

# Seeing the Light in Case of Emergency

**The Mont Blanc tunnel reopened for traffic on March 9, 2002 introducing new installations to provide greater safety. One feature is, for example, an escape tunnel with a lighting system constructed with Schott glass.**



► Many people are apprehensive about driving through massive mountains. In fact, Norwegian psychologist Gunnar D. Jenssen determined that 20 percent of the men and 40 percent of the women in his country are afraid of tunnels. This figure is higher in countries where there are fewer tunnels, such as Denmark, where 50 percent of the population suffers from this phobia, according to Jenssen.

It is our fear of the unknown, coupled with the uneasy feeling of knowing there are thousands of tons of rock above, and the tunnel exit far ahead.

Obviously, this anxiety would be compounded if the tunnel were completely dark, and you could only see your own headlights. For this reason, engineers try to outfit tunnels with up to ten percent of the brightness of normal daylight, explains Axel Stockmar. He has been involved with tunnel lighting for 30 years and is now

head of Light Consult International (LCI) in the Lower Saxon town of Celle, Germany, but the intensity of the light is only one aspect. It is also crucial how the light illuminates the tunnel. Will drivers be blinded? Engineers have to consider another factor: how does the light function in smoke caused, for example, by accidents? Will it penetrate smoke, or is it absorbed?

After the recent devastating fires in various Alpine tunnels, the safety standards of many tunnels have been seriously disputed, and experts are already working on European guidelines. Meanwhile, national authorities have tightened their standards of safety measures.

## Safety standards for tunnels

Take, for example, the Mont Blanc tunnel. With a length of 11.6 kilometers, it is currently the seventh longest mountain passage in the world. Before it reopened in March, a number of stipulations (that were not required for operation from the time of its opening in 1965 until the fire in 1999) now had to be fulfilled. These included additional escape and rescue routes. In this respect it was lucky that a tube running parallel to the tunnel already existed, although it had only been used as an access for maintenance work. This tube can be reached via 37 connecting corridors along the main tunnel and can now serve as a potential rescue route.

Hopefully, the tunnel will never have to be used as an evacuation route, but should the occasion arise, experts have to ensure that they can find their way. The 37 escape corridors to the emergency tunnel must therefore be well lit. The French company Comatelec was asked by the architects to design a lighting system for the Mont Blanc service and emergency tunnel. In fact, Comatelec has been responsible for the lighting systems in more than 85 percent of France's tunnels.

In their efforts to comply with the regulations, the lighting specialists remembered a project they worked on together with Schott's subsidiary, Schott-Rohrglas GmbH. Comatelec had chosen glass covers developed by Schott glass for the lighting fittings they designed for the service tube of the Eurotunnel between England and France.

## Restrictions regarding fire behavior

"Just as with the Eurotunnel, the lighting system in the Mont Blanc tunnel had to comply with all restrictions regarding fire behavior," explains Philippe Gandon-Léger, Technical Director of Comatelec. For this reason, plastic was ruled out as an engineering material for the lamps. It had to be glass. Borosilicate glass from Schott-Rohrglas is particularly heat- and chemical-resistant and is therefore used to produce various laboratory glassware.

The optical properties of the glass tubing are also important. "The lamps should not cast a beam of light just anywhere in the tunnel," stresses Gandon-Léger. "What we needed was an evenly distributed illumination of the evacuation routes

