TUBALL™ MATRIX 605

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} Ω·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	Test method	Value
Concentrate carrier	–	Siloxanes and Silicones vinyl group-terminated
Colour and appearance	–	Black paste
Density at 25 °C	DIN 51757	Approx. 0.91 g/ml
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} Ω·cm (sample shape: compression-moulded rubber sheet of 2 mm thickness). Measurements conducted according to ASTM D991/D257 standards.

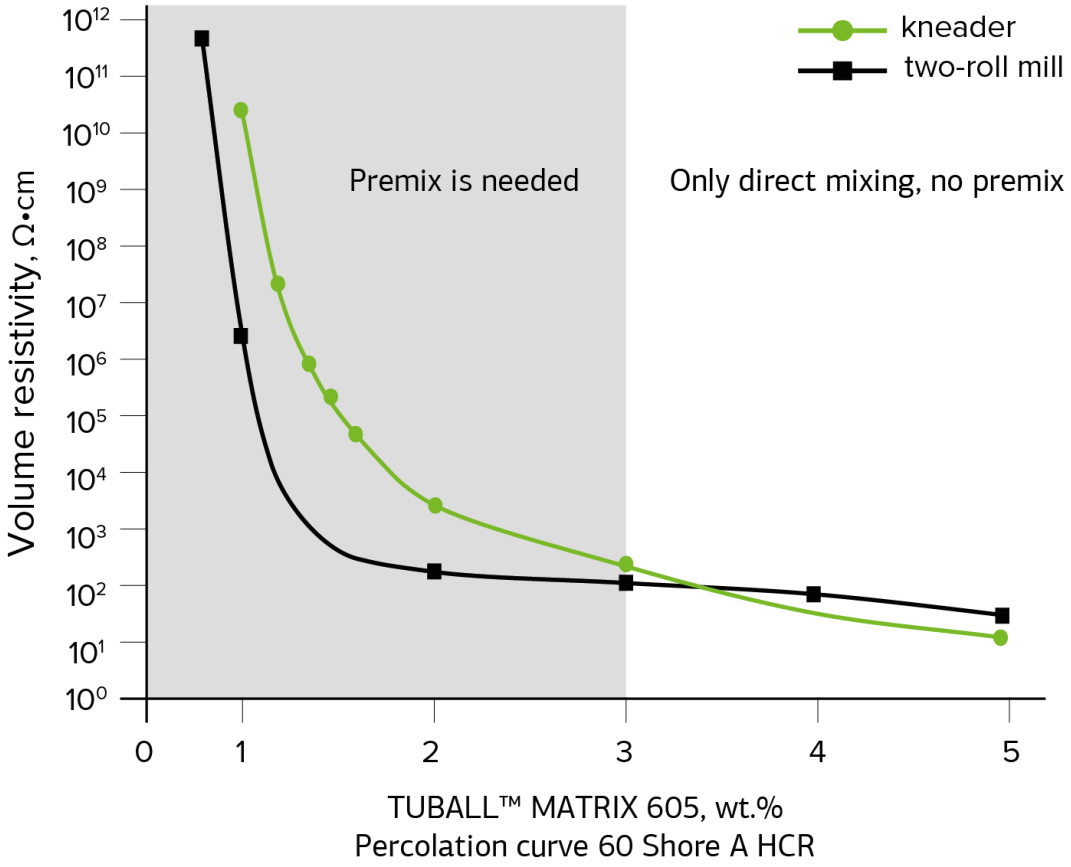
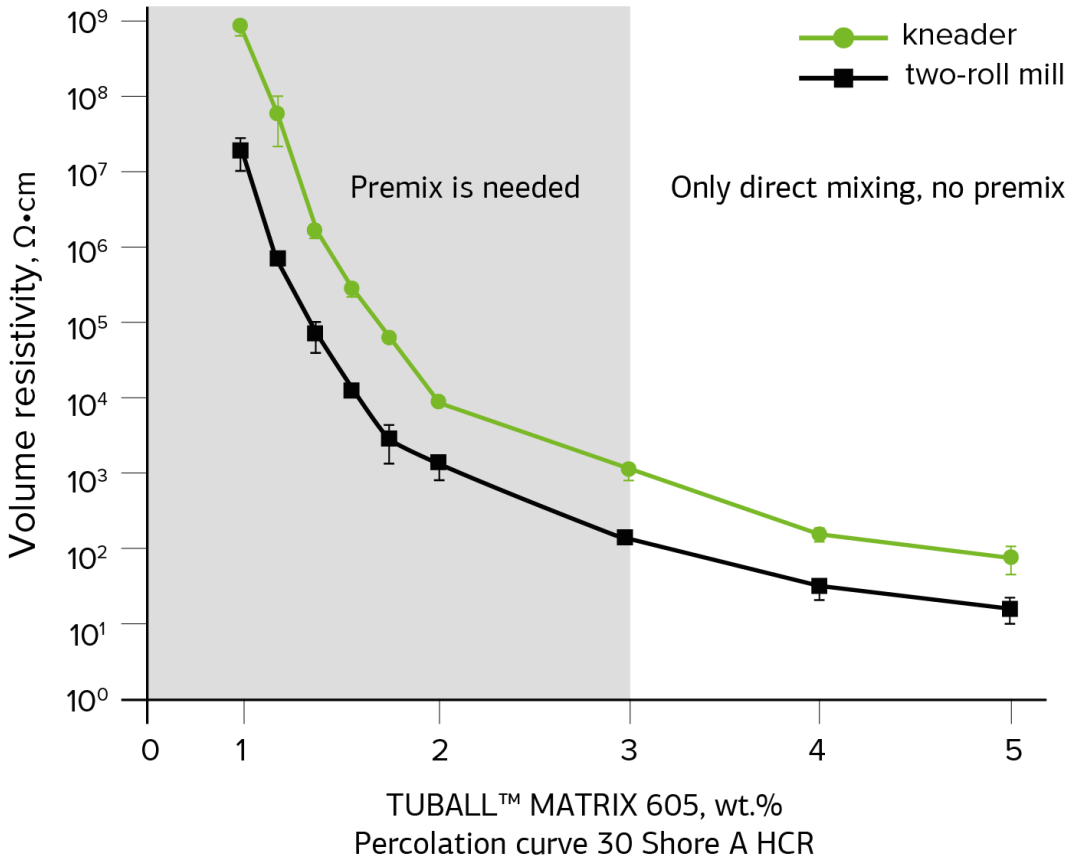


Figure 2. Volume resistivity of 30 Hardness HCR silicone with TUBALL™ MATRIX 605 in the range <10–10^{11} Ω·cm (sample shape: compression-moulded rubber sheet of 2 mm thickness). Measurements conducted according to ASTM D991/D257 standards.



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 12 month 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 Material 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 Material 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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