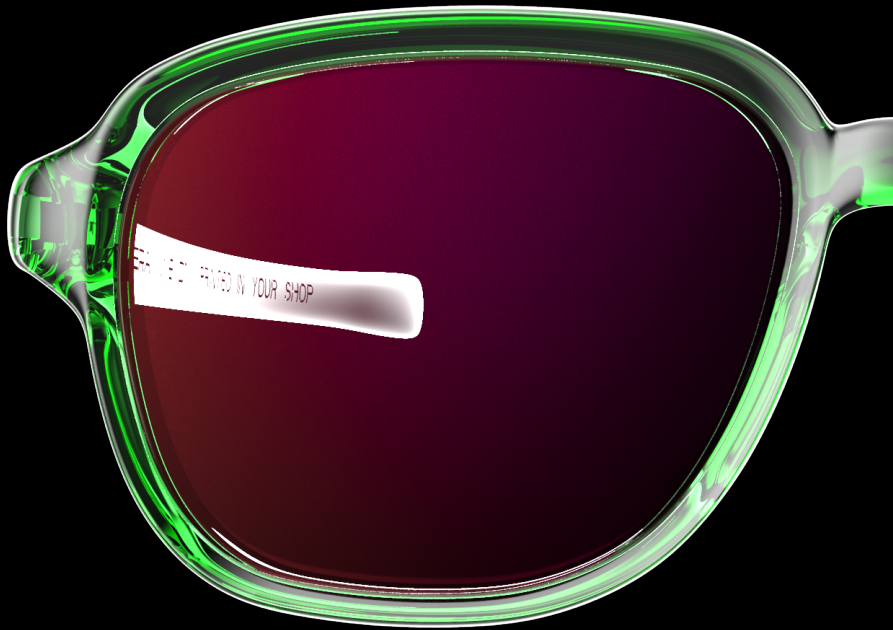


The Rigorous Testing & Science of Mission Eyewear Frames.

Mission Eyewear.

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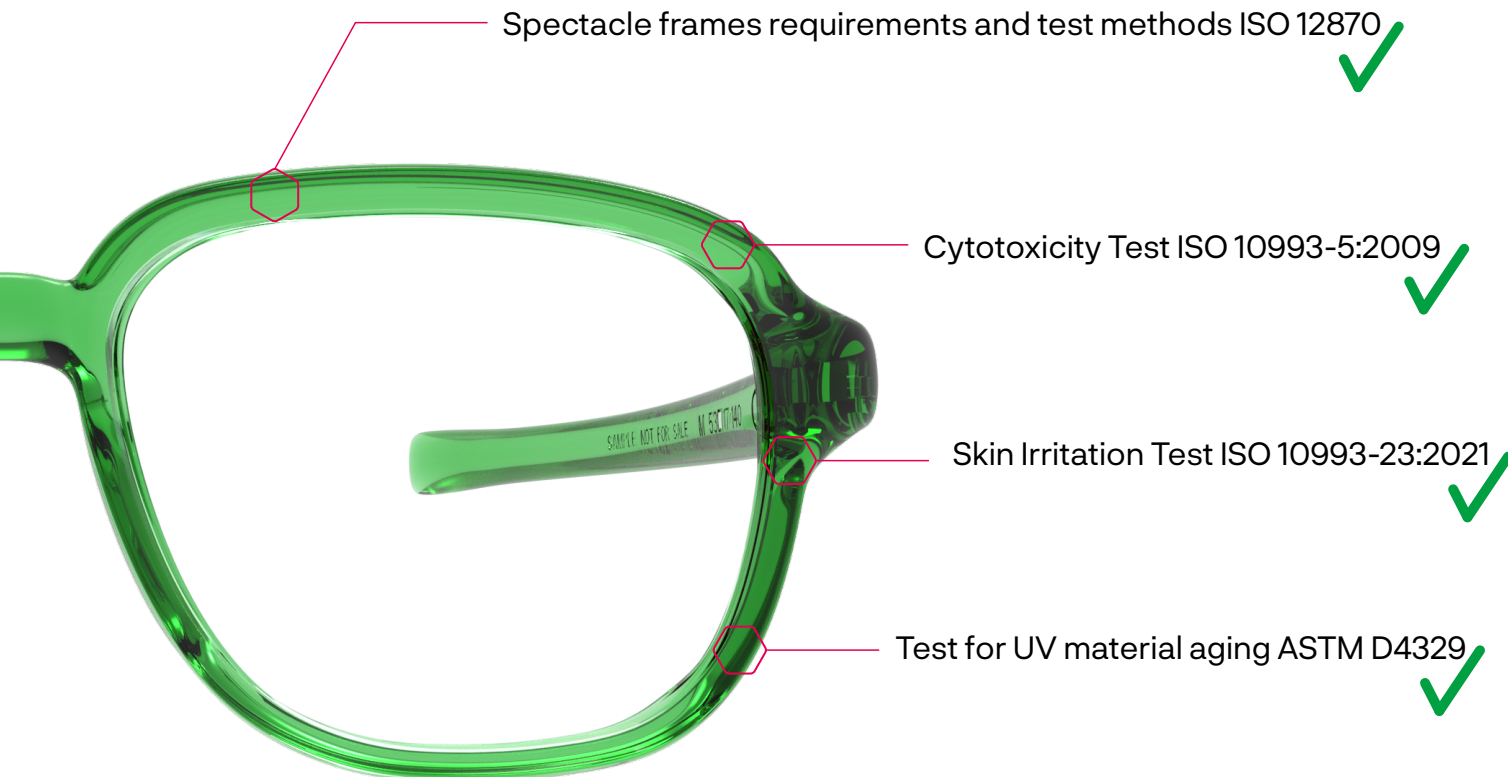
www.mission-eyewear.com

