



MASTERBATCH FOR SILICONE APPLICATIONS

GENERAL INFORMATION

TUBALL™ MATRIX is a line of concentrates based on TUBALL™ single wall carbon nanotubes (SWCNT) produced by OCSiAl. TUBALL™ MATRIX concentrates are available in several matrixes, are easy to handle, and can be processed using standard equipment. Depending on the TUBALL™ MATRIX percentage in the final compound and the processing conditions and other system components, the volume resistivity can be adjusted within the range $<10-10^{11}$ $\Omega\cdot\text{cm}$.

TUBALL™ is a unique SWCNT additive that provides electrical conductivity at low dosages not achievable with any standard conductive additive. These low dosages enable the electrical resistivity of the material to be reduced with minimal impact on the host matrix, including retaining and even improving mechanical properties, minimally increasing density, and limiting the influence on the rheological properties and colour.

TUBALL™ MATRIX 605 is a concentrate specifically designed to provide superior electrical conductivity to **silicone compounds (HCR — high consistency rubber)** while retaining mechanical properties and minimally impacting the host matrix.

BENEFITS

- TUBALL™ MATRIX, enable ultra-low dosage starting from just 0.5 wt.% for **anti-static, static dissipative and conductive applications**
- Allow production of conductive parts that retain **bright colours**
- Ensure permanent and uniform **electrical conductivity without “hot spots”**
- **Maintain rheology** of the uncured compound
- **Standard processing** and mixing equipment
- Improve mechanical properties and retain softness

TYPICAL PROPERTIES

Property	Value
Concentrate carrier	Siloxanes and Silicones vinyl group-terminated
Colour and appearance	Black paste
Density	1.00 g/cm ³
Vinyl groups	0.11 mmol/g

TYPICAL DOSAGE LEVEL

The concentration of TUBALL™ MATRIX 605 that is required in the final compound should be determined according to the desired level of conductivity, as shown in Figure 1 for HCR in high Shore A hardness range and Figure 2 for HCR in low Shore A hardness range compounded by two-roll mill and kneader accordingly.

The loading required to obtain a specific conductivity can vary by type of silicone (fumed silica based, precipitated silica based, etc.), by the final formulation and by the type of application/molding process. The dosage rates in Figures 1, 2 are based on tests carried out by OCSiAl in 2017–2018. For more information please refer to Processing guidelines.

Figure 1. Volume resistivity of 60 Hardness HCR silicone with TUBALL™ MATRIX 605 in the range $<10-10^{11}$ $\Omega\cdot\text{cm}$ (sample shape: compression-moulded rubber sheet of 2 mm thickness). Measurements conducted according to ASTM D991/D257 standards.

