ICS® INC. LABORATORIES

Test Report T4225-01-1 Issue 2
EN 166:2001
Bolle Safety
SG6319 Spectacles
04 September 2008

ACCREDITED
Certificate 1722.01

Approved by:

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Issued to: Bolle Safety
161 rue Alexis Perroncel,
69100 Villeurbanne
France

Date: 04 September 2008
Report: T4225-01-1
Issue: 2

Objective:

Contract testing to EN 166:2001, "Personal Eye Protection - Specifications".

Clauses: 7.1 Basic requirements
7.2.1.2 Protection against optical radiation, Ultraviolet filters (EN 170:2002) *(Clear and Yellow)*
7.2.1.4 Protection against optical radiation, Sunglare filters for industrial use (EN 172+A2:2001) *(Smoke)*
7.2.2 Protection against high-speed particles – Low, medium or high energy impact (F)

Samples:

SG6319 Anti-scratch & Anti-fog Spectacles

Ocular Variant	Qty	ICS Sample ID
Clear	30	5A-x
Smoke	30	5B-x
Yellow	30	5C-x

Date submitted: 28 July 2008

Procedures:

Testing protocols in accord with good laboratory practice were employed unless otherwise specified, for all tests. All tests were conducted in a standard laboratory atmosphere unless otherwise specified.

Testing procedures were followed as specified within:
EN 167:2001 "Personal eye-protection - Optical test methods"
EN 168:2001 "Personal eye-protection - Non-optical test methods"

Samples were randomly selected from the quantity provided and tested in the as-received condition unless otherwise stated.

When applicable, samples were assessed on medium (64mm IPD) headform.

Variation in luminous transmittance- P1 and P2, The actual variation is compared to the specification. If the actual variation does not meet the specification, then the corrected variation is used. The corrected variation is calculated from the difference between the theoretical and actual variation. The theoretical values are determined by applying Beer-Lambert's Law to the known thickness variation of the lens. Lens has a 42 mm vertical depth therefore 32 mm area measured.

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Assessment summary:

Dates tested: 29 August through 03 September 2008

EN 166 Requirement	Compliant	Non-Compliant
6 Design and manufacture		
6.1 General construction	X	
6.2 Materials	Not assessed	
6.3 Headbands	Not applicable	
7.1 Basic requirements		
7.1.1 Field of vision	X	
7.1.2 Optical requirements		
7.1.2.1 Spherical, astigmatic, and prismatic refractive powers	Optical Class 1	
7.1.2.2 Transmittance		
7.1.2.2.1 Oculars without filtering action	Not applicable	
7.1.2.2.2 Oculars with filtering action	See 7.2.1	
7.1.2.2.3 Variations in transmittance	X	
7.1.2.3 Diffusion of light	X	
7.1.3 Quality of material and surface	X	
7.1.4 Robustness		
7.1.4.1 Minimum robustness	Not applicable	
7.1.4.2 Increased robustness		
7.1.5 Resistance to Ageing		
7.1.5.1 Stability at elevated temperatures	X	
7.1.5.2 Resistance to ultraviolet radiation (oculars only)	X	
7.1.6 Resistance to corrosion	Not applicable	
7.1.7 Resistance to ignition	X	
7.2 Particular requirements (Optional)		
7.2.1 Protection against optical radiation		
7.2.1.2 Ultraviolet filters (EN170)		
Clear & Yellow	X	
7.2.1.4 Sunglare filters for industrial use (EN172)		
Smoke	X	
7.2.2 Protection against high speed particles (F)		
7.2.8 Lateral Protection	X	
7.3 Optional requirements	None claimed	
9 Marking	Not assessed	
10 Information supplied by the manufacturer	Not assessed	

Samples as assessed meet the requirements of EN166:2001 and as a result of this assessment the following markings are suggested:

Ocular Variant	Filter Type	Filter Scale	Ocular Marking	Frame Marking
Clear	Ultraviolet	2-1.2 or 2C-1.2	CE ‘filter scale’ ‘mfg’ 1 F	CE ‘mfg’ EN 166 F
Smoke	Sunglare	5-3.1		
Yellow	Ultraviolet	2-1.2 or 2C-1.2		

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Results:

6.1 General construction; Result: Pass

Samples were assessed and found to be free from projections, sharp edges or other defects that are likely to cause discomfort or injury.

