

Compact LED Light Fixtures for Cable Tunnels

1. Outline

As fluorescent lamps installed in cable tunnels (tunnels for laying communication cables) are being replaced with LED lights, we have been selling immersion-proof LED light fixtures with an IP67 (dustproof and immersion-proof) rating since 2013.

However, their use in narrow spaces has been limited due to their external dimensions. This time, we have released compact and easy-to-install LED light fixtures that can be installed in narrow spaces while maintaining the advantages of our conventional products.

The lineup of our immersion-proof LED light fixtures consists of general lights, which are lit only when power is supplied, and emergency lights, which have a battery so that they can be lit even during a power outage.



① New product (general light/emergency light)
② Conventional product (general light)
③ Conventional product (emergency light)

Photo 1. New product and conventional products

2. Downsizing of LED Light Fixtures for Cable Tunnels

2-1 Disadvantages of conventional products

LED light fixtures for cable tunnels are usually installed in the common space above passageways in those tunnels. The standard width of the available space is 800 mm, and other equipment is also installed in the same space.

As shown in Fig. 1 (a), the conventional emergency light, which is 940 mm long, cannot fit in the 800-mm-wide common space. Even in the case of the conventional general light, which is 630 mm long, due to its light emitting section being closer to one end of the body, the other end of the body intrudes into the dedicated space for cables on the same side, as shown in Fig. 1 (b). Although LED light fixtures should be ideally installed in the direction shown in Fig. 2 (a), conventional products often have been compelled to be installed in a direction parallel to the passageway, as shown in Fig. 2 (b), which has prevented full use of their performance and impaired the efficiency of illuminating passageways.

2-2 Improvements

The new products, both the general light and emergency light, have been downsized to a single length of 364 mm, and their light emitting section has been expanded to

their entire body length. As a result, it has become possible to install them in a transverse direction and make full use of their performance even in narrow spaces, as shown in Fig. 3.

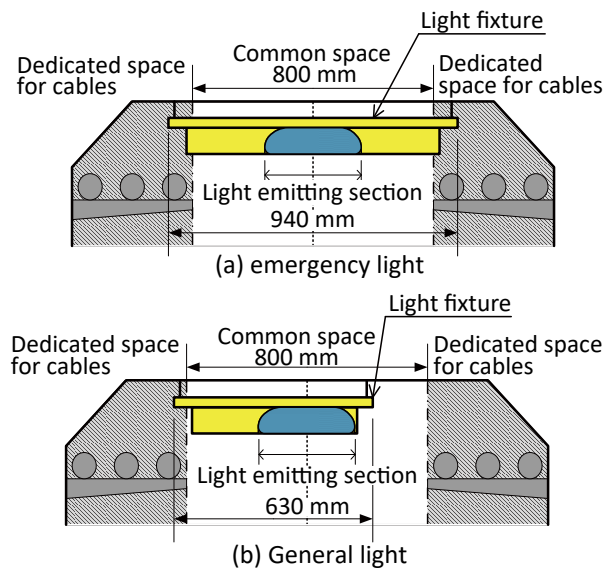


Fig. 1. Installation examples of conventional products (elevational view of the ceiling)

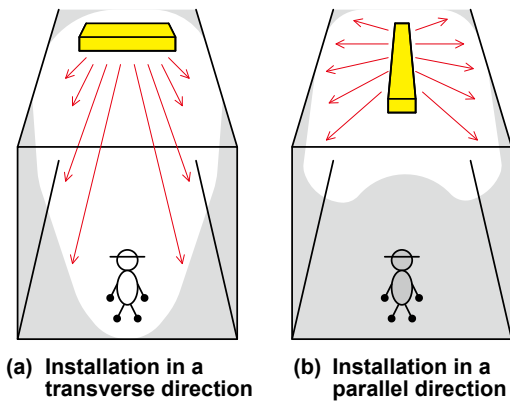


Fig. 2. Difference in illumination range depending on the installation direction of an LED light fixture

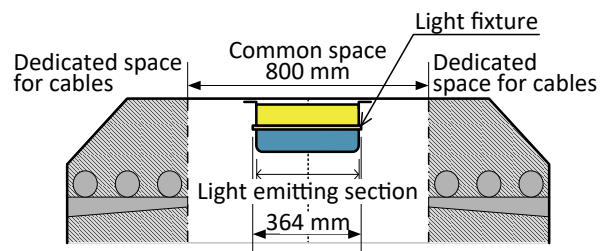


Fig. 3. Installation example of new product (elevational view of the ceiling)

The appearances of the new product and the conventional products are shown in Photo 1.

3. Features of the New Products

Table 1 shows the specifications of the new products and the conventional products.

3-1 Compact size

The bodies of the emergency light and the general light have been shortened by 61% and 42%, respectively, so that they can be installed in narrow spaces. Such significant reductions in length have been achieved by arranging the electric circuit above the light emitting section instead of next to it.

