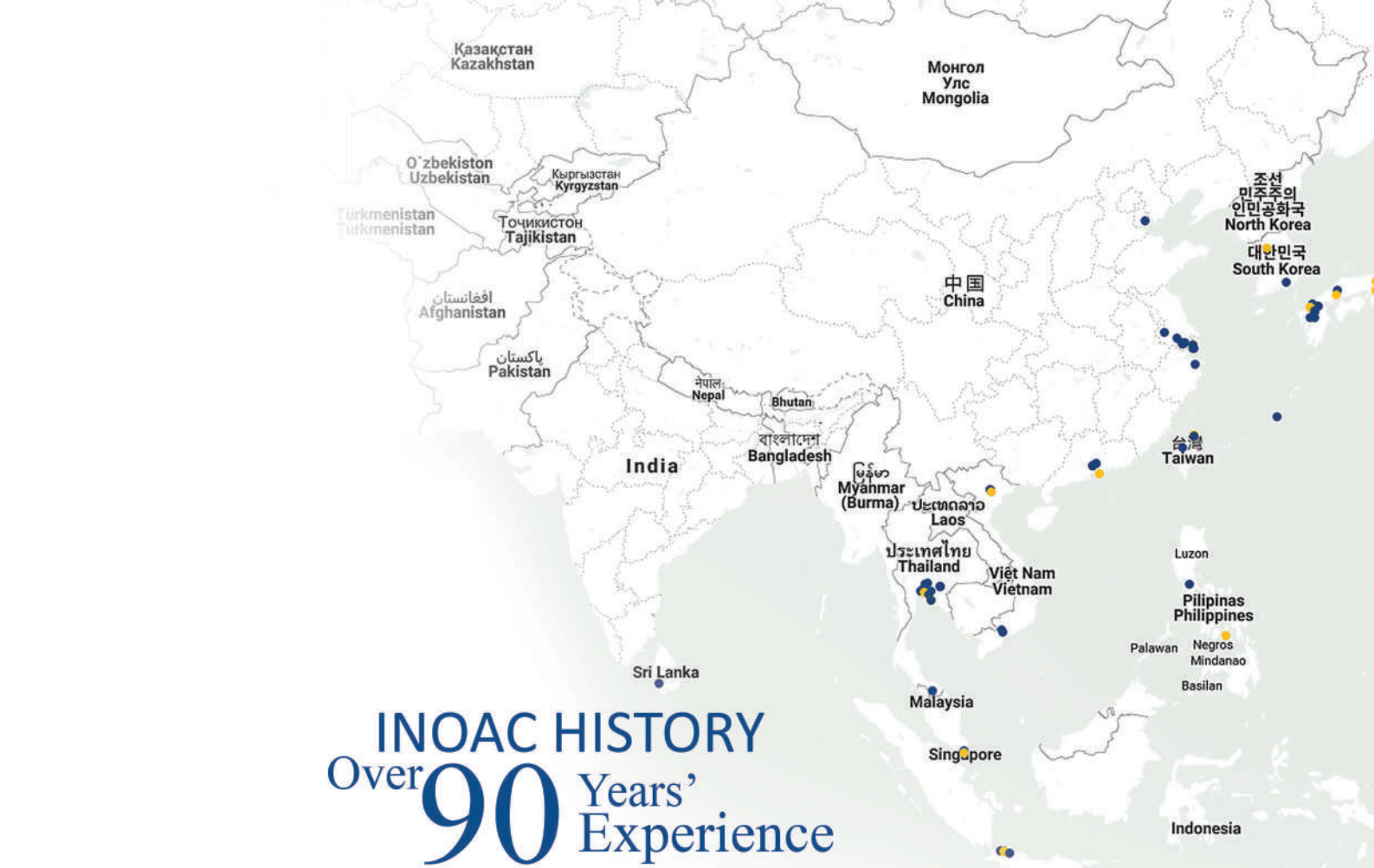
INOAC

PT. INOAC CONSTRUCTION MATERIALS INDONESIA

AIPOLY

BROADPIPE



INOAC HISTORY

Over 90 Years' Experience

1920~
Commenced production of bicycle

1960~
Entering into the piping material business

1990~
Renewed INOAC corporate identity
Entered welfare-equipment business

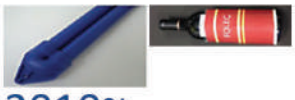
2000~
Entered environment business

2015~
Introduce polyurethane production line at ITH Rayong plant in Thailand & IVC in Vietnam

1950~
Started production of polyurethane foam for the first time in Japan
Entering into the automtive components business
Entering into the bedding business
Entering into nursing product

1970~
Entered into the furniture, logistic materials and cosmetic container business

1980~
Introduced "INOAC" as the common brand name
Entered into the office automation equipment industry business



2010~
Development of clean product

2015~
Production for High Density Polyurethane Pipe

2019~
Eshtablish PT. INOAC CONSTRUCTION MATERIALS INDONESIA
focuss in HDPE Pipe production

INOAC in

For realizing a
and synth

Innovation & Action

新たなフィールドに、イノアックの森を

INOAC Philosophy
企業理念

tends to create a beautiful forest, comprising many trees of varying characters, ather than raising a single tall tree.

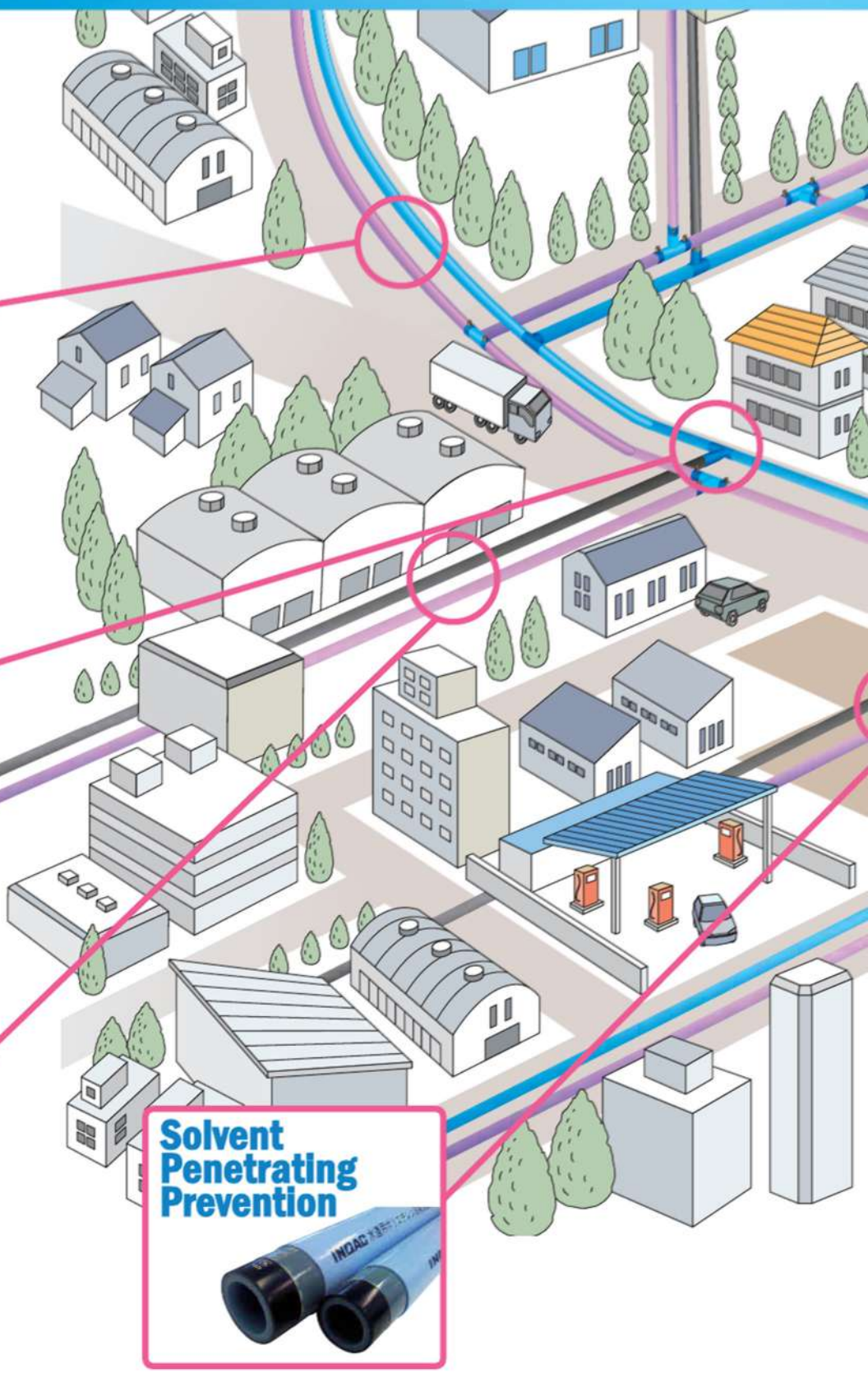
better life, INOAC has specialized not in a single business but has bred four business seeds: polyurethane, rubber, plastic
etic materials. INOAC has grown various businesses from these seeds. Today it has developed into a conglomerate,
supplying diverse products and services, thereby contributing to society.

