MEDICAL RESEARCH LABORATORY

U. S. Naval Submarine Base
New London

MEMORANDUM REPORT 53-4

REPORT ON GENERAL PURPOSE SUNGLASSES

(Submitted by Ship's Store Office)
77 Pairs - March 1953

Bureau of Medicine and Surgery, Navy Department
Project NM 003 041.51

Visual Engineering Section

16 March 1953

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BuMed Project NM 003 041.51 Goggle design and evaluation

Visual Engineering Section

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Data requested: Testing of sunglasses and an evaluation of their suitability for resale to Naval personnel.

Requested by: U. S. Navy Ship's Store Office ltr NP(13)/J14(D-3);JA:fm D-3 of 30 December 1952.

Material submitted: Seventy-seven sunglasses (samples of eight sunglasses manufacturers).

Tests conducted at MRL: Glasses were tested for the qualities specified in Medical Research Laboratory Memorandum Report 52-6, "Requirements for General Purpose Sunglasses for Over-the-Counter Sale." The following tests were run:

1. Visible Percent Transmission - using a Macbeth Daylight Lamp (5900° K) and a calibrated Weston Foot-Candle Meter with a Barrier Layer Cell.

2. Lens Size - using the New London Scale of Lens Size.

3. Percent Purity (Color) - using a Macbeth Daylight Lamp, a Bausch and Lomb Color Comparator, Munsell color standards, and the C. I. E. Method.

4. Infra-red Percent Transmission - using a 15 watt lamp source, Photovolt Model 501-M with a D cell, and filter 5263 for absorbing ultra-violet and visible light.

5. Ultra-violet Percent Transmission - using a Central Scientific Co. Quartz Mercury Arc with filter 9863, a Photovolt Model 512 with a B cell, and filters 9700 and 0140 for isolating the erythemal band (290-320 mu).

6. Base Curvature - using a Geneva Lens Measure.

7. Refractive Power - using an American Optical Co. Lensometer.

8. (& 9) Grade of Polish and Surface Examination - using a narrow incidence light and a black box with viewing aperture.

10. Frames - by inspection.

Requirements: The requirements stated in Memorandum Report 52-6 were used in evaluating the sunglasses, with the following provisions:

1. Visible Percent Transmission:

   a. Requirements specify 12-25%; the Weston Meter was accurate to ± 1%, and therefore a tolerance of 1% was allowed in the ratings.
   b. Clip-ons necessarily have a lens size too small to provide adequate peripheral coverage; therefore it is recommended that the transmission of clip-ons be in the region of 16-30%.
   c. Gradient density glasses provide extra glare protection at the top; therefore the visible percent transmission at the center of the lens may be higher than the 12-25% standard.

2. Excitation Purity:

   While purity of less than 25% is preferred, glasses with percent purities ranging from 25 through 35 were considered in the testing since this range of purity is not considered hazardous in general purpose sunglasses.

Results of the tests: See Table of Test Results (Enclosure 1).

Evaluation: When a glass failed to meet the requirements of one of the first seven tests (visible percent transmission, lens size, percent purity, infra-red percent transmission, ultra-violet percent transmission, base curvature, and refractive power) further testing of the glass was discontinued. The test battery was completed on all other glasses, and these are designated in the first column of the Table of Test Results as follows:

Group I - glasses which meet all the requirements of Memorandum Report 52-6.

Sunglass Ind. 150S and GIP 6

Group II - glasses which meet all the requirements of the first seven tests but do not meet the requirements of the minor tests (grade of polish, surface examination, and frames).

Comptone 9000 MS

Group III - glasses which have a neutrality in the 25-35% range and meet all other requirements.

Willson Prod. GP 180
Comptone 9000R6
Vision Prod. 200/6
Sunglass Ind. SG-RP and SG-GP
Eye-Site Labs 94/6B

Group IV - glasses which have a neutrality in the 25-35% range and meet all requirements but those of the minor tests.

