Replay 33K

Revet

CHARACTERISTICS OF THE MATERIAL

STEREO MICROSCOPIC OBSERVATION

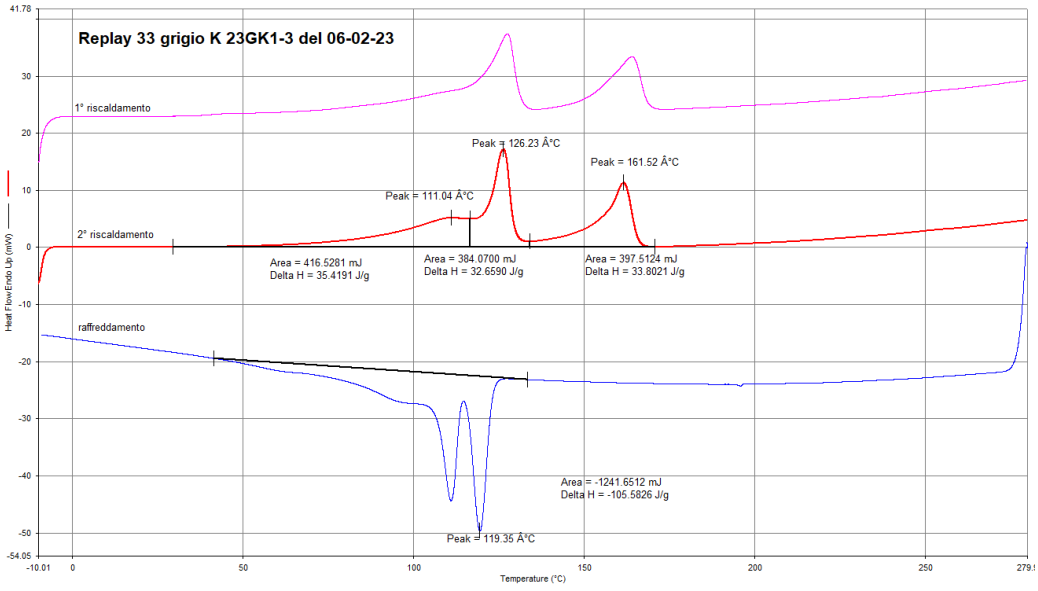
The figure below shows the product and stereo microscopic observation of the cutting surface of a **Replay 33K** sample.

DSC ANALYSIS

The **Replay33K** granules were analyzed by DSC with the following thermal program:

- 1° heating from -10°C a 280°C, 20 °C/min in N_2
- Cooling from 280°C a -10°C, -20 °C/min in N_2
- 2° heating from -10°C a 280°C, 20 °C/min in N_2

The figure below shows the DSC thermogram of **Replay 33K.**



Replay 33K thermogram

The DSC analysis shows that the **Replay 33K** granule is composed by of three main polymers, such as LDPE, HDPE and PP as demonstrated by the three different melting points in the thermogram. The table shows the indicative percentages calculated based on the fusion enthalpy.

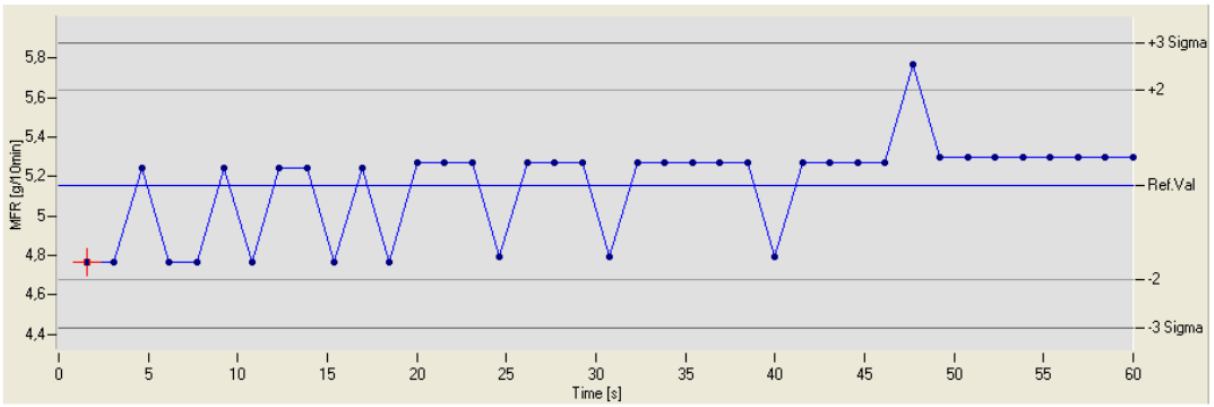
Replay 33K	
	% in the blend (*)
LLDPE/LDPE	30
HDPE	30
PP	≥ 35

Composition of Replay 33K (*) The reported components percentages are indicative

MELT FLOW RATE (MFR)

