



# The Transition of the Piping material and COCOMECH's Plastic Plumbing System



**COCOMECH**  
**HIGASHIO MECH CO.,LTD.**

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Translator

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JAPAN

# Company Profile: HIGASHIO MECH, Japan

- Japanese pipe fitting manufacturer
- 61 years history (Turnover : US\$86Million / Year 2011 estimation)

## ■ Conventional Products

- Blackheart Malleable Iron Pipe Fittings : 250-300 ton/Month  
Black, Galvanized, Epoxy-powder Coated & Inside Plastic Injection

## ■ New Products

- Fitting for PEX Pipe & Multilayer Pipe : [Snap-Joint] [Me-touch] [MechFit] [RTM] : 1 mil. pcs/Month
- Fittings for Stainless Pipe, Ref Copper Pipe: [Abacus (Su-Joint)] [O'zzone Boy] : 150,000pcs/Month



Company Headquarter

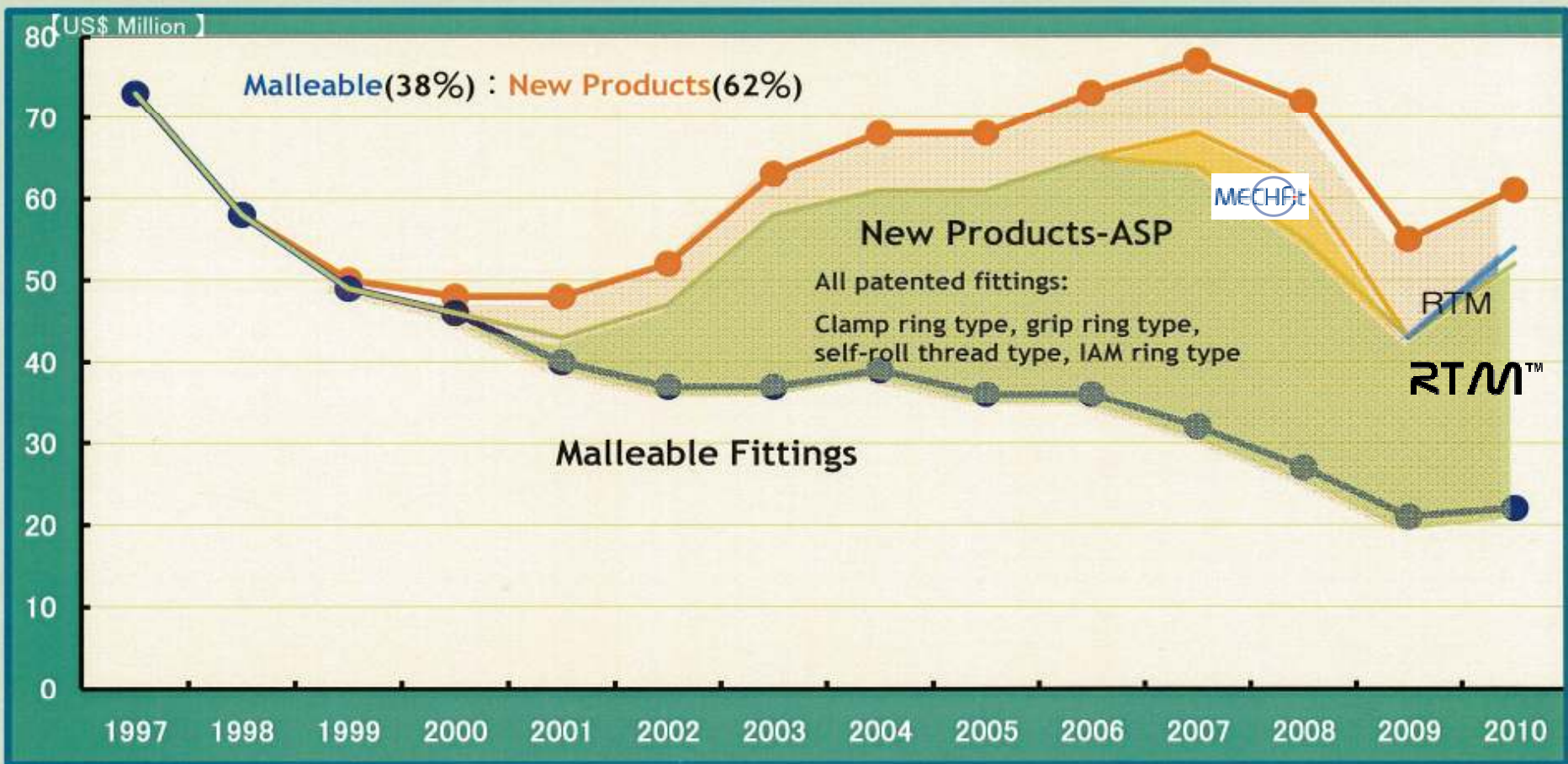


Metal-casting facility:



Automatic Assembling Machine  
of the Fittings for PEX, ML

# PRODUCT SALES TURNOVER

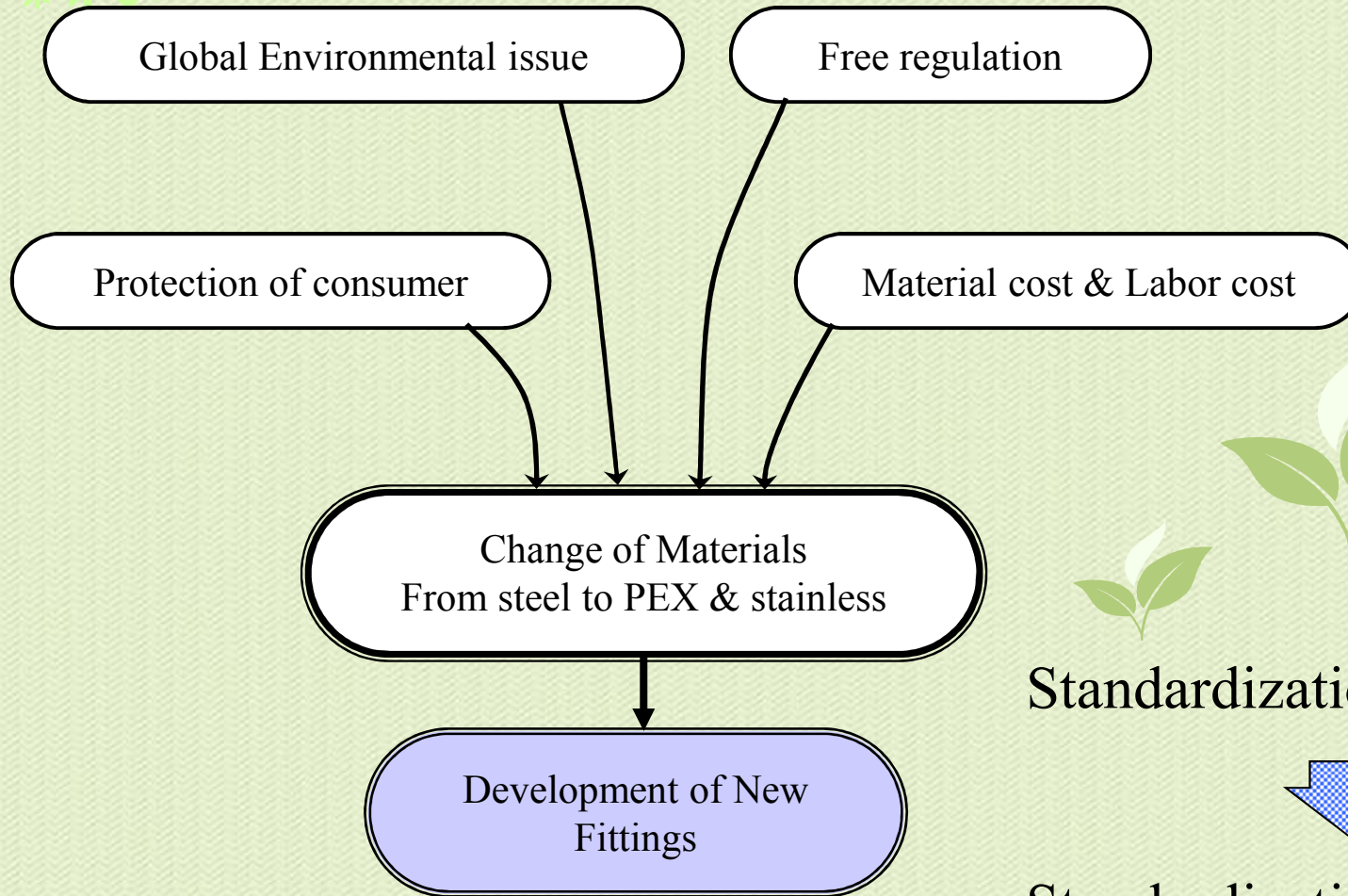


	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Malleable	73	58	49	46	40	37	37	39	36	36	32	27	21	22
ASP	0	0	1	2	8	15	26	29	32	37	45	45	34	39
Pex·ML	0	0	0	0	3	10	21	22	25	29	36	35	22	30
<b>Total</b>	<b>73</b>	<b>58</b>	<b>50</b>	<b>48</b>	<b>48</b>	<b>52</b>	<b>63</b>	<b>68</b>	<b>68</b>	<b>73</b>	<b>77</b>	<b>72</b>	<b>55</b>	<b>61</b>

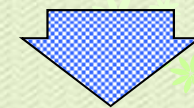
# Change of Piping Materials (By Fluids & Applications) Present~

	SANITARY				AIR-CONDITIONING			
	Potable Water	Hot Water	Hot Water, Circulating		Hot & Cold-Cooling Water	Refrigerant	Fan Coil	Floor Heating & Road Heating
			"Eco-Cuts" Natural refrigerant (CO <sub>2</sub> Heat pump) water heater	Prefabricated bath				
Hospitals & Hotels	1 Lining Steel Pipe 2 Stainless S Pipe * Multilayer Pipe (AL)	1 Stainless S Pipe 2 Copper Pipe 3 High Temperature Lining Steel Pipe * Multilayer Pipe(AL)	1 Copper Pipe 2 Multilayer Pipe(AL)	1 Rubber Hose 2 PEX Pipes	1 Galv. Steel Pipe 2 Stainless S Pipe 3 Lining Steel Pipe	1 Copper Pipe Environmental Protection Floor Gas→Refrigerant Gas→New Refrigerant	1 Copper Pipe 2 Multilayer Pipe(AL) 3 Stainless S flexible pipe	
	Long Life-Recycling	Long Life-Recycling	Durability-Cost cut	Durability	Long Life-Recycling	Freeless Method	Resistance against Corrosion Pollution	
Offices & Buildings	1 LP Pipe 2 Stainless S Pipe * Multi Layer Pipe (AL)	1 Stainless S Pipe 2 Copper Pipe 3 High Temperature Lining Steel Pipe * Multi Layer (AL)	1 Copper Pipe 2 Multilayer Pipe(AL)		1 Galv. Steel Pipe 2 Stainless S Pipe 3 Lining Steel Pipe	Change of Refrigerant R22→R407C→R410A		
	Long Life & Recycling	Long Life-Recycling	Durability-Cost cut		Increase of Office Devices→ Higher efficiency by "Building Main System"	High Pressure Resistant Fitting		
Plants (Plant Piping)			1 Copper Pipe 2 Multilayer Pipe(AL)		1 Galv. Steel Pipe 2 Stainless S Pipe 3 Lining Steel Pipe			
			Global heating/cooling CO <sub>2</sub> refrigerant gas Heat→Chiller system		Long Life & Recycling		Economy & Workability	
Apartments	1 Stainless S Pipe 2 Lining Steel Pipe 3 PE Pipe				1 Galv. Steel Pipe 2 Stainless S Pipe 3 Lining Steel Pipe			1 PEX Pipes
	Long Life & Recycling							
Residential Area	1 PEX-Pb Pipes 2 HI-PVC Pipe	1 PEX-Pb Pipes 2 Copper Pipe 3 HT-CPVC	1 Multilayer Pipe(AL) 2 PEX Pipes 3 Rubber Hose	1 Rubber Hose 2 PEX Pipes				
	Increase of prefabrication method Low Cost & Earthquake Resistant	Low Cost & Earthquake Resistant	Standardization & Durability	Durability	Long Life & Recycling			
House-Maker	1 PEX-Pb Pipes 2 HI-PVC Pipe	1 PEX-Pb Pipes 3 HT-CPVC	1 Multilayer Pipe(AL) 2 PEX Pipes 3 Rubber Hose	1 Rubber Hose 2 PEX Pipes				
	Low Cost, Anti-Quake System Piping	Low Cost, Anti-Quake System Piping	From copper→multilayer Standardization & Durability	Durability Systematization				
Detached Houses	1 PEX-Pb Pipes 2 HI-PVC Pipe 3 Lining Steel Pipe	1 PEX-Pb Pipes 2 Copper Pipe 3 HT-CPVC	1 Multilayer Pipe(AL) 2 PEX Pipes 3 Rubber Hose	1 Rubber Hose 2 PEX Pipes				
	Low Cost & Earthquake Resistant	Low Cost & Earthquake Resistant	Standardization & Durability	Durability		Economy		Durability

