



# SILOMEL®

**HMMM ADHESION PROMOTERS  
& AUXILIARIES FOR THE TIRE &  
RUBBER INDUSTRIES**

[WWW.MELAMIN.SI](http://WWW.MELAMIN.SI)

# HMMM ADHESION PROMOTERS

Melamin manufactures various types of functional HMMM (hexamethoxy methyl melamine) adhesion promoters under the brand name SILOMEL®, which are a key component of high-performance dry bonding systems used for direct adhesion, where no bonding agent is applied. HMMM is ideal for rubber to steel cord or rubber to synthetic fibres/textile bonding systems. Key applications for HMMM include rubber tyres, belts and hoses. What separates HMMM from other alternative types of adhesion promoters for example, HMT (hexamethylenetetramine), is its ability to offer better adhesion and rubber coverage under ageing conditions. Other advantages include; it is a methylene donor in chemical mechanism meaning no formaldehyde release, it is non-toxic, it offers no corrosive effects to the metal cord and allows for better scorch protection. HMMM is also suitable in textile bonding as it avoids the generation of amines, which can cause textile breakdown.

## SUSTAINABILITY

At Melamin, sustainability is at the heart of everything we do and a fundamental part of our mission. We are committed to minimizing our environmental impact through innovative practices and responsible resource management. Our goal is to reduce our carbon footprint and to create lasting value for our customers and the planet by embracing renewable energy, reducing waste, and promoting sustainable development. We are devoted to making a meaningful difference by building a greener and more sustainable future.

## KEY APPLICATIONS

- Rubber to steel cord bonding systems
- Rubber to synthetic fibres/textile bonding system

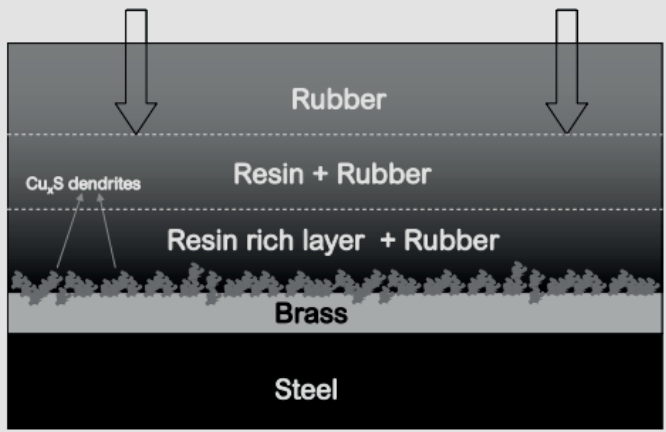
## TEXTILE TO RUBBER & STEEL TO RUBBER BONDING

- HMMM systems are compatible with untreated textiles, but more often so-called “RFL Dip” fabrics are also used (RFL refers to resorcinol formaldehyde latex), a treatment applied to fabric in a dipping process
- The adhesion between polyethylene terephthalate (PET) cord and nitrile-butadiene rubber (NBR) has been compared and studied. PET cord treated by hydrated silica-resorcinol-hexamethoxymethyl melamine (HRH) shows 300% T-test strength and 40% H-test strength adhesion to NBR higher than that of RFL



# PRINCIPLES OF RUBBER TO STEEL BONDING

Polar resins, being insoluble in rubber, migrate to the rubber-brass interface and form a resin-rich hydrophobic layer (moisture barrier) over the  $Cu_xS$  layer.



## SILOMEL STANDARD PRODUCTS PORTFOLIO

### HMMM ADHESION PROMOTERS

Product	Form	HMMM content (%)	Carrier	Free formaldehyde (%)	Properties
SILOMEL 100 L	liquid	98+	none	< 0,1	high degree of etherification
SILOMEL 73 M	powder	72	silica	< 0,1	free-flowing powder product with minimal dust
SILOMEL 67 K2	powder	65	silica	< 0,1	free-flowing powder product with minimal dust
SILOMEL 65 GE	powder	65	silica	< 0,1	free-flowing powder product
SILOMEL M50 BIO	powder	50	biosilica	< 0,1	free-flowing powder product

## AUXILIARIES

### SILICAS

Product	Appearance	DBP absorption ml/100g	Surface area m <sup>2</sup> /g	Bulk density g/l	pH (5% in water)
MSIL M65	Fine, white, odourless powder	min. 200	160-190	200-260	6.0-7.0
MSIL M73	Fine, white, odourless powder	min. 250	180-200	210-270	6.0-8.0
MSIL FX	Fine, white, odourless powder	min. 220	180-190	100-200	6.0-7.5
MSIL BIO	Fine, white, odourless powder	min. 200	185-215	200-350	6.0-7.5

# ABOUT US

Melamin, founded in 1954 in Kočevje, Slovenia, is a well-established, European chemicals manufacturing company with a long tradition in the production of amino resins. Melamin's products have been developed with extensive investments in new technologies and highly skilled personnel. The company is oriented towards satisfying the needs and requirements of its customers, as well as towards enhancing the environmental friendliness of its products by developing and offering low formaldehyde and low VOC resins. Melamin distinguishes itself, above all, in being strategically oriented, recognizable and socially responsible. Knowledge, innovation, adaptability, as well as the will and commitment of all individuals represents the essence of our success on the world market. Regardless of the challenges that lie ahead, our goal and focus are to retain, and further develop, our position as one of the most reliable global players in the field of amino resins.



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