

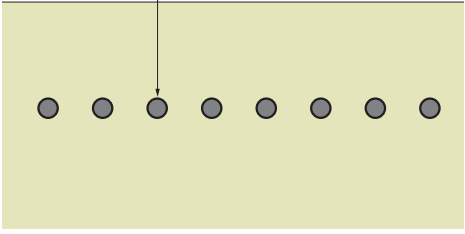
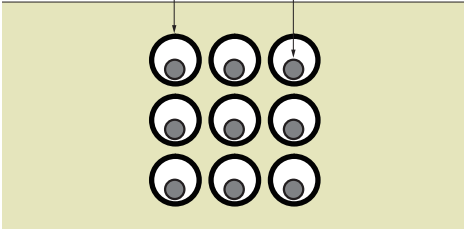
**Corrugated Hard Polyethylene Pipe
For Labor and Cost Savings
In Underground Cable Installation**

EFLEX



A track record of more than 40 years in Japan: EFLEX, underground electrical cable protective pipe

Comparing cables buried directly with cables laid inside pipe conduits (EFLEX)

		Direct burial	In pipe conduits (EFLEX)
Example installations			
Effects on cables	During installation	Easily damaged	Hard to damage
	During operation	Since cables are in direct contact with the soil, they are susceptible to water and loads that could cause failures. Cables also tend to become damaged during excavation work by other companies.	Since cables are protected inside pipe conduits, they are unlikely to fail. Cables are not easily damaged by the excavation work of other companies.
During cable addition and renewal		Excavation is needed, requiring time and expense.	Cables can be added or replaced without excavation.

•Features of EFLEX

Lightweight

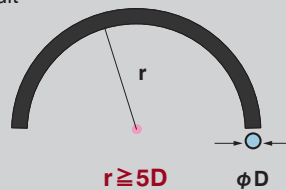
EFLEX	1.0 kg
Lined steel pipe	13.1 kg
Hume pipe	26.5 kg
Hard vinyl pipe	3.4 kg

(per $\phi 100$ -m)

Easy to transport and work

Easy to bend

May be bent manually, and the allowable bending radius is five times or more of the outer diameter of the pipe conduit



Easy to detour around obstacles

Long products

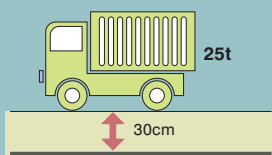
$\phi 30$: 300 m $\phi 200$: 40 m



Fewer joints

Robust

The corrugated structure enhances the compression strength. When buried at a depth of 30 cm, the pipes may withstand loads from 25-ton trucks in motion.



May be buried at a shallow depth

Low friction

The corrugated structure reduces the surface area that comes into contact with cables, which reduces friction.

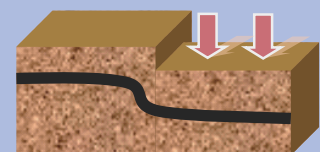
Friction coefficient

EFLEX	0.3
Lined steel pipe	0.5
Hume pipe	0.7
Hard vinyl pipe	0.4

Cables may be drawn in at a long length

Plasticity and elasticity

The plastic and elastic properties allow the pipe conduits to follow the motions of earthquake and ground subsidence.