# Change of Piping Materials



Standardization of Products



Standardization of Quality

# Higashio Mech's Current Product Line

	SANITARY					AIR CONDITIONING					FIRE EXTINGUISHING		PURE WATER	
	Portable Water	Hot Water	Hot Water Circulating		International	Hot & Cold Cooling Water	Refrigerant		Fan Coil	Floor Heating & Road Heating	S P	Water Supply		Acid .Alkali
			Eco Cute	Prefabricated bath			Domestic	International						
Hospitals & Hotels	Stainless Steel Rolled Thread					Rolled Thread			Clamp Ring					
Offices Buildings	Multilayer Rolled		Grip Ring		Clamp Ring Plastic collector	Stainless Steel	Refrigerant		PEX & Multilayer			Rolled Thread Stainless Steel		
Plants (Plant Piping)					PEX & Multilayer		Refrigerant		Rolled Groove				Cut Groove PolyPropylene	
Apartments	Rolled Thread Stainless Steel				Clamp Ring									
	Combi-Fusion PE pipe				PEX & Multilayer		Refrigerant	R22 Refrigerant					Eathquake resistant construction method	
Residential Area	Press method PEX pipe		Grip Ring		Grip Ring			Unitize					Ticket Punch Steel Pipe	
Detached Houses	Clamp Ring PEX pipe			Clamp Ring				Rolled Groove		Rolled				
	Clamp Ring PEX pipe			Multilayer				Refrigerant		PEX pipe			Finishing Machine	
Conventional House	Clamp Ring				Calibrator			Package Air-conditioning system Correct Flare		Resinify				
	Resinify							Refrigerant	SU Nut style					

# Basic Concept of Higashio's R&D

No pull-out, No leak, No special tool

Reject rate: less than 1PPM

Long-term reliability of piping system

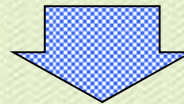
25years warranty

Installation Error

"Snap" finish sound  
and Transparent body

Pipe tolerance

Nut & nipple body design



Characteristic of Pipe

Clamp Ring's permanent  
squeeze force

**Solution is inside of "Fitting"**

**Market  
demand**

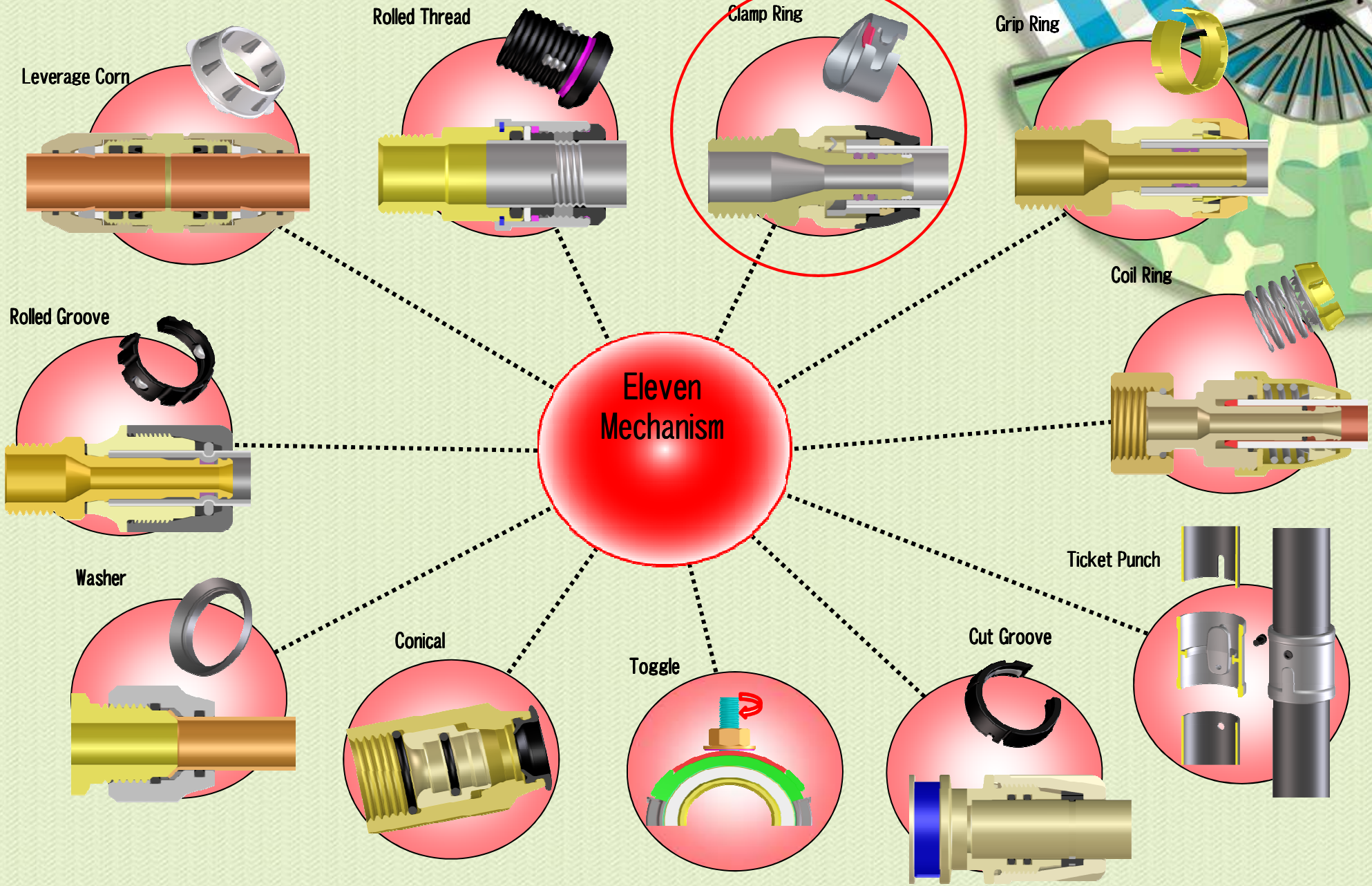
Function Design

Standardization of Products  
Quality



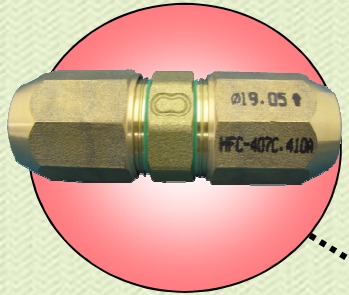
Standardization of

# ELEVEN WORLD FIRST 「COCOMECH FITTING」





# ELEVEN WORLD FIRST 「COCOMECH FITTING」



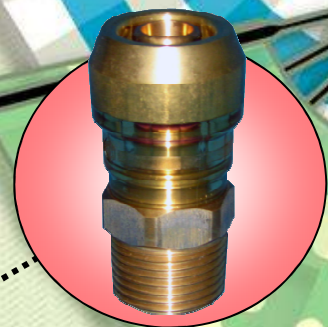
Leverage Corn



Rolled Thread



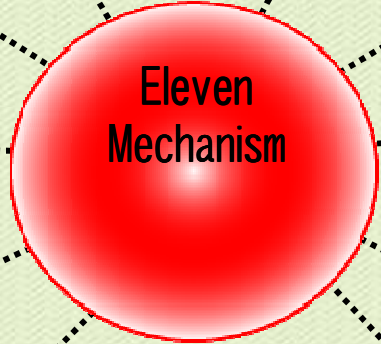
Clamp Ring



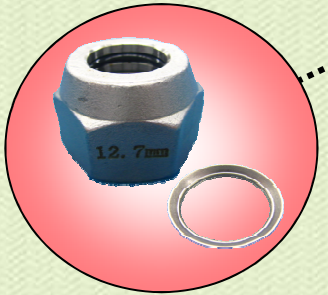
Grip Ring



Rolled Groove



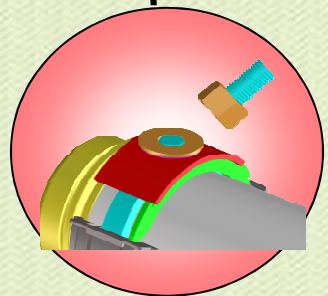
Coil Ring



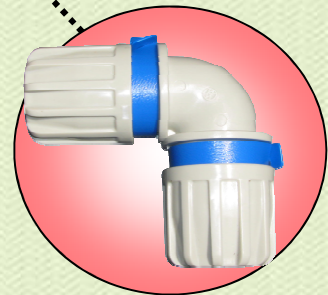
Washer



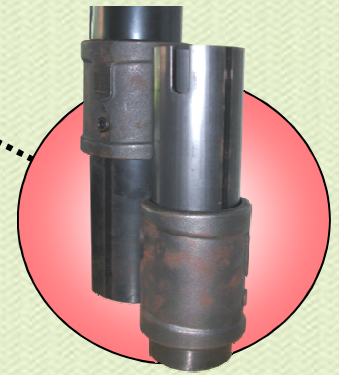
Conical



Toggle

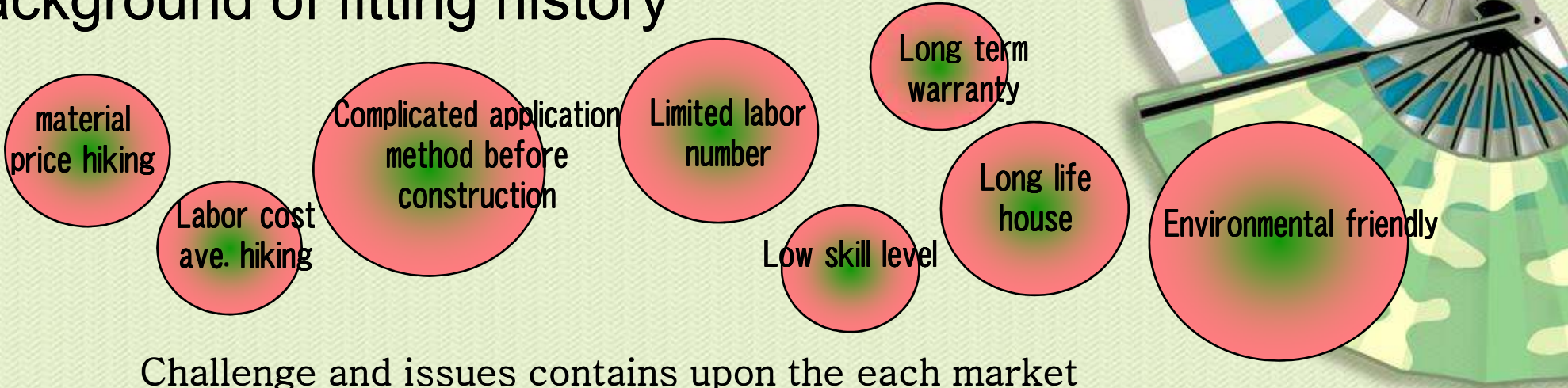


Cut Groove



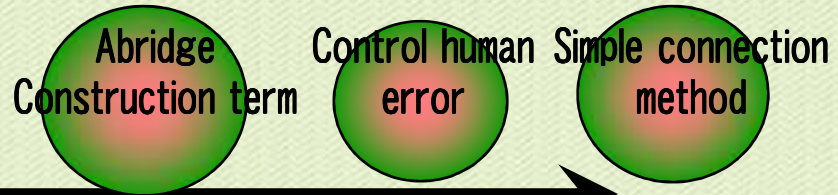
Ticket Punch

# Background of fitting history



Challenge and issues contains upon the each market

Change of Customer's Demand



Pipe material change (Metal→Plastic)

Fitting Concept change (joint methods, materials)

Total Cost (Labor) Reduction



With threads

Mechanical type fittings + Engineering plastics



# Pipe & Fittings

1) Pessimist      2) Optimist      3) Realist

**COCOMECH**  
HIGASHIO MECH CO.,LTD.



# Working condition of Pipe

## ■ Cross linked PE Pipe

	0~20°C	21~40°C	41~60°C	61~70°C	71~80°C	81~90°C	91~95°C
PN15	1.5MPa	1.25MPa	0.95MPa	0.85MPa	0.75MPa	0.70MPa	0.65MPa

