

# KUBOTA

## Adhesives Solution for Building Applications

WATER & HOT WATER SUPPLY PIPES

DRAIN & VENT



MADE  
IN  
**JAPAN**

Memberikan Kualitas Lekat Yang Bersih  
Aman dan Kuat

# Adhesives

## 1. Vinyl-Based Adhesives

The adhesive must not be mixed with other adhesive. If the adhesive is mixed with other adhesive or a solvent, the adhesive strength decreases significantly.

Usage range of nominal diameters covered by supplied brush

Can size	Guideline range of nominal diameter
100g	13~50
500g	13~50
1kg	65~150

**Tough dyne HI (White) Specially designed adhesive**

Conform to JWWA S101  
Be sure to apply Tough dyne HI (White) for bonding.

Correct connection  
Incorrect connection  
Not fully inserted

\*Note: It may be difficult to insert the pipe all the way to the stopper depending on the type of fitting. In that case, insert the pipe to the following position: Zero point + Min. 10%.

\* Color Tough dyne Blue cannot be used to bond pipes that are used for drinking water.

### Tough dyne HI

Code No. 1039

Product conforms to Japan Water Works Association's standards JWWA S101



- 100 g can (with brush)
- 500 g can (with brush)
- 1 kg can (with brush)

**Use** Bonding of HI products  
(can be used on general pipes and fittings)

**Property** Low viscosity (A), quick drying (viscosity: 500 MPa·s)

**Color** Colorless

### Tough dyne HI (White)

Code No. 1039

Product conforms to Japan Water Works Association's standards JWWA S101



- 500 g can (with brush)
- 1 kg can (with brush)

**Use** Bonding of HI products  
(can be used on general pipes and fittings)

**Property** Low viscosity (A), quick drying (viscosity: 500 MPa·s)

**Color** White

### Tough dyne Red

Code No. 1039

Product conforms to Japan Water Works Association's standards JWWA S101



- 500 g can (with brush)
- 1 kg can (with brush)

**Use** Bonding of general pipes and fittings

**Property** High viscosity (B), quick drying (viscosity: 1,700 MPa·s)

**Color** Colorless

**Caution** • This adhesive cannot be used to bond HI products.

### Tough dyne Blue

Code No. 1039

Product conforms to Japan Water Works Association's standards JWWA S101



- 100 g can (with brush)
- 500 g can (with brush)
- 1 kg can (with brush)

**Use** Bonding of general pipes and fittings

**Property** Low viscosity (A), quick drying (viscosity: 150 MPa·s)

**Color** Colorless

**Caution** • This adhesive dries quickly; therefore, it is not suitable for bonding pipes with nominal diameter of 200 and more.  
• This adhesive cannot be used to bond HI products.

### Tough dyne HT

Code No. 2039

Product conforms to the manufacturer's standards



- 100 g can (with brush)
- 250 g can (with brush)
- 500 g can (with brush)

**Use** Bonding of HT products

**Property** Low viscosity, quick drying (viscosity: 500 MPa·s)

**Color** Colorless

**Caution** • This adhesive cannot be used to bond general pipes/fittings or HI products.

(Note) Expiration date is indicated only on the Tough dyne HT can. Please check the expiration date before using.

### Tough dyne Yellow

Code No. 1039

Product conforms to the manufacturer's standards



- 1 kg can (with brush)
- 3 kg can

**Use** Bonding of general pipes and fittings (nominal diameter of 200 and more)

**Property** High viscosity, slow drying (viscosity: 1,000 MPa·s)

**Color** Colorless

**Caution** • This adhesive must not be used to bond pipes and fittings for water supply such as for drinking water.  
• When applying to pipes with large diameters, pour a necessary amount of adhesive into a different metal container and use a large brush.

