

**OCCUPATIONAL SAFETY
AND HEALTH STANDARDS BOARD**

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**FINAL STATEMENT OF REASONS**

CALIFORNIA CODE OF REGULATIONS

Construction Safety Orders

Chapter 4, Subchapter 4, Article 29, Sections 1714 and 1715

Precast Concrete Construction

There are no modifications to the information contained in the Initial Statement of Reasons except for the following substantive, nonsubstantive and/or sufficiently related modifications which are the result of public comments and/or Board staff evaluation.

Section 1714. Title.

Section 1714, titled: Hoisting and Erecting of Precast, Prefabricated Panels (Other Than Tilt-Up). The title describes the scope of Section 1714 to include precast, prefabricated panels other than tilt-up panels, which are covered by Section 1715.

Modifications are proposed to replace the term "panels" with "concrete construction," and to add the term "panels" after "tilt-up."

The purpose and necessity of the proposed modifications is to clarify the scope of the regulation to include hoisting and erection of all precast concrete construction (not just limited to panels). The scope is intended to include precast concrete bents, and other precast concrete shapes. The proposed modifications also clarify that tilt-up concrete panels are not included within the scope of Section 1714.

Section 1714(a).

This subsection requires that an erection plan and procedure shall be prepared by a registered civil engineer.

A modification is proposed to add "or under the direction of,..." after "shall be prepared by..." A modification is also proposed to add "hereinafter referred to as..." before "the responsible engineer."

The previous language could be misinterpreted to prohibit the responsible engineer from delegating preparation of the erection plan and procedure to individuals under his/her responsible charge. The purpose of the proposed modifications is to clarify that the erection plan and procedure may be prepared under the responsible supervision of a civil engineer currently

registered in California who will be referred to as the "responsible engineer" throughout the remainder of Section 1714. This is necessary to avoid misinterpretation of the regulations.

Section 1714(a)(2).

This section requires that job site inspections shall be made by the responsible engineer (or an authorized representative) during the course of erection to ensure that the erection plan and procedures are followed.

A modification is proposed to replace the parenthesis around "or an authorized representative" with commas.

The purpose and necessity for this change is to clarify that the responsible engineer may delegate job site inspections to authorized representatives.

Section 1714(a)(4).

This subsection requires that precast wall or vertical panel bracing shall be designed by, and installed in accordance with the direction of, the responsible engineer.

Modifications are proposed to strike the term "wall" and to replace it with "member," and also to change "designed by" to read "designed by, or under the direction of,..."

The purpose and necessity in changing "wall" to "member" is for consistency with the regulatory intent that Section 1714 is to apply to all precast, prefabricated concrete construction, other than tilt-up panels and that it is not just limited to precast, prefabricated vertical wall panels. The purpose and necessity of the change from "designed by" to read "designed by, or under the direction of..." is for consistency with the change in Section 1714(a) to permit the registered civil engineer to delegate preparation of the erection plan and procedure to individuals under his/her responsible direction.

Section 1714(a)(5).

This subsection provides that lifting methods and procedures for precast, prefabricated concrete panels shall not put employees at risk of being struck should something fail or malfunction.

Modifications are proposed to add the term "concrete member" and to delete "other" from "supporting equipment."

The purpose and necessity for the addition of "concrete member" is for consistency with the regulatory intent that Section 1714 is to apply to all precast, prefabricated concrete construction, other than tilt-up panels and that it is not just limited to precast, prefabricated wall panels. The deletion of "other" from "supporting equipment" is a non-substantive grammatical clarification.

Section 1714(b).

This subsection prescribed that all attachments shown on the erection plan shall be installed before the panel lifting line is released. The initial proposal was to relocate the substance of this section to 1714(d), and to replace it with Federal OSHA verbiage [(29 CFR 1926.704(c)] with editorial changes.

As a result of comments received, modifications are proposed to add ... "which are..." after "lifting inserts" and to add "applied or transmitted to them, and shall be used in accordance with the manufacturer's recommendations" to the end of the subsection.

