RANDOM CRACK SEALING – POLYMER & CRUMB RUBBER MODIFIED ASPHALT COMPOUND WITH REINFORCING FIBERS

1. SCOPE OF WORK

The work covered by this section of the specification consists of furnishing all plant, labor, equipment and materials necessary to perform all operations in connection with the cleaning and sealing of construction and random cracks in bituminous concrete pavements, including vegetation removal and sterilization of cracks, where necessary.

2. MATERIAL

Crack sealant shall be a modified asphalt-fiber compound designed specifically for improving the strength and performance of the parent asphalt sealant.

(a) The asphalt binder shall consist of a blend of neat asphalt binder, chemically modified crumb rubber (CMCR), and a polymer package, all of which meet the following specifications:

- The binder will meet PG 64-28E requirements after modification including:
  - PG grade requirements of AASHTO M320
  - Requirements of AASHTO TP70/MP19
- Modification, at a minimum, shall consist of 7% crumb rubber, and the maximum particle size for the recycled tire rubber shall be 80 mesh (#80 sieve)
- The asphalt supplier shall provide testing for both the neat and modified asphalt binders
- See below for typical modified test results for 64-28E with crumb rubber:

DSR ORIGINAL

- kPa >1.00 @ 64° C. Fail temp = 76+° C

DSR RTFO

- kPa >2.20 @ 64° C. Fail temp = 76+° C

MSCR

- JNR (MSCR unit of measure): 3.2 E <0.5% @ 64° C
- R3200 (Average % Recovery): >70%

DSR PAV

- kPa <6000 @ 64° C

BBR

- Stiffness <300 @ -18° C. M-Value >0.300 @ -18° C

(b) Fiber reinforcing materials shall be short-length polyester fibers having the following properties:

Length*	0.25 in. ± 0.02 in.
Elongation at Break (ASTM D2256-90)	35% ± 3%
Melting Point (ASTM D3418-82)	>475 degrees F (246 degrees C)
Crimps/Inch (ASTM D3937-90)	None
Cross Section	Round
Denier (ASTM D1577-90)	4.5 Nominal dpf
Tensile Strength (ASTM D2256-90)	>70,000 psi
Diameter	0.0008 in. **
Specific Gravity (ASTM D792-91)	1.32 to 1.40

* At temperatures ranging from ambient to maximum finished product mix temperature
** Subject to Normal Variations

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The modified asphalt-fiber compound shall be mixed at a rate of 8% fiber weight to weight of asphalt cement. This compound having the same chemical base provides compatibility and exhibits excellent bond strengths. The fiber functions to re-distribute high stress and strain concentrations that are imposed on the sealant by thermal sources, traffic loading, etc.

3. EQUIPMENT

Equipment used in the performance of the work required by this section of the specification shall be subject to approval by the Owner, and maintained in a satisfactory working condition at all times.

(a) Air Compressor: Air compressors shall be capable of furnishing not less than 100 cubic feet of air per minute at not less than 90 lbs. per square inch pressure at the nozzle. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water.

(b) Manually operated, gas powered air-broom or self-propelled sweeper designed especially for use in cleaning highway and airfield pavements shall be used to remove debris, dirt and dust from the cracks.

(c) Melter: The unit used to melt or maintain the crack sealant compound at the recommended application temperature shall be the indirect fired type. It shall be equipped with a remote heat exchanger and hot oil circulation pump capable of maintaining a consistent temperature of the heat transfer oil. The heat transfer oil shall be circulated to all sides and the bottom of the vat containing the crack sealant compound making a continuous loop back to the heat exchanger and having a flash point of not less than 600 degrees F. The melter shall be equipped with a satisfactory means of agitating the crack sealant at all times. This may be accomplished by continuous stirring with mechanically operated paddles and/or by a circulating gear pump attached to the melter. The melter must be equipped with a thermostatic control calibrated between 200 degrees F and 550 degrees F, and must be capable of pumping an 8% fiber content blend.

4. PREPARATION OF CRACKS

(a) Debris and Vegetation Removal: All cracks shall be blown clean and sterilized by use of a propane air torch generating 2,000 degrees F and 3,000 feet/second velocity to eliminate all vegetation, dirt, moisture and seeds. All debris removed from the cracks shall be removed from the pavement surface immediately by means of a power sweeper, hand or air broom.

(b) General: No crack sealant material shall be applied in wet cracks or where frost, snow or ice is present, nor when the ambient temperature is below 25 degrees F.