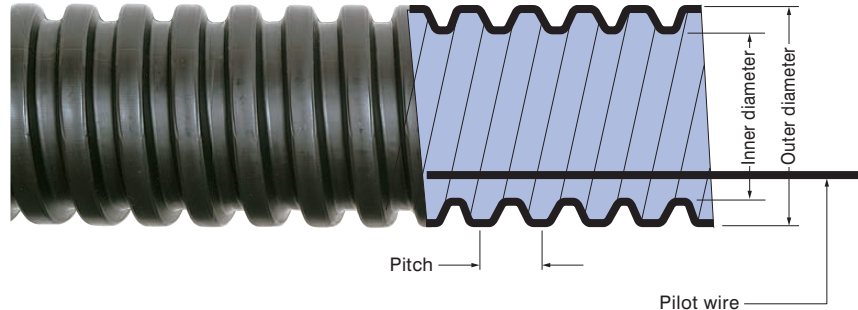


Adaptable to ground subsidence

EFLEX boasts the product lineup from $\varnothing 30$ to $\varnothing 200$

Underground Cable Conduit EFLEX

The standard dimensions of EFLEX are as shown in the table below. A pilot wire is inserted inside EFLEX during production. It is connected with the cable pilot wire to pull the cable into the pipe. EFLEX is, as a rule, shipped from the factory, wound in a coil. A pilot wire has an allowable tensile strength of 50 kg.



FP-□

Standard dimensions table

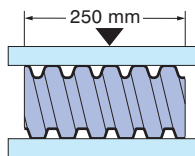
Product No.	Outer diameter (approx. in mm)	Inner diameter (approx. in mm)	Pitch (approx. in mm)	Reference weight (approx. in kg/m)	Standard length of product bundle (m)	Standard dimensions of product bundle Outer diameter x width (approx. in m)
FP-30	40	30	10	0.2	300	1.2 × 0.5
FP-40	54	42	13	0.3	200	1.5 × 0.65
FP-50	65	50	17	0.4	200	1.6 × 0.7
FP-65	85	66	21	0.6	100	1.6 × 0.65
FP-80	102	80	25	0.7	100	1.7 × 0.7
FP-100	130	100	32	1.0	100	2.0 × 0.8
FP-125	160	125	39	1.5	50	1.6 × 1.2
FP-150	189	150	47	2.0	50	1.8 × 1.3
FP-200	253	200	55	3.5	40	2.25 × 1.1

- When purchasing EFLEX, it is recommended that its nominal diameter be more than 1.5 times as large as the outer diameter of the cable to be accommodated.
- The allowable bending radius should be five times or more of the EFLEX outer diameter.
- ⚠ • If cables are not drawn in for a long time, the pilot wires could corrode. Replace them with plastic order wires to suit the conditions of use. When drawing in cables, replace pilot wires with order wires for the purpose.
 - Keep away from fire

•Product features

Flattened compression property

When the compression test stipulated by JIS C 3653 (Annex 1 to Installation methods of power cables buried ground) was conducted, the deformation ratio was less than 3.5% in all cases.



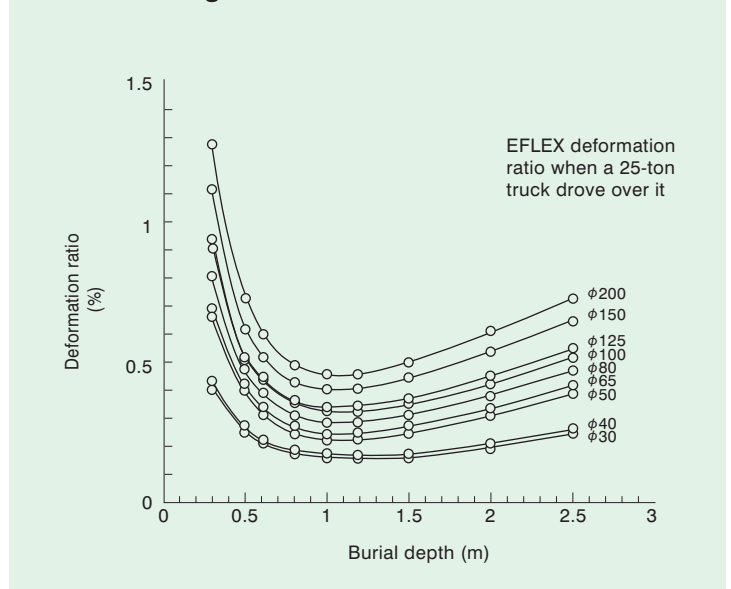
Flattened compression property

Nominal diameter (mm)	Load		Deformation ratio
	N	{kgf}	
30	373	38.0	≦ 3.5%
40	501	51.1	≦ 3.5%
50	612	62.5	≦ 3.5%
65	804	82.0	≦ 3.5%
80	969	98.9	≦ 3.5%
100	1225	125.0	≦ 3.5%
125	1518	154.9	≦ 3.5%
150	1805	184.2	≦ 3.5%
200	2412	246.1	≦ 3.5%

