
Refill N

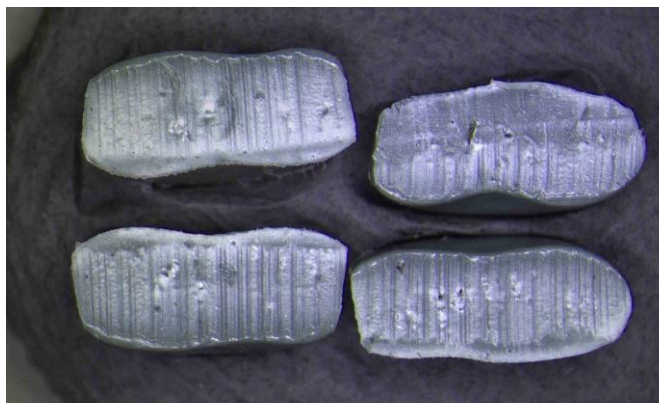
Technical Data Sheet



CHARACTERISTICS OF THE MATERIAL

STEREO MICROSCOPIC OBSERVATION

The figure below shows the product and the stereo microscopic observation of the cutting surface of the **Refill N**.

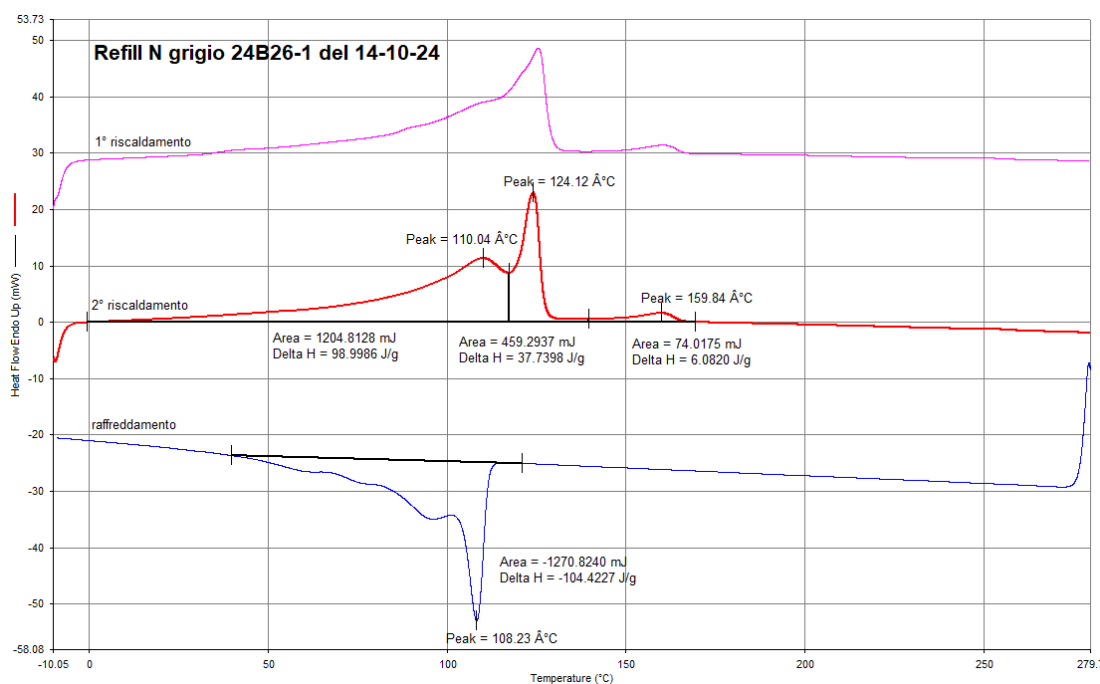


DSC ANALYSIS

The **Refill N** material was analyzed by DSC with the following thermal program:

- 1° riscaldamento from -10°C a 280°C , $20^{\circ}\text{C}/\text{min}$ in N_2
- Cooling from 280°C a -10°C , $-20^{\circ}\text{C}/\text{min}$ in N_2
- 2° riscaldamento from -10°C a 280°C , $20^{\circ}\text{C}/\text{min}$ in N_2

The figure below shows the DSC thermogram relating to the **Refill N** samples



Refill N thermogram

The DSC analysis shows that the **Refill N** 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.

Refill N	
	% in the blend (*)
LLDPE/LDPE	65
HDPE	30
PP	5

Composition of Refill N () The reported components percentages are indicative*

MELT FLOW RATE (MFR)

A MFR analysis was carried out on **Refill N** granules according to the ASTM D1238A standard with a weight of 2.16 kg. The analysis was performed at **190 °C**, preheating the sample for 180 seconds and recovering the material for 60 seconds. The average result of MFR is reported in the table below.

