

ALH SYSTEMS LIMITED SERIES SIX RAIL EMBEDMENT MATERIAL INSTALLATION GUIDE

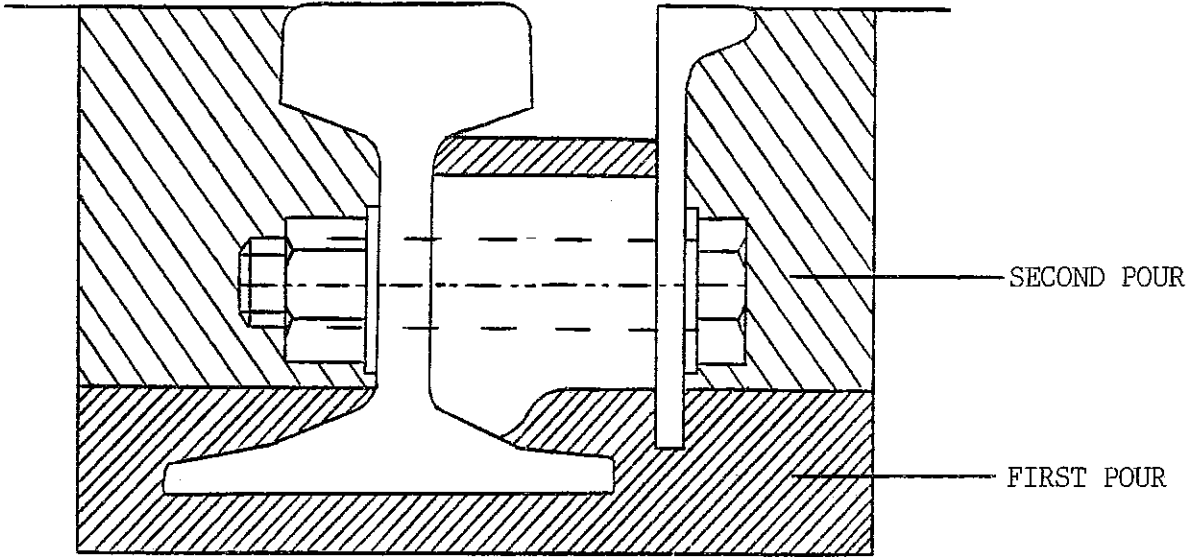


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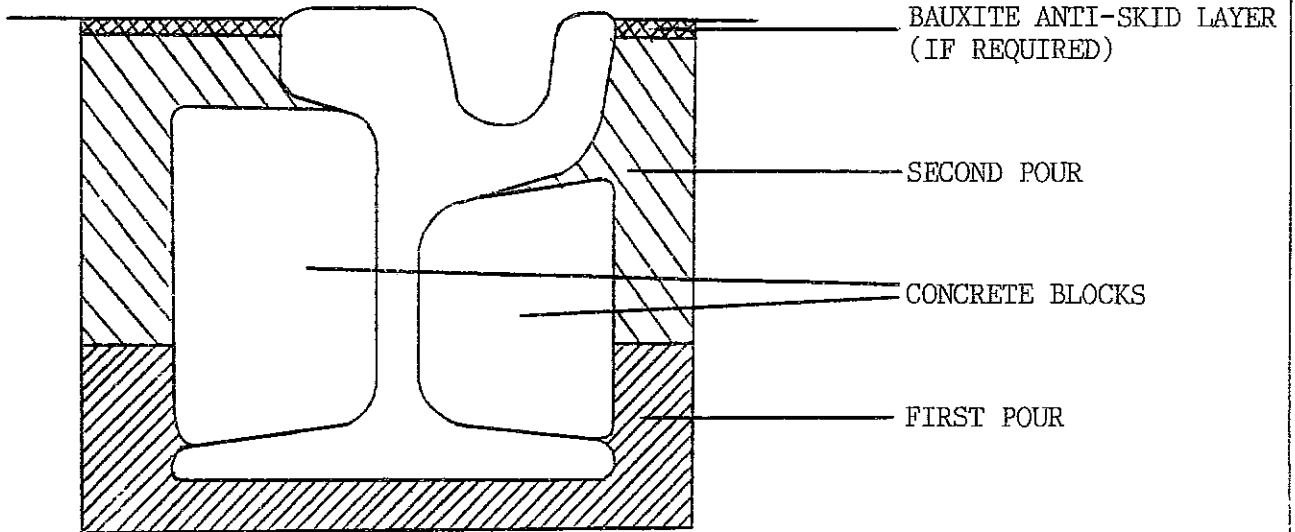
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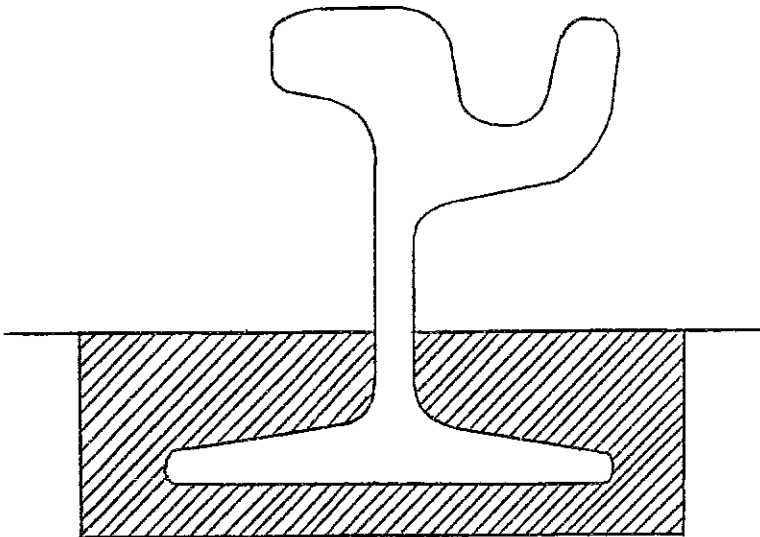
TYPICAL RAIL EMBEDMENT CONFIGURATIONS



