

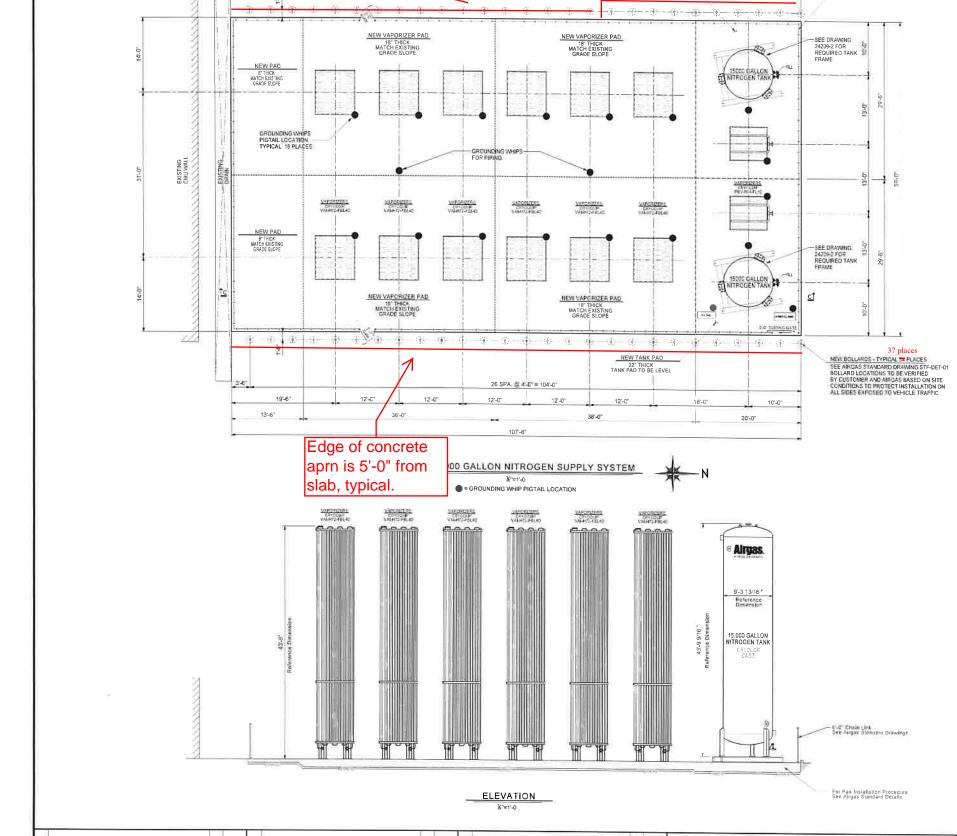
#### GENERAL NOTES

- 1 VERIFY ALL DIMENSIONS AND CONDITIONS IN FIELD
- 2 ALL CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF AC1-301 AND ACI-318
- 3. CONCRETE COMPRESSIVE STRENGTH SHALL BE 4000 PSI @ 28 DAYS
- 4 ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60
- 5. PROVIDE POSITIVE DRAINAGE OF CRUSHED STONE BASE AND SURROUNDING GRADE.
- 6. DESIGN SOIL CAPACITY 2000 PSF MINIMUM
- 7. THE SOIL BELOW AND AROUND THE NEW FOUNDATION SLAB SHOULD BE PREPARED PER AGEC GEOTECHNICAL REPORT DATED FEBRUARY 26, 2025. AGEC SHOULD BE CONTACTED FOR ADDITIONAL GUIDANCE.
- 8. DESIGN FOR OCCUPANCY CATEGORY IL
- 9 DESIGN WIND VELOCITY 103 MPH (ASCE 7-16) EXPOSURE C
- 10. DESIGN SEISMIC:
  0.2 SEC. SPECTRAL RESPONSE ACCELERATION 132 1%;
  1.0 SEC. SPECTRAL RESPONSE ACCELERATION 46.9%;
  SEISMIC DESIGN CATEGORY D
- 11. ALL ELECTRICAL WORK SHALL COMPLY WITH THE LOCAL ADOPTED VERSION OF NFPA 70. NEC

Work This Drawing With 2021 Versions of Airgas Standard Drawings:

- STF-DET-01 Standard Bollard, Fence, and Joint Details

- STF-DET-02 Tank Pad and Anchoring Installation Notes See Airgas Representative For Drawings Regarding: Grounding (STE-GEN-001), Delivery Guidelines, Exposure Distances, and Courtyard Guidelines,



CMU WALL TO NORTH CURE

Eliminate 70' of

bollards

Edge of concrete

apron.

3'-1 3/4" AVERAGE DIST. FROM CMU WALL TO DRAIN



WORK THIS DRAWING WITH DRAWING 24209-2 & 24209-3

0	FOR CONSTRUCTION	RG	3-10-26							$\dashv$	-
_A	FOR CLIENT REVIEW	RG	36-25							+	
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Airgas USA, LLC

NEW 6'-0" CHAIN LINK FENCE AREA MUST BE SECURE

ÇE 3-25 24209

S.M.HAW

Albany Engineered Composites 5995 W. Amelia Earhart Dr., Sall Lake City, UT 84116 15,000 GALLON NITROGEN SUPPLY SYSTEM PLAN & ELEVATION

24209-1 0

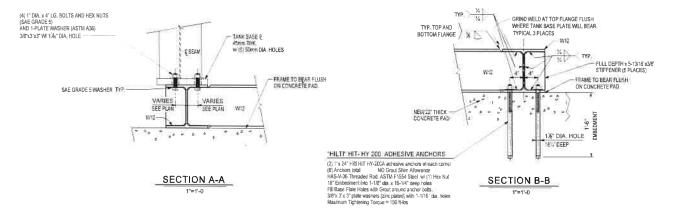
10+1 1/2 \* OUT / OUT FRAME 9'-1 1/2 \* 4.63/4" 4.634 1-8 1/4 3-65/6\* 27/16\* 2 7/16" ΠĄ TE THE 93/16" 4 13/16" 4 13/16 \*

ORIENTATION OF THE INSTALLATION SHALL BE VERIFIED IN THE FIELD

TANK SUPPORT FRAME DESIGNED TO SUPPORT A CRYOLOR CA53 NITROGEN TANK, 9'-3<sup>1</sup>%6" DIAMETER x 43'-9%6" HIGH

- NOTES:

  1.) ALL STEEL TO BE DETAILED FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST AISC & AWS SPECIFICATIONS.
- 2.) ALL STEEL TO BE ASTM A992
- ALL WELDING SHALL BE MADE BY CERTIFIED WELDERS USING ETCXX ELECTRICIES IN ACCORDANCE WITH THE LATEST AIMS SPECIFICATIONS D1.1.
- 4.) PAINT
  a. CLEAN SURFACE PER SSPC-SP 3 TO REMOVE RUST & SCALE.
  b. PRIMER: RUST-OLEUM 8300 HIGH SOLID EPOXY PRIMER:
  c. FINISH: COAT RUST-OLEUM ETIOS SYSTEM HIGH PERFORMANCE
  HIGH BUILD EPOXY. POLOR WHITE
  APPLY PER MANUFACTURERS RECOMMENDATIONS.
  COMPARABLE PAINT SYSTEMS MAY BE USED IF APPROVED BY AIRGAS.



