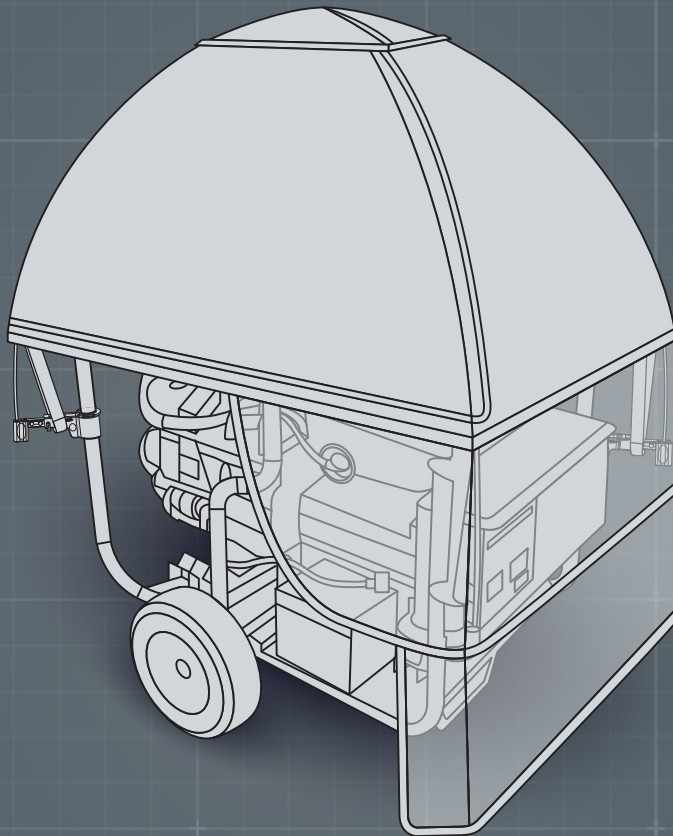




CERTIFIED PERFORMANCE

Weather, Material,
Independent, and
Storm Testing Analysis

2024



06/26/2024

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GENTENT INDEPENDENT PRODUCT TESTING

The GenTent product line has undergone extensive internal testing since the first prototype, with thousands of hours devoted to continual improvement based on customer feedback. GenTent solutions offer protection for over three thousand different generator models, and for nearly two hundred generator manufacturer brands.

With the adoption of the UL2201 and ANSI/PGMA G300 requirements that portable generators include automatic carbon monoxide (CO) shut-off, GenTent submitted product to multiple members of the PGMA members, which resulted in no compromise or false shutdowns from the carbon monoxide sensors while mounted with the GenTent.

GENTENT HAS BEEN TESTED BY:



GenTent has also submitted its materials and components to assessments conducted by Vartest Laboratories to evaluate flame retardancy, resistance capabilities, and ultraviolet protection. Moreover, complete GenTent products were submitted to 360° Product Testing, a specialized firm in product claims testing, as well as Novatio Engineering Solutions, which conducted tests within Department of Defense laboratories to assess their effectiveness in challenging remote weather conditions, especially for forward observers.





Vartest Laboratories

Established in 1986, Vartest Laboratories is an autonomous and accredited testing facility with a global reputation for excellence. Renowned for its extensive quality assurance programs, Vartest specializes in comprehensive testing of textiles and related products, maintaining the highest industry standards.

Vartest maintains not only ISO/IEC 17025 accredited facilities for flammability testing, but also aqueous and solvent based refurbishment systems and environmental cabinets needed to treat samples prior to testing.

See more about Vartest Laboratories, their testing methods, and credentials:



gentent.com/vartest

Significance of Flame Resistance in Portable Generator Tents and Running Covers

Flame resistance is of paramount importance in portable generator tents and running covers, as is exemplified by GenTent systems. Given the potential fire hazards associated with generator use, strict adherence to standards such as NFPA-701 and UL-94 are imperative to ensure the utmost reliability and safety of these covers.