INOAC intends to grow many trees, or businesses, of distinct characters, to satisfy the needs of the times.

INOAC

● Sales Branches ● Offices & Plants

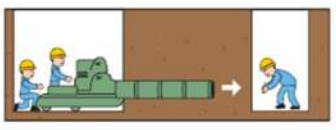
Solution for Non



HDPE PIPE

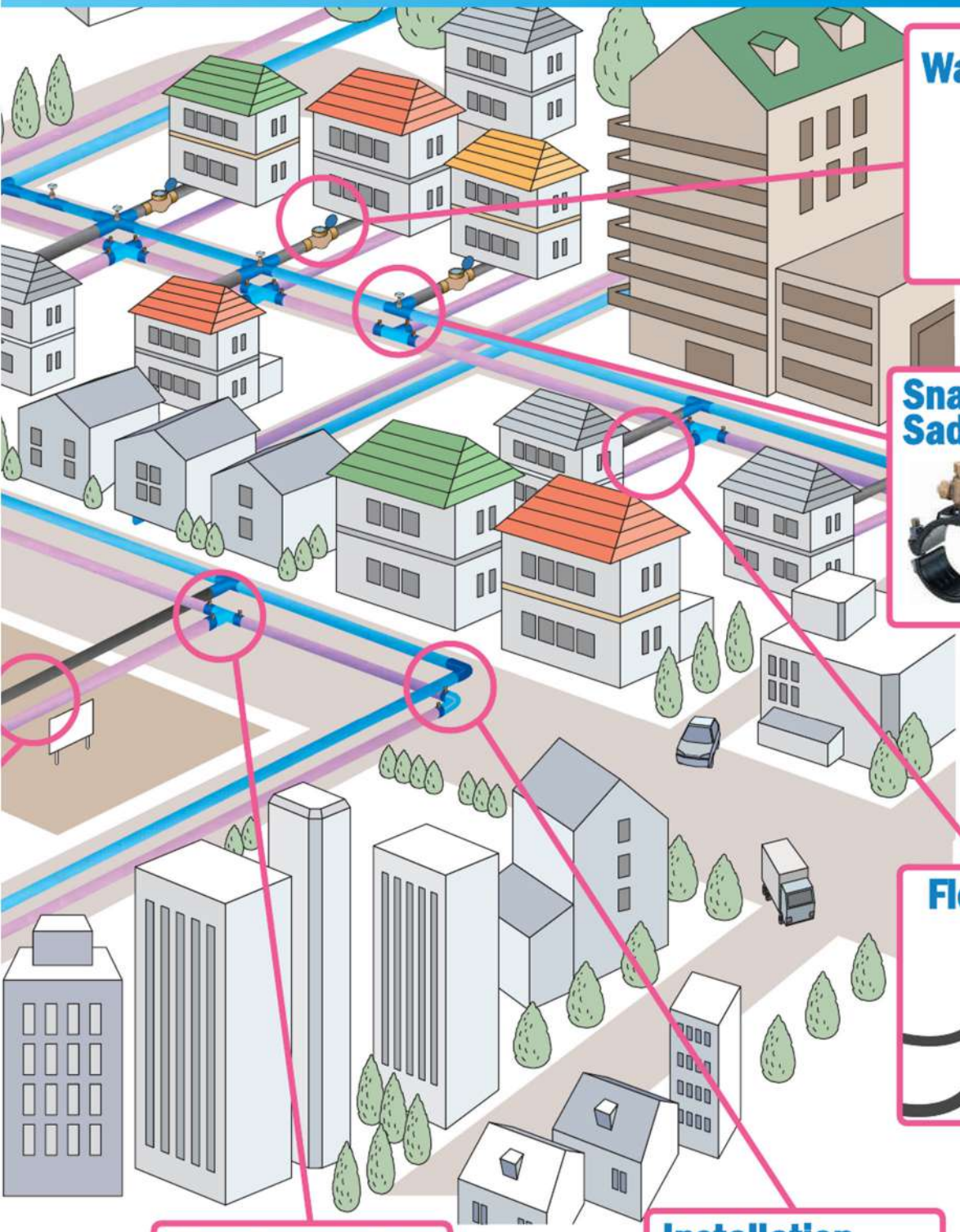
Electric Fusion

Pipe Jacking Method



Solvent Penetrating Prevention

Revenue Water

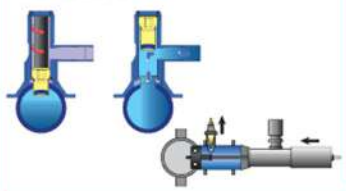


Water Meter

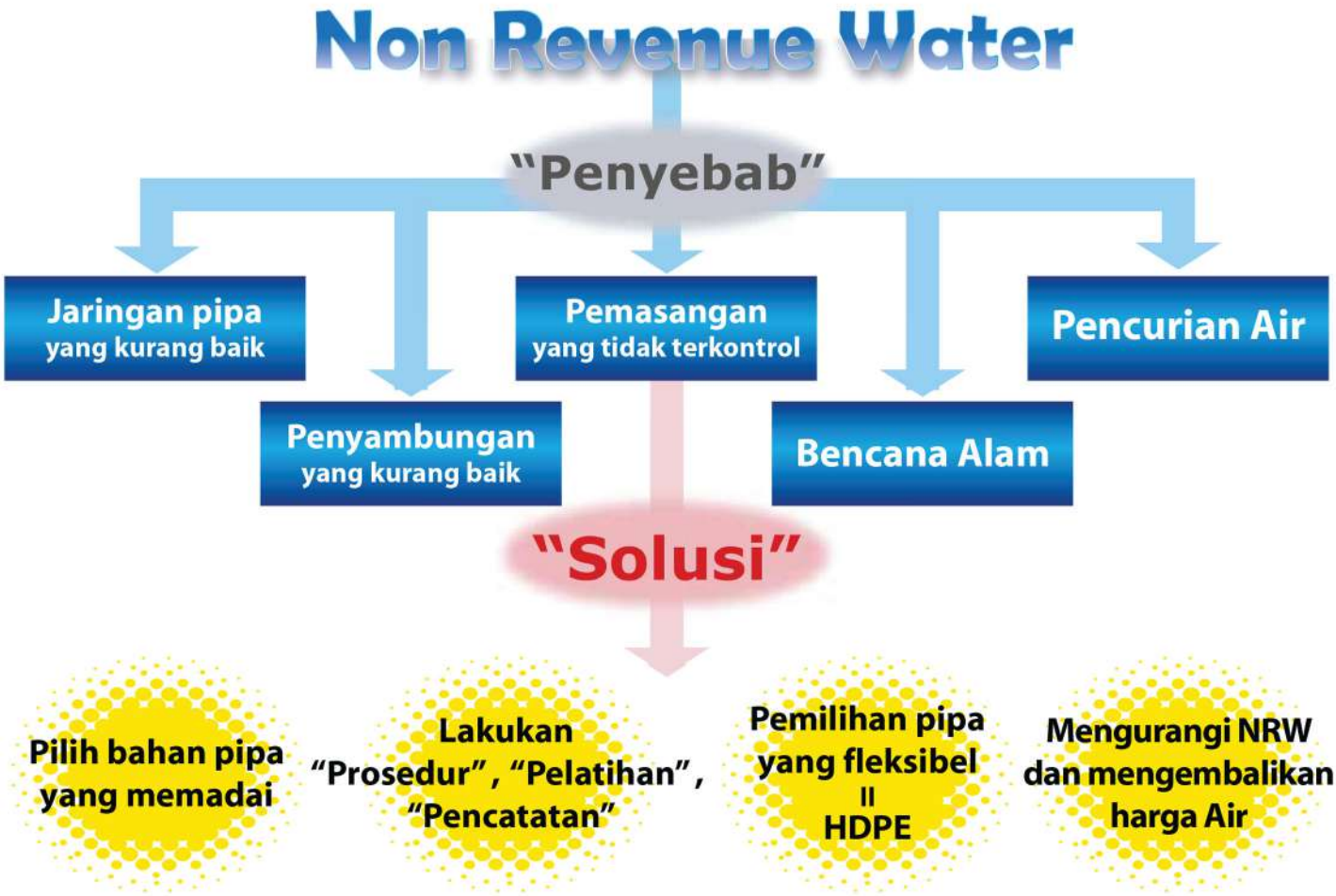
Snap Tap Saddle

Flexible Pipe

Non Suspention Water



Installation Management



■ How to improve the NRW (Experience of Japan)

