

DESCRIPTION: Basalite inventories various fibre types for use as primary or secondary reinforcement in concrete or shotcrete when increased durability is required. The fibre types include:

- High Strength Deformed Drawn Wire Fibre
- Deformed Cut Steel Fibre
- Synthetic Fibre

USES: FIBRE REINFORCEMENT provides discrete homogeneous reinforcement of concrete or shotcrete mixes and thus is ideal in situations where improved toughness, fatigue resistance, shear resistance, flexural strength, impact resistance, crack resistance or ductility is required. The random orientation of the fibre reinforces the concrete in all directions. FIBRE REINFORCEMENT can be the primary or secondary reinforcement in a wide range of construction projects, such as:

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| 1. Mine and Tunnel Linings | 9. Aqueduct Rehabilitation |
| 2. Slabs and Floors | 10. Seismic Retrofit |
| 3. Rock Slope Stabilization | 11. Marine Structure Repair and Rehabilitation |
| 4. Repair Materials | 12. Artificial and Decorative Rock Formations |
| 5. Shell Domes | 13. Fire Protection Coatings |
| 6. Refractory Linings | 14. Stucco and Plaster |
| 7. Dam Construction | 15. Security vaults |
| 8. Composite Metal Decks | |

SHOTCRETE:

FIBRE REINFORCEMENT can be used in either the dry or wet process shotcreting methods to increase the toughness, ductility, and impact resistance of in-place shotcrete. There are cases where Fibre Reinforced Shotcrete can replace wire mesh or reinforcing steel. The advantages of doing so are:

1. Substantially less material is required because Fibre Reinforced Shotcrete follows the contours of the surface, providing a uniform reinforced liner.
2. Time and money is saved because using Fibre Reinforced Shotcrete eliminates the labour intensive and, at times, unsafe mesh installation step, allowing for immediate application of shotcrete after excavation.
3. Higher quality in-place shotcrete because shooting through wire mesh can be very difficult, resulting in honeycombing, poor consolidation, shadowing, embedded rebound and poor bond to the mesh.
4. Steel Fibre is discontinuous, so rebar or wire mesh corrosion is eliminated.
5. Compatible with all types of Portland cements, Portland cement admixtures and shotcrete mix designs.

**USES:
(CONTINUED)**

CONCRETE:

FIBRE REINFORCEMENT can be used in concrete slabs, overlays, runways, bridge decks, channel linings, industrial floors and precast elements to improve toughness, shear resistance, crack resistance, and flexural strength. There are cases where Fibre Reinforcing can replace wire mesh or reinforcing steel. The advantages are:

1. The use of shrinkage steel can often be eliminated.
2. In some cases the thickness of the slab can be reduced up to 40 %.
3. It also offers greater accuracy and flexibility in project scheduling.
4. It can be placed and finished faster, requiring only conventional mixing, placing, and finishing techniques and equipment.
5. Ideal for joint free design.

PROCEDURES:

The addition of FIBRE REINFORCEMENT to concrete or shotcrete mixes will change the way the mix behaves in both the plastic and hardened state and should not be made without a review of the mix design by Basalite's technical staff or a materials consultant.

Some general guidelines for using fibres are as follows:

DRY SHOTCRETE:

1. Basalite can preblend fibres into the dry shotcrete mix, ensuring accurate dosage and even distribution of fibres throughout the mix.
2. On-site addition of fibres is acceptable when the fibres are added to the material in such a way that the fibres are thoroughly mixed with the shotcrete prior to shooting. It is not recommended that the fibres be added to the shotcrete as it is entering the shooting equipment.
3. When using dry shotcrete, use a premoisturizer to bring the moisture content of the mix to 3 to 5 % (by weight) prior to it entering the shooting equipment. Premoisturizers reduce dust, eliminate static in the shotcrete hose and reduce wastage due to rebound.

WET SHOTCRETE/CONCRETE:

1. Fibres can be added to Redi-Mix concrete/shotcrete during batching in the plant, or on-site through the hopper of the transit mixer. In either case, time should be allowed for adequate mixing to ensure the fibres are evenly distributed.
2. A false loss of slump will occur when fibres are added and the mix will appear less workable than a non-fibre mix. However, the fibre mix can still be placed with adequate vibration. Additional water will not improve the workability of fibre mixes and should not be used. Excessive addition of water can produce fibre balling.