## ■ Multi Layer Pipe

0~60°C	61~85°C	86~95°C
1.5MPa	1MPa	0.8MPa

# Size and delivery packing

O.D X t	PEX		ML	
	Per roll	Per bar	Per roll	Per bar
16X2.0	200m	5.8m	100m, 200m	5m
20X2.0	120m	5.8m	100m	5m
25X2.5	50m	5.8m	50m	5m
32X3.0	50m	5.8m	50m	5m

**Per Roll**



**Per Bar**

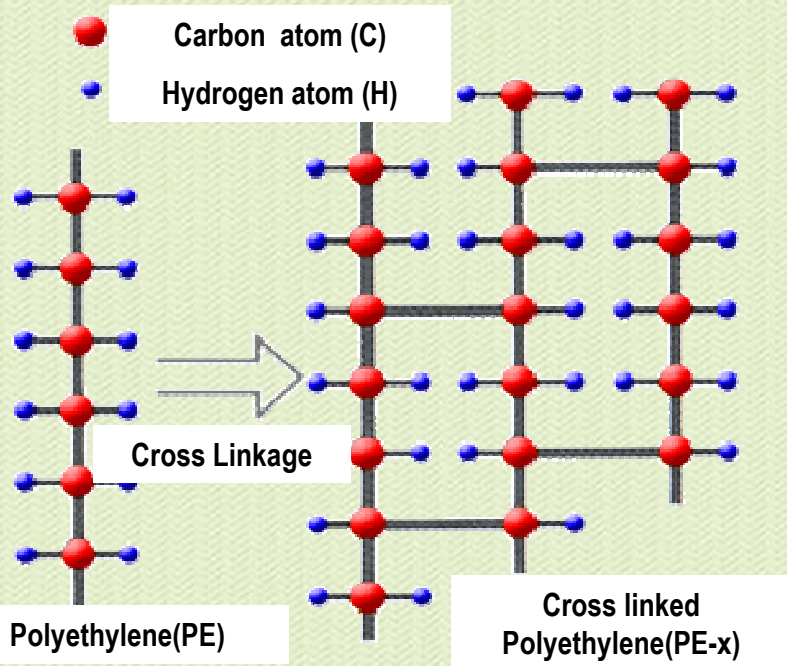


# Pipe Choice

## Material used

① PE-AL-PE (RT)

② PEX-AL-PEX



## 3 x Cross-Linked methods

### PE-Xa

### Peroxide (Engel) method

The PE is mixed with a high concentration of organic peroxide. The peroxide cause connections to originate between the PE chains. Extrusion speed is slower than Silane method, however, the clean finish surface can be provided. More flexible and good shape memory.

### PE-Xb

### Sioplas (Silane) method

Cross-linked originates by the addition of Silane to the PE, followed by water treatment. The majority takes place in a water bath or in sauna at elevated temperatures after the tube passes thru the extruder. Faster extrusion speed, but a little bit inflexible.

### PE-Xc

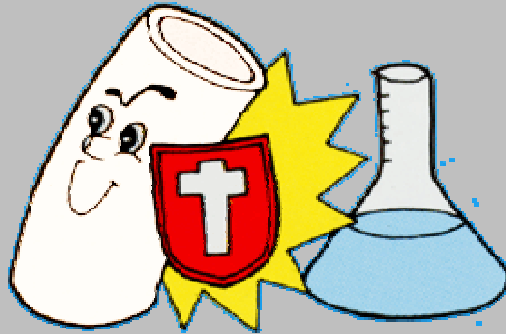
### Electron beam method

Cross-linked takes place during a second process when the pipe is exposed to intense electron beams. The beams excite the PE molecules so much that they cross-link. No chemicals are added and clean. The extrusion speed is high. Requires a greater initial investment in tooling and machinery costing millions of dollars. And exclusive for smaller size of nominal diameter of pipe. Superior shape memory.

# Strong points of PE-X

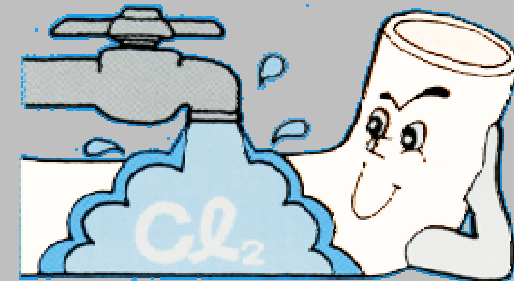
## (1) Corrosion Resistance

Acid-alkaline resistance, chemical resistance and rust-proof material



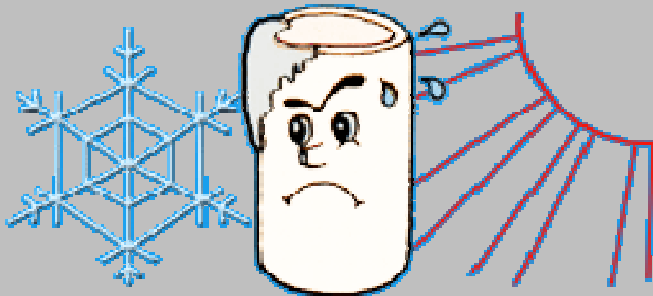
## (2) Chlorine Resistance

Good corrosion resistance for chlorine in drinking water.



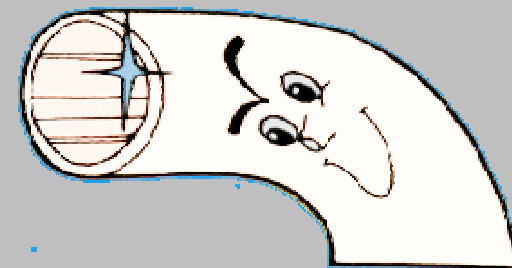
## (3) Weather Resistance

Low and high temperature resistance



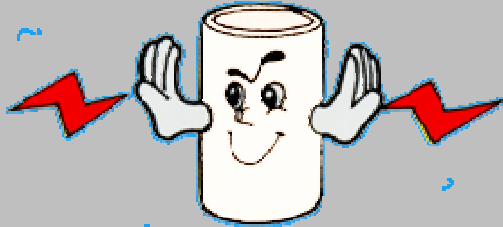
## (4) Scaling Resistant

Inside of pipe surface is very smooth and little friction drag. Less scaling problem.



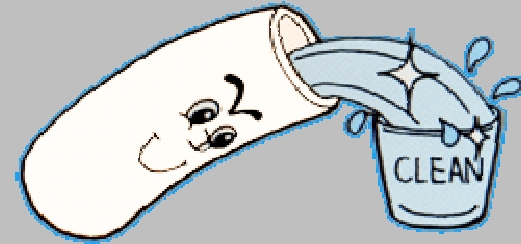
## (5) Good electrical resistance property

PEX is out of fear of electrical corrosion like a metal



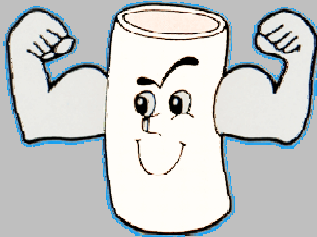
## (6) Sanitary & Hygienic Surface

Good chemical stabilization shall not affect any water quality.



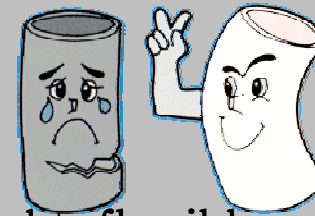
## (7) Good enough strength of pipe

Long life span for hot and cold water applications



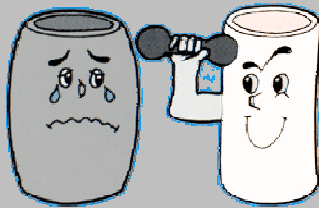
## (8) Good Degradation Resistance

PEX does eliminate the weak point of plastic, Environmental Stress Cracking problem (ESC), and last long without serious degradation of materials.



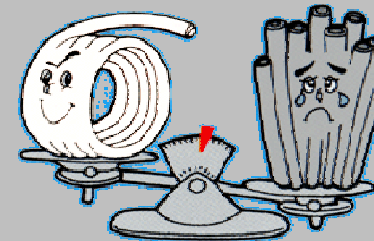
## (9) Strong against creep phenomenon

Compare to other materials, PEX shall not affect big creep problem and strong enough for breakage.

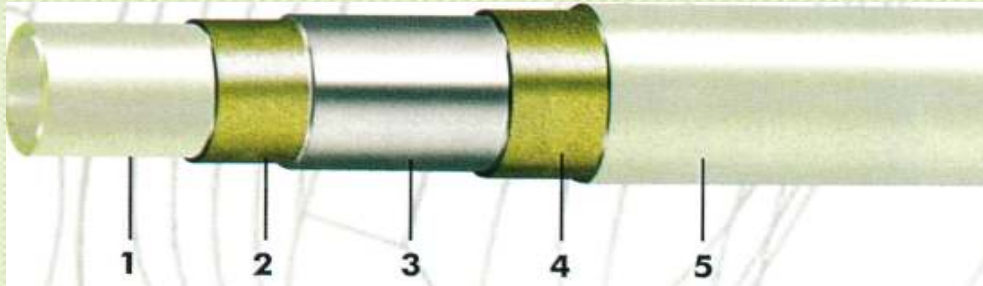


## (10) Light weight, flexible and workability

Light weight and flexible. Due to the delivery per a coil, handle with quite ease and superior workability can be provided in installation work.



## Multilayer Pipe (5 layer Pipe)



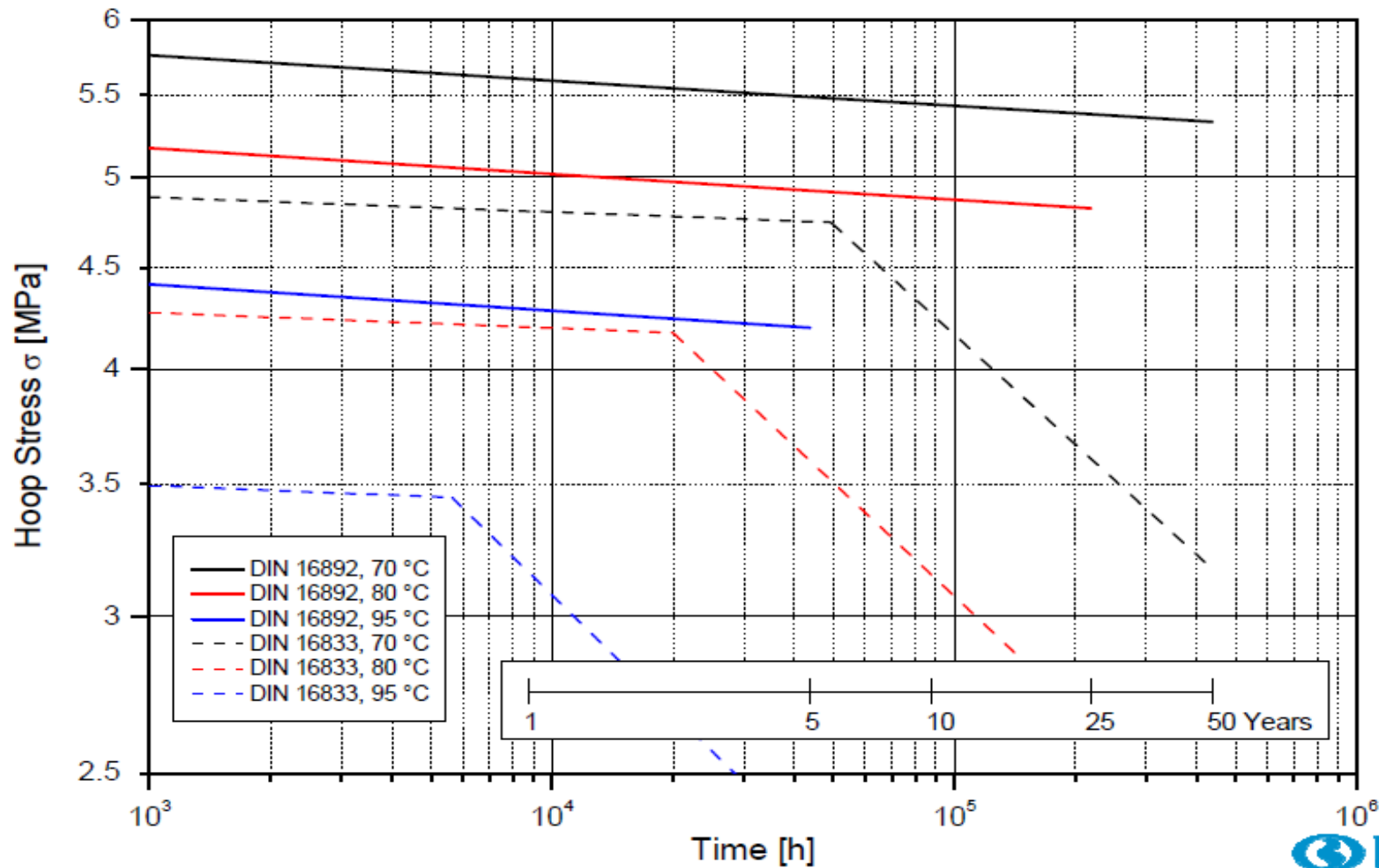
### Feature

- \*Usable at high temperature and high pressure condition.
- \*Superior anti-corrosion property.
- \*Flexible and shape memory performance.
- \*No oxygen diffusion.
- \*Light weight and handle with ease.
- \*Available a roll pack delivery.