Although the height of the new products has increased by about 50 mm, it does not affect the remaining space because they can be directly attached to the ceiling, while the conventional products have been suspended from the ceiling.

3-2 Improved workability

Due to the unification of the external dimensions of the emergency light and the general light, the positions of their mounting holes (anchor holes) have also been unified, which has consequently unified their mounting positions. In addition, due to the light emitting section being arranged over the entire body, it has become easier to center the light emitting section and workability has been improved (see Fig. 3).

Since it has become possible to hold the short body with one hand, handling of the products for installation has also become easier.

3-3 Improved maintainability

The battery check of the conventional emergency light has been conducted by holding a hand close to the inspection window to switch the light to the battery operation mode and confirming whether it turns on properly (In the case of fluorescent lamps, it has been common to perform this switching by pulling a string). In contrast, the new emergency light automatically checks the condition of the battery when it is lit, and if any abnormality is detected, the inspection lamp is lit, as shown in Fig. 4, which makes it possible to check the batteries of emergency lights only by visual inspection. As a result, it has become possible to perform inspection safely and efficiently even if they are installed in a high place.

3-4 Antidazzle light distribution design

Since the light of ordinary LED light fixtures does not diffuse and has high straightness, it is dazzling for those who see it from the front. In cable tunnels, where LED light fixtures are installed at a regular interval in the direction of travel over the long and narrow passageway, workers always see the light from the front, which makes them feel the center is dazzling and the side walls are very dark due to the contrast effect. Therefore, as with the conventional products, the new products have an optimum design in the optical axis direction of each LED light source to reduce dazzle and distribute light evenly in all directions in the cable tunnel (see Fig. 5).

In addition, while the conventional products have a light diffusion sheet attached to the inside of the cover, the new products reduce dazzle by diffusing light with a cover

made from materials containing a light diffusing material to optimize the balance between light transmittance and diffusivity. Nevertheless, the illuminance at three meters away has been improved by 23%.

3-5 Reduction of leakage current

By reviewing the design of the power supply circuit, the leakage current has been reduced by 40% compared to the conventional products. As a result, it has theoretically become possible to install 100 light fixtures under an earth-leakage circuit breaker with a rated sensitivity current of 15 mA, while it has conventionally been common to install 40 units or less.

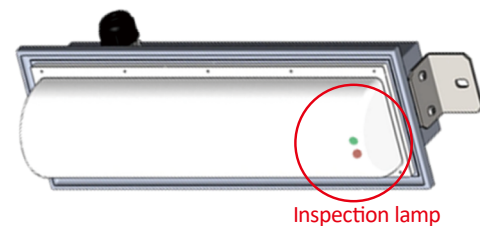
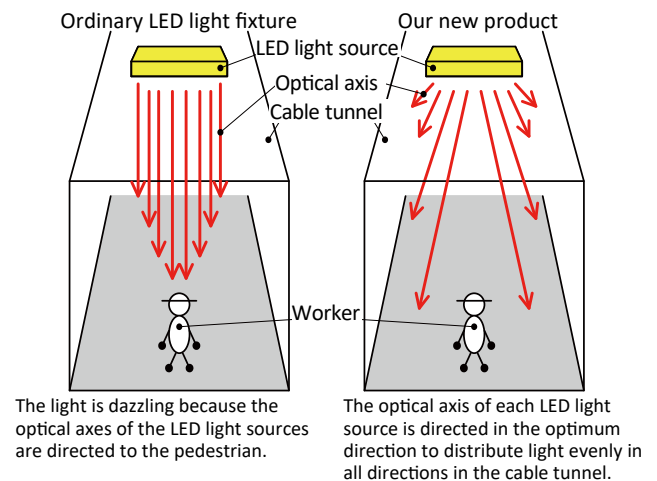


Fig. 4. Image of lit inspection lamp



The light is dazzling because the optical axes of the LED light sources are directed to the pedestrian.

The optical axis of each LED light source is directed in the optimum direction to distribute light evenly in all directions in the cable tunnel.

Fig. 5. Antidazzle light distribution design

Table 1. Specification comparison

Item	General light		Emergency light	
	Conventional product	New product	Conventional product	New product
Rated input	AC100/200 V 50/60 Hz			
External dimensions (mm)	Length	630	940	364
	Width	130	130	119
	Height	53	53	105
Weight (kg)	2.0	2.9	3.5	3.2
Electric power consumption (W)	20	20	26	26
Operable time during a power outage	-		60 minutes or more	
Leakage current (mA)	0.25 or less	0.15 or less	0.25 or less	0.15 or less
Ingress protection rating	IP67			
Illuminance (lx)	2.4 m underneath	45	45	45
	3 m away	13	16	13