

BS06-B

LIGO-T990139-00-D

BLANK

A. DCN: LIGO-T970205-00-D LIGO DETECTOR OPTICS
B. LIGO S/N: BS06 Incoming Inspection Check-off Sheet
Core Optics Blank Material

The purpose of this sheet is to verify material physical dimensions, perform visual inspection, and to facilitate material traceability of LIGO Detector optics. This sheet is to be included in the LIGO Quality Assurance traceability file. Complete a check-off sheet for each optic blank received and inspected.

C. LIGO Contract No.: PC 208421 D. Glass Mfg./Order No: Heraeus/5001652
E. Core optic Material: (BS) / FM / ITM / ETM / RM) F. Glass Mfg. Part No.: 50785
G. LIGO Drawing No.: D960793-B-D H. Manufacturer's Boule No.: M.F.F 9051/9061
I. Date Received at Caltech: 12-01-97

J Verify glass manufacturer's ^{inspection report} ~~Certification~~ against LIGO Component Specification No. E960094-A-D
Attach the applicable Component Specification Verification sheet.

K Attach a copy of the glass manufacturer's ^{inspection report} ~~Certification~~ to check-off sheet.

L Attach the glass manufacturer's birefringence map, ~~inclusion map~~, and data sheet per the above Component Specification. No inclusion map present

M Visually inspect for shipping container for damage. If applicable, describe the damage on attached.

N Visually inspect the blanks for damage, for chips on surfaces and edges, or for other defects. If applicable, describe damage/defects on attached sheet.

O Verify core optic blank physical dimensions per applicable LIGO drawing.

Inspection of material diameter. Diameter 10.10 in 256.6 mm

Inspection of material thickness. Thickness 2.08 in 52.8 mm

P Verify that the Registration Mark is present (with arrow pointing to the first surface) as required by LIGO Component Specification. No registration mark present

Q Verify receipt of 25mm X 25mm cylinder Witness Sample(s) required by the LIGO Component Specification and visually inspect for damage. Describe damage on the attached sheet. Shipped directly to Heraeus (France)

R Sign and date original packing slip (shipper) and distribute per paragraph 3.R.

Inspect By: [Signature] Date Inspected: 12-02-97

Reviewed and/or accepted by:

Cognizant Engineer: _____ Date: _____

LIGO QA Officer or Designee: _____ Date: _____

LIGO DETECTOR OPTICS
Incoming Inspection Check-off Sheet

Core Optics Blank Material

COMMENTS/DISCREPANCIES: (Disposition damage/discrepancies per LIGO Quality Assurance Plan (LIGO M960076-00-P) paragraphs 5.12 and 5.12.1.) _____

No registration marks (S/N incorrectly marked) - wrong serial number

No data disc

No birefringence or inclusion map (report \emptyset inclusions)

witness sample is being sent directly to Heraeus (France) by direction.

OH not reported

SKETCHES:

DISPOSITIONS: _____

LIGO Component Specification Verification Sheet

Mirror Blanks, Beam Splitter

		Serial Number: BS06	Specification	Reported Value	✓
		Mirror Blanks, Beam Splitter	Requirements	Physical Dimensions	LIGO-D960793- B
Diameter	256mm +1.0mm, -0mm			256.6mm	✓
Thickness	52.4 mm +1.0mm, -0mm			52.8mm	✓
Chamfer	2.0mm Max 2pl				
Clear Aperture	Central 235mm				
Material	Fused Silica Suprasil #3000 3115			Certification	✓
Registration Mark	"Top" of Optic, 80mm Arrow Points to Side 1			Certification	No
Witness Sample	25mm dia. x 25mm cylindrical			Shipped direct	✓
Witness Sample Map				Map Attached	✓
Defect Depth	< 0.5mm			Hand Sketch w/location & dim.	No
Homogeneity Within the Central 150mm	$\leq 5.0 \times 10^{-7}$ p-v $\lambda = 632.8\text{nm}$			Interferogram Homogeneity Map	✓
Homogeneity Within the Central 225mm	$\leq 2.5 \times 10^{-6}$ p-v $\lambda = 632.8\text{nm}$			Interferogram Homogeneity Map	✓
Homogeneity Data	ASCII Format			PC Compatible 3½ in. Disk	No
Birefringence Within the Central 150mm	≤ 1 nm/cm			Certification, Birefringence Map	✓
Birefringence Within the Central 225mm	≤ 5 nm/cm			Certification, Birefringence Map	✓
Bubble & Inclusion within the clear aperture. Max. Inclusion Diameter	Total $\leq 0.03\text{mm}^2$ Per 100cm^3 of Glass. $\leq 0.1\text{mm}$			Hand Sketch w/location & dim.	✓
Absorption	2ppm/cm $\lambda = 1.06\text{nm}$			Certification	No
Striae within the Clear Aperture	Grade A per MIL-G-174			Inspection Report	✓

