

1. INDUSTRIAL FLOOR SLABS ON GRADE

1.1 INTRODUCTION

The floor slab is to be a <post-tensioned><fibre reinforced><conventionally reinforced> constructed on grade to the design criteria shown on the structural drawings. The Contractor shall be responsible for the design of the slab to support the loads listed on the structural drawings. The structural drawings indicate a nominal thickness for the slab. If the Contractor intends to use a different thickness, then the Contractor shall advise the Engineer in writing prior to preparing any shop drawings.

Alternative designs will be considered but these must be from Approved Contractors experienced with this type of floor slab. All designs shall be accompanied by a Producer Statement "Design" and Producer Statement "Design Review" by an independent Chartered Engineer.

1.2 SUBGRADE AND SUBBASE PREPARATION

The Subgrade shall be formed to the levels indicated on the drawings to a levels tolerance of ± 25 mm. After construction of the Subgrade has been completed the Contractor will engage a competent Surveyor to carry out an as built level survey. A copy of these results is to be provided to the Engineer for review.

1.3 TESTING OF THE SUBGRADE

A geotechnical investigation has been carried out by <insert name of company and report reference> and a copy of the report forms part of the contract documents. The target "K" value for the subgrade of this project is $K =$ <insert value after discussing with geotechnical Engineer>. The slab design is to be based upon this value when preparing tender prices. Once the Contractor has been appointed, the K value is to be site checked in accordance with the following clauses. The slab design shall be modified if the K value varies significantly from that expected. The Contractor shall advise the Engineer within 5 days of the site testing and prior to placing any subbase.

1.3.1 Subgrades in Cut

The Contractor shall cut the site to approximately 150mm above Subgrade level and at this stage the Contractor shall arrange for the Geotechnical Engineer to carry out Benkelman Beam tests Scala tests or other approved testing to determine the actual K value of the Subgrade and provide the results to the Engineer for approval. Following approval the final trimming to subgrade level shall be completed and the as built level survey undertaken.

1.3.2 Subgrade in Fill

Where the site is to be filled then the compacted fill material will be placed up to the design subgrade level. At this stage the Contractor shall arrange for the Geotech Engineer to carry out Beam tests, Scala tests or other approved testing to determine the K value of the subgrade. Provide the results to the Engineer for approval. Following approval the final trimming to Subgrade level shall be completed and the survey undertaken.

1.4 SUBGRADE

The basecourse shall be compacted in accordance with the “Earthworks” or “Siteworks” Section of the General Specification.

The basecourse layers will suitable hardfill graded and compacted to provide a closed even surface not prone to rutting.

The top surface of the basecourse will be placed to a levels tolerance of +0mm or -10mm. A certificate and levels plan shall be provided by a Registered Surveyor engaged by the Contractor certifying that these tolerances have been achieved.

1.5 DESIGN LOADS FOR THE FLOOR SLAB

Refer drawings. The Contractor can assume for the purposes of design that the slab is not fully loaded until <90> days after casting.

1.6 FLOOR SLAB JOINTS

No opening joints in the floor will be accepted other than those shown on the structural drawings. Where joints are shown, the Contractor shall take care to form the joints carefully to maintain alignment and flatness.

1.7 CONCRETE STRENGTH

Refer drawings for minimum values.

1.8 FLOOR FINISH

The floor shall be finished as per the requirements of NZS 3114:1987 for the class of finish described on the structural drawings - however the tolerances for floor surface regularity shall be limited as per section 1.9 below.

1.9 FLOOR SURFACE REGULARITY

1.9.1 Free Movement Floors

The floor surface regularity shall be measured by a Registered Surveyor, who shall be engaged by the Contractor to provide an as-built plan of the finished slab. The survey shall be carried out within 72 hours of the floor being poured. The elevation of points of the floor on a 3 m by 3 m grid shall be measured, and the difference in elevation between all adjacent survey points calculated. Points of the floor within 1.5 m of a wall, column or other existing structure shall be excluded from the survey. The maximum allowable difference in elevation between adjacent survey points shall be limited as per the classification shown on the structural drawings and described in the table below. The floor shall be deemed to be non-compliant should more than 5% of the total number of measurements exceed the 95% limit, or any measurement exceed the 100% limit. Additionally all survey points shall be within ± 15 mm of the specified level.