ENLARGED TANK BASE PLATE INSTALLATION DETAIL



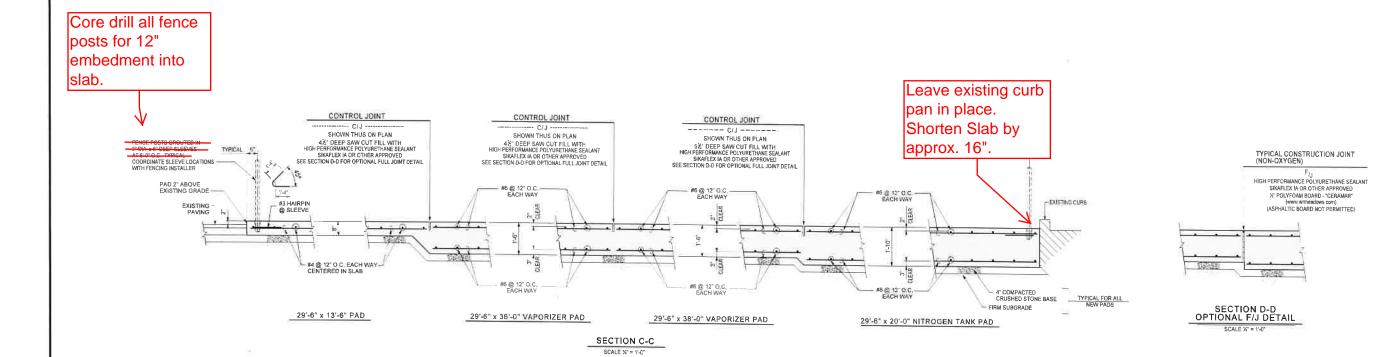
1/2" = 1"-0"

24209-2

3-10-25

WORK	THIS	DRAWING	WITH	DRAWING	24209-1	&	24209-3

0 FOR CONSTRUCTION	RG 3-10-25					Airgas USA, LLC Intermountain Office Property Communication of the Commu	CRAWN CE DATE 1-25	S.M.HAW	Albany Engineered Composites 5995 W. Amelia Earhert Dr.,
A FOR REVIEW	RG 36-25					All 900. #516 Valed at 1946.	CHECKED RG DATE 3.75	ASSECIATES INC.	Salt Lake City, UT 84116 15,000 GALLON NITROGEN SUPPLY SYSTEM
United DESCRIPTION	By Litz Miss	DESCRIPTION	±y CATE MAKE	Bilisa Pinza	EH D/TE	an Air Liquide company	##1_E1F No. 24209	TWINSEURG OH   330 405 4480	FRAME DETAILS



#### TANK ANCHORAGE

#### 15,000 GALLON NITROGEN TANK ANCHORAGE - TANK TO FRAME

ASTM A325 OR SAE GRADE 5 BOLTS 4 - ANCHORS AT EACH CORNER - 16 ANCHORS TOTAL

1° DIA, x 4" LG, ASTM A325 OR SAE GRADE 5 BOLT W11-HEX NUT (ASTM A563 STEEL) AND PLATE WASHER ¾"x3"x3" W11/k" DIA, HOLE -ZING PLATED

#### TANK FRAME ANCHORAGE

#### TANK FRAME ANCHORAGE - FRAME TO CONCRETE - NO GROUT

"HILTI" HIT- HY 200A ADHESIVE ANCHORS 2 - ANCHORS PER CORNER - 8 ANCHORS TOTAL

1° DIA, x 24" LG. HAS-V-36 THREADED ROD W/1-HEX NUT (ASTM F1554 STEEL) HIT-HY 2CCA ADHESIVE 18" MINIMUM EMERQUENT (SEE NOTE "A")

%" DIA. # 1857" DEEP HOLES IN CONCRETE MAXIMUM TIGHTENING TORQUE = 150 FT LBS.

NOTE 'A"

BECAUSE THE SEISMIC DESIGN CATEGORY (SDC) IS D.
THE TANK LEG ANCHORAGE MUST BE EMBEDED INTO THE CONCRETE
EMOUGH TO HANDLE THE TENSILE STRENGTH OF THE ANCHOR ROD.
REFERENCE ASCE 7-16 SECTION 15.7.5.

#### VAPORIZER ANCHORAGE

#### CRYOQUIP PBV-864-FL10 - NO GROUT ALLOWANCE

"HILTI" HIT- HY 200 ADHESIVE ANCHORS 1 ANCHOR PER BASE PLATE TOTAL OF 4 REQUIRED PER VAPORIZER

X<sup>\*</sup> DIA x 12" HAS.4-36 THREADED ROD W1-HEX NUT (ASTM F1554 STEEL) 8" MINIMUM EMBEDMENT INTO X<sup>\*</sup> DIA x SX<sup>\*</sup> DEEP HOLES IN CONCRETE MAXIMUNI TIGHTENING TORQUE = 100 FT, LBS.

#### CRYOQUIP VAI-H72-FBL40 - 1" MAXIMUM GROUT ALLOWANCE

"HILTI" HIT- HY 200 ADHESIVE ANCHORS 4 ANCHORS PER BASE PLATE TOTAL OF 16 REQUIRED PER VAPORIZER

Ä" DIA x 12" HAS-V-36 THREADED ROD WI'-HEX NUT (ASTM F1554 STEEL) 8" MINIMUM EMBEDMENT INTO Ä" DIA » SÄ" DEEP HOLES IN CONCRETE MAXIMUM TIGHTENING TORQUE = 100 FT. LBS.





