AR Glass Fiber Dispensing System

Metaspa S.L.

Application Data Sheet

Introduction

Glass fiber cutting and dispensing systems have been in use for many years in many industrial applications such as gypsum and cement board manufacturing. These cutting devises can now be purchased off-the-shelves and used as-is to cut AR glass roving in the ready-mix concrete and pre-cast concrete markets.

The Fiber Chopping and Dispensing System

The Metaspa chopping unit is simple and easy to install onto the central batching plant whether it is ready-mix plant or a pre-cast concrete plant.

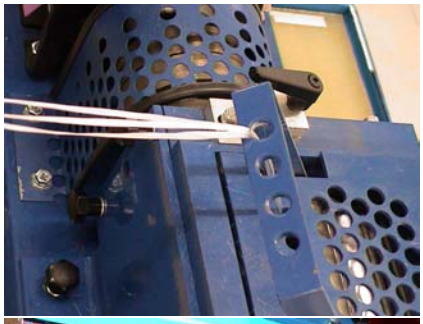
Metaspa S.L. specializes in the turn-key installation of automatic cutting and dispensing system. However, the chopping unit is available off-the-shelves and can be easily mounted in a pre-cast concrete plant or in a ready-mix plant. This unit weighs approximatively 66 pounds.

The Metaspa chopping unit include a flexible cylinder which can accommodate a flexible number of blades. The number of blades define the length of the chopped fiber. The standard cylinder includes 20 blades which chops the roving in ½ inch or 12mm fibers. To switch to 1 inch or 24mm fiber length, the number of blades on the standard cylinder would be reduced to 10. Special cylinder are available to chop the roving in ¼ inch and ¾ inch lengths.

The Metaspa chopping unit is very accurate, maintenance-free and also self-cleaning. To insure the quality of the chopping, the end-user will have to verify the chopper blades and the backing roller for small defects and change them on a regular basis. Experience shows that the greater the number of roving strands chopped at the same time, the faster the chopper blades get damaged and have to be replaced. Metaspa S.L. carries and sells spare parts.

Key Advantages

- Wide range of fiber length and output adjustments.
- Ability to mix fiber length during the chopping process.
- Ability to cut up to 16 rovings at once at 610 rpm maximum speed.
- Each roving weighs approximatively 40 pounds thus satisfying several batch mixing rotations.
- Better quality control with automatic fiber chopping and dispensing.
- No need for manual feeding of the bags during mixing thus greater productivity during the mixing of all raw materials.
- Reduce the risk of accidents in the plant which happen during the process of hand-feeding the fiber bags in the central mixer or on site directly in the truck drum.
- No fiber bags inventory to be kept in the truck or on site.
- System is maintenance-free, self-cleaning, easy to install and can be move from plant to plant.
- The chopper unit can be fully integrated in the automatic batching system of the plant thus falling in the ISO or quality control processes.



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Dosage Information

The dosage of glass fiber in the process is controlled by the speed of the machine (calculated in rotation per minute or rpm) and the number of ends or strands of glass fiber being chopped at the same time. As indicated, the length of the chopped fibers depends on the number of blades placed onto the cutting roll. Therefore, the length of the fiber does not impact the dosage rate.

The following table summarizes different dosage scenarios based on the speed and the number of strands. These numbers are indicative only and can be used for demonstration purposes only:

	Speed	4 strands	8 strands	12 strands	16 strands
Minimum Speed	122 rpm	79 grams 0.17 lb	158 grams 0.35 lb	237 grams 0.52 lb	316 grams 0.69 lb
Average Speed	370 rpm	244 grams 0.54 lb	488 grams 1.07 lb	732 grams 1.61 lbs	976 grams 2.15 lbs
Maximum Speed	610 rpm	414 grams 0.91 lb	828 grams 1.82 lbs	1.24 kg 2.73 lbs	1.65 kg 3.62 lbs

For example, at maximum speed of 610 rotations per minute, the Metaspa chopping unit will be able to chop and dose 3.62 pounds of glass fibers if 16 strands of fibers are fed through the machine at once.

A chopping Unit Installed in the RMC Plant or on the Batching Plant

The chopping unit can be directly mounted onto the plant structure using conventional hardware and electrical lines. The fibers will have to be located near the chopping unit in a location relatively dry i.e. not directly exposed to water or rain. As indicated, the chopping unit can be integrated in the batching system and linked to the main control panels with an on/off aparatus or a more complex system if needed (a printer can be set up to issue a report showing fiber content).

