System/Prescription Data

File : C:\tbida\zemax_port\echelle\DCTfiles\Run1082_5min_0.4-0.8.ZMX
Title:
Date : THU SEP 10 2009

GENERAL LENS DATA:

```
Surfaces               :              59
Stop                   :               1
System Aperture        : Float By Stop Size = 2100
Glass Catalogs         : SCHOTT INFRARED MISC OHARA
Ray Aiming             : Off
Apodization            : Uniform, factor =   0.00000E+000
Temperature (C)        :    2.00000E+001
Pressure (ATM)         :    1.00000E+000
 Adjust Index Data To Environment  : Off
Effective Focal Length  :          -16791 (in air at system temperature and pressure)
Effective Focal Length  :          -16791 (in image space)
Back Focal Length       :         14.6469
Total Track             :        7676.623
Image Space F/#         :        3.997857
Paraxial Working F/#    :        3.997857
Working F/#             :        3.953886
Image Space NA          :       0.1241002
Object Space NA         :        2.1e-007
Stop Radius             :            2100
Paraxial Image Height   :               0
Paraxial Magnification  :               0
Entrance Pupil Diameter :            4200
Entrance Pupil Position :               0
Exit Pupil Diameter     :        148.1014
Exit Pupil Position     :       -579.5528
Field Type              : Angle in degrees
Maximum Radial Field    :               0
Primary Wavelength      :             0.6 µm
Lens Units              :   Millimeters
Angular Magnification   :               0

Fields          : 1
Field Type: Angle in degrees
#        X-Value        Y-Value         Weight
 1       0.000000       0.000000       1.000000

Vignetting Factors
#       VDX       VDY       VCX       VCY       VAN
1  0.000000  0.000000  0.000000  0.000000  0.000000

Wavelengths     : 10
Units: µm
#          Value         Weight
 1       0.380000       1.000000
 2       0.400000       1.000000
 3       0.450000       1.000000
 4       0.500000       1.000000
 5       0.550000       1.000000
 6       0.600000       1.000000
 7       0.650000       1.000000
 8       0.700000       1.000000
 9       0.750000       1.000000
10       0.800000       1.000000
```

SURFACE DATA SUMMARY:

Surf	Type	Radius	Thickness	Glass	Diameter	Conic	Comment
OBJ	STANDARD	Infinity	Infinity		0	0	
STO	STANDARD	Infinity	137.8		4200	0	
2	STANDARD	-16000	-5619.048	MIRROR	4202	-1.082674	
3	STANDARD	-6926.4	5619.048	MIRROR	1310	-4.500899	
4	STANDARD	Infinity	1800		354.2308	0	primary vertex
5	STANDARD	Infinity	50		200	0	
6	STANDARD	Infinity	150		1200	0	
7	STANDARD	Infinity	-430.4373		25.00194	0	nominal focus
8	COORDBRK	-	0		-	-	
9	STANDARD	-246.7796	14	BAK2	129.9118	0	
10	STANDARD	-1501.656	5.426856		130.878	0	
11	EVENASPH	329.1227	42	CAF2	131.3112	0	
12	STANDARD	-236.4869	266.9948		129.2139	0	
13	STANDARD	Infinity	0		46.83981	0	
14	COORDBRK	-	0		-	-	
15	STANDARD	Infinity	15		25.26589	0	slit
16	STANDARD	-491.5085	5	SILICA	86	0	
17	STANDARD	Infinity	5	SILICA	92	0	
18	STANDARD	273.9677	55		89	0	
19	COORDBRK	-	0		-	-	
20	STANDARD	Infinity	0	MIRROR	57.70877	0	
21	COORDBRK	-	-307.4009		-	-	
22	EVENASPH	-214.9858	-52	CAF2	210	0	
23	STANDARD	680.6408	-15	BAK2	210	0	

24	STANDARD	-15985.32	-109.9042			210	0	
25	EVENASPH	5314.423	-40		CAF2	204	0	
26	STANDARD	280.4409	-15		BAK2	204	0	
27	STANDARD	-321.1194	-42		FPL51	204	0	
28	STANDARD	405.8411	0			204	0	
29	STANDARD	405.8411	0			204	0	
30	STANDARD	405.8411	-145			204	0	
31	COORDBRK	-	0			-	-	tilt prism
32	COORDBRK	-	58			-	-	trans prism
33	TILTSURF	-	-116		F2	220	-	
34	TILTSURF	-	58			220	-	
35	COORDBRK	-	0			-	-	untrans prism
36	COORDBRK	-	-58			-	-	untilt prism
37	COORDBRK	-	-280			-	-	tilt grating
38	COORDBRK	-	0			-	-	trans grating
39	TILTSURF	-	0		MIRROR	120	-	
40	COORDBRK	-	280			-	-	untrans grating
41	COORDBRK	-	58			-	-	untilt grating
42	COORDBRK	-	0			-	-	tilt prism
43	COORDBRK	-	-58			-	-	trans prism
44	TILTSURF	-	116		F2	220	-	
45	TILTSURF	-	-58			220	-	
46	COORDBRK	-	0			-	-	untrans prism
47	COORDBRK	-	145			-	-	untilt prism
48	STANDARD	405.8411	0			204	0	
49	STANDARD	405.8411	0			204	0	
50	STANDARD	405.8411	42		FPL51	204	0	
51	STANDARD	-321.1194	15		BAK2	204	0	
52	STANDARD	280.4409	40		CAF2	204	0	
53	EVENASPH	5314.423	109.9042			204	0	
54	STANDARD	-15985.32	15		BAK2	210	0	
55	STANDARD	680.6408	52		CAF2	210	0	
56	EVENASPH	-214.9858	362.4009			210	0	
57	STANDARD	-273.9677	10		SILICA	95	0	
58	STANDARD	491.5085	14.59103			95	0	
IMA	STANDARD	Infinity				79.78642	0	