7.1.1 Field of view; Result: Pass

Samples assessed and a 22mm(W) x 20mm(H) ellipse could be described in full for each eye (64mm pupil distance)

7.1.2.1 Refractive powers

Spherical and astigmatic powers

Sample ID	Left Ocular		Right Ocular		Optical Class Met
	Spherical Power (m^{-1})	Astigmatic Power (m^{-1})	Spherical Power (m^{-1})	Astigmatic Power (m^{-1})	
5A-1	-0.05	0.03	-0.03	0.02	1
5A-2	-0.05	0.05	-0.03	0.04	1
5A-3	-0.04	0.04	-0.03	0.03	1
Specification Optical Class 1: Optical Class 2: Optical Class 3:	 ≤ +/- 0.06 ≤ +/- 0.12 ≤ + 0.12 /- 0.25	 ≤ 0.06 ≤ 0.12 ≤ 0.25	 ≤ +/- 0.06 ≤ +/- 0.12 ≤ + 0.12 /- 0.25	 ≤ 0.06 ≤ 0.12 ≤ 0.25	

Difference in prismatic refractive power

Sample ID	Vertical Imbalance (cm/m)	Horizontal Imbalance (cm/m)	Optical Class Met
5A-1	0.00	0.27 Base Out	1
5A-2	0.00	0.23 Base Out	1
5A-3	0.00	0.27 Base Out	1
Specification Optical Class 1: Optical Class 2: Optical Class 3:	 ≤ 0.25 ≤ 0.25 ≤ 0.25	 ≤ 0.75 Base Out, ≤ 0.25 Base In ≤ 1.00 Base Out, ≤ 0.25 Base In ≤ 1.00 Base Out, ≤ 0.25 Base In	

7.1.2.2.3 Variations in transmittance *[filtering]*

Clear

Sample ID:	5A-4		5A-5		5A-6		Specification
Ocular:	Left	Right	Left	Right	Left	Right	
Maximum %T:	90.3	90.2	90.4	90.2	90.4	90.3	
Center %T:	90.3	90.2	90.3	90.2	90.4	90.2	
Minimum %T:	90.2	90.2	90.2	90.0	90.3	90.1	
Actual P1 & P2:	0.1	0.0	0.1	0.2	0.1	0.1	± 5%
P3:	0.1		0.1		0.2		± 20%
Pass/Fail:	Pass						

Smoke

Sample ID:	5B-4		5B-5		5B-6		Specification
Ocular:	Left	Right	Left	Right	Left	Right	
Maximum %T:	11.8	11.7	13.0	13.0	12.3	12.3	
Center %T:	11.0	10.9	11.9	11.9	11.3	11.2	
Minimum %T:	10.5	10.5	11.2	11.3	10.9	10.6	
Actual P1 & P2:	7.3	7.3	9.2	9.2	8.8	9.8	± 10%
P3:	0.9		0.0		0.9		± 20%
Pass/Fail:	Pass						

Yellow

Sample ID:	5C-4		5C-5		5C-6		Specification
Ocular:	Left	Right	Left	Right	Left	Right	
Maximum %T:	86.8	86.7	86.7	86.6	86.7	86.7	
Center %T:	86.6	86.4	86.6	86.4	86.5	86.5	
Minimum %T:	86.5	86.4	86.5	86.4	86.4	86.4	
Actual P1 & P2:	0.2	0.3	0.1	0.2	0.2	0.2	± 5%
P3:	0.2		0.2		0.0		± 20%
Pass/Fail:	Pass						

7.1.2.3 Diffusion of light

Sample ID	Measured Value ($cd/m^2/lx$)	Pass	Fail
Clear			
5A-4	0.26	X	
5A-5	0.27	X	
5A-6	0.24	X	
Smoke			
5B-4	0.09	X	
5B-5	0.12	X	
5B-6	0.10	X	
Yellow			
5C-4	0.19	X	
5C-5	0.21	X	
5C-6	0.24	X	
Specification:	≤ 0.75		

7.1.3 Quality of material and surface; Result: Pass

Samples assessed were found to be free of any optical defects that could impair vision.

