

Minute Man **anchors,**[®] inc.

We keep things down to earth...



Tank Anchoring

**Flotation, Tethering
Wind, and Seismic
Stabilization**

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Minute Man Anchors, inc.

PROPANE & OIL TANK ANCHORING SYSTEMS

General Installation Notes

1. Prior to installing the anchors, check for underground utilities. Always used insulated gloves when turning anchors into the ground to prevent possible shock.
2. The anchors and straps shown here on are designed to resist the buoyancy forces from an empty tank fully submerged above or below ground, lateral forces generated from seismic zone 4 activity, and 175 MPH EXP. "D" winds.
3. Earth Auger anchors shall have a minimum pull out value of 4,725 lbs. when used in the soil type that a specific anchor is designed for (*see soil test probe and soil classification chart*).
4. In the event earth augers are precluded from installation, alternate tethering designs can be submitted for consideration. Alternate concrete anchors; THDHLS, 210 JDH, and 210 JDH can be used in concrete slabs or footers.
5. Strap shall be; 1 1/4" x 0.035 Galvanized Steel Strap Zinc Coating meets ASTM D93953 G-115. Upright tanks can use optional 1/4" coated aircraft cable, 2000 lbs.
6. General purpose reinforced PVC lay flat water discharge hose or equivalent must be used to cover galvanized strap where ever it can potentially come in contact with the fuel tank.
7. In all cases when tanks up to 350 gallons are placed in areas of soil types in a., b., c., and d at least 2 straps and 4 anchors are required (see auger anchors).

Pacific Consulting Engineers

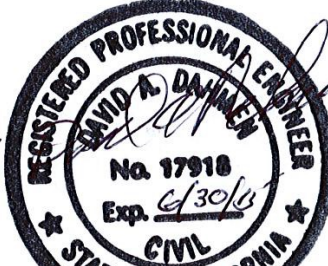
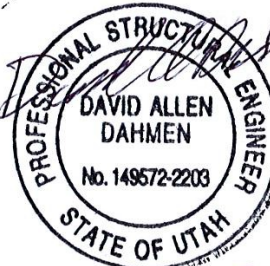
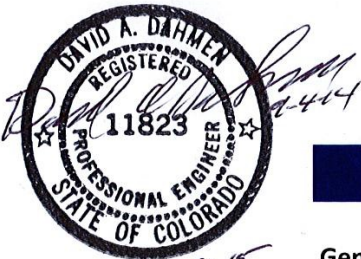
2150 Bell Ave., Suite 145 • Sacramento, CA 95838 • (916) 564-6028 • Fax: (916) 564-6029

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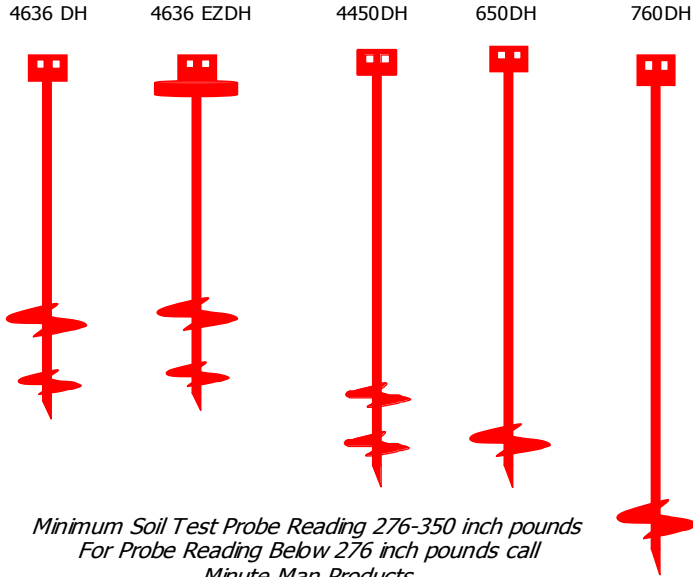
MINUTE MAN ANCHORS, INC. TANK THEATHERING & SEISMIC STABILIZATION

Design Loads: Flotation - Tank empty
fully submerged above or below ground.

2010 CBC and IBC
Seismic Importance Factor..... 1
Site Classification.....E
Sds.....1.68



Soil Class 2, 3, 4(a), & 4(b) Auger Anchors



- a. Soil Class 2 and 3 requires auger anchors a minimum of 36" in length.
- b. Soil Class 4(a) requires auger anchors a minimum of 48" in length.
- c. Soil class 4(b) requires auger anchors a minimum of 60" in length.
- b. For soil class 5 call Minute Man Products.

