

Voyager®

Department of Transportation FEDERAL MOTOR VEHICLE SAFETY STANDARDS

"The K.T. Safety Act" FMVSS No. 111

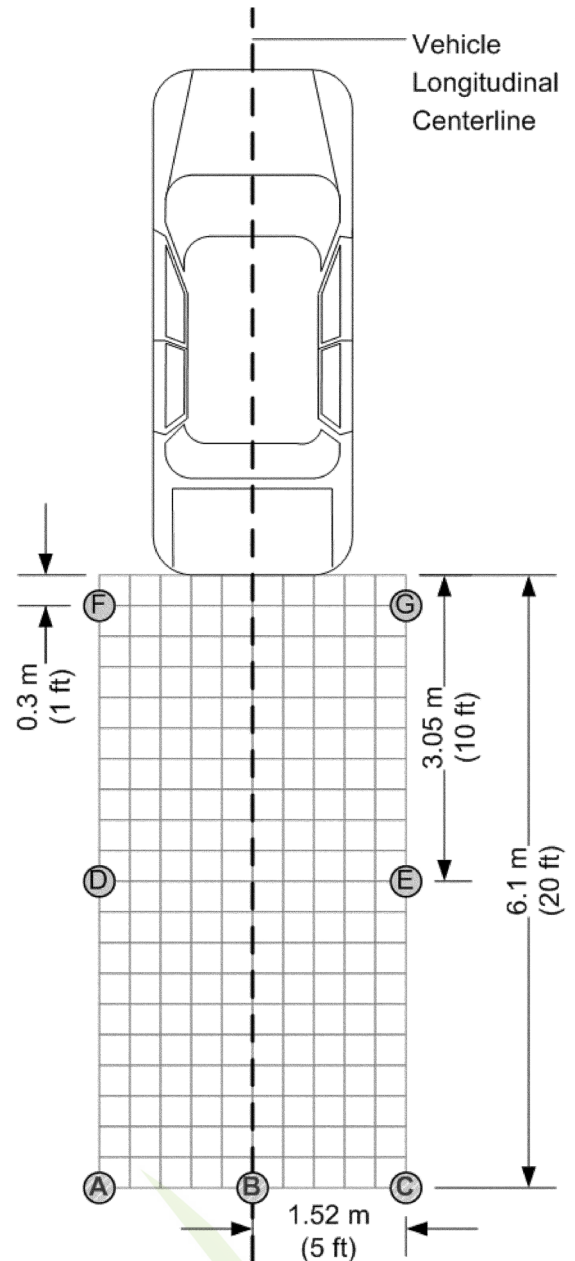
"The K.T. Safety Act" FMVSS No. 111 mandates a field of view test. This test includes "a cylindrical test object with a height of 32 inches and a diameter of 12 inches, consistent with an 18-month-old toddler."

ASA Electronics manufactures cameras compliant with "The K.T. Safety Act". All cameras are compliant with vehicles above AND below 10,000 GVWR.

Compliance test results can be conveniently found on the back of this page.



ASA Electronics FMVSS No. 111 Testing Environment



EXPAND your vision™

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Items used for testing

1. Checkered grid with 1'x1' black and white tiles measuring 10ft wide x 20ft deep.
2. 7 - 32"x12" diameter markers (consistent with an 18-month-old toddler).
3. Voyager® VCMS140i and VCMS155 cameras.

All measured cameras exceeded the test grid view to be able to see the expected camera view coverage per the FMVSS No.111 specifications.



Vehicle Type: Box Truck
Camera Height: 12.5'
Camera Used: VCMS155

Extended Side View Measurements

- 9.6' from first markers
- 16.0' from second markers
- 23.8' from third markers



Vehicle Type: Cargo Van
Camera Height: 5.3'
Camera Used: VCMS155

Extended Side View Measurements

- 6.6' from first markers
- 15.6' from second markers
- 25.0' from third markers



Vehicle Type: Walk-In Van
Camera Height: 9.5'
Camera Used: VCMS140i

Extended Side View Measurements

- 5.3' from first markers
- 16.6' from second markers
- 26.6' from third markers



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“The K.T. Safety Act” FMVSS No. 111 mandates that all equipment must pass rigorous durability testing. The testing parameters are as follows.