⇒ Maintain Waterworks pipe Area

1)Changed to HDPE pipe

2)Replaced each Accessories to Reliable products

Fittings	⇒	Electro Fusion Fittings
Snap tap Saddle	⇒	Two-in-One Model
Water Meter	⇒	Long life, High Accuracy

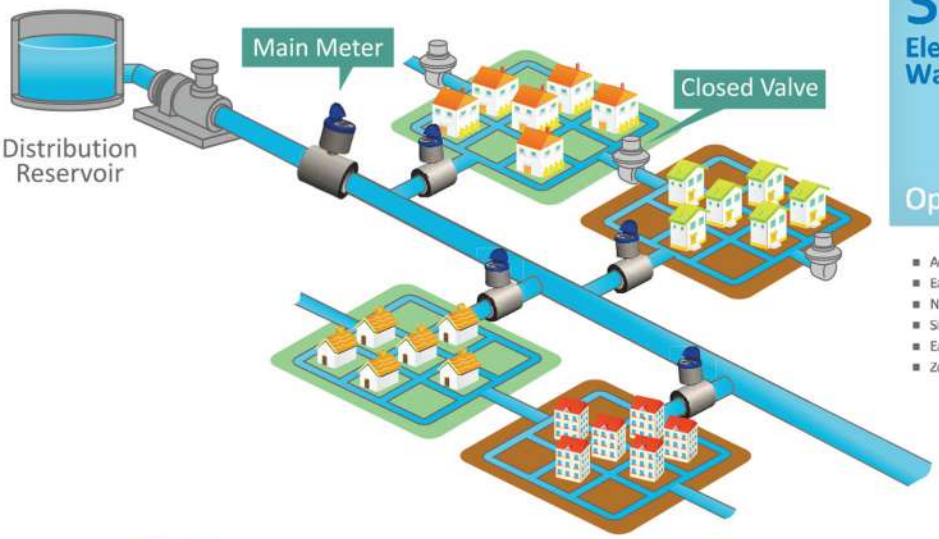
3)Establish and Expand Distribution Meter Area (DMA)

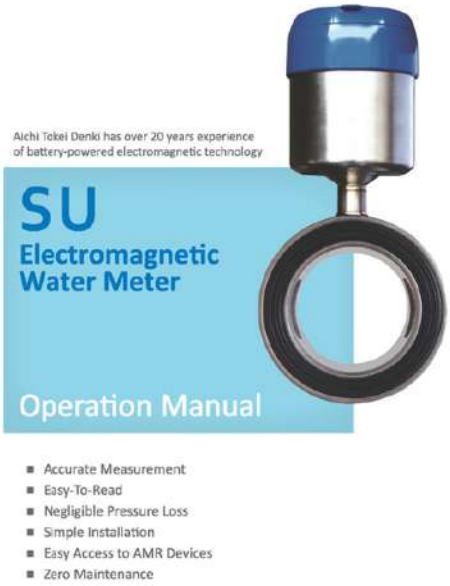
Memilih Peralatan yang bisa diandalkan

Water Meter — Sistem pengukuran elektromagnetik = Akurasi tinggi (tingkat kesalahan hanya dalam 2%)

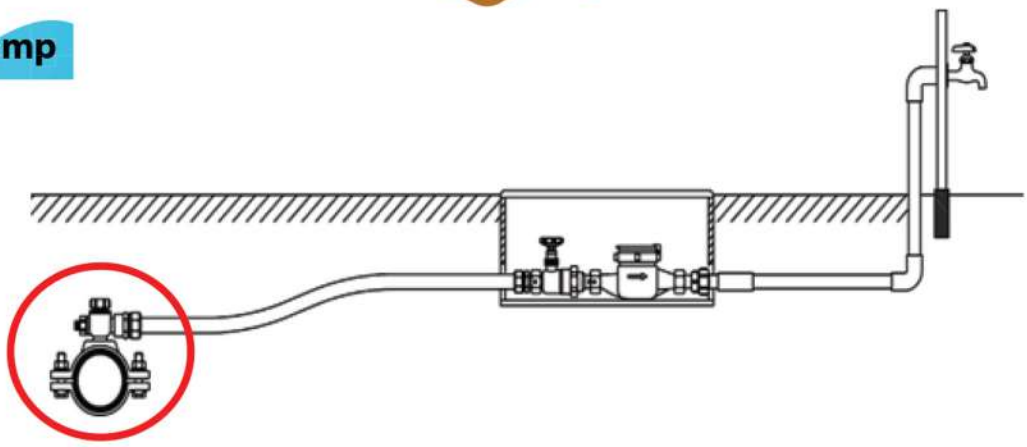
Valves — Sistem penyambungan anti bocor
Anti-slip

Contoh untuk memperbaiki NRW



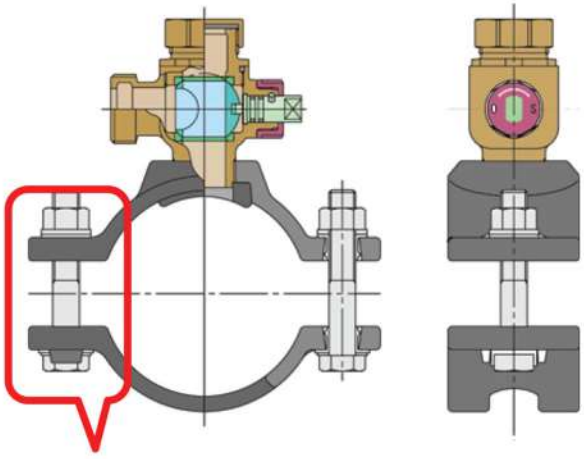


Saddle Clamp



Snap Tap Saddle yang didesign dengan sistem dua dalam satu (Penggabungan)

- Mekanisme penyambungan yang didesign secara baik
- Pilihlah tipe saddle yang cocok untuk menghindari tekanan yang berlebihan ke dalam pipa



Designed better fit to
Main pipe

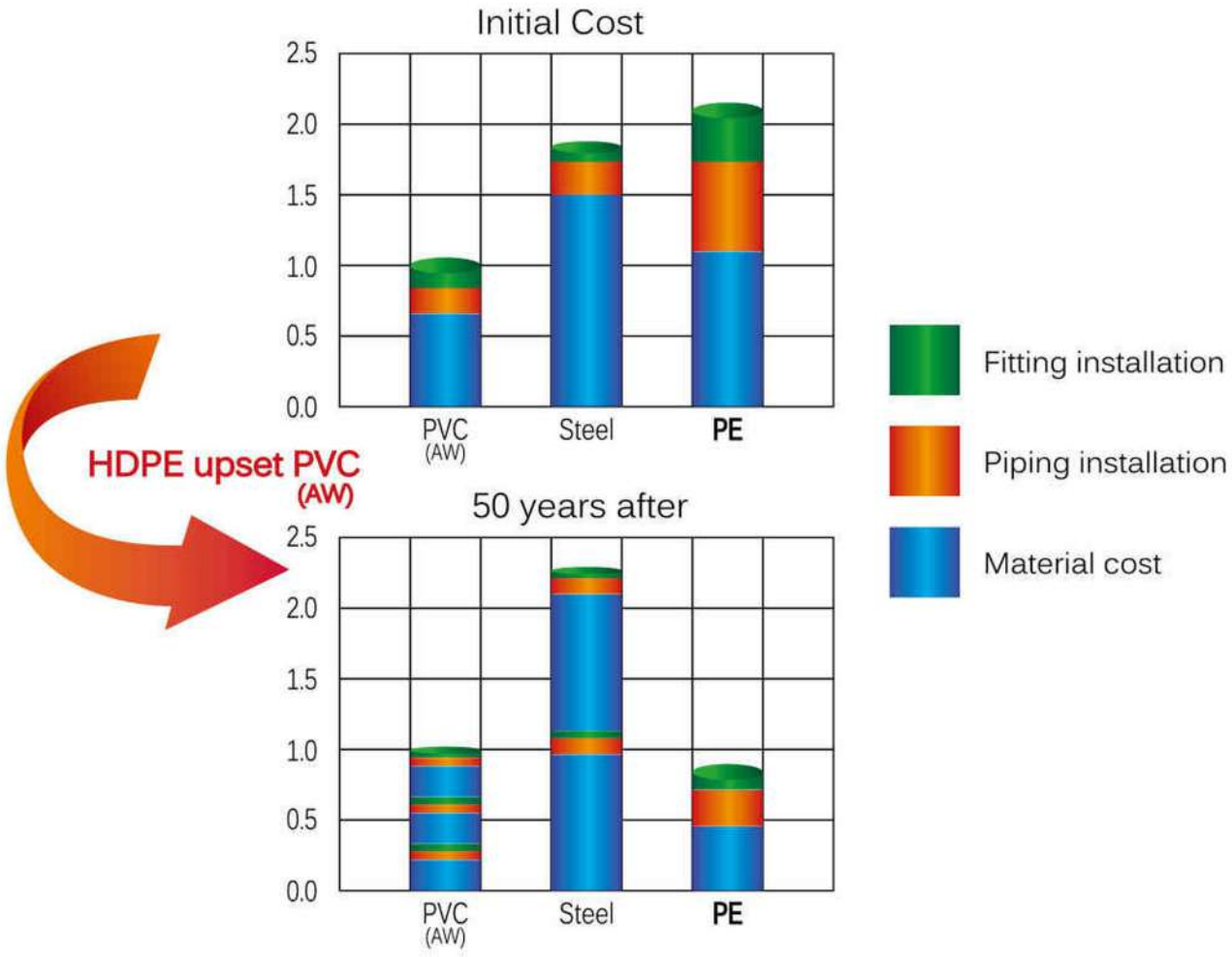
Why PE100 Pipe?

