



## NYGLOS® as a Reinforcement for Polypropylene

### Product Properties

	NYGLOS® M3	NYGLOS® 4W	NYGLOS® 8	NYGLOS® 12	NYGLOS® M15
G.E. Brightness	89	92	90	82	86
Bulk Density (lbs/cu.ft)(g/cc) Loose Tapped	(29.9)(0.48) (41.2)(0.66)	(12.5)(0.20) (22.0)(0.35)	(14.0)(0.22) (30.0)(0.48)	(17.5)(0.28) (37.5)(0.60)	(30)(0.48) (51)(0.82)
Oil Absorption (lbs/100 lbs)	40	75	80	70	42
D50 (µm)	3	4.5	8	12	15
Aspect Ratio (L:D)	5:1	11:1	19:1	13:1	8:1

### General Application Benefits

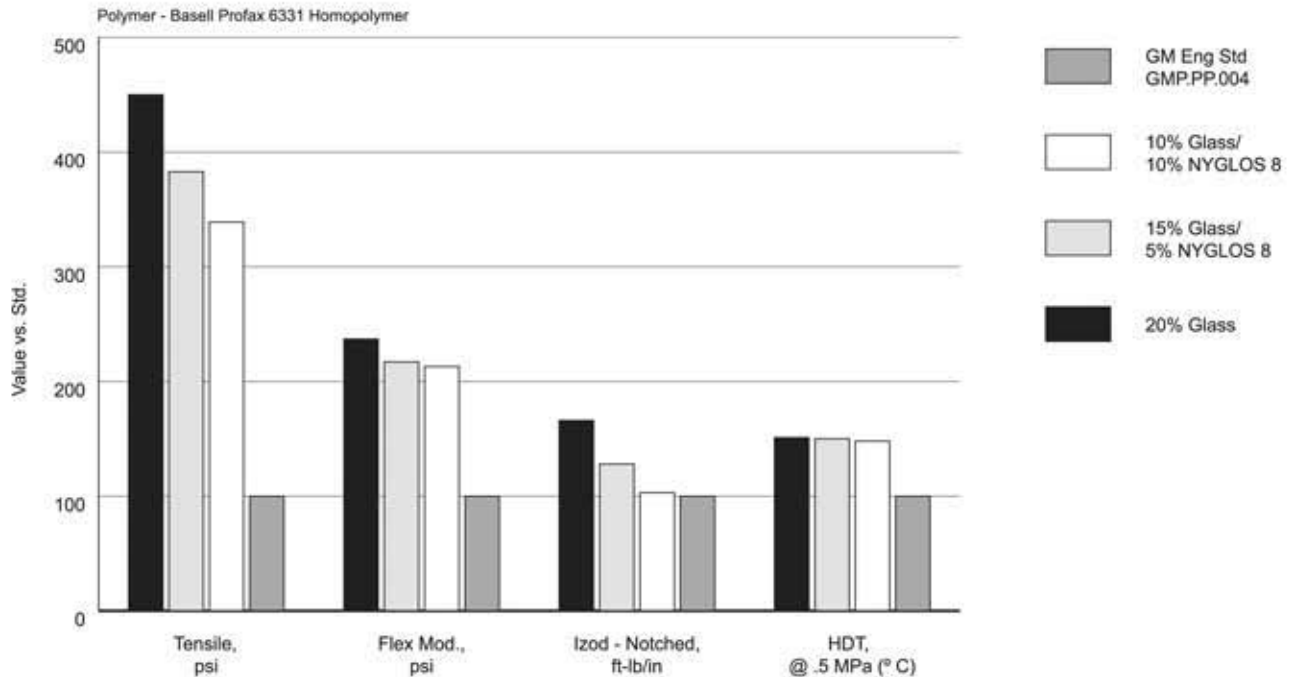
- improved dimensional stability
- cost effective replacement for milled glass fiber
- partial replacement for chopped glass fiber
- heat sag resistance
- increased flexural strength
- excellent balance in stiffness and impact
- comparable shrinkage at lower loadings
- improved mar, scratch and gouge resistance
- lower coefficient of linear thermal expansion (no-gap)
- improved heat distortion temperature
- improved torsional shear modulus
- improved creep resistance
- Class A surface appearance/E-Coat compatible
- non-toxic, odorless material

This data contains general information and describes typical properties only. It is offered for use by persons qualified to determine for themselves the suitability of our products for particular purposes. No guarantee is made or liability assumed, the application of this data and the products described herein being at the sole risk of the user.

