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REPUBLIC OF THE PHILIPPINES  
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS  
OFFICE OF THE SECRETARY  
MANILA

097.130PW4  
10-16-2014

OCT 16 2014

DEPARTMENT ORDER )

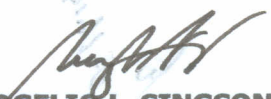
No. 110 )

Series of 2014 )

SUBJECT : DPWH Specification on the Use of  
Elasto Barchip – Synthetic Fibers in  
Portland Cement Concrete  
Pavement

In line with the continuing efforts to upgrade the construction technology thru adoption of successful research studies, this Department has approved the use of Elasto Barchip – Synthetic Fibers as additive to concrete subject to its specifications hereto attached. A Certificate of Conditional Approval has been issued by this Department, allowing the use of Elasto Barchip – Synthetic Fibers in DPWH projects from October 2014 until October 2019.

This Order shall take effect immediately.

  
**ROGELIO L. SINGSON**  
Secretary

Department of Public Works and Highways  
Office of the Secretary



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## **SPECIFICATION ON THE USE OF ELASTO BARCHIP – SYNTHETIC FIBERS IN PORTLAND CEMENT CONCRETE PAVEMENT**

### **1.0 Description**

This item shall consist of furnishing and placing of Elasto Barchip – Synthetic Fibers in Portland Cement Concrete Pavement, with or without reinforcement, constructed on the prepared base in accordance with this specification and in conformity with the lines, grades, thickness and typical cross-section shown on the Plans, or as established by the Engineer.

Elasto Barchip – Synthetic Fibers is an additive to Portland Cement Concrete Pavement to create concrete composites that are more durable than plain concrete. It can provide improved flexural ductility and toughness, fatigue capacity, and abrasion and impact resistance. It impedes crack development and slows crack growth, while it also provides increased load capacity in pavements that have already cracked. It can be used in areas prone to flooding and where traffic volume is heavy. It can also reduce spalling at contraction joints by keeping them tighter and more stable than the regular PCCP.

### **2.0 Material Requirements**

#### **2.1 Elasto Barchip - Synthetic Fibers**

Elasto Barchip - Synthetic Fibers is a monofilament polypropylene extract fiber, non-toxic and not hazardous to health and is resistant to acid and alkali designed to enhance the overall quality of concrete.

#### ***Properties of Elasto Barchip – Synthetic Fibers***

Material	-	Polypropylene extract synthetic fiber
Design	-	Macro monofilament
Fiber Length	-	48 mm
Diameter	-	0.72 mm
Shape	-	Rectangular – Fully embossed
Color	-	White
Specific Gravity	-	0.90 – 0.92
Tensile Strength	-	500 MPa (min.)
Young's Modulus	-	10 GPa
Melting Point	-	159 °C – 179 °C
Matrix Bonding	-	Excellent

## **2.2 Portland Cement**

It shall conform to the requirements of Subsection 311.2.1, Portland Cement, Item 311 – Portland Cement Concrete Pavement.

## **2.3 Fine Aggregate**

It shall conform to the requirements of Subsection 311.2.2, Fine Aggregate, Item 311 – Portland Cement Concrete Pavement.

## **2.4 Coarse Aggregate**

It shall conform to the requirements of Subsection 311.2.3, Coarse Aggregate, Item 311 – Portland Cement Concrete Pavement.

## **2.5 Water**

It shall conform to the requirements of Subsection 311.2.4, Water, Item 311 – Portland Cement Concrete Pavement.

## **2.6 Reinforcing Steel**

It shall conform to the requirements of Subsection 311.2.5, Reinforcing Steel, Item 311 – Portland Cement Concrete Pavement.

## **2.7 Joint Fillers**

It shall conform to the requirements of Subsection 311.2.7, Joint Fillers, Item 311 – Portland Cement Concrete Pavement.

## **2.8 Admixture**

Air-entraining admixture shall conform to the requirements of AASHTO M 154.

Chemical admixture, if specified or permitted, shall conform to the requirements of AASHTO M 194.

Fly Ash, if specified or permitted as a mineral admixture and not exceeding 20% partial replacement of Portland Cement in concrete mix shall conform to the requirement of ASTM C 618.