### Color Tough dyne Blue

Code No. 1039

Product conforms to the manufacturer's standards



- 500 g can (with brush)
- 1 kg can (with brush)

**Use** Bonding of DV fittings

**Property** Low viscosity, quick drying (viscosity: 500 MPa·s)

**Color** Blue

**Caution** • Use Tough dyne Yellow for drain pipes with nominal diameter of 200 and more.  
• This adhesive must not be used to bond pipes and fittings for water supply such as for drinking water.  
• Be sure to wipe off the adhesive adhered on the base material. The dye contained in the adhesive penetrates the sheet over time. As a result, the blue dye appears on the surface.

## 2. Selection of Vinyl-Base Adhesive to Use

◎ Recommended ○ Usable × Cannot be used

Pipeline Classification	Pressurized Pipeline						Nonpressurized Pipeline		
Application Classification	Water Supply/Hot Water Supply			General Pressurized Pipe			Drain and Vent		
Pipe Product Classification	HI Product	General Pipe	HT Product	HI Product	General Pipe		HT Product	General Pipe	
Nominal Diameter Classification	150 and less			150 and less	150 and less	200 and more (Note 1)	150 and less	150 and less	200 and more (Note 1)
Tough dyne HI	◎	○	×	◎	○	×	×	○	×
Tough dyne HI (White)	◎	○	×	◎	○	×	×	○	×
Tough dyne Red	×	○ (Note 4)	×	×	○ (Note 4)	◎	×	○ (Note 4)	◎
Tough dyne Blue	×	◎	×	×	◎	×	×	◎	×
Tough dyne HT	×	×	◎	×	×	×	◎ (Note 3)	×	×
Color Tough dyne Blue	×	×	×	×	◎	×	×	◎	×
Tough dyne Yellow	×	×	×	×	×	◎ (Note 2)	×	×	◎

Note 1. When applying the adhesive to pipes with nominal diameter of 200 and more, pour a necessary amount of adhesive into a different metal container and use a large brush.  
 Note 2. Tough dyne Blue and Color Tough dyne Blue dry quickly; therefore, they are not suitable for bonding pipes with nominal diameter of 200 and more.  
 Note 3. When bonding HT-DV products to general pipes, such as for the connection of the drain pipe from a dishwasher, use Tough dyne HT.  
 Note 4. Tough dyne Red is recommended for nominal diameters of 65 and more.  
 Note 5. Tough dyne Yellow must not be used to bond pipes and fittings for water supply such as for drinking water.  
 Note 6. Use Tough dyne HI for HI pipes and fittings with nominal diameter of 200 and more.

## 3. Lubricants for Rubber Ring Joints

### V Soap

Code No. 7000

Product conforms to the manufacturer's standards



1 kg resin container (with brush)

2 kg resin container

Use Connecting pipes to fittings with rubber ring  
 Property Liquid  
 Main component Potassium soap

### V Spray

Code No. 7000



340ml

Use Connecting pipes to fittings with rubber ring  
 Property Spray  
 Main component Silicone oil

## 4. Amount of Adhesive and Lubricant to Apply

- The amount of adhesive/lubricant indicated in the tables are guideline figures. When ordering, add 20% to 30% more to compensate for the loss that can occur at the construction site.
- The indicated amount is the amount applied on the socket and pipe at one location.

### Amount of vinyl-base adhesive to apply (reference)

For TS socket

g/location

Nominal Dia.	13	16	20	25	28	30	35	40	50	65	75	100	125	150	200	250	300	350	400	450	500	600
Tough dyne HI/ HI (White)	0.6	0.8	1.1	1.6	—	2.1	—	3.3	4.8	6.6	8.1	13	20	30	55	—	—	—	—	—	—	—
Tough dyne Red	0.9	1.2	1.7	2.4	2.6	3.2	3.5	5.0	7.1	9.9	12	20	30	45	80	130	180	—	—	—	—	—
Tough dyne Blue	0.6	0.8	1.1	1.6	1.7	2.1	2.3	3.3	4.8	6.6	8.1	13	20	30	—	—	—	—	—	—	—	—
Tough dyne HT	0.6	0.8	1.1	1.6	—	2.1	—	3.3	4.8	6.6	8.1	13	20	30	—	—	—	—	—	—	—	—
Tough dyne Yellow	—	—	—	—	—	—	—	—	—	—	—	—	—	—	70	105	150	205	265	330	410	595

Note The indicated amount is for a surface area of 1m<sup>2</sup>. The amount in the table were calculated based on 300 g for Tough dyne Red, 200 g for Tough dyne HI and Tough dyne HI (White), and 250 g for Tough dyne Yellow.