5. PREPARATION AND PLACEMENT OF SEALANT

(a) The asphalt-fiber compound shall be thoroughly mixed for a minimum of one hour before application can begin. To ensure a uniform fiber distribution in the sealant, and also to limit fluctuations in the application temperature of the blended material, the contractor must have a full melter kettle of sealant mixed, heated to the proper application temperature, and ready for testing at the start of each work day. Once that batch of sealant is emptied from the melter kettle, crack sealing operations will cease for the remainder of the day. No new materials will be allowed to be added to the melter kettle during the work day under any circumstances. Minimum application temperature shall be 320 degrees F.

(b) Sealant shall be delivered to the pavement cracks through a high pressure hose line and applicator shoe. Diameter of the applicator shoe is not to exceed 3.5 inches. Once the pavement cracks are sealed, the width of the sealant on the pavement (overbanding) shall be no greater than 3 inches. When traffic requires immediate use of the roadway, a boiler slag aggregate shall be broadcast over the cracks to prevent the sealant from being picked up.

RANDOM CRACK SEALING – POLYMER & CRUMB RUBBER MODIFIED ASPHALT COMPOUND WITH REINFORCING FIBERS

6. WORKMANSHIP

All workmanship shall be of the highest quality, and any excess of spilled sealant shall be removed from the pavement by approved methods and discarded. Any workmanship determined to be below the high standards of the particular craft involved will not be accepted, and will be corrected and/or replaced as required by the Owner.

7. PERFORMANCE

(a) It is the intention of the Owner not to award a contract for this work under this or any other proposal if the bidder cannot furnish satisfactory evidence that he has the ability and experience to perform this class of work, and that he has sufficient capital and equipment to enable him to prosecute the work successfully and to complete it within the time named in the contract. The Owner reserves the right to reject this or any other proposal, or to award the contract as is deemed to be in the best interest of said Owner

(b) To ensure contractor's capabilities, the bidder shall provide with his bid evidence that at least two (2) of the company's crack sealing field supervisory personnel have completed AASHTO TSP2 training, and successfully passed the Crack Treatment certification exam administered by the National Center for Pavement Preservation (NCPP). During completion of the work, contractor will be required to have at least one (1) AASHTO TSP2 Crack Treatment certified employee assigned to the job and present at all times when crack sealing work is being performed.

(c) Properly formulated and mixed asphalt fiber compound overbanding shall not be greater than three inches (3") in width. Penalties will be imposed upon the contractor for overbanding beyond three inches (3").

(d) The contractor must submit the following with his bid proposal:

- A list of six (6) jobs which he has successfully completed with the polymer and crumb rubber modified asphalt compound with reinforcing fibers specified herein, giving the name and address of these projects so they can be investigated prior to the award of the contract.
- The trade name of the crack sealant the bidder intends to use.
- The manufacturer of the crack sealant the bidder intends to use.

(e) The Owner will require the contractor to successfully perform a 200 foot test strip in the field prior to commencing work under the contract.

(f) Manufacturer's certificate of material compliance will be furnished to the Owner certifying conformance to the above material specifications, including the following:

- Performance Grade of Unmodified Asphalt: **PG 64-28S** (standard)
- AASHTO M-320, Table 1
- 7% chemically-modified crumb rubber (CMCR)
    - Composed of 100% 80-mesh recycled tire rubber
- 3-4% specially formulated polymer package
- Performance Grade of Modified Asphalt: **PG 64-28E** (able to withstand "extremely heavy" traffic loads)
- AASHTO M-320, Table 1

- "E" Jnr 3.2 kPa @ 64^0C: **<0.5%**
- R3200 (Average % Recovery) @ 3.200 kPa: **>70%**

- 8% polyester reinforcing fibers

(g) Time is of the essence in the completion of this work in order to minimize disruption to the traveling public, and to reduce the Owner's cost for police details and inspections of the work in progress. Accordingly, bidders shall submit with their bid the volumetric capacity (in gallons) of the melter kettle proposed to perform the work, together with a statement regarding their average anticipated daily production rate or range of gallons per day of material expected to be applied. The Owner reserves the right to consider its costs for traffic control and inspections in addition to contractor's bid prices to determine the proposal with lowest overall costs.

8. MEASUREMENT AND PAYMENT

(a) The unit of measure for the work may be any of the following:

- Gallon
- Pound
- Linear Foot
- Square Yard
- Day
- Lump Sum

The unit of measure will be determined by the awarding authority and set forth in the bid documents. Payment shall be at the unit price bid in the proposal and shall be full compensation for furnishing, preparing, placing the material specified and furnishing of all labor, equipment and incidentals for the satisfactory completion of this item.