3-10-25

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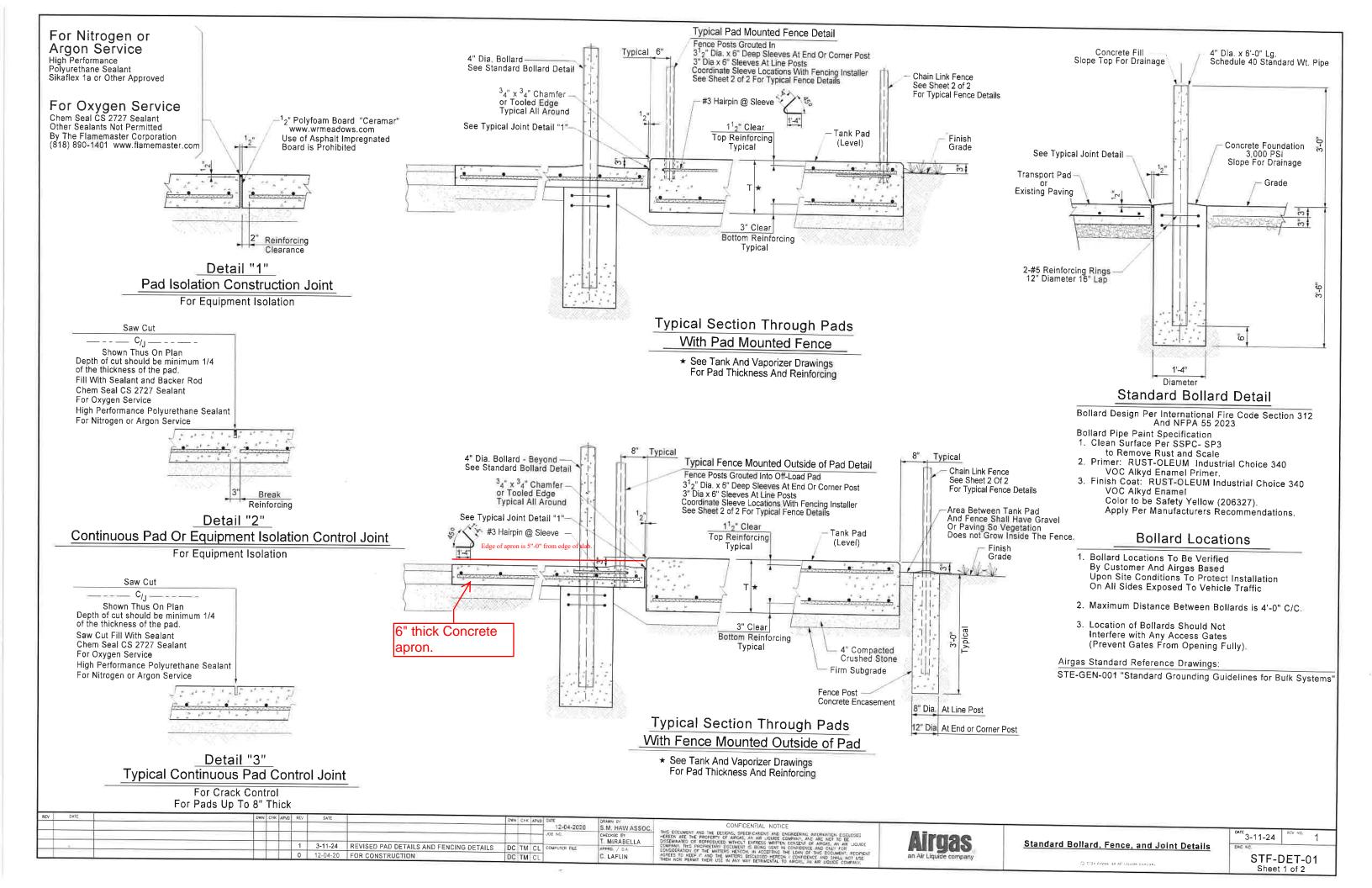
Vi.	Airgas USA, LLC	
),	Intermountain 4610 Vasquez Blvo Denver Colorado 60216	
1	Phone (3C3) 370-78C8 HTTP://www.airgas.com	

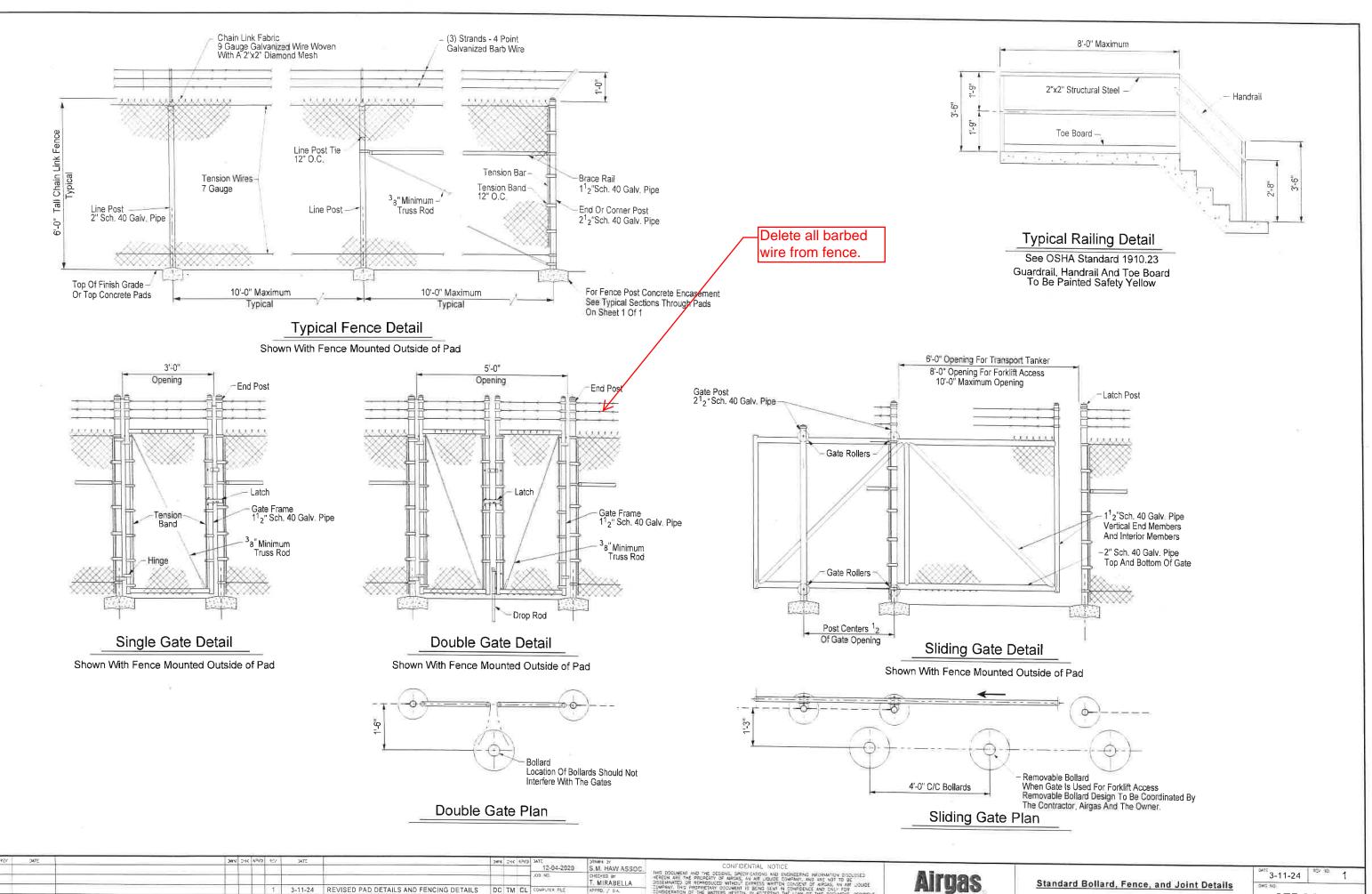
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WORK THIS DRAWING WITH DRAWING 24209-1 &	24209-2
Albany Engineered Composites 5995 W. Amelia Earhart Dr.	X <sub>n</sub> = 40 <sub>n</sub>
Salt Lake City, UT 84116	ERMANNE NO
15,000 GALLON NITROGEN SUPPLY SYSTEM	24209-3
PAD DETAILS	24209-3