7.1.4.2.2 Increased robustness - Complete eye-protectors

Sample ID	Location	Conditioning	Velocity (m/s)	Pass	Fail
Clear			5.1m/s 22mm 43g Drop Ball 1.33m (51.3")		
5A-7	Left Frontal (1)	55°C		X	
5A-8				X	
5A-9	Right Frontal (2)			X	
5A-10				X	
5A-11	Left Lateral (3)			X	
5A-12	Right Lateral (4)			X	
15A-3	Left Frontal (1)	-5°C		X	
5A-14				X	
5A-15	Right Frontal (2)			X	
5A-16				X	
5A-17	Left Lateral (3)			X	
5A-18	Right Lateral (4)			X	
Smoke					
5B-7	Left Frontal (1)	55°C		X	
5B-8				X	
5B-9	Right Frontal (2)			X	
5B-10				X	
5B-11	Left Lateral (3)			X	
5B-12	Right Lateral (4)			X	
5B-13	Left Frontal (1)	-5°C		X	
5B-14				X	
5B-15	Right Frontal (2)			X	
5B-16				X	
5B-17	Left Lateral (3)			X	
5B-18	Right Lateral (4)			X	
Yellow					
5C-7	Left Frontal (1)	55°C		X	
5C-8				X	
5C-9	Right Frontal (2)			X	
5C-10				X	
5C-11	Left Lateral (3)			X	
5C-12	Right Lateral (4)			X	
5C-13	Left Frontal (1)	-5°C		X	
5C-14				X	
5C-15	Right Frontal (2)			X	
5C-16				X	
5C-17	Left Lateral (3)			X	
5C-18	Right Lateral (4)			X	

7.1.5.1 Stability at elevated temperatures; Result: Pass

Samples assessed had no visible deformation.

7.1.5.2 Resistance to ultraviolet radiation - Transmittance

Sample ID	Before (%T)	After (%T)	Relative Change (%)	Pass	Fail
Clear					
5A-4	90.3	90.4	0.1	X	
5A-5	90.2	90.4	0.2	X	
5A-6	90.4	90.4	0.0	X	
Specification:			±5		
Smoke					
5B-4	11.0	10.9	-0.9	X	
5B-5	11.9	11.9	0.0	X	
5B-6	11.3	11.5	1.8	X	
Specification:			±10		
Yellow					
5C-4	86.6	86.9	0.4	X	
5C-5	86.4	86.7	0.4	X	
5C-6	86.5	86.7	0.2	X	
Specification:			±5		

7.1.5.2 Resistance to ultraviolet radiation - Diffusion of Light

Sample ID	Measured Value ($cd/m^2/lx$)	Pass	Fail
Clear			
5A-4	0.20	X	
5A-5	0.19	X	
5A-6	0.20	X	
Smoke			
5B-4	0.09	X	
5B-5	0.11	X	
5B-6	0.11	X	
Yellow			
5C-4	0.15	X	
5C-5	0.17	X	
5C-6	0.22	X	
Specification:	≤ 0.75		