Blnk_BS.doc

OH: _____

Project LIGO

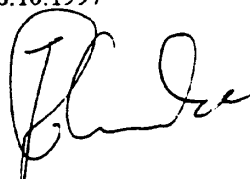
Customer : HERAEUS Amersil Inc. Duluth, Ga 30136-5821
Order No. : 45000023300dtd 30.09.96 as
HAI-Order No. : none
HQS-Order No. : 94908401
Item No. : 2
Quality : Fused silica Suprasil 311 S
HQS melt No. : MF.F 9051
Marking : 960095-IM18-*B506 13N 5062*

Diameter : 256,5 mm
CA Diameter : $\emptyset 200 \text{ mm} = 0,71 \times E^{-6}$
Thickness : 52,84 mm
Edge : 0,3 - 0,5 mm
Parallelism : 0,08 mm
Roughness : ground
R_a : 1,08 μm
R_r : 8,86 μm
Bubble class : 0 ; none bubbles
Birefringence : CA $\emptyset 200 \text{ mm} \leq 5 \text{ nm/cm}$; CA $\emptyset 80 \text{ mm} \leq 1 \text{ nm/cm}$
Homogeneity : see Interferogram
Striae Grade : A
Granularity : none
Remark : Test Sample ($\emptyset 25 \times 25 \text{ mm}$) with the same marking

POL - Qualitätsprüfung Optik

Date : 08.10.1997

Inspector :