Concrete Slab Anchors



CONCRETE ANCHORS WITH STRAP FOR PROPANE TANKS

<u>TANK SIZE</u>	<u>NUMBER OF STRAPS</u>	<u>VOLUME OF CONCRETE</u>
350 & 500 gallon	2	10 cubic ft.
1000 gallon	2	20 cubic ft.
1500 gallon	2	21 cubic ft.
2000 gallon	3	27 cubic ft. (1 yard)
2500 gallon	3	27 cubic ft. (1 yard)

**Calculation formula for determining pre-existing slab or footer volume:
Length x Width x Height (in inches) ÷ 1728" = Cubic Feet*

Note: Prior to installation, refer to any local, state and federal regulations, to assure proper compliance. Soil test probe the anchor location in order to match the soil classification with the proper anchor.



Minute Man anchors[®], inc.

ANCHOR INSTALLATION

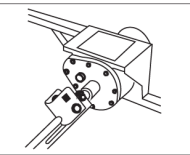
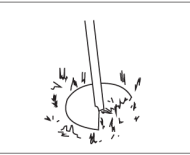

There are two basic methods of installing anchors, each equally effective in properly securing manufactured homes to the ground.

CAUTION: The installation of anchors with a drive machine is a two person operation.

Warning: Before ground anchor installation, determine that the anchor locations around home will not be close to any underground electrical cables, water lines or sewer piping. Failure to determine the location of electrical cables may result in serious personal injury.

MACHINE INSTALLATION

In this method, the anchor is turned to full depth into the ground by an anchor drive machine.

1.  Attach anchor to machine.
2.  Placed anchor in proper position in line with strap and machine.
3.  Anchor should be installed at a slight angle as shown to assure head being positioned behind future skirting.

MANUAL INSTALLATION

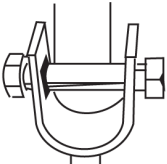
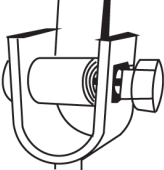
A hole is dug to a depth of approximately $\frac{1}{2}$ the length of the anchor, in the proper position as explained under machine installation.



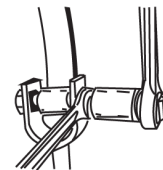
After the hole is dug to $\frac{1}{2}$ the length of the anchor, then the anchor is turned into the ground by hand, using a rod or length of pipe for leverage or by machine.

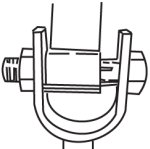
After anchor is installed full depth, earth is repacked, six inches at a time.

PROPER TENSIONING OF STRAP TO ANCHOR HEAD

1.  Insert bolt into head; attach nut loosely. Insert strap in slot of $\frac{5}{8}$ " bolt until strap is flush with far side of bolt.
2.  Bend strap 90° and take at least three complete turns on bolt until strap is taut.

3. Bolt is turned with $\frac{15}{16}$ " socket wrench, or adjustable wrench, on hex head. With square hole in anchor head, hold bolt under tension while repositioning wrench: Place open-end wrench on $\frac{5}{8}$ " square shoulders of bolt. Align square shoulders of bolt with square hole in anchor head.



4.  Holding hex head of bolt in position, tighten nut to draw square shoulders into square hole. Shoulders are now in locking position; continue to tighten nut. Tensioning device is now in locked, secure position.

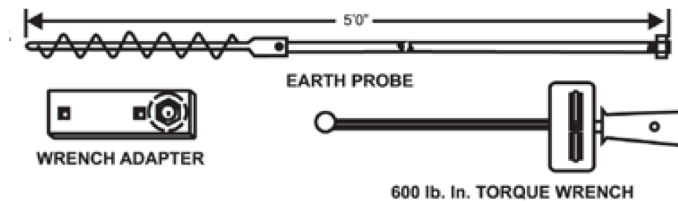
Note: The tensioning bolt can be inserted in the head from either side.

Notice: In areas of severe cold weather, where possible damage could occur from frost heave, the homeowner should be prepared to adjust tension on the straps to take up slack.

Note:

Each state, county, municipality may require a specific anchor from the groups shown for each soil classification. Check local regulations before installation.
 Test soil with soil probe and torque wrench at the anchor location in order to match the proper anchor with soil soil classification.
 A stabilizer plate or certified stabilizing device must be used with DH anchors when the anchors are used to resist lateral loads.

Soil Test Probe and Torque Wrench



Warning: Before ground anchor installation or probing, determine that the anchor or probe locations around the home will not be close to any underground utilities. Failure to determine the location of electrical lines may result in serious personal injury.