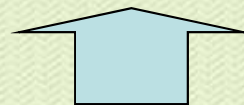
# Comparison: PE-X v PE-RT



# Selecting condition of pipe

## Piping design - choice of pipe size

R = Resistant	1) Fluid	2) Pipe	3) Design	4) Construction budget		Due date
				Material	Labor	
Heat R	●					
Corrosion R	●					
Heat insulation	●					
Quake R		●				
Weather R		●				
Straightforward		●				
Life Span			●			
Maintainability			●			
Recycling			●			
Material cost				●		
Work Quality				●		
Workability-time					●	●
Workability-skill					●	

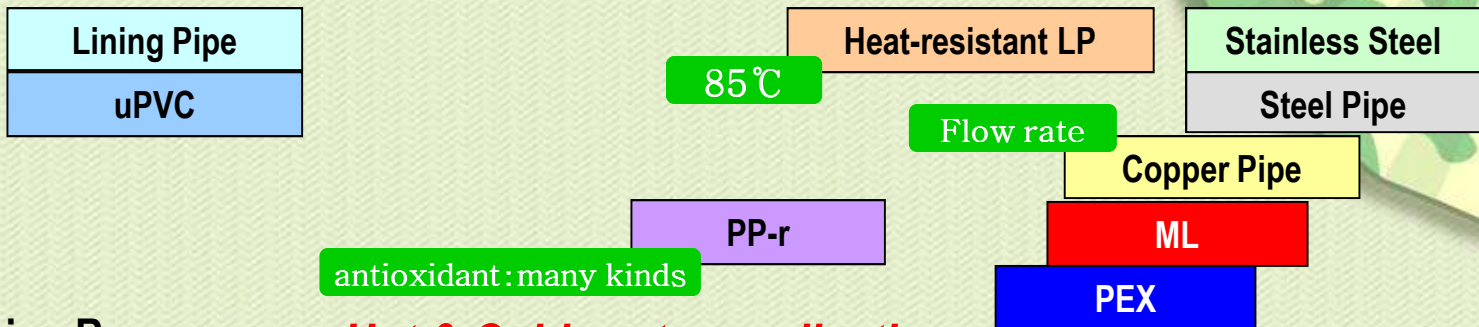


Zone restrictions, Country regulation (water quality, employed material, certificate, specifications, code & standard, traditions etc)

# 1) Fluidic condition

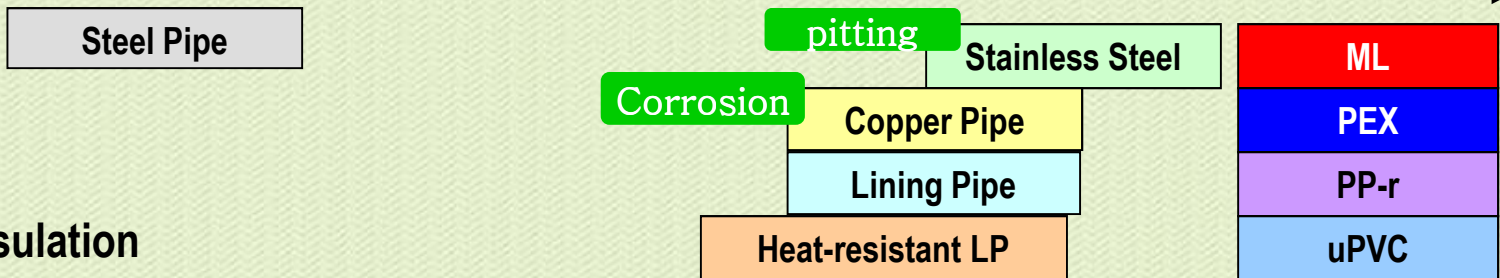
Heat R/Press. R

*Hot water -refrigerant -hot-water cylinder piping*



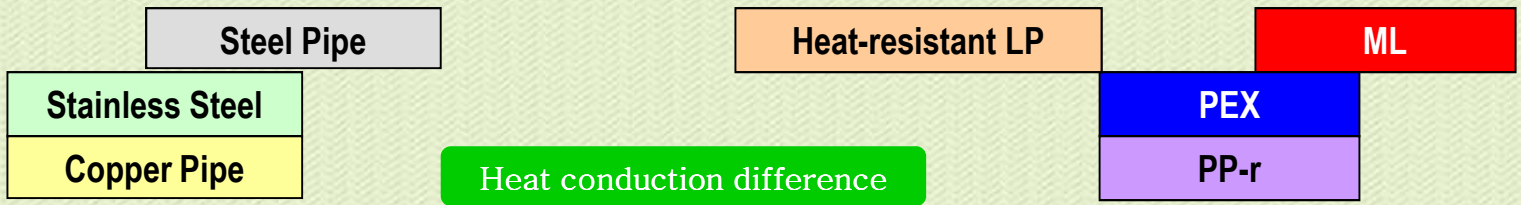
Corrosion R

*Hot & Cold water applications*



Thermal insulation

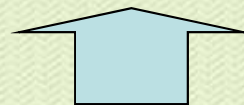
*Refrigerant -Plant facility piping applications*



# Selecting condition of pipe

## Piping design - choice of pipe size

R = Resistant	1) Fluid	2) Pipe	3) Design	4) Construction budget		Due date
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Heat R	●					
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Weather R		●				
Straightforward		●				
Life Span			●			
Maintainability			●			
Recycling			●			
Material cost				●		
Work Quality				●		
Workability-time					●	●
Workability-skill					●	

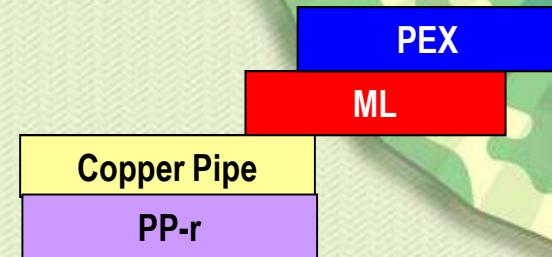
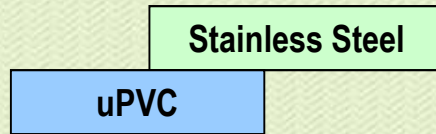
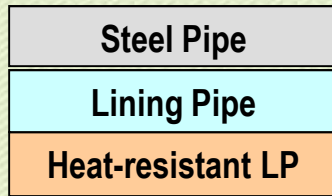


Zone restrictions, Country regulation (water quality, employed material, certificate, specifications, code & standard, traditions etc)

## 2) Piping condition

Quake Resistance

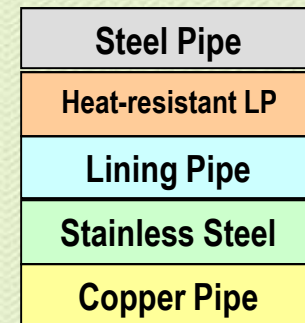
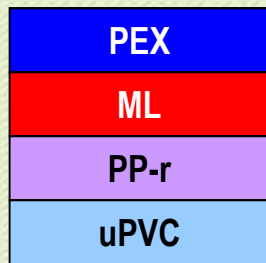
*Country & or region*



Flexibility of pipe

Weather Resistance

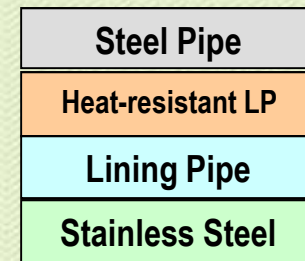
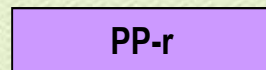
*in door & or outdoor*



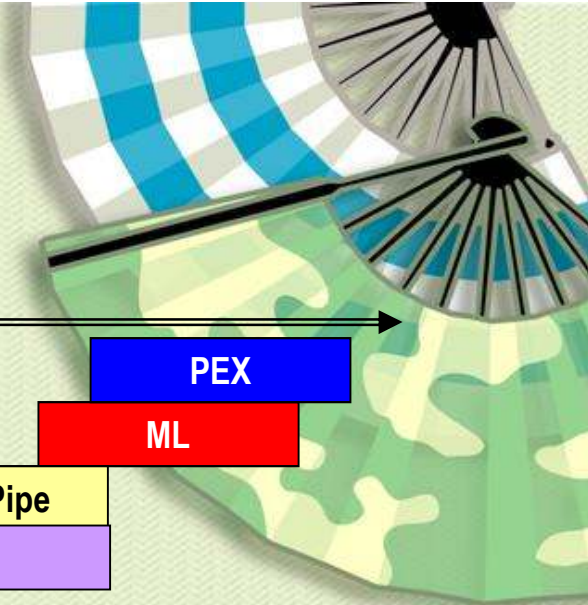
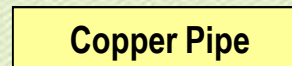
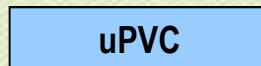
Resistance to ultraviolet

Straightforward

*Special Piping or anti-freeze : fine sight area etc*



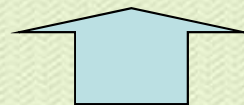
Stiffness property



# Selecting condition of pipe

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Straightforward		●				
Life Span			●			
Maintainability			●			
Recycling			●			
Material cost				●		
Work Quality				●		
Workability-time					●	●
Workability-skill					●	

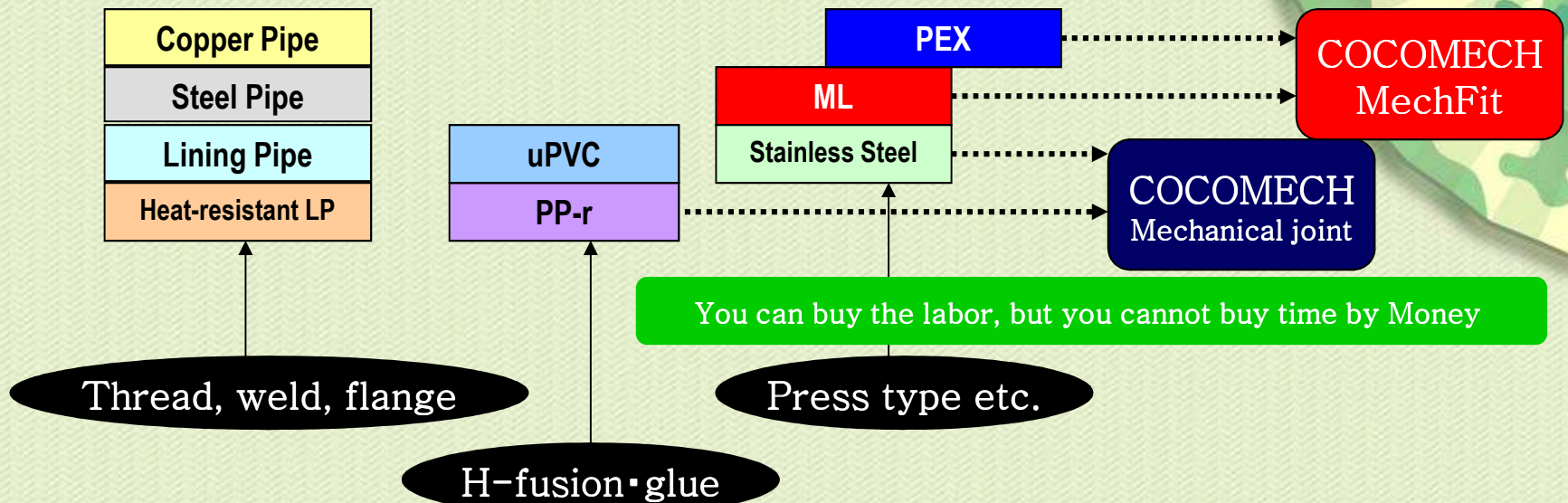


**Zone restrictions, Country regulation (water quality, employed material, certificate, specifications, code & standard, traditions etc)**