BS80A GUARDED RAIL



SEI 35G FULL EMBEDMENT



SEI 35G FOOT ONLY

1.0 GENERAL

- 1.1. The following work shall only be carried out by specialist contractors trained by ALH Systems Limited and approved by the specifying Engineer. The manufacturer of Series 6 rail embedment material is:

ALH Systems Limited
114 Station Road
Westbury
Wiltshire BA13 4TN
England

- 1.2. Read and understand the Material Health and Safety Data Sheets for Series Six Primer, Series Six Encapsulant and Epoxy Adhesive. If in doubt seek further advice from ALH Systems Limited.
- 1.3. Series Six will not adhere to water, dust, laitance, loose rust, grease, oil or other contaminants. Ensure the concrete trough, ballast blocks and rails are free from contamination before the priming and pouring operations are carried out.

2.0 CONCRETE BALLAST BLOCKS (where applicable).

- 2.1. Pour/scrape the hardener component out of its container into the base component.
- 2.2. Mix for a minimum of 4 minutes using a low speed (500rpm) mixer fitted with a jiffy mixer paddle.
- 2.3. Ensure the rail surface and ballast blocks are dry and free from contaminants. Using a trowel or scraper apply a layer of the epoxy adhesive to the web and foot of the rail.
- 2.4. Press the concrete blocks firmly into the epoxy adhesive, a gap of 25mm (1") to 100mm (4") must be left between blocks to allow the rail to follow any required curve.
- 2.5. Clamp the blocks into place using plastic strapping or similar.
- 2.6. The concrete blocks should be applied to the rail at least 24 hours before installation.

3.0 SURFACE PREPARATION

3.1. Concrete Troughs

Surfaces to which Series 6 is required to give a long term effective bond will be mechanically prepared to provide a sound, dry, laitance and contaminant free substrate.

- 3.1.1. Series 6 should not be applied to 'green' concrete which must be allowed to cure for 14 days.
- 3.1.2. If release oil has contaminated the concrete surface this will be removed by high pressure water or steam cleaning.
- 3.1.3. The concrete surface in particular the top 50mm (2") to 75mm (3") must be mechanically prepared to removed the laitance. This can be achieved by using a mechanical wire brush, shot/grit blasting or scabbling the surface.
- 3.1.4. All debris must be removed from the troughs by vacuum or compressed air. If compressed air is used, care must be taken to ensure oil does not contaminate the prepared concrete surface or debris is not blown onto recently applied Series 6 or adjacent prepared slots.
- 3.1.5. Wet or damp concrete must be dried using hot air or a flame torch.
- 3.1.6. Protection must be provided where necessary to ensure the troughs remain clean and dry until after the Series 6 has been poured.

