

Independent Product Testing

University of Colorado Denver: Face Shield Test Report Xodus Face Shield

Face Shield Test Report Xodus Face Shield
May 27, 2020



1. Summary

This report provides results from testing conducted by the Bioengineering Department on the Anschutz Medical Campus in Aurora Colorado. Test procedures were adapted from the American National Standards Institute (ANSI) standard Z87.1-2003 [1] and guidelines compiled for the Journal of Occupational and Environmental Hygiene [2]. This test does not assess mechanical impacts.

1.1. Test Articles

Test articles reported on are described in Table 1.

Table 1: Test articles.

Test Article	Part #/Lot #	Number of Samples	Material	Date
Xodus Medical Face Shield	REF: 40767 LOT: 200427	2	PET	5/27/2020

1.2. Results Summary

Results are summarized in Table 2. Specifications were derived from the ANSI standards and the clinical guidelines [1,2]. When the shields arrived, one had visible creasing in a corner, likely from shipping (Fig. 1 & 2). The shields studied were functional, demonstrating no flammability, no liquid penetration during spraying, and no vision impairment or degradation after cleaning. The shields studied were biocompatible, demonstrating no skin irritation during use. The shields studied demonstrated no shifting during use over a 1-hour period time. Overall, the shields passed all tests.



Figure 1: Shield upon arrival.



Figure 2: Creasing at corner.

1.3. Recommendations

The shield creasing upon arrival could have caused visual distortion if it occurred higher on the shield in the user's direct line of sight. Alternative shipping and handling methods should be considered to maintain optimal visual clarity of the shields.

Table 2: Test Results Summary.

Face Shield Test Matrix Summary					
All standards per ANSI Z87.1 [1]. Methods are modified.					
Tests developed from healthcare face shield guidelines [2].					
	Description	Specification	Test	Result	P/F
Functionality	Flammability	Burn rate < 76 mm/minute	Expose to butane torch per ASTM 635	No flames observed, just curling	Pass
	Cleanability	No loss of vision or observed degradation	Clean with 70% ethanol, 10% bleach and Quaternary Ammonia solution.	No degradation or vision loss	Pass
	Spray Test	No penetration from colored water spray.	Spray shield from several angles with red colored water, assess for penetration	No penetration observed	Pass
	Visibility	No significant loss of vision	Perform standard eye test with and without, assess for change	No vision impairment	Pass
Biocompatibility	Biocompatible Material?	Is the material listed in the bill of materials known to be biocompatible?	Research	PET is known to be biocompatible	Pass
	Irritability	Irritation of skin?	Tester feedback	None Noted	Pass
Human	Wear test	No shift in position greater than 3 cm	Perform typical nursing duties, assess for motion	No shifting during use	Pass
	Don/Doff time	Takes no more than 30 seconds to don or doff	Measure time	10 seconds	Pass

2. Results

2.1. Human Factors

When moving the head side-to-side and up-and-down repeatedly, the shield did not shift. In the initial wear test up to 1 hour, there was no skin irritation or noticeable contact points from the shield.

2.2. Spray Testing

After spraying the shield three times at eye-level from three sides, no liquid penetration was observed - no liquid was absorbed on areas protected by the face shield.

2.3. Cleaning and Vision

Three test solutions, 70% ethanol, 10% bleach, and a quaternary ammonia solution, were individually applied to the shield before a subsequent vision test. No damage, hazing, or reduction in vision was observed after cleaning the shield with the test solutions.

2.4. Flammability

When applying a butane flame to the shield material, no flames or burning were observed. The material demonstrated curling but did not ignite. Burn rate was not recorded as no burning was observed.

3. Conclusion

The shield provided good spray protection, satisfactory visual quality, good cleanability, and was easy to take on and off. The material is not flammable and is known to be biocompatible. The tester experienced no discomfort during wear.

4. References

[1] American National Standards Institute. "ANSI Z87. 1-2003 Standard Practice for Occupational and Educational Eye and Face Protection." (2003).

[2] Roberge, Raymond J. "Face shields for infection control: A review." *Journal of Occupational and Environmental Hygiene*, 13.4 (2016): 235-242.