



SIKA TECH ZONE

How to design an ideal floor for your warehouse and logistics facility?

#Flooring

BUILDING TRUST



THE BACKGROUND OF INDUSTRIAL FLOORING FOR WAREHOUSES AND LOGISTICS FACILITIES

In warehouses and logistics buildings the concrete slab and flooring are critical to the effective functioning of the operations. However, it is often the perception that the concrete floor is one of the most straight forward elements of the project, and many times the overall attention paid to design and construction detail is less than proportional to its ultimate importance in the efficient operation of the facility. The expectation is that these large area floors must be constructed with lowest possible cost and provide problem free service year after year.

FUNCTION OF FLOOR SLAB

The floor slab is constructed to provide a suitable wearing surface on which the operations in the facility may be carried out efficiently and safely. In the case of ground-bearing floor slab, the concrete slab distributes the applied loads without deformation or cracking to the weaker subgrade below. Piles supporting slabs are designed as a suspended ground slabs.

These requirements may also apply to other commercial floors whether they are trafficked concrete or are finished with high performance flooring systems. The following checklist discusses some of the principle issues for consideration when specifying and designing concrete floor slabs for logistics facilities. Specific slab construction properties may differ between industries or even within the same industry.

TYPICAL FLOOR SLAB REQUIREMENTS

- Support operational and stationary loads without cracking and deforming.
- Minimize the number of exposed joints.
- Utilize maintenance isolation joints that do not impede vehicle operating speed.
- Provide a durable abrasion resistant and dust-free surface.
- Appropriate levelness and flatness tolerances to support material handling systems (“MHE”)

- Balance surface texture traction with cleanability
- Flexibility to accommodate possible future changes in operations.
- Provide a safe and pleasant working environment.

FLOOR LOADINGS

Load bearing concrete slabs-on-ground face two types of loadings: static and dynamic loadings. Static loads include for example, block stacking, equipment and machinery and storage racking systems. Dynamic loadings include material handling equipment (“MHE”), and other traffic including: forklifts, pallet stackers and other vehicles.

STRUCTURAL DESIGNS AND SLAB TYPES

To ensure that the concrete floor will continue to carry its design loading successfully, it is vital to design and construct the subgrade as carefully as the floor itself. Pressures exerted on the subgrade due to loading are usually low because of the rigidity of concrete floor slabs and loads from forklifts wheels or high rack legs are spread over large areas. Thus, concrete floors do not necessarily require strong support from the subgrade. However, subgrade support must be reasonable uniform without voids or abrupt changes soften support.

Subgrade soils are considered problem soils when they are highly expansive or highly compressible such as silts and clays that do not provide reasonable uniform support. Proper classification of the subgrade soil must be conducted to avoid problem subgrades.

The classification report provides information for needed subgrade improvement measures and design parameters for the concrete slab specification.

The structural design of the concrete floor slab on-ground is dominated by the sub-grade conditions and the floor loadings. The two design options are a ground-bearing slab, or a pile supported suspended slab. If consolidation of plastic soils is determined to be a potential problem a suspended slab may be the only effective solution, in which the floor slab is built on piles or between ground beams.

Both design types can be reinforced with steel mesh or fibers or can be post-tensioned. Polypropylene macro-fiber technology is becoming more popular for ground bearing slabs.



Image: The Sika® FloorJoint S, -XS and -EX joint systems are the perfect solutions for any logistics facility floor. They are flat, noiseless and providing nearly vibration-free ride for all kind of forklifts, which spares forklift bearings and promotes smooth trafficking

JOINT DESIGN REQUIREMENTS

Warehouses and logistic centers have a high volume of vehicular traffic. In order to maintain the long-term functionality and safe operations of these facilities, unplanned concrete cracks must be minimized and repaired, while planned expansion and contraction joints must be detailed to support the traffic. Proper design of the concrete mix, use of concrete reinforcement, satisfactory curing, and appropriate joint spacing all contribute to crack prevention.