ANALYSIS OF VARTEST LABORATORIES RESULTS BY COMPONENT

GenTent Universal Kit

GenTent Canopy with Opaque Apron:

- **Material:** Sewn Marine grade vinyl coated polyester
- **NFPA-701-2019 Rating:** PASS

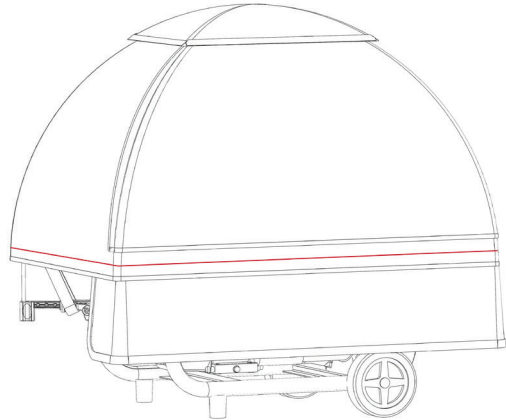
Additional Notes:

- Average After-Flame Duration: 0.0 seconds
- Average Drip Burn Duration: 0.0 seconds
- Average Percent Weight Loss: 15.92%

See the full test result:



gentent.com/test/universalcanopy



GenTent Clamp System:

- **Material:** Injected molded parts with Polycarbonate FR3
- **UL-94 Rating:** V-0 (N=1)

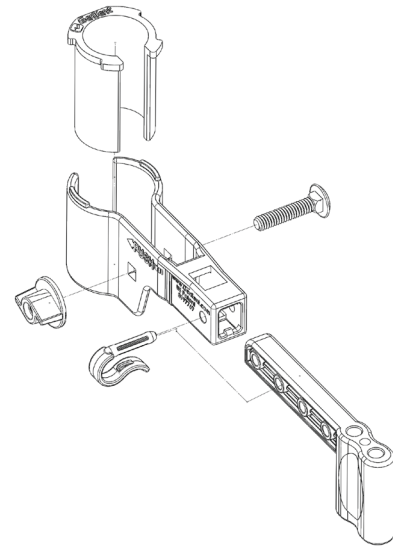
Additional Notes:

- No burning to clamp
- No dripping flame particles
- No cotton ignition

See the full test result:



gentent.com/test/clamp



GenTent Clamp Rubber Sleeve:

- **Material:** Molded EPDM Rubber
- **UL-94 Rating:** V-0 (N=1)

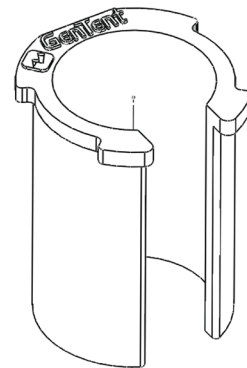
Additional Notes:

- No burning to clamp
- No dripping flame particles
- No cotton ignition

See the full test result:



gentent.com/test/sleeve



GenTent Universal Mounting Adapters:

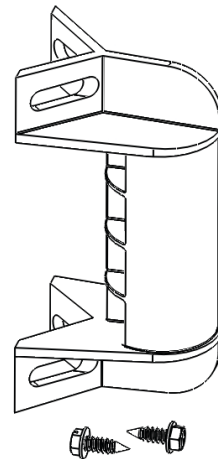
- **Material:** Injected molded parts with Glass Filled Nylon
- **UL-94 Rating:** V-0 (N=1)

Additional Notes:

- No burning to clamp
 - No dripping flame particles
 - No cotton ignition
- See the full test result:



gentent.com/test/frameadapter



GenTent Center Connector:

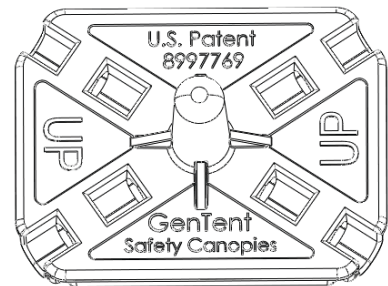
- **Material:** Injected molded parts with Polycarbonate FR3
- **UL-94 Rating:** V-0 (N=1)

