

**OCCUPATIONAL SAFETY  
AND HEALTH STANDARDS BOARD**

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**FINAL STATEMENT OF REASONS**

## CALIFORNIA CODE OF REGULATIONS

TITLE 8: Division 1, Chapter 4, Subchapter 7 Article 2,  
Section 3209 of the General Industry Safety Orders.

**Standard Guardrails**

There are no modifications to the information contained in the Initial Statement of Reasons.

**SUMMARY AND RESPONSE TO WRITTEN COMMENTS:****I. Written Comments**

**Mr. Van A. Howell, CSP, United States Department of Labor, Occupational Safety and Health Administration, by letter dated January 18, 2011.**

**Comment:**

Mr. Howell stated the proposal ensures consistent strength requirements for guardrails and is commensurate with the federal standard.

**Response:**

The Board thanks Mr. Howell for his comment.

**Mr. Larry McCune, by letter dated February 17, 2011.**

**Comment:**

Mr. McCune stated that the Board's proposal to adopt changes to Title 8, Section 3209(c) introduces a substantial change in the design of metal guardrails. According to Mr. McCune, the proposed language would increase the structural requirements for all metal guardrails not limited to steel angle sections and would increase the weight of angle iron guardrails by 47 percent. Mr. McCune stated that the Division of Occupational Safety and Health has determined that the California ¼ inch metal thickness design for guardrails is capable of supporting the minimum 200 pounds top rail pressure required by the federal OSHA standards. Therefore, Mr. McCune

believes that the proposed amendments are not necessary to be at least as effective as the federal standard. Mr. McCune also stated that the State's 20 pounds per linear foot design load requirement may not be effective for short guardrail sections and that 1½ inch standard pipe does not have the bending strength of 2x2x3/8 inch angle iron.

Response:

The Board believes strength of the guardrail system is not dictated solely by whether the top rail can withstand a 200 horizontal and vertical point force. The Federal standard addresses the top rail and assures that the sum total or overall strength of the guardrail system which includes midrails and vertical members are constructed of 3/8 inch thick metal members that are inherently stronger than the ¼ inch thick metal members required by Title 8. Consequently, it is clear to the Board that Title 8 must be amended to require the structural metal used to fabricate the guardrail system to be a minimum 3/8 inch thick. The Board also believes that amending the standard to require 3/8 inch thick metal will also ensure that the entire guardrail system will safely support loads that may be imposed on it regardless of the length of the guardrail. (See also the response to Board Member Jackson's oral comment below).

With regard to Mr. McCune's comment about the bending strength of 1½ inch metal pipe versus 2x2x3/8 inch angle iron, the Federal OSHA August 12, 2010 letter (a document relied upon) pointed out a specific disparity between ¼ inch and 3/8 inch thick structural angles. Federal OSHA did take issue with other metal shapes of equivalent bending strength such as pipe. However, it is noted that the state standard is identical to the federal standard to the extent that Section 3209(c)(3) also addresses other metal shapes of equivalent strength. The illustration of metal pipe post and rails shown in Section 3209, SG-1 indicates that 1½ inch outside diameter of the pipe is a *minimum* dimension. Therefore, it is up to the employer to either increase the minimum pipe diameter to provide strength equivalent to 3/8 inch thick angle metal or fabricate the railing using a pipe alloy that has the inherent bending strength commensurate with 3/8 inch thick metal. In any event, since the proposal contains a grandfather provision for metal railings, the 3/8 inch thick requirement only applies to railings installed after the effective date of the proposed requirement.

The Board thanks Mr. McCune for his comments and participation in the Board's rulemaking process.

II. Oral Comments

There were no oral comments received from the regulated public at the February 17, 2011 Public Hearing in Oakland, California. Upon considering the proposal, a Board Member had the following concern:

Board Member, Mr. William Jackson

Comment:

Mr. Jackson commented that he would like to see in the record calculations showing whether the 2x2x1/4 inch angle iron meets the performance standards of 200 pounds force applied vertically and horizontally along any point of the top of the guardrail.

Response:

Board staff consulted with Mr. Gregory McClelland, Director of Safety, Western Steel Council Association. According to Mr. McClelland and data taken from the American Institute of Steel Construction (AISC) Manual, 13th Edition (Manual), tables 1-7, 4-11 and 5-2 indicate that the design properties for a 2x2x1/4-inch steel angle could support the 200 pound vertical and horizontal load design prescribed by federal OSHA standards. This data was derived from metallurgical calculations performed by the author and contributors to the Manual. This criterion is for force applied at any point along the top rail of a guardrail system and not for the other structural components of the railing such as the midrail and vertical members that support the top rail.

Board staff notes that the scope of this rulemaking proposal is to respond to the federal OSHA contention that Title 8, Section 3209(c)(3) does not contain sufficient requirements for strength and protection to make it at least as effective as federal standard 29 CFR 1910.23(e)(3)iii. The federal standard requires the metal thickness for all guardrail system members to be a minimum of 3/8-inch thick steel and affords the entire guardrail system the additional strength that the 3/8-inch thick metal provides which is approximately 45% greater than the 1/4-inch thickness required by the Title 8 permanent guardrail standard. Therefore, regardless of whether the 1/4-inch thick metal top rail can withstand a 200 pound load applied horizontally and vertically along any point of the top rail is notable but not as important as the synergistic strength of the total guardrail system which includes midrails and vertical members. A guardrail system comprised of 1/4-inch thick top rail, vertical and midrail members will not be as strong as one constructed of 3/8-inch thick metal throughout. This is what the federal standard requires and why the proposed amendment from 1/4-inch thick to 3/8-inch thick metal is necessary.

ADDITIONAL DOCUMENTS INCORPORATED BY REFERENCE

None.

DETERMINATION OF MANDATE

This regulation does 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 as and less burdensome to affected private persons than the adopted action.