Instructions

1. Place tip of probe into ground where the anchor is to be located. Using a 15/16" hex socket with a ratchet, breaker bar, or electric drive machine, turn soil probe in a clockwise direction.
2. Rotate probe into the soil to a depth equal to the length of the recommended anchor to be installed.
3. To determine the soil classification:
 - a) Place wrench adapter onto torque wrench.
 - b) Insert hex portion of wrench adapter onto the top of the probe.
 - c) Support probe shaft with one hand while turning the probe steadily with the torque wrench.
Do not exceed 600 inch pounds when turning!
 - d) Read torque value while turning torque wrench and probe clockwise.
 - e) Use Minute Man Anchors' Soil Classification Chart to cross reference probe readings and match the anchor model with the proper soil class at the site.

11.

Soil Classification and Bearing Capacity

TABLE TO § 3285.202

Soil classification		Soil description	Allowable soil bearing pressure (psf) ¹	Blow count ASTM D 1586-99	Torque probe ³ value ⁴ (inch-pounds)-
Classification number	ASTM D 2487-00 or D 2488-00 (incorporated by reference, see § 3285.4)				
1	Rock or hard pan	4000+		
2	GW, GP, SW, SP, GM, SM.	Sandy gravel and gravel; very than dense and/or cemented sands; coarse gravel/cobbles; preloaded silts, clays and coral.	2000	40+	More than 550.
3	GC, SC, ML, CL	Sand; silty sand; clayey sand; silty gravel; medium dense course sands; sandy gravel; and very stiff silt, sand clays.	1500	24-39	351-550.
4A	CG, MH ²	Loose to medium dense sands; firm to stiff clays and silts; alluvial fills.	1000	18-23	276-350.
4B	CH, MH ²	Loose sands; firm clays; alluvial fills	1000	12-17	175-275.
5	OL, OH, PT	Uncompacted fill; peat; organic clays	Refer to 3285.202(e)	0-11	Less than 175.

Notes:

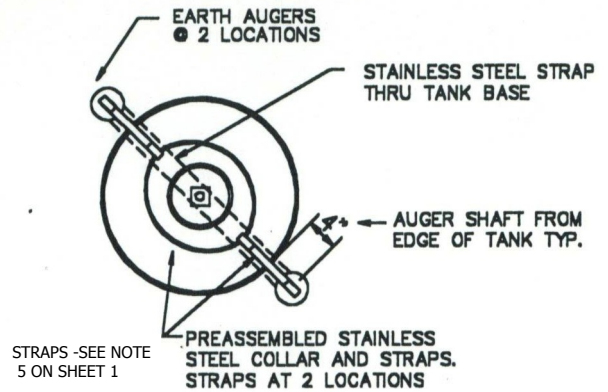
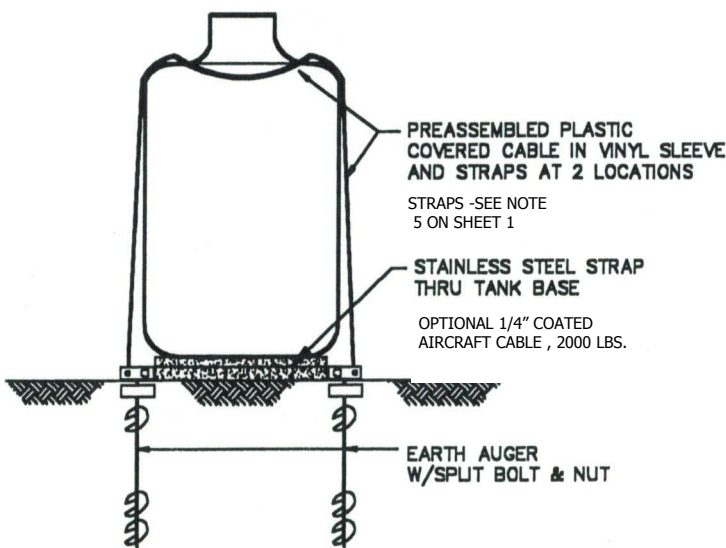
- ¹ The values provided in this table have not been adjusted for overburden pressure, embedment depth, water table height, or settlement problems.
 - ² For soils classified as CH or MH, without either torque probe values or blow count test results, selected anchors must be rated for a 4B soil.
 - ³ The torque test probe is a device for measuring the torque value of soils to assist in evaluating the holding capacity of the soil in which the ground anchor is placed. The shaft must be of suitable length for the full depth of the ground anchor.
 - ⁴ The torque value is a measure of the load resistance provided by the soil when subject to the turning or twisting force of the probe.
- (f) If soil appears to be composed of peat, organic clays, or uncompacted fill, or appears to have unusual conditions, a registered professional geologist, registered professional engineer, or registered architect must determine the soil classification and maximum soil bearing capacity.