Additional Notes:

- No burning to clamp
 - No dripping flame particles
 - No cotton ignition
- See the full test result:



gentent.com/test/centerconnector



**GENTENT UNIVERSAL KIT COMPLETE FINDINGS:
ALL TESTED MATERIALS NFPA-701 AND UL-94 COMPLIANT**

GenTent Inverter Kit GenTent Canopy with Opaque Apron:

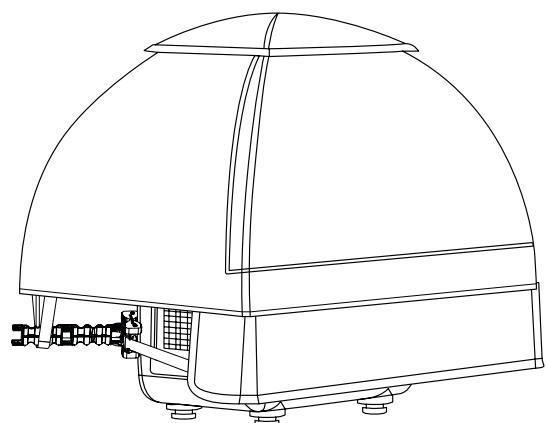
- **Material:** Sewn Marine grade vinyl coated polyester
- **NFPA-701-2019 Rating:** PASS

Additional Notes:

- Average After-Flame Duration: 0.0 seconds
 - Average Drip Burn Duration: 0.0 seconds
 - Average Percent Weight Loss: 15.92%
- See the full test result:



gentent.com/test/invertercanopy



GenTent Universal Steel Ratchet Buckle with Kevlar Strap

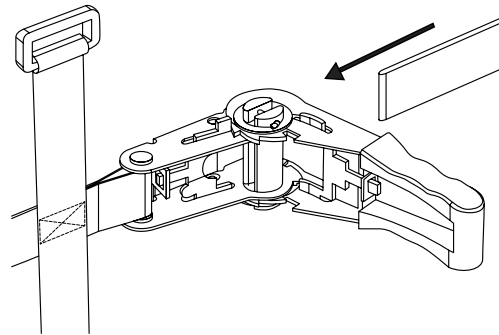
- **Material:** Kevlar, Plastic, Steel
- **UL-94 Rating:** V-0 (N=1)

Additional Notes:

- No burning to clamp
 - No dripping flame particles
 - No cotton ignition
- See the full test result:



gentent.com/test/ratchet



GenTent Angle Brace:

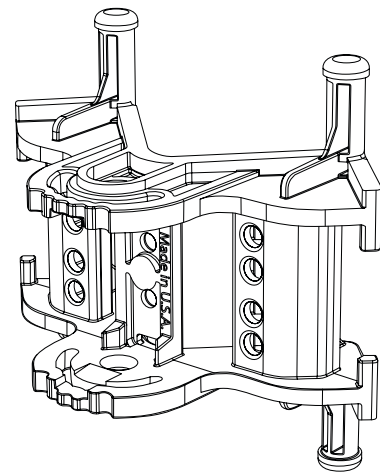
- **Material:** Injected molded parts with Polycarbonate FR3
- **UL-94 Rating:** V-0 (N=1)

Additional Notes:

- No burning to clamp
 - No dripping flame particles
 - No cotton ignition
- See the full test result:



gentent.com/test/anglebrace



GenTent Gator Grommet:

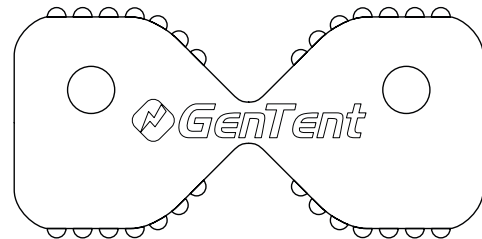
- **Material:** Molded EPDM Rubber
- **UL-94 Rating:** V-0 (N=1)

Additional Notes:

- No burning to clamp
 - No dripping flame particles
 - No cotton ignition
- See the full test result:



gentent.com/test/gatorgrommet

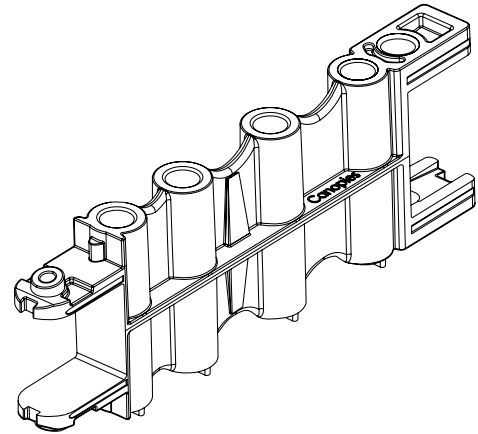


GenTent Extender Arm:

- **Material:** Injected molded parts with Polycarbonate FR3
- **UL-94 Rating:** V-0 (N=1)

Additional Notes:

- No burning to clamp
 - No dripping flame particles
 - No cotton ignition
- See the full test result:



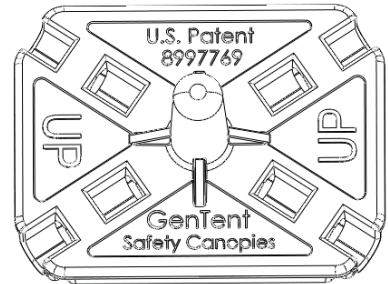
gentent.com/test/extender

GenTent Center Connector:

- **Material:** Injected molded parts with Polycarbonate FR3
- **UL-94 Rating:** V-0 (N=1)

Additional Notes:

- No burning to clamp
 - No dripping flame particles
 - No cotton ignition
- See the full test result:



gentent.com/test/centerconnector

**GENTENT INVERTER KIT COMPLETE FINDINGS:
ALL TESTED MATERIALS NFPA-701 AND UL-94 COMPLIANT**

COMPONENT TESTING CONCLUSION

The meticulous and comprehensive testing results from Vartest Laboratories affirm the flame resistance of GenTent Safety Canopies. Delving into each component, both the GenTent Universal Kit and Inverter Kit have showcased exceptional performance, surpassing the stringent NFPA-701 and UL-94 standards. The absence of ignition, sustained flame, and other hazardous characteristics underscores the unyielding commitment of GenTent and Vartest Laboratories to ensuring the safety and reliability of portable generator running covers.

GENTENT DEMONSTRATED SIGNIFICANT WEATHER PERFORMANCE CAPABILITIES:

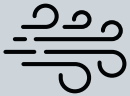
The evaluations carried out by 360° Product Testing encompassed critical product claims, including protection against outlet moisture, durability under snow load, survivability in high winds, prevention of interference with generator cooling, obstruction of generator air intake, and the auto-ignition resistance of GenTent materials.



Ensured moisture protection of the control panel and outlets; effectively shielded against heavy rain and water exposure (equivalent to 12 inches of rain per hour).



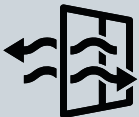
Supported 55.5 LBS of canopy pressure (equivalent to 18" of snow), providing durable coverage during heavy snowfall.



Survived sustained forecast wind speeds of ≥ 70 MPH from all four sides, with no detachment or damage to the generator or the GenTent system.



Shown no discernible temperature difference of the generator during operation, indicating that the GenTent did not interfere with the generator's cooling profile or performance standards.



Not impeding the generator air intake in any significant way, allowing for proper ventilation and exhaust of the portable generator.



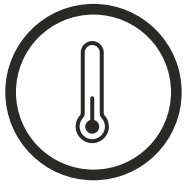
Confirmed to have materials that will not auto-ignite even when exposed to high temperature surfaces typical of a hot muffler, ensuring flame retardancy and compliance with NFPA-701 and UL-91 standards. Tested with lower emissions, high temperature exhaust output from UL2201 compliant generators.