AIPOLY BROADPIPE uses high-density polyethylene **certified as PE100 in accordance with ISO 9080.** This material offers the world's highest levels long-term hydrostatic pressure strength. PE100 is a polyethylene which keeps 10MPa or more of hoop stress over a fifty-year period at 20℃ without pipes bursting proven through long-term hydrostatic pressure strength.

Suject	HDPE	PVC (AW)	Steel	Effect to
Flexibility	✓	X	X	Deformation proof
	Flexible	Stiff	Very Hard	
Durability	✓	X	△	Reduce Life Cycle Cost
	No Stain	Crack	Corrode	
Wokability	✓	✓	X	Save construction time
	Light Weight	Light Weight	Heavy	
Weatherability	✓	X	△	Save construction cost
	No trouble	Deteriorate	Corrode	
Joint method	✓	X	△	Reliability for Leakage
	Fusion	Glue	Weld or Thread	

◆Product Life time

Pipe	HDPE	PVC(AW)	Steel
Life time	100 years	30 years	40 years



Single-layered Pipe with Blue stripe

Condition of operation

Maximum allowable pressure

(at a temperature of 20℃) :

SDR 11, 1.6 MPa
SDR 13.6, 1.25 MPa
SDR 17, 1.0 MPa

Temperature range : 0-50℃

SDR 21 0,8 Mpa

PE100						
Outer Diameter	SDR11	SDR13.6	SDR17	SDR21	Length(m)	
	Tickness	Tickness	Tickness	Tickness	Straight Pipe	Coil
	mm	mm	mm	mm		
D20	2,0	1,5	1,2		6	100
D25	2,3	2,0	1,5			
D32	3,0	2,4	2			
D40	3,7	3,0	2,4			
D50	4,6	3,7	3			
D63	5,8	4,7	3,8			
D75	6,8	5,6	4,5			50
D90	8,2	6,7	5,4			
D110	10,0	8,1	6,6	5,3		
D125	–	9,2	7,4	6		
D160	14,6	11,8	9,5	7,7		
D180	–	13,3	10,7	–		
D200	18,2	14,7	11,9	9,6		
D225	–	16,6	13,4	–		
D250	22,7	18,4	14,8	11,9		
D280	–	20,6	16,6	–		
D315	28,6	23,2	18,7	15		
D355	32,2	26,1	21,1	16,9		
D400	36,3	29,4	23,7	19,1		
D450	40,9	33,1	26,7	21,5		
D500	45,4	36,8	29,7	23,9		
D560	50,8	41,2	33,2	26,7		
D630	57,2	46,3	37,4	30		
D710	64,5	52,2	42,1	33,9		
D800	72,6	58,8	47,4	38,1		

Fitur

Tahan Gempa Bumi	Pipa ini mempunya kelenturan yang sangat baik dan dapat lentur seiring dengan pergerakan tanah dan gempa bumi.
Mudah dalam pengerjaan	Polyethylene memiliki beban berat yang ringan dan sangat lentur, mudah untuk dibengkokan tanpa peralatan khusus
Tahan Lama	Ketahanan jangka panjang dalam penggunaan dari Polyethelyne (PE100)
Tahan terhadap tekanan	Sistem penyambungan EF dan Butt welding memastikan penyambungan yang sangat merekat yang baik untuk menahan air dan udara
Tahan Karat	Bahan Polyethylene sangat stabil bahkan terhadap zat kimia dan tidak ada resiko karat yang disebabkan oleh tanah
Keamanan	Plastik Polyethylene terbuat dari Carbon dan Hydrogen, maka Polyethylene tidak akan memproduksi gas beracun seperti Dioxin ketika dibakar. dan juga Polyethylene dapat didaur ulang
Tahan terhadap Cuaca	Polyethylene mempunyai ketahanan terhadap cuaca yang sangat baik yang dapat digunakan sebagai pipa luar ruangan yang terbuka

EF Fittings

EF Sockets

EF Reducers

EF Elbows 45°

EF Tees

EF Reducer Tees

EF Elbows 90°

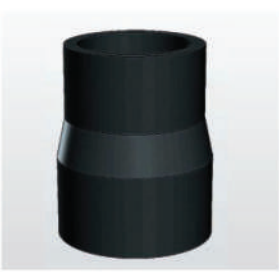
Butt Fusion Fittings (Molded)

▶Product specifications are subject to change without notice

Molded Tees

Flange Adapters

Molded Reducers



Molded Elbows 90°

Butt Fusion Fittings (Segmented)

Segment Tee

Segment Cross

Segment YTee

Segment Elbows45°

Segment Elbows 11°

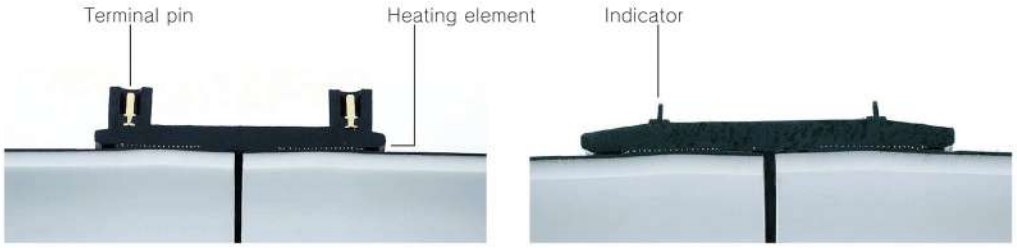
Segment Elbows 22°

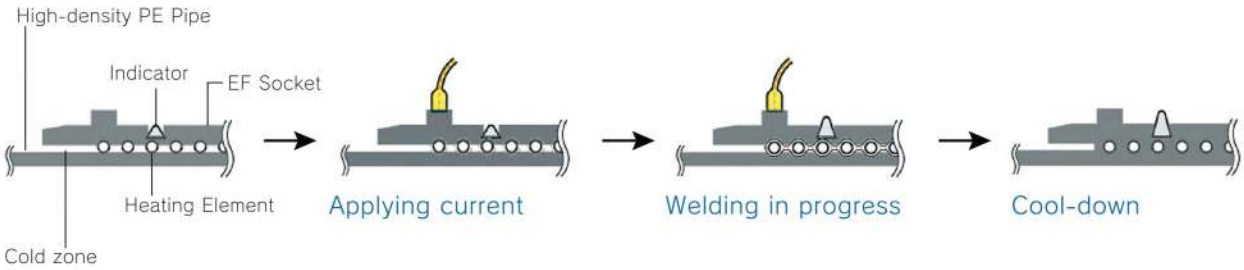
Segment Elbows 60°

Segment Elbows 90°

EF Welding (Electro-fusion Welding)

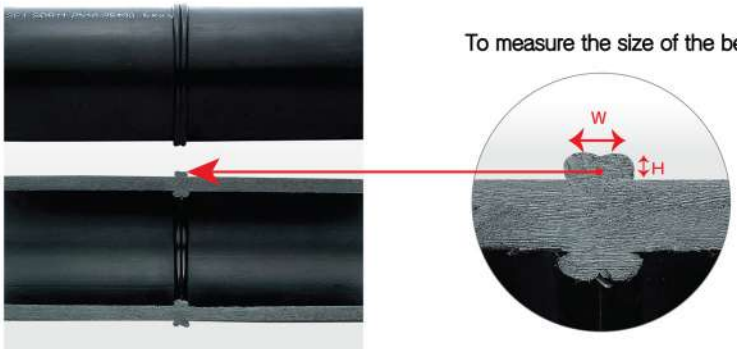
EF welding is a method of connecting pipes and fittings by melting the plastic with electricity, which provides a stable connection with excellent sealability.