This is a non-substantive modification to clarify the nature of the load that the lifting inserts must support. Staff has determined that the phrase "applied or transmitted to them" is used in 29 CFR 1926.704(c), which this section parallels. It is therefore necessary to add the phrase in order to provide safety equivalent to that required by Federal OSHA. The modification also clarifies that the lifting inserts shall be used in accordance with the manufacturer's recommendations.

Section 1714(d).

This section requires that precautions shall be taken to prevent wall units and structural framing from overturning or collapsing until permanent connections are completed.

Clarifications are proposed to change "wall units" to a more inclusive "concrete members" and to add "falling" to the list of what is to be prevented. "The" is added before "permanent connections" for improved grammar. Finally, "specified in the erection plan" is added at the end of the section to emphasize that all erection is to be done in accordance with the erection plan required by Section 1714(a).

The purpose and necessity of these non-substantive modifications is for clarity and for consistency with other changes made to Section 1714.

Section 1714(e).

This section requires that adjustment of panels after initial placement, which requires lifting of the panel in any manner, shall not be made unless wire rope safety tie backs are used or the panels are reattached to the load line.

A modification is proposed to change "panel(s)" to the more inclusive "precast member(s)."

The purpose and necessity of the change from "panel(s)" to "member(s)" is for consistency with the regulatory intent that Section 1714 is to apply to adjustment of all precast, prefabricated concrete construction (other than tilt-up) which requires lifting and that it is not limited to panels.

Section 1715(a).

This section requires that concrete erection stresses, lifting point attachments and locations in tilt-up concrete panels shall be designed by a currently registered civil engineer.

Modifications are proposed to relocate "for expected loads, including impact,..." for grammatical clarity and to add "or under the direction of ..." after "including impact, by,..." A modification is also proposed to add "hereinafter referred to as..." before "the responsible engineer."

The previous language could be misinterpreted to prohibit the responsible engineer from delegating design of concrete erection stresses, lifting point attachments and locations to individuals under his/her responsible direction. The proposed modifications also clarify that the responsible civil engineer currently registered in California will be referred to as the "responsible engineer" throughout the remainder of Section 1715. The purpose of the proposed modifications is to clarify the definition of "responsible engineer" and, furthermore, to clarify that the responsible engineer may delegate design work to those under his/her responsible direction. These modifications are necessary to prevent misinterpretation of the regulations.

Section 1715(b).

This section requires that lifting inserts which are embedded or otherwise attached to tilt-up concrete members shall be capable of supporting at least two times the maximum intended load.

A modification is proposed to retain the phrase "applied or transmitted to them" which was previously proposed to be stricken from the text in the 45 day notice. Staff has determined that the phrase "applied or transmitted to them" is used in 29 CFR 1926.704(b), which this section parallels. The purpose and necessity of this modification is to reinstate the 29 CFR language to assure safety equivalent to that required by Federal OSHA.

Furthermore, a modification is proposed to add "and shall be used in accordance with the manufacturer's recommendations" to the end of the section. This purpose and necessity of this modification is to clarify that the lifting inserts shall be used in accordance with the manufacturer's recommendations.

Section 1715(d).

This section requires vertical panel bracing which is used to support tilt-up panels prior to final bolting/attachment to be designed by a currently registered civil engineer.

A modification is proposed to add "or under the direction of,..." to "designed by," and to replace "a currently registered civil engineer" with "the responsible engineer."

The previous language could be misinterpreted to prohibit the responsible engineer from delegating design of temporary panel bracing to individuals under his/her responsible direction.

The purpose and necessity of the proposed modifications is to clarify that design of the vertical panel bracing may be delegated by the responsible engineer to those under his/her responsible direction, as is common practice in the industry.

Existing wind load design criteria have been placed in new Section 1715(d)(1) for clarity.

Section 1715(d)(1).

Existing wind load design criteria for vertical panel bracing have been relocated from Section 1715(d) to Section 1715(d)(1) for clarity. This, in-turn, has necessitated section renumbering as described below.