SURFACE DATA DETAIL:

```
Surface OBJ     : STANDARD
Surface STO     : STANDARD
Surface   2     : STANDARD
 Mirror Substrate : Curved, Thickness = 8.40400E+001
 Aperture       : Floating Aperture
 Maximum Radius :          2101
Surface   3     : STANDARD
 Mirror Substrate : Curved, Thickness = 2.62000E+001
 Aperture       : Floating Aperture
 Maximum Radius :           655
Surface   4     : STANDARD primary vertex
Surface   5     : STANDARD
Surface   6     : STANDARD
Surface   7     : STANDARD nominal focus
Surface   8     : COORDBRK
 Decenter X     :                0
 Decenter Y     :        16.562684
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface   9     : STANDARD
Surface  10     : STANDARD
Surface  11     : EVENASPH
 Coeff on r  2  :                0
 Coeff on r  4  :  -1.6274871e-008
 Coeff on r  6  :   -3.096935e-013
 Coeff on r  8  :                0
 Coeff on r 10  :                0
 Coeff on r 12  :                0
 Coeff on r 14  :                0
 Coeff on r 16  :                0
Surface  12     : STANDARD
Surface  13     : STANDARD
Surface  14     : COORDBRK
 Decenter X     :                0
 Decenter Y     :            -10.9
 Tilt About X   :       -1.3627892
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  15     : STANDARD slit
Surface  16     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :             43
Surface  17     : STANDARD
Surface  18     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :          44.5
Surface  19     : COORDBRK
 Decenter X     :                0
```

```
 Decenter Y     :                0
 Tilt About X   :              -45
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  20     : STANDARD
 Mirror Substrate : Curved, Thickness = 1.15418E+000
Surface  21     : COORDBRK
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :              -45
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  22     : EVENASPH
 Coeff on r  2  :                0
 Coeff on r  4  :   4.2109587e-009
 Coeff on r  6  :  -5.1424803e-014
 Coeff on r  8  :                0
 Coeff on r 10  :                0
 Coeff on r 12  :                0
 Coeff on r 14  :                0
 Coeff on r 16  :                0
 Aperture       : Floating Aperture
 Maximum Radius :              105
Surface  23     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              105
Surface  24     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              105
Surface  25     : EVENASPH
 Coeff on r  2  :                0
 Coeff on r  4  :   1.9494748e-008
 Coeff on r  6  :    3.196056e-013
 Coeff on r  8  :   9.7627425e-018
 Coeff on r 10  :                0
 Coeff on r 12  :                0
 Coeff on r 14  :                0
 Coeff on r 16  :                0
 Aperture       : Floating Aperture
 Maximum Radius :              102
Surface  26     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              102
Surface  27     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              102
Surface  28     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              102
Surface  29     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              102
Surface  30     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :              102
Surface  31     : COORDBRK tilt prism
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :              -17
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  32     : COORDBRK trans prism
 Decenter X     :                0
 Decenter Y     :              -15
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  33     : TILTSURF
 X Tangent      :                0
 Y Tangent      :          -0.4663
 Aperture       : Floating Aperture
 Maximum Radius :              110
Surface  34     : TILTSURF
 X Tangent      :                0
 Y Tangent      :           0.4663
 Aperture       : Floating Aperture
 Maximum Radius :              110
Surface  35     : COORDBRK untrans prism
 Decenter X     :                0
 Decenter Y     :               15
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  36     : COORDBRK untilt prism
 Decenter X     :                0
```

```
 Decenter Y     :                0
 Tilt About X   :               17
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  37     : COORDBRK tilt grating
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :              -37
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  38     : COORDBRK trans grating
 Decenter X     :                0
 Decenter Y     :              -30
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  39     : TILTSURF
 Mirror Substrate : Curved, Thickness = 2.40000E+000
 X Tangent      :                0
 Y Tangent      :            0.004
 Aperture       : Floating Aperture
 Maximum Radius :             60
Surface  40     : COORDBRK untrans grating
 Decenter X     :                0
 Decenter Y     :               30
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  41     : COORDBRK untilt grating
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :               37
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  42     : COORDBRK tilt prism
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :              -17
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  43     : COORDBRK trans prism
 Decenter X     :                0
 Decenter Y     :              -15
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  44     : TILTSURF
 X Tangent      :                0
 Y Tangent      :           0.4663
 Aperture       : Floating Aperture
 Maximum Radius :            110
Surface  45     : TILTSURF
 X Tangent      :                0
 Y Tangent      :          -0.4663
 Aperture       : Floating Aperture
 Maximum Radius :            110
Surface  46     : COORDBRK untrans prism
 Decenter X     :                0
 Decenter Y     :               15
 Tilt About X   :                0
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  47     : COORDBRK untilt prism
 Decenter X     :                0
 Decenter Y     :                0
 Tilt About X   :               17
 Tilt About Y   :                0
 Tilt About Z   :                0
 Order          : Decenter then tilt
Surface  48     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            102
Surface  49     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            102
Surface  50     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            102
Surface  51     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            102
Surface  52     : STANDARD
```

```
 Aperture       : Floating Aperture
 Maximum Radius :            102
Surface  53     : EVENASPH
 Coeff on r  2  :                0
 Coeff on r  4  :   1.9494748e-008
 Coeff on r  6  :    3.196056e-013
 Coeff on r  8  :   9.7627425e-018
 Coeff on r 10  :                0
 Coeff on r 12  :                0
 Coeff on r 14  :                0
 Coeff on r 16  :                0
 Aperture       : Floating Aperture
 Maximum Radius :            102
Surface  54     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            105
Surface  55     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :            105
Surface  56     : EVENASPH
 Coeff on r  2  :                0
 Coeff on r  4  :   4.2109587e-009
 Coeff on r  6  :  -5.1424803e-014
 Coeff on r  8  :                0
 Coeff on r 10  :                0
 Coeff on r 12  :                0
 Coeff on r 14  :                0
 Coeff on r 16  :                0
 Aperture       : Floating Aperture
 Maximum Radius :            105
Surface  57     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :           47.5
Surface  58     : STANDARD
 Aperture       : Floating Aperture
 Maximum Radius :           47.5
Surface IMA     : STANDARD
 Aperture       : Rectangular Aperture
 X Half Width   :             30
 Y Half Width   :             30
 X- Decenter    :                0
 Y- Decenter    :              -11

COATING DEFINITIONS:


PHYSICAL OPTICS PROPAGATION SETTINGS SUMMARY:

 OBJ STANDARD
    Use Rays To Propagate To Next Surface  : Off
    Recompute Pilot Beam                   : Off
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit
 STO STANDARD
    Use Rays To Propagate To Next Surface  : Off
    Recompute Pilot Beam                   : Off
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit
   2 STANDARD
    Use Rays To Propagate To Next Surface  : Off
    Recompute Pilot Beam                   : Off
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit
   3 STANDARD
    Use Rays To Propagate To Next Surface  : Off
    Recompute Pilot Beam                   : Off
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit
   4 STANDARD       primary vertex
    Use Rays To Propagate To Next Surface  : Off
    Recompute Pilot Beam                   : Off
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit
   5 STANDARD
    Use Rays To Propagate To Next Surface  : Off
    Recompute Pilot Beam                   : Off
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit
```

```
 6 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 7 STANDARD        nominal focus
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 8 COORDBRK
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 9 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
10 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
11 EVENASPH
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
12 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
13 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
14 COORDBRK
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
15 STANDARD                slit
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
16 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
17 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
18 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
```

```
  Reference Radius                      : Best Fit
19 COORDBRK
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
20 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
21 COORDBRK
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
22 EVENASPH
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
23 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
24 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
25 EVENASPH
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
26 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
27 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
28 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
29 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
30 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
31 COORDBRK           tilt prism