# 4) Construction budget (Labor fee)

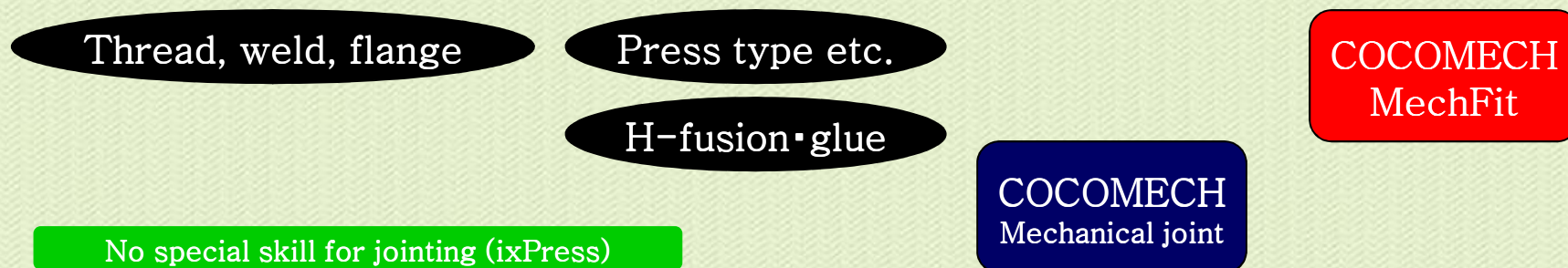
Workability (time) = work period

*Labor per day and owner's requirement and Agreement*



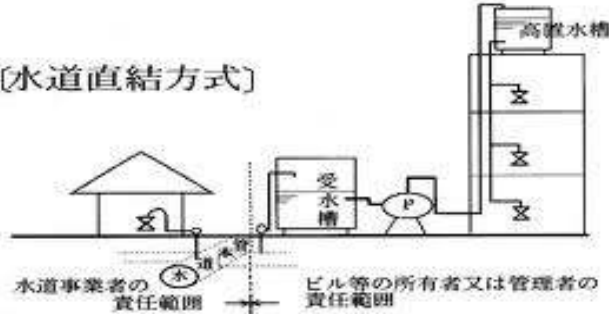
Workability (skill)

*Traditional history, cultural level of the people*



[受水方式]

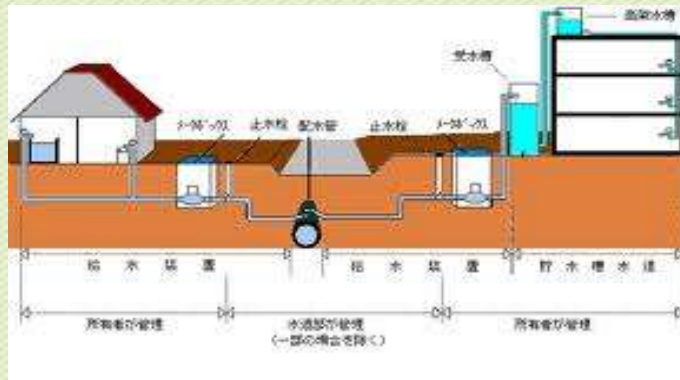
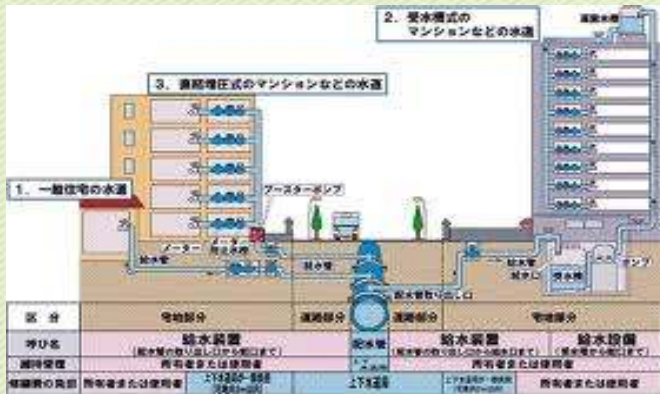
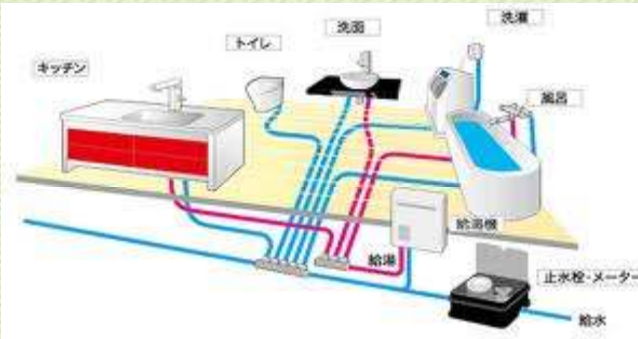
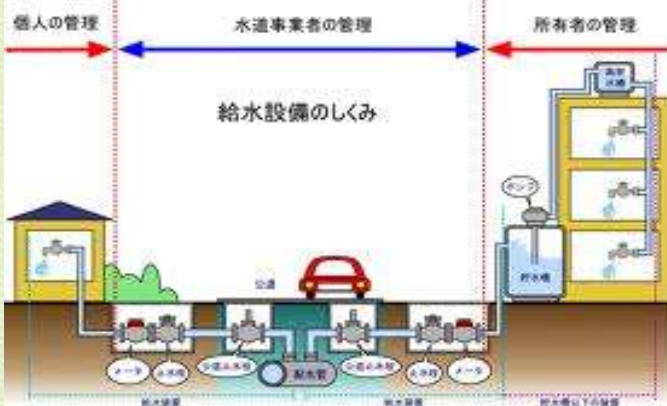
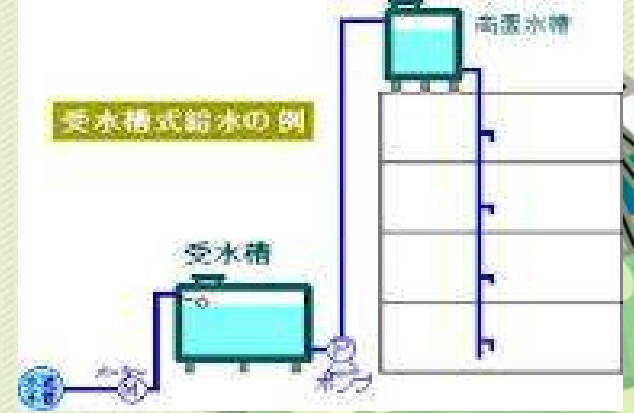
[水道直結方式]



