

Patching

Sample Construction Specification Guideline

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1. Scope

The scope of this sample construction specification guideline is limited and intended to provide general information regarding the design, component material specification, application, inspection, measurement, and payment of cold mix patching.

2. Description

Cold Mix Patching is an application of asphalt-coated aggregate. The cold mix is typically produced through a pug mill or asphalt plant and stored in a stockpile. Cold Mix Patching is used to repair defects such as potholes and larger areas of distress to maintain the safe flow of traffic and to prevent further distress.

3. Materials

The Cold Mix Patching mixture shall consist of aggregate and asphalt emulsion residue.

4. Material Specification

4.1 Asphalt Emulsion

The asphalt emulsion used in the manufacture of the cold mixture shall be designated RM-90 and shall comply with the following specifications. Asphalt emulsion delivered to the project shall be accompanied by a laboratory Certificate of Analysis and any other certifications as deemed necessary or advisable.

Property	Test Procedure	Specification	
	AASHTO	Min	Max
Tests on Emulsion			
Flash Point, Tag Open Cup, °F	T79	200	-
Viscosity, Saybolt-Furol, 140°F, seconds	T59	100	-
Tests on Residue From Distillation to 500°F			
Residue by Distillation, %, weight	T59	80	-
Water Distillation, %, volume	T59	6	-
Tests on Residue From Distillation to 680°F			
Oil Distillate, %, volume	T78	2	-
Solubility, %	T44	97.5	-

4.2 Aggregate

The aggregate shall meet the requirements of ASTM Section 800 and meet the gradation of a size 78 or 89.

5. Equipment

5.1 General

Vehicles and equipment capable of handling and transporting the cold asphalt mixture from the stockpile location to the repair site such as a standard bucket loader and an asphalt mix haul truck.

5.2 Pothole Repair

- 5.2.1 – Tools necessary to remove debris and standing water include air compressors and other equipment.
- 5.2.2 – Tools necessary to transfer and compact the cold mix into the pothole include items such as shovels and hand tamps.
- 5.2.3 – Tools necessary to clean and remove excess mix prior to opening to traffic include push brooms and shovels and other ancillary items.

5.3 Paver Application

- 5.3.1 – Self-propelled, four-wheeled rotary mechanical brooms capable of operating in both forward and reverse is recommended. Brooms should be checked to ensure they are in good condition and meet applicable environmental requirements.
- 5.3.2 – Asphalt mixture haul trucks.

5.3.3 – Asphalt paving machine capable of laying cold mixture and controlling depth of application as well as grade.

5.3.4 – Steel wheel roller – Minimum 10 ton (9.1 metric tons) capable of adequately compacting the cold asphalt mixture.

5.4 Blade Application

5.4.1 – Asphalt mixture haul trucks.

5.4.2 – Motorized grader or roadway maintainer capable of shaping cold mixture and controlling grade.

5.4.3 – Steel wheel roller – Minimum 10 ton (9.1 metric tons) capable of adequately compacting the cold asphalt mixture.

6. Design

A design indicating the amount of asphalt emulsion required to properly coat the aggregate will be performed by a qualified laboratory. The following tests will be performed, and the results at three levels of asphalt emulsion in 0.5% increments will be included in the design.

6.1 Penn Dot Bulletin 25

- (a) A minimum of 97% coating is required with the following notes and exceptions to the test method. Begin procedure at section 4.1.1.3 for unwashed stone and hand mixing.
- (b) Heat the mixture to the intended manufacturing temperature. Mixes manufactured through the hot mix plant are heated to 160°F-210°F (71.1°C-98.9°C). Mixes manufactured in a pug mill are mixed at room temperature.
- (c) Heat the emulsion to 140°F or 160°F (60°C-71.1°C).
- (d) Use tap water instead of distilled (typically less than 3%).
- (e) Use 400 g of aggregate for each mixture.
- (f) Do not submerge the cold mix material in water to evaluate coating.
- (g) Evaluate drain down at 0, 2, and 24 hours. No drain down is permitted.
- (h) Drain down is evaluated by placing the entire batch into a one-pound loaf pan and allowing the material to sit undisturbed at room temperature.
- (i) Remove the mixture from the loaf pan and visually assess the pan. More than one contact spot with connected spots constitutes drain down, indicating that too much asphalt was added to the mix.