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
```

```
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
32 COORDBRK          trans prism
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
33 TILTSURF
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
34 TILTSURF
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
35 COORDBRK        untrans prism
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
36 COORDBRK         untilt prism
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
37 COORDBRK         tilt grating
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
38 COORDBRK        trans grating
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
39 TILTSURF
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
40 COORDBRK      untrans grating
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
41 COORDBRK       untilt grating
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
42 COORDBRK           tilt prism
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
43 COORDBRK          trans prism
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
44 TILTSURF
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
```

```
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 45 TILTSURF
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 46 COORDBRK        untrans prism
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 47 COORDBRK         untilt prism
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 48 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 49 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 50 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 51 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 52 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 53 EVENASPH
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 54 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 55 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 56 EVENASPH
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
  Do Not Rescale Beam Size Using Ray Data: Off
  Use Angular Spectrum Propagator        : Off
  Use Parallel Probing Rays              : Off
  Reference Radius                       : Best Fit
 57 STANDARD
  Use Rays To Propagate To Next Surface  : Off
  Recompute Pilot Beam                   : Off
```

```
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit
  58 STANDARD
    Use Rays To Propagate To Next Surface  : Off
    Recompute Pilot Beam                   : Off
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit
 IMA STANDARD
    Use Rays To Propagate To Next Surface  : Off
    Recompute Pilot Beam                   : Off
    Do Not Rescale Beam Size Using Ray Data: Off
    Use Angular Spectrum Propagator        : Off
    Use Parallel Probing Rays              : Off
    Reference Radius                       : Best Fit

EDGE THICKNESS DATA:

Surf          X-Edge          Y-Edge
 STO       -0.094655       -0.094655
   2    -5511.884940    -5511.884940
   3     5649.779595     5649.779595
   4     1800.000000     1800.000000
   5       50.000000       50.000000
   6      150.000000      150.000000
   7     -430.437300     -430.437300
   8       -8.702093       -8.702093
   9       21.275569       21.275569
  10       13.141345       13.141345
  11       26.715784       26.715784
  12      275.991051      275.991051
  13        0.000000        0.000000
  14        0.000000        0.000000
  15       13.115443       13.115443
  16        6.884557        6.884557
  17        8.638178        8.638178
  18       51.361822       51.361822
  19        0.000000        0.000000
  20        0.000000        0.000000
  21     -334.343412     -334.343412
  22      -16.909735      -16.909735
  23      -23.492604      -23.492604
  24     -105.995925     -105.995925
  25      -24.356324      -24.356324
  26      -50.837306      -50.837306
  27      -12.342897      -12.342897
  28        0.000000        0.000000
  29        0.000000        0.000000
  30     -158.026897     -158.026897
  31        0.000000        0.000000
  32       58.000000        6.707000
  33     -116.000000      -13.414000
  34       58.000000        6.707000
  35        0.000000        0.000000
  36      -58.000000      -58.000000
  37     -280.000000     -280.000000
  38        0.000000        0.240000
  39        0.000000       -0.240000
  40      280.000000      280.000000
  41       58.000000       58.000000
  42        0.000000        0.000000
  43      -58.000000       -6.707000
  44      116.000000       13.414000
  45      -58.000000       -6.707000
  46        0.000000        0.000000
  47      158.026897      158.026897
  48        0.000000        0.000000
  49        0.000000        0.000000
  50       12.342897       12.342897
  51       50.837306       50.837306
  52       24.356324       24.356324
  53      105.995925      105.995925
  54       23.492604       23.492604
  55       16.909735       16.909735
  56      385.194263      385.194263
  57       16.449763       16.449763
  58       12.290420       12.290420
 IMA        0.000000        0.000000

SOLVE AND VARIABLE DATA:

 Semi Diameter   1      : Fixed
 Semi Diameter   2      : Fixed
 Thickness of   3       : Solve, Total length from 2, held at 0
 Semi Diameter   3      : Fixed
 Semi Diameter   5      : Fixed
 Semi Diameter   6      : Fixed
```

```
 Thickness of   7       : Variable
 Parameter  2 Surf   8  : Variable
 Curvature of   9       : Variable
 Curvature of  10       : Variable
 Curvature of  11       : Variable
 Parameter  2 Surf  11  : Variable
 Parameter  3 Surf  11  : Variable
 Curvature of  12       : Variable
 Thickness of  12       : Variable
 Parameter  3 Surf  14  : Variable
 Semi Diameter  16      : Fixed
 Semi Diameter  17      : Fixed
 Semi Diameter  18      : Fixed
 Parameter  3 Surf  21  : Solve, Pickup from surface 19 scaled by 1, offset by 0
 Semi Diameter  22      : Fixed
 Semi Diameter  23      : Fixed
 Semi Diameter  24      : Fixed
 Semi Diameter  25      : Fixed
 Semi Diameter  26      : Fixed
 Semi Diameter  27      : Fixed
 Semi Diameter  28      : Fixed
 Semi Diameter  29      : Fixed
 Semi Diameter  30      : Fixed
 Thickness of  33       : Solve, Pickup from surface 32 scaled by -2, offset by 0
 Semi Diameter  33      : Fixed
 Thickness of  34       : Solve, Pickup from surface 32 scaled by 1, offset by 0
 Semi Diameter  34      : Solve, pickup from surface 33 scaled by 1
 Parameter  2 Surf  34  : Solve, Pickup from surface 33 scaled by -1, offset by 0
 Parameter  2 Surf  35  : Solve, Pickup from surface 32 scaled by -1, offset by 0
 Thickness of  36       : Solve, Pickup from surface 32 scaled by -1, offset by 0
 Parameter  3 Surf  36  : Solve, Pickup from surface 31 scaled by -1, offset by 0
 Semi Diameter  39      : Fixed
 Thickness of  40       : Solve, Pickup from surface 37 scaled by -1, offset by 0
 Parameter  2 Surf  40  : Solve, Pickup from surface 38 scaled by -1, offset by 0
 Thickness of  41       : Solve, Pickup from surface 32 scaled by 1, offset by 0
 Parameter  3 Surf  41  : Solve, Pickup from surface 37 scaled by -1, offset by 0
 Parameter  3 Surf  42  : Solve, Pickup from surface 31 scaled by 1, offset by 0
 Thickness of  43       : Solve, Pickup from surface 32 scaled by -1, offset by 0
 Parameter  2 Surf  43  : Solve, Pickup from surface 32 scaled by 1, offset by 0
 Thickness of  44       : Solve, Pickup from surface 33 scaled by -1, offset by 0
 Glass of  44           : Pickup from 33
 Semi Diameter  44      : Solve, pickup from surface 33 scaled by 1
 Parameter  2 Surf  44  : Solve, Pickup from surface 33 scaled by -1, offset by 0
 Thickness of  45       : Solve, Pickup from surface 32 scaled by -1, offset by 0
 Semi Diameter  45      : Solve, pickup from surface 33 scaled by 1
 Parameter  2 Surf  45  : Solve, Pickup from surface 33 scaled by 1, offset by 0
 Parameter  2 Surf  46  : Solve, Pickup from surface 32 scaled by -1, offset by 0
 Thickness of  47       : Solve, Pickup from surface 30 scaled by -1, offset by 0
 Parameter  3 Surf  47  : Solve, Pickup from surface 31 scaled by -1, offset by 0
 Semi Diameter  48      : Fixed
 Semi Diameter  49      : Fixed
 Semi Diameter  50      : Fixed
 Semi Diameter  51      : Fixed
 Semi Diameter  52      : Fixed
 Semi Diameter  53      : Fixed
 Semi Diameter  54      : Fixed
 Semi Diameter  55      : Fixed
 Semi Diameter  56      : Fixed
 Semi Diameter  57      : Fixed
 Semi Diameter  58      : Fixed

INDEX OF REFRACTION DATA:

System Temperature:   20.0000 Celsius
System Pressure   :    1.0000 Atmospheres
Absolute air index:    1.000272 at wavelength 0.600000 µm
Index data is relative to air at the system temperature and pressure.

Surf                 Glass    Temp    Pres      0.380000    0.400000    0.450000    0.500000    0.550000    0.600000
   0                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   1                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   2                MIRROR   20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   3                MIRROR   20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   4                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   5                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   6                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   7                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   8              <CRD BRK>                   1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
   9                   BAK2   20.00    1.00    1.55929283  1.55595196  1.54960763  1.54516016  1.54189185  1.53939614
  10                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  11                   CAF2   20.00    1.00    1.44349273  1.44185367  1.43870629  1.43647559  1.43482640  1.43356391 source:
  12                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  13                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  14              <CRD BRK>                   1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  15                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  16                 SILICA  20.00    1.00    1.47248471  1.47011611  1.46556566  1.46232648  1.45991088  1.45803770 source:
  17                 SILICA  20.00    1.00    1.47248471  1.47011611  1.46556566  1.46232648  1.45991088  1.45803770 source:
  18                         20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  19              <CRD BRK>                   1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
  20                 MIRROR  20.00    1.00    1.00000000  1.00000000  1.00000000  1.00000000  1.00000000  1.00000000
```