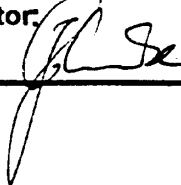


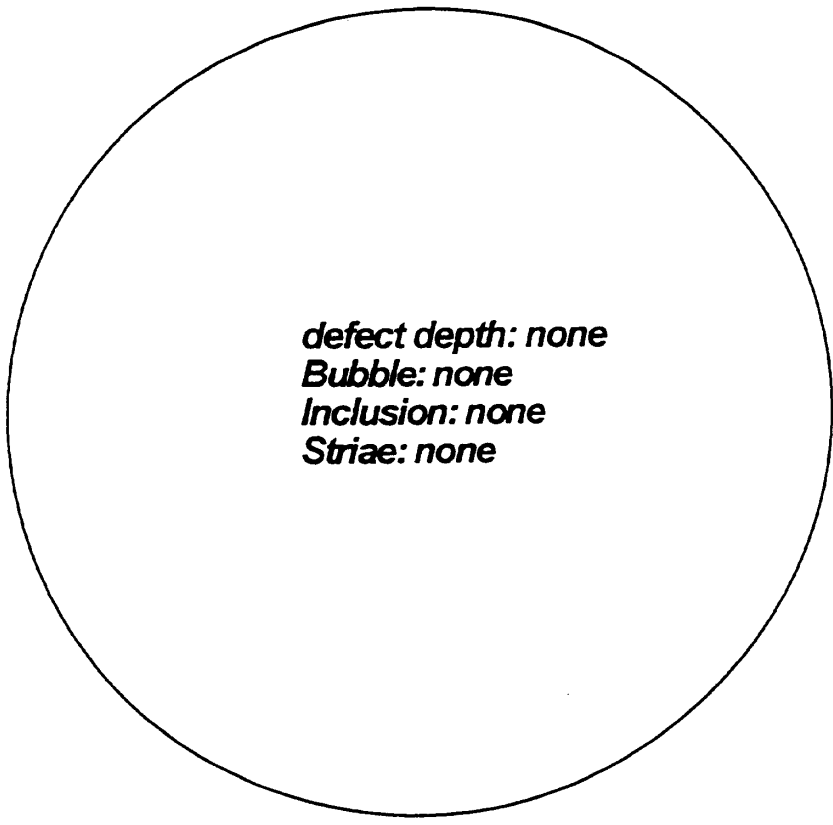
Heraeus
QUARZGLAS

POL-QW

Order Nr.: 94908401 Pos.: 2
Ø 256,5 mm x 52,84 mm
Quality: Suprasil 311
Plate No.: 960095-1418/5062

Date: 8.10.97

Inspector: 



defect depth: none
Bubble: none
Inclusion: none
Striae: none

Diameter	0,03mm	0,05mm	0,08mm	0,12mm	0,2mm	0,31mm	Sum
piece							
mm ²							

TBCS=

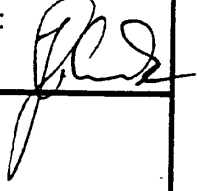
mm²
/100cm³

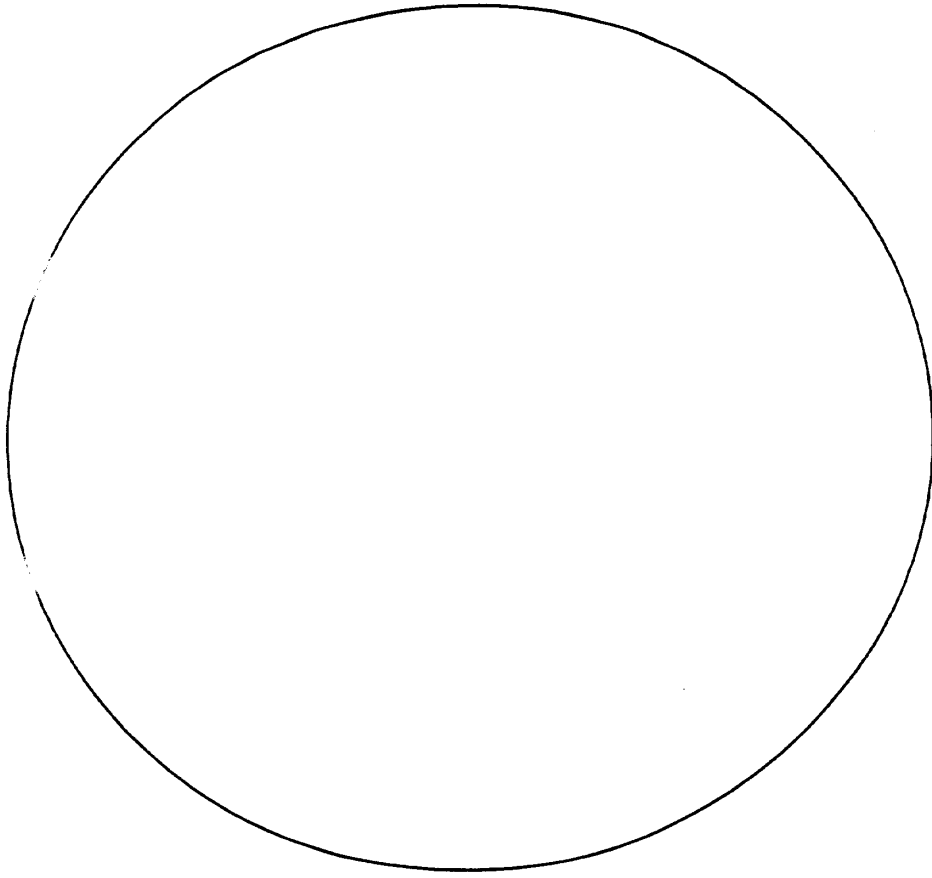
Heraeus
QUARZGLAS

POL - QW

Order No.: 94908401 Pos.: 2
Ø 256,5 mm x 52,84 mm
Plate No.: 960095-1M 18/5062
Residual strain- Report

