

HEDMAN MINES LIMITED
P.O. BOX 990
TIMMINS, ONTARIO, CANADA

"Hedman Fundamental Cationic Fibre"

April 24, 1972

Technical Information

VISCOSITY BUILDING CHARACTERISTICS OF HEDMAN CATIONIC FIBRE

Hedman Cationic Fibre has significantly large viscosity building characteristics - it causes formulations to be very much SHEAR RATE DEPENDENT.

In other words, if Hedman Fibre is mixed at a high shear rate, the viscosity remains low. But at a low shear rate, the viscosity goes up.

Example: Epoxy formulation with Hedman Fibre as sole filler (50%) -
(1) On No. 4 Spindle of Brookfield Viscosity Meter at ½ rpm (revolutions per minute) viscosity registered in the 80,000 to 100,000 centipoise range; but at 60 rpm, viscosity went down to a few thousand.

(2) Asphalt - cut back - on No. 7 Spindle of Brookfield Viscosity Meter

	CENTIPOISES			
	10 RPM	20 RPM	50 RPM	100 RPM
Asphalt - cut back	12,000	11,000	10,000	10,600
75% Asphalt - 25% HF	148,000	94,000	53,600	30,000
50% Asphalt - 50% HF				+ 40,000 -off scale

When shear is applied, the mix will flow; when there is no shear, it will hang and won't sag, an important characteristic in many applications.

This applies to any system with wetting, such as Polyester, etc.
In Thermoplastics in the melt phase at too high a shear rate the mix may squeeze out like water, and at too low a shear rate it will be almost unmoveable.
In Injection Molding situations the shear rate and pressures are extremely high, which may overcome the tendency to build up the viscosity.

With Hedman Cationic Fibre as filler, VISCOSITY IS STRICTLY A FUNCTION OF SHEARING. (This is in contrast to other fillers, such as a low oil absorption calcium carbonate for instance, which has little effect on viscosity - only to the extent that it is present - and no shear rate dependence.)

Source:
(1) Gulf + Western Industries, Inc., Research Division, Swarthmore, Pa., U.S.A.
(2) The New Jersey Zinc Company, Div. of Gulf, Research Div., Palmerton, Pa., U.S.A.

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PLAINTIFF'S EXHIBIT FOS-305

Hedman Fundamental Cationic Fibre

$Mg^3 (SiO^2) (OH)^4$

(LIZARDITE)

CHEMICAL ANALYSIS—approximate:

MgO		38%
SiO^2		40%
FeO		2%
Fe^2O^3	less than	3%
AlO^3	less than	3%
CaO	less than	1%
H^2O or loss on ignition	less than	13%
Insoluble in acid		42.5 to 46%

Oil Absorption—71ml 100 grams and lower
Filtration or freeness—approx. 100 seconds

PHYSICAL PROPERTIES:

Screen—10 minute ro-tap - dry - U.S. Standard
— 16 mesh — 100%
+ 70 mesh — 60-90%
—200 mesh — 1% to 5%
Bulk Density - 400 to 560 cc 100 grams

Charge	Ecctropositive
pH	9.4
Refractive Index—parallel length	1.556
perpendicular	1.549
Specific Gravity	1.87
Brightness (E 610 Reflection Meter)	63 to 67

CHARACTERISTICS:

Colour:	White
Grit:	Nil
Glass Spicules:	Nil
Unopened fibre bundles:	Nil
Mica:	Nil
Sand:	Nil above 200 mesh
Texture:	Uniform—Velvety feel - soft
Fibre: - *uniformity:*	Natural uniform fibre distribution
- *range*	Confined to a narrow range—no irregular lengths of fibre over a wide range
Adsorption:	Adsorption properties are good—facilitates control of flow
Moulding and processing:	Easy to mould and process—stability reduces warpage, deformation and shrinkage
Heat resistance:	Fireproof
Toughness and Strength:	In contrast to other fillers, Hedman FC Fibre imparts improved flex modulus, impact strength, flex strength, compressive strength and toughness
Other characteristics:	Distinct Viscosity Building Characteristics, which are very much shear rate dependent, in plastic and asphalt mixes.

DESCRIPTION:

Besides being hydrous inert, quick slurrying, faster filtering and more acid resistant, HFCF's loss on ignition at 1800 F is much lower than with customary raw materials.

A new concept, Hedman Fibrous Filler is designed to meet modern needs in automated continuous processing not formerly possible due to irregular lengths and diameters of fibres, unopened fibre bundles, and undesirable impurities. The basic characteristics of Hedman Fibres allows easier and more intimate blending for a more homogeneous mix to produce consistently uniform products.

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USES FOR HEDMAN CATIONIC FIBRE

To achieve maximum efficiency for the purpose intended technical assistance will be provided.

Cellulose Products (Paper and Board)	• Newsprint, rotonews, printing papers Boxboard, screening board, folding board and other cylinder board grades
	Construction paper, crepe, filter paper, kraft paper for laminates, fire retardent roofing and deadening felt, match book board, moulded paper products, non-wovens, paper towelling, poster paper, surface coating, wall board cover paper.
	Depending on individual mill conditions and if used as directed Hedman Cationic Fibre can provide the following benefits: Improved opacity, printability, smoothness of finish, softness, moisture equilibrium, uniformity, heat resistance, as well as reduced picking, discolouration, curling and warping, shrinking. In boxboard applications, this low-cost, uniform, short-fibrous filler improves bulking, folding and sizing qualities under controlled furnish pH conditions.
	Hedman Cationic Fibre has been found to be one of the most efficient and economical Pitch Control Agents.
Friction Materials	Bonded brake shoes, disc brakes
Plastics	Phenolic moulding compounds, polyester moulding compounds Polyethylene, polypropylene and other plastic compounds Polymeric sealants and undercoatings PVA adhesives PVC drainage and sewer pipes PVC floor tiles
Welding Rods	Flux Coatings
General Uses	Asphalt paving, caulking compounds, cement products, dry wall cement, putties, insulating cement, floor coverings, wall coverings, accoustic ceiling tiles, panels, texture paints, primer paints, rubber, static coatings, undercoatings, fibrous greases, shaft grouting material, oil well drilling muds.

THOUSANDS OF TONS OF HEDMAN FIBRE ARE BEING USED ANNUALLY IN PRODUCTION CIRCUITS!

AVAILABILITY

Hedman Fundamental Cationic Fibre is available in UNRESTRICTED quantities as a "*Primary Product*" from [illegible] rich reserves via a new automated process in a newly designed milling circuit. This unique process assures the production of clean, uniformly short fibres of uniform diameter.

For the first time, long-term volume supply of such a LOW-COST fibrous material, which is competitive with other low-cost raw materials, is available as an incentive to pursue new ideas.

Particulars and samples of the size you request will be gladly provided for your specific application.

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