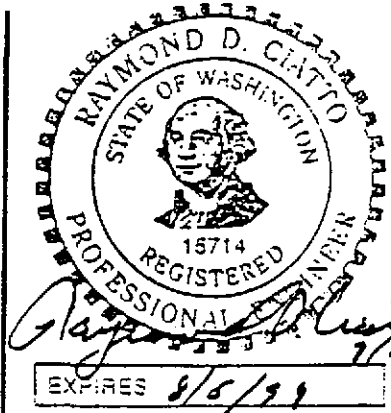


Title: PROCEDURE FOR INSTALLATION OF CONCRETE ANCHORS



PROCEDURE FOR
 INSTALLATION OF CONCRETE ANCHORS
 FOR
 LIGO VACUUM EQUIPMENT

Hanford, Washington

PREPARED BY:

R. D. Ciatto

INSTALLATION MANAGER:

[Signature]

QUALITY ASSURANCE:

Allen L. Bradbrook

TECHNICAL DIRECTOR:

D. A. [Signature]

PROJECT MANAGER:

[Signature]

Information contained in this specification and its attachments is proprietary in nature and shall be kept confidential. It shall be used only as required to respond to the specification requirements, and shall not be disclosed to any other party.

OCT 02 1997

3	RDC 9/30/97	RES 9/30/97	ATT. A REVISED
2	REC 5/5/97	RES 9/5/97	RE-RELEASED FOR CONSTRUCTION DEO # 0551
1	REC 7/1/97	RES 7/1/97	RE-RELEASED FOR CONSTRUCTION DEO # 0548
0	-	-	ISSUED PER DEO 138 FOR 2012

REV LTR. | BY-DATE | APPD. DATE | DESCRIPTION OF CHANGE

PROCESS SYSTEMS INTERNATIONAL, INC.

PROCEDURE

INITIAL APPROVALS	PREPARED	DATE	APPROVED	DATE	Number	Rev.
	RDC	4/26/96	RES	4/24/96	V049-1-101 LIGO-E970139-03-V	3

Title: CONCRETE ANCHOR INSTALLATION PROCEDURE

1.0 PURPOSE

The purpose of this procedure is to define the necessary installation steps required to ensure that concrete anchors meet all project requirements.

2.0 GENERAL

Hilti HVA adhesive anchors will be used to fasten LIGO vacuum equipment to concrete floor slabs. Concrete anchors have been sized and arranged to restrain the equipment against operating and seismic loads, including unbalanced vacuum loads that occur during normal operation. Proper installation of the anchors is required to ensure satisfactory performance of the vacuum equipment.

Component base plates will be fastened to the floor slabs that are constructed of 3000 psi concrete. It is the intent of this procedure that the anchors be installed in accordance with the manufacturer's requirements.

3.0 RESPONSIBILITY

The installation contractor is responsible for implementing this procedure. Conflicts, if any, between this procedure and manufacturer's installation requirements shall be brought to the attention of PSI prior to the start of installation.

4.0 PROCEDURE

4.1 References:

1. Hilti Publication H-427, Technical Guide - Anchor and Powder Actuated Fastening, HVA Adhesive Anchor, Installation Instructions (HAS Threaded Rod - Option #1), Hilti Fastening Systems, Tulsa, OK, 1987, pp. 8-13.
2. Hilti Publication H-600, Systems and Solutions, Hilti Fastening Systems, Tulsa, OK, 1995, pp. 133-135.

SPECIFICATION

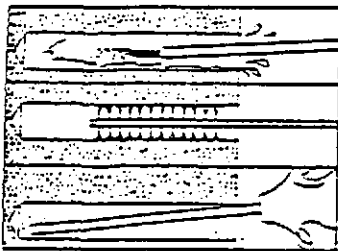
Number: LIG0-E970139-03-V A V049-1-101	Rev. 3
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Title: CONCRETE ANCHOR INSTALLATION PROCEDURE