Introduction

We are often asked by opticians about the properties of the Mission Eyewear 3D printing material. Frequently asked questions are

- Does the material meet the ISO 12870 standard?
- Has the material been tested for biocompatibility?
- How UV stable is the Digital Eyewear material?
- What tests have been carried out?

To answer all these questions and to ensure the highest level of quality and safety for our Digital Eyewear materials, we have carried out the following tests.



Conclusion for opticians

The Mission Eyewear material meets and passes all the necessary tests for an eyewear frame material. It is significantly more UV resistant than traditional materials such as Acetate or PA11. It remains stable, retains its appearance and provides a durable solution for high quality frames.

Spectacle Frames Requirements ISO 12870

This standard specifies the mechanical, physical and chemical performance requirements for plastic frames. It's all about ensuring that frames are durable, safe and comfortable over time.

Resistance to Ignition

Whether the frame material catches fire or continues burning when exposed to a small flame. Therefore a 650°C heated wire is applied to the material for 5 seconds. The test is passed if the material does not ignite or continue to glow after contact.

Resistance to Perspiration

How well the frame resists corrosion or degradation from sweat. This test involves soaking frames in an artificial sweat solution and subjecting them to cycles of heating and cooling. The test is passed if the material shows no significant corrosion, staining or surface degradation.

Mechanical Stability

This is an indirect test of material integrity by simulating real world wear and tear.

Resistance to Temperature

How materials handle heat (e.g., left in a hot car). Sample frames are exposed to 55°C for a period of time and then cooled. The test is passed if the material shows no deformation or degradation; it must maintain shape and function.

Resistance to Ultraviolet Radiation

This tests ensures that colored parts of spectacle frames, particularly exposed areas, do not undergo unacceptable changes in color or surface appearance when exposed to UV light.

All the tests related to ISO 12870, which focus on the properties of the material, have been passed by our material for digital eyewear.



Cytotoxicity Test ISO 10993-5:2009

This important test helps to screen materials for potential toxicity. It assesses whether a material is toxic to living cells - specifically in vitro cytotoxicity, which means it is tested in a laboratory using cultured cells.

Effects on cells are scored on a scale of 0 to 4 and results showing a reactivity score of 0, 1 or 2 are generally acceptable.

Our Digital Eyewear material has passed the Cytotoxicity Test (ISO 10993-5:2009). We have passed this test for samples produced with all our systems. Showing great cell survivability at 24, 48 and 72 hours.

Skin Irritation Test ISO 10993-23:2021

The skin irritation test assesses whether a material causes irritation when in contact with the skin. This is important because even if a material is technically non-toxic (see Cytotoxicity Test ISO 10993-5:2009), it may still cause discomfort or inflammation due to its chemical composition or surface properties. This is particularly important for the nose area of frames, which are often in constant contact with the skin.

Our Digital Eyewear material passed the Skin Irritation Test (ISO 10993-23:2021) after 24, 48 and 72 hours with the best possible score of 0.

