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Properties of PPC (Colymer Sheets)*

(Neutron Shielding Material)

	PPC-V	PPC-B
Specific Gravity	.940 g/cc^3 minimum	.955 g/cc^3 minimum
Hydrogen Concentration	12.4% minimum	12.0% minimum
Carbon plus Hydrogen Concentration	99.0% minimum	96.2% minimum
Boron Concentration	-------	2% +.7% -.2%
Thermal Stability - After 24 Hours @ 550° F	Shall not melt, flow, crack, blister, bulge or otherwise distort.	Shall not melt, flow, crack, blister, bulge or otherwise distort.
Weight Loss - After 24 Hours @ 550° F	1.5% maximum	1.5% maximum
Thermal Expansion		
70° F to 350° F Thickness	2.4 x 10^{-4} in/in/F	2.4 x 10^{-4} in/in/F
70° F to 350° F Width & Length	1.5 x 10^{-4} in/in/F	1.5 x 10^{-4} in/in/F

* Typical properties.

Properties of PPC (Copolymer Sheets)*

(Neutron Shielding Material)

(continued)

Additional Features:

1. Excellant neutron attenuation
2. High temperature stability 350° F Continuous with spikes to 600° F
3. Low weight loss at high temperatures - 1.5% after 1300 Hours
4. Stability to large doses of radiation -10^9 RADS
5. Low specific gravity .945g/cc^3
6. Superior chemcal resistance
7. Machinable with woodworking tools

Additional considerations for neutron shielding

A. Neutron attenuation capability/Hydrogen content

1. Composition of PPC-B contain 2% Boron as Boron Carbide

   Hydrogen 12%

   Carbon 84.5%

   Specific gravity 0.945 g/cc^3

   Hydrogen density 0.126 g/cc^3

B. Radiation resistance/change in material properties.

1. Effects of neutron exposure

	PPC-V @10^7 RAD & 350° F	PPC-B @10^8 RAD & 350° F
Hydrogen Release Factor	5.4 x 10^{-5}ML/RAD-LB	3.7 x 10^{-5}ML/RAD-LB
H_2	59.0	74.6
CH_4	15.5	4.8
C_2H_6	9.4	3.6
C_3H_8	2.9	1.0
N_2	2.0	8.7
O_2	0.4	0.8
CO_2	6.3	2.6
C_5 to C_7	3.7	2.5

C. Structural strength/need for cladding PPC normally supported with 12" centers.

D. No dusting.

Typical properties of PPC Neutron Shielding vs. Other Plastics

	PPC	Nylon	Hi Density Polyethylene	Low Density Polyethylene	Acrylic	Phenolic
% Weight Loss °F						
One inch slab after:						
24 Hrs. 400 Vacuum	0.6	Melts	Melts	Melts	Melts	---
2 Hrs. 500 Air	1.0					
Specific Gravity, g/cc3	.94	1.15	.96	.92	1.2	1.3
Hardness (Rockwell)	M40	R115	R15	R10	M95	M125
Tensile, psi (Stress)	2500	8000	3000	1500	10000	7000
Elongation, %	30	250	100	100		
IZOD Impact, ft-lb/in notch	1.5	2.0	1.0	-	0.4	0.3
Melt Point °F	None	400	160	150	300	chars
Water Absorption						
24° C 14 Days (% Incr)	.005	1.6	.01	.02	0.3	0.2
Dissipation Factor, 23° C						
60 Hz/sec	.0018	.02	.0005	.0005	.04	0.1
1 Mhz/sec	.0023	.02	.0005	.0005	.03	0.05
Dielectric Constant, 23° C						
60 Hz/sec	2.74	3.8	2.3	2.3	4.0	5.5
1 Mhz/sec	2.46	3.8	2.3	2.3	2.6	5.0
Machining Qualities	Superior	Excellant	Excellant	Good	Fair	Fair
Continuous use Temp., °F	>350	180-300	250	180-212	140-200	250
Brittleness Temp., °F		-70	-100	-80	---	---