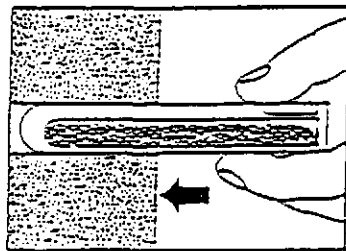
- 4.2 Critical equipment shall be aligned per procedures V049-2-021 section 8.3 and V049-2-174 prior to drilling the anchor bolt hole. Critical equipment anchor bolt requirements are detailed in attachment A of this specification.
- 4.3 Locate and install anchor bolts in accordance with the this specification and the equipment drawings. The hole location tolerance is +/- 1/16 in of position marked on concrete floor. Holes shall be plumb to within 1° of vertical. Embedment depths shown in this specification are minimum depths for the equipment listed. Drill holes using approved equipment to ensure full design bond strength and to maintain project cleanliness requirements. A Hilti PMH bit may be used to core drill holes for the HVA adhesive anchors. Rebar cutting is permitted.
- 4.4 Dwg. V049-4-243 shows the threaded rod installation △
3
- 4.5 Adhere to curing time required by Hilti before loading or disturbing anchors.
- 4.6 Prior to placing grout, tighten nuts the following torque:
- 3/4" rod - 175 ft.lbs.
- 1" rod - 375 ft.lbs.

4.7 Step by step instructions:

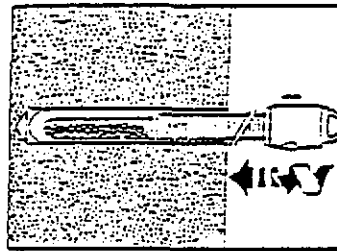
Installation Instructions (HAS Threaded Rod — Option #1)



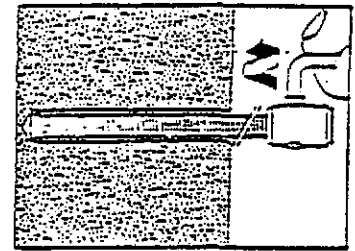
1. Set the drill depth gauge and drill the hole to the required hole depth. **IMPORTANT:** Clear out dust and fragments; preferably using a jet of water or compressed air and a wire brush. The hole may be damp, but the water should be blown out.



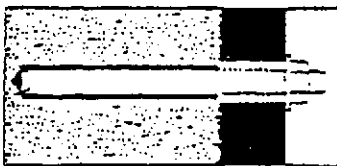
2. Insert the cartridge.



3. Insert the shaft in the rotary hammer chuck, screw the anchor rod in the adaptor and place the adaptor on the shaft. At the rotary hammer drilling setting, drive in the rod to the depth mark. Remove the drill and shaft assembly from the adaptor.



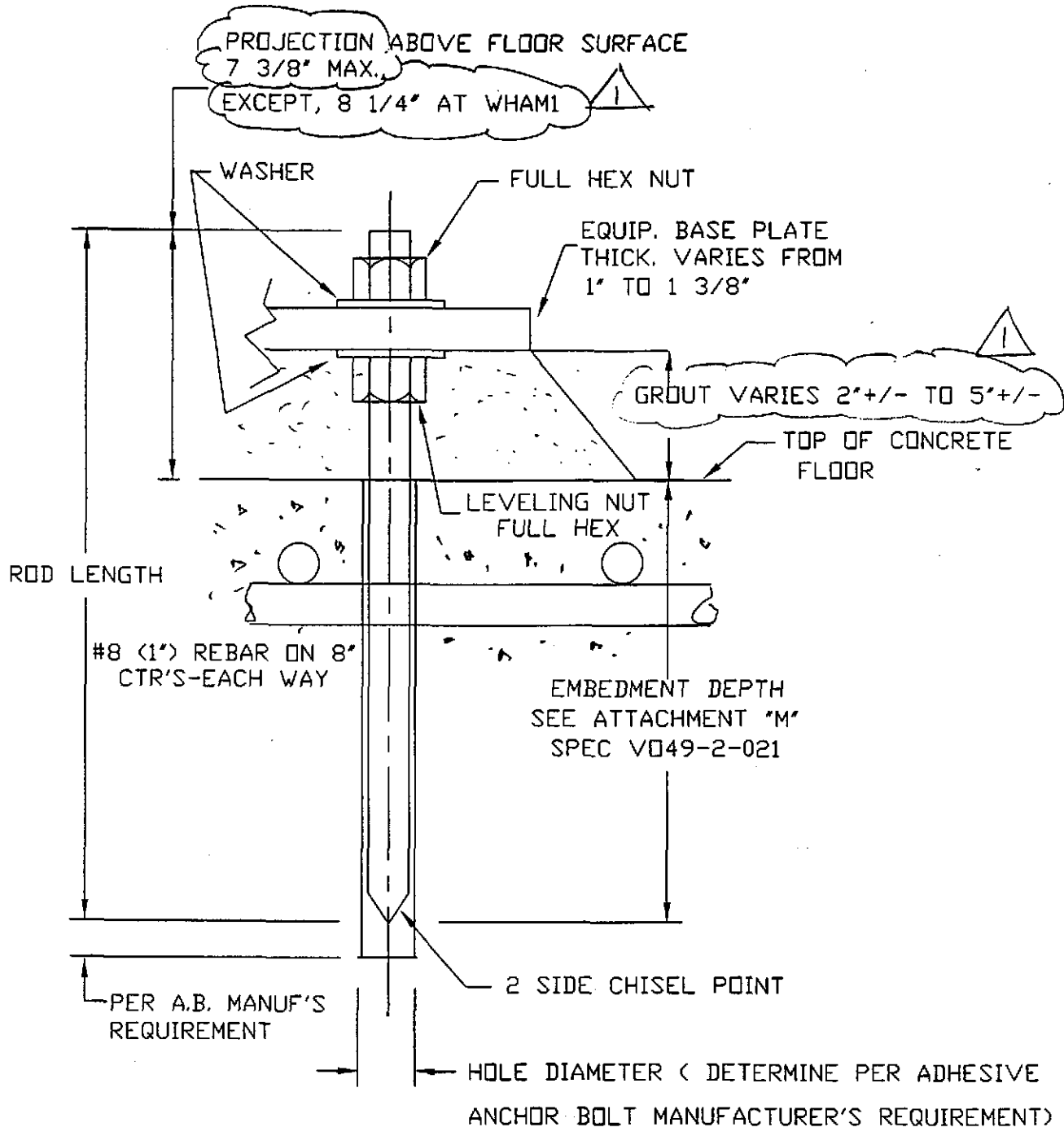
4. Rotate the hex bolt adaptor and unscrew the adaptor from the anchor rod immediately. When removing the adaptor, do not pull out the rod. If the adaptor is removed immediately, movement of the rod will not be detrimental to the fastening.



