

Cement Asphalt Mortar (CAM)



1. Scope of use and purpose:

- Filling material under track slab of slab track.
- Filling material between track slab and reinforced concrete anchor in tunnel sections.

(for section longer than 200m from the tunnel portal)

2. Features:

Mixed mortar made of both cement and asphalt with appropriate elastic modulus and vibration absorption.

Abstract of CAM for Slab Track of MAHSR

CAM standard composition

No.	Materials	JIS	Requirements
①	Asphalt emulsion A	JIS K 2208	
②	Polymer emulsion	JIS Z 8802 JIS K 5600 JIS K 6387 JIS K 2208 JIS K 6387	
③	Water	—	Water that does not contain harmful quantity of oil, acid, salts or other organic substances which can adversely affect the quality of CAM shall be used.
④	Fine aggregate	JIS A 1102 JIS A 1103 JIS A 1105 JIS A 1109 JIS A 1137 JSCE	Sand shall be normal, hard, and durable. It shall not contain a harmful quantity of dirt, mud, or other organic substances. Natural sand (from river or mountain) or artificial sand (silica sand etc.), which passes a screen 95% having a mesh size of 2.5mm shall be used.
⑤	High-early strength cement	JIS R 5210	
⑥	Ad-mixture	—	An expansive admixture for cement, which is mainly composed of calcium sulfur aluminate ($3\text{CaO} \cdot 3\text{Al}_2\text{O}_3 \cdot \text{CaSO}_4$)-based minerals with a small amount of high-polymer materials and inorganic salts, or a lime-based expansive admixture for cement shall be used.
⑦	Aluminum in powder	JIS K 5906	JIS K 5906 Type-2 standards shall be used.
⑧	Anti forming agent	—	Silicon-based antifoaming agent shall be used.
⑨	Air Entrainment (AE) agent	—	AE agent brings entrained air (closed-cell microbubble approximately less than $200\mu\text{m}$) into concrete and improves the resistance to frost damage.

Abstract of CAM for Slab Track of MAHSR

CAM Technical Requirements

Materials	Test Item	Standard value	Time & Frequency	Test Method
Fine aggregate	Surface water content	—	<ul style="list-style-type: none"> • Twice in the morning and in the afternoon. • If silica sand is used, measurement can be omitted. 	JIS A 1111
CAM	Mixing temperature	5~40°C	<ul style="list-style-type: none"> • Immediately before injection / pumping. 	Measure using a thermometer
	Flow time	16~28 Seconds	<ul style="list-style-type: none"> • Immediately before injection / pumping. 	JSCE-F521
	Air content	8~12%	<ul style="list-style-type: none"> • Immediately before injection / pumping. 	JIS A 1128
	Bleeding ratio	0%	<ul style="list-style-type: none"> • Twice at first injection and after 24 hours. 	JIS A 1123
	Expansion ratio	1~3%	<ul style="list-style-type: none"> • Twice at first injection and after 24 hours. (within 20 minutes after adding aluminum powder) 	JSCE-F522
	Compressive strength	Material age 01 day : 0.1 N/mm ² 07 day : 0.7 N/mm ² 28 day : 1.8 N/mm ²	<ul style="list-style-type: none"> • Once a day at the first injection; 1st day, 7th day and 28th day. • Cylinder test piece with $\Phi 50\text{mm}$ and H50mm. • Loading rate 1mm/min. 	Test Method for Slab Track issued by JR TT