3.2. Steel Surfaces

The steel surfaces must be dry and contaminant free to ensure a long term effective bond.

- 3.2.1. Oil, grease or other contaminants must be removed by either high pressure water/steam cleaning or by use of a suitable degreasing solvent.
- 3.2.2. Wet or damp rails must be dried using hot air or a flame torch.
- 3.2.3. The top 50mm (2") to 75mm (3") of the rail head and or where applicable the bulb flat should be mechanically prepared by means of a mechanical wire brush or shot/grit blasting techniques.

4.0 PRIMING

4.1. Series 6 Primer is an active material which achieves its maximum strength as soon as it is touch dry, usually after 5 minutes, after 12 hours have elapsed a further coat must be applied to all accessible places, particularly the top 50mm (2") to 75mm (3") of the concrete trough, rail head and bulb flat. Shake or stir well before using.

4.2. Concrete Trough

4.2.1. Apply a suitable masking tape to the top surface of the trough with one edge aligned with the inner edge of each side.

4.2.2. Series 6 Primer will be applied by brush or roller to the inner surfaces of the trough which shall be clean, dry and free from dust and debris.

4.3. Rail

4.3.1. Series 6 Primer will be applied by brush or roller to all surfaces which will be in contact with Series 6 Encapsulant.

4.4. Priming - General Notes

4.4.1. No smoking when priming or allow smoking within a 2 metre zone around the operative priming.

4.4.2. Flame drying should be a minimum distance of 5 metres from the priming operation and the flame must be directed away from the operative priming.

4.4.3. When priming inside a protective 'tent' ensure adequate ventilation at all times.

4.4.4. Protective equipment required - rubber gloves (dipped PVC) and protective goggles or glasses.

5.0 INSTALLATION of RAILS

- 5.1. Prior to the commencement of any work the concrete trough will have been surveyed for level and line and checked against the design requirements and any remedial work carried out prior to starting track installation.

Using the above information preformed Series 6 polymer levelling pads, together with non-resilient packers will be placed in the bottom of the trough to provide an accurate system of supports for the rail.

The rails are then lowered into the trough onto the levelling pads and packers and then the level of the rail top checked against the design parameters.

Any remedial work required to be carried out at this stage by carefully lifting the rail out of the trough and changing the packers.

- 5.2. On satisfactory completion of 5.1. the rail will be aligned and held vertically using plastic wedges fitted between the edge of the concrete trough and the rail assembly.

Line, level, cant, gauge and electrical resistance of the trackwork should be accurately surveyed to comply with the design parameters.

Note: None of the above work will be carried out by ALH Systems or ALH Systems personnel.

6.0. MIXING & POURING

- 6.1. The pouring operation should take place within 12 hours of priming. If this cannot be achieved then the following procedure may be adopted. Remove all debris and water from the trough. Dry the top of the concrete trough and rail if necessary. Re-prime the top 50mm (2") to 75mm (3") of the concrete trough and rail, pour immediately.

6.2. BUCKET MIXING

- 6.2.1. Pour Base component (small can) into the Hardener component (large can) allow to drain for 30 seconds.
- 6.2.2. Mix using a high level electric or pneumatic drill fitted with an ALH plastic mixing paddle. Mix for 1 minute.
- 6.2.3. Add the required volume of granular cork using a scoop. Mix for 10 to 30 seconds. Pour immediately.

6.3. MACHINE MIXING

On large volume pours an alternative to bucket mixing is to use a fixed ratio metering, mixing and dispensing machine.

The mixing machine is fed from 200 litre drums of material. Mixing is carried out via a static mixer. The mixed material is metered into a plastic or metal bucket and the cork added as per bucket mixing.

In applications where cork is not used the mixed material is fed directly from the static mixing tube into the trough.

Machine mixing offers a lower unit cost for the Series 6 Encapsulant and reduced wastage but there is a high initial capital cost for the equipment.

6.4. POURING OPERATION

- 6.4.1. Starting at the lowest end of the section fill the spaces between the trough and rail. Pouring must be from one side only to ensure the cavity between the bottom of the trough and the rail is completely filled. Continue to pour until the resin level is just below the plastic wedges.
- 6.4.2. After 30-60 minutes when the first pour material has started to cure check level and alignment. Remove the plastic wedges.

