NOT RECOMMENDED			

Soil classifications, E' values, and accuracy percentages are represented in the following table:

AVERAGE VALUES OF MODULUS OF SOIL REACTION, E' (FOR INITIAL FLEXIBLE PIPE DEFLECTION)					
SOIL CLASS	PIPE BEDDING MATERIALS SOIL TYPE (Unified Classification System ^a)	E' FOR DEGREE OF COMPACTION OF PIPE ZONE BACKFILL (PSI)			
		Loose	Slight <85% Proctor, <40% relative density	Moderate 85%-95% Proctor, 40%-70% relative density	High >95% Proctor, >70% relative density
Class V	Fine-grained Soils (LL>50) ^b Soils with medium to high plasticity CH, MH, CH-MH	No data available; consult a competent soils engineer; Otherwise use E' = 0			
Class IV	Fine-grained Soils (LL<50) Soils with medium to no plasticity CL, ML, ML-CL, with less than 25% coarse-grained particles	50	200	400	1,000
Class III	Fine-grained Soils (LL<50) Soils with medium to no plasticity CL, ML, ML-CL, with less than 25% coarse-grained particles Coarse-grained soils with Fines GM, GC, SM SC ^c contains more than 12% fines	100	400	1,000	2,000
Class II	Coarse-grained Soils with Little or No Fines GW, GP, SW, SP ^c contains less than 12% fines	200	1,000	2,000	3,000
Class I	Crushed Rock	1,000	3,000	3,000	3,000
	Accuracy in Terms of Percentage Deflection ^d	±2	±2	±1	±0.5

^a ASTM Designation D 2487, WSBR Designation E-3

^b LL = Liquid limit

^c Or any borderline soil beginning with one of these symbols (i.e. GM-GC, GC-SC)

^d For ± 1% accuracy and predicted deflection of 3%, actual deflection would be between 2% and 4%.

Note: Values applicable only for fills less than 50ft (15m). Table does not include any safety factor. For use in predicting initial deflections only; appropriate Deflection Lap Factor must be applied for long-term deflections. If bedding falls on the borderline between two compaction categories, select lower E' value or average the two values. Percentage Proctor based on laboratory maximum dry density from test standards using about 12,500 ft-lb/cu ft (598,000 J/m³) (ASTM D 698, AASHTO T-99, USBR Designation E-11). 1 psi = 6.9kN/m².

Source: "Soil Reaction for Buried Flexible Pipe" by Amster K. Howard, U.S. Bureau of Reclamation, Denver, Colorado. Reprinted with permission from American Society of Civil Engineers Journal of Geotechnical Engineering Division, January 1977, pp. 33-43.