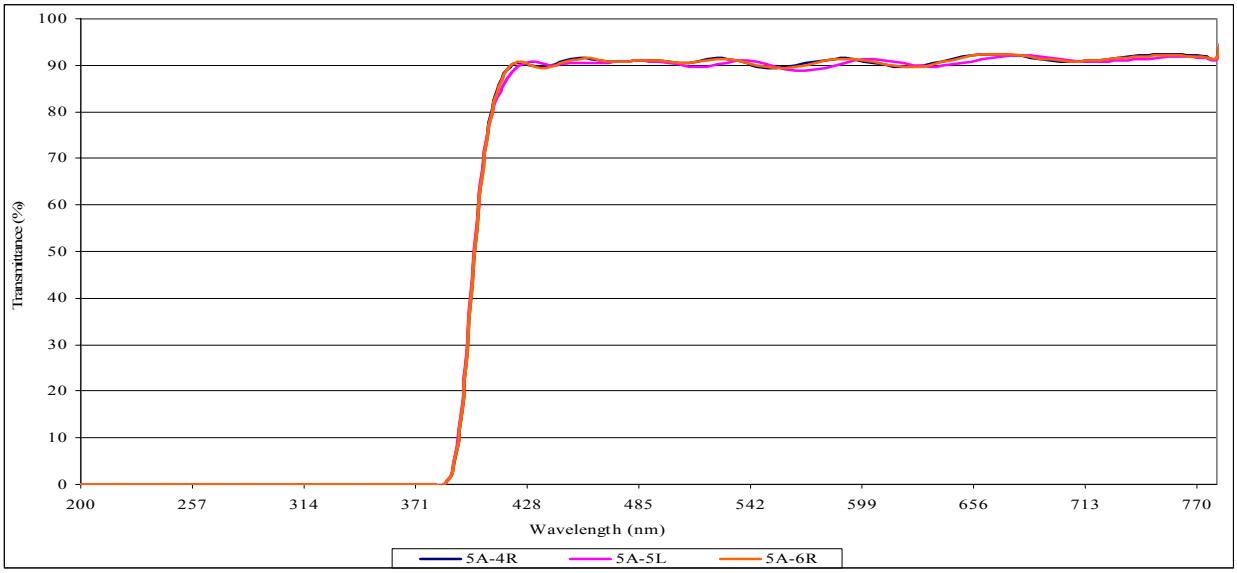
7.1.7 Resistance to ignition; Result: Pass

Lenses, fronts and temples did not ignite or continue to glow after removal of the steel rod.

7.2.1.2 Protection against optical radiation - Ultraviolet filters (EN 170)

Clear

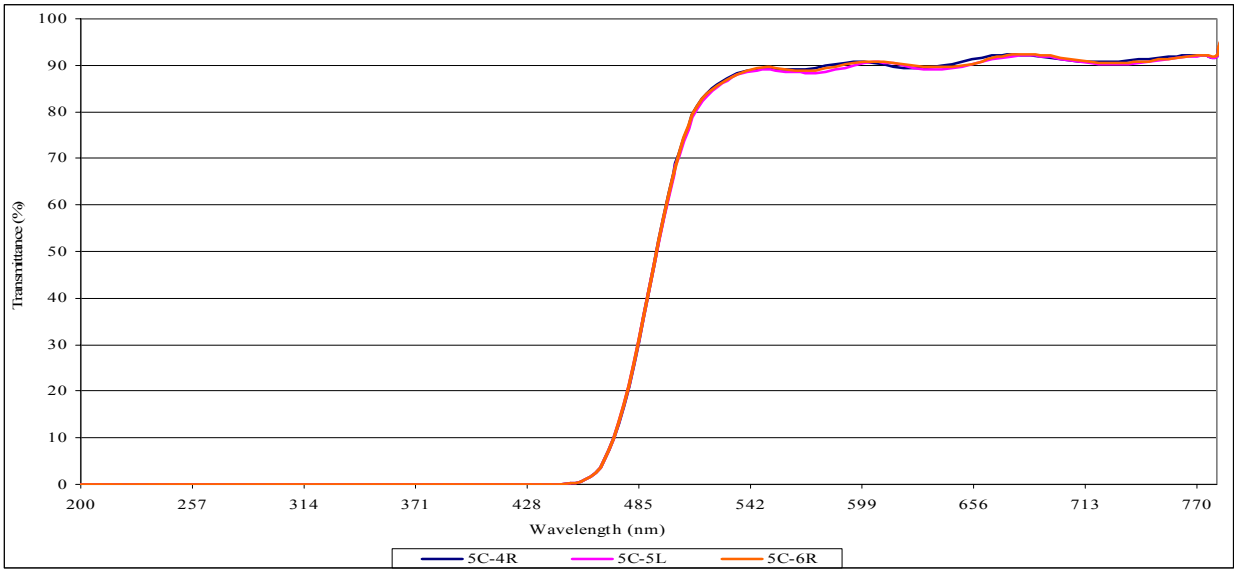
Sample ID:	5A-4	5A-5	5A-6	Specification Scale Number 2-1.2 or 2C-1.2
Luminous (Tv)	90.6	90.2	90.5	100 to 74.4%
313nm	1.6E-4	1.6E-4	1.5E-4	≤ 0.0003%
365nm	3.2E-4	3.2E-4	3.2E-4	≤ 10%
Max. 210 to 313nm	3.4E-4	3.3E-4	3.3E-4	≤ 0.0003%
Max. 313 to 365nm	3.8E-4	3.9E-4	3.9E-4	≤ 10%
Max. 365 to 405nm	66.7	67.4	66.2	< Tv
Optional requirements for oculars with enhanced color recognition:				
Min. 500 to 650nm	89.3	88.8	89.3	≥ 0.2 Tv
Attenuation Quotients:				
Red Signal	1.00	1.01	1.00	≥ 0.8
Yellow Signal	1.00	1.00	1.00	
Green Signal	1.00	1.00	1.00	
Blue Signal	1.00	1.00	1.00	
Scale number met	2-1.2 or 2C-1.2			