For DV socket

g/location

Nominal Dia.	20	25	40	50	65	75	100	125	150	200	250	300	350	400	450	500	600	700
Tough dyne Blue	—	—	4	5	7	10	15	20	30	—	—	—	—	—	—	—	—	—
Color Tough dyne Blue	—	—	4	5	7	10	15	20	30	—	—	—	—	—	—	—	—	—
Tough dyne HT	0.8	1.1	4	5	—	10	—	—	—	—	—	—	—	—	—	—	—	—
Tough dyne Yellow	—	—	—	—	—	—	—	—	—	55	90	125	175	220	275	350	525	700

### Amount of lubricant for rubber ring joint to apply (reference)

g/location

Nominal Dia.	40	50	75	100	125	150	200	250	300	350	400	450	500	600
Amount of V Soap used	5	5	7	10	15	20	25	35	50	65	90	115	140	190

Number of application locations per can

Nominal Dia.	150	200	250
Number of joint location per V Spray can	35	23	15



# Bonding Techniques

## 1. Bonding HI-TS and TS Products

Cutting the pipe

### 1 Draw a cut line.



Draw a cut line around the pipe, using a wide piece of thick paper or tape.

### 2 Cut the pipe.

Cut with a power disc saw



Cut with a disc sander



Cut with a PVC pipe saw



Cut the pipe along the cut line at right angles to its longitudinal axis.

Chamfering

Chamfer with a disc sander



Chamfer with a rasp



Chamfer with a Chamfering tool (commercially available)



Chamfer with a reamer (commercially available)



The edge should be chamfered as the table below.

Drawing a marker line for inserting the pipe



After chamfering the pipe edge, draw a marker line around the inserting end of the pipe with a marker pen to show the insertion length.

Draw the line all around the pipe as possible.

**Zero point and bonding length (for nominal diameters 50 and more)**

The position where the pipe stops after lightly pushing the inserting end into the socket

The position of the marker line is obtained by adding the zero point length to the bonding length in the table on the right, and should be marked with a marker pen.

For nominal diameters 40 and less, insert the pipe up to the stopper located in the socket.

**Bonding lengths for nominal diameters 50 and more**

Units: mm

Nominal Dia.	Bonding length	Nominal Dia.	Bonding length
50	20	300	100
75	25	350	120
100	30	400	135
125	35	450	150
150	45	500	170
200	70	600	200
250	85		

**Typical insertion lengths for nominal diameters 40 and less**

Units: mm

Nominal Dia.	13	16	20	25	30	40
Fitting insertion length	26	30	35	40	44	55

**Chamfer dimension** Units: mm

Nominal Dia.	30 and more	40-65	75-150
Chamfer dimension	1	2	5

If a pipe and a joint are bonded together without the edges chamfered, a film is formed back in the inserted end and the pipe line may become clogged.

## Bonding (for nominal diameters 40 and less)

### 1 Clean the surface.



Clean the inner surface of the fitting and the outer surface of the inserting end of the pipe with a dry cloth.

### 2 Apply the adhesive.



Apply the adhesive evenly and thinly in the circumferential direction around the inner surface of the fitting first and then the outer surface of the inserting end of the pipe.

### 3 Insert the pipe.



Insert the pipe straight into the fitting up to the marker line without a pause immediately after applying the adhesive. Hold the fitting and the pipe together for at least 30 seconds.

### 4 Bonding completion.



After bonding the pipe to the fitting, remove any adhesive coming out of the joint surface immediately. Do not apply unreasonable force to the joint.