Date: 8.10.97

Inspector: 



Edge	Center						Pos.
10							nm
2	< 1						nm/cm

Beam splitter, Suprasil 311 S

Ø 256mm x 52 mm

HQS-Order No.: 94908401

Date: 28.11.97 Ko

q:\interfer\sonderligo\ligo.wk4

HAI order No.: 5000023300dtd 30.09.96 as

Ligo Serial No.	HQS Serial No.	BN	witness sample No.	OH-content [ppm]	Homogeneity [ppm]			
					Delta n -(Tilt)		Delta n -(Tilt + Focus)	
					Ø 225 mm	Ø 80 mm	Ø 225 mm	Ø 80 mm
960094-BS01	960095-IM13	5061	960095-IM13 or 5061	153,9	1,21	0,217	0,499	0,171
960094-BS02	960095-IM14	5057	960095-IM14 or 5057	142,2	0,822	0,166	0,649	0,162
960094-BS03	960095-IM15	5059	960095-IM15 or 5059	201,9	0,606	0,133	0,603	0,13
960094-BS04	960095-IM16	5060	960095-IM16 or 5060	202,7	0,993	0,179	0,673	0,14
960094-BS05	960095-IM17	5058	960095-IM17 or 5058	198	2,425	0,245	1,551	0,27
960094-BS06	960095-IM18	5062	960095-IM18 or 5062	198,8	0,891	0,236	0,796	0,235

Input Test Mass, Recycling Mirror, End Test Mass; Suprasil 312 S

Ø 256 mm x 108 mm

Ligo Serial No.	HQS Serial No.	BN	witness sample No.	OH-content [ppm]	Homogeneity [ppm]			
					Delta n -(Tilt)		Delta n -(Tilt + Focus)	
					Ø 200 mm	Ø 80 mm	Ø 200 mm	Ø 80 mm
960095-IM1	960095-IM1	5397	960095-IM1 or 5397	151,8	1,582	0,224	0,677	0,12
960095-IM2	960095-IM2	5394	960095-IM2 or 5394	293,7	1,526	0,271	0,604	0,099
960095-IM3	960095-IM3	5013	960095-IM3 or 5013	210,9	1,899	0,309	0,466	0,092
960095-IM4	960095-IM4	5319	960095-IM4 or 5319	255,3	0,741	0,151	0,389	0,108
960095-IM5	960095-IM5	5318	960095-IM5 or 5318	308,5	0,871	0,256	0,546	0,177
960095-IM6	960095-IM6	5056	960095-IM6 or 5056	226,6	0,736	0,25	0,478	0,161
960095-IM7	960095-IM7	5055	960095-IM7 or 5055	199,3	1,19	0,195	0,527	0,129
960095-IM8	960095-IM8	5395	960095-IM8 or 5395	167,3	1,719	0,148	0,98	0,148
960095-IM9	960095-IM9	5014	960095-IM9 or 5014	153,1	2,325	0,278	0,503	0,097
960095-IM10	960095-IM10	5054	960095-IM10 or 5054	154	2,27	0,295	0,44	0,113
960095-IM11	960095-IM11	5396	960095-IM11 or 5396	257,3	0,432	0,198	0,461	0,212
960095-IM12	960095-IM12	6653	960095-IM12 or 6653	309,5	1,907	0,31	0,971	0,32
960095-IM13	960095-IM19	7273	960095-IM19 or 7273	KW 50	1,431	0,28	0,345	0,087

