TUBALL™ MATRIX

PROCESSING GUIDELINES

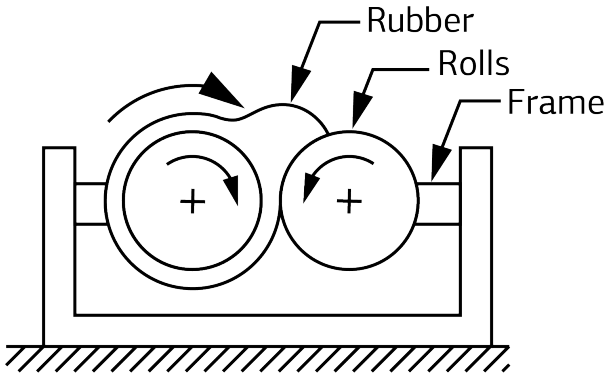
for **TUBALL™ MATRIX**
608 beta, 621 beta, 622 beta
for FKM

RECOMMENDATIONS ON USE OF TUBALL™ MATRIX

MIXING EQUIPMENT

The optimal mixing option is introduction of TUBALL™ MATRIX into 2-roll mill. The 2-roll mill is useful for creating the high shear strain that is needed for dispersion of small particles such as nanotubes.

Figure 1. 2-roll mill



DILUTION PRINCIPLES

Recommended dosage

Two types of formulation based on silica and carbon black was tasted with using the same dosage of TUBALL™ MATRIX 608 beta.

Examples of calculating the concentration of TUBALL™ MATRIX in a rubber compound are shown below.

Sample description	Reference (Silica), phr	TUBALL™ MATRIX 608 beta 3 wt.% (Silica), phr	Reference (Carbon black), phr	TUBALL™ MATRIX 608 beta 3 wt.% (Carbon black), phr
A200SC FKM Gum	100	100	100	100
HF-5# curinq agent	2.04	2.0	2.04	2.04
Carbon black N990	-	-	30.6	30.6
FRT3018-mixed filler	30.6	30.6	-	-
TUBALL™ MATRIX 608 beta	-	4.5	-	4.5
NICC5000 $Ca(OH)_2$	6.1	6.1	6.1	6.1
ST 150 MgO	3.06	3.06	3.06	3.06
WS280 release aqent	1.02	1.02	1.02	1.02
Functional chemicals	2.04	2.04	2.04	2.04
Total	144.86	149.36	144.86	149.36

It is recommended that laboratory tests be carried out to study the effect of intermediate concentrations on the properties of samples in order to optimize the formula used. The most efficient working concentration of TUBALL™ MATRIX 608 beta needs to be determined directly at the production facility, as it depends on the purpose of the prepared rubber mixture and on the process.

Introduction sequence

It is recommended to add TUBALL™ MATRIX at the 2nd mixing stage into 2-roll mill.

COMPOUNDING*

A slightly increased mixing time could be required to improve dispersion of TUBALL™ MATRIX (see example below):

Raw materials	TUBALL™ MATRIX add in 2nd step
Gum-A200SC	Plasticate Gap 2 cm 10 times Gap 1.5 cm twice Gap 1 cm once Gap 0.5 cm package roller 3 min Cut rubber: 2-3 min
Add curing agent HF-5#	Cut rubber: 1 min
Add Filler mixutre- FRT3018/ CB N990	Add filler: 5 min
Add NICC5000,ST150, WS280 and wax	Add additives: 6 min Cut rubber: 5 min Narrow gap 0.7 mm mill: 7 times Gap 1 cm: once - take out rubber
Add TUBALL™ MATRIX 608 beta (2nd step)	Gap 2 cm: 3 times Gap 1 cm: once Gap 0.5 cm: twice Gap 0.2 cm: 3 times Narrow gap 0.7 mm mill: 7 times Gap 3 mm: once - take out rubber

*Compounding process performed at FUSUN TECH laboratory.

Determination of performance from TUBALL™ MATRIX

The complex of rubber properties can be determined according to the following international standards:

ASTM D 412 – Strength indices;
ASTM D 2240 – Shore A hardness;
ASTM D 395 – Compression set;
ASTM D 257, D 991 – Electrical resistance;
ASTM D 5289 – Rheometric data;
ASTM D 5963 – Abrasion indices;
ASTM D 624 – Tear strength, etc.

If there are special requirements for the rubber, or other operational needs, other tests as defined by the user might need to be conducted.

NOTE. Adjustment of oil/plasticizer content in formulation

The total plasticizer content will be increased with TUBALL™ MATRIX addition compared with the reference compound. Depending on the dosage of TUBALL™ MATRIX, the plasticizer content may be adjusted in order to avoid a significant impact on stiffness and compression set to optimize the final properties.