Section 1715(d)(1) [renumbered to 1715(d)(2)]

The existing Section 1715(d)(1) has been renumbered to 1715(d)(2) as a result of modifications made above. This section requires a lifting plan to be prepared by a registered civil engineer prior to commencement of panel erection.

Modifications are proposed to modify "a detailed lifting plan" to "detailed lifting and erection plans" and to change "by a currently registered civil engineer" to "by, or under the direction of, the responsible engineer."

The previous language could be misinterpreted to prohibit the responsible engineer from delegating design of the lifting and erection plan(s) to individuals under his/her responsible charge.

The modification to use "lifting and erection plans" is necessary to clarify that lifting and erection plans may be separate documents and that they shall either be prepared by the responsible engineer, or by individuals under his/her responsible direction, as is common practice in the industry.

The necessity and purpose of these proposed changes is for consistency with common practice in the industry and for consistency with Section 1715(e).

Section 1715(d)(2) [renumbered to Section 1715(d)(5)].

In keeping with the shift in numerical sequence initiated above, the proposal is to renumber existing subsection 1715(d)(2) to new subsection number 1715(d)(5). Changes for this renumbered section will be described in numerical sequence below.

Section 1715(d)(3).

This section requires the lifting plans and procedures to be available on the job site.

A modification is proposed to add "and erection" before "plans" to clarify the documents required to be available on the job site.

The purpose and necessity for this sufficiently related modification is for consistency with Sections 1715(d)(2) and 1715(e)

Section 1715(d)(4).

This section requires field modifications to the lifting plan to be approved by a registered civil engineer.

Based on comments received, a modification is proposed to change "by a currently registered civil engineer" to "by the responsible engineer."

The purpose of the proposed modification is to clarify that field modifications to the lifting plan shall be approved by the responsible engineer, consistent with changes proposed to Section 1715(a).

Section 1715(d)(5). [renumbered from Section 1715(d)(2)]

This section requires that lifting methods and procedures shall not place employees at risk of being struck by the panel or other supporting equipment.

A modification is proposed to strike the word "other" from the last part of the section.

The deletion of "other" from "supporting equipment" is a non-substantive grammatical clarification.

Section 1715(e).

This new section requires tilt-up wall panels to be temporarily supported to prevent toppling and/or collapse until permanent connections are completed.

A modification is proposed to add "as specified in the erection plan" to the end of the section.

The purpose of this modification is to clarify that temporary bracing of tilt-up panels shall not be removed until permanent attachments have been made in accordance with the erection plan. This modification is necessary to assure that all work is done in accordance with the lifting and erection plans.

SUMMARY AND RESPONSE TO ORAL AND WRITTEN COMMENTS

I. Written Comments

Dr. John Howard, Chief, Division of Occupational Safety and Health (Division), by letter dated September 6, 2000.

Comment No. 1:

The Division recommends changing the title of Section 1714 as follows (using strike-out and underline to show proposed changes):

Hoisting and Erecting ~~of~~ Precast, Prefabricated ~~Panels~~ Concrete Construction (Other Than Tilt-up ~~Panels~~).

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

The Board agrees that this proposed modification to the regulation is necessary to make it clear that the regulations include not only precast panels, but also any other precast construction such as ornamentation, concrete bents, and other concrete shapes. The title of Section 1714 will be revised.

Comment No. 2:

The Division recommends changing references from the "responsible engineer" to read: "civil engineer." This recommendation applies to Sections 1714(a)(2), 1714(a)(3) and 1714(a)(4). The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff agrees that the clarification of the role of the engineer in the preparation of the erection plan and procedure is necessary. The original proposal uses the term "the responsible engineer" in Section 1714(a) to refer to "a civil engineer currently registered in California." Board staff is of the opinion that use of the term "the responsible engineer" is less cumbersome than repeating the requirement for a licensed civil engineer in several sections.

Comment No. 3:

The Division recommends deleting parentheses around "or an authorized representative" in Section 1714(a)(2).

