

Solar Lighting System 'HIMAWARI'

Procedures for Installation of Sunlight Collector

& Laying of Ducts for Fiber Optic Cables

1. Installing the Sunlight Collector

1. Selecting the Right Installation Position

1) The best places are those which are exposed to sunlight all day long in all seasons and all time zones.

*A garden or a balcony may be acceptable when exposed to sunlight for longer hours.

*Avoid places where sunlight will be blocked by water vapor emitted from any outside air conditioner unit.

2) Select a place with appropriate structural strength and load capacity.

*Take corrective measures such as reinforcing the structure if the existing building has any load capacity problems.

*Change the structural design as required for any newly constructed building.

3) Select a place that requires the possible shortest distance for laying fiber optic cables.

4) Select a place that allows appropriate access for inspection work (one square meter).

5) Select a place that is within the coverage of a lightning rod.

6) When two or more sunlight collectors are installed, be sure to eliminate the possible interference of shadows cast by one collector on the other.

2. Foundation and Frame

1) The foundation may be constructed of either concrete or structural steel, and must be either a floating foundation or an independent foundation in principle.

2) Provide a clearance of 30 cm or more between the base of the sunlight collector and the floor to allow the proper bend radius for the fiber optic cables. (When laying the duct, provide an allowance of 30 cm or more from the leading edge of the duct.)

3) For anchor bolt or bolt hole positions, follow the foundation plan.

4) Be sure to make proper arrangements for easy maintenance work (such as stairways for accessing the installed sunlight collectors).

5) For mounts with a height of 1.5 m or more, install handrails or other appropriate means to ensure a safe work environment.

3. Power Supply

Select a single phase, 220 V±10% power supply and connect a proper earth wire

4. Lifting

For lifting, use a crane (truck) or a tow-truck (truck) in principle

2. Laying of Ducts for Fiber Optic Cables

1. Selecting the Duct's Route

Based on the building plan or a site inspection, select a route from the sunlight collector(s) to the illumination units' installation points.

In this step, select the shortest possible route involving a minimal bend radius

(*Note: Be sure to set any bend in the duct to a minimum of 300 R to match the allowable bend radius of the fiber optic cables.)

2. Preparing the Duct's Route

Following the selected route, drive a sleeve with a larger diameter than the ducts through the flooring, walls, and other obstacles through which the duct will pass before installing the ducts. For suspended installation of ducts, install insert nuts in the necessary positions.

3. Selection of Duct Materials

When selecting duct materials, be sure to select suitable metal ducts in principle so that the installation meets any fire regulations. However, in practice, when installing in framework only, conduit tubes may be used. If, for example, duct laying work follows ceiling/basement work, use of flexible tubes such as Eflex will contribute to improved workability.

4. Selection of Proper Duct Diameter for Different Number of Ducts (>Also see Section 3 'List of Duct Diameters for Fiber Optic Cables.')

Select an appropriate duct diameter for the number of fiber optic cables to be laid. For distributed installation of illumination units, lay independent ducts for individual illumination units.

5. Termination of Duct Ends

Locate the leading edge of ducts 50cm short of the center of the sunlight collector(s) and within 10 to 30 cm short of illumination unit(s).

6. Maximum Allowable Length of Duct

(>See also Section 4 'Reference Drawing for Installing Ducts.')

When any fiber optic cable requires a distance of 20 m or more in a horizontal installation or 15 m or more in a vertical installation, be sure to use relay boxes at intervals of 20 m or 15 m respectively to limit the length of the ducts.

When the cable laying work is scheduled to follow the finishing of ceilings, be sure to provide proper access opening just below the boxes in the ceilings. When the installation of access opening just under the boxes in the ceiling is not possible due to architectural restrictions or other reasons, take other appropriate measures to allow access to duct joints in the ceiling.

7. Allowable Number of Bends in the Duct

Limit bends between adjacent boxes to two places (amounting in total to two right angles).

8. Curing after Laying Ducts

After laying the ducts, remember to complete curing to protect against rain water, dirt, and dust.

3. List of Duct Diameters for Fiber Optic Cables(Japanese standard)

*Numbers in parentheses show inside diameters in mm.

No. of Fiber Optic Cables	Metallic Conduit Nominal Diameter		Flexible Tube Nominal Diameter
	Thin Steel	Thick Steel	
1	31(28)	28(28)	28(28)
2	39(35)	36(36)	42(41)
3	39(35)	42(42)	42(41)
4	63(59)	54(53)	54(52)
5	63	70(68)	70(67)
6	75(71)	70	70
7	75	70	70
8	75	70	70
9	-	82(81)	82(78.5)
10	-	82	82
11	-	82	82
12	-	82	82
13	-	104(105)	100(96)
14	-	104	100
15	-	104	100
16	-	104	100
17	-	104	100

◎ Incorporate a bending radius of 300 R or more for every duct and conduit. Never use any normal bend for metallic conduits with a normal size of 42 or less.