Proven to exhibit no compromise or false shutdowns when installed alongside G300 or UL2201 carbon monoxide sensors. This ensures the effective utilization of the GenTent with industry-compliant sensors, providing reliable and accurate detection of carbon monoxide.



gentent.com/360product



GENERATOR COOLING INTERFERENCE TESTING

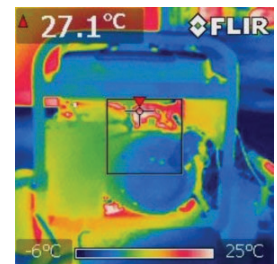
360 Product Testing loaded a test generator by a 3,000-watt load and operated with and without the GenTent installed to determine if the GenTent might affect generator cooling. Thermocouples were located at alternator and engine air inlet and outlet ports. The thermocouples were connected to an Omega HH309 Data Logger Thermometer to record temperatures while the generator was operating. In addition, a Flir i7 thermal imaging camera was utilized to capture thermal images.

The generator was operated while supplying power to a 3,000-watt load both with and without the GenTent installed, for a period of at least thirty minutes, while temperatures were recorded and thermal images were obtained. Thermocouples were located at the following ports: T1. Engine cooling air port, T2. Alternator cooling air port at engine end, T3. Cooling air port on alternator at cover end, T4. Alternator cooling air underneath cover.

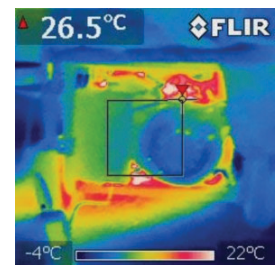
The tested 3,000-watt load consisted of two oil-filled space heaters. Each heater was connected to a different generator receptacle to ensure a balanced load for the generator, then set to its highest heat setting. Power consumed by the heaters was confirmed with a *Watts Up? Pro* power analyzer. With GenTent, engine cooling air was slightly higher, but did vary $\pm 3-4$ °F operating in either configuration.



gentent.com/test/cooling



Running temperature
With (above) and
Without GenTent



GENTENT WAS FOUND TO HAVE NO APPRECIABLE EFFECT ON THE OPERATING TEMPERATURES OF THE GENERATOR.



OUTLET MOISTURE PROTECTION TESTING

The Westinghouse WH7500E generator and installed GenTent were subjected to simulated heavy wind-driven rain using an Orbit 58674 Turret wand and a Shop-Vac B3331.0 Power Blower. A Productive Alternatives Stratus RG202 Magnifying Rain Gauge measured the amount of simulated rain. The simulated rain and wind were directed at the GenTent covered generator from various directions for >10 minutes.



gentent.com/test/moisture



12" per hour
simulated rain



**ALL 110V OUTLETS, PANEL CONTROLS
AND 220V OUTLETS REMAINED DRY.**



WIND SURVIVABILITY TESTING



gentent.com/test/wind

In testing GenTent's wind survivability, 360 Product Testing secured a generator with GenTent installed near the rear of an open 6' x 12' trailer. The trailer was towed on a highway with wind speeds measured in excess of 70 MPH (wind gusting from the front, rear, left and right sides) in order to determine the ability of the GenTent to survive sustained high winds.

For each orientation of measurement, a Panasonic PV-DV53D digital camcorder forward of the generator, and a Microsoft HD-3000 webcam to one side of the generator, were used to capture video (for purposes of documenting a product performance). In addition, an EXTECH HD350 Pitot Tube Anemometer, was mounted approximately two feet from the generator to record the wind speed at the generator.

When subjected to sustained high winds 70 MPH – 80 MPH ground speed, the side of the GenTent canopy facing the wind was pushed in and the entire canopy shook mildly, while the electrical apron tended to float upward toward a horizontal position. (unless the wind direction was directly toward the front)

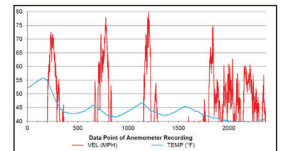
Further, testing was performed, subjecting the GenTent to sustained winds of 35 MPH – 45 MPH ground speed; using the standard electrical apron as well as the clear apron.