21	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
22	CAF2	20.00	1.00	1.44349273	1.44185367	1.43870629	1.43647559	1.43482640	1.43356391 source:
23	BAK2	20.00	1.00	1.55929283	1.55595196	1.54960763	1.54516016	1.54189185	1.53939614
24		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
25	CAF2	20.00	1.00	1.44349273	1.44185367	1.43870629	1.43647559	1.43482640	1.43356391 source:
26	BAK2	20.00	1.00	1.55929283	1.55595196	1.54960763	1.54516016	1.54189185	1.53939614
27	FPL51	25.00	1.00	1.50983902	1.50765520	1.50346507	1.50049657	1.49830110	1.49661778
28		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
29		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
30		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
31	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
32	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
33	F2	20.00	1.00	1.65954303	1.65215474	1.63881063	1.62993705	1.62365512	1.61899937
34		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
35	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
36	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
37	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
38	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
39	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
40	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
41	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
42	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
43	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
44	F2	20.00	1.00	1.65954303	1.65215474	1.63881063	1.62993705	1.62365512	1.61899937
45		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
46	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
47	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
48		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
49		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
50	FPL51	25.00	1.00	1.50983902	1.50765520	1.50346507	1.50049657	1.49830110	1.49661778
51	BAK2	20.00	1.00	1.55929283	1.55595196	1.54960763	1.54516016	1.54189185	1.53939614
52	CAF2	20.00	1.00	1.44349273	1.44185367	1.43870629	1.43647559	1.43482640	1.43356391 source:
53		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
54	BAK2	20.00	1.00	1.55929283	1.55595196	1.54960763	1.54516016	1.54189185	1.53939614
55	CAF2	20.00	1.00	1.44349273	1.44185367	1.43870629	1.43647559	1.43482640	1.43356391 source:
56		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
57	SILICA	20.00	1.00	1.47248471	1.47011611	1.46556566	1.46232648	1.45991088	1.45803770 source:
58		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
59		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Surf	Glass	Temp	Pres	0.650000	0.700000	0.750000	0.800000	
0		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
1		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
2	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
3	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
4		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
5		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
6		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
7		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
8	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
9	BAK2	20.00	1.00	1.53742741	1.53582964	1.53449957	1.53336656	
10		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
11	CAF2	20.00	1.00	1.43256827	1.43176233	1.43109453	1.43052933	source: Handbook of Optics Vol.
12		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
13		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
14	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
15		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
16	SILICA	20.00	1.00	1.45653497	1.45529247	1.45423674	1.45331725	source: Handbook of Optics Vol.
17	SILICA	20.00	1.00	1.45653497	1.45529247	1.45423674	1.45331725	source: Handbook of Optics Vol.
18		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
19	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
20	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
21	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
22	CAF2	20.00	1.00	1.43256827	1.43176233	1.43109453	1.43052933	source: Handbook of Optics Vol.
23	BAK2	20.00	1.00	1.53742741	1.53582964	1.53449957	1.53336656	
24		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
25	CAF2	20.00	1.00	1.43256827	1.43176233	1.43109453	1.43052933	source: Handbook of Optics Vol.
26	BAK2	20.00	1.00	1.53742741	1.53582964	1.53449957	1.53336656	
27	FPL51	25.00	1.00	1.49528604	1.49420261	1.49329862	1.49252671	
28		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
29		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
30		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
31	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
32	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
33	F2	20.00	1.00	1.61542246	1.61259169	1.61029388	1.60838665	
34		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
35	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
36	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
37	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
38	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
39	MIRROR	20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
40	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
41	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
42	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
43	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
44	F2	20.00	1.00	1.61542246	1.61259169	1.61029388	1.60838665	
45		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
46	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
47	<CRD BRK>			1.00000000	1.00000000	1.00000000	1.00000000	
48		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	