7.2.1.2 Protection against optical radiation - Ultraviolet filters (EN 170)

Yellow

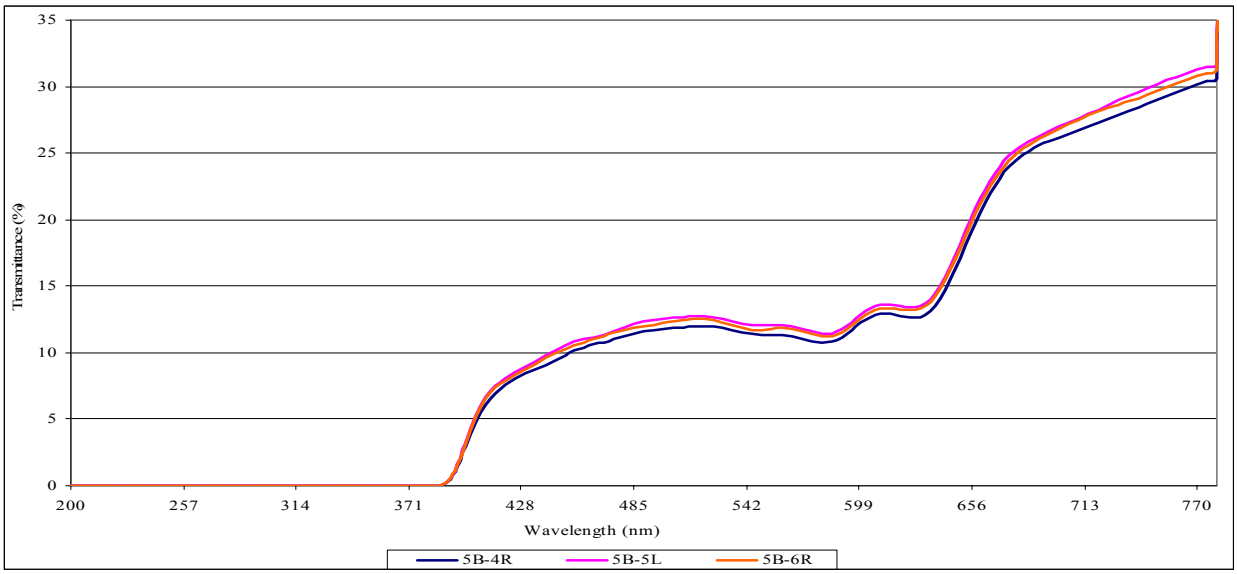
Sample ID:	5C-4	5C-5	5C-6	Specification Scale Number 2-1.2 or 2C-1.2
Luminous (Tv)	86.9	86.4	86.8	100 to 74.4%
313nm	<1E-4	<1E-4	<1E-4	≤ 0.0003%
365nm	1.9E-4	1.8E-4	1.9E-4	≤ 10%
Max. 210 to 313nm	<1E-4	<1E-4	<1E-4	≤ 0.0003%
Max. 313 to 365nm	2.3E-4	2.2E-4	2.3E-4	≤ 10%
Max. 365 to 405nm	1.9E-	1.8E-4	1.9E-4	< Tv
Optional requirements for oculars with enhanced color recognition:				
Min. 500 to 650nm	62.6	62.0	62.4	≥ 0.2 Tv
Attenuation Quotients:				
Red Signal	1.08	1.09	1.09	≥ 0.8
Yellow Signal	1.08	1.08	1.08	
Green Signal	0.98	0.98	0.98	
Blue Signal	0.82	0.82	0.82	
Scale number met	2-1.2 or 2C-1.2			



