Los Alamos NATIONAL LABORATORY EST. 1943

Conduct of Engineering
Request for Variance or Alternate Method

To display the *VAR Request Metadata* pane for this document, click **File > Info > Properties > Show Document Panel.**

1.0 General

1.1 Document Number: VAR-10745	1.2 Revision: 0
1.3 Brief Descriptive Title: Alternate Post-Installed Anchors for NDC-3 SSCs	
1.4 Affected Program: Engineering Standards	1.5 Request Type: Alternate Method
1.6a Affected Tech Area 99	1.6b Affected Buildings Sitewide
1.7 Requestor: Apperson, Jason Wesley Organization: LI-PROJ	

1.8 Revision History

Revision Number	Changes and Comments
0	Initial issue.

2.0 Affected Conduct of Engineering Program/Documents

2.1 Affected "P" Document: P342 Engineering Standards If against the P document itself, revision (or ***N/A***): N/A	2.2 Subordinate or related document(s) [AP, master spec, LANL ESM chapter & section; or code, Order, standard, etc.]: Document Title/No.: LANL ESM Chapter 5, Section III, Nuclear SSCs Design and Analysis Requirements Revision 11 Document Title/No.: Enter text.. Revision Enter text.. Document Title/No.: Enter text.. Revision Enter text..

2.3 Section/Paragraph: Appendix A, Paragraph A.1.B.2

2.4 Specific Requirement(s) as Written in the Document(s):

Allowed post-installed (PI) anchors are the Hilti HDA undercut anchor (i.e., HDA) (Requirement 5-3125), KB-TZ expansion anchor (i.e., KB-TZ) (Requirement 5-3126), KB-TZ2 expansion anchor (i.e., KB-TZ2) (Requirement 3127), and HIT-RE 500 V3 adhesive anchor (i.e., V3) (Requirement 3128).

2.5 Contractual, preference, or other basis for requirement in 2.4:

The allowed HILTI post-installed anchors are LANL's preferred anchors as they meet ACI 318 or ACI 349, 2015 & 2021 IBC requirements, and are available from an NQA-1 supplier. ESM Chapter 5 Requirements ID Log provides more background.

2.6 Type of VAR from ESM Chap 1, Z10 [*Applies only to standards variances*)	2.7 Discipline
Type 2	Structural

3.0 Request Information & Comments

3.1 NCR required (work has occurred)? No
If Yes, NCR Number: Enter text.

3.2 System/Component Affected	3.3 Highest ML Level
OpSystem Acronym & Name BLDG - Building System Number or Name BLDG	ML-1

3.4 Proposal with Justification/Compensatory Measures:

Proposal:

Allow the use of all post-installed mechanical anchors meeting the qualification requirements of ACI 349-13 for nuclear applications under ESM Chapter 5, Section III, Appendix A, *Design of Anchoring to Concrete*. The use of qualified post-installed mechanical anchors shall include application of relevant ACI 349-13 code provisions for design and installation, to suit projects' needs with consideration of the qualification limitations and conditions of use of each anchor type, as detailed in the anchor's evaluation/qualification report (e.g., ICC-ESR).

The revised language below shall replace the requirements in ESM Chapter 5, Section III Appendix A, Paragraph A.1.B.2 (current subparagraph A.1.B.2.a and Table III.A-1 remain):

Allowed post-installed (PI) anchors are the Hilti HDA undercut anchor (i.e., HDA) (Requirement 5-3125), KB-TZ expansion anchor (i.e., KB-TZ) (Requirement 5-3126), KB-TZ2 expansion anchor (i.e., KB-TZ2) (Requirement 5-3127), HIT-RE 500 V3 Adhesive anchor (i.e., V3) (Requirement 5-3128), and all post-installed mechanical anchors meeting the qualification requirements of ACI 349-13 and the qualification limitations and conditions of use for each anchor type, as detailed in the anchor's evaluation/qualification report such as an ICC-ESR (Requirement 5-3128A)[1,2].

Note:

1. Where anchors defined herein are to be used for anchorage of safety-related equipment or safety related applications (*e.g.,* Safety Class and Safety Significant SSCs), the vendor shall be listed on the IESL, or proper commercial grade dedication (CGD) shall be performed. Otherwise, procurement of anchors shall be commensurate to the management level of the source SSC.
2. It is the responsibility of the Engineer of Record (EOR) to confirm anchor availability and project's ability to perform CGD before specifying them in a new design.

Justification:

Mechanical anchors are used to establish a load path between components and the concrete structure to resist static and dynamic loading. Many mechanical anchors not discussed in the LANL ESM Chapter 5, Section III, Appendix A have been independently evaluated by ICC Evaluation Services Report (ICC-ESR) to document qualification to ACI 355.2.