Under these three scenarios, the standard electrical apron did not float upward below 35 MPH, while the clear apron upgraded accessory did not float up to 45 MPH or below.

The results of these tests brought us to the GenTent rating for forecast winds of 70 MPH. As this is measured above the boundary layer (10 meters or about 33 feet up), ground level wind speeds are significantly less. Using the Wind Power Law and the Log Wind Profile calculations, a 70 MPH forecast wind translates to a range from 35mph to 45mph on the ground. Using this same calculation, a ground wind speed of 70 MPH translates to over 110 MPH above the boundary layer (or forecast wind speeds).

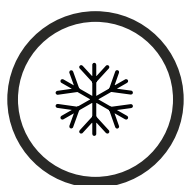


GenTent secured to an open 6' x 12' trailer and exposed to sustained wind speeds in excess of 70 MPH.



WHEN SUBJECTED TO SUSTAINED HIGH WINDS 70 MPH – 80 MPH GROUND SPEED, THE GENTENT STAYED FIRMLY ATTACHED IN ALL INSTANCES.





SNOW LOAD DURABILITY TESTING



gentent.com/test/snow

The engineered sloped sides of the GenTent make it difficult for any significant amount of snow to accumulate on the canopy. Although it is possible for a significant depth of snow to accumulate on the very center of the GenTent, snow elsewhere on the GenTent canopy easily sheds away.

The weight of snow is determined by many weather factors and varies greatly. In general, colder air temperatures result in lighter snow, while snow formed in warmer air temperatures and old fallen snow are heavier. This variation is due to different types of snow crystals formed by different weather conditions.

In addition to recording the depth of a snowfall, it is also common practice to melt fallen snow and record the water-equivalent depth; the result is a ratio of snow-to-water depth. In the United States, this ratio for newly fallen snow typically falls in the 8:1 - 20:1 range; the standard value used by the US National Weather Service for converting snowfall into liquid water is 13:1.

To simulate the weight of an extreme quantity of snow accumulation, a hole was drilled through a 2" x 8" (nominal) board to provide clearance for separator protruding from the GenTent center connect. A 50 LBS bag of Halite salt crystals was placed on the board, totaling 55.5 LBS.

Over the 799 in² area covered by the GenTent, 55.5 LBS would be equivalent to the mass of 1.905" of water at 0 °C. Assuming a 10:1 ratio, wet and heavy snow, 1.9" of water would be equivalent to 19" of snow distributed over the entire canopy surface.

All components returned to their original shape and form-factor soon after the 55.5 LB bag and board were removed.

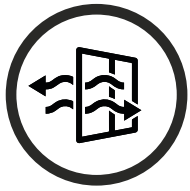


**GenTent withstanding
55.5 LBS of weight,
equivalent to
19" of snow**



**GENTENT SUPPORTED THE WEIGHT WITH NO DAMAGE
TO THE CLAMPS AND FIBERGLASS SUPPORT RODS.**





GENERATOR AIR INTAKE IMPEDENCE TESTING



gentent.com/test/air

In their testing, 360 Product testing noted the air intake for the generator tested was approximately a 5/8" x 3" slot at the right bottom of the air cleaner cover. Impediment of the intake was determined by using an EXTECH HD350 Pitot Tube Anemometer to measure the pressure drop near the center of the air filter created when the generator was operating with a 3,000 watt load. An increased pressure drop would indicate the air intake was impeded.

PVC tubing was connected to two ports of a tee fitting that was epoxied into the "weep hole" at the bottom of the air cleaner cover and secured near the center of the air filter (as shown above). An additional length of PVC tubing connected the tee to the HD350. During operation with and without the GenTent, the pressure drops with a 3,000-watt load ranged between 0.30 and 0.34 in/H2O. For reference, when approximately 20% of the air intake slot was manually covered, the pressure drop increased to 0.70 to 0.75 in/H2O.