7.2.1.4 Protection against optical radiation - Sunglare filters for industrial use (EN 172)

Smoke

Sample ID:	5B-4	5B-5	5B-6	Specification Scale Number 5-3.1
Luminous (Tv)	11.8	12.5	12.2	17.8 to 8.0 %
Max. 280 to 315nm	<1E-4	<1E-4	<1E-4	≤ 0.01 Tv
Max. 315 to 350nm	<1E-4	<1E-4	<1E-4	≤ 0.5 Tv
Mean 315 to 380nm	<1E-4	<1E-4	<1E-4	≤ 0.5 Tv
Requirements for "Driving and Road Use:				
Luminous (Tv)	11.8	12.5	12.2	≥ 8.0%
Min. 500 to 650nm	10.7	11.4	11.3	≥ 0.2 Tv
Attenuation Quotients:				
Red Signal	1.17	1.16	1.16	≥ 0.8
Yellow Signal	1.04	1.04	1.04	
Green Signal	0.98	0.98	0.98	
Blue Signal	1.06	1.06	1.06	
Scale number met	5-3.1			



7.2.2 Protection against high-speed particles

Sample ID	Location	Velocity (ft/s)	Pass	Fail
Clear				
5A-19	Left Frontal (1)	150	X	
5A-20		148	X	
5A-21		149	X	
5A-22		149	X	
5A-23	Right Frontal (2)	149	X	
5A-24		150	X	
5A-25		149	X	
5A-26		149	X	
5A-27	Left Lateral (3)	148	X	
5A-28		148	X	
5A-29	Right Lateral (4)	149	X	
5A-30		148	X	
Smoke				
5B-19	Left Frontal (1)	149	X	
5B-20		149	X	
5B-21		149	X	
5B-22		149	X	
5B-23	Right Frontal (2)	148	X	
5B-24		150	X	
5B-25		148	X	
5B-26		149	X	
5B-27	Left Lateral (3)	149	X	
5B-28		148	X	
5B-29	Right Lateral (4)	148	X	
5B-30		149	X	
Yellow				
5C-19	Left Frontal (1)	149	X	
5C-20		148	X	
5C-21		149	X	
5C-22		149	X	
5C-23	Right Frontal (2)	148	X	
5C-24		148	X	
5C-25		149	X	
5C-26		148	X	
5C-27	Left Lateral (3)	148	X	
5C-28		149	X	
5C-29	Right Lateral (4)	149	X	
5C-30		148	X	

7.2.8 Lateral protection; Result: Pass

Samples prevent the tip of a 2mm rod from touching the lateral impact regions of the headform.

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Sample photographs:

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17. Client agrees to pay any and all additional costs associated with unexpected or above standard communications and/or consultations with client or third parties as designated by client.
18. Client agrees to pay any and all additional costs for work additional to the original scope of work as agreed to by client.
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21. Quotations are valid for 30 days from date of issue. Terms: 30% Laboratory/Testing fees invoiced and payable upon acceptance of quotation. Remaining Laboratory/Testing fees invoiced and payable upon completion of services, 15 days net. Cancelled jobs will be invoiced for work performed and/or set-up costs incurred. Cancelled Purchase Orders are subject to 10% service charge. Shipping costs incurred by ICS will be invoiced at cost +10% handling fee. A minimum USD $25.00 handling fee will be invoiced. Shipping costs incurred by the client will be invoiced a USD $25.00 handling fee.
22. In the event that payment is not received within 15 days of invoice date, Client agrees to pay a late payment charge on the unpaid balance equal to 1-1/2% per month or the maximum charge allowed by law, whichever is less, and all costs and expenses, including attorney's fees where recovery of the same is not prohibited by law, incurred by ICS in collecting such invoices.
23. All costs associated with compliance with any subpoena(s) for documents, testimony in a court of law, or for any other purpose relating to work performed by ICS in connection with work performed for that Client, shall be paid by Client. Client shall also pay ICS's then existing standard fee for consulting, deposition and trial testimony and all expenses related thereto.
24. Cancelled/discontinued orders: Client responsible for all administrative and testing charges up to point of cancellation.