Floor Classification	Typical Use	Limit in Elevation Difference (mm)	
		95%	100%
FM1	Where very high standards of flatness and levelness are required. May require strip pour techniques be used.	4.5	7.0
FM2 (Special)	Floors that will may later converted to defined movement flatness*	6.5	10.0
FM2	Buildings containing wide aisle racking with stacking or racking over 8 m high, free movement areas and transfer areas	8.0	12.0
FM3	Buildings containing wide aisle racking with stacking or racking up to 8 m high. Retail and manufacturing facilities	10.0	15.0

1.9.2 Defined Movement Floors

The floor will be constructed to the flatness requirements of DIN 15 185 (an excerpt from the standard is provided below). The floor surface regularity shall be measured by a Registered Surveyor, who shall be engaged by the Contractor to provide an as-built plan of the finished slab. The survey shall be carried out within 72 hours of the floor being poured. The survey will measure the elevation of points at 200 mm centres along the wheel tracks of material handling equipment in each aisle of the floor. The floor shall be deemed to be non-compliant should any of the elevation differences measured exceed the limits of DIN 15 185. Additionally all survey points shall be within ± 15 mm of the specified level.

Table 1. Differences in height across the driving track

	permissible difference in height h as limit value between the outer driving tracks S_p with track width S in m			
	up to 1,0 m	above 1,0 m up to 1,5 m	above 1,5 m up to 2,0 m	above 2,0 m up to 2,5 m
Truck lift height $\leq 6,00$ m	2,0 mm	2,5 mm	3,0 mm	3,5 mm
Truck lift height $> 6,00$ m and mechanized operation	1,5 mm	2,0 mm	2,5 mm	3,0 mm

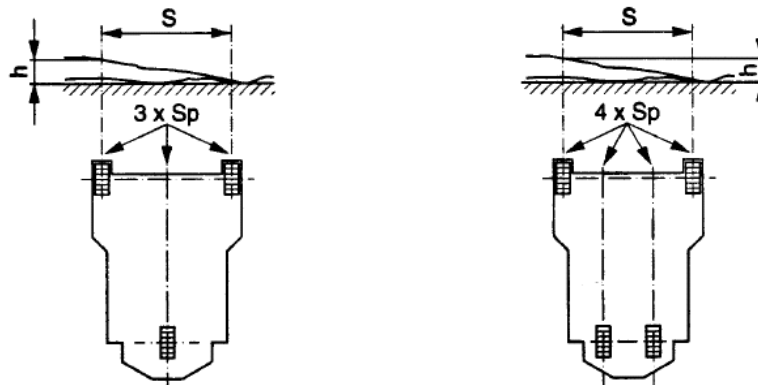


Table 2. Flatness tolerance lengthwise of the drive tracks

Fixed measure for limit values in the drive tracks S_p with distances of the measure points in m				
	1,0 m	2,0 m	3,0 m	4,0 m
for all types of application	2,0 mm	3,0 mm	4,0 mm	5,0 mm
The checking of the flatness is done according to DIN 18 202				

The remaining surface must correspond in its flatness to DIN 18 202/05.86, table 3, line 3.

1.10 NON COMPLIANCE

In the event of the floor being outside the required tolerances the Contractor has the following options for consideration by the Engineer:

- Provide certification and justification from an independent Chartered Engineer for the as built slab thickness
- Provide a remediation plan for Engineers approval. For a defined movement floor it is expected that the remediation plan will involve grinding of the floor to ensure it complies with the required tolerances.
- Provide a monetary bond to the value of at least the value of the floor slab for a period of 10 years
- Remove the slab and reconstruct to the specified thickness and tolerance.

1.11 CURING

The slab shall be water cured for a minimum of 7 days. The contractor shall provide a method statement as to how this will be achieved. Alternatively the Engineer may approve curing using a membrane forming compound that complies with the requirements of NZS 3109:1997. *<Should a membrane curing system be approved then it shall be compatible with future painted line markings on the floor.>*

1.12 CLEANING

The floor shall be thoroughly cleaned prior to handover.