Grayflare

TOUREV Laser Barriers

Economical and fully customizable laser enclosures for optics and photonics.

Website: www.grayflare.com
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Tourev laser barriers

Tourev represents our effort to develop a high-quality laser barrier solution. Tourev laser barriers are made of a scientifically developed lightweight fabric consisting of 3 or 6 layers of heat-resistant materials.

Certifications

Tourev systems have NFPA-701 flame retardant certification. They meet ANSI Z136 standards for Class 4 lasers up to the rated power density of at least 50 W/cm^2 Tourev3) or 125 W/cm^2 (Tourev6).

Window covers

We offer Tourev window covers that come with your choice of magnets or "Velcro" around the edges. The magnetic covers can be used on steel window frames. 12-inch magnet spacing is standard. Before ordering, check if a permanent magnet will stick to your window frame.

Fig. 1. Tourev laser-rated magnetic lab window covers.

Otherwise you should select the "Velcro" option. One side will be sewn around the edges of your cover and the other side comes with adhesive that you can attach to your frame.

Because our laser barrier window covers use magnets or "Velcro", you can remove them in an instant. This is useful if you want to uncover your lab windows (for lab tours, etc).

Window cover sizes and options are made according to your specifications.

Framed systems

Our framed systems consist of a lightweight polished steel frame and a set of Tourev barrier sheets with magnets sewn into the edges. The Tourev sheets will cover the top and the 4 sides of the frame unless requested otherwise. Just tell us the dimensions of the frame you want and we'll make your system for you. 9" magnet spacing is standard.

Fig. 2. Left: A section of the framing material. Center: construction of a frame. Right: a complete unit with curtains. One curtain is pulled back so that an undergraduate researcher can access her experiment.

The frames are made of lightweight hollow steel tubes, matte black with 1-in^2 cross section. Assembly is quick and tidy. The magnetic curtains attach directly to the frame and can be easily folded back to access any part of the experiment.

Curtains

Tourev systems also come as hanging curtains. The curtains will contain grommets along the top, which are hooked onto rollers that fit into a suspended rail. You simply specify the length and height of the curtain and the number of pieces you want.

Obviously, there is no single hanging rail format. What you want depends on how you plan to hang your curtains. Curtain rails can be suspended directly from the ceiling or from the frame used to hold ceiling panels.

We obtain our most of curtain rail systems from an international distributor. You can order directly from a distributor (e.g., McMaster-Carr) or from us. Please see the website for more options.

Fig. 3. Curved rail and a curtain. The rail mounting system must be selected according to the shape of the system and on the type of ceiling and wall in your lab.

If you want your curtains ruffled, you should add about twice the length of material. Since Tourev is scientifically developed and a fairly expensive material, you may want to use only 20% extra length, just enough to give your system some flexibility. You don't want to pull one end and discover that the other end is also moving.

Freestanding barriers

Our freestanding barriers consist of a lightweight black steel frame sized to your specification, on a floor stand. With this setup, you have a barrier panel that you can move around. The Tourev barrier attaches to the frame using sewn-in magnets.

ANSI Z136 standards

Laser barriers must be rated according to the Z136 protocols set forth by the American National Standards Institute (ANSI).

Barrier curtains should be tested for first visible damage and breakthrough under specific test conditions with exposure times of 100 seconds. The response of the barrier may depend on the wavelength, pulse energy, and other properties of the laser beam.

Our rating procedure uses a Coherent Verdi 532 nm laser (CW, >100:1 polarized, 5W maximum power). The nearly Gaussian beam profile of this laser is shown in Fig. 4, from which we calculate the rated irradiance using the 1/e distance (37% of peak) to measure the beam diameter. Tourev shows first visible damage at ~15 W/cm^2, as a faint red spot. We rate Tourev3 up to 50 W/cm^2 and Tourev6 at 125 W/cm^2 (no breakthrough for 100 seconds).

Tourev's fire retardant testing and certification is performed by Turning Star Inc, New Jersey, USA.

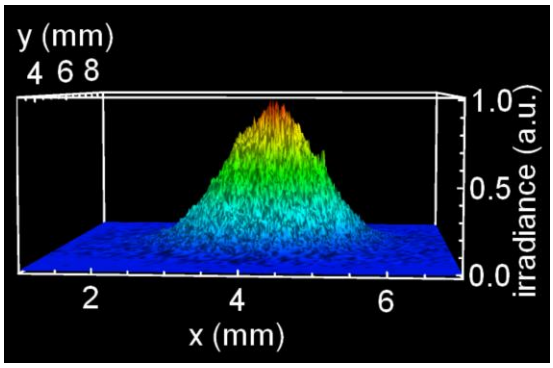

Fig. 4. Measured beam profile for our Verdi test laser used for laser barrier tests.

Comparison

Unlike fabrics we have tested from other laser barrier distributors (Fig. 5), Tourev was developed for minimal smoke formation and excellent thermal performance (Fig. 6). Also, our ratings are measured conservatively. In comparison, we have tested products from other makers and found that breakthrough can occur at powers below the stated rating, under ANSI Z136 conditions.