Admixture/s maybe added to the concrete mix to produce some desired modifications to the properties of concrete if necessary, but not as partial replacement of cement. If specified, monofilament polypropylene synthetic fibers, which are used as admixture to prevent the formation of temperature/shrinkage cracks and increase impact resistance of concrete slabs shall be applied in the dosage rate recommended by its manufacturer.

## **2.9 Curing Materials**

It shall conform to the requirements of Subsection 311.2.9, Curing Materials, Item 311 – Portland Cement Concrete Pavement.

## **2.10 Calcium Chloride**

It shall conform to AASHTO M144, if specified or permitted by the Engineer.

## **2.11 Storage of Cement and Aggregate**

It shall conform to the requirements of Subsection 311.2.11, Storage of Cement and Aggregate, Item 311 – Portland Cement Concrete Pavement.

## **2.12 Packaging, Dispensing and Storage of Elasto Barchip – Synthetic Fibers**

Barchip fibers are packaged in the desired measured quantities in either degradable paper bags, plastic bags and/or bulka bags. Paper bags can be put directly into the concrete track or opened and the loose fiber dispensed. The plastic bags is not degradable and will need to be opened before dispensing into the concrete track.

All boxes of fibers shall be stored immediately upon delivery at the site, on a clean dry surface, under cover and in the place approved by the Engineer.

## **2.13 Proportioning, Consistency and Strength of Concrete**

It shall conform to the requirements of Subsection 311.2.12, Proportioning, Consistency and Strength of Concrete, Item 311 – Portland Cement Concrete Pavement.

# **3.0 Construction Requirements**

## **3.1 Quality Control of Concrete**

It shall conform to the requirements of Subsection 311.3.1, Quality Control of Concrete, Item 311 – Portland Cement Concrete Pavement.

## **3.2 Equipment**

It shall conform to the requirements of Subsection 311.3.2, Equipment, Item 311 – Portland Cement Concrete Pavement.

### **3.3 Preparation of Grade**

It shall conform to the requirements of Subsection 311.3.3, Preparation of Grade, Item 311 – Portland Cement Concrete Pavement.

### **3.4 Setting Forms**

It shall conform to the requirements of Subsection 311.3.4, Setting Forms, Item 311 – Portland Cement Concrete Pavement.

### **3.5 Conditioning of Subgrade or Base Course**

It shall conform to the requirements of Subsection 311.3.5, Conditioning of Subgrade or Base Course, Item 311 – Portland Cement Concrete Pavement.

### **3.6 Handling, Measuring and Batching Materials**

It shall conform to the requirements of Subsection 311.3.6, Handling, Measuring and Batching Materials, Item 311 – Portland Cement Concrete Pavement.

### **3.7 Mixing Concrete**

It shall conform to the requirements of Subsection 311.3.7, Mixing Concrete, Item 311 – Portland Cement Concrete Pavement.

### **3.8 Addition, Mixing and Pumping of Elasto Barchip - Synthetic Fibers in Concrete Mix**

The amount of Elasto Barchip Synthetic Fiber to be added in a concrete mix shall not be less than 1.25 kg per cubic meter of concrete. The total fiber requirement shall be added first to the mixer with the initial batch water to achieve optimum fiber distribution during mixing operation. The bag will release the fiber which will be homogenously distributed throughout the mix after five (5) minutes of mixing.

The fiber shall be pumped through 50 mm rubber hoses without difficulty. Precaution should be taken to ensure the fibers pass freely through the pump hopper grate.

### **3.9 Limitation of Mixing**

It shall conform to the requirements of Subsection 311.3.8, Limitation of Mixing, Item 311 – Portland Cement Concrete Pavement.

### **3.10 Placing Concrete**

It shall conform to the requirements of Subsection 311.3.9, Placing Concrete, Item 311 – Portland Cement Concrete Pavement.

### **3.11 Test Specimens**

It shall conform to the requirements of Subsection 311.3.10, Test Specimens, Item 311 – Portland Cement Concrete Pavement.