49		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
50	FPL51	25.00	1.00	1.49528604	1.49420261	1.49329862	1.49252671	
51	BAK2	20.00	1.00	1.53742741	1.53582964	1.53449957	1.53336656	
52	CAF2	20.00	1.00	1.43256827	1.43176233	1.43109453	1.43052933	source: Handbook of Optics Vol.
53		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
54	BAK2	20.00	1.00	1.53742741	1.53582964	1.53449957	1.53336656	
55	CAF2	20.00	1.00	1.43256827	1.43176233	1.43109453	1.43052933	source: Handbook of Optics Vol.
56		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
57	SILICA	20.00	1.00	1.45653497	1.45529247	1.45423674	1.45331725	source: Handbook of Optics Vol.
58		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	
59		20.00	1.00	1.00000000	1.00000000	1.00000000	1.00000000	

THERMAL COEFFICIENT OF EXPANSION DATA:

Surf	Glass	TCE *10E-6	
0		0.00000000	
1		0.00000000	
2	MIRROR	0.00000000	
3	MIRROR	0.00000000	
4		0.00000000	
5		0.00000000	
6		0.00000000	
7		0.00000000	
8	<CRD BRK>	0.00000000	
9	BAK2	8.00000000	
10		0.00000000	
11	CAF2	18.90000000	source: Handbook of Optics Vol. II
12		0.00000000	
13		0.00000000	
14	<CRD BRK>	0.00000000	
15		0.00000000	
16	SILICA	0.00000000	source: Handbook of Optics Vol. II
17	SILICA	0.00000000	source: Handbook of Optics Vol. II
18		0.00000000	
19	<CRD BRK>	0.00000000	
20	MIRROR	0.00000000	
21	<CRD BRK>	0.00000000	
22	CAF2	18.90000000	source: Handbook of Optics Vol. II
23	BAK2	8.00000000	
24		0.00000000	
25	CAF2	18.90000000	source: Handbook of Optics Vol. II
26	BAK2	8.00000000	
27	FPL51	0.00000000	
28		0.00000000	
29		0.00000000	
30		0.00000000	
31	<CRD BRK>	0.00000000	
32	<CRD BRK>	0.00000000	
33	F2	8.20000000	
34		0.00000000	
35	<CRD BRK>	0.00000000	
36	<CRD BRK>	0.00000000	
37	<CRD BRK>	0.00000000	
38	<CRD BRK>	0.00000000	
39	MIRROR	0.00000000	
40	<CRD BRK>	0.00000000	
41	<CRD BRK>	0.00000000	
42	<CRD BRK>	0.00000000	
43	<CRD BRK>	0.00000000	
44	F2	8.20000000	
45		0.00000000	
46	<CRD BRK>	0.00000000	
47	<CRD BRK>	0.00000000	
48		0.00000000	
49		0.00000000	
50	FPL51	0.00000000	
51	BAK2	8.00000000	
52	CAF2	18.90000000	source: Handbook of Optics Vol. II
53		0.00000000	
54	BAK2	8.00000000	
55	CAF2	18.90000000	source: Handbook of Optics Vol. II
56		0.00000000	
57	SILICA	0.00000000	source: Handbook of Optics Vol. II
58		0.00000000	
59		0.00000000	