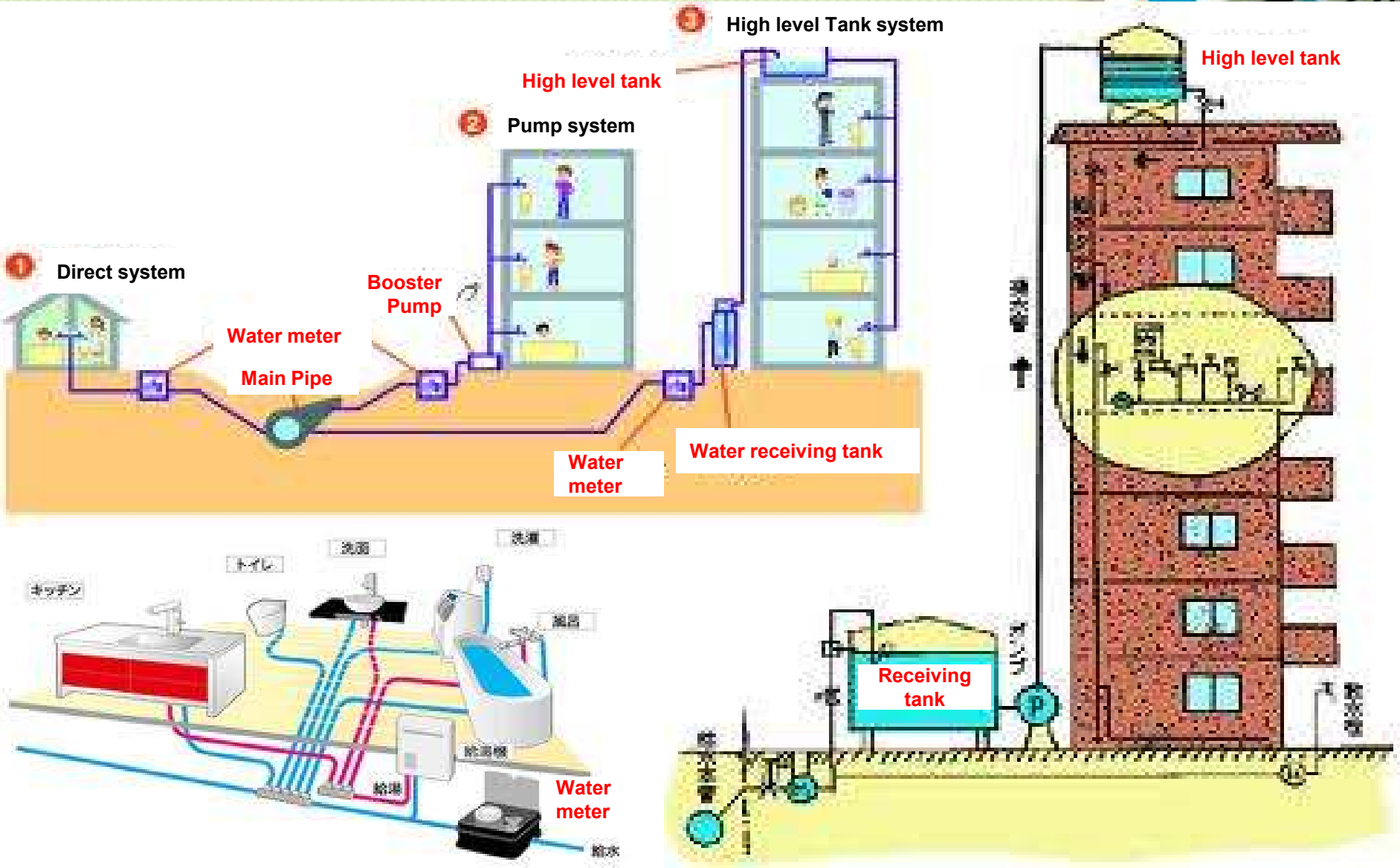
貯水槽水道模式図



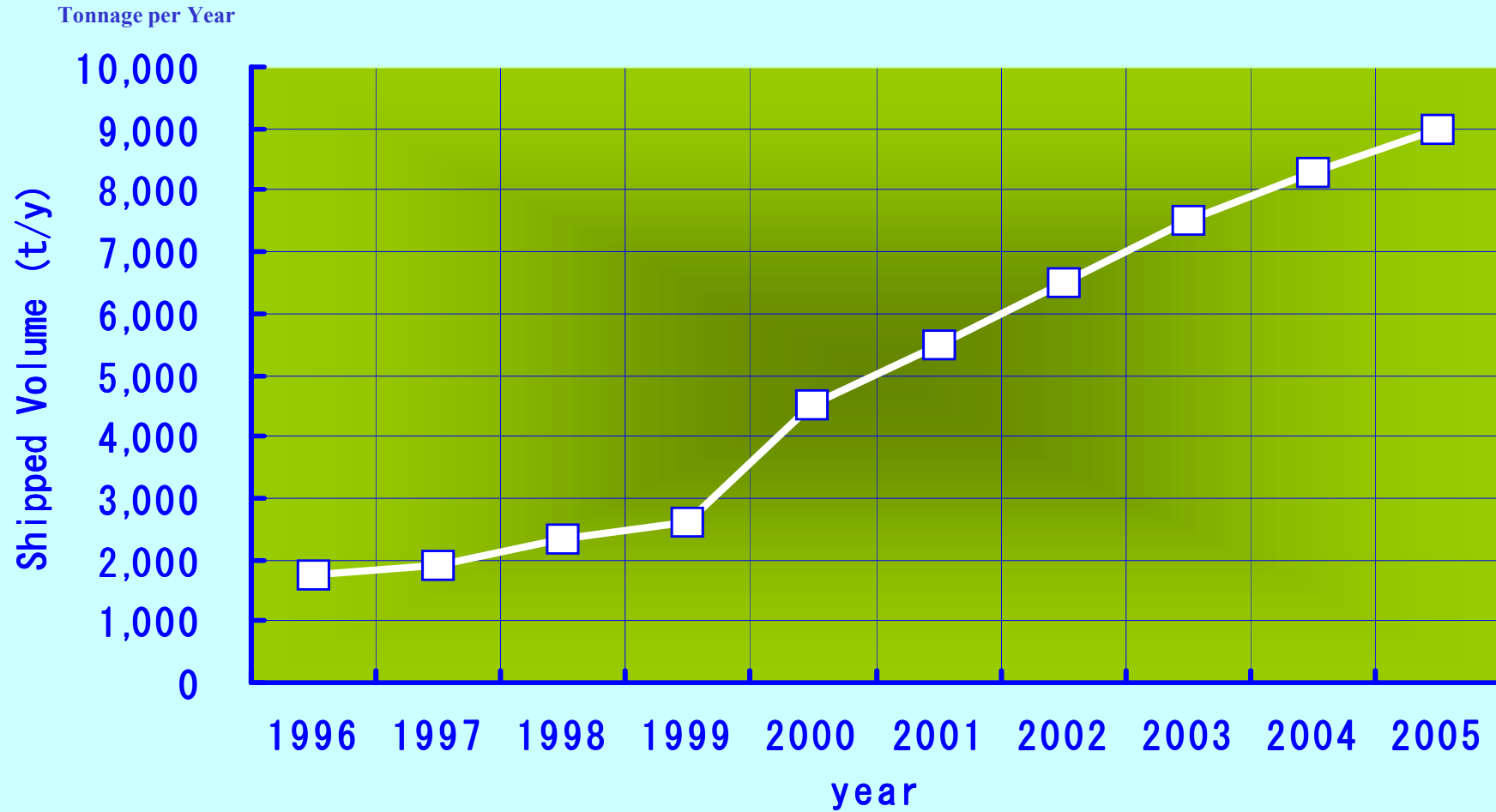
受水槽式給水の例





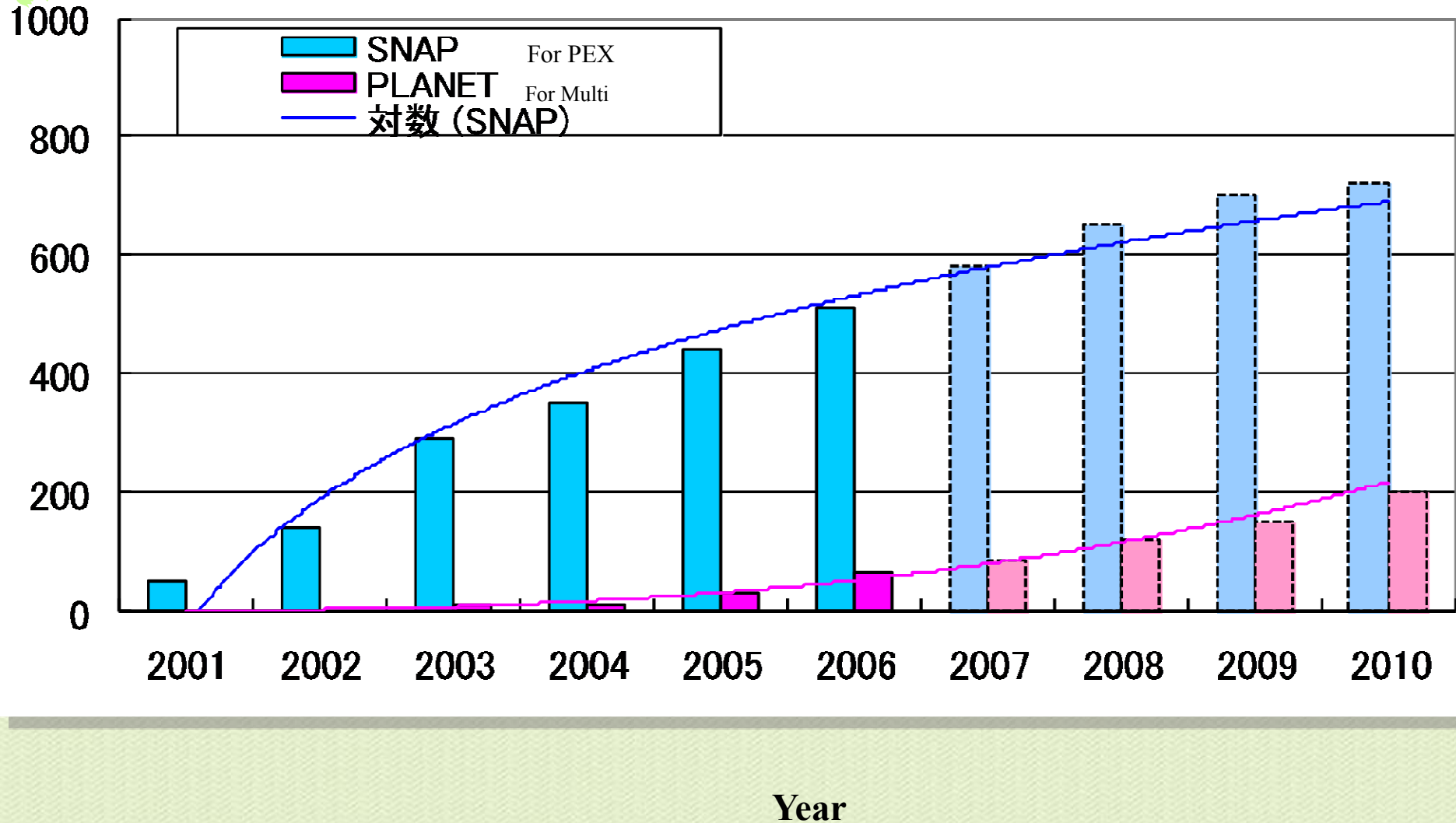


# PEX Pipe Shipment in Japan



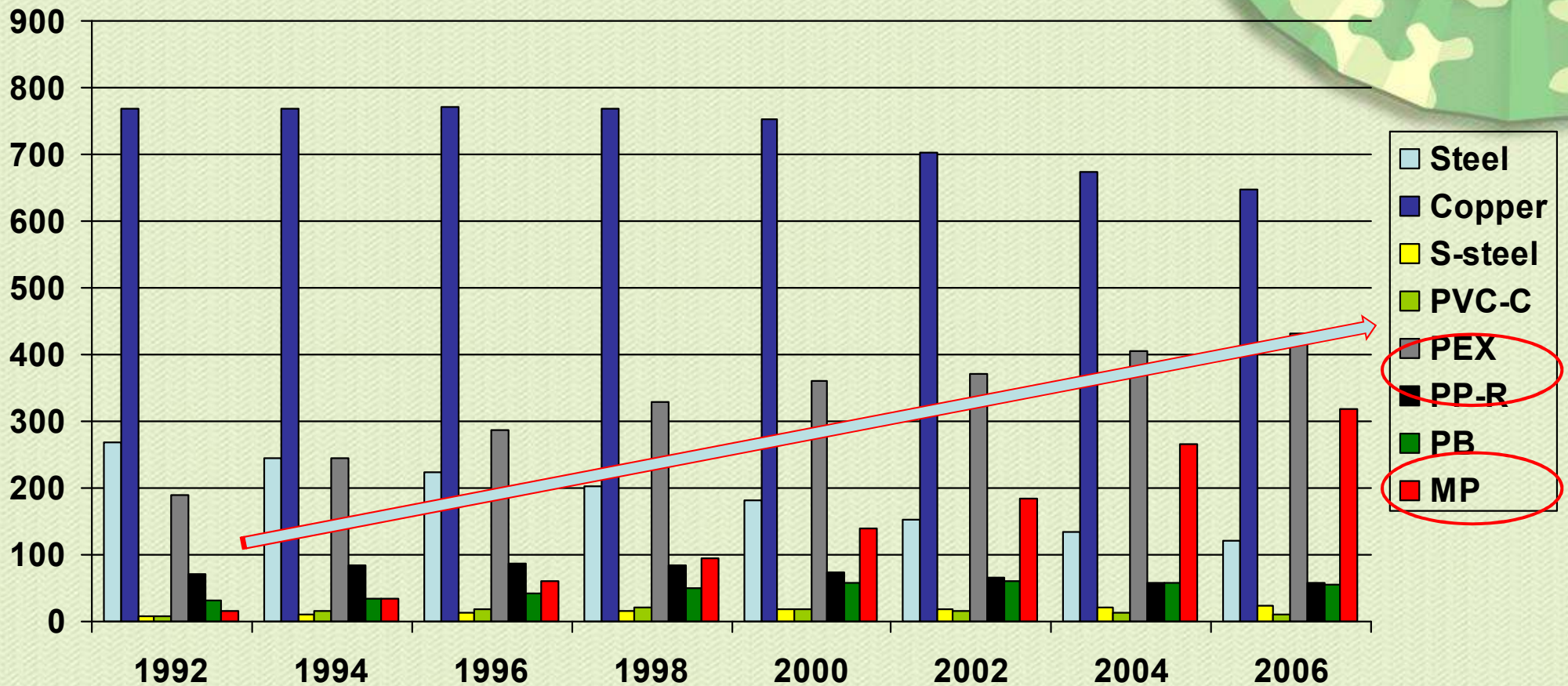
# Plastic Pipe Fitting, Shipment of COCOMECH