C. LAFLIN

DC TM CL

D 12-04-20 FOR CONSTRUCTION

Standard Bollard, Fence, and Joint Details

STF-DET-01

#### Pad Installation Procedure

- 1. Site must be well drained and have sufficient soil bearing pressure to support the floating pads. 2000 pounds per square foot is the minimum recommended soil pressure.
- 2. Excavate material to the proper elevation to accommodate the pad and base. The bottom of the excavation, or subgrade, must be firm and free of water. Make sure that the excavation has a path for the water to escape. Water must not be allowed to be trapped under the pads. If the bottom of the excavation does not meet these specifications, the pads cannot be installed until corrective action has been taken.
- 3. Place aggregate base material in the excavation. The best material for the base is a clean, well graded crushed stone ranging from 1" to dust. Compact this material uniformly with a vibrating plate or vibrating roller. The surface should feel like concrete when walked on.
- 4. Install forms with adequate strength and the proper grades. The surfaces of both tank pad and vaporizer pad shall be level. Install forms at the joints. Joints shall be constructed as specified. Install the specified reinforcing bars with three inches (3") of clearance above the aggregate base. Maintain three-inch (3") clearance at edges and two-inch (2") clearance from the joints. Where tank pads required top reienforcing install the specified reinforcing with one and one half (11/2") clearance.
- 5. Pour concrete (4000 psi mix) and screed to the specified grades. (4) to (6) test cylinders (6"dia. x 12" Lq.) should be made for future strength quality control needs. After initial set, remove joint forms and install the specified foam backer board prior to making the next pour. Finish the surface of the pads with a light broom finish and finish the edges with a chamfer or radius.
- 6. After pad has cured for 28 days, caulk the joints with the specified sealant. Follow the manufacturer's instructions explicitly. After the tank pad has cured for 7 days (for normal concrete), the tank may be set but not filled

#### Anchoring Procedure for Vaporizers

- 1. Layout the centerline location of each vaporizer on the pad(s). Set the vaporizer(s) on the pad(s) and position the unit(s) on the marked centerlines. Double-check the orientation of the vaporizer(s) to insure that the piping tie-in points are in the correct position. Mark the anchor hole locations on the concrete using the vaporizer(s) as a template.
- 2. The anchors for the vaporizers shall be either Hilti Carbon Steel "Kwik Bolt TZ" expansion anchors with electroplated zinc finish or Hilti HIT HY 200 Adhesive System . Follow the Hilti instructions for the proper installation of the anchors.
- 3. Each vaporizer requires a minimum of four (4) anchors.
- 4. Drill the appropriate size and depth holes using the vaporizer as a template if possible. If not possible, move the vaporizer and drill at the marked holes. Select the correct size hole from the list above.
- 4a. Follow OSHA's standard (1926.1153) for preventing respirable crystalline silica:
  - Use a drill equipped with commercially available shroud or cowling with dust collection system
  - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions
  - Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.
  - Use a HEPA-filtered vacuum when cleaning holes
- 5. If a vaporizer has been moved off of the holes, set the vaporizer back in position over the drilled holes. If the vaporizer requires plumbing, use up to a 1/4" of aluminum shims between the base plate and concrete pad.
- 6. Install the fastener through the vaporizer base plate hole. Install the washer and nut and drive the shank to the specified embedment depth. Tighten the nuts to the recommended installation torque values listed above, or if a torque wrench is not available 2 or 3 turns from the finger tight position will achieve proper anchor setting.
- 7. In the very rare instance that an anchor would pull out during the process of applying torque to the nut, the anchor must be reset. Remove the expansion bolt and reset. Repeat items 5 through 7.

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#### Tank Pad and Anchoring Installation Notes National Standards For Industrial / Commercial Facility Use

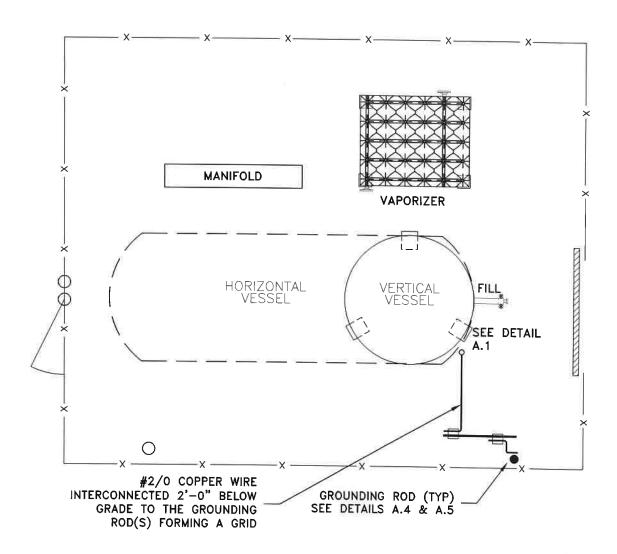
12-04-20 STF-DET-02

### **Anchoring Procedure for Tanks**

- 1. Obtain the exact location of the holes in the tank base plate. Find where the fill point of the tank is to be positioned and locate the tank legs from this point. Accurately layout holes on the pad surface centered about the centerline of the tank pad. Double check the location of the holes.
- 2. At each anchor location drill the hole size specified for the tank size.
- 2a. Follow OSHA's standard (1926.1153) for preventing respirable crystalline silica:
  - Use a drill equipped with commercially available shroud or cowling with dust collection system
  - Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions
  - Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.
  - Use a HEPA-filtered vacuum when cleaning holes
- 3. Tanks Using Hilti Kwik Bolt TZ: Fasteners shall be Hilti Carbon Steel "Kwik Bolt TZ" expansion anchors with electroplated zinc finish. (or other approved). Follow the Hilti instructions for the proper installation
- 3a. The anchor hole must be carefully prepared for the expansion bolt. See part 2a above for proper drilling requirements to prevent respirable crystalline silica.
- 3b. Install the expansion bolts through the tank base plate hole. Install the plate washer, nut and drive the shank to the specified embedment depth. Tighten the nuts to the recommended installation torque values, or if a torque wrench is not available 2 or 3 turns from the finger tight position will achieve proper anchor setting.
- 3c. In the very rare instance that an anchor would pull out during the process of applying torque to the nut the anchor must be reset. Remove the expansion bolt and reset. Repeat items 3a and 3b.
- 4. Tanks Using Hilti HIT-HY 200 Adhesive System: Fasteners shall conform to the Hilti HIT-HY 200 AR system, which uses a zinc plated ASTM F1554 steel threaded rod with a chisel point. Hilti's designation for the special rod is "HAS-V-36", which comes with a plated steel plain washer and a plated steel nut. If Hilti cannot provide the rod length specified on the chart, then a standard ASTM F1554 threaded rod may be used.
- 4a. The anchor hole must be carefully prepared for the threaded rod. See part 2a above for proper drilling requirements to prevent respirable crystalline silica.
- 4b. It is important that the manufacturer's instructions be followed carefully. The anchors must perform to their design capacity.
- 5. After the tank pad has cured for 7 days (for normal concrete), the tank may be set but not filled.
- 6. In the case where the surface of the pad is level and flat, use the following shimming procedure: Install the tank over the anchors making sure that the fill point is located properly. If the tank is slightly out of plumb, use up to 1/4" steel shim plate that is at least as large as the tank base plate.
- 7. In the case where the surface of the pad is sloped and the tank cannot be set properly on full bearing shims, contact S. M. Haw Associates, or a local engineer to review anchor bolt requirements in conjunction with a dry-pack grout.