Heraeus
QUARZGLAS

POL-QW

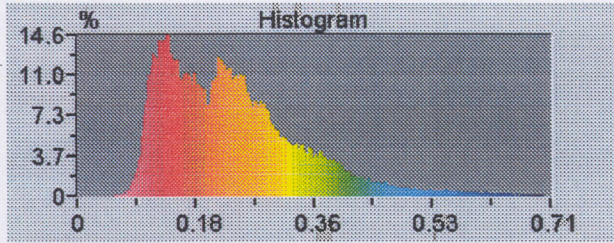
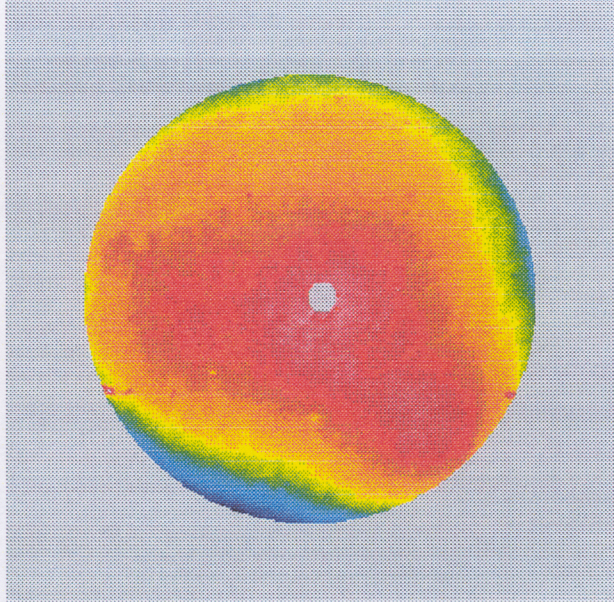
Data taken at 632.8 nm

Date: 07.10.97 Operator: Fu
ID: 506200 No.:

HQS-Order-No.: 98492874
Customer: HAI
Product: LIGO
Pos.-No.: 2
Order-No.: 18
Comment: 960094-im-~~xxx~~

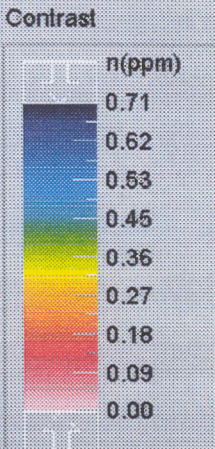
thickness: 52.0 mm
sample diameter: 280.0 mm
CA diameter: 200.0 mm
examined diameter: 200.3 mm

Center: (0.0mm,0.0mm)
Radius: 100.1mm
Points: 69729



Sub. Terms	Magn.	Angle
X Tilt	0.0432	-58.3624
Focus	0.1347	
Astigm.	0.1093	-28.4695
Coma	0.0457	93.5334
SA3	0.0244	

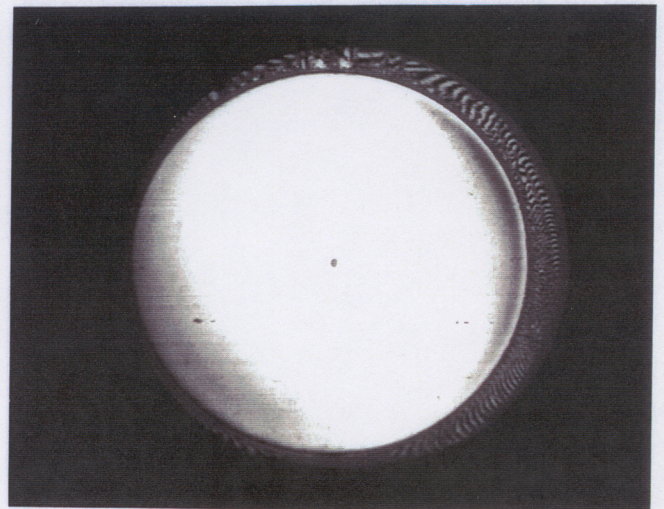
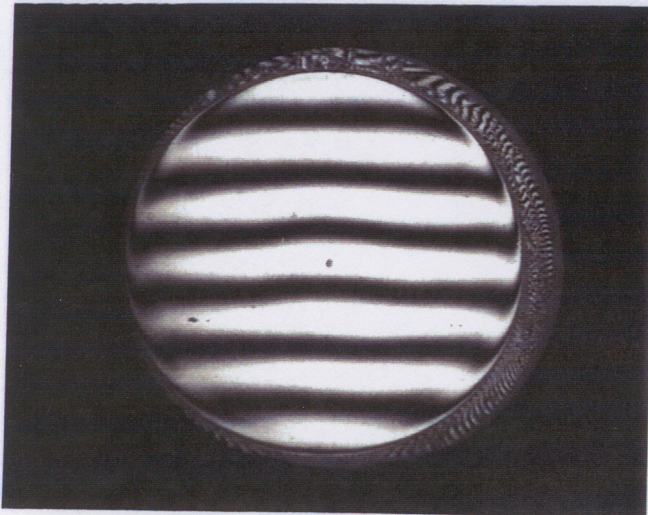
Phase Data	
Unit	n(ppm)
PV:	0.71
RMS:	0.102
Scale:	0.5