## Bonding (for nominal diameters 50 and more)

### 1 Clean the surface.



Clean the inner surface of the fitting and the outer surface of the inserting end of the pipe with a dry cloth. Position the wire and fastener in advance.

⚠ Sand, water or oil on the surface to be bonded may cause faulty bonding.

### 2 Apply the adhesive.



Apply the adhesive evenly and thinly in the circumferential direction around the inner surface of the fitting first and then the outer surface of the inserting end of the pipe.

⚠ In the summer two persons should work together as much as possible to work quickly and prevent the adhesive from drying during this process.

### 3 Insert the pipe.



Insert the pipe straight into the fitting up to the marker line without a pause, immediately after applying the adhesive. Hold the fitting and the pipe together.

⚠ Do not hammer the pipe into the fitting. This may damage the pipe.

### 4 Bonding completion.



After bonding the pipe to the fitting, remove any adhesive coming out of the joint surface immediately. Do not apply unreasonable force to the joint.

⚠ After the bonding work, ventilate the work area to remove any solvent gas.

**Typical holding time required to bond TS products**

Nominal Dia.	50 and less	65 to 150	200 and more
Typical holding time	At least 30 sec.	At least 60 sec.	At least 1 min. in summer At least 3 min. in winter

## 2. Bonding HT-TS Products

### 1 Cutting the pipe



Determine the cutting length of the pipe, considering the insertion length of the fitting. When drawing a cut line, wrap a wide piece of paper around the pipe to ensure that the cut surface will be at right angles to the longitudinal axis of the pipe. Draw the line all around the pipe with a felt-tip pen. Use a saw with fine teeth. Cut the pipe shallowly all around the circumference rotating the pipe.

### 2 Chamfering



Chamfer the pipe to remove burrs and shavings produced by the cutting work on the inner and outer edges, using a chamfering tool or a rasp. Always chamfer the cut surface. Otherwise, when the pipe is inserted, the adhesive on the surface of the fitting will be removed by the cut edge, leading to potential pipe clogging.

### 3 Drawing a marker line

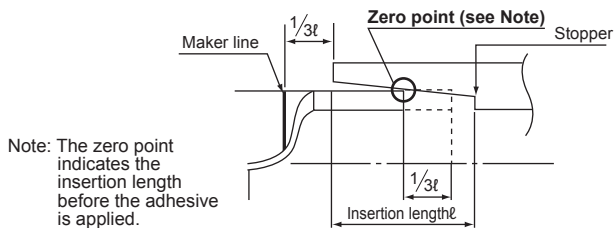


Measure the joint length of the fitting. Draw a marker line around the inserting end of the treated pipe.

**Note: The insertion length of the fitting varies with the product types. Always measure the length of the fitting and draw a marker line.**

For nominal diameters 50 and more, the position of the marker line should be obtained by adding one-third of the insertion length $\ell$  to the zero point length.

Zero point and bonding length



### 4 Cleaning



Clean the inner surface of the fitting and the outer surface of the inserting end of the pipe with a dry cloth. Dirty surface may cause leakage or the disconnection of the pipe and fitting. Wipe off any oil with a small amount of acetone or alcohol. Be careful not to touch the bonding surfaces with oily or wet gloves.

### 5 Applying the adhesive



Always use Tough dyne HT. Do not use other adhesives. Apply the adhesive evenly and thinly around the inner surface of the fitting first and then the outer surface of the inserting end of the pipe. Do not apply the adhesive excessively to the inner surface of the fitting. Excessive adhesive will be pushed into the pipe when the pipe is inserted, which leads to potential cracking (solvent cracking).

#### Amount of adhesive to apply (reference)

Nominal Dia.	13	16	20	25	30	40	50	65	75	100	125	150
Amount	0.6	0.8	1.1	1.6	2.1	3.3	4.8	6.6	8.1	13	20	30

Notes: 1. The above values are for use on each of the inserting surface of the pipes and the surface of the socket.  
2. Prepare 20 to 30% more required amount of adhesive, taking into account the expected loss in actual use.