### **3.12 Strike-off of Concrete and Placement of Reinforcement**

It shall conform to the requirements of Subsection 311.3.11, Strike-off of Concrete and Placement of Reinforcement, Item 311 – Portland Cement Concrete Pavement.

### **3.13 Joints**

It shall conform to the requirements of Subsection 311.3.12, Joints, Item 311 – Portland Cement Concrete Pavement.

### **3.14 Final Strike-off (Consolidation and Finishing)**

It shall conform to the requirements of Subsection 311.3.13, Final Strike-off (Consolidation and Finishing), Item 311 – Portland Cement Concrete Pavement.

### **3.15 Surfaces Test**

It shall conform to the requirements of Subsection 311.3.14, Surfaces Test, Item 311 – Portland Cement Concrete Pavement.

### **3.16 Curing**

It shall conform to the requirements of Subsection 311.3.15, Curing , Item 311 – Portland Cement Concrete Pavement.

If steam curing at a temperature in excess of 160 °C is to be used, polypropylene fibers should not be used.

### **3.17 Removal of Forms**

It shall conform to the requirements of Subsection 311.3.16, Removal of Forms, Item 311 – Portland Cement Concrete Pavement.

### **3.18 Sealing Joints**

It shall conform to the requirements of Subsection 311.3.17, Sealing Joints, Item 311 – Portland Cement Concrete Pavement.

### **3.19 Protection of Pavement**

It shall conform to the requirements of Subsection 311.3.18, Protection of Pavement, Item 311 – Portland Cement Concrete Pavement

### **3.20 Concrete Pavement**

It shall conform to the requirements of Subsection 311.3.19, Concrete Pavement – Slip Form Method, Item 311 – Portland Cement Concrete Pavement.

### **3.21 Acceptance of Concrete**

It shall conform to the requirements of Subsection 311.3.20, Acceptance of Concrete, Item 311 – Portland Cement Concrete Pavement.

### **3.22 Opening to Traffic**

It shall conform to the requirements of Subsection 311.3.21, Opening to Traffic, Item 311 – Portland Cement Concrete Pavement.

### **3.23 Tolerance and Pavement Thickness**

It shall conform to the requirements of Subsection 311.3.22, Tolerance and Pavement Thickness, Item 311 – Portland Cement Concrete Pavement.

## **4.0 Method of Measurement**

The area to be paid for under Item 311 shall be the number of square meters ( $m^2$ ) of concrete pavement placed and accepted in the completed pavement. The width for measurement will be the width from outside edge to outside edge of completed pavement as placed in accordance with the Plans or as otherwise required by the Engineer in writing. The length will be measured horizontally along the center area of concrete pavement measured.

Elasto Barchip – Synthetic Fiber will be measured in kilogram (kg)

## **5.0 Basis of Payment**

The accepted quantity, measured as prescribed in Section 4, shall be paid for at the contract unit price for Portland Cement Concrete Pavement and Elasto Barchip – Synthetic Fibers, which price and payment shall be full compensation for preparation of roadbed and finishing of shoulders, unless otherwise provided by the Special Provisions, furnishing all materials, for mixing, placing, finishing and curing all concrete, for furnishing and placing all joint materials, for sawing weakened plane joints, for fitting the prefabricated center metal joint, for facilitating and controlling traffic, and for furnishing all labor, equipment, tools and incidentals necessary to complete the item.



Republic of the Philippines  
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

OFFICE OF THE SECRETARY

# *Certificate of Conditional Approval*

## **Product Accreditation**

This is to certify that

**Elasto Plastic Concrete**

**BarChip - Macro**

**Synthetic Fibers**

Supplied by:


**Blue Ocean Chemtrade, Inc.**

**2/F 1260 Juan Luna St., Tondo, Manila**

is duly accredited for use in DPWH projects as an additive to paving concrete subject to its specifications (hereto attached) pursuant to the provisions of DPWH Department Order No. 189, series of 2002.

This accreditation shall remain in force until expiry date printed below, subject to its compliance with the requirements of the aforementioned Department Order.

Conditional Approval Number :	0020
Date Issued :	October 2014
Expiry Date :	October 2019

  
**ROGELIO L. SINGSON**  
Secretary