### **BULK LIN/LOX/LAR SYSTEMS**

Notes reflect the requirements of NFPA70, *National Electric Code* and Airgas requirements. Additional requirements may be imposed by the AHJ (Authority Having Jurisdiction).



SEE SITE SPECIFIC EQUIPMENT ARRANGEMENT DRAWING FOR ACTUAL CONDUCTOR LOCATION

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# CONFIDENTIAL NOTICE THE DOCASES HIS TELESCOPE, SPEETOCODE AND DEMECTIVE RESIDENCIAN CONCIDENT HEREIN AND THE PROPORTY OF ARROR, AN ARE LIGHER COMPANY, AND ARE NOT TO BE DESIGNABLED ON REPORTORS DEPENDED WITH THE PROPERTY OF THE METERS AND AREA OF THE PROPERTY HEREIN AND AREA OF THE METERS DESIGNATION O



#### NOTES FOR GROUNDING REQUIREMENTS

- "NOTE: TELEMETRY BASED SYSTEMS ARE NOT CONSIDERED TO BE A PLC OR DCS SYSTEM.
- GROUND GRID SHALL BE DESIGNED PER NEC. GROUND GRIDS OR MATS SHALL BE ACHIEVED BY MEANS OF ZINC OR COPPER-CLAD STEEL RODS OF SUFFICIENT LENGTH TO REACH PERMANENT GROUND MOISTURE. THE EQUIPMENT TO BE GROUNDED SHALL BE CONNECTED TO THE GROUND SYSTEM BY MEANS OF ADEQUATELY SIZED, BARE, STRANDED, COPPER CABLES.
- 2. CONNECTIONS TO MOTOR FRAMES AND GROUND BUSSES SHALL BE MADE WITH LUGS BOLTED OR WELDED TO THE EQUIPMENT. ANCHOR BOLTS WILL NOT BE USED FOR FASTENING LUGS OF GROUNDING CABLES. CONNECTIONS OF CABLE TO CABLE OR CABLE TO STRUCTURE ARE TO BE MADE BY MEANS OF COPPER OXIDE AND ALLUMINUM POWDER WELDING PROCESS OR "UL" RATED COMPRESSION GROUNDING CONNECTIONS. EQUIPMENT THAT IS FURNISHED WITH GROUNDING PADS SHALL BE CONNECTED TO THE GROUND GRID USING "UL" RATED MECHANICAL GROUND CONNECTER AT THE PAD AND COMPRESSOR OR COPPER OXIDE AND ALUMINUM POWDER WELDING PROCESS.
- GROUND GRID OR MAT SHALL BE TESTED TO VERIFY DESIGN AND ALL EQUIPMENT TESTED VALUES SHALL BE BELOW (10 OHMS FOR PLC:DCS AND 25 OHMS WITHOUT) FOR ENTIRE GROUND GRID VALUE WITH RESPECT TO THE REFERENCE ROD.
- 4. INDIVIDUAL GROUND RODS MUST MEASURE (10 OHMS FOR PLC/DCS AND 25 OHMS WITHOUT) OR LESS. FOR EACH GROUND ROD MEASURING GREATER THAN (10 OHMS FOR PLC/DCS AND 25 OHMS WITHOUT) ONE ADDITIONAL GROUND ROD SHALL BE INSTALLED A DISTANCE OF 1.2 TIMES THE GROUND ROD LENGTH FROM THE INSTALLED GROUND ROD. A REFERENCE GROUND ROD FOR CURRENT AND FUTURE TESTING SHALL ALSO BE INSTALLED.
- 5. THE NON-ELECTRICAL EQUIPMENT SHALL BE CONSIDERED TO BE ADEQUATELY GROUNDED WHEN THE CONDUCTIVE STRUCTURAL ELEMENT ON WHICH IT IS SUPPORTED IS CONNECTED TO THE GROUNDING SYSTEM WITH A 0.5 OHMS POINT-TO-POINT TEST (FROM ANY POINT ON THE STRUCTURAL ELEMENT TO THE GROUNDING SYSTEM). THE NON-ELECTRICAL EQUIPMENT TO BE GROUNDED IN A TYPICAL FLAMMABLE BULK INSTALLATION INCLUDES: VESSELS. TUBES, VAPORIZERS, CONTROL MANIFOLDS, VENT STACKS, FENCING & DISTRIBUTION TRAILERS.
- 6. THE CONDUIT AND/OR RACEWAY SYSTEM FOR EACH CIRCUIT SHALL BE BONDED TOGETHER TO BE ELECTRICALLY CONTINUOUS. CONDUIT MAY BE USED TO PROTECT THE BARE COPPER GROUND WIRE WHEN ROUTED THROUGH THE FOUNDATION OR WHEN RUN ABOVE THE FOUNDATION WHERE EXPOSED TO POTENTIAL DAMAGE. IF METAL CONDUIT IS USED, THE CONDUIT SHALL BE BONDED TO THE CABLE AT BOTH ENDS. SLEEVES OR CLOSE NIPPLES USED BY CABLES EXITING ENCLOSURES RUNNING TO CABLE TRAY SHALL BE GROUNDED TO THE TRAY. CONDUIT DROPS FROM TRAYS SHALL BE GROUNDED TO THE TRAY, NON-METALLIC LIQUID TIGHT FLEXIBLE CONDUIT ABOVE 1° SHALL HAVE BONDING JUMPERS BETWEEN THE CONNECTORS OR CONDUIT. FLEXIBLE CONDUIT SIZES 1° AND SMALLER SHALL HAVE AN INTERNAL GROUND WIRE "UL" LISTED FOR GROUNDING.
- 7. SLEEVES OR CLOSE NIPPLES USED BY CABLES EXITING ENCLOSURES RUNNING TO CABLE TRAY SHALL BE GROUNDED TO THE TRAY. CONDUIT DROPS FROM TRAYS SHALL BE GROUNDED TO THE TRAY, NON-METALLIC LIQUID TIGHT FLEXIBLE CONDUIT ABOVE 1" SHALL HAVE BONDING JUMPERS BETWEEN THE CONNECTORS OR CONDUIT. FLEXIBLE CONDUIT SIZES 1" AND SMALLER SHALL HAVE AN INTERNAL GROUND WIRE "UL" LISTED FOR GROUNDING.
- 8. ALL LOW VOLTAGE MOTORS 600 VAC OR LESS AND 50 HP OR LESS SHALL HAVE AN INSULATED GROUND WIRE TERMINATED TO THE MOTOR FRAME IN THE PECKER HEAD GROUND LUG AND LANDED IN THE MOTOR CONTROL CENTER
- 9. ALL MOTORS GREATER THAN 50 HP SHALL HAVE ONE GROUND WIRE CONNECTED TO ITS FRAME RUNNING DIRECTLY TO THE GROUND GRID (MINIMUM SIZE GROUND WIRE SHALL BE THAT OF THE REQUIRED BOND WIRE) AND SHALL ALSO HAVE THE INSULATED GROUND WIRE TERMINATED TO THE MOTOR FRAME IN THE PECKER HEAD GROUND LUG AND LANDED IN THE MOTOR CONTROL CENTER.
- 10. ALL RESISTIVE ELECTRICAL EQUIPMENT (HEATERS) WITH A RATING OF 1 KW OR ABOVE SHALL HAVE AN ADDITIONAL GROUND WIRE (MINIMUM SIZE GROUND WIRE SHALL BE THAT OF THE REQUIRED BOND WIRE) FROM THE FRAME RUNNING DIRECTLY TO THE GROUND GRID IN ADDITION TO THE GROUND WIRE RUNNING FROM THE ELECTRICAL GROUND IN THE EQUIPMENT CONTROL, PANEL TO THE DISTRIBUTION OR MOTOR CONTROL CENTER.
- 11. CABLE TRAYS AND RACEWAY SYSTEMS SHALL BE BONDED TOGETHER AND TO THE GROUND GRID AS SHOWN ON THE GROUNDING DRAWINGS AND DETAILS AND, AS A MINIMUM, GROUNDED AT BOTH ENDS AND AT 60-FOOT INTERVALS.
- 12. FOR INSTALLATIONS WITH NEW FOUNDATIONS, ROUTE GROUNDING ELECTRODES THROUGH CONCRETE PER FOUNDATION AND LAYOUT DRAWINGS. FOR EXISTING FOUNDATIONS, RUN GROUNDING LEADS ABOVE FOUNDATION, LOCATED TO MINIMIZE TRIPPING HAZARDS. GROUNDING SYSTEMS INCORPORATED INTO THE STEEL REINFORCED CONCRETE FOUNDATION ARE PERMITTED ON NEW INSTALLATIONS ONLY.
- 13. EQUIPMENT TO BE GROUNDED FOR LIGHTING PROTECTION SHALL BE VESSELS, VAPORIZERS, AND VENT STACKS. HORIZONTAL EQUIPMENT OVER 15 FEET IN LENGTH AND VESSELS OVER 10 FEET IN DIAMETER SHALL HAVE TWO DIAGONALLY OPPOSED GROUND CONNECTIONS AT A MINIMUM.
- 14. SEE PAGE 5 FOR EQUIPMENT GROUNDING DETAILS