Resistance against loads

When a 25-ton truck drove over a location where EFLEX has been buried at a depth of 30 cm from the ground surface, the deformation ratio was less than 3.5%, demonstrating sufficient resistance against loads.

Resistance against loads



EFLEX Work Procedures



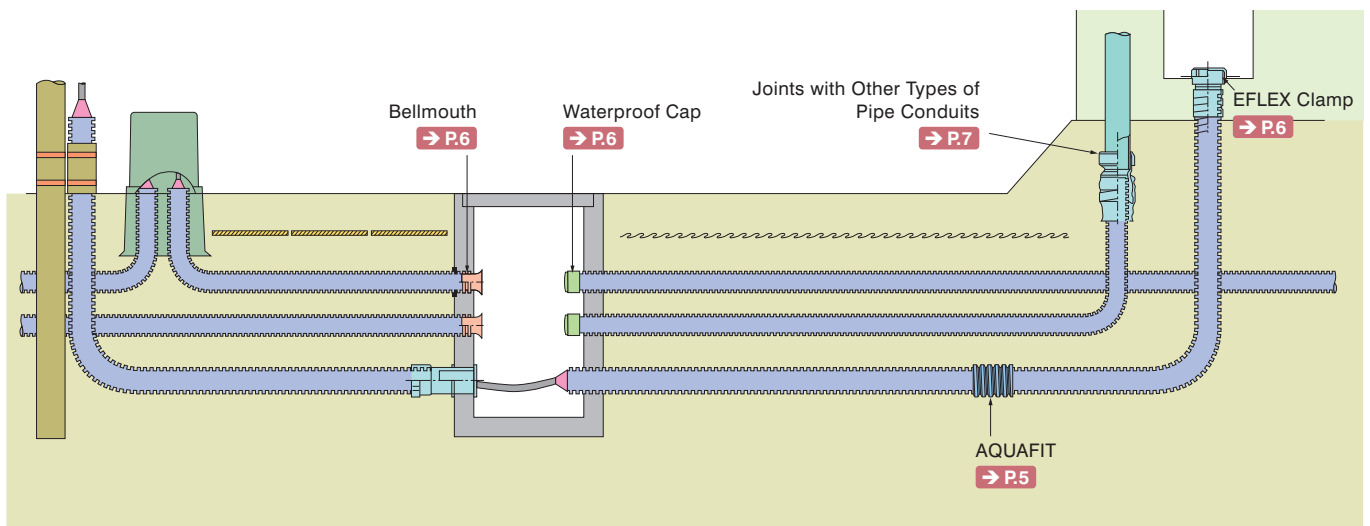
Long and easy-to-bend EFLEX saves labor and shortens work times when laying conduits.

- ▲ • Roll the grip to extend the cables.
- Make sure that the cables do not wind while they are being laid.
- Compact the ground under EFLEX, especially near the manhole.
- Pierce with rods for testing, to discern whether cable-laying conditions are acceptable.

Feel free to order our Work Procedure document for details.