6.2 Tex DOT 530-C

Evaluate the mix for striping. No visual evidence of striping is allowed when performing Method Tex DOT 530-C with the following exceptions and notes:

- (a) Make several mixes and optimize based on asphalt content, water content, mixing temperature, and emulsion temperature.
- (b) Evaluate mixes at two hours and 24 hours.
- (c) Do not oven cure the materials. Allow them to stand on the counter at room temperature for 24 hours.
- (d) Do not use a hot oil bath. Use a hot plate and 1 QT (0.95 L) cans.
- (e) Skip to section 4.5 of Tex DOT 530-C.
- (f) Set hot plate temp and place the metal can (with 700 ml of water) on the hot plate. Bring water to a boil.
- (g) Pick up test method at 4.5.4, with the oil bath being replaced by a hot plate.

7. Weather

Cold Mix Patching shall not be placed when rain is likely to occur. Ambient and pavement temperature shall be minimum 40°F (4°C) and rising before beginning application.

8. Traffic Control

Prior to start of the project, a traffic control plan shall be developed to address all aspects of traffic control, including without limitation, coordination with local officials and traffic control equipment and methods. The traffic control plan is intended to promote controlled traffic flow through the project in order to protect the safety of the contractor and owner personnel, the public, and the product. The traffic control plan shall remain in place until the product has sufficiently compacted to withstand traffic without damage. Any damage to the newly applied Cold Mix Patching due to the premature release of traffic shall be repaired to the satisfaction of the agency at the contractor's expense.

9. Surface Preparation

Immediately prior to beginning the Cold Mix Patching, the pavement surface shall be cleared of all loose material, standing water, silt spots, vegetation, and other objectionable material. The agency shall approve the surface preparation prior to Cold Mix Patching.

10. Application

10.1 Pothole Repair

The cold patching mixture is placed into the prepared pothole by hand until slightly overfilled. Using a hand tamp or steel wheel roller, compact the mix thoroughly to achieve a solid patch capable of withstanding the forces of traffic. Add and compact additional mixture as necessary to achieve a final surface that is level with the surrounding pavement. Remove excess material from the area prior to opening to traffic.

10.2 Paver Application

The cold patching mixture is introduced to the asphalt paver in a similar manner to a typical paving operation. The depth and final grade of the material shall be controlled by the paver according to the plans. Compaction is achieved by using a steel wheel roller(s) in a pattern established and approved by the agency during initial application.

10.3 Blade Application

The cold patching mixture is placed on the intended surface and spread to the desired depth and grade as listed in the plans by use of a motorized grader or roadway maintainer. Compaction is achieved by using a steel wheel roller(s) in a pattern established and approved by the agency during initial application.

11. Material Storage and Handling

The Cold Mix Patching material shall be maintained in a stockpile and protected from contamination from foreign materials and excessive dust. A firm surface or constructed pad is required to build a stockpile upon. When new material is brought into the stockpile area, assure material of significant age difference is segregated using the oldest material first. When storing over an extended period of time, do not mix or turn over the stockpile.

12. Inspection

Assure all equipment is functional and in good working order. Assure material is fully compacted prior to release of traffic. Assure smaller areas such as potholes are filled and compacted flush with the surrounding pavement surface. For paver and blade applications, verify application rate in lb/yd² meets plan requirements. Assure traffic control plan is in use.

13. Quality Control

The cold patch mixture delivered to the project shall be certified by the manufacturer of the mix as to the asphalt content and the gradation of the aggregate used. Retain a five (5) gallon bucket of mix representative of that supplied to the project until six (6) months after successful completion of the project. Testing of the retain sample or any representative sample of the supplied mixture may be completed by a qualified laboratory at the expense of the agency.

14. Measurement

Cold Mix Patching shall be measured by the weight in tons (metric tons) of mixture placed.

15. Payment

Payment shall be in consideration of all materials, tools, labor, and other items necessary to complete the project as required by the plans. Cold Mix Asphalt Patching shall be paid for by:

- Total tons (metric tons) of mix used on the project