### 6 Bonding the pipe to the fitting



Push the pipe into the fitting tightly. Check the positions and orientations of the pipe and the fitting, and align their axes so that there is no twisting. Insert the pipe straight into the fitting up to the marker line without a pause. Hold the fitting and the pipe together for the time shown in the table below. After bonding the pipe to the fitting, immediately remove any adhesive coming out of the joint surface.

#### Typical holding time

Nominal Dia.	Time
50 and less	At least 30 sec.
65 -150	At least 60 sec.

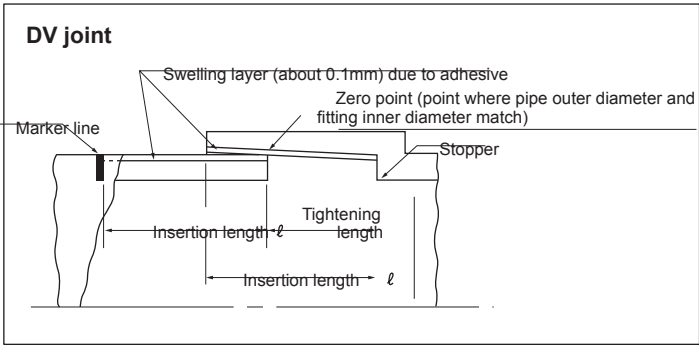
**Due to the tolerance of the fitting, the pipe may not be inserted in to the marker line. If this is the case, stop inserting the pipe there. Do not hammer the pipe into the fitting. The fitting will be subject to large load and may crack.**

### 7 Treatment after bonding

During the bonding work, open both ends of the pipe to remove the solvent vapor of the adhesive from the pipe by natural ventilation or using a blower. Do not move the bonded pipe and fitting for 15 to 30 minutes. If a bending or tension force is applied to the joint immediately after bonding, the bonded surfaces will be separated. After the bonding work, fix the pipe and provide protection against expansion. Check any parts that came into contact with chemicals, such as creosote, to prevent accidents after start of use.

3. Bonding DV Products

3.1 Bonding DV products



Most PVC drain pipes can be joined together using DV fittings. This technique is generally called TS connection, which a pipe is bonded to a DV fitting with a tapered inserted end, using the swelling of the PVC pipe due to the adhesive as well as the elasticity of the pipe.

When a PVC adhesive is applied to a pipe and fitting, a 0.1 mm thick swelling layer is formed on the surface. These layers facilitate the insertion of the pipe into the fitting. After insertion, the swelling layers of the pipe and the fitting mix and melt to combine the bonding surfaces, resulting in excellent water tightness. The insertion lengths of DV fittings are shorter than those of pressure pipe fittings, and the taper angles are smaller than those of pressure pipe fittings (for nominal diameter up to 150 mm). These allow a pipe to be inserted right up to the stopper, forming a flat joint surface. The inner corners of elbows and Y-fittings are round enough to ensure a smooth flow of effluent.

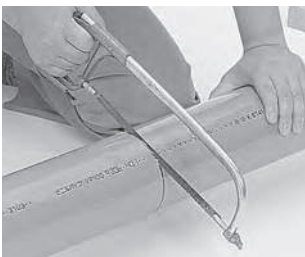
**Note:** DT fittings are designed for drain and vent applications, and should not be used for pressure pipe applications.

3.2 Cutting and chamfering

- (1) Determine the cutting length of the pipe, considering the insertion length of the fitting. Draw a cut line all around the pipe with an oil-based pen to ensure that the pipe will be cut at right angles to the longitudinal axis of the pipe. Use a wide piece of paper or tape when drawing the line.



- (2) Use a saw with fine teeth. Cut the pipe evenly and shallowly all around the circumference along the cut line rotating the pipe.



- (3) Remove burrs and shavings on the cut surface. Chamfer the outer circumference with a chamfering tool (about 1 mm size) or a rasp.



- (4) After chamfering the pipe end, measure the insertion length of the fitting and draw a marker line with an oil-based pen.