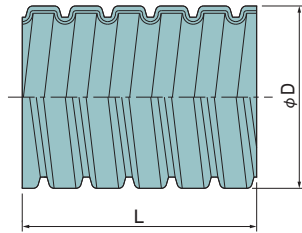
EFLEX System

Various components are combined to protect cables inside EFLEX

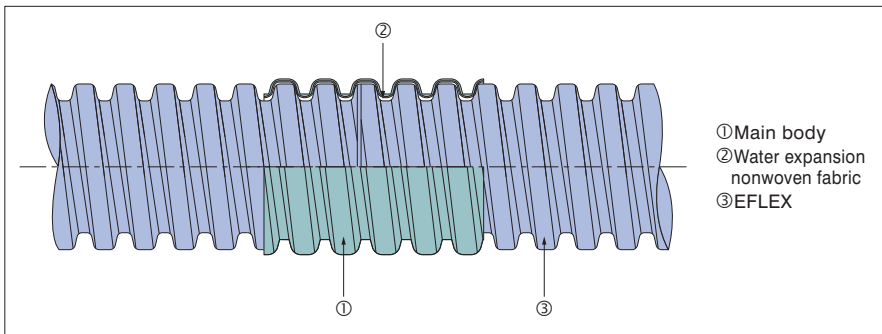


AQUAFIT (Straight Joining Procedure for Joining EFLEX System Together)

FSA-□



Product No.	Outer dia. φD (approx. in mm)	Length L (approx. in mm)
FSA-30	44	52
FSA-40	60	72
FSA-50	70	90
FSA-65	90	115
FSA-80	111	135
FSA-100	140	175
FSA-125	172	182
FSA-150	201	190
FSA-200	260	270



•Work procedures

- ❶ Twist the joint at one end of EFLEX.
- ❷ Line one end of EFLEX up with another.
- ❸ Twist the joint twisted in ❶ back so that the connecting part is centered.

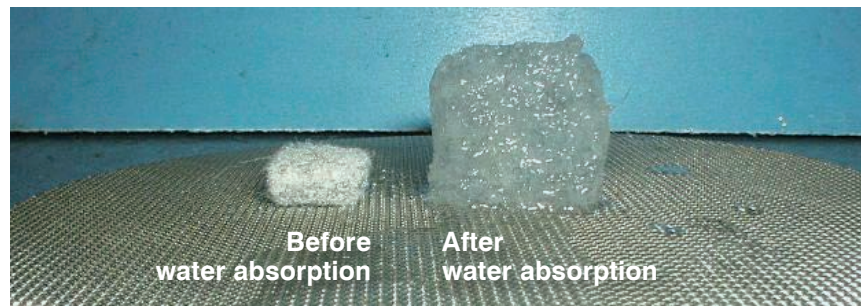


*AQUAFIT of radius between ø125 and 200 can be worked more smoothly using a belted wrench and other tools. Cut the edge of EFLEX perpendicularly.

- ⚠ Do not remove from the bag until immediately before working, as a non-woven water-expansion cloth has been used.
 Avoid storing in places exposed to high temperature and humidity or direct sunlight.
 Avoid using in places where a large volume of water will penetrate the duct part.

Excellent waterproofing property of non-woven water-expansion cloth

When non-woven, water-expansion cloth comes into contact with water, it expands immediately and stops water from seeping.



Cross section before water absorption



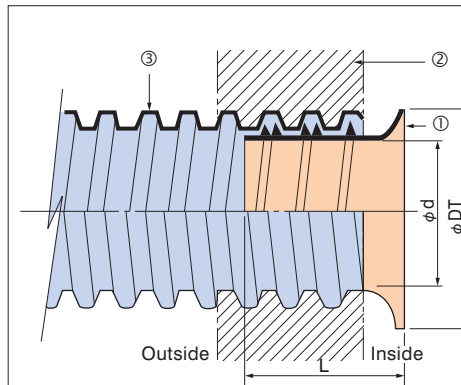
Cross section after water absorption

Bellmouth

FM-□



After EFLEX has been fixed to the manhole, the bellmouth should be attached to the end part of EFLEX to enhance the appearance and prevent cables from being scratched or damaged while being pulled in. The bellmouth can be screwed easily into the EFLEX.