A MFR analysis was carried out on the **Replay 33K** granules according to the ASTM D1238A standard with a weight of 2.16 kg. The analysis was performed at **230 °C**, preheating the sample for 180 seconds and recovering the material for 60 seconds. The instrument also measures the Melt Volume Rate (MVR) during the test.
The average results of MFR and MVR are reported in the table below

Sample	MFR (Average data)	MVR (Average data)
Replay 33K	**5** g/10 min	5,70 ± 0,25 cm^3/10 min



Trend of the MVR as a function of time for the sample of Replay 33K at 230 °C

ASH ANALYSIS

The ashes were analyzed in accordance with the ISO 3451 standard and they were analyzed also by FT-IR spectroscopy. The analysis shows the presence of **inorganic salts, silicates and calcium oxide**. The table shows the results of the quantitative analysis carried out on the **Replay 33K.**

Sample	% Ashes (Average data)
Replay 33K	2,2

Average result for ashes determination

MOISTURE ASSESSMENT

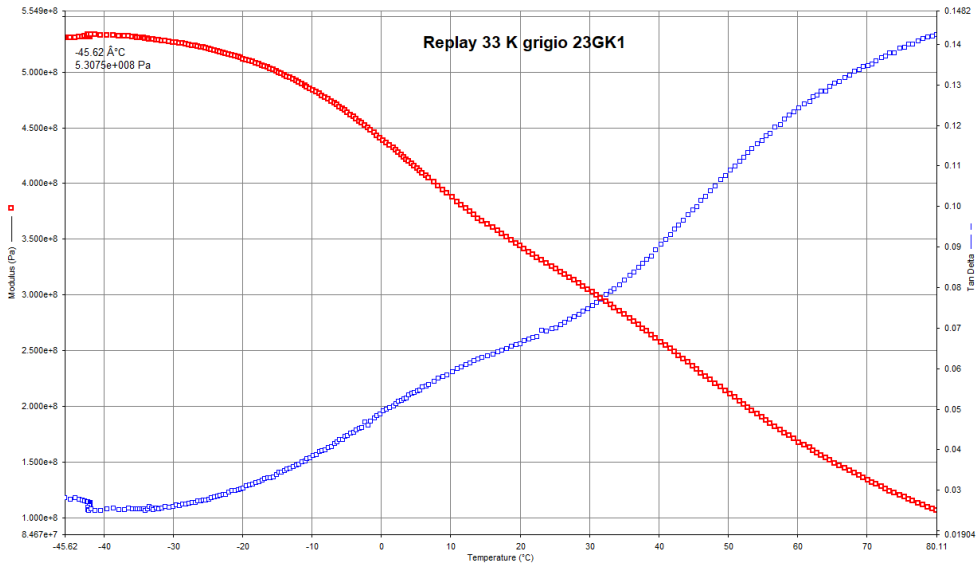
The moisture assessment was performed following the UNI 10667-16 standard. A **Replay 33K** sample was dried into an oven at 100°C for 8 h. The residual moisture in the granules was less/equal to 0.2%

Sample	% Moisture (Average data)
Replay 33K	≤ 0.2

Average values of moisture in the Replay 33K granules

DMA Analysis

The sample of **Replay 33K** was analyzed by DMA in single cantilever mode with an oscillation frequency equal to 1Hz, according in a range of temperature between a thermal program -50 °C to 80 °C at 5 °C/ min.



DMA graph of Replay 33K, storage modulus E' in red ,TanDelta in blue

The **Replay 33K** has an initial storage modulus E' equal to 9.28E+08 Pa. The glass transition temperature is not visible in the analyzed temperature range.

TECHNICAL DATA SHEET

Replay 33K- polyolefins blend

Property	Test method	Test conditions	Unit of measurement	Typical value
PHYSICAL				
Density	ASTM D 792-91	23°C	g/cm^3	0,949
Melt Flow Rate (MFR)	ASTM D 1238A	230/2,16	g/10 min	5
Ash percentage	ISO 3451		%	2.2
Moisture percentage	UNI 10667-16		%	≤ 0.2
MECHANICAL				
Izod impact strength test	ISO 180A	23°C	KJ/m^2	7,2 ± 0,8
Izod impact strength test	ISO 180A	-20°C	KJ/m^2	2,3± 0,5
Bending modulus of elasticity	ISO 178		N/mm^2	713
Tensile strength modulus of elasticity	ISO 527		N/mm^2	845
THERMAL				
HDT Heat Deflection Temperature	ASTM D 648-96		°C	nd
VICAT Heat penetration index	ASTM D 1525-96		°C	nd
Melting point (for each mixture peak)	ASTM D 3418-97		°C	165
MOLDING CONDITIONS				
Barrel temperature			°C	109-220
Mould temperature			°C	30-60
Drying temperature			°C	60-80
Drying time			h	4

The product complies with the UNI 10667 standard.
The data shown are the average values of a significant sample of the product and are provided to supply information to the user; they do not constitute any warranty and do not imply in general terms any guarantee or commitment by the Company. The mean value obtained in the tensile tests have a confidence interval established at 95% of the mean value.

