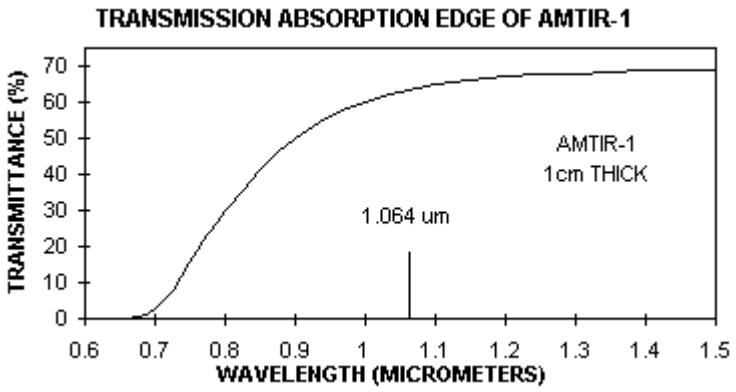
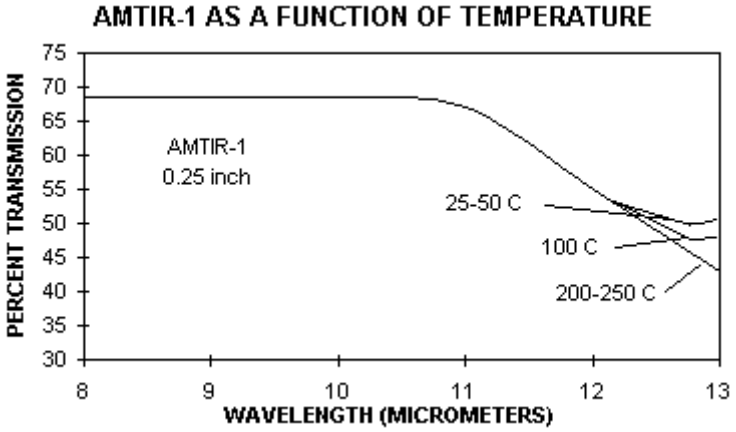
AMTIR-1

The name **AMTIR** is an acronym for amorphous material transmitting infrared radiation. The glass is melt formed and can be cast or slumped into most any size or shape. The material offers high optical homogeneity at low cost Plates up to 12" X 18" are currently available. The upper use temperature is 300°C with no free carrier absorption as is found in crystalline materials. The 8-12μ m dispersion of 113 is an ideal value for pairing with germanium for a color corrected lens design. The low thermal change in refractive index (72 X 1O $^{-6}$/°C) is a definite aid to Systems designers in trying to avoid thermal defocusing. The glass transmits some red light making it possible to use as a window material covering both atmospheric windows (3-5μ m and 8-l2μ m) as well as the yag laser wavelength at 1.064 μ m.

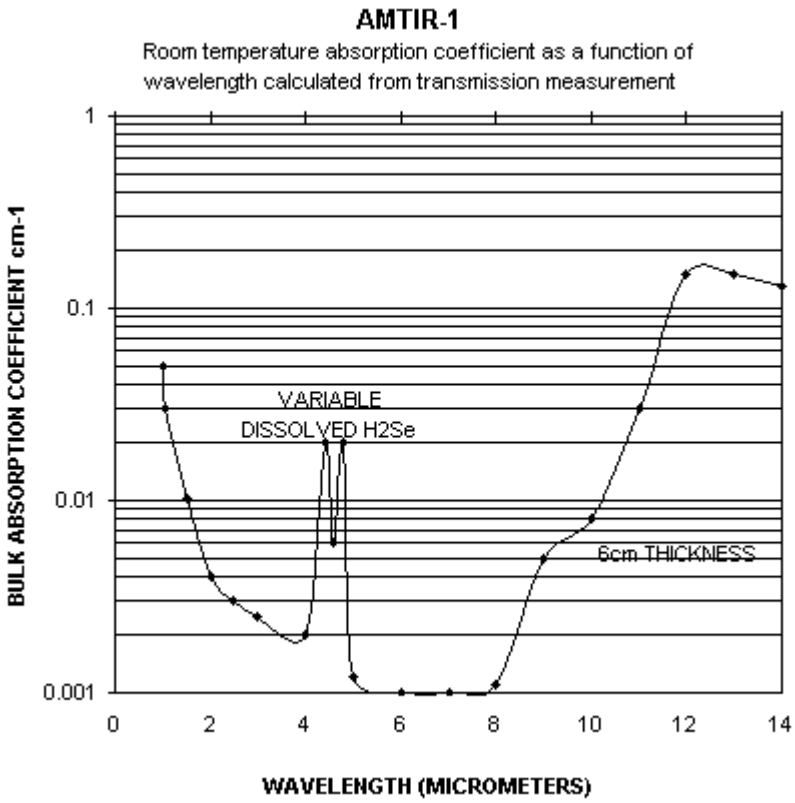
GENERAL PROPERTIES OF AMTIR-1

Composition	$Ge_{33}As_{12}Se_{55}$ Glass
Density	4.4 gms/cm^3
Thermal Expansion	12 X 10^{-6}/°C
Hardness (Knoop)	170
Rupture Modulus	2700 psi
Young's Modulus	3.2 X 10^6 psi
Shear Modulus	1.3 X 10^6 psi
Poisson's Ratio	0.27
Thermal Conductivity	6 cal / cm sec°K X 10^{-4}
Specific Heat	0.07 cal / gm °K
Upper Use Temperature	300°C
Resistivity	2 X 10^{12} Ω cm @ 100Hz
Glass Transition Temperture	362°C
Annealing Temperture	370°C





AMTIR-1 THERMAL CHANGE IN REFRACTIVE INDEX 25-65ºC		**DISPERSION**
Wavelength µm	$\Delta N / \Delta T \times 10^6$/ºC	3-5 µm 210
1.15	101	8-12 µm 113
3.39	77	
10.6	72	



REFRACTIVE INDEX AND ABSORPTION COEFFICIENT FOR AMTIR-1 (Measured)		
WAVELENGTH um	**REFRACTIVE INDEX 25 C**	**ABSORPTION COEFF cm-1**
1.0	2.5977	0.069
1.064	2.5862	0.066
1.5	2.5466	0.03
2.0	2.5306	0.03
2.4	2.5250	0.01
3.0	2.5192	0.01
4.0	2.5146	0.01
5.0	2.5117	0.02
6.0	2.5092	0.01
7.0	2.5068	0.01
8.0	2.5042	0.01
9.0	2.5013	0.01
10.0	2.4981	0.01
11.0	2.4946	0.03

12.0	2.4905	0.15
13.0	2.4860	0.15
14.0	2.4825	0.13

CORROSION RESISTANCE		
MEDIUM	**EXPOSURE TIME**	**CHANGE**
Air, 300º C	1 Week	No Change
Dilute Hcl	1 Week	No Change
Dilute H_2 SO_4	1 Week	No Change
Dilute HNO_3	1 Week	No Change
Alkalis (conc)	1 Week	Dissolves
Kerosene	1 Week	No Change
Water	1 Week	No Change
Seawater	4 Month	No Change

Precise refractive index values are obtained by performing minimum deviation measurements on prisms fabricated from standard production plates. Values 3-14 µm are 1990 results. Batch-to-batch variation has been shown to be less than ± 0.0010. Measured optical homogeneity for a 162mm diameter plate 26mm thick was ± 20 X 10^{-6} or $\Delta N/N = 8 \times 10^{-6}$. (B.M. Ranat of Pilkington and Bill Spurlock of Exotic Materials, 1990)