## Polypropylene - NYGLOS® 8 Partial Replacement/Chopped Glass Fiber

### Benefits

- Savings and improved surface
- Extension of chopped glass with NYGLOS 8 reduces physical properties
- Properties must meet or exceed typical OEM engineering standard



## NYGLOS® 8 vs. Talc (1.8µ) Polypropylene CoPolymer Interior Hard Trim

### Benefits at reduced loading levels:

- similar stiffness and impact
- similar mold shrinkage
  - reduced density
  - improved mar & scratch resistance

Properties	Units	Talc	NYGLOS® 8	
Melt Flow	g/10 min	35.1	36.6	29.4
Density		1.005	0.973	1.003
Ash Content	%	15.1	5.2	15.1
Tensile Strength @ Yield	Mpa	33.6	33.6	34.0
Tensile Elongation @ Break	%	39.0	47.0	27.0
Flexural Strength	Mpa	50.3	43.9	50.0
Flexural Modulus (Auto Young)	Mpa	2358	1899	2696
Flexural Modulus (Man Young)	Mpa	2677	2151	3152
Izod Impact @ 23°	J/m	29.5	30.9	27.5
Izod Impact @ -30°	J/m	20.2	21.7	24.1
Hardness	R-Scale	95.5	96.0	96.8
HDTUL @ 1.82 Mpa	°C	88.7	78.9	96.8
HDTUL @ 0.455 Mpa	°C	139.0	129.1	138.8
Scratch Vis. (FLTM BN108-13)	Newtons	<7	<15	<10
Mold Shrinkage – Mold	Xmm/1000mm	9.97	11.77	7.93
Mold Shrinkage – Transverse	Xmm/1000mm	11.10	13.12	12.05
Mold Shrinkage – Overall	Xmm/1000mm	10.54	12.45	9.99
Talc	%	15.00		
NYGLOS® 8	%		5.00	15.00

## High Impact Polypropylene CoPolymer Interior Hard Trim

Sample No.	11	12	13	14	15	16	17
PP Copoly Int. 1	80	80	90	85	80	90	85
Talc - 2 $\mu$	20						
NYGLOS 8		20	10	15			
NYGLOS 4W 10992					20	10	15
TESTS, Units:							
Ash Content, MW (620/15), %	20.8	21.7	11.2	15.2	19.3	10.1	14.9
Tensile Strength @ Break, MPa	16	16	15	15	17	15	16
Tensile Strain @ Break	41.5	20.8	75.3	72.5	165.1	273.2	204.7
Flex, Secant Modulus, MPa	1580	2007	1461	1704	1837	1400	1687
Flex, Peak Stress, MPa	33	34	30	32	34	30	32
Impact Resistance, Notched Izod @ RT, J/m	231	141	288	207	435	554	490
Gardner Impact @ RT	187	134	174	159	230	250	240
Melt Flow Rate	27.7	29.8	33.2	32.6	36.3	35.0	33.8

### Preliminary Shrinkage Data Points

Sample No.	11	12	13	14	15	16	17
PP Copoly Int. 1	80	80	90	85	80	90	85
Talc - 2 $\mu$	20						
NYGLOS 8		20	10	15			
NYGLOS 4W 10992					20	10	15
Tool = 2.998 x 2.003							
Length	2.964	2.968	2.973	2.980	2.974	2.967	2.971
Width	1.973	1.964	1.978	1.980	1.978	1.977	1.975
Tool - L	0.034	0.03	0.025	0.018	0.024	0.031	0.027
Tool - W	0.03	0.039	0.025	0.023	0.025	0.026	0.028
Shrink (in./in.) LENGTH	0.0113	0.01	0.0083	0.006	0.008	0.0103	0.009
Shrink (in./in.) WIDTH	0.015	0.0195	0.0125	0.0115	0.0125	0.013	0.014
Ratio - L/W	0.757	0.514	0.668	0.523	0.641	0.797	0.644