Note: If you smell smoke, it could be that a strong beam is hitting the barrier. Check your setup immediately.

Localized production of ash can occur where a laser beam strikes a barrier. As long as the combustion products remain situated in the fabric, the ash can continue to block the beam. But shaking or bending the fabric can cause the ash to fall out, allowing beam penetration.

Some laser barriers use a fiberglass base. Fiberglass may release small glass fibers into the air when bent or flexed, and we believe that further studies are needed to understand the long-term health danger this could present. Tourev does not use fiberglass.

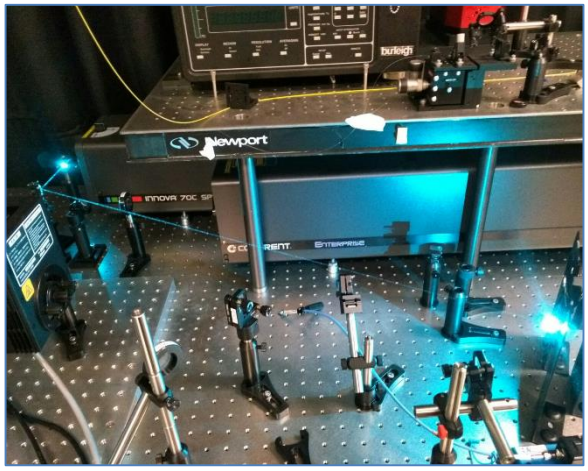

Fig. 5. Laser barrier fabric test. This test was done with a competitor's product rated at 250 W/cm^2. The laser beam is visible because of scattering from abundant smoke produced as the barrier fabric burns at ~25 W/cm^2 (Ar laser, 488 nm). By comparison, our scientifically developed materials showed negligible combustion under the same test conditions.

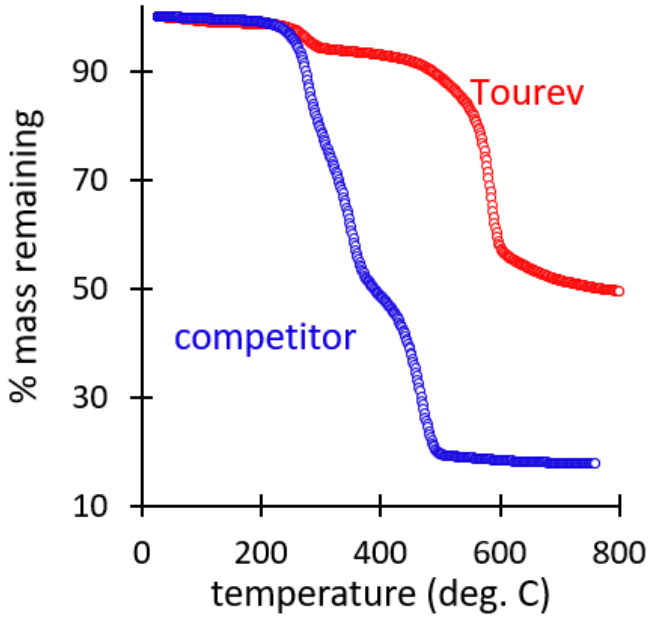

Fig. 6. Thermogravimetric analysis of Tourev barrier material compared to the material from another laser barrier maker. The competitor's product shows large combustion mass losses compared to Tourev.

Usage

Obviously, no laser barrier can block every conceivable laser beam. Therefore, we can assume no responsibility for the use of your curtain. These products are meant only to temporarily protect personnel from accidental stray beams. But the ultimate responsibility belongs to you.

- Curtains are not suitable as barriers for ultra-high-power lasers such as engravers or cutters.
- Do not use the curtain as a safety measure for laser beams higher than the rated irradiance.
- Be careful about beams that may be reflected over the top of a hanging curtain. If using a frame, make sure that there are no gaps between the curtain and the steel frames through which a reflected beam could escape into the room.
- Use the supplied test patch to evaluate the material response to your specific laser beam (we will provide a test patch with every sale). Use appropriate laser safety procedures.
- A barrier should be used around the laser setup and there should also be an entryway barrier inside the lab door.
- Personnel should be able to communicate to users in the lab before passing the doorway barrier.
- Never intentionally expose your curtains to a laser beam. The curtains are meant as a last resort, not a beam block!

Maintenance

- Inspect your curtains regularly for damage. This is especially important if you suspect that a Class 4 beam has hit the material.
- Do not wash Tourev curtains. If one gets dirty for some reason, you can gently hand wipe it with a moist towel.
- Do not stretch, bend, or fold the curtains after installing them.

Pricing

A full price list in Canadian dollars can be found at www.grayflare.com. Since every setup is unique, we encourage you to email us with your exact dimensions, and we will quickly get back to you with a quotation for your Tourev system.