Butt Welding

Butt welding is a method of connecting pipes by heating up the two ends of PE pipes then joining them under a specific pressure.



EF

EF Welding Procedure

Marking

Scraping the pipe surface

Cleaning the scraped surface and inner surface of fitting

1. Pipe cleaning

1 Check to ensure there are no scratches on the pipe.
2 Clean away any dirt or grime on the pipe using paper towel or a clean cloth.

◆If there are any hazardous scratches on the pipe, cut off that piece.
◆The procedure for spigot fitting is carried out in the same manner.

2. Scraping the pipe surface

1 Measure the prescribed distance from the end of the pipe and make a reference mark.
2 Scrape the surface of the pipe with scraper from the reference mark to the end of the pipe.

◆If any surface remains to be scraped, use a hand scraper to finish.
◆Ideally, the swarf produced from scraping will consist of one continuous strip (0.1 to 0.2 mm in thickness).
◆If the swarf is not one continuous strip, that means it' s time to replace the scraper blade.
◆Be sure to scrape the reference mark completely.
◆Use grease pencil or oily marking pen.

3. Cleaning scraped surface

The scraped surface of the pipe and the entire inner surface of the fitting are cleaned using paper towel soaked in ethanol or acetone.

◆Please do whole process with bare hand (No work gloves or any other gloves.)
◆Do not touch the surface with your hands once it has been cleaned. If it is touched, it must be cleaned again.
◆Be sure to wipe off all dust, grease, and other contaminants from the welding surface. A defective weld could result if contaminants remain.
◆Do not open plastic bag of EF fitting until just before use to ensure that no dirt gets on the welding surface.
◆For paper towel, use Kimwipes or JK Wipers.
◆If the cleaning erased the reference mark, add the mark again.
◆The procedure for spigot fittings is carried out in the same manner.

Inserting the pipe up to the reference mark

Fixing the pipe and fitting

Starting main power supply for the controller unit

Starting power supply for the controller

Checking the welding data

4. Inserting and fixing Pipe and Fitting

1 Insert both pipes into the fitting, up to the position of their reference marks.
2 Use clamps to fix the pipes and fitting.

◆Do not hammer the pipes in or insert them at an angle.
◆Confirm that both pipes form a straight line.

5. Welding preparation

Insert the power plug of the controller.

◆Check to ensure the capacity of generator is sufficient.
◆Connect the output cable.
◆Securely plug the cable into the socket terminals.
◆The socket terminals do not have polarity (positive or negative).
◆Keep any water or dirt away from the output cable and socket terminals.
◆A defective weld or water leakage may result if welding is performed with water or dirt on any of the connecting parts.

《Dealing with an EF socket》

Scan the barcode label affixed to the fitting using the barcode scanner, and check to see if the fitting type is displayed on the controller.

◆If the error lamp is blinking, read the error message displayed on the LCD screen and fix the problem.
◆Pen-style barcode scanner should be held at an angle of 10° to 30° perpendicular to the barcode label, with the pen tip lightly touching the barcode label.
◆Be sure to use only the barcode label that is affixed to the fittings. A defective weld may result if you input the wrong barcode.
◆Check to ensure there are no problems with the welding data displayed on the LCD screen.

Other Precautions

Do not use the fitting for making reference marks.

Do not touch after cleaning. If it is touched, it will have to be cleaned again.

Do not allow the welding area to get dirty or wet.

Do not use a rag or tissue paper for cleaning. Be sure to use specialized Kimwipes or JK Wipers.

Do not carry out welding if the pipe is inadequately inserted.

Fix the pipes in place to keep them straight and do not exert any pressure on the joint area that would cause it to bend.

Do not use a metal hammer directly on the socket during insertion. Cushion it using a piece of wood or some other appropriate method.

Do not carry out welding without using clamps to fix the pipes.

Do not apply any pressure to the cable while electrical current is being applied.

Warning

Warnings Regarding Controller Use

No disassembly or alterations

Do not disassemble or alter the controller.
It may result in breakdown, fire, or electric shocks.

No sudden impacts or exposure to water

Do not drop or throw the controller.
Do not let water into the controller by allowing it to get wet from rain or subsurface water. It may result in breakdown, fire, or electric shocks.

No handling with wet hands

To avoid electric shocks, do not touch the power supply, plug or output cable connectors with wet hands.

Ensure proper grounding

Use electrical power outlets that have a grounding pin.
For generators, have a grounding wire that goes into the ground.

Ensure proper operating temperatures

The operating temperature range of the controller is between -10˚C and 40˚C. Installations carried out in summer may exceed the operating temperature of the controller. In such cases, temporarily halt work until the controller temperature drops. If the temperature indicator on the panel rises above 40˚C, try to cool down the controller with appropriate methods such as erecting a sunshade or putting it in the shade.

Caution

Cautions Regarding Controller Use

Follow proper handling standards

Follow the contents of the "EF Controller Operating Manual" in order to ensure work safety and installation quality.

No using the controller for other purposes

Do not use the controller for any purpose other than the EF welding of Aipoly Broadpipe.

Caution regarding the handling of generators (Use in Japan)

When using a generator, use a model with single-phase 100V (50/60Hz) with a rated output of at least 2.0 KVA.
Avoid using a combined welder-generator unit.

Caution

Cautions Regarding Tool Use

Caution regarding the handling of pipe cutters and scrapers

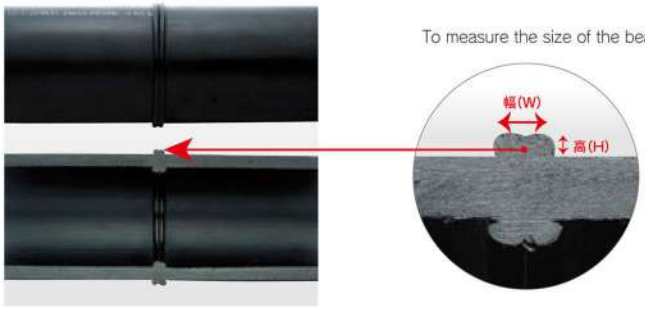
The blade of a pipe cutter or scraper is extremely sharp.
Do not touch the blade with your bare hands.

Caution regarding the handling of ethanol and acetone

Ethanol and acetone are hazardous substances under the Fire Services Act, and having open flames around them is strictly prohibited.
Follow all regulations and local administrative requirements with regard to storage. During use, ensure good ventilation and take care to have as little contact with your skin as possible.
If you accidentally get any in your eye, promptly see a physician for an examination.

Butt Welding

Butt welding is a method of connecting pipes by heating up the two ends of PE pipes then joining them under a specific pressure.



Butt Welding Procedure

1 Pipe setting

2 Scraping the pipe surface

3 Cleaning the scraped surface

4 Heating plate setup

5 Heating the pipe edge

6 Press to weld

7 Cooling

8 Welding completed

Aipoly Broadpipe Technical Data

Physical properties of PE 100

	Tests Item	Test Method	Unit	Standard value		Tests Item	Unit	Standard value
Physical properties	Density	ISO 1183	kg/m^3	942~953	Thermal and electrical properties	Linear expansion coefficient ※2	10^{-5}/℃	11~13
	Water absorption	ISO 62	%	≦0.03		Specific heat capacity	kJ/kg・K	1.9~2.3
Mechanical properties	Tensile strength at yield	ISO 527-1	MPa	≧20		Heat conductivity	W/m・k	0.46~0.50
	Elongation at break		%	≧350		Melting point	℃	128~132
	Modulus of elongation		MPa	900~1100		Softening temperature (Vicat)	℃	125~127
	Poisson's ratio		-	0.46		Brittleness temperature	℃	≧-70
	Bending strength	ISO 178	MPa	24~25		Flammability	-	No performance
	Flexural modulus		MPa	1000~1200		Volume resistivity	MΩ・cm	≧10^9
	Hardness (Durometer)	ISO 868	HDD	67~68		Dielectric breakdown strength	MV/m	17.3~23.6
	Impact strength (Charpy)	ISO 179	kJ/m^2	16~18		Permittivity	-	2.30~2.35