COMPLIANCE OF THE MATERIAL WITH THE REACH REGULATION

The table shows the results of the analysis performed on the sample to assess **Replay 33K** compliance with the Reach Regulation.

Parameter	Unit of measurement	Method	Result	Notes
PCB (PCB (polychlorinated biphenyl))	mg/kg	EPA 3550C EPA8270E	<1	/

CHLOROPARAFFINS		EPA 3550C EPA8270E		
C10-C13	mg/kg		<10	Substances included in the Candidate List
C14-C17	mg/kg		/	
C18-C20	mg/kg		/	/

PHTHALATES		EPA 3550C EPA8270E		
DI-N-BUTYL PHTHALATE (DBP)	mg/kg		<50	< 1000 (limit for single substance and as a sum in articles intended for children - All XVII Reach-)
DI - ISOBUTYL PHTHALATE (DIBP)	mg/kg		<50	
BENZYL BUTYL PHTHALATE (BBP)	mg/kg		<50	
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	mg/kg		72	
DI-ISO NONIL PHTHALATE (DINP)	mg/kg		<50	< 1000 (limit for single substance in articles intended for children -All XVII Reach-)
DI-ISO DECIL PHTHALATE (DINP)	mg/kg		<50	
DI-N -OCTIL PHTHALATE (DNOP)	mg/kg		<50	

POLYCYCLIC AROMATIC HYDROCARBONS (IPA)		EPA 3550C EPA8270E		
NAPHTALENE	µg/kg		<100	/
ACENAPHTHYLENE	µg/kg		<100	/
ACENAPHTHENE	µg/kg		<100	/
FLUORENE	µg/kg		<100	/
PHENANTHRENE	µg/kg		<100	/
ANTHRACENE	µg/kg		<100	/
FLUORANTHENE	µg/kg		<100	/
PYRENE	µg/kg		<100	/
BENZ(a)ANTHRACENE	µg/kg		<100	< 1000 (limit for single rubber or plastic substance, <500 if intended for articles for children - All XVII Reach)
CHRYSENE	µg/kg		<100	
BENZO(b)FLUORANTHENE	µg/kg		<100	
BENZO(k)FLUORANTHENE	µg/kg		<100	
BENZO(j)FLUORANTHENE	µg/kg		<100	
BENZO(e)PYRENE	µg/kg		<100	
BENZO(a)PYRENE	µg/kg		<100	
PERYLENE	µg/kg		<100	
INDENO(1,2,3-cd)PYRENE	µg/kg		<100	/
DIBENZ(a,h)ANTHRACENE	µg/kg		<100	/
BENZO(g,h,i)PERYLENE	µg/kg		<100	/
DIBENZO(a,l)PYRENE	µg/kg		<100	/
DIBENZO(a,e)PYRENE	µg/kg		<100	/
DIBENZO(a,i)PYRENE	µg/kg		<100	/
DIBENZO(a,h)PYRENE	µg/kg		<100	/

HEXAVALENT CHROMIUM (CR VI)	mg/kg	EPA 3060A EPA 7196A	1,9	158 (cautionary limit established on the inclusion of lead chromate in the SVHC)

HEAVY METALS			<10,5	/

ANTIMONY	mg/kg	UNI EN 13657 UNI EN ISO11885	<24,3	198 (cautionary limit established on the inclusion of diarsenic pentaoxide in the SVHC)
ARSENIC	mg/kg	UNI EN 13657 UNI EN ISO11885	3,6	10 (specific limit for plastic materials -all XVII Reach-)
CADMIUM	mg/kg	UNI EN 13657 UNI EN ISO11885	4,1	/
CHROMIUM	mg/kg	UNI EN 13657 UNI EN ISO11885	<1,7	If the detection limit of the method is exceeded, an in-depth analytical analysis is necessary for the evaluation of the single specific applicable limits
MERCURY	mg/kg	UNI EN 13657 EPA 6010C	<7,5	
NICKEL	mg/kg	UNI EN 13657 UNI EN ISO11885	<13,2	158 (cautionary limit established on the inclusion of lead chromate in the SVHC)
LEAD	mg/kg	UNI EN 13657 UNI EN ISO11885	18,9	/
COPPER	mg/kg	UNI EN 13657 UNI EN ISO11885	<22,0	/
SELENIUM	mg/kg	UNI EN 13657 UNI EN ISO11885	<10,5	/
TIN	mg/kg	UNI EN 13657 UNI EN ISO11885	<10,5	/
TELLURIUM	mg/kg	UNI EN 13657 UNI EN ISO11885	<26,0	/
ZINC	mg/kg	UNI EN 13657 UNI EN ISO11885	88,8	/

APPLICATION EXAMPLES AND CURRENT PROJECTS

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