Thousand pieces / month



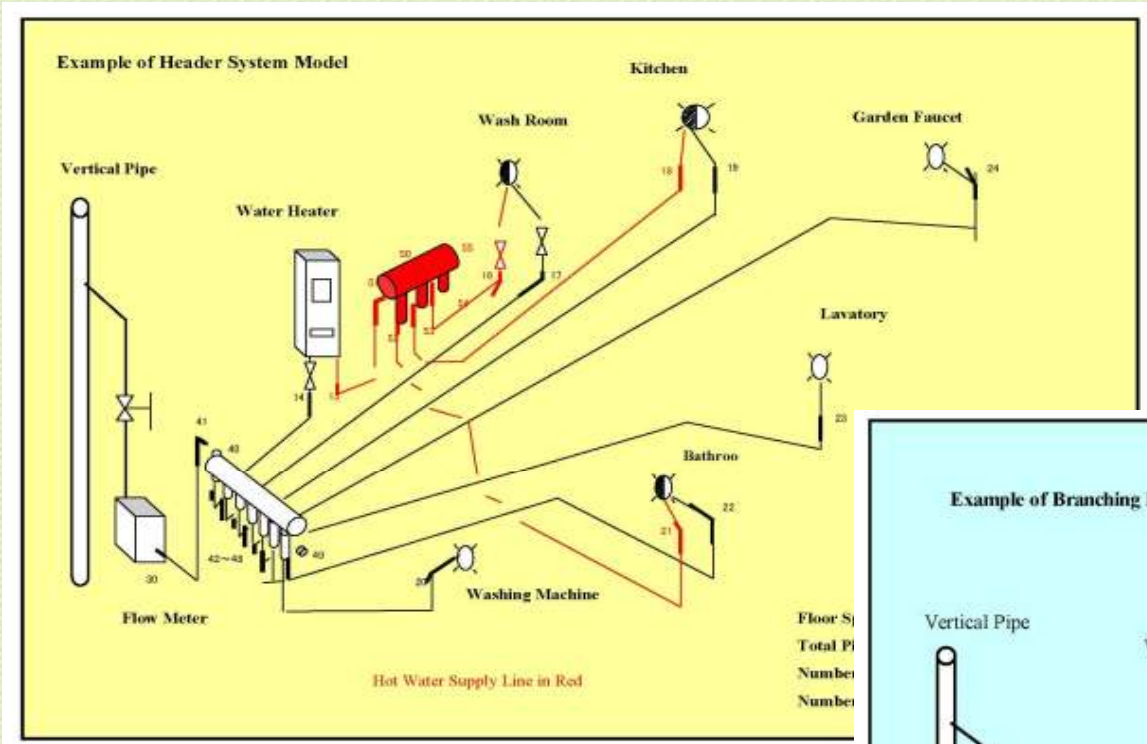
# EUROPEAN MARKET

## HEATING AND PLUMBING PIPES IN EUROPE (MIO.M) *Macro info*

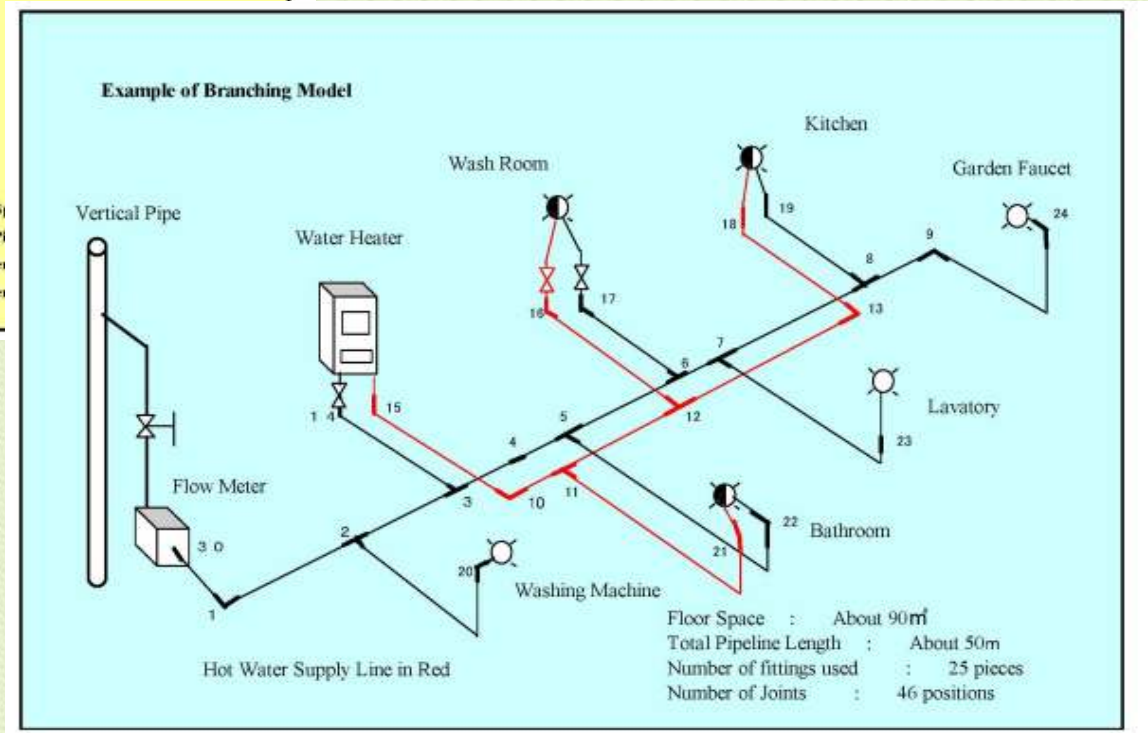


# PEX Piping Method in Japan

## (1) Header Method



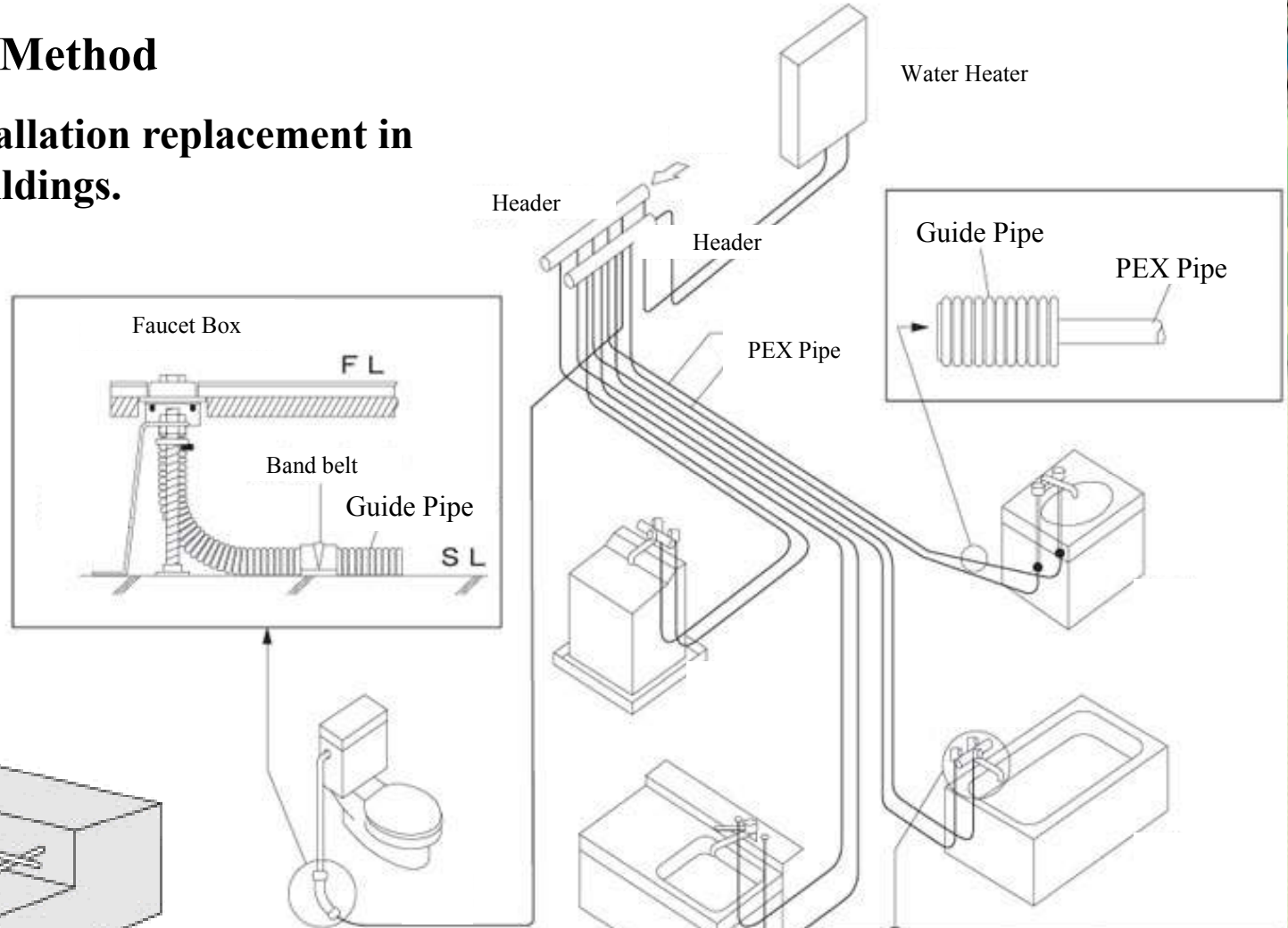
## (2) Branching Method



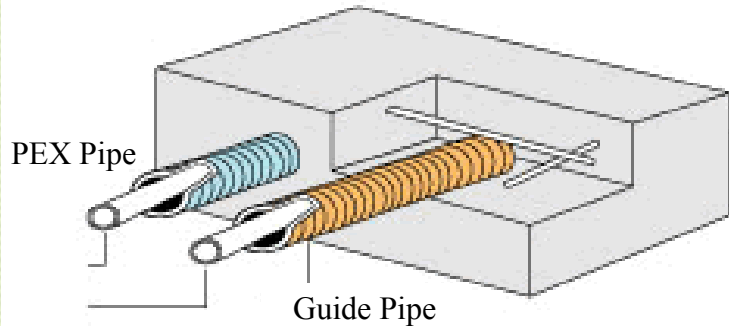
# PEX Piping Method in Japan

## (3) Capsular Guide-Pipe Method

Can be used for future installation replacement in Apartment Houses and Buildings.



### ● Guide-pipe Method



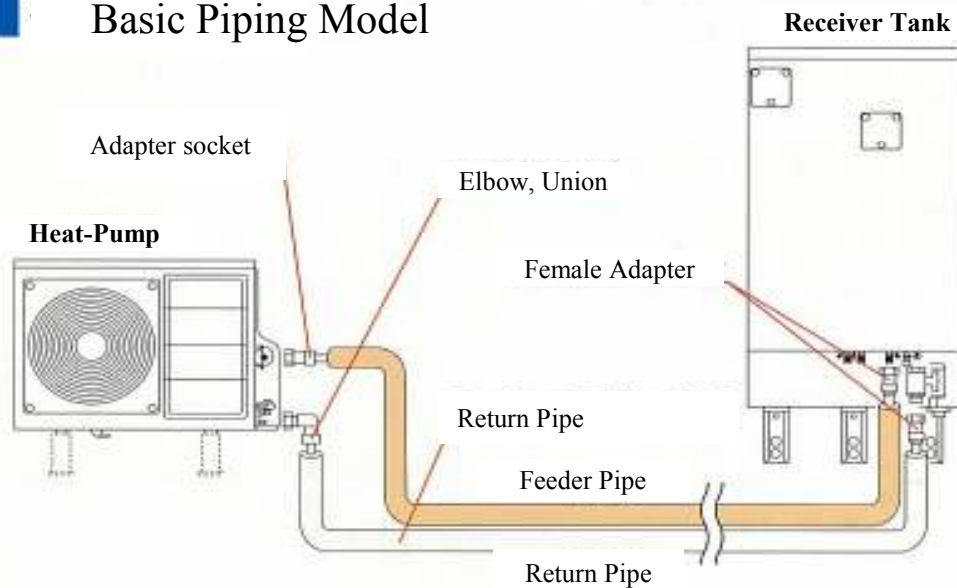
PEX pipe's slide in the Guide pipe

# Multilayer Pipe Usage in Japan

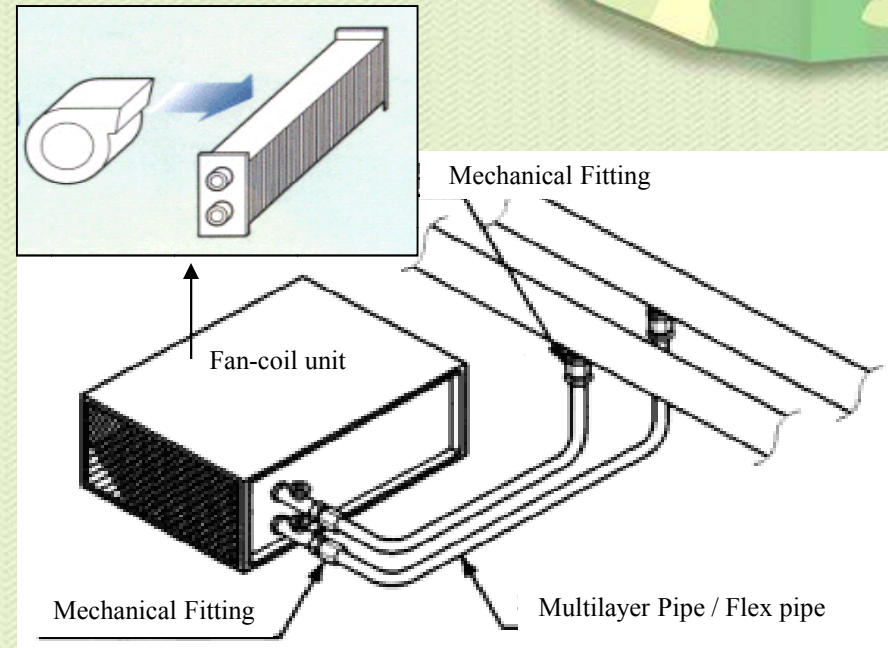
(PEX-AL-PEX)

## Water heater Piping

### Basic Piping Model



## Fan-Coil Unit Piping



**KEY CAPABILITY : Great Oxygen Barrier**

**Without Any Corrosion Trouble**

# In Cold Region: Freeze Damage Resistant

PEX-AL-PEX

No Freeze-Up



PEX

Fluid may build up in deflection due to Pipe bending and freezing-up



To prevent pipe from freezing-up, retainable shape of multilayer pipe is well utilized.



The logo for MECHfit features the word "MECHfit" in a blue, sans-serif font. The "fit" portion is enclosed within a blue circular outline. A small red dot is positioned above the letter "i".

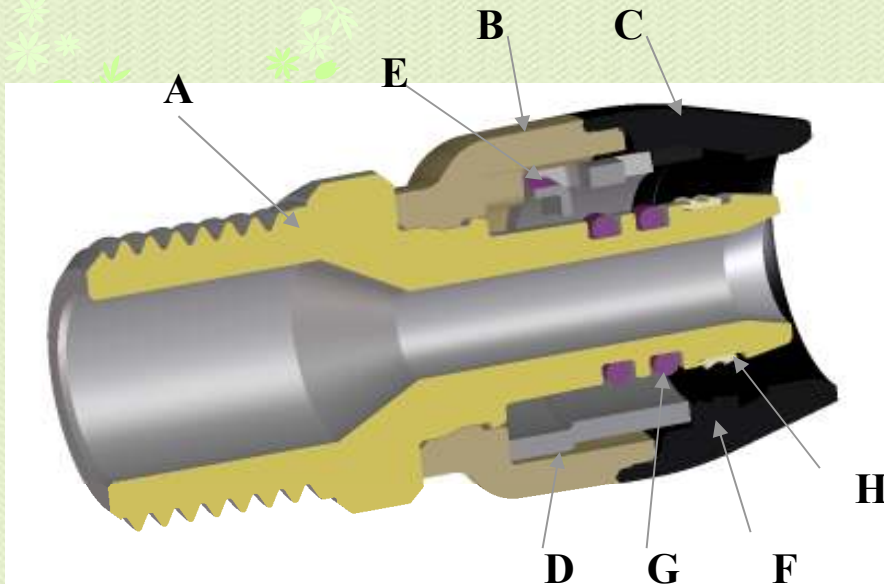
MECHfit

The logo for MECH COCOMECH consists of a blue rectangular box containing a white stylized infinity symbol. Below the box, the word "MECH" is written in white, and "COCOMECH" is written in blue below that.

