

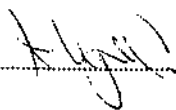
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Business Process Document

The installation of switching station slab foundation bases

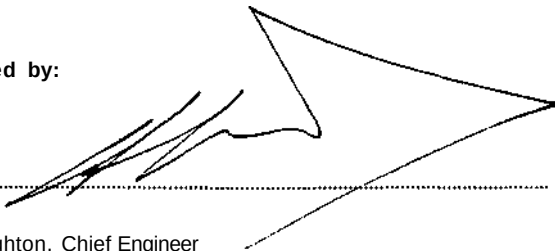
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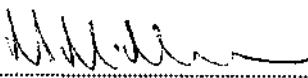
K. Lydford, Head of Electrification & Plant Engineering

Authorised by:



A. McNaughton, Chief Engineer

Accepted for issue by:



M. McManus, National Standards Manager

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1 Purpose

This guidance note describes the method of installation of concrete slab bases for switching stations.

2 Scope

All electrification switching stations for traction purposes.

3 Reference documentation

This guidance note should be read in conjunction with the following documents:-

Specification AC105	"Foundations for Overhead Line Equipment Structures".
Drawing No. I/89/802/A2	for a.c. switching stations.
Drawing No. HP/D/I8382	for d.c. switching stations.
Drawing No. I/85/807/A3	200 X 200 mesh X 2.4m steel fabric for the reinforcement of concrete.
Drawing No. HPI8645	Expansion joint in switching station slab base
BS 4800	Schedule of paint colours for building purposes
BS CP204	

4 Special requirements

Any special or particular requirements with regard to the removal of obstructions, contaminates or spoil, the re-establishment of the stability of embankments and slopes etc. will be detailed on the individual foundation cross-sections and will be completed to the satisfaction of the purchaser.

5 Ground preparation

- 5.1 The area of the foundation plinth should be excavated to a minimum depth of 300 mm below the lowest ground level, making allowance for the required formwork.
- 5.2 The area for the pathway and for a further 2 metres around should be grubbed out to a depth of 75 mm.
- 5.3 Any localised digging required to remove vegetation or obstructions in the base of the excavation should be backfilled with hardcore and rolled in to provide a compact level surface for the foundation plinth.
- 5.4 At the discretion of the purchaser, all surplus soil may be spread evenly on site avoiding any contamination of the track ballast or raising of the ground level adjacent to the plinth.

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6 Reinforcement

- 6.1 The reinforcement is to be square mesh and should be fixed firmly into position before any concrete is poured.
- 6.2 If cut panels of mesh are used the overlaps must be a minimum of 400 mm (two meshes) and firmly wired together.

7 Formwork

- 7.1 The design and construction of formwork shall be carried out taking due account of the surface finish required. The formwork shall be sufficiently rigid and tight to prevent loss of grout or mortar from the concrete at all stages and for the appropriate method of placing and compacting.

The formwork shall be sufficiently rigid to maintain the forms in their correct position, shape and profile within the limits of the design tolerance. The supports shall be designed to withstand the worst combination of selfweight and construction load caused by placing vibrating and compacting the concrete.

8 Foundations - concrete

- 8.1 The concrete used must be in accordance with Specification [ACI05](#) - Ordinary Concrete 1:2:4 mix.
- 8.2 The water content/workability of the concrete to be controlled by a slump test on site. The slump test should be within the range of 25-75mm.
- 8.3 If the concrete is to be pumped, plasticisers shall be added, provided they do not contain calcium chloride, and the slump test may be accepted up to 100 mm. (It is customary, when pumping is undertaken, to call up a special concrete mix.)
- 8.4 Concrete shall be thoroughly compacted by vibration during the operation of placing and thoroughly worked around the reinforcement. To avoid layering or cracking the whole thickness should be placed in one pass.
- 8.5 When concrete is placed at air temperature below 2°C all snow, ice and frost should be removed from the aggregates and water. The surface temperature of the concrete at the time of placing shall be at least 5°C.
- 8.6 During hot weather working the contractor shall ensure that the constituent materials of the concrete are sufficiently cool to prevent the concrete from stiffening in the interval between its discharge from the mixer and compaction in its final position.
- 8.7 Should the length of the foundation exceed 20m then an expansion joint is to be incorporated in the foundation. The construction of the expansion joint shall be as shown on drawing [HPI8645](#). The exact position of the joint shall be determined by the purchaser.

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9 Foundation - finish

- 9.1 The foundations should be compacted and tamped or power floated. Any laitance produced by this work must be removed before the final float work is done.
- 9.2 To provide a good bond to the floor screeds in D.C. switching stations, the foundation must be roughened by brushing at this stage (see 10.2 below).
- 9.3 The surface shall be free from voids, honey-combing or other large blemishes.
- 9.4 The recommended curing period is 28 days. Immediately after compaction and for 7 days thereafter concrete shall be protected, to prevent the loss of moisture from the concrete and from the harmful effects of weather, including rain, rapid temperature changes, frost and drying out.
- 9.5 The foundation should be suitably tented, in order that the concrete remains dry for the application of the surface coating or screed.