F/# DATA:

F/# calculations consider vignetting factors and ignore surface apertures.

	Wavelength:	0.380000		0.400000		0.450000	
#	Field	Tan	Sag	Tan	Sag	Tan	Sag
1	0.0000, 0.0000 deg:	4.5248	3.9993	4.3926	3.9945	4.1796	3.9908

	Wavelength:	0.500000		0.550000		0.600000	
#	Field	Tan	Sag	Tan	Sag	Tan	Sag
1	0.0000, 0.0000 deg:	4.0538	3.9917	3.9713	3.9937	3.9132	3.9958

	Wavelength:	0.650000		0.700000		0.750000	
#	Field	Tan	Sag	Tan	Sag	Tan	Sag

```
 1   0.0000, 0.0000 deg:    3.8703    3.9977    3.8371    3.9993    3.8107    4.0006

            Wavelength:        0.800000
 #               Field        Tan       Sag
 1   0.0000, 0.0000 deg:    3.7890    4.0016

GLOBAL VERTEX COORDINATES, ORIENTATIONS, AND ROTATION/OFFSET MATRICES:

Reference Surface: 1

Surf           R11            R12            R13                X
               R21            R22            R23                Y
               R31            R32            R33                Z

  1   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  0.000000000E+000

  2   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  1.378000000E+002

  3   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000 -5.481248000E+003

  4   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 primary vertex
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  1.378000000E+002

  5   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  1.937800000E+003

  6   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  1.987800000E+003

  7   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 nominal focus
      0.0000000000   1.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.0000000000   1.0000000000  2.137800000E+003

  8   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  1.656268400E+001
      0.0000000000   0.0000000000   1.0000000000  1.707362700E+003

  9   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  1.656268400E+001
      0.0000000000   0.0000000000   1.0000000000  1.707362700E+003

 10   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  1.656268400E+001
      0.0000000000   0.0000000000   1.0000000000  1.721362700E+003

 11   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  1.656268400E+001
      0.0000000000   0.0000000000   1.0000000000  1.726789556E+003

 12   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  1.656268400E+001
      0.0000000000   0.0000000000   1.0000000000  1.768789556E+003

 13   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   1.0000000000   0.0000000000  1.656268400E+001
      0.0000000000   0.0000000000   1.0000000000  2.035784356E+003

 14   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.9997171465   0.0237829159  5.662684000E+000
      0.0000000000  -0.0237829159   0.9997171465  2.035784356E+003

 15   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 slit
      0.0000000000   0.9997171465   0.0237829159  5.662684000E+000
      0.0000000000  -0.0237829159   0.9997171465  2.035784356E+003

 16   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.9997171465   0.0237829159  6.019427739E+000
      0.0000000000  -0.0237829159   0.9997171465  2.050780113E+003

 17   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.9997171465   0.0237829159  6.138342319E+000
      0.0000000000  -0.0237829159   0.9997171465  2.055778699E+003

 18   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.9997171465   0.0237829159  6.257256898E+000
      0.0000000000  -0.0237829159   0.9997171465  2.060777285E+003

 19   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
      0.0000000000   0.6900897124   0.7237238347  7.565317275E+000
      0.0000000000  -0.7237238347   0.6900897124  2.115761728E+003
```

```
20   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000   0.6900897124   0.7237238347  7.565317275E+000
     0.0000000000  -0.7237238347   0.6900897124  2.115761728E+003

21   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465  7.565317275E+000
     0.0000000000  -0.9997171465  -0.0237829159  2.115761728E+003

22   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -2.997486333E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.123072617E+003

23   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -3.517339249E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.124309329E+003

24   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -3.667296821E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.124666073E+003

25   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -4.766027953E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.127279915E+003

26   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -5.165914812E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.128231232E+003

27   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -5.315872384E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.128587976E+003

28   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -5.735753585E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.129586858E+003

29   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -5.735753585E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.129586858E+003

30   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.0237829159   0.9997171465 -5.735753585E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.129586858E+003

31   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 tilt prism
     0.0000000000  -0.3150327220   0.9490808101 -7.185343448E+002
     0.0000000000  -0.9490808101  -0.3150327220  2.133035381E+003

32   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 trans prism
     0.0000000000  -0.3150327220   0.9490808101 -7.138088539E+002
     0.0000000000  -0.9490808101  -0.3150327220  2.147271593E+003

33   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.3150327220   0.9490808101 -6.587621669E+002
     0.0000000000  -0.9490808101  -0.3150327220  2.128999695E+003

34   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.3150327220   0.9490808101 -7.688555409E+002
     0.0000000000  -0.9490808101  -0.3150327220  2.165543491E+003

35   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 untrans prism
     0.0000000000  -0.3150327220   0.9490808101 -7.185343448E+002
     0.0000000000  -0.9490808101  -0.3150327220  2.133035381E+003

36   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 untilt prism
     0.0000000000  -0.0237829159   0.9997171465 -7.185343448E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.133035381E+003

37   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 tilt grating
     0.0000000000  -0.6206386788   0.7840966971 -7.765179392E+002
     0.0000000000  -0.7840966971  -0.6206386788  2.134414790E+003

38   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 trans grating
     0.0000000000  -0.6206386788   0.7840966971 -9.774458541E+002
     0.0000000000  -0.7840966971  -0.6206386788  2.331716521E+003

39   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000
     0.0000000000  -0.6206386788   0.7840966971 -9.774458541E+002
     0.0000000000  -0.7840966971  -0.6206386788  2.331716521E+003

40   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 untrans grating
     0.0000000000  -0.6206386788   0.7840966971 -9.960650144E+002
     0.0000000000  -0.7840966971  -0.6206386788  2.308193620E+003

41   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 untilt grating
     0.0000000000  -0.0237829159   0.9997171465 -7.765179392E+002
     0.0000000000  -0.9997171465  -0.0237829159  2.134414790E+003

42   1.0000000000   0.0000000000   0.0000000000  0.000000000E+000 tilt prism
     0.0000000000  -0.3150327220   0.9490808101 -7.185343448E+002
```