In addition, throttle position was monitored by attaching a stiff wire to the throttle linkage. An increase of throttle position would indicate that it was more difficult for the generator to obtain air when supplying power to the same load.



Intake vacuum with (above) and without GenTent



NO APPRECIABLE DIFFERENCE OF THROTTLE POSITION WAS OBSERVED WITH OR WITHOUT THE GENTENT INSTALLED.

CONCLUSION

GenTent Safety Canopies has gained valuable insights through its experience outfitting over three thousand different portable generators while adhering to safety standards set forth by the generator manufacturers.

As a result of extensive testing, GenTent has developed a deep understanding of how to engineer a safe and effective generator tent that allows portable generators to operate in inclement weather while maintaining strict safety ratings, and without hindering generator performance.



**ALL TEST RESULTS ARE AVAILABLE AT
[GENTENT.COM/PRODUCTTESTING/](https://gentent.com/producttesting/)**

GENTENT: A FIELD-TESTED EMERGENCY RESPONSE TOOL

GenTent has established itself as a trusted solution for various critical government installations and operations. This includes flightlines for both the U.S. Air Force and Army, as well as U.S. Naval base installations. GenTent has also been implemented at various government laboratory testing sites and remote locations managed by the U.S. Forest Service Department.

Following successful field testing, GenTent was contracted by the U.S. Army and Air National Guard to equip their CERF-P disaster response efforts and flightlines with GenTent's Safety Canopies. Remarkably, this contract has remained in service for over a decade.

The CERF-P (Chemical, Biological, Radiological, Nuclear, and Explosive Enhanced Response Force Package) is a National Guard initiative aimed at integrating existing National Guard units into the broader federal and local civilian emergency response framework, particularly in the event of CBRNE disasters.

NOAA (National Oceanic and Atmospheric Administration) has also relied on GenTent solutions in various locations to support its Hurricane Hunters and GRAV-D initiative, which measures gravity data across the country. GenTent serves as a protective measure for power equipment used in remote and wet environments.

GenTent offers an effective solution for government agencies, with manufacturing based in the United States and the capability to customize solutions for more than three thousand generators. Agencies like the National Guard, FEMA, and other emergency response organizations can benefit from a turnkey solution to enhance their toolkits for mitigating additional property damage, injuries, and fatalities associated with portable generator hazards during emergency scenarios, especially those exacerbated by adverse weather conditions.

Additionally, GenTent products are supplied to the Department of Defense as a joint supplier agreement with Novatio Engineering. After successfully passing DOD testing requirements, the agreement enables Novatio to fit to their custom, multi-fuel Ex-Power generator models for future government bids.



References

Vartest Laboratories:

<https://www.vartest.com/>

GenTent Safety Canopies Original Product Testing:

<https://www.gentent.com/producttesting/>

GenTent Angle Brace FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Angle-Brace-GENTEN121523G.pdf

GenTent Center Connector FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Center-Connector-GENTEN121523E.pdf

GenTent Clamp System FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Clamp-GENTEN121523H.pdf

GenTent Extender Arm FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Extender-Arm-GENTEN121523C.pdf

GenTent Extreme Canopy and Opaque Apron FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Extreme-Canopy-and-Apron-GENTEN121523I.pdf

GenTent Gator Grommet FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Rubber-Grommet-GENTEN012624B.pdf

GenTent Universal Steel Ratchet Buckle with Kevlar Strap FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Ratchet-Buckle-GENTEN121523A.pdf

GenTent Rubber Sleeve FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Rubber-Sleeve-GENTEN012624A.pdf

GenTent Standard Canopy and Opaque Apron FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Standard-Canopy-and-Apron-GENTEN121523J.pdf

GenTent Universal Frame Adapter FR Testing:

https://www.gentent.com/content/pdfs/firesafety/NFPA701_and_UL94_Results/Universal-Frame-Adapter-GENTEN121523D.pdf



Trusted supplier for industry leaders
and several government agencies





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