See also the following reference documents:

- ACI 506.1R-98 Committee Report on Fiber Reinforced Shotcrete
- ACI 544-3R Guide to Specifying, Proportioning, Mixing, Placing, and Finishing Steel Fibre Reinforced Concrete
- ASTM C 1116 Standard Specification for Fibre-Reinforced Concrete and Shotcrete
- ASTM A 820 - 95 Standard Specification for Steel Fibers for Fiber Reinforced Concrete

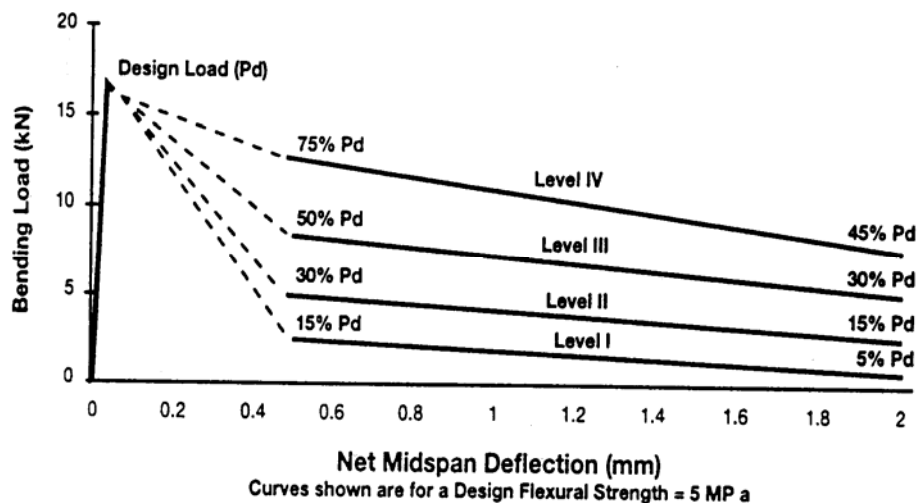
FIBRE REINFORCEMENT

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TECHNICAL DATA:

	High Strength <u>Drawn Wire</u>	Cut Steel <u>Fibre</u>	Synthetic <u>Fibre</u>
ASTM A 820 fibre designation	Type I	Type II	n/a
Length, mm (in.)	30 (1 3/16)	25 (1.0)	50 (2.0)
Diameter, mm (in.)	.7 (.017)	.4 (.017)	.4 (.014) approx.
Tensile Strength, MPa (psi)	1150 (166,750)	690 (100,050)	600 (87,000)
Toughness performance level	4 - 5	2 - 3	1 - 3
Making ASTM C 1116 concrete / shotcrete designation:	Type I	Type I	Type III

Definition of Flexural Toughness Performance Levels



DOSAGE:

The fibre dosage rate and type required will vary depending on each application and should be discussed with Basalite's technical staff or a materials consultant. Some general guidelines for dosage rates are:

<u>Material</u>	<u>Steel</u>		<u>Synthetic</u>	
	<u>kg/m³</u>	<u>lb./yd³</u>	<u>kg/m³</u>	<u>lb./yd³</u>
Dry Mix Shotcrete	47 - 78	80 - 132	4.5 - 9	7.6 - 15.1
Wet Mix Shotcrete	45 - 60	76 - 101	4.5 - 9	7.6 - 15.1
Concrete Slab	20 - 40	33 - 67	4.5 - 13.5	4.5 - 23

PACKAGING:

Steel Fibre - 25 kg (55.1 lb.) or 22.7 kg (50 lb.)
 Synthetic Fibre - 0.9 kg (2.0 lb.) or 4.5 kg (9.9 lb.)
 Liability for damages or defective goods shall be limited to the refund of the purchase price or product replacement.

SAFETY PRECAUTIONS:

The use of gloves and eye protection during handling of fibres is strongly advised. Fibre concretes/shotcretes contain Portland cement and thus normal safety precautions used when handling conventional cement based products should be followed.

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