



**COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY DIVISION**

**STEEL STORAGE RACKS
PLAN REVIEW LIST**

GENERAL PROJECT INFORMATION

PLAN CHECK NO. _____ DISTRICT NO _____
JOB ADDRESS _____ CITY _____ ZIP _____

NOTE: Numbers in the parenthesis () refer to sections of the 2014 edition of County of the Los Angeles Building Code, Table (T), Plumbing Code (PC), Mechanical Code (MC), Electrical Code (EC), Fire Code (FC), Building Code Manual (BCM), 2010 Minimum Design Loads for Buildings and Other Structures including Supplement No. 1 (ASCE7-10), 2008 specification for the design, testing and utilization of industrial steel storage racks (ANSI/MHI 6.1).

INSTRUCTIONS

- Corrections with circled item numbers apply to this plan check.
- In the left-hand margin of the circled corrections, please indicate the sheet number and detail or note number on the plans where the corrections are made. Resubmit marked original plans and two corrected sets of plans, calculations and this plan review list.
- Incomplete, unclear, or faded drawings or calculations will not be accepted.
- Incorporate all comments as marked on checked set of plans and calculations and these correction sheets.

APPLICATION

1. Provide a key plan showing property lines, street names, and location of building(s) with proposed storage racks.
2. Valuation is low. It should be \$_____. Pay a supplemental plan check fee of \$_____ at the time of resubmittal.
3. Show on the plans a complete description of the entire scope of work.
4. In order to issue a building permit to the agent of the property owner, an authorization letter by the owner enabling the agent to pull the permit(s) must be presented. Instead, if the permit is pulled by a licensed contractor or his/her agent, the following information is required.
 - a. Certificate of Workers Compensation Insurance made out to the Contractors State License Board.
 - b. Copy of business tax registration certificate or a newly paid receipt for one.
 - c. Copy of contractor's state license or pocket ID.
 - d. Notarized letter of authorization for agents of contractor.
5. Two sets of plans and one set of calculations will be required when permit is issued. Plans shall be:
 - a. Quality blue or black line drawings with uniform and light background color.
 - b. Minimum 18"X24" size (24"X36" recommended) with minimum 1/8" lettering size.
 - c. Sticky back details must produce prints without contrasting shades of background color.
6. Obtain agency clearances (see attached).

PLAN DETAILS

7. Floor plan of the building is required to show location of and to differentiate between all types of proposed storage racks. Floor plan must also show aisle widths and exiting scheme from the building in which storage racks will be placed.
8. Use of steel racks are permitted for more than one configuration, the drawings are to include either all permissible configurations or limitations as to the maximum number of shelves, the maximum distance between shelves and the maximum distance from the floor to the bottom shelf. (RMI 1.4.5)
9. Building permits are required for storage racks over 5'-9" high. Structural plans, details, and calculations by a California Licensed civil/structural Engineer are required for the construction of storage racks over 8' or greater in height. (RMI 2.6.1)
10. Lower portions of posts, especially the front posts of the racks, are exposed to damage by forklift trucks or other moving equipment. It is recommended to strengthen the posts by welding two columns together, welding an angle deflector to the front of the aisle side columns, using heavier horizontal and diagonal bracing or using larger base plates and anchors with the aisle side columns. (RMI 1.4.9)
11. Provide a note on plans that the racks shall be installed plumb. The maximum tolerance from the vertical is 0.5 inches in 10 feet of rack height. (RMI 1.4.11.1)
12. Each sheet of the drawings the structural calculations shall be signed by and bear the approved stamp of civil/structural engineer or architect licensed by the State of California.

