



Czinger Vehicles Part 555 Petition for Polycarbonate Glazing Materials

Supplementary information

**CONFIDENTIAL BUSINESS INFORMATION**

Submitted per 49 CFR Part 512

After the public comment period for the Czinger Vehicles 49 CFR Part 555 petition for use of a polycarbonate windshield material finished, the following questions were posed by NHTSA:

1. Which of the tests for Item 1 glazing does the windshield glazing for the 21C meet? A list of the tests is sufficient.
2. Have you evaluated whether the windshield glazing in the 21C meets the performance requirements for Item 4 glazing for rigid plastics?
  - a. Specifically, have you or the glazing manufacturer performed Test Nos. 16, 17, 19, 20, 21, or 24, as specified in ANSI/SAE Z26.1-1996?
    - i. If so, did the glazing pass those tests?
    - ii. If the glazing has not be subjected to Test Nos. 16, 17, 19, 20, 21, or 24, do you have any basis for believing that the glazing would pass those tests if tested?

**Czinger Vehicles responses are given below.**

**Question 1:** The windshield is expected to meet tests 1, 2, 3, 4, 9, 12, 15, and 26 of Item 1. It is not expected pass test 18 Abrasion Resistance due to results from supplier testing.

**Question 2:** The windshield supplier, Isoclima, states that the polycarbonate material passes all Item 4 glazing tests and a test report is provided with this supplement to show material compliance.

**Isoclima AS 4 Test Report**

The attached 2016 third party laboratory test report shows that 3mm and 6mm thick samples of the Isoclima material, which Czinger Vehicles is using in its windshield, has passed Item 4 (AS4) testing.

This report is clear and convincing evidence that the Isoclima material being used by Czinger Vehicles (with 5 mm thickness) is indeed Item 4 compliant.

**European Compliance**

The Isoclima polycarbonate glazing material passes all ECE Regulation 43 tests including abrasion resistance.

**Czinger Vehicles would also like to submit the following mitigating factors and commitments for polycarbonate windshield material implementation.**

**Hypercar Use Case**



- Clearly a hypercar and its use is atypical when compared to a more conventional road car
- Czinger have performed some analysis with a sample size of 53 hypercars across a range of different brands. Czinger can share this analysis in detail if required but the headlines are shown below. From the 53 samples analyzed:
  - Average annual mileage is 266 miles with a maximum of 1230 miles and a minimum of 1 mile
  - Extrapolated mileage suggests mileage accumulation over 15 years to be on average 3991 miles with a maximum of 18461 and a minimum of 1

As such the exposure of the windshield to abrasion is significantly less than for a “typical” everyday road car

- The Czinger 21C is a \$2m+ hypercar. Hypercars tend to be collector’s items. They typically increase in value. As such, owners tend to be very interested and concerned with attention to detail, cleanliness, maintenance and overall presentation. It would be extremely unlikely that a hypercar would ever be washed in a high street carwash, more likely the owner would have dedicated specialist car detailers who would attend to their collection
- In the event of even a minor scratch developing on a 21C windshield it is very likely that the owner would look to replace it due to the nature of ownership of a car like this

**Possible Further Mitigations**



Some other considerations that Czinger feel could be of value to propose as further mitigations against abrasion concerns:

- Czinger would be prepared to offer an increased warranty for the screen – in the event of a windshield becoming scratched through normal use, Czinger would be prepared to supply and install a new screen at no cost to the car owner.
- Tear offs are used extensively in motorsport applications for polycarbonate screens and helmet visors. These thin protective films are applied to the windshield or helmet visor and can be removed quickly during a race. In racing applications, they are not really used for abrasion protection but instead as a quick way of cleaning a windshield or visor during the pitstop in the case of a windshield, or simply during a race in the case of a helmet visor. For the 21C, we could use such a system for additional abrasion protection. We would install this and it could be a regular service item.



## **Isoclima Test Report**

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