10 Installation of Unistruts and floor screed (d.c. switching stations only)

- 10.1 When the building has been erected and subsequent to installation of any necessary unistruts the floor shall be screeded to the level specified on drawing [HP/D/18382](#).
- 10.2 To secure a good bond the foundation concrete must be roughened to provide a key for the screed. This can be done either by brushing the foundation concrete when wet to expose the coarse aggregate, or by mechanical hacking of the surface when hard. Loose material must be removed and the area to be screeded soaked in water overnight. Immediately prior to the screed laying any excess water must be removed and a cement grout with a water: cement ratio at 0.35 by weight applied. The grout must not be allowed to dry before the screed is laid.
- 10.3 The screed mix must conform with [BS CP204](#) PT.2, 1970, para. 116 and must be mixed thoroughly.
- 10.4 When the screed is to be laid at air temperature below 2°C all snow, ice and frost should be removed from the aggregates and water. The surface temperature of the screed mix at the time of placing shall be at least 5°C.
- 10.5 During hot weather working the contractor shall ensure that the constituent materials are sufficiently cool to prevent the screed mix from stiffening before it is floated.
- 10.6 The whole area is not to be sub-divided into bays but is to be screened in one pass, without power floating and any laitance must be removed. Care must be taken to prevent concrete entering the unistrut channels if installed.
- 10.7 The completed screed must be closely covered with well-lapped polythene sheeting securely held at the edges for at least 7 days to prevent rapid moisture loss. After this the screed is to be allowed to dry naturally. The screed must then be protected against abrasion and impact until the floor surface is applied.

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10.8 It is important that the floor is flat and level.

The finished screed shall be subject to the following tolerances:-

Areas where circuit breakers will be installed including associated drawout areas (see enquiry document) ± 1 mm over any 1000 mm.

Remainder ± 2 mm over any 1000 mm.

10.9 The surface shall be free from voids, honeycombing or other large blemishes and shall not hold water.

11 Surface coatings

(To be applied after the foundation or screed is fully cured)

11.1 Before a surface coating is applied, the surface should be prepared and cleaned of any laitance not previously removed during the foundation installation process.

This should be done by one of the following methods:-

- a) Power grinding.
- b) Enclosed blasting.
- c) Hot compressed air

11.2 Within four hours of cleaning, the top surface of the foundation is to be coated with a primer as follows:-

- a) If the surface of the foundation has been cleaned by a hot compressed air system, then a two pack solvent free epoxy primer shall be used, or
- b) For power grinding or enclosed blasting surface preparations (these methods are unsuitable for badly contaminated concrete), the primer should either be a waterborne penetrating primer or a water dispersible primer.

The primer should be left overnight to cure, and then apply a two pack flexible solvent free epoxy at approximately 300 microns. (For d.c. switching stations use 2 coats of Eponite G.23 or similar, colour Green, code I4C35 to [BS 4800](#), see Information Leaflet No. 38. No aggregate is to be used.)

11.3 The preparation of the foundation surface and installation of the surface coating material should be carried out only by the approved firms.

All materials used are to be those as listed in Appendix A.

11.4 The sides of the foundation should not be covered with the surface coating, so as to allow the foundation to "breathe".

11.5 The foundation should remain tented to enable the surface coatings to cure correctly. Longer curing time should be allowed in cold weather. Coatings should not be applied when the temperature is less than 7°C.

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12 Paths and ballasted area

- 12.1 Paths around the building should slope away from the foundation, with a fall of 25 mm over the path width to the catchment drains, shown on the drawing.
- 12.2 Paths should be cast in a maximum of 4 m long sections.
- 12.3 Where it would be difficult and costly to provide a concrete path, e.g. the concrete may have to be pumped, a paving slab path may be installed instead, using 3 ft x 2 ft paving slabs bedded on sand.
- 12.4 A strip 2m wide all around the plinth and pathway shall have 30 mm ballast rolled in and compacted to the same depth as the pathway.

13 Drainage

- 13.1 Where specified in the enquiry document, grid and drain system shall be incorporated to collect water emanating from the down spouts of the building. The branches should be 75 mm minimum diameter and the main drain 100 mm diameter, the minimum gradient no less than 1 in 40. Rodding points shall be included at appropriate locations.
- 13.2 Depending on ground conditions, surface water drainage may have to be installed especially where the foundation is at the bottom of an embankment. This will be determined by the purchaser, once the site has been approved.

Catchment drains should be used around the edge of the path and flush with it.

14 Stairways

If stairways are required for access from track level to the switching station area, these will be specified in the procurement specification.

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Appendix A Approved materials

For two pack solvent free epoxy primer, see Information Leaflets Nos. 37, 38, 39, 41 attached hereto.

For Waterborne penetrating primer or water dispersable primer see Information Leaflets Nos. 42 and 43 attached hereto.

NOTE

Primer Colour in all cases to be 'Green'.

Approximate coverage m²/litre = 3 - 5

Approximate drying times at 20°C =

Touch dry	-	8 hrs.
Hard dry	-	24 hrs.
Full cure	-	3 - 7 days.