



ENGINEERS &
GEOSCIENTISTS
BRITISH COLUMBIA

PRACTICE ADVISORY

NEW REGULATIONS FOR STEEL STORAGE RACKS AND GOOD ENGINEERING PRACTICE

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This practice advisory has been issued to inform members and licensees of Engineers and Geoscientists BC about WorkSafeBC changes to the *Occupational Health and Safety (OHS) Regulation* regarding storage racks, and how good engineering practice can be applied to these regulations. The new regulations are in Section 4.43.1 – Storage Racks, under Part 4: General Conditions, and took effect January 1, 2018. This advisory presents considerations for design engineers regarding these new regulations and other related topics regarding steel storage racks.

The new regulations apply to steel storage racks made of steel frames, beams, and associated accessories that are assembled into a structure to support materials and products. Common types of steel storage racks are pallet racks and cantilever racks; however, the new regulations also apply to other types of steel storage racks such as drive-in or drive-through racks, push-back racks, and other similar types of industrial racks. Exemptions to the new regulations are steel storage racks under eight feet in height, where the materials are loaded or unloaded off the storage rack manually by workers. The new regulations do not apply to shelving and display fixtures commonly used for retail purposes.

BACKGROUND

Steel storage racks, particularly pallet racks, have become an essential element of most modern warehouses, manufacturing facilities, 'big box' retail centres, and other storage and distribution facilities. In 1972, the *Uniform Building Code* referenced racks in the Parts and Portions table. The 2015 *National Building Code of Canada* also references racks in the Parts and Portions table. On March 30, 2017, WorkSafeBC's Board of Directors approved changes to the *Occupational Health and Safety (OHS) Regulation* regarding storage racks. These changes are discussed below.

OHS REGULATION 4.43.1 – STORAGE RACKS

The new regulations outline the worker safety requirements for racks in workplaces to ensure employers understand the hazards, their responsibilities, and the procedures that must be in place with respect to these structures. The employer is advised to follow the specifications of the

manufacturer or a professional engineer. Good engineering practice requires familiarity and knowledge of applicable codes, standards, and guidelines.

The following is a summary of what is contained in OHS Regulation 4.43.1:

- Subsections (1) and (2) define storage racks and an exemption from the regulation based on height and method of loading.
- Subsections (3) to (7) deal mainly with installation requirements that may require the engagement of a professional engineer.
- Subsection (3)(b) requires that employers “must ensure that a storage rack in the workplace is designed and constructed in accordance with good engineering practice.” Engineers and Geoscientists BC reinforces that good engineering practice includes design for lateral forces including wind and seismic, and therefore members are required to consider those forces when determining the rated capacity of the storage rack.
- Subsection (5) requires that employers “must ensure that the instructions of the manufacturer or a professional engineer for safely loading, unloading and maintaining the storage rack are readily available in the workplace to workers”. Members should review *OHS Guidelines Part 4 General Conditions* and the non-mandatory *User Guide for Steel Storage Racks – CSA A344-17* for further information.
- Subsection (6) requires that employers “must ensure that the rated capacity of the storage rack is clearly posted near the storage rack and readily visible to workers.”
- Subsection (7) requires that structural modification of a storage rack “is carried out in accordance with the specifications of the manufacturer or a professional engineer.”
- Subsection (8) is the inspection requirement that a qualified person inspects, records, and reports to the employer at regular intervals. For more information on the qualified person, see *OHS Guidelines Part 4 – Storing and Handling Materials*.
- Subsection (9) is the maintenance requirement.

RATED CAPACITY

The new regulation does not define the design criteria for determining the rated capacity of a storage rack; however, members can refer to OHS Regulation 4.8 Rated Capacity for general information. According to Engineers and Geoscientists BC, good engineering practice for developing the rated capacity of a storage rack includes consideration of seismic loading as per the *BC Building Code*, *Vancouver Building Bylaw* or the *National Building Code*. The engineer responsible for the design should also determine any relevant municipal requirements related to seismic design. The only instance when seismic forces would not have to be addressed is when it is not required by neither the relevant code nor the local authority having jurisdiction (e.g., the municipality). A documented rationale should be kept on file.

If there is existing racking that has not been previously engineered (i.e., no presence of sealed drawings) to the building code at the time of installation, then the engineer engaged to determine the rated capacity must determine the rated capacity based on current design codes and standards.

If the existing racking has been previously engineered (i.e., the presence of sealed drawings) and the rated capacity is based on the relevant code in place at the time of design, then no further engineering is required. When it has been determined that the racking has been modified, the engineer responsible for determining the rated capacity should exercise their professional discretion as to whether the modification warrants the need for bringing the entire rack up to the current code.

Engineers and Geoscientists BC recommends that a professional engineer not assign a rated capacity for a storage rack that has conditions placed on the rating (e.g., a statement such as “static load only” where seismicity is applicable). However, good engineering practice supports professional engineers providing capacities for specific rack configurations.

OHS Regulation 4.2 Safe Buildings and Structures states: “the employer must ensure that each building and temporary or permanent structure in a workplace is capable of withstanding any stresses likely to be imposed on it.” When a professional engineer is engaged by an employer to assess the rated capacity of a storage rack, they should be aware of this clause.

GEOTECHNICAL CONSIDERATIONS

Warehouse buildings and other large facilities constructed prior to December 19, 2006, (BCBC 2006) will likely not have a geotechnical report identifying the Site Class for seismic design. Newer warehouse buildings often have structural drawings that indicate Site Class E values were used for seismic design even when the geotechnical report indicates Site Class F. In the case of short-period structures such as warehouses, Site Class E values are often allowed by the geotechnical engineer; however, a closer examination of the actual geotechnical report will usually reveal that it does not apply to long-period structures such as pallet racking. Members should confirm the correct site classification with the geotechnical engineer of record.

PERMITTING AND DESIGN REQUIREMENTS

Members should consult the local authority having jurisdiction for their building permit requirements for pallet racks as requirements vary considerably between jurisdictions. Members should also review the Parts and Portions table of the *National Building Code of Canada* (NBC 2015) for further information on the design of storage racks.

DAMAGED RACKING

Damage is common in warehouse buildings and other large facilities due to the use of forklifts. Most rack standards throughout North America do not have prescriptive provisions to quantify the capacity of damaged racking. European rack standards do allow a damage classification system but require that the racking be designed and used per multiple linked European standards, thus

allowing for additional safety when slightly damaged. Members should consult the original manufacturer or professional engineer's drawings to confirm the applicable design standard and if any damage is acceptable.

VERSION HISTORY

VERSION NUMBER	PUBLISHED DATE	DESCRIPTION OF CHANGES
1.0	August, 30, 2018	Initial version.
2.0	November, 13, 2018	Title revised to indicate that the advisory relates to good engineering practice, and section added on "Rated Capacity."
3.0	July, 10, 2019	Revisions made to "Rated Capacity" section to add clarity, and some additional guidance added on existing racking.

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