

VIRO[®] SPECIFICATION WARRANTY

Polymindo Permata, PT provides the Specification Warranty of VIRO[®] products as follows :

- Polymindo Permata, PT warrants that under normal use and proper care, VIRO[®] products will be free from defects of cracking, peeling and breaking for 3 (three) years from time of delivery. The above warranty does not cover failure or damage caused by improper applications, and unreasonable, or abusive use.
- Polymindo Permata, PT warrants that under normal use and proper care, VIRO[®] products are designed to withstand fading, weathering and ageing for 3 (three) years from time of delivery. However, color pigmentation can affect the color consistency of VIRO[®] products, so there may be slight color variations between production batches. Such variations are unavoidable, but Polymindo Permata, PT will exert its best efforts to ensure color consistency and keep the variations to an acceptable level.
- Polymindo Permata, PT will not be liable for incidental, consequential or indirect damages for negligence, infringement of warranty, strict liability or contract arising in connection with VIRO[®] products.
- The customer's sole remedy and Polymindo Permata, PT's sole liability for any claims will be the customer's purchase price.

NOTE : VIRO's test reports are provided by Sentra Teknologi Polimer (Polymer Technology Center), Indonesia, The Productivity and Standards Board (PSB), Singapore and Q-LAB Weathering Research Service, Arizona USA.

IMPORTANT : *This document must be read in conjunction with our conditions of sale. As a condition of a placement of any order, we assume that the customer has fully read and agreed to all of the above conditions.*

Headquarters

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Viro USA

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NINGBO Fanlong Plastics Advance Material Co., LTD

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Zhangting Town, Yuyao City (315410),
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MECHANICAL AND PHYSICAL PROPERTY SPECIFICATIONS OF POLYROD AND POLYPEEL

The mechanical and physical properties of POLYROD and POLYPEEL have been tested by the Sentra Teknologi Polimer (Polymer Technology Center), Indonesia and the Productivity and Standard Board (PSB), Singapore in accordance with the test methods issued by the American Society for Testing and Materials (ASTM) and the International Organization for Standardization (ISO).

The mechanical and physical properties of POLYROD and POLYPEEL have been tested as follows:

MECHANICAL PROPERTY

TYPE OF TEST	VALUE	UNIT	TEST METHOD
Tensile strength	33.44	MPa	ASTM D638 - 98
Elongation at break	772.6	%	ASTM D638 - 98
Tensile modulus	957	MPa	ASTM D638 - 98
Yield stress	24.55	MPa	ASTM D638 - 98
Charpy impact strength	84.80	KJ/m ²	ISO 179 - 97
Shore D hardness (1 second)	67.8		ASTM D 2240 - 95
Shore D hardness (15 second)	58.3		ASTM D 2240 - 95
Vicat softening point (50 N load)	84.25	°C	ASTM D 1525 - 95
Flexural modulus	2,036	MPa	ASTM D790 - 98
Flexural strength	29.24	MPa	ASTM D790 - 98
Compressive strength	169.7	MPa	ASTM D695 - 96
Yield stress (compressive)	48.91	MPa	ASTM D695 - 96
Heat deflection temperature (Heating rate : 120 °C/hour)	46.4	°C	ASTM D648 - 96
Glass Transition Temperature	- 95	°C	Differential scanning Calorimetric analysis (DSC)
Coefficient of thermal expansion (30 - 60 °C)	108	10 ⁻⁶ /K	ASTM E831 - 93
(100 - 113 °C)	750	10 ⁻⁶ /K	ASTM E831 - 93

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PHYSICAL PROPERTY

PROPERTY	VALUE	UNIT	TEST METHOD
Density	0.9545	g/cm ³	ASTM D792 - 98
Flammability (burning rate of sample)	19.9	mm/min	ASTM D635 - 98
Water absorption	51	ppm weight	ASTM D570 - 95
Chemical resistance (change in weight)			
a. Sea water (pH.7.6)	0.0216	%	<u>ASTM D543 - 95</u>
b. Swimming pool water (pH 7.1)	0.0259	%	
c. 2 % detergent (pH 7.6)	0.0115	%	
d. 5 % citric acid	0.0023	%	
e. 5 % NH ₄ OH (ammonium hydroxide)	0.0076	%	
f. 20 % sulfuric acid	0.0006	%	
Chemical resistance (change in volume)			
a. Sea water (pH.7.6)	0.2279	%	<u>ASTM D543 - 95</u>
b. Swimming pool water (pH 7.1)	0.2507	%	
c. 2 % detergent (pH 7.6)	0.4206	%	
d. 5 % citric acid	0.1260	%	
e. 5 % NH ₄ OH (ammonium hydroxide)	0.1426	%	
f. 20 % sulfuric acid	0.2403	%	

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ACCELERATED WEATHERING TEST

Polyrod and Polypeel products were tested for accelerated weathering by the Singapore Productivity and Standards Board in accordance with the test methods issued by the International Organization for Standardization (ISO) and the American Society for Testing and Materials (ASTM). The test condition and results are as follows:

Test Method:

1. ISO 4892- 2: 1994

Test Condition:

Apparatus used : Xenon test Beta LM
 Operating Cycle : 5 mins rain followed by 25 mins rainfree
 Light source (Continuous) : Xenon lamps NXE 2200
 Filter system : Xenochrome 300 in suprax cylinder
 UV irradiance : $80 \pm 5 \text{ W/m}^2$ at 300 to 400 nm
 Black standard temperature : $55 \pm 5^\circ \text{ C}$ (dry cycle)
 Air temperature in test enclosure : $30 \pm 3^\circ \text{ C}$
 Relative humidity in test enclosure : $75 \pm 5\%$
 Test duration : 2000 hours

2. ISO 105A02: 1993

“Grey Scale for Assessing Change in Color”

3. ASTM D523- 89 (Reapproved 1999)

“Specular Gloss”

Geometry: 60°

ACCELERATED WEATHERING (XENON ARC) TEST

Test Duration (Light hours)	<u>Result</u>
1000	No change in color (Grey Scale 5) 99.2% gloss retention
2000	No change in color (Grey scale 5) 3.4% gloss retention

Remarks:

The Grey Scale for assessing color change ranges from 1 to 5:

5: No perceived difference in color between the tested and untested specimens.

1: Greatest contrast in color between the tested and untested specimens.

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FAQ

Q : Is VIRO[®] suitable for year-round outdoor use?

A : Yes. VIRO[®] is designed to be insensitive to temperature differences ranging from -70° to 80° C.

Q : Won't the color of VIRO[®] fade?

A : No. VIRO[®] fiber won't fade, even if it's exposed to extreme weather conditions during summer and winter. It's been proven in laboratory tests that VIRO[®] can withstand UV exposure for three years.

Q : Is VIRO[®] safe for the environment?

A : Yes. VIRO[®] fiber is made from polyethylene, which is non-toxic (even when burned, no toxic substances are generated) and 100% recyclable.

Q : Does VIRO[®] require special cleaning and maintenance?

A : No special maintenance is required. Simply clean using a wet cloth. an occasional cleaning using soap or a mild detergent is also recommended.

Q : Does VIRO[®] offer a broad range of colors, shapes and textures?

A : Yes! VIRO[®] offers many different choices for our customers.

Q : Can we put VIRO[®] in outdoor for the whole year?

A : Yes, VIRO[®] is designed to be insensitive to temperature differences ranging from - 70 °C to 80 °C

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