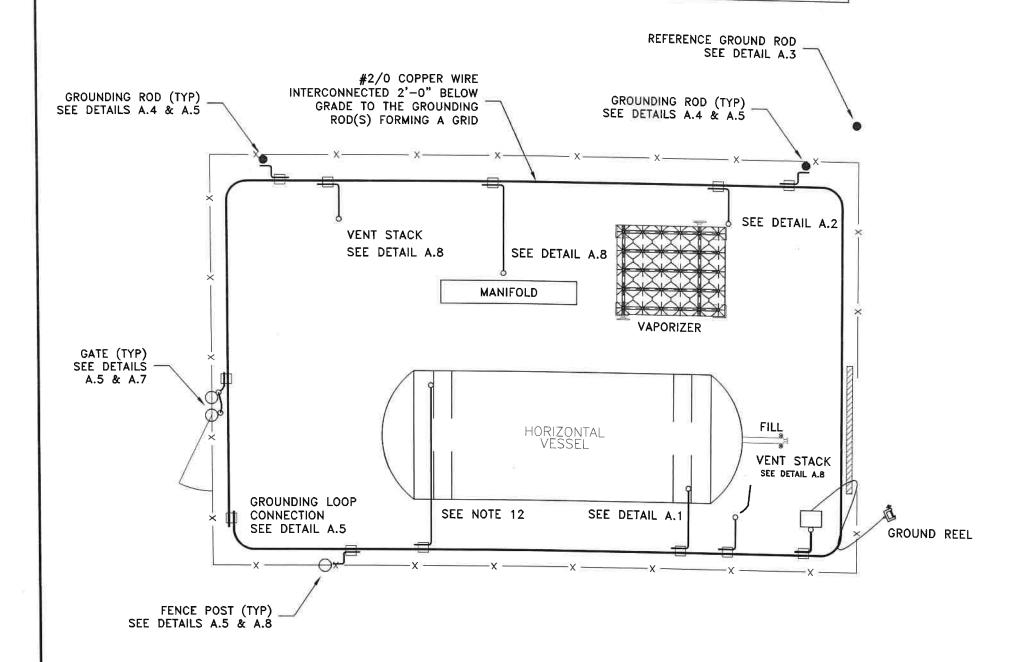
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STANDARD GROUNDING DETAIL FOR BULK SYSTEMS

### **BULK HORIZONTAL LH2 SYSTEMS**

Notes reflect the requirements of NFPA70, National Electric Code; CGA H-5, Installation Standards for Bulk Hydrogen Supply Systems; CGA H-3, Cryogenic Hydrogen Storage; CGA G-5.5, Hydrogen Vent Systems; 29 CFR Section 1910.103 and Airgas requirements.

Additional requirements may be imposed by the AHJ (Authority Having Jurisdiction).