5. Setting and hardening time. The set anchor rod may not be disturbed or loaded during or before the end of the specified hardening time.

SPECIFICATION

Number:	A V049-1-101	Rev.	3
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TYPICAL VACUUM EQUIPMENT
CONCRETE ANCHOR DETAIL

REF. INSTALLATION SPEC V049-2-021

REV.	ISSUE DESCRIPTION	ENG.	CHKD	DRWN	DATE	DED#
1	ISSUED FOR CONSTRUCTION				09/30/97	0551
0	ISSUED FOR CONSTRUCTION				09/05/97	0548

DO NOT SCALE THIS DWG.

 **PROCESS SYSTEMS INTERNATIONAL INC.**
20 WALKUP DR. WESTBOROUGH, MASSACHUSETTS 01581 USA

**CONCRETE ANCHOR DETAIL
LARGE EQUIP. ADHESIVE TYPE
LIGD VACUUM EQUIPMENT**

CAD FILE V0494243	SIZE A	DWG. NO. V049-4-243	REV. 1
SCALE NONE		SHEET 4 OF 4	

Title: INSTALLATION OF CONCRETE ANCHORS

ATTACHMENT "A" TO V049-1-101

REQUIRED CONCRETE ANCHORS FOR VACUUM EQUIPMENT

Component Tag No.	Anchor Diameter	Rod Length	Minimum Embedment Depth	Notes
WBSC1	1"	15 5/8"	8 1/4"	12
WBSC2	1"	15 5/8"	8 1/4"	12
WBSC3	1"	15 5/8"	8 1/4"	12
WBSC4	1"	15 5/8"	8 1/4"	12
WBSC5 HOLD	1"	14 1/8"	8 1/4"	
WBSC6	1"	14 1/8"	8 1/4"	
WBSC7	1"	19 3/4"	12 3/8"	8
WBSC8	1"	19 3/4"	12 3/8"	8
WBSC9 HOLD	1"	8 ea -14 1/8"/8 ea -18 1/4"	8 1/4"/12 3/8"	3,8
WBSC10	1"	8 ea -15 1/8"/ 8 ea -19 1/4"	8 1/4"/12 3/8"	3,8
WHAM1	1"	20 ea -16 1/2"/4 ea -20 5/8"	8 1/4"/12 3/8"	4
WHAM2	1"	15 5/8"	8 1/4"	
WHAM3	1"	15 5/8"	8 1/4"	
WHAM4	1"	15 5/8"	8 1/4"	
WHAM5	1"	15 5/8"	8 1/4"	
WHAM6	1"	20 ea -15 5/8"/4 ea -19 3/4"	8 1/4"/12 3/8"	4
WHAM7	1"	20 ea -15 5/8"/4 ea -19 3/4"	8 1/4"/12 3/8"	4
WHAM8	1"	15 5/8"	8 1/4"	
WHAM9	1"	15 5/8"	8 1/4"	
WHAM10	1"	15 5/8"	8 1/4"	
WHAM11	1"	15 5/8"	8 1/4"	
WHAM12	1"	20 ea -15 5/8"/4 ea -19 3/4"	8 1/4"/12 3/8	4
WHAM13	Spare			
WCP1	1"	19 3/4"	12 3/8"	9
WCP2	1"	19 3/4"	12 3/8"	9
WCP3	1"	18 1/4"	12 3/8"	9
WCP4	1"	18 1/4"	12 3/8"	9
WCP5 HOLD	1"	18 1/4"	12 3/8"	9
WCP6 HOLD	1"	18 1/4"	12 3/8"	9
WCP7	1"	19 1/4"	12 3/8"	9
WCP8	1"	18 1/4"	12 3/8"	9
WGV1	3/4"	14"	6 5/8"	6
WGV2	3/4"	14"	6 5/8"	6
WGV3	3/4"	14"	6 5/8"	6
WGV4	3/4"	14"	6 5/8"	6