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff agrees that this proposed modification is necessary to clarify that the responsible engineer may delegate job site inspections to an authorized representative. The parentheses have been replaced with commas around the phrase "or an authorized representative."

Comment No. 4:

The Division recommends revising Board staff's proposed Section 1714(b) as follows (underlines and strike-outs are used to show the Division proposed changes to the Board staff's initial proposal):

Lifting inserts, embedded or otherwise attached ~~to~~, used in precast concrete elements or precast, prestressed concrete members shall be capable of supporting at least have a minimum safety factor of four times the maximum intended load, and shall be used in accordance with the manufacturer's recommendations.

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff notes that any changes proposed to this section must be at least as effective as 29 CFR 1926.704(c) that it parallels. Therefore, Board staff agrees that the Division's proposed changes are necessary where they provide equal or superior safety to that required by Federal OSHA. Board staff also finds it necessary to modify the proposal to include additional Federal language "applied or transmitted to them" in order to assure that the proposal will provide a level of safety equal or superior to that required by Federal OSHA. Therefore, Board staff proposes to modify Section 1714(b) as follows:

Lifting inserts, **which are** embedded or otherwise attached to precast concrete members, shall be capable of supporting at least four times the maximum intended load **applied or transmitted to them, and shall be used in accordance with the manufacturer's recommendations.**

Additionally, Board staff proposes to modify the corresponding Section 1715(b) (tilt-up construction) in a similar manner as follows:

Lifting inserts, which are embedded or otherwise attached to ~~tilt-up precast concrete members, other than tilt-up members,~~ shall be capable of supporting at least ~~four~~ two times the maximum intended load **applied or transmitted to them and shall be used in accordance with the manufacturer's recommendations.**

Comment No. 5:

The Division recommends revising Board staff's proposed Section 1714(c) as follows (underlines and strike-outs are used to show the Division proposed changes to the Board staff's initial proposal):

Lifting hardware shall be capable of supporting ~~at least five times~~ the maximum ~~intended imposed~~ load ~~applied or transmitted to the lifting hardware~~ with a safety factor of five.

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff notes that the current proposal is verbatim of 29 CFR 1926.704(d). Therefore, the main difference between the Division's proposal and Federal OSHA is the use of "imposed" versus "intended" load and "safety factor of five" versus "at least five times." Since "intended" is used elsewhere in Section 1714, and since it is consistent with Federal OSHA, Board staff believes it would be best to maintain the current proposed regulatory language. Staff also proposes to continue using "at least five times" for consistency with Federal OSHA.

Comment No. 6:

The Division recommends adding a new paragraph as follows:

Bracing for precast wall units or vertical panels shall be installed in accordance with the erection plan and procedure required by subparagraph (a).

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

It appears that the Division's comment may have been based on an earlier draft of the proposed changes. This section was revised prior to public notice. This requirement is now essentially contained in Sections 1714(a)(2) and (4), and it is therefore unnecessary to duplicate it. Board staff does not find a necessity for this proposed change.

Comment No. 7:

The Board staff initially proposed to delete the original Section 1714(b) and to replace it with a new Section 1714(d) as follows:

Precast concrete wall units and structural framing shall be supported to prevent overturning and collapse until permanent connections are completed.

The Division recommends retaining requirements of the existing Section 1714(b) with one modification as follows:

All attachments shown on the erection plan shall be installed before the ~~panel~~ lifting load line is released.

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff notes that the proposed Section 1714(d) is nearly verbatim of 29 CFR 1926.704(a); however, Board staff agrees with the Division's proposal to the extent that it proposes to combine the Division's recommended changes for 1714(b) and (d) into the following revision to make requirements for precast concrete members consistent with those for tilt-up concrete [Section 1715(e) as revised by Comment No. 10]. Board staff proposes to amend Section 1714(d) as follows:

(d) Precast concrete wall units and structural framing shall be supported to prevent overturning and collapse until **the permanent connections specified in the erection plan** are completed.