## Homo-Polymer Polypropylene Appliance Data

Batching, %	80/20	80/20	80/20	80/20
Resin	AMOCO 4018	AMOCO 4018	ARISTECH FP 200S	ARISTECH FP 200S
Minerals	TALC	NYGLOS <sup>®</sup> 12	CALCIUM CARBONATE	NYGLOS <sup>®</sup> 12
<b>Laboratory Test Data</b>				
Tensile Strength, psi, ASTM D-638	2553	2512	2815	4065
<b>Tensile Modulus, psi</b>	289984	<b>325193</b>	282788	<b>429914</b>
Flex Strength, psi, ASTM D-790	7001	6640	8111	8277
Notched Izod, ft-lbs/in at RT, ASTM D-256	282224	279220	308112	324232
Melt Index, 230°C at 2160g, ASTM D-1238	1.9	1.7	0.6	0.5
Specific Gravity, ASTM D-792	11.5	13.3	20.8	21.9
Ash Content, %, ASTM D-229	19.6	19.3	18.3	18.2
<b>Ford Test Method, Bn 108-13 Scratch Visibility Finger #3-3.0 N</b>	2.0 N	<b>3.0 N</b>	5.0 N	<b>6.0 N</b>
Gloss, ASTM E-430, 60°	35.6	66.8	65.1	65.3

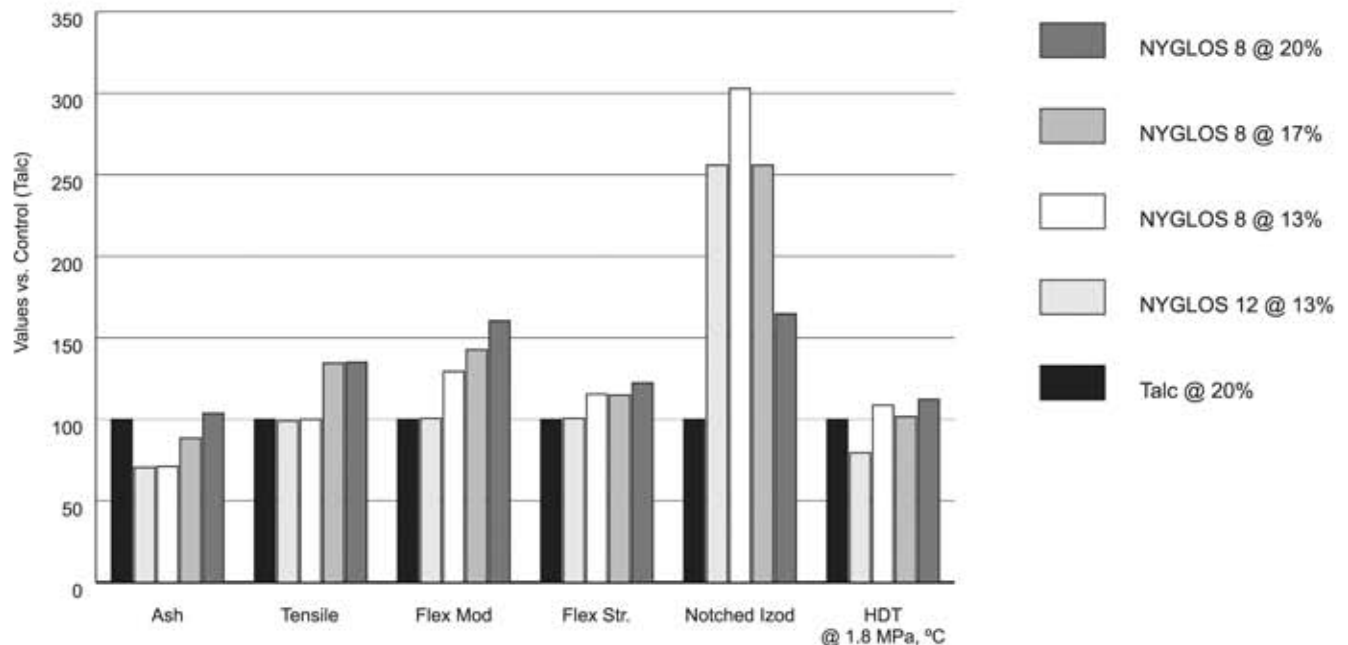
AMOCO 4018 - Melt Index approximately 12.0; Specific Gravity approximately 0.90

