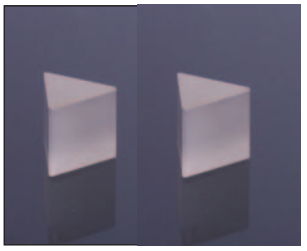
Ultrafast Laser Dispersing Prism Pairs

Dispersing prism pairs are used to compensate for spectral dispersion that occurs in ultrafast laser systems. This dispersion increases inversely with the pulse width and, therefore, can become significant in ultrafast lasers. OFR, a division of Thorlabs, will manufacture ULD prism pairs with six different materials for compensation of various amounts of dispersion. The surface flatness of the polished prism faces is 1/8 wave or better, the angle of tolerance is ±15 minutes or better, and each ULD prism pair is matched to within one arcsec. The apex angle (α) in OFR ULD prisms is chosen such that the input and output angles are both at Brewster's Angle (θ_B).

The accumulated phase ϕ(ω) in a prism pair is equal to

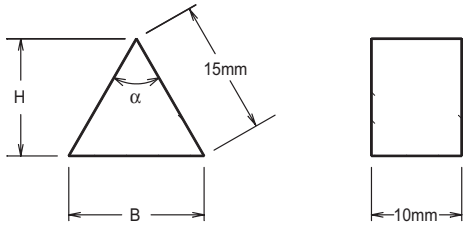
$$\phi(\omega) = \frac{2\omega d}{c}\cos\left(\theta_f^{short} - \theta_f\right)$$

where the variables ω, d, θ_f, and θ_f^{short} correspond to frequency, prism separation, exit angle (frequency dependent), and exit angle of the shortest transmitted wavelength, respectively.



$$\theta_f(\omega) = \arcsin\left[n\sin\left(\alpha - \arcsin\left(n^{-1}\sin\theta_B\right)\right)\right]$$

The variables n, θ_B, and α correspond to the frequency dependent refractive index of the prism material, angle of incidence with the surface of the first prism, and apex angle of the prism, respectively. The second and third derivatives of the accumulated phase with respect to frequency are defined to be the Group Velocity Dispersion (GVD) and the Third-Order Dispersion (TOD), respectively.



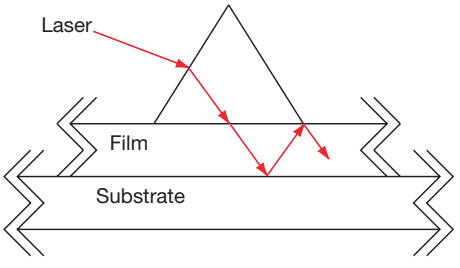
Specifications

- **Spectral Range:** 700-900nm
- Apex Angles Identical to Within 1arcsec
- **Unpolished Sides:** Flat and Ground

ITEM #	MATERIAL	$	£	€	RMB	GVD @800nm	TOD @800nm	α	H (mm)	B (mm)	θ_B	REFRACTIVE INDEX @800nm	SCRATCH-DIG
AFS-CAF	CaF_2	$650.00	£409.50	€604,50	¥6,207.50	-5fs²/cm	-12fs³/cm	69.9°	12.3	17.2	~55.0°	1.430	40-20
AFS-FS	Fused Silica	$575.00	£362.30	€534,80	¥5,491.30	-165fs²/cm	-20fs³/cm	69.1°	12.4	17.0	~55.6°	1.453	20-10
AFS-BK7	BK7	$485.00	£305.60	€451,10	¥4,631.80	-205fs²/cm	-31fs³/cm	67.0°	12.5	16.6	~56.5°	1.511	20-10
AFS-F2	F2	$495.00	£311.90	€460,40	¥4,727.30	-515fs²/cm	-169fs³/cm	63.7°	12.7	15.8	~58.2°	1.610	20-10
AFS-SF10	SF10	$495.00	£311.90	€460,40	¥4,727.30	-975fs²/cm	-388fs³/cm	60.6°	13.0	15.1	~59.7°	1.711	20-10
AFS-SF14	SF14	$495.00	£311.90	€460,40	¥4,727.30	-1135fs²/cm	-473fs³/cm	59.6°	13.0	14.9	~60.2°	1.745	20-10

Coupling Prisms

High index of refraction prisms are used for the coupling of light into films. A rutile (TiO_2) crystal prism is used for n greater than 1.8 and a gadolinium gallium garnet (GGG) prism is used for n less than 1.8.



Specifications

- **Scratch-Dig:** 10-5
- **Surface Flatness:** λ/4

ITEM #	MATERIAL	$	£	€	RMB	ANGLES (DEGREE)	BASE (mm)
ADT-6	Rutile	$585.00	£368.60	€544,10	¥5,586.80	45-45-90	6 x 6
AT-6	Rutile	$615.00	£387.50	€572,00	¥5,873.30	30-60-90	6 x 6
ADG-6	GGG	$535.00	£337.10	€497,60	¥5,109.30	45-45-90	6 x 6

	GGG		RUTILE	
λ	n_o	n_e	n_o	n_e
488nm	1.988		2.732	3.042
633nm	1.965		2.584	2.865
830nm	1.951		2.513	2.779
1064nm	1.944		2.479	2.733
1550nm	1.936		2.453	2.694

Ordinary Refractive index (n_o)
Extrodinary Refractive Index (n_e)