Generally, an ICC-ESR documents the testing of anchors with finite embedment depths (*i.e.,* one to several embedment depths per anchor diameter, across a range of diameters). Additionally, many ICC-ESRs recognize and identify that a project may utilize anchors with embedment depth outside of the qualification scope by stating that information presented in the ICC-ESR is to be used in conjunction with design criteria of ACI 349, Appendix D.

To justify the use of mechanical anchors outside of those referenced in LANL ESM Chapter 5, Section III, Appendix A, the following conditions must be met:

1. The product will include documented qualification per ACI 355.2.
2. The anchors will be classified as Category I for use in cracked concrete and to resist earthquake induced loads.

In addition, for applications that fall outside the bounds of the finite testing identified in the ACI 355.2 qualification documentation (e.g., ICC-ESRs), the use of these mechanical anchors may still be justified if design engineers comply with the anchor qualification limitations and conditions of use along with the provisions of ACI 349 Appendix D.

This approach allows for engineering judgment and flexibility while ensuring adherence to the relevant code requirements for structural integrity and safety.

3.5 Attachments

Document Title or Description N/A

3.6a Project ID	3.6b: Project Name	3.6c: Code of Record Date
N/A	N/A	N/A

3.7 Duration:	3.8a If Finite Period, Start Date:	3.8b End Date:
Lifetime	Click to enter a date.	Click to enter a date

3.8c Provide the PFITS number for tracking removal/correction: N/A

3.9 USQD/USID required (Nuclear, High/Mod Hazard)? No

If Yes, USQD/USID Number N/A

3.10 QA Review for process change matters potentially affecting LANL's NQA-1 implementation

Is a QPA Determination required?: No If ***Yes***, then: Choose an item.

QPA Comments: Enter text..

3.11 POC Determination: Accept

POC Comments: Enter text..

3.12 Management Program Owner's (SMPO) Approval for P341 and APs; P342, ESM, ML-1 and -2, and Contract Matters; and P343

SMPO Determination: Accept

Comments: Enter text..

4.0 Participant Signatures

NOTE: *DO NOT ADD NAMES FROM WITHIN WORD! Save and close the form first, then do 1-4 below:*

1. *From the SharePoint library, select the document, then click the **ellipsis** (…) in the second column; a small dialog appears*
2. *In the small dialog click the **ellipsis** again*
3. *Click **Edit Properties** and check out the document if prompted toEnter names using the controls provided, then **Save***

4.1 POC (Management Program Owner's Representative): Coronado Restrepo, Carlos Arturo	Organization ES-SPD	Signature CARLOS CORONADO RESTREPO (Affiliate) Digitally signed by CARLOS CORONADO RESTREPO (Affiliate) DN: cn=CARLOS CORONADO RESTREPO (Affiliate), c=US, o=U.S. Government, ou=Department of Energy Date: 2025.08.12 09:53:55 -06'00'
4.2 Facility Design Authority Representative Cereijo Ruiznavarro, Jorge FDAR signature not required ☐	Organization PFE-DO	Signature JORGE CEREIJO RUIZNAVARRO (Affiliate) Digitally signed by JORGE CEREIJO RUIZNAVARRO (Affiliate) Date: 2025.08.14 13:08:22 -06'00'
4.3 LANL Owning Manager (FOD or R&D/Program) ~~Tesch, Chuck~~ FOD or Program Manager signature not required ☒	Organization Enter text..	Signature
4.4 Quality Reviewer's Name: [QPAName] QPA review/signature not required ☒	Organization Enter text.	Signature
4.5 Safety or Security Management Program Owner's Approval for P341 and APs; P342, ESM and Contract Matters; and P343 Richardson, Michael Joseph SMPO signature not required (Type 1 variance) ☐	Organization ES-DO	Signature MICHAEL RICHARDSON (Affiliate) Digitally signed by MICHAEL RICHARDSON (Affiliate) Date: 2025.08.20 09:03:16 -06'00'
4.6 Additional Signer 1 Winter, Benjamin David Role: TA55 Structural SME	Organization PFE-DO	Signature BENJAMIN WINTER (Affiliate) c=US, o=U.S. Government, ou=Department of Energy, 0.9.2342.19200300.100.1.1=89001003501582, cn=BENJAMIN WINTER (Affiliate) Z# 281946, PFE-DO 2025.08.12 10:11:53 -06'00'

4.7 Additional Signer 2	Organization	Signature
[AdditionalSigner2] Role: Enter text.	Enter text.	

4.8 CoE Administrator Signature	Signature
Leyba, Matthew Anthony NOTE: The CoE Admin is always the last signature placed on this document. The date of that signing is the date of this document.	MATTHEW LEYBA (Affiliate) Digitally signed by MATTHEW LEYBA (Affiliate) Date: 2025.08.20 09:43:04 -06'00'