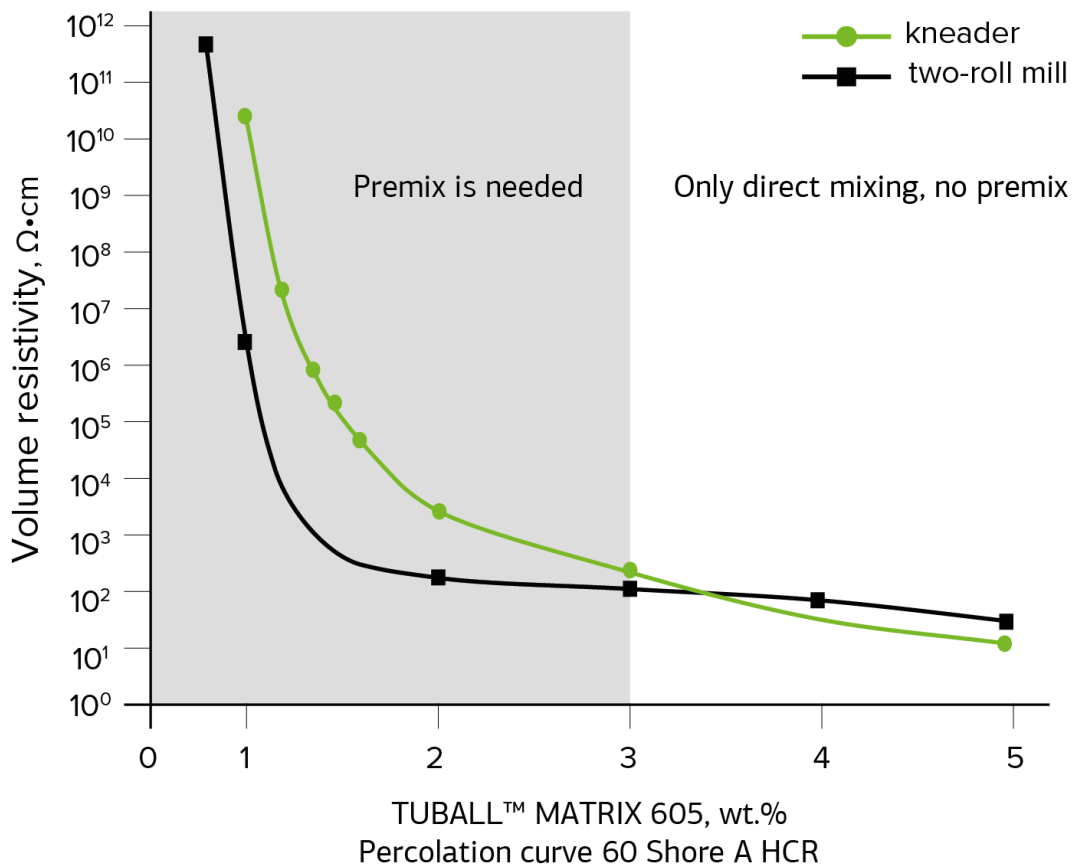
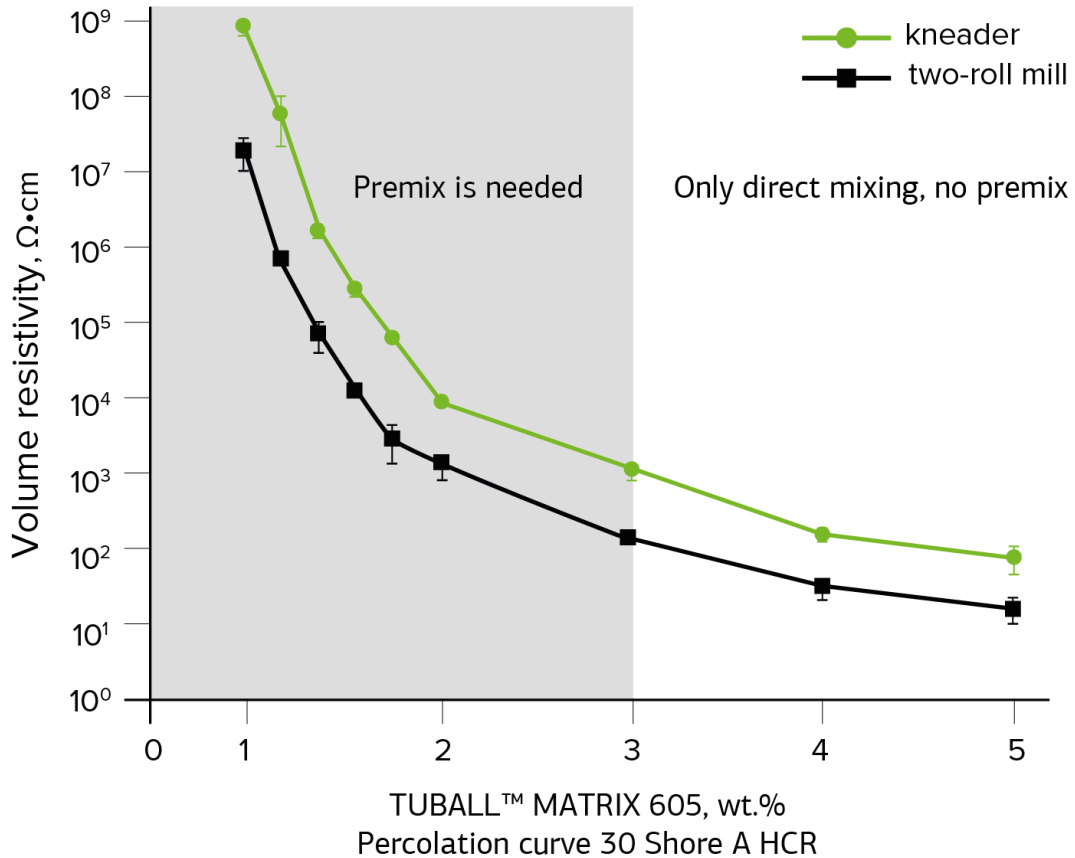


