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## **State of the art in the range of storage systems**

The development of simple racks to complex storage systems with large dimensions make high demands on the material, the product design and the quality of manufacturing.

State building codes define the frame of necessary structural calculations and their double-checking, by officially authorized checking engineers, for storage systems as building structures. Simple racking systems with a height less than 7.5m (top edge of filling mass) are an exception and can be erected without previous approval.

Nevertheless even though there is no need for structural approval, structural safety is still essentially required.

Despite the higher structural requirements to racking systems it is not possible at the moment to make an officially acknowledged structural calculation due to missing regulations by construction authorities for free standing storage systems. This circumstance cannot be compensated by general product liability of the manufacturers.

The present work gives an overview about common pallet rack systems which are currently available at the market. This overview can be used as a basis for further development how storage facilities could be treated by the construction authority. Initially the general load transmission and various bracing systems were investigated, followed by an analysis of the structural design which catalogs the individual components, the different joints, the possible dimensions and the bearing loads as well.

Subsequently, the regulations of DIN EN 15 512 "Steel static storage systems - Principles for structural design"; were successively examined in detail and critically commented to analyze the state of the art.

Thereafter, the results of detailed analysis were sorted and summarized accordingly to the principal load transmission within the storage system so that in conjunction with the previous step a detailed reflection is possible any time.

In the subsequent evaluation, the results of previous studies on the pallet rack systems were summarized and possible recommended procedures were given.

The completion of the work is made by analyzing the structural design of drive-in and drive-through racking, which are a special form of the pallet rack systems.