	0.0000000000	-0.9490808101	-0.3150327220	2.133035381E+003	
43	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	trans prism
	0.0000000000	-0.3150327220	0.9490808101	-7.138088539E+002	
	0.0000000000	-0.9490808101	-0.3150327220	2.147271593E+003	
44	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.3150327220	0.9490808101	-7.688555409E+002	
	0.0000000000	-0.9490808101	-0.3150327220	2.165543491E+003	
45	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.3150327220	0.9490808101	-6.587621669E+002	
	0.0000000000	-0.9490808101	-0.3150327220	2.128999695E+003	
46	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	untrans prism
	0.0000000000	-0.3150327220	0.9490808101	-7.185343448E+002	
	0.0000000000	-0.9490808101	-0.3150327220	2.133035381E+003	
47	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	untilt prism
	0.0000000000	-0.0237829159	0.9997171465	-7.185343448E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.133035381E+003	
48	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-5.735753585E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.129586858E+003	
49	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-5.735753585E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.129586858E+003	
50	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-5.735753585E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.129586858E+003	
51	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-5.315872384E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.128587976E+003	
52	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-5.165914812E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.128231232E+003	
53	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-4.766027953E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.127279915E+003	
54	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-3.667296821E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.124666073E+003	
55	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-3.517339249E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.124309329E+003	
56	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	-2.997486333E+002	
	0.0000000000	-0.9997171465	-0.0237829159	2.123072617E+003	
57	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	6.254976033E+001	
	0.0000000000	-0.9997171465	-0.0237829159	2.114453667E+003	
58	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	7.254693179E+001	
	0.0000000000	-0.9997171465	-0.0237829159	2.114215838E+003	
59	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000	
	0.0000000000	-0.0237829159	0.9997171465	8.713383885E+001	
	0.0000000000	-0.9997171465	-0.0237829159	2.113868821E+003	

GLOBAL SURFACE CENTER OF CURVATURE POINTS:

Reference Surface: 1

Surf	X	Y	Z	
1	-	-	-	
2	0.0000000000	0.0000000000	-15862.2000000000	
3	0.0000000000	0.0000000000	-12407.6480000000	
4	-	-	-	primary vertex
5	-	-	-	
6	-	-	-	
7	-	-	-	nominal focus
8	-	-	-	
9	0.0000000000	16.5626840000	1460.5831000000	
10	0.0000000000	16.5626840000	219.7067000000	
11	0.0000000000	16.5626840000	2055.9122560000	
12	0.0000000000	16.5626840000	1532.3026560000	
13	-	-	-	
14	-	-	-	

15	-	-	-	slit
16	0.0000000000	-5.6700775984	1559.4106381200	
17	-	-	-	
18	0.0000000000	12.7730076767	2334.6674919252	
19	-	-	-	
20	-	-	-	
21	-	-	-	
22	0.0000000000	-514.6736237934	2128.1856066884	
23	0.0000000000	328.7143534293	2108.1217061791	
24	0.0000000000	-16347.5281776197	2504.8435946200	
25	0.0000000000	4836.3170012883	2000.8874397387	
26	0.0000000000	-236.2299048708	2121.5615294846	
27	0.0000000000	-852.6158086023	2136.2251312691	
28	0.0000000000	-167.8490521101	2119.9347732780	
29	0.0000000000	-167.8490521101	2119.9347732780	
30	0.0000000000	-167.8490521101	2119.9347732780	
31	-	-	-	tilt prism
32	-	-	-	trans prism
33	-	-	-	
34	-	-	-	
35	-	-	-	untrans prism
36	-	-	-	untilt prism
37	-	-	-	tilt grating
38	-	-	-	trans grating
39	-	-	-	
40	-	-	-	untrans grating
41	-	-	-	untilt grating
42	-	-	-	tilt prism
43	-	-	-	trans prism
44	-	-	-	
45	-	-	-	
46	-	-	-	untrans prism
47	-	-	-	untilt prism
48	0.0000000000	-167.8490521101	2119.9347732780	
49	0.0000000000	-167.8490521101	2119.9347732780	
50	0.0000000000	-167.8490521101	2119.9347732780	
51	0.0000000000	-852.6158086023	2136.2251312691	
52	0.0000000000	-236.2299048708	2121.5615294846	
53	0.0000000000	4836.3170012883	2000.8874397387	
54	0.0000000000	-16347.5281776197	2504.8435946200	
55	0.0000000000	328.7143534293	2108.1217061791	
56	0.0000000000	-514.6736237934	2128.1856066884	
57	0.0000000000	-211.3404469342	2120.9694181180	
58	0.0000000000	563.9164068710	2102.5263328429	
59	-	-	-	

ELEMENT VOLUME DATA:

For centered elements with plane or spherical circular faces, exact volumes are computed by assuming edges are squared up to the larger of the front and back radial aperture.

