Item C423 - Crack Sealing (With Recycled Tire Rubber)

C423.1 Description. This item shall consist of performing all operations and furnishing all labor, equipment and materials for cleaning and sealing longitudinal and transverse joints and miscellaneous cracks in the pavement with a job blended Type II hot-applied fiberized joint and crack sealant material modified with recycled tire rubber in accordance with this specification. Additionally, a black sand aggregate shall be applied to the freshly applied material on all major thoroughfare streets, but not necessarily on streets to receive an asphalt overlay.

C423.2 General Requirements. The joints and cracks described above will be sealed using an asphalt sealant reinforced with polyester fiber and ground rubber to provide a stress absorbing membrane to prevent water penetration and to provide firm adherence to the existing pavement. The sealant shall be applied in a one-step operation in which a hot (350°F) sealant at high pressure (100 psi max.) is placed directly into and over the joint or crack. Joints and cracks and immediate adjacent pavement are to be cleaned by air blasting before application of the sealant. The aggregate sand shall be spread over the freshly applied material in a manner selected by the Contractor with final approval of the method by the City. Excess sand as well as all debris shall be cleaned from the street once the sealant has cured.

C423.3 Materials and Composition

C423.3.1 Asphalt

PG64-22 (standard paving grade liquid asphalt)

C423.3.2 Polyester Fibers

5.0% (plus or minus) 0.5% by weight of the asphalt

Table 3.2-1 Fiber Requirements

Material	Polyester Fibers
Denier (ASTM D 1557*)	3.0 to 6.0
Length, inch	0.25 (plus/minus) 0.02
Crimps (ASTM D 3937	None
Tensile Strength, min psi (ASTM D 2256*)	70,000 psi
Specific Gravity	1.32 to 1.40
Min Melting Temperature	475F
Ignition Temperature	1000F min

Recycled fibers <u>are not</u> permitted.

*This data must be obtained prior to cutting of the fibers.

The manufacturer of the fiber shall furnish certified test data to the Laboratory, or at the request of the Laboratory. A letter of certification stating that the material complies with specification requirements shall be furnished with each shipment. The Contractor shall furnish the manufacturer's certification to the City.

The material shall be combined so that the fibers shall be 7 percent by total weight of the asphalt cement. The combined materials shall meet the following properties:

Strength (@ break)	at 72 F	350 psi min
	at 0 F	500 psi min.
Elongation (@ break)	at 72 F	50% of min.
	at 0 F	20% of min.

C423.3.3 Recycled Tire Rubber. 5.0 % (plus or minus) 0.5% by weight of asphalt.

Material shall be ground tire rubber, or approved equal, with 100 percent of the material passing the No. 20 sieve and 95-100 percent passing the No. 30 sieve. The rubber material shall be reasonably free of excess fabric, wire or other contaminating materials (total of 0.5 percent by weight) except that up to 4 percent calcium carbonate may be included to prevent the rubber particles from sticking together. Project blended rubber-asphalt mixture shall be approved by the Engineer prior to application.

The manufacture shall furnish certification that the recycled tire rubber furnished meets the above specification. The Contractor shall furnish this certification to the City.

C423.3.4 Aggregate Sand. To be spread over all applied material on major

thoroughfares,
But not necessarily on streets to receive an asphalt overlay.

Aggregate sand shall be a fused Ferro-Alumina-Silicate of complex composition (commonly termed as coal slag or wet bottom boiler slag). The material shall be free of clay and organic matter. The material shall be of a consistent chemistry and specific gravity to provide high breakdown resistance. The aggregate sand shall meet the following requirements:

Table 3.4-1 Aggregate Sand Specification

Particle Shape	Rough, Fractured and Angular
Free Silica	< 1%
Hardness	6 to 7 on the Mohs Scale
Color	Black
Moisture Content	< 0.5%

Table 3.4-2 Aggregate Material Size:

Sieve Size	Percent Passing
No. 4	100
No. 6	100-98
No. 8	100-85
No. 12	53-25
No. 16	90-65
No. 20	100-90

C423.4 Equipment. All equipment, tools, and machines used in the performance of this work shall be maintained in satisfactory working order at all times. The unit shall be equipped with all lights necessary for safe and legal operation on public roads.

The material shall be blended in a double walled oil-jacketed vat equipped with an agitator (reversing rotary auger action) and separate thermometers for the oil bath and the blending vat. A 2- inch re-circulating pump is required to provide circulation of the material when not applying crack sealant. The unit shall be capable of mixing 3000-pound minimum batches of material. The temperature of the material shall be maintained between 340 and 360°F. Automatic temperature controls and an automatic safety shutoff system shall be used.