- **Corrosion Test Procedure.** The external components are subjected to two 24-hour corrosion test cycles. In each corrosion test cycle, the external components are subjected to a salt spray (fog) test in accordance with ASTM B117-03 (incorporated by reference, see § 571.5) for a period of 24 hours. Allow 1 hour to elapse without spray between the two test cycles.
- **Humidity Exposure Test Procedure.** The external components are subjected to 24 consecutive 3-hour humidity test cycles. In each humidity test cycle, external components are subjected to a temperature of $100^{\circ} 7^{\circ} - 0^{\circ} \text{F}$ ($38^{\circ} 4^{\circ} - 0^{\circ} \text{C}$) with a relative humidity of not less than 90% for a period of 2 hours. After a period not to exceed 5 minutes, the external components are subjected to a temperature of $32^{\circ} 5^{\circ} - 0^{\circ} \text{F}$ ($0^{\circ} 3^{\circ} - 0^{\circ} \text{C}$) and a humidity of not more than $30\% \pm 10\%$ for 1 hour. Allow no more than 5 minutes to elapse between each test cycle.
- **Temperature Exposure Test Procedure.** The external components are subjected to 4 consecutive 2-hour temperature test cycles. In each temperature test cycle, the external components are first subjected to a temperature of $176^{\circ} \pm 5^{\circ} \text{F}$ ($80^{\circ} \pm 3^{\circ} \text{C}$) for a period of one hour. After a period not to exceed 5 minutes, the components are subjected to a temperature of $32^{\circ} 5^{\circ} - 0^{\circ} \text{F}$ ($0^{\circ} 3^{\circ} - 0^{\circ} \text{C}$) for 1 hour. Allow no more than 5 minutes to elapse between each test cycle.

Our hands-on Research and Development team is committed to designing and delivering high quality, high performance products. Each of our Voyager products is expertly designed from the ground up and subject to extensive testing in our own on-site test lab to ensure durability for years to come.



FMVSS 111 compliant test results can be found on the following pages.

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Corrosion Testing - QUV Salt/Fog Cyclical Corrosion Chamber

Voyager products are subjected to accelerated UV exposure that equates to 5-7 years of actual outdoor exposure to assure you that your electronics will function properly for many years. In addition, product and product components are subjected to dry/wet cycles of highly corrosive fog/mist to test for corrosion resistance and corrosion protection effectiveness.



Camera	Test Observations	Results	
VCMS140i	Performed QFog Salt Fog Test on VCMS140i. After 24 hours examined the camera for signs of rust or corrosion due to the testing. Camera showed no signs of rust at 24 hours.	Pass	
VCMS155	Performed QFog Salt Fog Test on VCMS155. After 24 hours examined the camera for signs of rust or corrosion due to the testing. Camera showed no signs of rust at 24 hours.	Pass	

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Humidity Exposure Testing - SES RK/20S Temperature/Humidity Chamber

Voyager products are subjected to long durations of 95% Relative Humidity at high temperatures to ensure the effectiveness of the conformal coating circuit corrosion protection. In addition to high humidity, products will also be exposed to rapid temperature cycles.


Camera	Test Observations	Results	
VCMS140i	Camera was set up in chamber at FMVSS 111 specifications as listed above. Camera was observed during testing and was fully functional throughout the test. Upon test completion, camera remained fully functional.	Pass	
VCMS155	Camera was set up in chamber at FMVSS 111 specifications as listed above. Camera was observed during testing and was fully functional throughout the test. Upon test completion, camera remained fully functional.	Pass	



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Temperature Exposure Testing - SES RK/20S Temperature/Humidity Chamber

Voyager products are subjected to long durations of exposure to operational temperature extremes and rapid temperature cycles to ensure the highest level of reliability under the most severe temperatures and conditions our products may encounter.

Camera	Test Observations	Results	
VCMS140i	Camera was placed in temperature chamber according to FMVSS 111 standards. camera was operational during test and monitored throughout. No abnormalities were noted and following test completion camera remained fully functional.	Pass	
VCMS155	Camera was placed in temperature chamber according to FMVSS 111 standards. camera was operational during test and monitored throughout. No abnormalities were noted and following test completion camera remained fully functional.	Pass	