Minute Man Anchors, inc.



Galvanized G-115 Sling Upright Tank Anchoring System

- 1 G-115 Sling (looped cable) in Protective Blue Vinyl Sleeves w/ 2 Galvanized G-115 Straps
- 1 piece of Galvanized G-115 Strap
- 2 Auger Anchors or optional Concrete Anchors
- 4 Strap Bolts & nuts



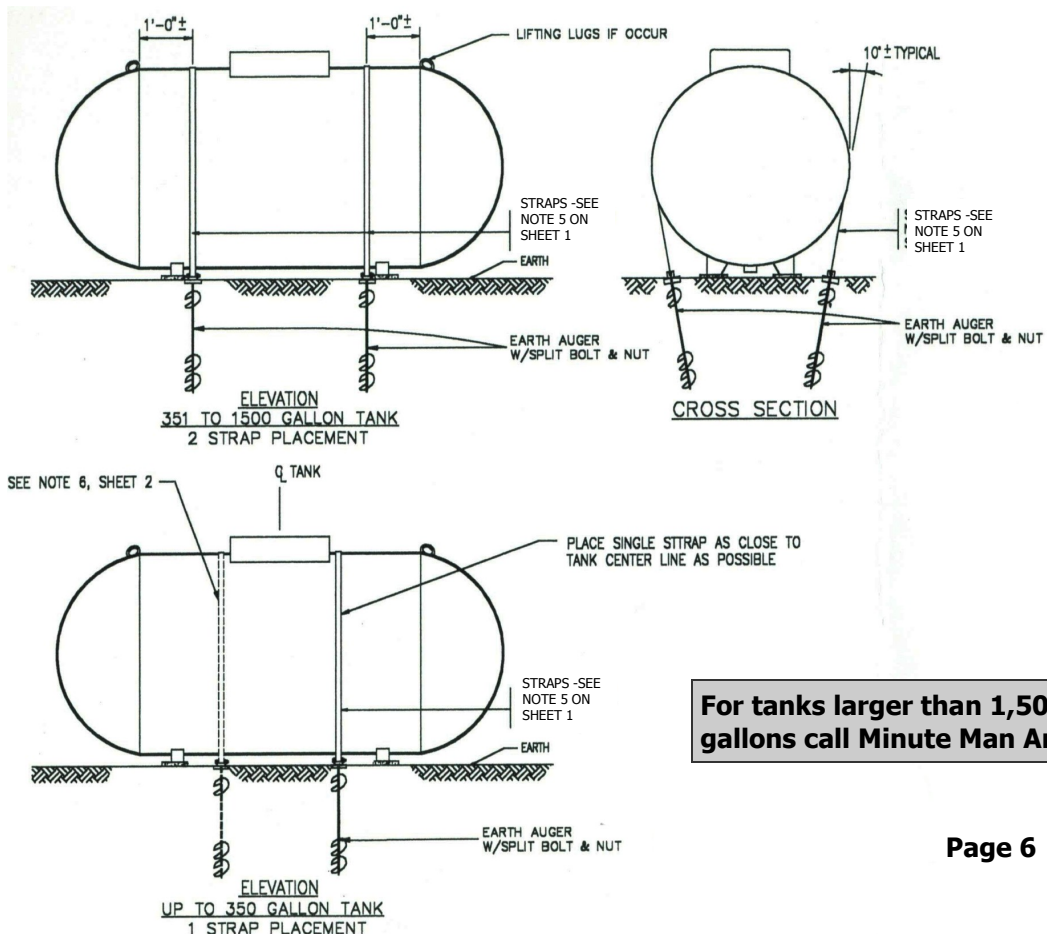
ELEVATION: UPRIGHT TYPE TANK

Minute Man Anchors, inc.

Galvanized G-115 Strapping for Side Mounted Tank Anchoring System



- 2 pieces of Galvanized G-115 Strapping
- 2 pieces of Vinyl Strap Sheathing
- 4 Auger Anchors or optional Concrete Anchors
- 4 Strap Bolts & Nuts



For tanks larger than 1,500 gallons call Minute Man Anchors

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Galvanized G-115 Strapping for Oil Tank Anchoring System



- 2 pieces of Galvanized G-115 Strapping
- 2 pieces of Vinyl Strap Sheathing
- 4 Auger Anchors or optional Concrete Anchors
- 4 Strap Bolts & Nuts