ATTACHMENT

Number:

A V049-1-101

Rev.

3

Title: INSTALLATION OF CONCRETE ANCHORS

Component Tag No.	Anchor Diameter	Rod Lenth	Minimum Embedment Depth	Notes
WGV5	3/4"	14"	6 5/8"	7
WGV6				5
WGV7	3/4"	14"	6 5/8"	7
WGV8				5
WGV9				5
WGV10	3/4"	12 1/2"	6 5/8"	7
WGV11	3/4"	12 1/2"	6 5/8"	7
WGV12				5
WGV13				5
WGV14 HOLD	3/4"	12 1/2"	6 5/8"	7
WGV15 HOLD	3/4"	12 1/2"	6 5/8"	7
WGV16				5
WGV17	3/4"	13 1/2"	6 5/8"	7
WGV18	3/4"	13 1/2"	6 5/8"	7
WGV19				5
WGV20 HOLD	3/4"	12 1/2"	6 5/8"	7
WA-7A1 HOLD	1"	14 1/8"	8 1/4"	
WA-7B1	1"	14 1/8"	8 1/4"	
WA-7A2 HOLD	1"	14 1/8"	8 1/4"	
WA-7B2	1"	15 1/8"	8 1/4"	
WB-1A	1"	15 5/8"	8 1/4"	11
WB-1B	1"	15 5/8"	8 1/4"	11
WB-2A	1"	15 5/8"	8 1/4"	13
WB-2B	1"	15 5/8"	8 1/4"	13
WB-3A	1"	15 5/8"	8 1/4"	13
WB-5A	1"	15 5/8"	8 1/4"	13
WB-6	1"	19 3/4"	12 3/8"	8
WB-7	1"	19 3/4"	12 3/8"	8
WB-9A	1"	15 5/8"	8 1/4"	13
WB-9B	1"	15 5/8"	8 1/4"	13
WBE-5	1"	15 5/8"	8 1/4"	
WBE-6	1"	15 5/8"	8 1/4"	
Pipe Bridge	3/4"	9 3/4"	6 5/8"	10

ATTACHMENT

Number:

A V049-1-101

Rev.

3

Title: INSTALLATION OF CONCRETE ANCHORS

Notes:

1. **Install Hilti HVA anchors with HEA capsules and HAS standard rods, unless otherwise noted, in accordance with Specification V049-1-101.**
2. **This note deleted.**
3. **Use 12 3/8" minimum embedment for base plates at end of arm.**
4. **Use 12 3/8" minimum embedment for the four anchors at the end of the arm.**
5. **These gate valves are supported by others.**
6. **See Dwg. V049-4-034, for 48" gate valve anchor bolt locations.**
7. **See Dwg. V049-4-033 for 44" gate valve anchor bolt locations.**
8. **Use Hilti HAS Super Threaded Rod. Scarify floor.**
9. **Use Hilti HAS Super Threaded Rod with 12 3/8" embedment for all baseplates. Scarify floor.**
10. **No grout pad. Shim if necessary.**
11. **Scarify floor at baseplates connected to diagonal members.**
12. **Scarify floor.**
13. **Use Hilti HAS Super Threaded Rod for baseplates connected to diagonal members. Scarify floor for these baseplates.**

ATTACHMENT

Number:

A V049-1-101

Rev.

3