For all other elements, approximate volumes are numerically integrated to 0.1% accuracy. Zero volume means the volume cannot be accurately computed.

Single elements that are duplicated in the Lens Data Editor for ray tracing purposes may be listed more than once yielding incorrect total mass estimates.

	Volume cc	Density g/cc	Mass g
Element surf 9 to 10	237.800828	2.860000	680.110368
Element surf 11 to 12	463.223294	3.181000	1473.513300
Element surf 16 to 17	40.288834	0.000000	0.000000
Element surf 17 to 18	46.081218	0.000000	0.000000
Element surf 22 to 23	1202.059758	3.181000	3823.752091
Element surf 23 to 24	666.332820	2.860000	1905.711864
Element surf 25 to 26	1039.899097	3.181000	3307.919028
Element surf 26 to 27	1069.832173	2.860000	3059.720014
Element surf 27 to 28	891.668024	0.000000	0.000000
Element surf 33 to 34	4410.749619	3.599000	15874.287880
Element surf 44 to 45	4410.749619	3.599000	15874.287880
Element surf 50 to 51	891.668024	0.000000	0.000000
Element surf 51 to 52	1069.832173	2.860000	3059.720014
Element surf 52 to 53	1039.899097	3.181000	3307.919028
Element surf 54 to 55	666.332820	2.860000	1905.711864
Element surf 55 to 56	1202.059758	3.181000	3823.752091
Element surf 57 to 58	93.697072	0.000000	0.000000
Total Mass:			58096.405421

CARDINAL POINTS:

Object space positions are measured with respect to surface 1.
Image space positions are measured with respect to the image surface.
The index in both the object space and image space is considered.

	Object Space	Image Space
W = 0.380000		
Focal Length :	16767.629674	-16767.629674
Focal Planes :	-474388.399193	0.608888
Principal Planes :	-491156.028867	16768.238562

Anti-Principal Planes	:	-457620.769518	-16767.020787
Nodal Planes	:	-491156.028867	16768.238562
Anti-Nodal Planes	:	-457620.769518	-16767.020787

W = 0.400000

Focal Length	:	16764.476877	-16764.476877
Focal Planes	:	-469334.296716	0.329800
Principal Planes	:	-486098.773592	16764.806676
Anti-Principal Planes	:	-452569.819839	-16764.147077
Nodal Planes	:	-486098.773592	16764.806676
Anti-Nodal Planes	:	-452569.819839	-16764.147077

W = 0.450000

Focal Length	:	16767.284272	-16767.284272
Focal Planes	:	-460411.184002	0.027925
Principal Planes	:	-477178.468274	16767.312196
Anti-Principal Planes	:	-443643.899731	-16767.256347
Nodal Planes	:	-477178.468274	16767.312196
Anti-Nodal Planes	:	-443643.899731	-16767.256347

W = 0.500000

Focal Length	:	16775.324944	-16775.324944
Focal Planes	:	-454580.043867	-0.022844
Principal Planes	:	-471355.368811	16775.302100
Anti-Principal Planes	:	-437804.718923	-16775.347788
Nodal Planes	:	-471355.368811	16775.302100
Anti-Nodal Planes	:	-437804.718923	-16775.347788

W = 0.550000

Focal Length	:	16783.708243	-16783.708243
Focal Planes	:	-450420.972896	0.007206
Principal Planes	:	-467204.681139	16783.715449
Anti-Principal Planes	:	-433637.264653	-16783.701037
Nodal Planes	:	-467204.681139	16783.715449
Anti-Nodal Planes	:	-433637.264653	-16783.701037

W = 0.600000 (Primary)

Focal Length	:	16791.000539	-16791.000539
Focal Planes	:	-447240.605692	0.055866
Principal Planes	:	-464031.606231	16791.056406
Anti-Principal Planes	:	-430449.605152	-16790.944673
Nodal Planes	:	-464031.606231	16791.056406
Anti-Nodal Planes	:	-430449.605152	-16790.944673

W = 0.650000

Focal Length	:	16796.900461	-16796.900461
Focal Planes	:	-444666.416535	0.100424
Principal Planes	:	-461463.316996	16797.000886
Anti-Principal Planes	:	-427869.516073	-16796.800037
Nodal Planes	:	-461463.316996	16797.000886
Anti-Nodal Planes	:	-427869.516073	-16796.800037

W = 0.700000

Focal Length	:	16801.469000	-16801.469000
Focal Planes	:	-442482.387901	0.133163
Principal Planes	:	-459283.856900	16801.602163
Anti-Principal Planes	:	-425680.918901	-16801.335837
Nodal Planes	:	-459283.856900	16801.602163
Anti-Nodal Planes	:	-425680.918901	-16801.335837

W = 0.750000

Focal Length	:	16804.864876	-16804.864876
Focal Planes	:	-440555.274268	0.152118
Principal Planes	:	-457360.139144	16805.016994
Anti-Principal Planes	:	-423750.409392	-16804.712758
Nodal Planes	:	-457360.139144	16805.016994
Anti-Nodal Planes	:	-423750.409392	-16804.712758

W = 0.800000

Focal Length	:	16807.254300	-16807.254300
Focal Planes	:	-438798.612548	0.157457
Principal Planes	:	-455605.866848	16807.411757
Anti-Principal Planes	:	-421991.358248	-16807.096843
Nodal Planes	:	-455605.866848	16807.411757
Anti-Nodal Planes	:	-421991.358248	-16807.096843