UV Ageing Test ASTM D4329

We have tested the UV ageing behaviour of the Mission Eyewear Digital Frame material, PA11 and Acetate. The tests simulate the effects of prolonged UV exposure on plastics. This allows to assess key properties such as color stability, structural integrity and resistance to surface degradation. Samples of each material are exposed to fluorescent UV lamps over a period of weeks. Each week for a duration of 6 weeks, a sample of each material is removed from the test chamber and its properties are tested. The graphs show the ability of the different materials to resist deterioration in mechanical properties. The test is specifically designed to show the limits of polymers. And showing a deterioration in mechanical properties is actually the aim of this test.

Digital Eyewear material:
Shows the best results of all materials tested! It remains dimensionally stable with no visible changes, mechanically almost unchanged.

Acetate:

Shows severe deformation after 1 week, unusable after 3 weeks (mechanically + visually).

PA11:

Significant loss of strength and visible yellowing.

Young's Modulus:

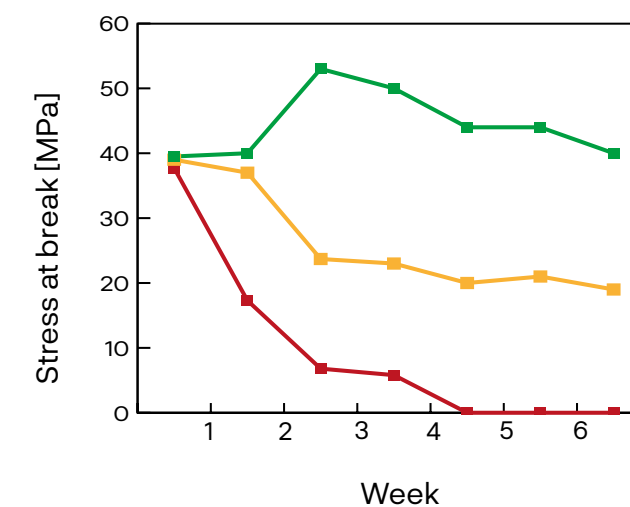
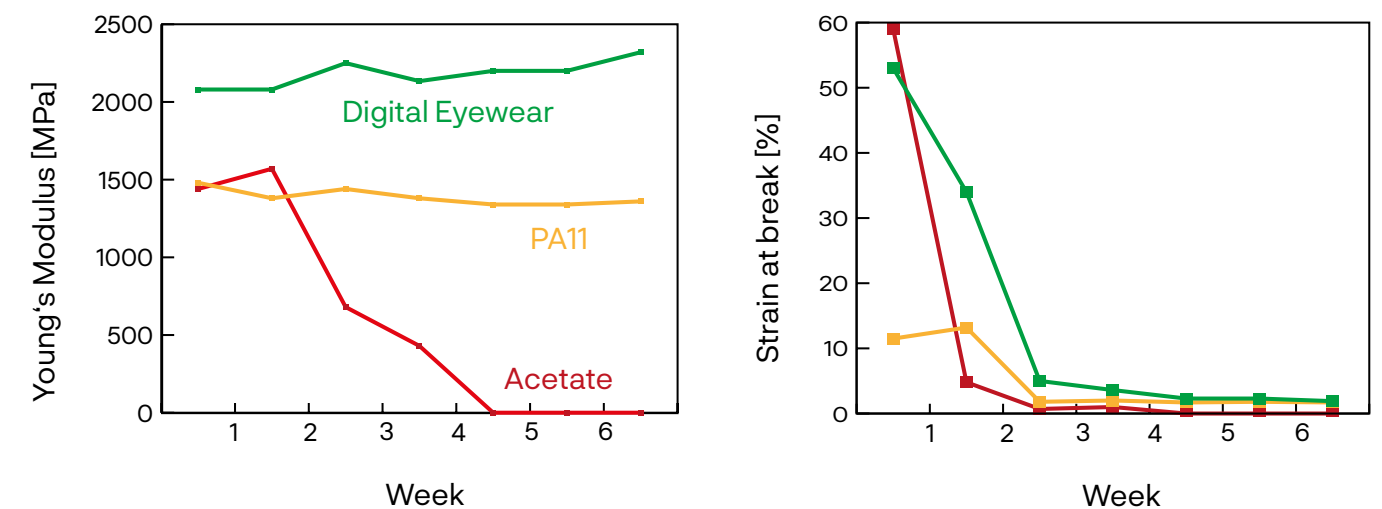
This is a measure of the stiffness of a material.

Strain at Break:

This is the measure of the deformation a material undergoes relative to its original length before break.

Stress at Break:

This is the maximum stress a material can withstand before it breaks.



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