Comptone GF6 and 7500
Vision Prod. 1200/6
Visionade (Global Opt. Co. Prod.) 760

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TABLE OF TEST RESULTS (77 Sunglasses - March 1953)

	Company and Glasses	Visible % T L	Visible % T R	Lens Size	% Purity	Infra-red % T	Ultra-violet % T	Base Curvature	Uniformity of Curvature	Refractive Power	Grade of Polish	Surface Exam.	Frames
	Allison Prod.												
	MP 10	20	20	3									
	MP 11	20	20	3									
	MP 42	21	21	3									
	MP 60	21	21	3									
	MP 61	20	20	3									
	MP 65	39	38										
	MP 635	19	19	3									
	MP 700	29	29	clip-on	28	fail(92)							
	MP 750	20	20	clip-on	42								
	MP 800	21	21	4	51								
	MP 820	21	21	4	52								
	MP 825	21	21	4	48								
	PA 1	20	20	3									
	PA 2	23	23	3									
	GP 70	23	23	clip-on	42								
	GP 100	21	21	5	42								
	GP 103	21	21	5	47								
Group III	GP 180	24	25	4	34	pass	pass	6.0	good	pass	A	negligible bubbles & scratches	good
	GP 183	25	25	4	42								
	Lowres												
	400 GP6	19	19	4	43								
	400 GP6	20	20	5	47								
	400 GP4	17	17	5	46								
	Comptone												
Group IV	GP6	13	12	4	26	pass	pass	6.0	good	pass	A	good	soft
Group IV	7500	13	11	4	26	pass	pass	6.0	good	pass	A	negligible bubbles	soft
Group III	9000 R6	12	12	5	27	pass	pass	6.0	good	pass	A	good	good
Group II	9000 MS	11	12	5	23	pass	pass	6.0	good	pass	A	negligible bubbles	soft
	4000	12	10										
	198/9	10	12										
	2700	13	12	clip-on									

	Company and Glasses	Visible % T L	Visible % T R	Lens Size	% Purity	Infra-red % T	Ultra-violet % T	Base Curvature	Uniformity of Curvature	Refractive Power	Grade of Polish	Surface Exam.	Frames
	Vision Prod.												
Group III	200/6	26	23	clip-on	35	pass	pass	6.0	good	pass	A	negligible bubbles	good
	450/6	25	28										
	520/6	25	24	3									
	800/6	25	24	3									
	950 P/6	25	26	2									
	950 R/6	26	26	2									
Group IV	1200/6	25	25	5	33	pass	pass	6.0	good	pass	A	negligible bubbles & scratches	soft
	1200 R/6	10	11										
	Visionade (Global Opt. Co. Prod.)												
	36	19	19	3									
	52	20	19	3									
	386	26	26	4	41								
Group IV	760	18	19	4	35	pass	pass	6.0	good	pass	A	negligible bubbles & scratches	soft
	Fit 48	20	19	clip-on	48								
	444 GP	18	18	5	50								
	444 RP	20	19	5	52								
	Sun GlassInd.												
	1910	13	14	3									
	1920	10	11										
	01901	20	20	2									
	01910	20	20	3									
	01920	20	20	3									
	25 F	11	11	clip-on									
Group I	150 S	11	12	4	24	pass	pass	6.0	good	pass	A	good	good
	GIW 4	20	21	5	33	fail(65)							
	GIW 6	10	11										
Group I	GIP 5	14	13	5	18	pass	pass	6.0	good	pass	A	good	good
Group III	SG - RP	24	23	5	35	pass	pass	6.0	good	pass	A	negligible scratches in left	good
Group III	SG - GP	25	24	5	29	pass	pass	6.0	good	pass	A	good	good
	1605- Gradient	L 5-28 R 9-40		4	28	pass	pass	L3.5 - 3.9 R3.9 - 4.25	poor				

	Company and Glasses	Visible % T L	Visible % T R	Lens Size	% Purity	Infra-red % T	Ultra-violet % T	Base Curvature	Uniformity of Curvature	Refractive Power	Grade of Polish	Surface Exam.	Frames
	U. S. Lens												
	401	34	34										
	1006	37	36	clip-on									
	1632	22	22	5	49								
	9001	36	38										
	9040	18	18	4	46								
	9045	19	18	3									
	203/6 PR	25	26	5	39								
	203/6 RS	13	13	5	72								
	531/6 RS	18	17	5	72								
	1811/4	40	40										
	1811/6	24	24	3									
	Eye-Site Labs												
	5[illegible]-6B	23	23	3									
	400-6B(PL)	22	22	2									
	400-6B(GP)	23	23	2									
Group III	94/6B	23	23	4	34	pass	pass	6.0	good	pass	A	good	good
	1100-6B	22	23	2									
	1600-6B-GP	24	23	5	40								
	1700-6B-GF	23	23	3									
	94PT-GF-6B	23	23	4	42								
	1600-6B-R	23	23	5	43								

NOTES:

1. "L" refers to left lens and "R" refers to right lens.
2. In "Frame" Column, "soft" refers to the part of the frame holding the lenses.