Cracking occurs when the tensile stress in a section of slab exceeds the tensile strength of the concrete. Unplanned cracks in a warehouse or logistic facility floor will quickly lead to deterioration causing safety issues and potential product damage. When cracks do occur, they must be cleaned and filled with traffic supporting semi-flexible resin.

Isolation joints design to accommodate normal structural movement are generally sealed with a highly flexible sealant. This practice will not work in warehouses and logistic facilities when the isolation joint is in a traffic pattern. A specialized joint system must be specified that will accommodate the movement and support the traffic without creating a discontinuity in the level surface.

Contraction joints, in theory, accommodate the movement created by the shrinking of the concrete slab as it cures. In practice, these joints continue to see movement due to temperature and humidity changes. These sawcut joints must be filled in areas expecting vehicular traffic. Left untreated, hard wheels will impact the joint edge leading to spalls. Similar to the treatment of cracks, traffic supporting a semi-flexible resin is used to fill these joints.

SURFACE CHARACTERISTICS

The most important and required surface property of a warehouse floor is its ability to resist wear and dusting. Today good appearance, light reflectivity color usage for aesthetics and direction control are important considerations. And the industry demands a strong floor with good abrasion resistance, chemical resistance at the same time] an aesthetically superior floor with the best colour and appearance of the warehouse and logistics facility. Sika® Chapdur (IN) is a one part, preblended, coloured mineral dry shake hardener for concrete comprising of cement, specially selected natural mineral aggregates, admixtures and pigments. Sika® Chapdur (IN) provides an extremely hard wearing and abrasion resistant topping for monolithic floors. It effectively uses the surface moisture over concrete floors and provides and efficient, economical and a performing strong wear and abrasion resistant finish.

Sika Resin and Resin Cementitious technologies for Sika Resin based systems ensures that the functional requirement of the floors is met with the use of most durable technologies ranging from the everyday medium duty Epoxy floor toppings to the more heavy duty PU and PU Cementitious performance flooring solutions some which have been in service for more than 50 years globally. Sika Ucrete: The World's Toughest Floor - Trusted since 1969. Sika Ucrete uses a unique polyurethane resin technology that gives floors exceptional resistance to aggressive chemicals, extreme mechanical and thermal shock, providing a long-term, durable flooring solution.

Sikafloor MultiDur Epoxy system with textured, smooth and broadcast-coloured finishes is a system consisting of differently designed thicknesses to provide is a solid colour, high gloss, resin-rich, seamless, epoxy floor coating system that is well-suited for medium-duty traffic areas. This general service coating system delivers an easy to maintain, smooth surface with chemical and abrasion resistance.

Rising Moisture from slab is a common issue encountered with Industrial concrete slabs due to high water table or overlooking the dampproof coarse underneath the mother slab. As a result of this, resinous floors tend to fail much faster than expected. Use of good moisture barrier provide durability to the floor topping solutions while they are laid and are being cured.

Sikafloor EpoCem Technology, a three-component epoxy modified cementitious self-smoothing screed used as a base layer beneath resinous flooring coatings provides an effective solution.

Only by providing the right combination of load carrying ability, controlling cracks, treating joints, appropriate tolerances and wearing surface performance will a warehouse floor allow the operations to be carried out as expected, with maximum efficiency and cost-effectiveness. Any defect in specification or workmanship will be exposed by the constant, demanding traffic found in these environments. Thus, the most important requirement for the floor in warehouse and logistics facilities is to provide a problem-free platform for the operations relating to functionality, durability and economy.



WE ARE SIKA

Sika is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing, and protecting in the building sector and the motor vehicle industry. Sika's product lines feature concrete admixtures, mortars, sealants and adhesives, structural strengthening systems, flooring as well as roofing and waterproofing systems.

To know more about our product solutions for the flooring of warehouses and logistics facility, [click here](#) or call us at **18002108050**

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