- ① Bellmouth
- ② Manhole (hand hole)
- ③ EFLEX

Product No.	Outer dia. DT (approx. in mm)	Inner dia. d (approx. in mm)	Length L (approx. in mm)
FM-30	50	26	40
FM-40	65	36	50
FM-50	78	45	60
FM-65	97	60	75
FM-80	115	74	85
FM-100	144	93	105
FM-125	176	116	130
FM-150	205	141	150
FM-200	272	189	185

EFLEX Clamp (connector)

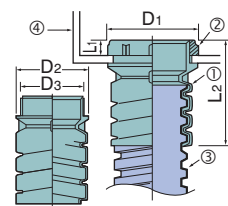
CL-□



If EFLEX units are fitted to a terminal box, use the EFLEX clamps as shown in the Figure.

A hole such as that indicated in the Table below should be opened on the EFLEX fitting plane of the terminal box to match the diameter of EFLEX used.

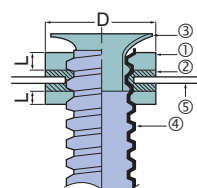
For 30-100 mm φ



- ① Clamp sleeve
- ② Bushing
- ③ EFLEX
- ④ Terminal box

Product No.	Bushing (approx. in mm)		Connecting tube (approx. in mm)			Hole dia. (approx. in mm)
	D1	L1	D2	D3	L2	
CL-30	51	13	50	41.9	76	42.7
CL-40	77	18	73	59.6	96	60.4
CL-50	88	18	90	75.2	105	76.0
CL-65	101	18	104	87.9	136	88.7
CL-80	117	22	116	100.3	151	102.7
CL-100	132	24	135	113.0	178	115.4

For 125-200 mm φ



- ① Collar
- ② Rubber packing
- ③ Bellmouth
- ④ EFLEX
- ⑤ Terminal box

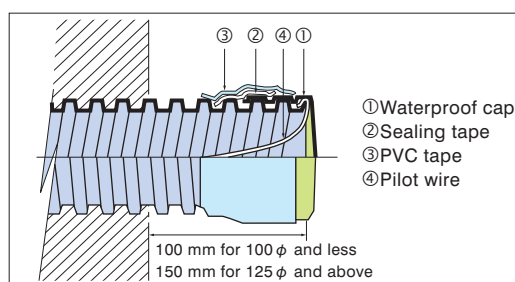
Product No.	Collar (approx. in mm)		Hole dia. (approx. in mm)
	L	D	
CL-125	41	191	170
CL-150	47	228	200
CL-200	63	290	265

Waterproof Cap for EFLEX End

FFC-□



Screw the water cap onto the outside of EFLEX (the amount of EFLEX protruding from a wall should match the amount of taping). Wrap sealing tape around the boundary line of EFLEX and secure its end with PVC tape.



●Kinds: 9 types

FFC-30, 40, 50, 65, 80, 100, 125, 150, 200

●Composition

Waterproof cap, sealing tape, and PVC tape

Epoxy Putty (wall surface waterproofing material)

EPOKAN (In cans) Total weight: 3 kg



Base agent:
1.5 kg;
hardening agent:
1.5 kg

EPOAL (In bags) 1 kg



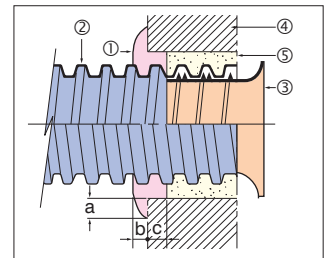
Base agent:
0.25 kg x 2;
hardening agent:
0.25 kg x 2

Use when EFLEX is attached to a manhole for laying cables at a place with high groundwater level.