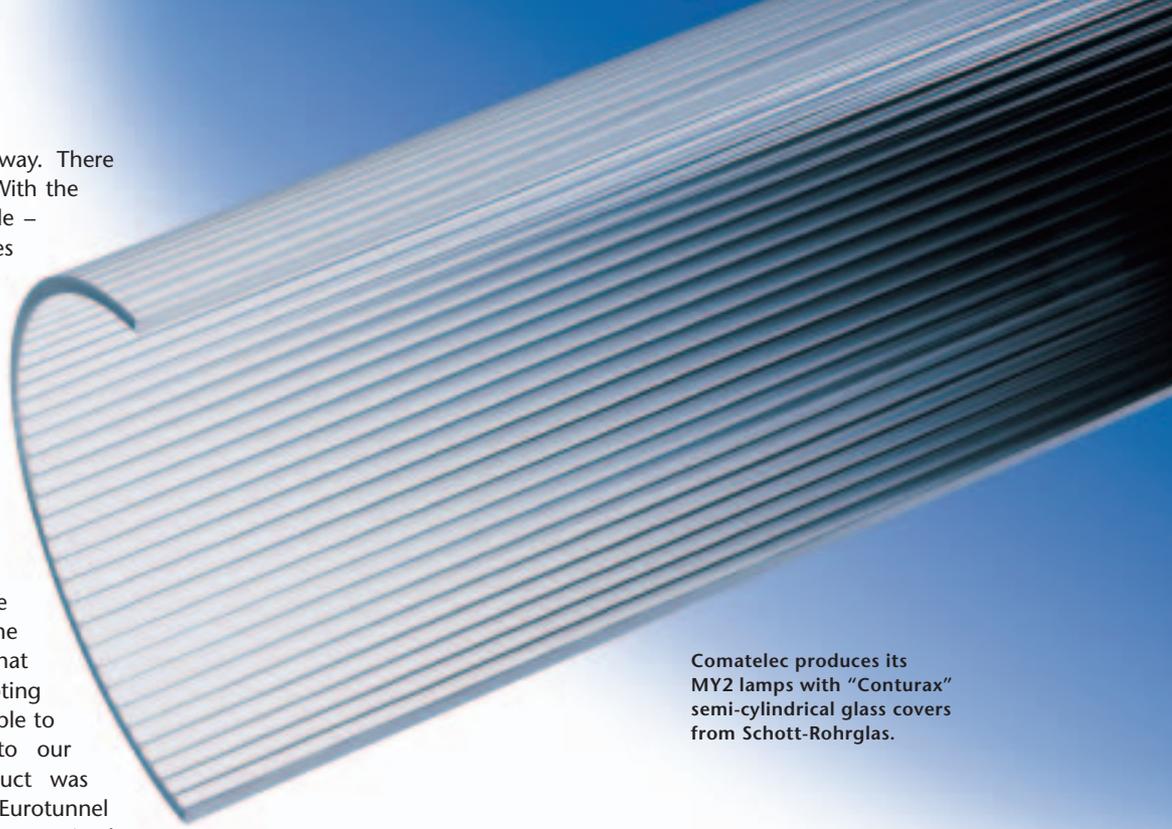
so that people can find their way. There should not be any dark areas." With the help of a specially devised profile – in the form of prismatic grooves on the inside of the semi-cylindrical glass protector – the light is optimally and evenly dispersed in all directions, and the light loss is kept to a minimum.

### A product tailored to needs

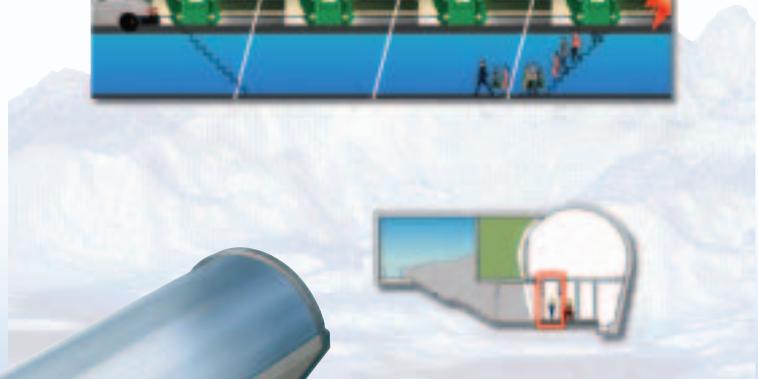
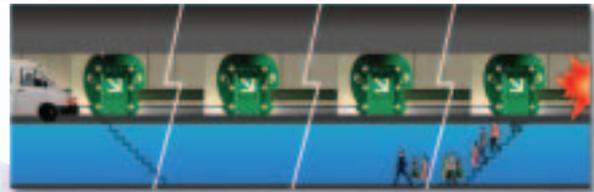
"The remarkable thing about Schott-Rohrglas was not only the glass," recalls Gandon-Léger. "The deciding factor for us was that Schott was very flexible in accepting our exact wishes and was thus able to tailor its product according to our needs." In fact, a new product was developed specifically for the Eurotunnel lighting: Conturax 038. Comatelec received some 7,700 semi-cylindrical glass covers for the Eurotunnel in the early 1990s. The French company has since become a regular customer. For the Mont Blanc tunnel alone, Comatelec has ordered more than 4,000 Conturax 038 glass covers in different sizes for its "MY2" lamps, as Comatelec calls its lighting elements.

Philippe Gandon-Léger is not bothered by the fact that, in the ideal case, the many thousands of people who drive through the Mont Blanc tunnel every day will not see the "MY2" lamps that Comatelec took great effort to develop. "Although we all hope they will never have to play a crucial role, it is nevertheless our job to ensure that the lights work reliably in emergency situations."

The installation of an additional tunnel for emergencies and the requirements in terms of its lighting are not the only features of the new safety concept. The tunnel test made by the German automobile club, ADAC, shows that the more stringent regulations have achieved their first success. When the German organization conducted an extensive safety check of 30 tunnels in Europe in spring 2002, the Mont Blanc tunnel ranked among the top three. And with a grade of "very good," ADAC rated it number one of the Alpine tunnels tested. ◀



Comatelec produces its MY2 lamps with "Conturax" semi-cylindrical glass covers from Schott-Rohrglas.



The main tunnel can be exited through fireproof doors to 37 connecting corridors. Staircases lead to the emergency tunnel below, which is constantly supplied with fresh air.