Flow time



Air content



Bleeding ratio



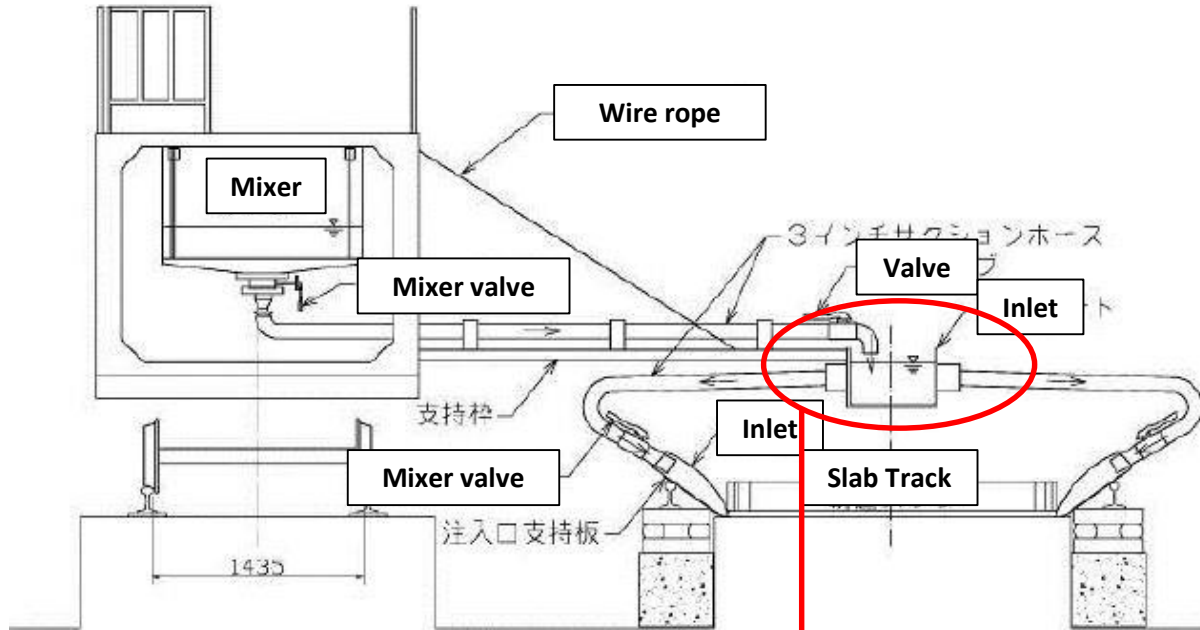
Expansion ratio



Compressive strength

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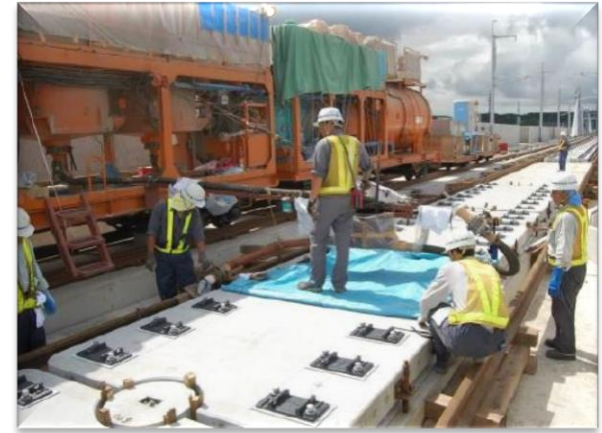
Placement of injection work instruments



CAM plant car

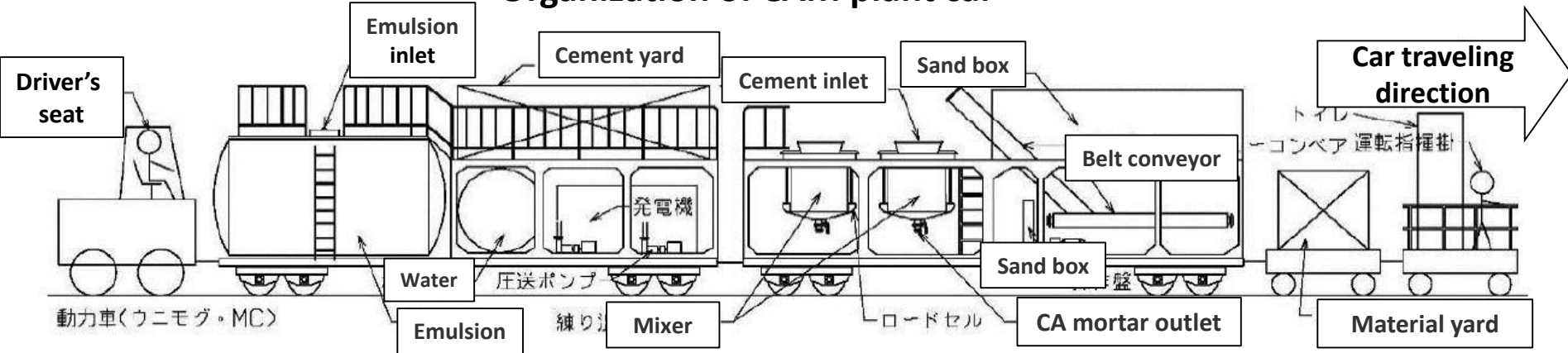
CAM injection for under track slab

CAM pouring around reinforced concrete anchor in tunnel section



Abstract of CAM for Slab Track of MAHSR

Organization of CAM plant car



CAM standard composition : Quantities per 1m³ of CAM

(Unit: kg)

Asphalt emulsion	Polymer emulsion	Water	Fine aggregate	High-early strength cement	Ad-mixture	Aluminum in powder	Anti forming agent	AE agent
441	63	63 or less	630	284	32	0.041	0.158	7.9