- When selection is made prior to laying of ducts to install fiber-optic cables in different lines, it is advisable to use different duct sizes for duct laying work according to the number of cables required for individual lines.

(Case 1): 36-lens HIMAWARI with a total number of 6 fiber optic cables

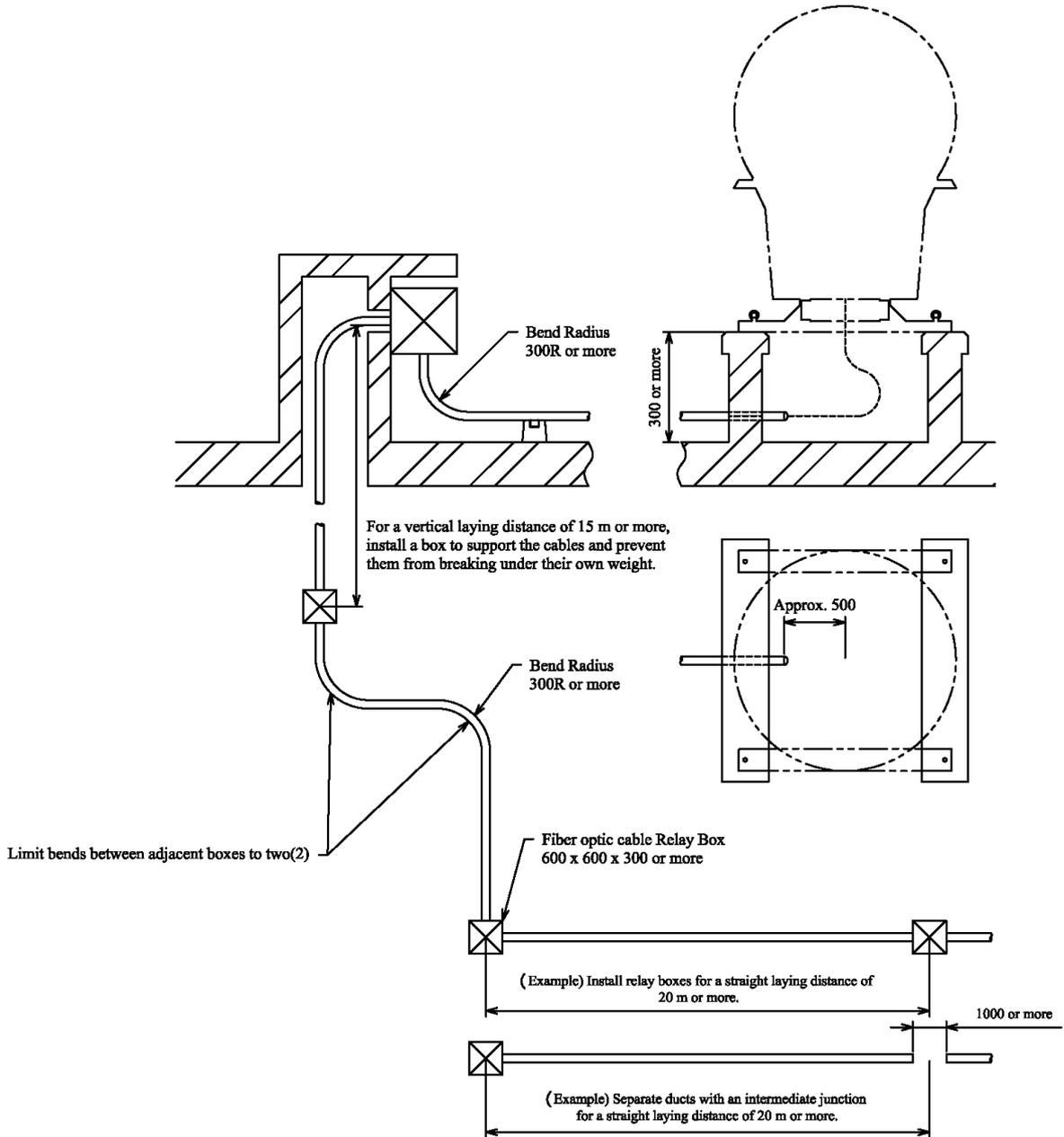
- ① Six (6) fiber optic cables routed to a living room → Metallic conduit size of 75
- ② Three (3) fiber optic cables routed to a bedroom → Flexible tube size of 42
- ③ Four (4) fiber optic cables routed to a study → Metallic conduit size of 63
- ④ Two (2) fiber optic cables routed to the entrance → Metallic conduit size of 39

(Case 2): 12-lens HIMAWARI with a total number of 2 fiber optic cables

- ① One fiber optic cable routed to a downlight → Flexible tube size of 28
- ② One fiber optic cable routed to a spotlight → Metallic conduit size of 31

4. Reference Drawing for Installing Ducts

(1) Installing a pigeon house (duct tower):



(2) Exposed Laying