Dial-type temperature gauges shall be mounted to allow monitoring of the temperature of the product in the tank and the heating oil. The unit shall also be equipped with gauges that measure the volume of material in the vat. If the unit does not have gauges, the City will require weigh tickets to verify the amount of AC used so that the specified weights of fiber and ground tire rubber tire may be determined.

C423.5 Surface Preparation. The surface shall be thoroughly clean and dry when the sealant is applied. All cracks to be sealed shall be cleaned with compressed air and free of vegetation, loose dirt and moisture. The air compressor shall be able to deliver a minimum of 100 psi. Old sealant which protrudes above the pavement surface shall be removed. Cleaning work is to be done concurrently with the application process.

A propane fired hot air lance may be required when the cracks exhibit excessive oxidation of the surface, when there is moisture on the surface, or when cracks exhibit latent moisture.

Sealing shall be limited to cracks that are open enough to permit entry of the sealant. Tightly closed cracks (less than 1/4 inch) shall only be sealed if they show signs of raveling or spalling. Cracks greater than 1 inch shall be filled with hot-mix asphalt and then sealed as directed by the City Engineer.

C423.6 Application

1. After the fibers have been added to the PG64-22, it shall mix for a minimum of 5 minutes or until a uniform mix of fibers, ground rubber and PG64-22 is produced. Operating temperature shall be 340 to 360 degrees F in order to produce a smooth flowing mixture. At no time shall the operating temperature exceed the fibers melting temperature.

2. The sealant shall be applied centered over the crack. After compaction, the thickness of the membrane shall be 1/8" (plus/minus) 1/16" and the width shall meet the following requirements:

	Transverse	Longitudinal
Over Portland Cement Concrete	8"	6"
Over Asphalt Concrete	3-5"	3-4"

3. When traffic or temperature conditions dictate, wet the material with water and/ or dust the sealant with a light coat of aggregate sand to prevent tracking or pick-up.

4. Sealant shall be rolled with a water-wetted steel roller if the pavement is to be overlaid within two days. Any damage incurred before placement of the overlay is to be repaired to the satisfaction of the City Engineer.

5. The street shall be cleaned of any loose material blown out from the cracks and any excess sand or fine aggregate as directed by the City Engineer. Care shall be taken to keep any loose material from being deposited in yards or on drives.

6. If a tack coat is to be applied over the sealant, the tack coat must be allowed to cure completely before any paving operations commence. Use of cutbacks for tack coat shall not be permitted.

7. It is the intent of the City that the crack seal be applied in such a manner that the end result is neat in appearance. The material is to be applied to the crack and pavement surface with specially designed applicator heads which are round and concave. The diameter of these heads shall be 4 inches. The applicator wand is to be equipped with a material shutoff control operated by the applicator. This control is necessary for a neat job and prevents excess material from being applied. The cost for this portion of work shall be included in the unit cost for the crack sealant.

C423.7 Traffic. Traffic shall be maintained at all times. One lane shall remain open to traffic while the remainder of the street is being sealed. On heavily traveled roads, work hours may be limited between the hours of 8:30 A.M and 3:30 P.M. Flaggers shall be employed to direct traffic around the work area. If at any time the traffic control becomes unacceptable, the City will stop the work until the deficiencies are corrected. All traffic control devices shall conform to the Ohio Manual of Uniform Traffic Control Devices, latest edition. Any damage to the uncured sealant shall be repaired by the Contractor at no cost to the City. Payment for traffic control shall be included in the price bid for the sealant.

C423.8 Weather Limitations. Sealing shall not be performed when the surface temperature is below 40 degrees F. No material shall be applied while the surface is wet nor when the impending weather conditions are such that proper curing may not be obtained.

C423.9 Measurement and Payment. The quantity of sealant, complete and accepted in place, will be measured in pounds. Final payment for the work will not be made until all load tickets and inventories are verified to assure that specification quantities have been applied. In the case of a dispute, the judgment of the City Engineer shall be final.

The price bid for this work shall include all labor, equipment and material necessary for the placing of the fiber reinforced crack sealant according to these specifications; cleaning the joints and cracks; cleaning the roadway of all loose materials created by the blowing out of the cracks or from dusting of the material with fine aggregate; repair of joints and cracks in excess of 1" in width as directed; and traffic control.

Payment for accepted quantities will be made at the contract price for:

Item	Unit	Description
C423	Pound	Crack Sealing, Type II, Residential
C423	Pound	Crack Sealing, Type II, Mains