MECH  
COCOMECH

# Clamp ring method “MECHFit”

— compatible for PEX & Multilayer pipe



General model



Plastic model



Insert threads Model

	Components	General Items	Plastic Items
A	Main Body	Brass (Tin coat)	PPSUBlend, PSU (insert DZR-brass)
B	Transparent Body	PC	
C	Nut	PC	PC
D	Clamp Ring	SK85	
E	Jump Pin	S65C	
F	Stop Ring	PPSU	
G	O-ring	EPDM	
H	Guide Ring	PERT	—

# MECHFit Feature

## ① One touch connection

- No need of special skill for installation
- Less time consumption, Fast & quality construction

## ② Compatible for ML & PEX pipes

- ML: ISO/DIS21003-2
- PEX ISO15875-2 comply

## ③ Downsizings design

## ④ Cost-friendly

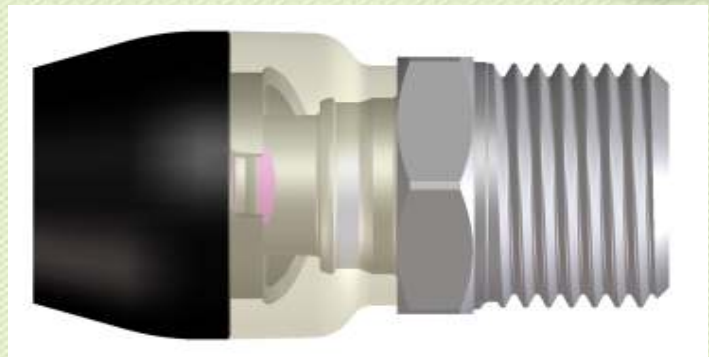
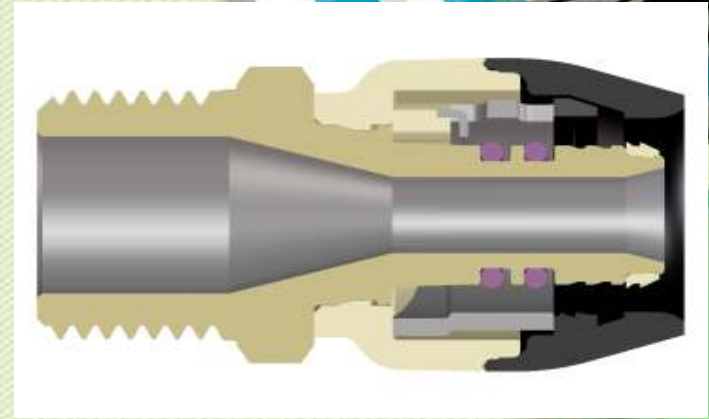
## ⑤ Conforming product for ISO and EN

- Performance: ISO15875-5
- Material: EN12420
- Dimensional: EN1254-3



## MECHFit mechanical feature

- The clamp ring and Guide ring features can absorb the dimensional fluctuation of the pipe
- Squeezing force of clamp ring contribute the creep leak trouble by following the dimensional change of the pipe, and we can carry such a long term warranty.
- Installer can check the completion of the job both by snap sound and by sight thru the transparent body.
- The fitting and pipe can be adjustable after insertion. No twist of pipe can be occurred.

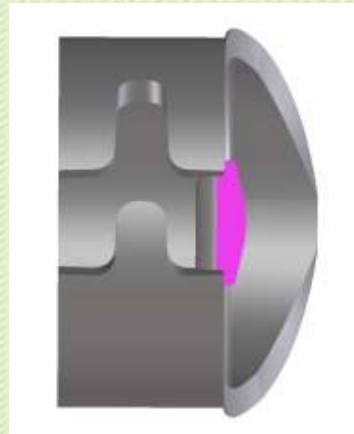


## Strong point of Clamp Ring

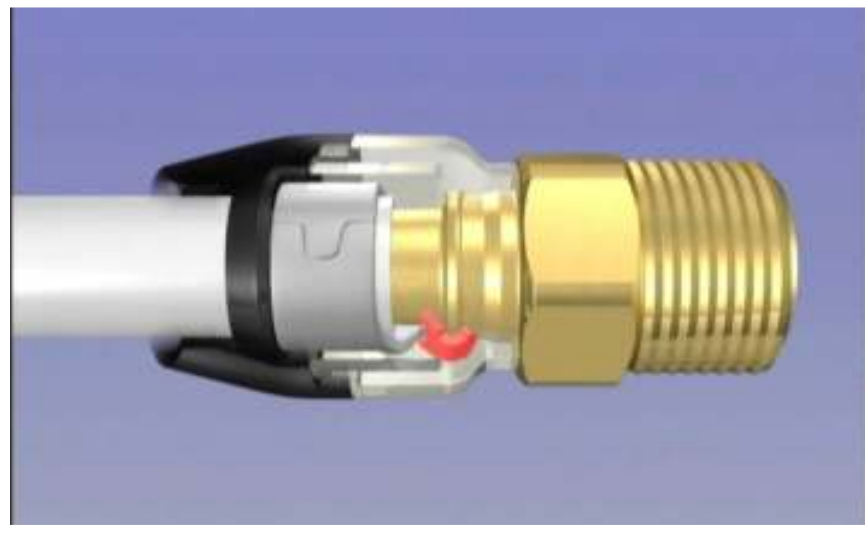
After insertion the pipe into the fitting, the red jumper pin jumps out and the clamp ring squeezes the pipe from outside semi-permanently.



- Absorb the dimensional fluctuation of the pipe
- Grip the pipe movement at work  
(Prevent creep trouble in advance)
- You can check the completion of job by the snap sound in installation.



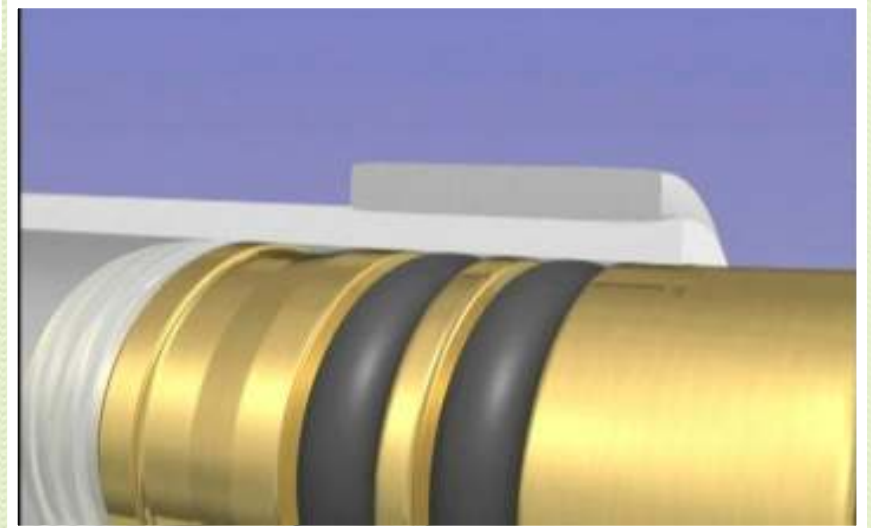
Jumper Pin



Just push in!  
Completion of the job  
shall be checked from  
transparentbody.



Clamp ring squeeze  
the pipe permanently.

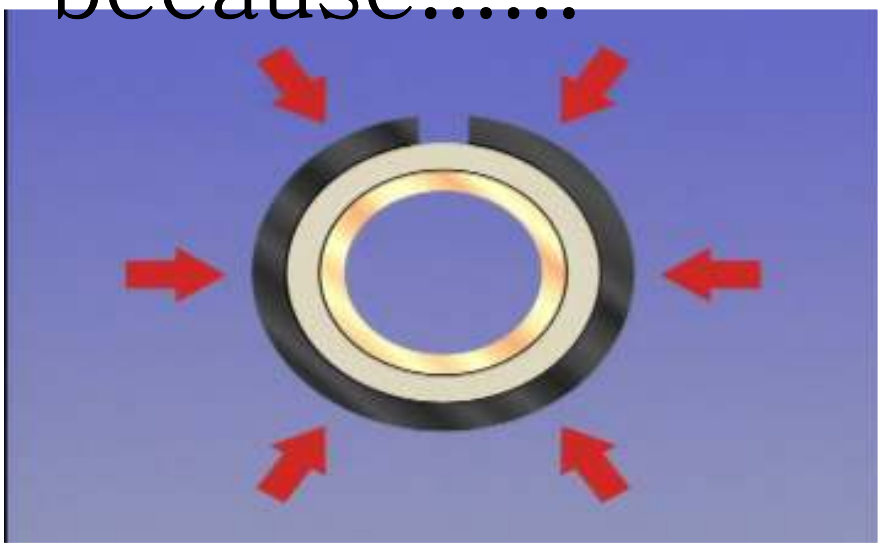




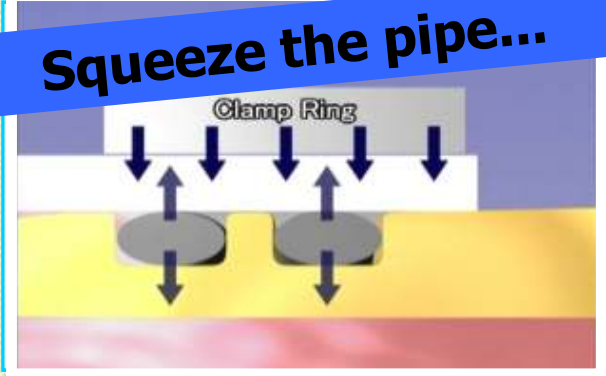
Cause pipe movement...



Reliable!  
because.....



Squeeze the pipe...

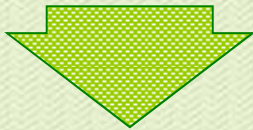
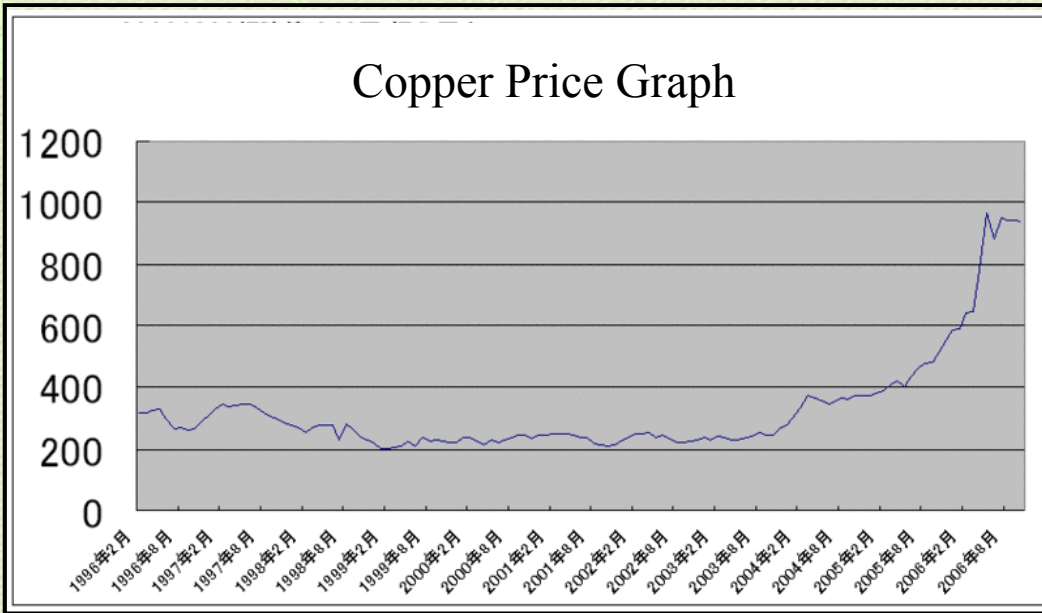


Stop the leakage...



Clamp ring Method

# Copper Price Hike



## Change to Plastic

\*Reduces Cost & \*Stable Supply  
Best selection of each parts



Price