Figure 2. Volume resistivity of 30 Hardness HCR silicone with TUBALL™ MATRIX 605 in the range $<10-10^{11}$ $\Omega\cdot\text{cm}$ (sample shape: compression-moulded rubber sheet of 2 mm thickness). Measurements conducted according to ASTM D991/D257 standards.



METHOD OF ADDITION

To enable a well-distributed network of percolating TUBALL™ nanotubes to develop in the silicone matrix, a compounding step of the concentrate is essential.

TUBALL™ MATRIX 605 can be diluted into compounds through the use of standard silicone compounding equipment (two-roll mill, kneader). Other approaches for masterbatch dilution may be used provided that their mixing efficiency is sufficient. More information about the key parameters for masterbatch dilution and compound processing can be found in the “Processing Guidelines for TUBALL™ MATRIX 605 for High Consistency Silicones”.

PACKAGING

Plastic cans (0.1, 0.2, 0.5, 1, 5, 10 kg).

OCSiAl provides TUBALL™ MATRIX 605 test samples in plastic cans (50, 100 or 200 g concentrate).

STORAGE AND TRANSPORTATION

The product is stable in its unopened original packaging when stored under normal temperature conditions. The recommended storage life is up to 18 months when stored as directed.

SAFETY

To ensure safe handling, the appropriate safety regulations should be observed. OCSiAl recommends that every user should be able to apply the safe handling procedures necessary for the user's applications before any handling or manufacturing takes place. A Safety Data Sheet outlining the hazards and handling methods for TUBALL™ MATRIX is available.

WARRANTIES AND DISCLAIMER

The Products correspond to the chemical composition indicated in the Technical Data Sheet and the Safety Data Sheet supplied with the Product. The information contained in this document (Information) is based on trials carried out by OCSiAl and may contain inaccuracies or errors that could cause injury, loss or damage.

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CONTACT INFORMATION

ASIA		EUROPE	NORTH & SOUTH AMERICA
<p>KOREA Office 208, Pilot Plant bld. 12, Gaetbeol-ro, Yeonsu-gu, Incheon 21999, Republic of Korea +82 32 260 0407 asiapacific@ocsial.com</p> <p>HONG KONG Room 701, 7/F, Tower 2, Silvercord, 30 Canton Road, Tsim Sha Tsui, Kowloon, Hong Kong +852 3180 9317</p> <p>JAPAN Kusumoto Chemicals Ltd.: Kusumoto bld., 1-11-13 Uchikanda Chiyoda-ku, Tokyo, Japan 1010047 +8103 3292 8685 info_tuball@kusumoto.co.jp</p>	<p>INDIA A504 Universal Business Park, Ansa Industrial Estate, Chandivali, Andheri (E), Mumbai, 400072, India +91 22 4120 8615 india@ocsial.com</p> <p>CHINA #2004, 20th Floor, Block B, Dachong Business Centre, No. 9678, Shennan Road, Nanshan District, Shenzhen, Guangdong, China +86 135 9012 5295</p> <p>Room B8, Naked Hub, bld. 1, No. 818, Shenchang Road, Minhang District, Shanghai, China china@ocsial.com</p>	<p>LUXEMBOURG 1 Rue de la Poudrerie L-3364 LEUDELANGE Grand-Duche de Luxembourg +352 27990373 europe@ocsial.com</p> <p>RUSSIA 29, bld. 2, Kalanchevskaya str., Moscow, 107078 +7 499 653 5152</p> <p>24, Inzhenernaya str., Novosibirsk 630090, Russia +7 383 201 8387 russia@ocsial.com</p>	<p>USA 500 S Front str., Suite 860, Columbus, OH 43215 +1 415 906 5271 usa@ocsial.com</p>