※1 : Above are all representative values, not guaranteed values.
※2 : ASTM D696

Performance Standards for High-density Polyethylene Pipes and Joints

Tests Item		Standard value	Test Method
Tensile strength at yield		≧20.0MPa	25mm/min
Elongation at break		≧350%	
Resistance to pressure		Leak、transformation、breakage、is not permitted	2.5MPa×2min
Destructive water pressure strength		≧4.0MPa	
Thermal stability		OIT≧20min	200℃,Oxygen
Heat elasticity		±3%	110℃,ethylene glycol×30min
Elusion Property	Taste	No abnormalities	JWWA Z 108,JWWA Z 110
	Odor	No abnormalities	
	Chromaticity	≦0.5degree	
	Turbidity	≦0.2degree	
	Total organic carbon	≦5mg/ℓ	
	Loss of residual chlorine	≦0.7mg/ℓ	
Hydrostatic Strength		Cracks are not permitted	20℃; 2.48MPa×100hrs 80℃; 1.10MPa×165hrs 80℃; 1.00MPa×1000hrs
Resistance to Chlorine in water		There must be no foam generation	60℃,chloride concentration 2000ppm×168hrs
Environmental Stress Cracking resistance		Cracks are not permitted	ISO4427
Weathering test	Appearance	Cracks are not permitted	≧3.5GJ/m2
	Elongation at break	≧350%	
	Thermal stability	≧10min	
Low-speed crack progress		Cracks are not permitted	80℃,0.92MPa×165hrs
Fusion miscibility		Cracks are not permitted	80℃,1.10MPa×165hrs

Pressure and Temperature Limits

Equation for calculating pressure and temperature limits

$$P = \frac{2\sigma t}{D - t}$$ (Naday's equation)

P : Pressure, MPa
t : Pipe thickness, cm
σ : Tensile circumferential stress, MPa
D : Outer pipe diameter, cm

Unit: MPa

SDR	20°C	25°C	30°C	35°C	40°C	45°C	50°C
11	1.60	1.49	1.39	1.28	1.18	1.07	0.97
13.6	1.25	1.16	1.09	1.00	0.93	0.83	0.76
17	1.00	0.93	0.87	0.80	0.74	0.67	0.61
21	0.80	0.74	0.70	0.64	0.59	0.53	0.48
Pressure reduction coefficient	1.00	0.93	0.87	0.80	0.74	0.67	0.61

※Safety factor=1.25

Chemical Resistance

The material comprising high-density polyethylene pipe exhibits these main chemical resistance properties.
(This table is based on ISO 10358. The behavior shown may vary if pressure or other stresses are applied to the pipe.)
Summary: ◎: great ○: good ×: poor ※: Pipe odor changes.

Medicine	℃ Temperature		Smell
	20	60	
Acid and acidity			
35% Hydrochloric Acid	◎	◎	
60% Sulfuric Acid	◎	◎	
98% Sulfuric Acid	○	×	※
25% Nitric Acid	◎	○	
50% Nitric Acid	○	×	※
>50% Nitric Acid	×	×	※
50% Phosphoric Acid	◎	◎	
60% Acetic Acid	◎	○	※
Acetic Acid	○	○	※
Chromic Acid	◎	○	※
<80% Fomic Acid	◎	◎	
Oxalic Acid	◎	◎	
Lactic Acid	◎	◎	
Oleic Acid	○	×	※
Maleic Acid	◎	◎	

Medicine		℃ Temperature		Smell
		20	60	
Alkalinity				
Ammonia Solutions		◎	◎	
Caustic Soda		◎	◎	
Caustic Potash		◎	◎	
Calcium Hydroxide		◎	◎	
Salts				
Potassium Dichromate		◎	◎	
Potassium Permanganate		◎	◎	
Calcium Carbonated		◎	◎	
Ferric Chloride		◎	◎	
Barium Chloride		◎	◎	
Ammonium Sulfate		◎	◎	
Hydrogen Peroxide	10%	◎	◎	
	30%	◎	○	
	90%	◎	×	※

Medicine	℃ Temperature		Smell
	20	60	
Organic solvent			
Ethanol(Ethyl Alcohol)	◎	○	
95% Ethanol(Ethyl Alcohol)	○	○	
Methanol(Alcohol Methyl)	◎	○	
Aceton	○	×	※
Aniline	○	×	※
Benzene(Benzol)	×	×	※
Carbon Tetrachloride	×	×	※
Chloroform	×	×	※
Carbon Bisulfide	×	×	※
Acetaldehyde	○	×	※
Ethyl Ether	×	×	※
Glycerine	◎	○	
Formalin	◎	◎	
Toluene	×	×	
Ethanol	◎	○	

Medicine	℃ Temperature		Smell
	20	60	
Gas			
Sulfur Dioxid	◎	◎	
Carbonated-Gas	◎	◎	
Natural Gas	◎	○	
Carbon Monoxide Gas	◎	◎	
Carbon Dioxide	◎	◎	
Ozone	○	×	
Chlorine-Gas	×	×	※
Others			
Developing Fluid	◎	◎	
Sea Water	◎	◎	
Gasoline	○	×	※
Kerosene	○	×	※
Urea	◎	◎	
Insecticide for termite control	×	×	※

Remarks
The behavior shown above are just reference data, and may vary depending on the usage environment such as density of chemicals, temperature, and time.
Even if above summary shows ◎ or ○, the evaluation in the actual usage environment is required.

Support Intervals

Maximum support intervals

A summary of maximum support intervals for pipes is given as follows.
(※1 Difference in Temperature: 35℃ ※2 Difference in Temperature: 50℃ Calculated in the condition of water fulfilled in the pipe.)

◆SDR11

Maximum support interval (m)		OD														
		D25	D32	D40	D50	D63	D75	D90	D110	D125	D160	D180	D225	D250	D315	D355
Indoor piping※1	Horizontal piping	0.6	0.8	1.0	1.2	1.6	1.9	2.3	2.8	3.2	3.6	3.9	4.5	4.8	5.7	6.2
	Vertical piping	1.2	1.6	2.0	2.4	3.2	3.8	4.6	5.6	6.4	7.2	7.8	9.0	9.6	11.4	12.4
Outdoor piping※2	Horizontal piping	0.5	0.7	0.9	1.1	1.4	1.6	2.0	2.4	2.8	3.6	3.9	4.5	4.8	5.7	6.2
	Vertical piping	1.0	1.4	1.8	2.2	2.8	3.2	4.0	4.8	5.6	7.2	7.8	9.0	9.6	11.4	12.4

◆SDR13.6

Maximum support interval (m)		OD														
		D63	D75	D90	D110	D125	D160	D180	D225	D250	D280	D315	D355	D400	D450	D500
Indoor piping※1	Horizontal piping	1.5	1.8	2.2	2.6	2.9	3.4	3.7	4.3	4.4	5.0	5.4	5.8	6.3	6.8	7.3
	Vertical piping	3.0	3.6	4.4	5.2	5.8	6.8	7.4	8.6	8.8	10.0	10.8	11.6	12.6	13.6	14.6
Outdoor piping※2	Horizontal piping	1.3	1.6	1.9	2.4	2.7	3.4	3.7	4.3	4.4	5.0	5.4	5.8	6.3	6.8	7.3
	Vertical piping	2.6	3.2	3.8	4.8	5.4	6.8	7.4	8.6	8.8	10.0	10.8	11.6	12.6	13.6	14.6

◆SDR17

Maximum support interval (m)		OD												
		D90	D110	D125	D160	D180	D225	D250	D280	D315	D355	D400	D450	D500
Indoor piping※1	Horizontal piping	2.2	2.5	2.7	3.2	3.5	4.1	4.4	4.7	5.1	5.6	6.0	6.5	7.0
	Vertical piping	4.4	5.0	5.4	6.4	7.0	8.2	8.8	9.4	10.2	11.2	12.0	13.0	14.0
Outdoor piping※2	Horizontal piping	1.9	2.3	2.5	3.2	3.5	4.1	4.4	4.7	5.1	5.6	6.0	6.5	7.0
	Vertical piping	3.8	4.6	5.0	6.4	7.0	8.2	8.8	9.4	10.2	11.2	12.0	13.0	14.0

◆SDR21

Maximum support interval (m)		OD						
		D250	D280	D315	D355	D400	D450	D500
Indoor piping※1	Horizontal piping	4.1	4.5	4.8	5.2	5.7	6.1	6.6
	Vertical piping	8.2	9.0	9.6	10.4	11.4	12.1	13.2
Outdoor piping※2	Horizontal piping	4.1	4.5	4.8	5.2	5.7	6.1	6.6
	Vertical piping	8.2	9.0	9.6	10.4	11.4	12.2	13.2

Minimum bending radius by size

A summary of minimum bending radius for pipes is given as follows.

Minimum bending radius (m)	OD																		
	D25	D32	D40	D50	D63	D75	D90	D110	D125	D160	D180	D225	D250	D280	D315	D335	D400	D450	D500
Straight pipes only	0.8	1.0	1.2	1.5	2.0	2.5	3.0	3.5	4.0	5.0	5.5	6.8	7.5	8.5	9.5	11.0	12.0	13.5	15.0
Including fittings	2.0	2.5	3.0	4.0	5.0	6.0	7.0	8.5	9.5	12.0	13.5	17.0	19.0	21.0	24.0	27.0	30.0	34.0	37.5

Thermal longitudinal expansion

When high-density polyethylene pipe is laid underground, friction with the earth will prevent expansion, so no problem arises. However, exposed piping can undergo great expansion due to temperature fluctuations, so a certain amount of deflection cannot be avoided.