SEE SITE SPECIFIC EQUIPMENT ARRANGEMENT DRAWING FOR ACTUAL CONDUCTOR LOCATION

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#### NOTES FOR GROUNDING REQUIREMENTS

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- 2. CONNECTIONS TO MOTOR FRAMES AND GROUND BUSSES SHALL BE MADE WITH LUGS BOLTED OR WELDED TO THE EQUIPMENT. ANCHOR BOLTS WILL NOT BE USED FOR FASTENING LUGS OF GROUNDING CABLES. CONNECTIONS OF CABLE TO CABLE OR CABLE TO STRUCTURE ARE TO BE MADE BY MEANS OF COPPER OXIDE AND ALUMINIUM POWDER WELDING PROCESS OR "UL" RATED COMPRESSION GROUNDING CONNECTIONS. EQUIPMENT THAT IS FURNISHED WITH GROUNDING PADS SHALL BE CONNECTED TO THE GROUND GRID USING "UL" RATED MECHANICAL GROUND CONNECTER AT THE PAD AND COMPRESSOR OR COPPER OXIDE AND ALUMINIUM POWDER WELDING PROCESS.
- GROUND GRID OR MAT SHALL BE TESTED TO VERIFY DESIGN AND ALL EQUIPMENT TESTED VALUES SHALL BE BELOW 10 OHMS FOR ENTIRE GROUND GRID VALUE WITH RESPECT TO THE REFERENCE ROD.
- INDIVIDUAL GROUND RODS MUST MEASURE 10 OHMS OR LESS. FOR EACH GROUND ROD MEASURING GREATER THAN 10 OHMS. ONE ADDITIONAL GROUND ROD MUST BE INSTALLED. THE ADDITIONAL GROUND ROD SHALL BE INSTALLED A DISTANCE OF NOT LESS THAN 6 FEET FROM THE INSTALLED GROUND ROD. A REFERENCE GROUND ROD FOR CURRENT AND FUTURE TESTING SHALL ALSO BE INSTALLED.
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- ALL LOW VOLTAGE MOTORS 500 VAC OR LESS AND 50 HP OR LESS SHALL HAVE AN INSULATED GROUND WIRE TERMINATED TO THE MOTOR FRAME IN THE PECKER HEAD GROUND LUG AND LANDED IN THE MOTOR CONTROL CENTER
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- 10. CABLE TRAYS AND RACEWAY SYSTEMS SHALL BE BONDED TOGETHER AND TO THE GROUND GRID AS SHOWN ON THE GROUNDING DRAWINGS AND DETAILS AND. AS A MINIMUM, GROUNDED AT BOTH ENDS AND AT 60-FOOT INTERVALS.
- 11. FOR INSTALLATIONS WITH NEW FOUNDATIONS, ROUTE GROUNDING ELECTRODES THROUGH CONCRETE PER FOUNDATION AND LAYOUT DRAWINGS. FOR EXISTING FOUNDATIONS, RUN GROUNDING LEADS ABOVE FOUNDATION, LOCATED TO MINIMIZE TRIPPING HAZARDS, GROUNDING SYSTEMS INCORPORATED INTO THE STEEL REINFORCED CONCRETE FOUNDATION ARE PERMITTED ON NEW INSTALLATIONS ONLY.
- 12. EQUIPMENT TO BE GROUNDED FOR LIGHTING PROTECTION SHALL BE VESSELS, VAPORIZERS, AND VENT STACKS. HORIZONTAL EQUIPMENT OVER 15 FEET IN LENGTH AND VESSELS OVER 10 FEET IN DIAMETER SHALL HAVE TWO DIAGONALLY OPPOSED GROUND CONNECTIONS AT A MINIMUM.
- 13. PAGE 5 FOR EQUIPMENT GROUNDING DETAILS

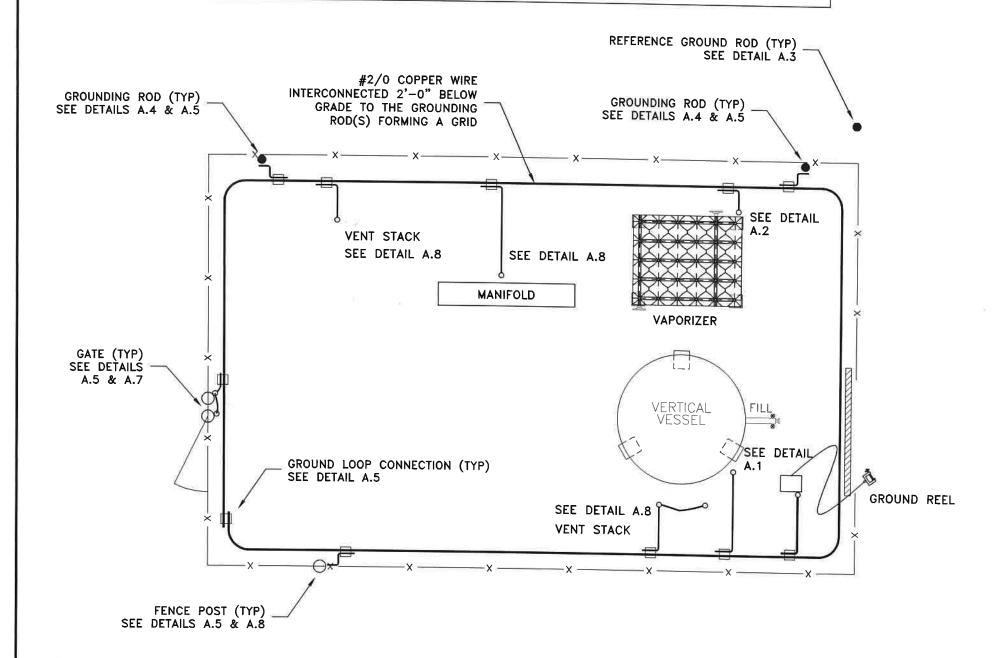
PAGE 2 OF 5 1 000 NO.

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### **BULK VERTICAL LH2 SYSTEMS**

Notes reflect the requirements of NFPA70, National Electric Code; CGA H-5, Installation Standards for Bulk Hydrogen Supply Systems; CGA H-3, Cryogenic Hydrogen Storage; CGA G-5.5, Hydrogen Vent Systems; 29 CFR Section 1910.103 and Airgas requirements.

Additional requirements may be imposed by the AHJ (Authority Having Jurisdiction).



SEE SITE SPECIFIC EQUIPMENT ARRANGEMENT DRAWING FOR ACTUAL CONDUCTOR LOCATION

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### STANDARD GROUNDING DETAIL

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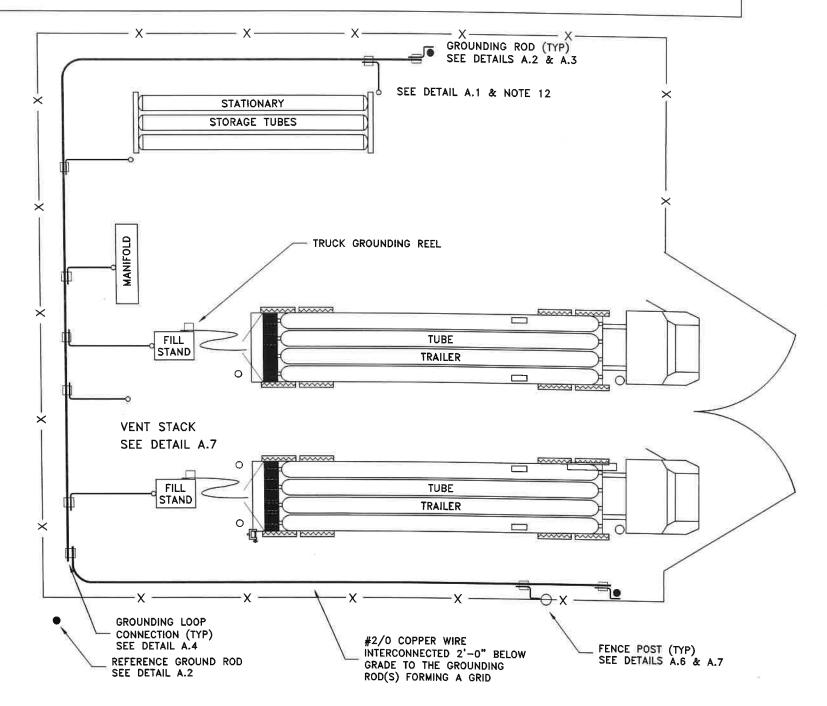
#### NOTES FOR GROUNDING REQUIREMENTS