A Dedicated Chopping Station

If no room is available by the batch plant to locate the chopping unit, a dedicated chopping station can be built near the batch plant that would require an additional stop by the RMC truck (see last picture). An on/off system could be set up at that station that would automatically cut and dose 7 or 10 pounds of glass fibers depending on the truck size. More research is necessary to better define the feasibility of this dedicated chopping station.

A Dedicated AR Glass Product

The High Dispersion (HD) roving has been especially developed to be chopped using the Metaspa machine. Originally, the HD chopped fibers were designed to be sold in one-pound bag for one cubic yard of concrete (in ¾ of an inch length). AR glass fibers are unique in that they can be easily chopped with no damage to the fiber and with no impact of the dispersability in the mix. More information on the HD Roving are shown on page 3 and 4 of this document.

Typical Properties of Cem-FIL® AR Glass

Density:	2.68t/m3
Tensile Strength	
Virgin Filament:	3,500 MPa
Strand:	1,700 MPa
Elastic Modulus:	72 GPa
Elongation at Break:	4.5%
Moisture Content:	< 0.3%
Effect of Temperature:	Non-Combustible. Softening Point 860°C

Identification (ISO)

Example:	ARC14 320 HD
AR:	Alkali Resistant
C:	Continuous filament
14:	Filament diameter in microns
320:	Strand Tex (g/km)
HD:	Product code

Technical considerations (nominal values)

Filament diameter (μm)	Moisture Content (%)	(L.O.I.) (%)
14	ISO 3344 : 1977	ISO 1887 : 1980
	< 0.3	1.0

Characteristics and Performance

- Density similar to concrete / Elastic Modulus greater than concrete / Tensile Strength greater than steel.
- Anti-Crak™ HD fibers provide micro-reinforcement, and therefore improved mechanical performance, unlike synthetic fibers which give micro-defects due to their low modulus and strength.
- Fiber to matrix bond is optimum: mineral to mineral.
- Very high dispersibility: 63 - 197 million reinforcing monofilaments per lb of fibers. Non-corroding reinforcement, resistant to acid and alkalis.

Elastic Modulus:

Unlike synthetic fibers, Anti-Crak™ HD fibers have an Elastic Modulus greater than that of hardened concrete, and can therefore effectively reinforce both fresh and hardened concrete and mortars.

Material	Modulus of Elasticity GPa
Cem-FIL® AR Fibers	72
Polypropylene	3.5
High Mod. Polypropylene	7
PVA	29
Polyester	17
Concrete	35

Manufactured Products:

Tensile Strength:

Material	Tensile Strength MPa
Cem-FIL® AR Fibers	1,700
Polypropylene	350
High Mod. Polypropylene	550
PVA	910
Polyester	1,000
Steel	1100

Specific Gravity:

The Specific Gravity of Cem-FIL® AR glass fibers is similar to that of concrete, therefore the fibers will neither float nor sink in the mix when under vibration.

Material	Specific Gravity
Cem-FIL® AR Fibers	2.68
Polypropylene	0.91
High Mod. Polypropylene	0.91
PVA	1.30
Polyester	1.34
Concrete	2.40

Bulk packaging

Each pallet contains 48 cartons on 3 levels of 16 cartons each. The completed pallet is enclosed in polythene and identified with two labels.

	Packaging style	Total number of cartons	Pallets			
			Length (in)	Width (in)	Height (in)	Approx. net weight (lb)
Anti-Crak™ HD	Roving Bulk Carton 1 lb bags	48	45	45	43	2,016 1,920 1,440

Shipment

Sea transport: a maximum of 20 pallets (double level) may be loaded in a 20-foot container giving a total net weight of 40,320lb (roving), 38,400lb (bulk cartons) or 28,800lb (bags).

Road vehicle: up to 18 pallets (single level). Total net weight 36,288lb (roving), 34,560lb (bulk cartons) or 25,920lb (bags).

Storage

Cem-FIL® fibers should be stored dry in their original packaging, the best conditions being at a temperature of 60 to 95ºF, and at a relative humidity of 35 to 65%. If the product is stored at low temperature (below 60ºF) it is advisable to condition the product in the workshop for 24 hours before use to prevent condensation.

Quality

Cem-FIL® chopped strands are manufactured under a Quality Management System approved to ISO 9001. Additionally, the consistency and performance of Cem-FIL® is subject to independent assessment and approval in Germany.
(Zulassung nº Z-31.2-127).

Edited by :

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