Sample	MFR (Average data)
Refill N	0.9 g/10 min

Average result of MFR

MOISTURE ASSESSMENT

The moisture assessment was performed following the UNI 10667-16 standard. A **Refill N** 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)
Refill N	≤ 0.2

Average values of moisture in the Refill N granules

ASH ANALYSIS

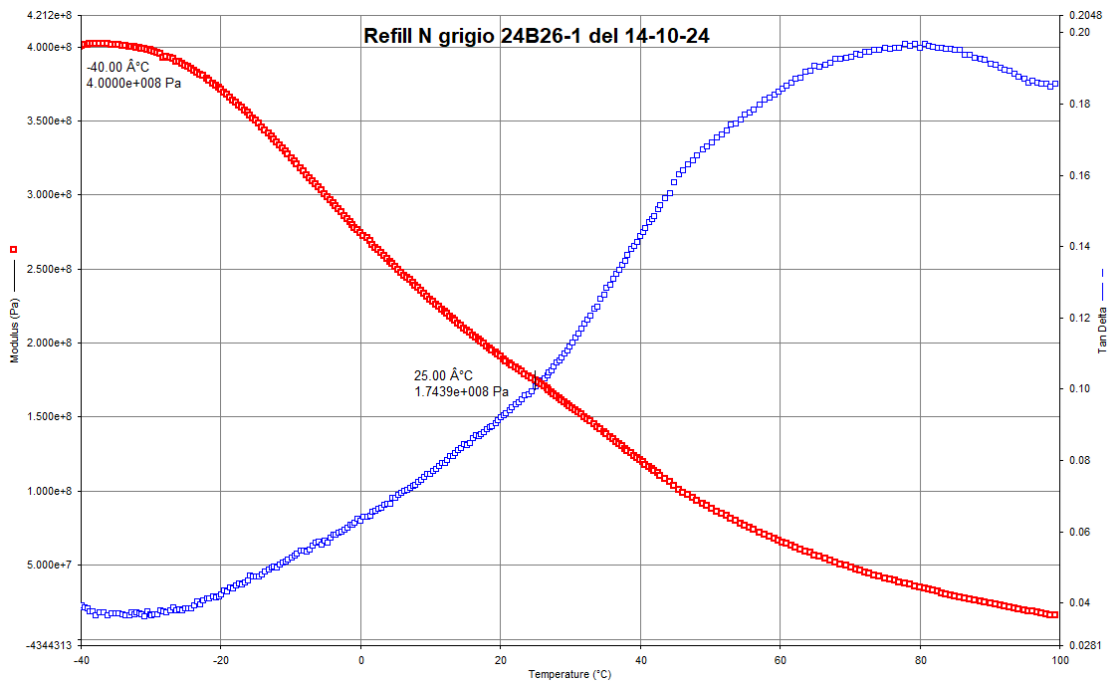
The ashes were analyzed in accordance with the ISO 3451 and they were analyzed also by FT-IR spectroscopy. The analysis shows the presence of **inorganic salts, silicates and calcium oxide**. The table shows the results of the quantitative analysis carried out on the **Refill N**.

Sample	% ashes (Average data)
Refill N	2,3

Average result for ashes determination

DMA ANALYSIS

The sample of **Refill N** 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 -40 °C to 100 °C at 5 °C/ min.



DMA graph of Refill N, the red curve indicates the storage modulus E' blue curve the TanDelta

The **Refill N** has an initial storage modulus E' equal to 4,00E+08 Pa and a storage modulus E' at 25 °C equal to 1,74E+08 Pa. The glass transition temperature is not visible in the analyzed temperature range.

TECHNICAL DATA SHEET

Refill N – Polyolefins blend

Property	Test method	Test conditions	Unit of measurement	Typical value
PHYSICAL				
Density	ASTM D 792-91	23°C	g/cm ³	0,96
Melt Flow Rate (MFR)	ASTM D 1238A	190/2,16	g/10 min	0,9
Ash percentage	ISO 3451		%	2,3
Moisture percentage	UNI 10667-16		%	≤ 0,2
MECHANICAL				
Izod impact strength test	ISO 180A	23°C	KJ/m ²	40 ± 6,0
Izod impact strength test	ISO 180A	-20°C	KJ/m ²	17 ± 5,0
Bending modulus of elasticity	ISO 178		N/mm ²	331
Tensile strength modulus of elasticity	ISO 527		N/mm ²	378
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	113, 127, 163
MOLDING CONDITIONS				
Barrel temperature			°C	190 - 220
Mould temperature			°C	30-60
Drying temperature			°C	60-80
Drying time			h	4
<p>The product complies with the UNI 10667 standard</p> <p>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.</p>				

COMPLIANCE OF THE MATERIAL WITH THE REACH REGULATION

The table shows the results of the analysis performed on the sample to assess its compliance with the Reach Regulation.