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- 2. CONNECTIONS TO MOTOR FRAMES AND GROUND BUSSES SHALL BE MADE WITH LUGS BOLTED OR WELDED TO THE EQUIPMENT. ANCHOR BOLTS WILL NOT BE USED FOR FASTENING LUGS OF GROUNDING CABLES. CONNECTIONS OF CABLE TO CABLE OR CABLE TO STRUCTURE ARE TO BE MADE BY MEANS OF COPPER OXIDE AND ALUMINUM POWDER WELDING PROCESS OR "UL" RATED COMPRESSION GROUNDING CONNECTIONS. EQUIPMENT THAT IS FURNISHED WITH GROUNDING PADS SHALL BE CONNECTED TO THE GROUND GRID USING "UL" RATED MECHANICAL GROUND CONNECTER AT THE PAD AND COMPRESSOR OR COPPER OXIDE AND ALUMINUM POWDER WELDING PROCESS.
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### **BULK GH2 SYSTEMS**

Notes reflect the requirements of NFPA70, National Electric Code; CGA H-5, Installation Standards for Bulk Hydrogen Supply Systems; CGA H-3, Cryogenic Hydrogen Storage; CGA G-5.5, Hydrogen Vent Systems; 29 CFR Section 1910.103 and Airgas requirements.

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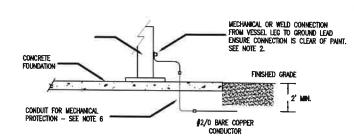
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- 13. PAGE 5 FOR EQUIPMENT GROUNDING DETAILS

STANDARD GROUNDING DETAIL FOR BULK SYSTEMS

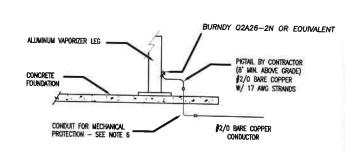
## **EQUIPMENT GROUNDING DETAILS**

## DETAIL A.1 CONNECTION TO VESSEL SEE NOTE 5



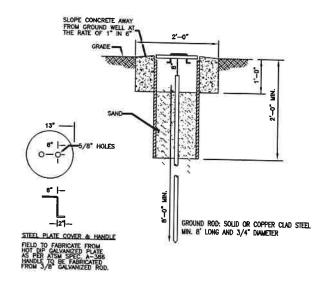
ALL PIGTALS BY CONTRACTOR SHALL BE MINIMUM B' LENGTH ABOVE GRADE FROM POINT IDENTIFIED ON SITE SPECIFIC ARRANGEMENT DRAWING \$2/0 BARE COPPER W/ 17 AWG STRANDS

## DETAIL A.2 CONNECTION TO VAPORIZER SEE NOTE 5



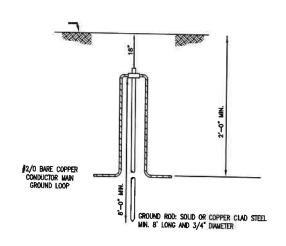
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## DETAIL A.3 REFERENCE GROUND ROD



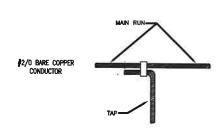
where rock bottom is encountered, the ground roo shall be driven at an objudie angle not to exceed 45 degrees from the vertical. Where the rock bottom is encountered at an angle up to 45 degrees, the ground roo can be permitted to be buried in a trench that is at least 30 inches deep

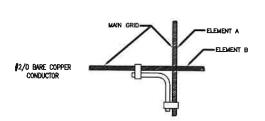
## DETAIL A.4 GROUND ROD



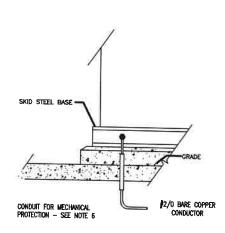
WHERE ROCK BOTTOM IS ENCOUNTERED, THE GROUND ROD SHALL BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45 DEGREES FROM THE VERTICAL. WHERE THE ROCK BOTTOM IS ENCOUNTERED AT AN ANGLE UP TO 45 DEGREES, THE GROUND ROD CAN BE PERMITTED TO BE BURIED IN A TRENCH THAT IS AT LEAST 30 INCHES DEEP

# GROUND LOOP CABLE CONNECTIONS SEE NOTE 2



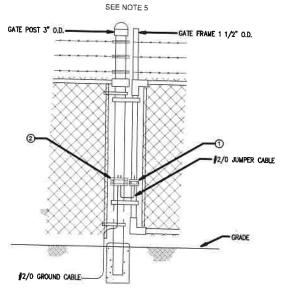


#### DETAIL A.6 CONNECTION TO SKID SEE NOTE 5



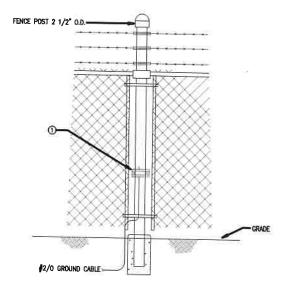
ALL PIGTALS BY CONTRACTOR SHALL BE MINIMUM 8' LENGTH ABOVE GRADE FROM POINT IDENTIFIED ON SITE SPECIFIC ARRANGEMENT DRAWING \$2/0 BARE COPPER W/ 17 AWG STRANDS

#### <u>DETAIL A.7</u> FENCING WITH GATE



ALL PIGTAILS BY CONTRACTOR SHALL BE MINIMUM B' LENGTH ABOVE GRADE FROM POINT IDENTIFIED ON SITE SPECIFIC ARRANGEMENT DRAWING \$2/0 BARE COPPER W/ 17 AWG STRANDS

## DETAIL A.8 FENCE OR PIPE CONNECTIONS



GROUND CLAMP SPECIFICATION	BURNDY PART NUMBER				
NOMINAL PIPE OR FENCE POST SIZE	SINGLE CONDUCTOR	DUAL CONDUCTOR			
1" NPS	GAR1526	GD1526			
1-1/2" NPS	GAR1726	GD1726			
2" NPS	GAR1826	GD1826			
2-1/2" NPS	GAR1926	GD1926			
3" NPS	GAR2026	GD2026			

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STANDARD GROUNDING DETAIL FOR BULK SYSTEMS 5 OF 5 100 Mg. 1