Aristech FP 200S - Melt Index approximately 15-20; Specific Gravity approximately 0.90

## Comparison of NYGLOS<sup>®</sup> to 7.5 $\mu$ Talc in PP - CoPolymer @ equal and reduced loading levels

### Benefits:

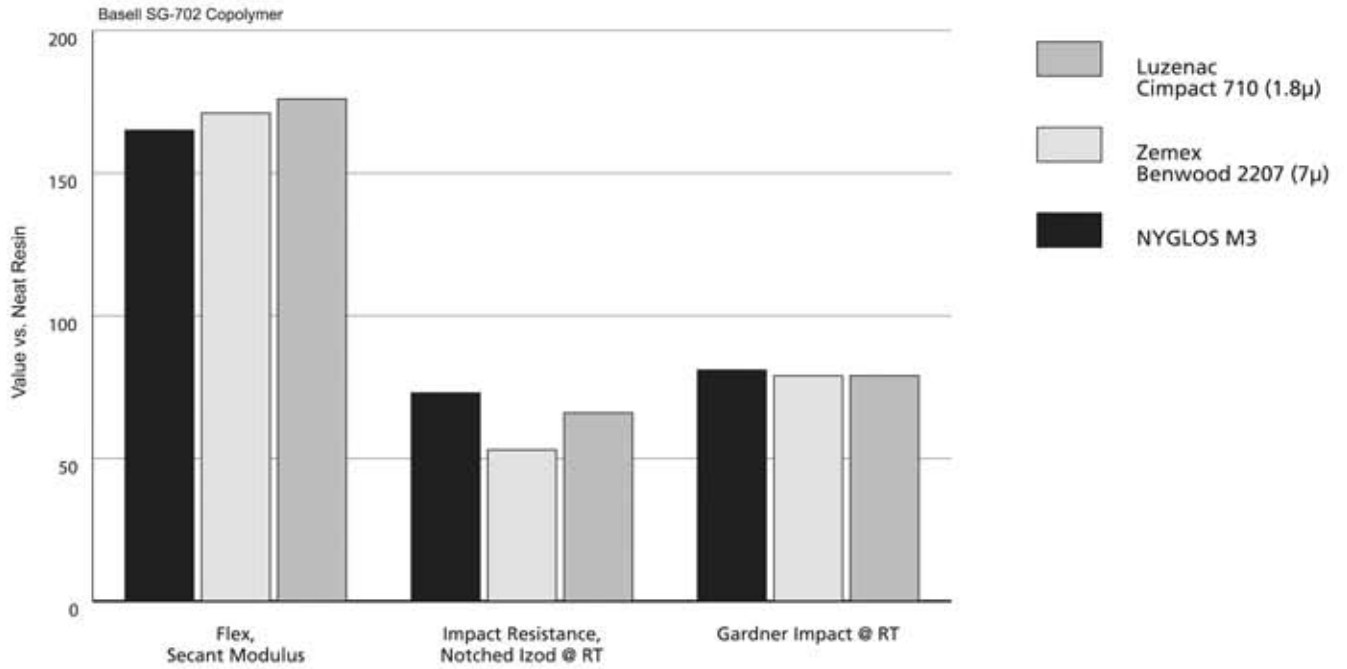
- NYGLOS 8 at 20% loadings improves stiffness and mar & scratch resistance
- NYGLOS 8 at reduced loadings provides equivalent stiffness and better impact properties as well as increased mar & scratch at lower density
- NYGLOS 12 gives equivalent physical properties, improved mar & scratch, at a reduced raw material cost



### Comparison of NYGLOS® M3 to Talc (@ 20% in PP CoPolymer)

**Benefits**

- Improved mar & scratch
  - Lower CLTE
- Equivalent shrinkage (both directions)
  - Priced to compete with fine talc



### Mar & Scratch Resistance in PP

NYGLOS' family provides better balance of physicals and superior mar & scratch resistance