Epoxy putty amount used (Per location)

EFLEX		Hole diameter on wall surface (approx. in mm)	Epoxy putty amount used (kg)
Product No.	Outer diameter (approx. in mm)		
FP-30	40	80	0.5
FP-40	54	100	0.5
FP-50	65	110	0.5
FP-65	85	130	1.0
FP-80	102	160	1.0
FP-100	130	180	1.5
FP-125	160	210	2.0
FP-150	189	260	4.0
FP-200	253	310	5.5

⚠ Please be sure to use it immediately after opening the can or bag.
Place in hot water in winter when it is hard.
Special packing is necessary for export.
(UN classification 'Class 9' material is included in products.)

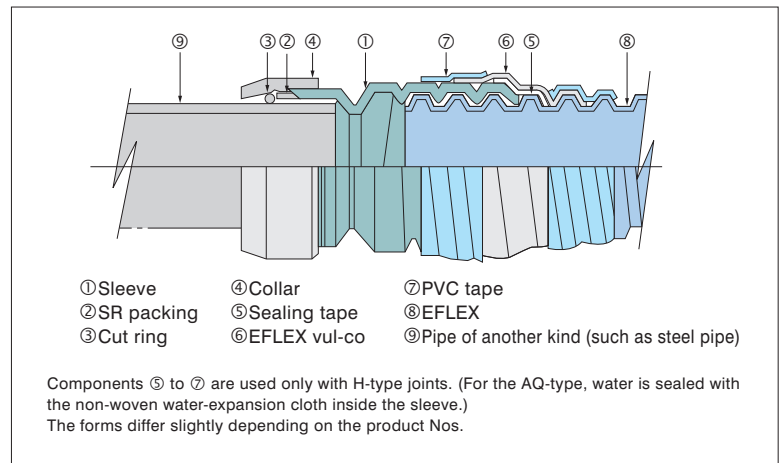


- ① Epoxy putty (wall surface waterproofing material)
- ② EFLEX
- ③ Bellmouth
- ④ Manhole (hand hole)
- ⑤ Mortar

Nominal diameter	a (mm)	b (mm)	c (mm)
φ30 ~ 100	20	10	20
φ125 or more	20	10	30

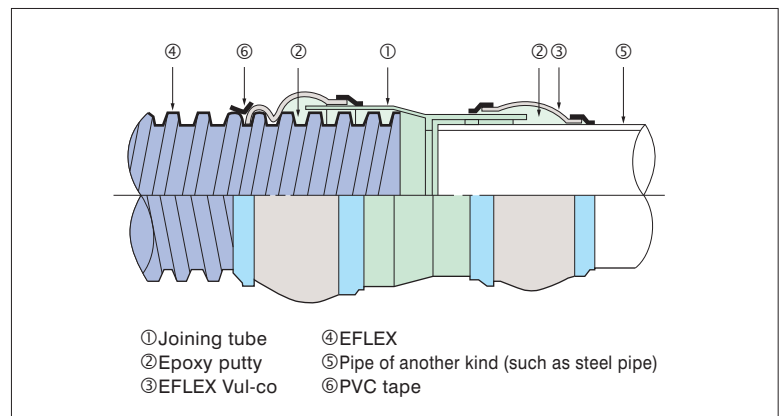
Joins with Other Types of Pipe Conduits (connecting EFLEX with pipes of another kind)

•AQ-type and H-type joints for another kind pipes



•A type joining part

FT-□-□



⚠ Special packing is necessary for export. (UN classification 'Class 9' material is included in products.)

If you require a joint for connecting different types of pipes, please contact us with the sizes of the pipes.

Other Relevant Products

A New Multi-hole Pipe of Unit-type Pursuing Work Laborsaving and Cost Reduction.

FURUKAWA FK SYSTEM
MULTI-HOLE PIPE OF SYNTHETIC RESIN **KOTA-KUN**

The information box project, the so-called C·C·Box Project, is being promoted by the Ministry of Land, Infrastructure and Transport, aimed at "promotion of underground laying of electric cables" as well as "early realization of advanced information society." To respond to such demands of the times, Furukawa Electric has developed a multi-hole pipe of synthetic resin as a cable duct material using recycled plastics. We hope the customer will make use of our materials system for underground cable laying that we have developed in pursuit of work laborsaving, shortening of work periods and cost reduction.