3.3 Bonding

- !** (1) Clean the inner surface of the fitting and the outer surface of the inserting end of the pipe with a dry cloth. Wipe off any oil on the pipe with thinner. Make sure that the pipe end has been treated and a marker line indicating the insertion length has been drawn on the pipe.



- ⊘** (2) Apply the adhesive thinly and evenly to the inner surface of the fitting first and then the outer surface of the inserting end of the pipe. For pipes with large nominal diameters, put the adhesive into a larger can and use a larger brush to work efficiently. An animal hair brush should be used. A plastic brush will melt, which reduces the adhesion of the adhesive.



- !** (3) After applying the adhesive, immediately push the pipe into the fitting lightly, and align their axes so that there is no twisting. Then, insert the pipe straight into the fitting to the marker line without a pause. For pipes with larger nominal diameters, two persons should work together to ensure that the pipe is inserted in the fitting to the stopper. Do not hammer in the pipe.
- !** (4) Always keep the force holding the fitting and the pipe together applied for a while after bonding them. Otherwise, the pipe may be disconnected from the fitting due to the tapered inner surface of the fitting. The holding time varies with the amount of adhesive applied, dimensional tolerance and temperature. Typical holding times are shown in the table below. Remove any adhesive coming out the joint surface immediately.



Typical holding time for DV fittings

Nominal Dia.	150 and less
Holding time	At least 30 sec. in summer At least 60 sec. in winter

**Note:** For nominal diameters 200 and more, Tough dyne Yellow, a high-viscosity, slow drying adhesive for large pipes, is typically used. Therefore, the holding time becomes longer.

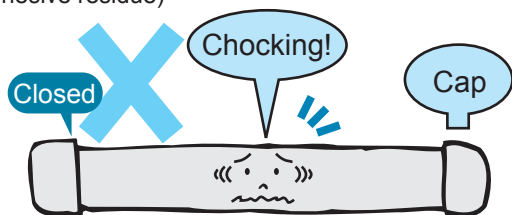


Solvent cracking is a phenomenon which hairline cracks occurs when a solvent is added to objects.

The hairline cracks would grow larger after starting the service and increase the possibility of leakage. For PVC-U or PVC-C pipes, the possibility of leakage increases particularly when the following factors occur.

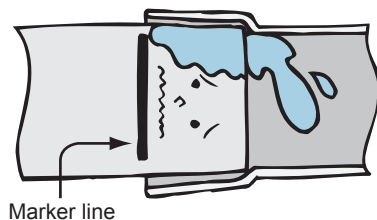
When all these factors are combined, the possibility increases furtherer.

- **Pipe clogging after bonding**  
(adhesive residue)



- **Presence of solvent**

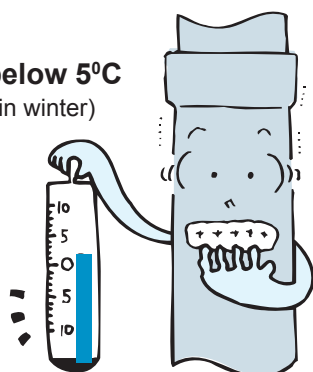
Adhesive coming out of the inner surface of the pipe due to excessive adhesive applied or the presence of chemicals that have adverse effects (such as preservatives) on the surface



- **Unreasonable stress being applied**  
(Thermal stress, pipe flattening, pipe bending)



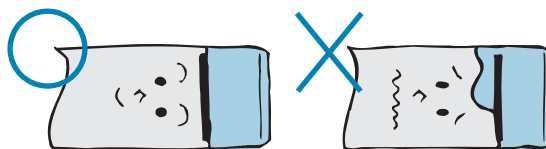
- **Low temperature below 5°C**  
(Particularly piping work in winter)



## During bonding work

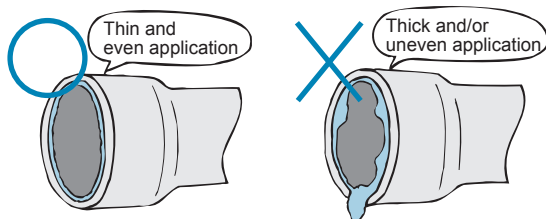
**Position to apply the adhesive on the outer surface of the pipe**

⚠ Do not apply the adhesive beyond the marker line.