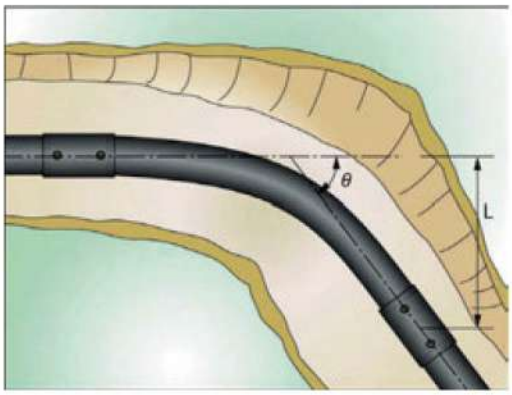
The amount of expansion of high-density polyethylene pipe due to temperature fluctuations is calculated according to the following equation.

$$\Delta L = a \cdot \Delta\theta \cdot L$$

Here, ΔL: Amount of expansion
L: Length of pipe
$\Delta\theta$: Temperature difference (with 20℃ as base temperature)
a: Coefficient of longitudinal expansion 13×10^{-5}/℃

Temperature θ°C	Temperature difference Δθ°C	Expansion per 1 m ΔL (mm/m)
0	-20	-2.6
10	-10	-1.3
20	0	0
30	10	1.3
40	20	2.6

Piping



Be sure to avoid getting any water on the EF weld section during welding. If water is present, use a pump to remove it, or raise the weld section of pipe so that the welding can be performed without any contact with water.

◆If you are unable to eliminate water when welding with pre-installed pipe, use mechanical fittings to connect.

◆If it is raining, use a tent or something similar to provide shelter from the rain and ensure that the weld section does not get wet.

◆The indicator bulge may appear even if sand or grease has contaminated the welding surface, so the indicator alone cannot be used to determine a proper weld. Be sure to implement the correct procedure (proper washing, cutting, and fixing) in addition to checking the controller to confirm normal completion.

◆Do not backfill or carry a pipe until its cool-down has been completed.

Allowable bending angle and variation at 5m length

Size	25	32	40	50	63	75	90	110	125	160
Angle θ	144	115	96	72	58	48	41	34	31	24
Variation L (cm)	360	354	328	273	229	196	171	142	128	102

Size	180	225	250	280	315	355	400	450	500
Angle θ	22	17	16	14	12	11	10	9	8
Variation L (cm)	91	73	65	59	51	46	41	36	33

Minimum bending radius

単位 : m　Unit: m

Size	25	32	40	50	63	75	90	110	125	160
Straight pipes only	0.8	1.0	1.2	1.5	2.0	2.5	3.0	3.5	4.0	5.0
Including joints	2.0	2.5	3.0	4.0	5.0	6.0	7.0	8.5	9.5	12.0

Size	180	225	250	280	315	355	400	450	500
Straight pipes only	5.5	6.8	7.5	8.5	9.5	11.0	12.0	13.5	15.0
Including joints	13.5	17.0	19.0	21.0	24.0	27.0	30.0	34.0	37.5

◆Bending straight pipe should be done within the range shown above.

◆Do not use any adhesive tapes directly onto pipes and fittings. Adhesives may negatively affect pipes.

◆If the pipe is encased in concrete or mortar, ensure that the temperature does not exceed 60°C during the curing.

Recommended Standard for Water Pressure Testing

Water pressure testing is to be conducted to confirm the installation was correctly done.A specified water pressure is applied to the pipe and it is maintained for a set period of time,and the change of pressure is to be measured during that time. This is ordinary water pressure testing for piping system.
(Pneumatic test is not recommended due to the possibility of breakage of jig.)
Water pressure testing is done in accordance with the procedure as follows.

1. Preparation

Enclose the test section with gate valve, stop valve, flange lid, and so on.The structure of the test area should be easy to ventilate with hydrant, faucet, air valve,and so on at the same time.Pressure gauge and the pump for testing are to be prepared.
If the pipe is hot, continue running water through it to cool it (to 40°or lower) before the water flow test.

Caution **【Caution】**
If exposed piping being heated up by the sun, applying water pressure may cause the pipe rupture even at pressures lower than standard pressures.

2. Applying water

As a rule, testing should be done beginning the flow of water from the low end of the pipe as eliminating air in the pipe by opening hydrant or faucet.
Once the pipe is full of water, close the gate valve or faucet at both end of the test section.

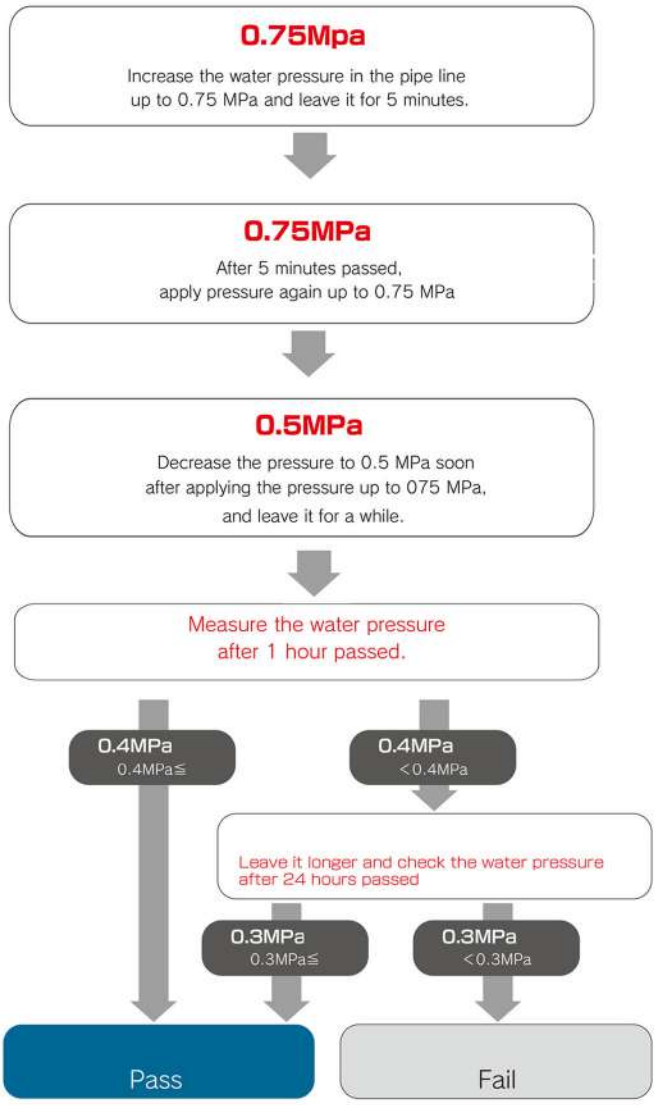
Caution **【Caution】**
1)Rapid water flow may possibly cause the unexpected accident caused by the air pressure in the pipes. Careful control in opening the faucet or hydrant and eliminating air in the pipe is required in applying water.
2) In applying water, make sure to eliminate air in the pipe to minimize the initial decrease of water pressure and gain fast stabilization of water pressure.
Open the hydrant or faucet completely to eliminate air in the pipe, and close the valve once all the air has been eliminated.

3. Applying pressure and checking the pressure change

Attach a water pressure gauge to the hydrant or faucet.
When testing at water pressures that exceed normal pressures, apply pressure by attaching a test pump to the hydrant or faucet.
Apply pressure up to the level to be tested, and hold it for a specified period.
Check the presence of abnormity and pressure change during the period.

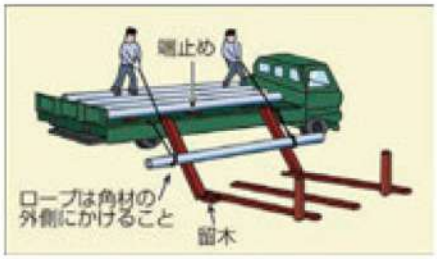
Caution **【Caution】**
1)Water pressure testing should be done after passing a certain period after finishing the EF welding.
Testing pressure < 1.0MPa: Test can be conducted after 30 minutes passed
Testing pressure ≧ 1.0MPa: Test can be conducted after 1 hour passed
2)Water pressure testing should be done after passing enough time from running water to eliminate the air in the pipe.
3)To avoid the move of piping system, a certain level of backfilling is recommended before conducting the test.
4)High-performance polyethylene pipes also possibly show the initial drop of water pressure without water leakage that lies in its characteristic of initial expansion as plastic materials.
The level to which the pressure drops depends on the type of pipes or piping systems, degree of tightening, and the volume of air in the pipe.
To minimize the effect from them, we recommend that the water pressure testing is conducted within the range of 500m as maximum length in piping system.
5)If the testing pressure exceeds 0.75 MPa, the valve seal may be affected, so this should be avoided.
The water pressure testing is one of the examples of detecting water leakage. Please try to carry out visual inspection of the joint sections at the same time.