Thanks to Its Weight Only 25% of Concrete Trough in Addition to Its Superior Workability, Green-Trough Promises Shortening of Working Period and Reduction of Working Costs.

GREEN-TROUGH

Waste plastics from electric wire and cable sheathes that were conventionally disposed of as industrial waste are recycled to be born again as this cable protection trough. Thanks to its superior impact resistance, high resistance against salt and chemicals along with flame retardance, Green-Trough can be used for a long time with excellent stability. It also offers outstanding workability and a possible reduction in construction period due to its light weight, and reduces the exchange work of troughs thus helping to reduce industrial waste as well as to preserve resources.



FURUKAWA ELECTRIC CO., LTD. <http://www.furukawa.co.jp/english/>

HEAD OFFICE

Marunouchi Nakadori Bldg., 2-3, Marunouchi 2-chome, Chiyoda-ku, Tokyo 100-8322, Japan
Phone: +81-3-3286-3195 Fax: +81-3-3286-3454
e-mail: fec.kanro-global@furukawaelectric.com

AMERICAN FURUKAWA, INC. (AFI)

47677 Galleon Drive, Plymouth, MI 48170 U.S.A.
Phone: +1-734-446-2230 Fax: +1-734-446-2260

FURUKAWA ELECTRIC EUROPE LTD. (FEEL)

Furukawa House 77-85 Fulham Palace Road London W6 8JD, United Kingdom
Phone: +44-20-7313-5300 Fax: +44-20-7313-5310

FURUKAWA ELECTRIC SINGAPORE Pte.Ltd.(FES)

60 Albert Street, #13-10 OG Albert Complex, Singapore 189969
Phone: +65-6224-4686 Fax: +65-6336-2635

FURUKAWA SHANGHAI LTD. (FSL)

Room 1006, Hongyi Plaza, 288 Jiujiang Road, Shanghai 200001, P.R.China
Phone: +86-21-3366-5301 Fax: +86-21-3366-5315

FURUKAWA ELECTRIC HONG KONG LTD.(FEHK)

Suite 1810, 18/F, Tower 2, 33 Canton Road, China Hong Kong City, Tsim Sha Tsui, Kowloon, Hong Kong
Phone: +852-2512-8938 Fax: +852-2512-9717

FURUKAWA (THAILAND)CO.,LTD(FTC)

No.191 Silom Complex Building 16th Floor, Units 4,C Silom Road, Kwaeng Silom, Khet Bangrak, Bangkok 10500
Phone: +66-2- 632-1079 Fax: +66-2-632-1080

FURUKAWA ELECTRIC LatAm S.A.

Rua Hasdrubal Bellegard, 820 Cidade Industrial Curitiba Cep 81460-120, Curitiba, P.R. Brazil
Phone: +55-41-3341-4000 Fax: +55-41-3341-4141
Sales Division: São Paulo
Phone: +55-11-5501-5800 e-mail: cmo@furukawa.com.br

PT. FURUKAWA ELECTRIC INDONESIA

Registration No AHU-32328.AH.01.01.Tahun 2010
Sucaco Building, 6th Floor Jl. Kebon Sirih No.71, Jakarta-10340
Phone: +62-21-3190-6212 Fax: +62-21-3190-6407

The products and their appearances, as described in this brochure, are subject to change for improvement without prior notice.

Export Control Regulations

The products and/or technical information presented in this publication may be subject to the application of the Foreign Exchange and Foreign Trade Act and other related laws and regulations in Japan.

In addition, the Export Administration Regulations (EAR) of the United States may be applicable.

In cases where exporting or reexporting the products and/or technical information presented in this publication, customers are requested to follow the necessary procedures at their own responsibility and cost.

Please contact the Ministry of Economy, Trade and Industry of Japan or the Department of Commerce of the United States for details about procedures.