Note: Additional changes are proposed by Comment No. 8, below.

Comment No. 8:

The Division recommends revising proposed Section 1714(d) as follows:

(d) Precast concrete ~~wall units and elements, precast prestressed concrete and structural framing~~ shall be supported to prevent **falling**, overturning and collapse until permanent connections are completed.

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff agrees that the proposed modifications are necessary to the extent that Section 1714(d) (also modified by Comment No. 7) be further modified as follows:

(d) Precast concrete ~~wall units~~ **members** and structural framing shall be supported to prevent **falling**, overturning and collapse until **the permanent connections specified in the erection plan** are completed.

Comment No. 9:

The Division recommends replacing the term "panels" with "elements" in Section 1714(e) which is more inclusive.

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff agrees with the Division that it is necessary to include construction requirements for all precast members, not just for wall panels. (See Response to Comment No. 1). However, Board staff has noted that Federal OSHA uses the term "members" rather than "elements" and staff is of the opinion that the use of the term "members" is more inclusive. Therefore, staff proposes to amend Section 1714 as follows:

(a)(4) Precast ~~wall member~~ or vertical panel bracing shall be designed by, and installed in accordance with the direction of, the responsible engineer.

(a)(5) Lifting methods and procedures shall be such that employees are not at risk of being struck by the ~~concrete member~~, panel or ~~other~~ supporting equipment.

(e) Adjustment of ~~panels precast members~~, after initial placement, which requires the lifting of the ~~panel members~~ in any manner, shall not be made unless wire rope safety tie backs are used or the ~~panels members~~ are reattached to a load line.

Additionally, Board staff proposes the following clarification to Section 1715(d)(5) to make regulations for tilt-up construction consistent with those for precast concrete construction [Section 1714(a)(5)]:

Lifting methods and procedures shall be such that employees are not at risk of being struck by the panel or ~~other~~ supporting equipment.

Comment No. 10:

The Division recommends clarifying Section 1715(e) as follows:

Tilt-up wall panels shall be supported to prevent overturning, toppling and/or collapse **prior to release of the lifting load line** until permanent connections are completed **as specified in the erection plan**.

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff agrees that a portion of the proposed changes are necessary for clarity and for consistency with industry practices; however, Board staff does not support inclusion of the clause "prior to release of the lifting load line" as this is not consistent with industry practices. Industry practice is to raise the tilt-up panel and to attach temporary bracing. Once temporary bracing is attached, the lifting load line is normally detached and the crane moves on to the next lift. Therefore, Board staff supports the Division's recommendations to the extent that Section 1715(e) be revised as follows:

Tilt-up wall panels shall be supported to prevent overturning, toppling and/or collapse until permanent connections are completed **as specified in the erection plan.**

Comment No. 11:

The Division recommends clarifying Section 1715 with a subsection addressing procedures for adjustment of panels after initial placement as follows:

Adjustment of panels, after initial placement, which requires the lifting of the panel in any manner shall not be made unless the panels are reattached to the load line.

The purpose and necessity given by the Division for this proposed change is to clarify existing safety orders and to conform to current building standards and industry practices.

Response:

Board staff agrees with the intent of the proposed change. However, Board staff finds the condition that lifting lines be required only "when lifting the panel in any manner" to be problematic. In a fatal construction accident in Southern California in 1999, a contractor argued that he had been incorrectly cited because he claimed he was not lifting the panel after initial placement, but was only skidding the base of the panel using a hydraulic jack and crowbar. In this accident, the panel became unbalanced and the weight of the panel overcame the temporary bracing when the bottom of the panel was skidded approximately 4" after placement of temporary bracing and the removal of the lifting line. Board staff believes that Section 1715(e) as revised by Comment No. 10 addresses the issues more broadly than the Division's recommendation and will cover the issues involved in the 1999 fatal accident more thoroughly so that no further changes are necessary.

The Board thanks Dr. John Howard and the Division of Occupational Safety and Health for their participation in the Standards Board's rulemaking process.