CALCULATIONS

13. The design, testing and utilization of industrial steel storage racks shall be in accordance with the Rack Manufacturers Institute (RMI) specifications
14. The seismic design of steel storage racks shall be in accordance with the requirements of Section 15.5.3 of ASCE 7-10 or Section 2.6 of RMI latest edition.
15. Storage racks shall be designed for the most critical load combinations in accordance with ASCE 7-10 or modified RMI for wind loads
16. Storage racks with multiple configurations shall be designed for each individual configuration. (RMI 1.4.5)
17. Storage racks located above the ground level in buildings shall be designed to resist earthquake forces that consider the response of the building and storage rack to earthquake ground motions. (RMI 8.3)
18. The distribution of base shear over the height of the storage rack shall be in accordance with either Section 12.8.3 of ASCE 7-10 with factor $k=1$ or in accordance with RMI 2.6.6.
19. Overturning moment shall be calculated when only the top level of the rack is loaded and is subject to seismic force; the seismic load must act through the center of gravity of the top load. (RMI 2.6.8)
20. The weight of the rack contents used to determine the resisting moment shall be the same weight of the rack contents used for determination of the lateral forces. (RMI 2.6.2)
21. Where racks are braced against the building structure, the building structure shall be designed for the horizontal and vertical forces from the rack. Connections of racks to buildings shall be designed and installed to prevent reactions or displacements of the buildings from damaging the racks or vice versa. (RMI 8.2)
22. The height-to-depth ratio of a storage rack shall not exceed 6 to 1 measuring to topmost beam position unless the rack is properly anchored or braced externally. Racks with height-to-depth ratio exceeding 6 to 1 shall also be designed to resist a 350 lb side force applied to any empty single frame at the top shelf level in a direction perpendicular to the aisle. Anchors and base plates will be designed to resist uplift forces from this force when applied to an empty frame. Single rows of rack exceeding a height to depth ratio of 8 to 1 must be tied externally to the building or cross-aisle to another rack. (RMI 8.1)
23. Load support beams, supporting arms (if any), and end connection of beams or arms to columns are to be designed for an additional vertical impact load of 25 % of one unit load (pallet load), placed in the most unfavorable position for the determination of beam shear & moment. (RMI 2.3)
24. At working load (excluding 25% impact), the deflection of pallet-rack's beam shall not exceed 1/180 of the span measured with respect to the ends of the beam. (RMI 5.3)
25. All beam to post, frame bracing to post connections, shall be capable of supporting the combined vertical dead load, live load and product load reactions and a horizontal load equal to highest value of 1.5 % of the dead load plus the product load or the earthquake load (RMI 2.4.1)
26. Except for movable-shelf racks, beams shall have connection locking devices (or bolts) capable of withstanding an upward force of 1000 pounds per connection without failure or disengagement. The upward force should be applied to an unloaded beam. (RMI 7.1.2)
27. The effect of perforations on the carrying capacity of compression members may be considered by using the section properties based on the minimum net area. Provide calculations for this consideration. (RMI 4.1.3.1)
28. Support of racks by foundations, concrete floor slabs, or other means shall be in accordance with Chapter 18 of the 2014 Los Angeles County Building Code. All values of allowable foundation pressure are for footings having a minimum width of 12" and a minimum depth of 12" into natural grade. Where storage racks are supported by slab on grade, a maximum allowable soils bearing value of 750 psf will be allowed unless a soils report recommends a higher value for slabs on grade.
29. Engineer of record shall verify the conditions of existing slab on grade supporting storage racks and make his/her observations as part of the plans. Structural calculations and details shall be required for rack locations with close proximity to expansion and construction joints. In addition, the engineer shall indicate if cracks are present and provide adequate mitigation measures.
30. When the storage racks' members preclude calculations of allowable loads and deflections, determination may be made with a testing program in accordance with RMI Section 9.

NOTES ON PLANS

31. Provide material specifications for:
 - a. Concrete
 - b. Steel
 - c. Welds
 - d. Bolts
32. All rack installations and rack manufactured in conformance with the code shall display, in one or more conspicuous locations, a permanent plaque each, not less than 50 square inches on area, and showing the maximum permissible unit load or maximum uniformly distributed load per level, in clear, legible print. (RMI 1.4.2)
33. Special inspection is required for all structural welds except for welding done in an approved fabricator's shop. (1705.2.2.1)
34. All welding, except when performed at an approved fabricator shop, shall be done by County of Los Angeles certified welders.