Parameter	Unit of measurement	Method	Result
PCB (polychlorinated biphenyl)	mg/kg	EPA 3550C EPA8270E	<0,31

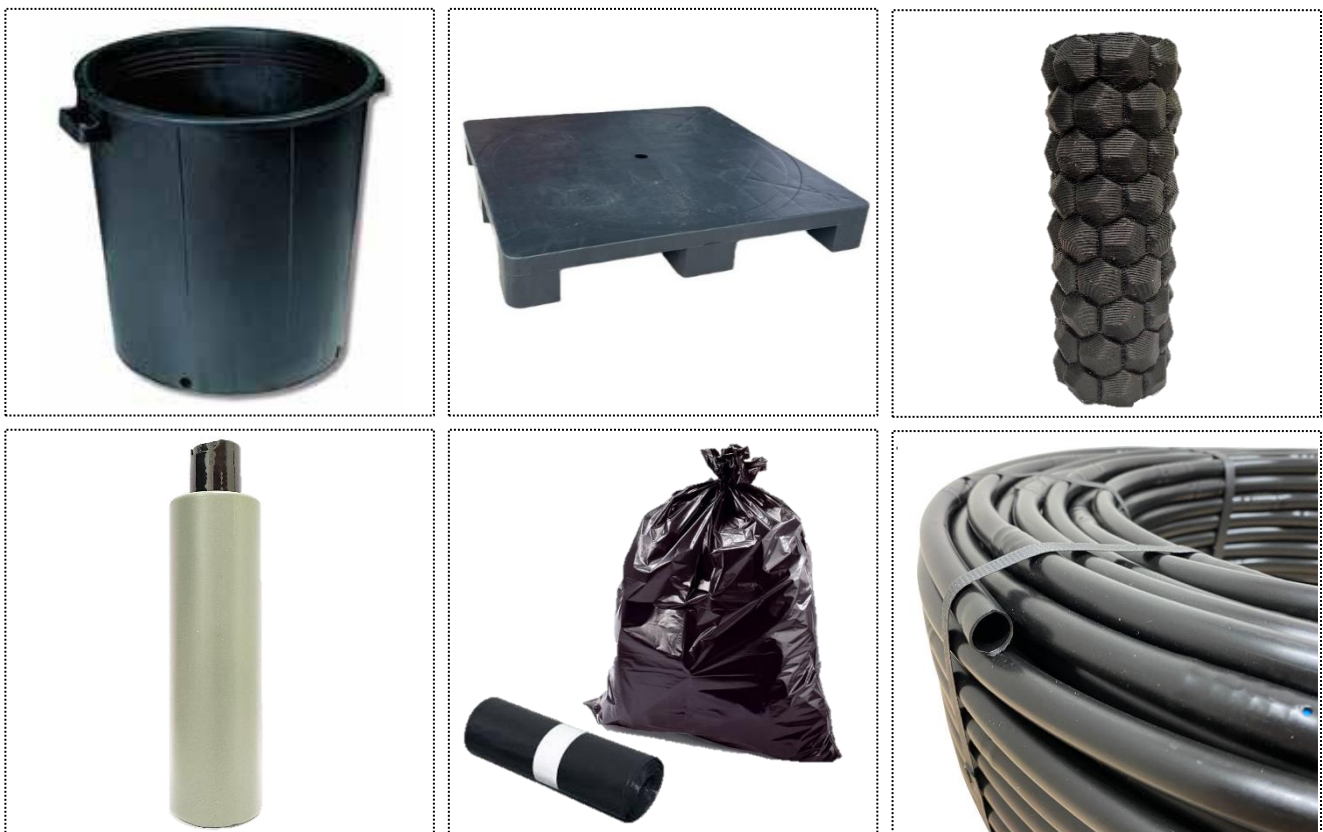
CHLOROPARAFFINS		EPA 3550C EPA8270E	
C10-C13	mg/kg		<10,0
C14-C17	mg/kg		<10,0
C18-C20	mg/kg		<10,0

PHTHALATES		EN ISO 16181-1:2021	
DI-N-BUTYL PHTHALATE (DBP)	mg/kg		<50
DI - ISOBUTYL PHTHALATE (DIBP)	mg/kg		<50
BENZYL BUTYL PHTHALATE (BBP)	mg/kg		<50
BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)	mg/kg		57
DI-ISO NONIL PHTHALATE (DINP)	mg/kg		<50
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
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	ION CHROMATOGRAPHY	38,1
HEAVY METALS			
ANTIMONY	mg/kg	UNI EN 13657 UNI EN ISO11885	<21,1
ARSENIC	mg/kg	UNI EN 13657 UNI EN ISO11885	<19,5
CADMIUM	mg/kg	UNI EN 13657 UNI EN ISO11885	<1,3
CHROMIUM	mg/kg	UNI EN 13657 UNI EN ISO11885	4,0
MERCURY	mg/kg	UNI EN 13657 EPA 6010C	<1,7
NICKEL	mg/kg	UNI EN 13657 UNI EN ISO11885	<3,5
LEAD	mg/kg	UNI EN 13657 UNI EN ISO11885	<15,8
COPPER	mg/kg	UNI EN 13657 UNI EN ISO11885	19,5
SELENIUM	mg/kg	UNI EN 13657 UNI EN ISO11885	<34,0
TIN	mg/kg	UNI EN 13657 UNI EN ISO11885	<10,5
TELLURIUM	mg/kg	UNI EN 13657 UNI EN ISO11885	<28,2
ZINC	mg/kg	UNI EN 13657 UNI EN ISO11885	91,6

APPLICATION EXAMPLES AND CURRENT PROJECTS





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