Criteria of judgment in Water Pressure Testing
(Manufacturer recommendation)



Cautions Regarding Construction

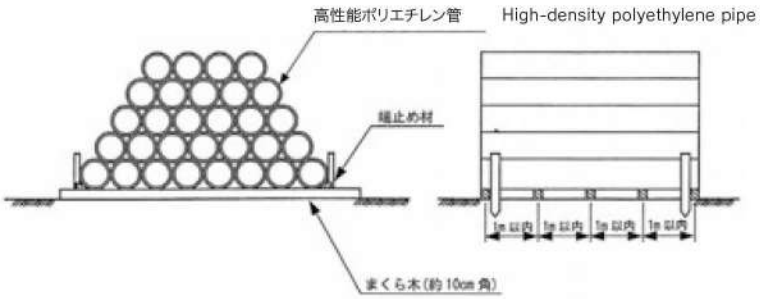
Transportation



Cautions

◆When unloading pipes and joints from the truck, do not subject the impacts to the products by tossing them around.
◆When transporting products by truck, place cushioning material to avoid direct contact with hoists or corners of the bed.
◆When carrying a pipe, be sure to lift and carry the entire pipe rather than dragging or sliding along the ground.

Storage



As for storage, please conform to the items below to avoid any discoloration or deterioration of the products.

◆As a rule, pipes should be stored indoors in the packaging as they were shipped from supplier. When storing outdoors on-site, cover them with a tarp or something similar to avoid direct sunlight, and take consideration with regard to ventilation. Be sure to attach terminal caps to the pipe ends to prevent deterioration, which may be caused by direct sunlight.

◆When storing pipes, select a flat area and place them on wooden sleepers about 1 m apart to avoid any unevenness. Avoid stacking them crosswise on each other.

◆ Fittings should be stored indoors. If stored outdoors on-site, they should be covered with a tarp in the cardboard packaging as they were shipped from the supplier.

◆Both pipes and fittings should be stored without any chance of contact with detergents, solvents, or grease, and away from fire (bonfires, welding torches, and industrial lighting).

Kementerian Perindustrian
REPUBLIK INDONESIA

NA 01329

BALAI SERTIFIKASI INDUSTRI
INSTITUTE for INDUSTRIAL CERTIFICATION

SERTIFIKAT PRODUK

Nomor : 302/S/SA/B/IX.8/2016

diberikan kepada:

PT. INOAC CONSTRUCTION MATERIALS INDONESIA

Jl. Agarindo. Km 6, Sukamantri, Ps. Kemis, Kab. Tangerang, Banten

Berdasarkan sistem sertifikasi 5, dinyatakan bahwa perusahaan telah menerapkan Sistem Manajemen Mutu SNI ISO 9001:2015 dan mutu produknya telah memenuhi persyaratan :

- SNI 4829.2:2015 *Sistem Perpipaan Plastik - Pipa Polietilena (PE) dan Fiting untuk Sistem Penyediaan Air Minum - Bagian 2 : Pipa*

untuk alamat pabrik:
Jl. Agarindo. Km 6, Sukamantri, Ps. Kemis, Kab. Tangerang, Banten

Tempat dan tanggal terbit :
Jakarta, 02 September 2016

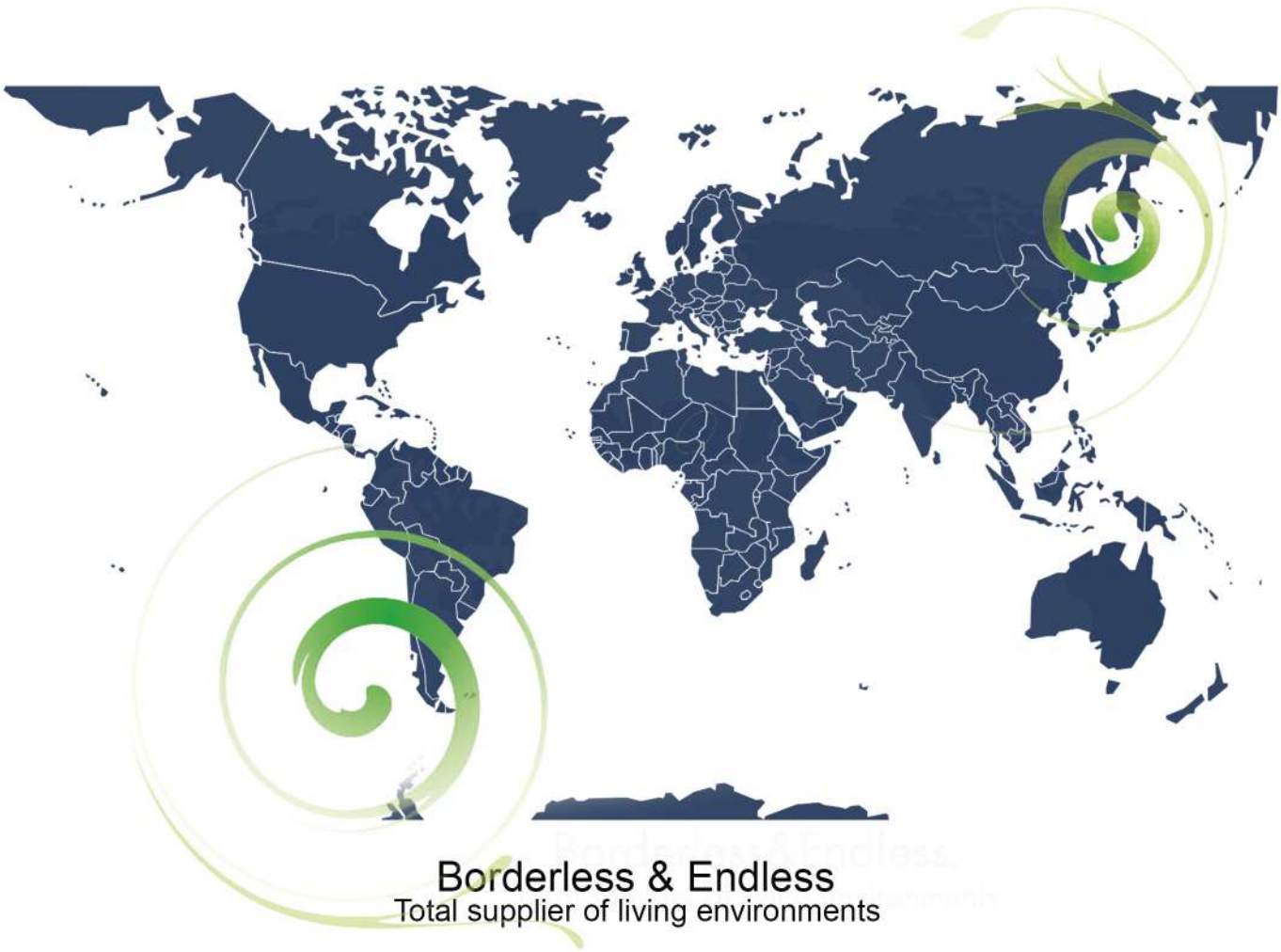
Disahkan oleh:

ANTO GIRSANG
Kepala

Terbitan kedua
Revisi 1, tanggal : 28 Desember 2018

Sertifikat ini berlaku sampai dengan tanggal **01 September 2020** selama perusahaan masih memenuhi ketentuan dan peraturan yang ditetapkan Balai Sertifikasi Industri dan hanya berlaku jika diperlihatkan bersamaan dengan lampirannya.
Sertifikat ini menggantikan sertifikat No. 302/S/SA/B/IX.8/2016 tanggal 02 September 2016 dengan nomor seri NA 01143.

AIPOLY
BROADPIPE



INOAC
PT. INOAC CONSTRUCTION MATERIALS INDONESIA

PT Garda Surya Indonesia

Email: Gardasurya.ind@gmail.com
Whatsapp: 0813-1341-257

Office: Ruko Faraday Blok A No. 05, Jl. Scientia Boulevard, Medang, Kec. Pagedangan, Kab. Tangerang
Warehouse: Jl. Diklat Pemda No.97, Sukabakti, Kec. Curug, Kabupaten Tangerang, Banten 15334