6.4.3. Continue to pour, one side at a time until the trough is either full or if an anti skid treatment is to be used, 3-5mm ($\frac{1}{8}$ "- $\frac{1}{4}$ ") from the top of the trough.

6.4.4. When a complete fill is required the surface can be smoothed off using a suitable spatula or trowel.

After the material has been allowed to cure for 15-30 minutes remove the masking tape from the concrete.

6.4.5. If required the cavity between the rail and the bulb flat can now be filled with Series 6 Encapsulant.

7.0. ANTI SKID SURFACE TREATMENT

- 7.1.1. Allow the second pour, filled to within 3-5mm ($\frac{1}{8}$ "- $\frac{1}{4}$ ") of the top of the trough to cure for 30-60 minutes.

Mix the encapsulant as in the normal way but do not add cork.

The required quantity of bauxite is then mixed into the Series 6, for 15-30 seconds using a high speed electric or pneumatic drill fitted with a jiffy mixer paddle.

- 7.1.2. Place the bauxite filled material into the slots either side of the rail and bulb flat, trowel the surface to the required level and roll in a further dressing of bauxite ensuring this layer is pressed well into the mixed material.
- 7.1.3. After the material has been allowed to cure for 15 to 30 minutes remove the masking tape.

8.0 STORAGE OF MATERIAL

8.1. Epoxy Adhesive

Supplied in sealed plastic containers.
Store in a cool dry area (5°C-25°C) away from direct sunlight and potential sources of ignition.
Keep away from Food and Drink.

8.2. Encapsulant

Supplied in either lever lid metal containers or plastic buckets.
Store in a cool dry area (5°C-25°C) away from direct sunlight and potential sources of ignition.
Keep away from food and drink.

8.3. Primer

Supplied in 1 litre lever lid metal containers.
Store in a cool dry area (5°C-25°C) away from direct sunlight and potential sources of ignition.
Keep away from food and drink.

Note: Highly Flammable

8.4. Cork and Bauxite

Supplied in plastic or metal containers.
Store in a cool dry area (5°C-25°C) away from direct sunlight and potential sources of ignition.
Keep away from food and drink.

9.0 REPAIR TECHNIQUES

9.1 Localised Surface Damage to the Encapsulant

- 9.1.1 Remove the damage section of material to a depth of 50mm (2").
- 9.1.2 Abrade the rail and concrete surfaces using a high speed drill fitted with a suitable wire brush.
- 9.1.3 Remove all debris, dust and ensure the substrates are dry.
- 9.1.4 Apply masking tape to the edge of the concrete trough and to the rail. Prime all substrates with Series 6 Primer.
- 9.1.5 To the mixed Series 6 Encapsulant add either cork or bauxite as required and pour immediately.

Allow to cure for 15 to 30 minutes and remove the masking tape.

- 9.1.6 Rail Traffic - this operation could if required be carried out without disruption to the tram service.

Road Traffic - the time between pouring and allowing road traffic over the repair is dependent upon the ambient temperature, as a guide the following times should be used:

Ambient temperature -	0° to 5°C	> 12 hours
	6° to 15°C	> 6 hours
	16° and above	> 3 hours

9.2 Damage to Concrete Arris

- 9.2.1 Using a suitable saw, cut a slot parallel to the rail approx 75mm (3") deep and at least 20mm ($\frac{1}{2}$ ") from the edge of the existing Series 6 encapsulant, or beyond the broken concrete.
- 9.2.2 Dry the concrete surface, remove any concrete adhering to the Series 6 encapsulant and abrade with wire brush.
- 9.2.3 Apply masking tape to the edge of the concrete trough. Prime all substrates with Series 6 Primer.

- 9.2.4. Mix and pour Series 6 (with or without cork or bauxite) into the slot.

9.3. Rail Removal

- 9.3.1. Saw cut through the concrete trough either side of the Series 6 encapsulant to a depth equal to that of the trough depth and cut through the rail. Using suitable lifting equipment, lift the rail out of its trough starting at one end and working along the length to be removed.
- 9.3.2. Remove all traces of old Series 6 material from the bottom of the trough using the techniques described in Section 3.1.

Replacement is as for new rail.

9.4. Track Welding

Where the track has to be welded during the installation operation or during replacement a distance of 500mm (20") must be left either side of the weld and Series 6 encapsulated rail.