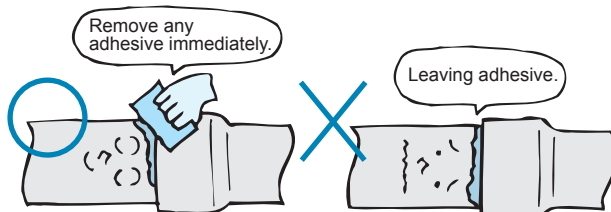
**Adhesive coming out to the pipe inner surface**

⚠ Apply the adhesive thinly and evenly to the inner surface of the TS fittings.



**Removing excessive adhesive**

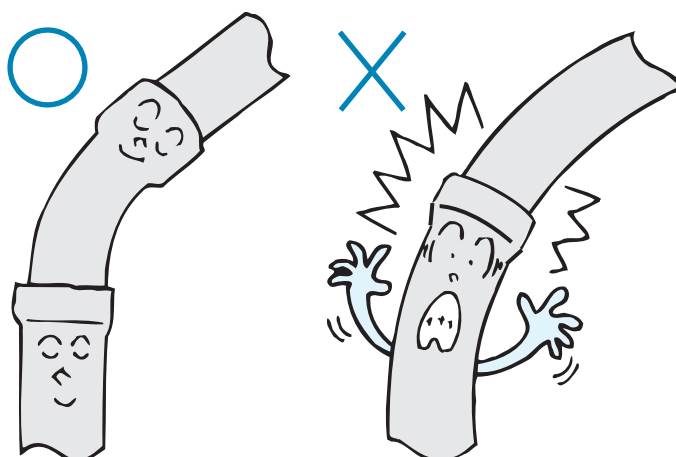
⚠ After inserting the pipe into the fitting, remove adhesive coming out of the joint surface with a cloth.



## During piping work

**Use bends**

⚠ Use bends at pipe corners. Do not bend the pipe.



# Instruction for Handling PVC Adhesive

## ⊘ Do not use adhesives for other applications

PVC and plastic adhesives were developed to bond PVC pipes to PVC fittings, and should not be used for other applications.

## ❗ Use of appropriate adhesives

There are three types of adhesive: one for HI products, one for HT products and one for other products. The adhesives are designed to provide appropriate joint strength to pipes and fittings. Therefore, it is necessary to use the adhesive appropriate for the type of pipe.

## ❗ If adhesive enters the eye

If adhesive enters the eye, do not rub the eye. Seek medical attention immediately.

## ❗ Storage according to laws and regulations

Adhesives are hazardous substances under the Fire Defense Law. Follow applicable laws, regulations and municipal ordinances when storing adhesives.

## ⚠ Ventilation and fire prevention

When using an adhesive, ventilation should be provided to prevent intoxication. Also fire sources should be kept away from organic solvents.

## ❗ Use of gloves

Wear gloves to protect against skin irritation and sores. Do not touch the adhesive directly. If the adhesive touches the skin, wash it off with soap and water immediately.

## ❗ Washing hands and gargling

After using the adhesive, wash your hands and gargle well.

## ❗ Store in a cool and dark place away from fire sources

Adhesives contain organic solvents. After using the adhesive close the lid of the can securely and store it in a cool and dark place indoors. Be sure to keep away from fire sources.

## ⊘ Do not use old and expired adhesives

Do not use an old and expired adhesive that has jelled or that has no pungent solvent odor. Do not thin the adhesive with thinner. This will decrease the adhesion, leading to the pipe disconnection from the fitting and causing leakage.



# KUBOTA

Kubota ChemiX Products  
Adhesives Solution for Building Applications

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