II. Oral Comments

Oral comments received at the October 19, 2000, Public Hearing

Mr. Richard Warner, representing Southern California Edison.

Comment No. 1:

Mr. Warner stated that, based on the language used in Section 1714(a), he did not know how one could consider "the responsible engineer" to be a civil engineer. Mr. Warner also commented that the language of Section 1714(a) appeared to require the design and erection plan to be prepared by the same individual. Mr. Warner stated that he believes that a lot of these designs are prepared by those other than engineers, but that they are always approved by engineers. Mr. Warner believes that it is important that the language be clarified to address the issue that the design does not have to be prepared by an engineer provided that it is prepared under the direction of a registered engineer.

Response:

Board staff agrees with Mr. Warner that there is ambiguity in Section 1714(a) and finds it necessary to clarify that "the responsible engineer" is a civil engineer currently registered in California and that the plans may be designed by, or under the direction of, the responsible engineer. Board staff is of the opinion that these modifications are necessary to clarify the role and responsibility of the engineer in the design of the erection plan and procedure.

Comment No. 2:

Mr. Warner stated that he believes that many precast erection designs are prepared by individuals other than engineers, but that they are always approved by engineers. Mr. Warner recommended that Section 1714(a)(4) be modified to read (underlines and strike-outs indicate changes proposed):

The design of Pprecast walls or vertical panel bracing shall be approved ~~designed~~ by, and installed in accordance with the directions of, the responsible engineer approved by a ~~directions of, the responsible engineer~~ civil engineer registered in the State of California.

Response:

Board staff agrees with Mr. Warner that clarification of Section 1714(a)(4) is necessary for consistency with the Business and Professions Code and with industry practices. Board staff proposes the following modification in response to Mr. Warner's comment:

(4) Precast wall or vertical panel bracing shall be designed by, or under the direction of, and installed in accordance with the direction of, the responsible engineer.

Comment No. 3:

Mr. Warner commented that Section 1715(d) should be changed to "shall be approved by, and installed in accordance with the directions that are approved by an engineer currently registered in California."

Response:

This comment concerning Section 1715 (tilt-up construction) addresses the same concern as for Comment No. 1 which concerned Section 1714 (pre-cast, prefabricated concrete construction). Board staff agrees with Mr. Warner and finds it necessary to modify Section 1715(d) as follows:

- 1715(d) ~~Precast wall or~~ Vertical panel bracing used to support the tilt-up panels prior to final bolting/attachment shall be designed by, or under the direction of, and installed in accordance with the direction of, the responsible engineer, a currently registered civil engineer.
- 1715(d)(2) Prior to the commencement of panel erection, a detailed lifting plan shall be prepared by or under the direction of the responsible engineer a currently registered civil engineer. All panel erection shall be performed in accordance with the plan.
- 1715(d)(4) Field modifications to the lifting plan shall be approved by the responsible engineer a currently registered civil engineer and added to the plans and procedures available at the job site.

Comment No. 4:

Mr. Warner commented that Section 1715(d)(4) should be clarified to require that the engineer approving field modifications must be a civil engineer currently registered in California.

Response:

Board staff agrees with Mr. Warner and is of the opinion that his concerns have been addressed by our responses to his Oral Comments numbers 1 and 3 (above).

The Board thanks Mr. Warner for his participation in the Standards Board's rulemaking process.

ADDITIONAL DOCUMENTS RELIED UPON

California Business and Professions Code, Sections 6731, 6734, 6735, and 6736.

This document is available for review Monday through Friday, from 8:00 a.m. to 4:30 p.m., at the Standards Board's office at 2520 Venture Oaks Way, Suite 350, Sacramento, California.

DETERMINATION OF MANDATE

These regulations do not impose a mandate on local agencies or school districts as indicated in the Initial Statement of Reasons.

ALTERNATIVES CONSIDERED

The Board invited interested persons to present statements or arguments with respect to alternatives to the proposed regulation. No alternative considered by the Board would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the adopted action.