Reset	
UpperL	0.713
LowerL	0.000

File: 506200.dat, 07.10.97, 06:11

XPS-12"



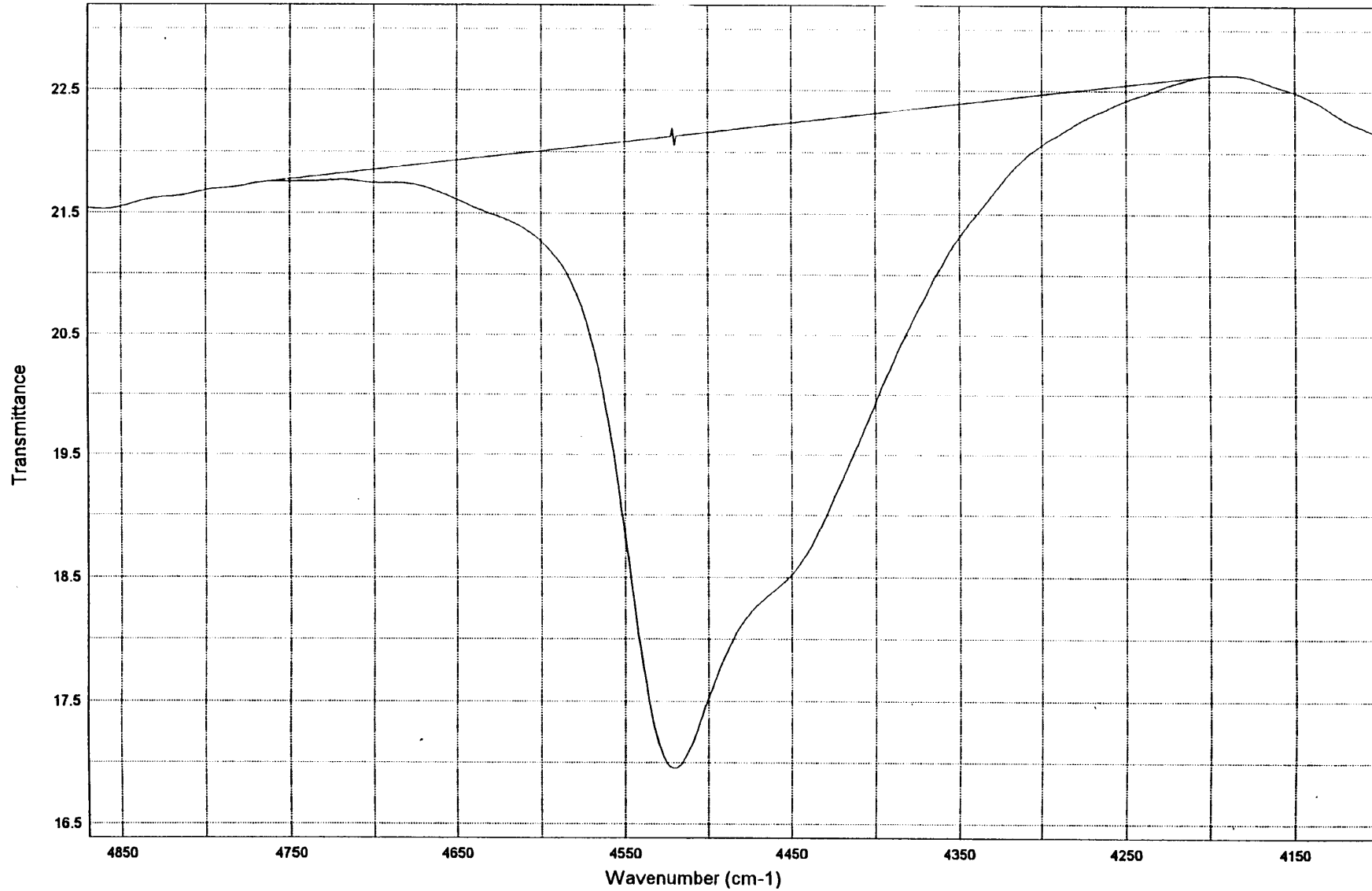
BS06

I0=22.1287 , I1=16.9556 at x=4521

OH-content: 198.8 ppm

Heraeus
QUARZGLAS

MEASURE NO. : 5062A
DATE : 07.10.1997 TIME : 14:56
MEASURE START : 10000 1/cm
MEASURE END : 2500 1/cm
OP-DISK-PATH LENGTH : Fisch-215-PL: 2.56 cm / Order No.: 99303974 / Material: Suprasil 311-----OH-content: 198.8 ppm at x=4521



Heraeus Amersil Inc
 3473 Satellite Blvd.
 Duluth, GA 30096

Heraeus AMERSIL

Sales Order #: 5001652
 Delivery #: 30039279

Delivery Note/ Packing List


Terms: FOB Duluth
 Customer PO #: pc208421

SOLD TO: Customer # 1658
 CALIFORNIA INST OF TECH
 ACCOUNTS PAYABLE 201-6
 PASADENA, CA 91125
 USA

SHIP TO: CUSTOMER # 5594
 CALIFORNIA INST OF TECH
 Attn: Gari Billingsley
 391 SOUTH HOLLISTON
 PASADENA, CA 91125
 USA

Order Date: 09/24/1996
 Account #:
 Tracking #: 1Z3944240200060485
 0476 0467 0458 0449 0430

Salesman: 00000020 MARC SCHNEIDER
 Route: UPS002 UPS Blue 2 Day PPA
 Total Weight: 252.000 LB
 Shipping Cartons: 00006

LINE ITEM	MATERIAL NUMBER	DESCRIPTION	UOM	SHIP DATE	NOTICE	CURRENT SHIPMENT
000001	50785	DISC, SUP 311, G, 256 X 52 SUPRASIL 311 DISC, GROUND, 256MM DIA X 61MM THK. PER LIGO PROJECT DRAWING D960793-A-D REV A AND SPECIFICATION LIGO-E960094 REV A <i>Received complete 12-02-97 </i>	EA	11/24/1997	<p>Open cartons and compare to bill of lading and packing list promptly. Claims for shortages or breakage must be made within 15 days after receipt of goods.</p> <p>Unpack with great care. Please do not discard the packing case nor any of the packing material until contents of case have been carefully checked and found correct and in good order.</p> <p>In case of damaged materials regardless of the external condition of the cartons, the consignee must institute the following procedure. Where shipments are made FOB Point of Shipment, it is the consignee's responsibility to file claim with the carrier and obtain an inspection report from the carrier for truck, air freight or parcel post shipments. For UPS shipments or FOB Destination shipments, all requests for inspection of damaged material should be made by the shipper and the consignee must notify Heraeus-Amersil Inc. promptly of such breakage to institute a claim. Damaged material, packing material, and packing case must be retained for carrier's inspection.</p> <p>Return no goods unless authorized. If material is not satisfactory, notify us and hold material subject to our order.</p>	6.000