

# Mazda

929

626

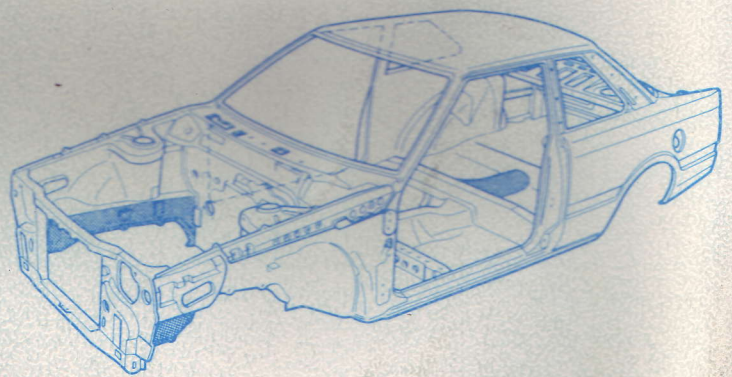
323/GLC

RX-7

E-Series

## Body Shop Manual

High strength steel  
and Plastic parts



# MAZDA





## FOREWORD

This repair manual is to provide Authorized Mazda dealers with the right procedures to repair high-strength steel and plastic parts, which have been incorporated to reduce the weight of the vehicles.

The repair of high-strength steel and plastic parts cannot be done by conventional procedures. And among these materials, different material requires different procedures.

In order for our customers to be satisfied with Mazda Service, we hope this repair manual is understood and fully utilized.

**Mazda Motor Corporation  
HIROSHIMA JAPAN**

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Mazda Motor Corporation  
HIROSHIMA JAPAN



## PLASTIC PARTS

The methods for repairing plastic automotive parts differ with their respective materials. Therefore, it is important to correctly identify each material and properly follow the specified procedures using the right repair parts.

## MATERIAL IDENTIFICATION OF PLASTIC PARTS FOR MAZDA VEHICLES

The part number and the name of the materials are stamped on the reverse side of the part.

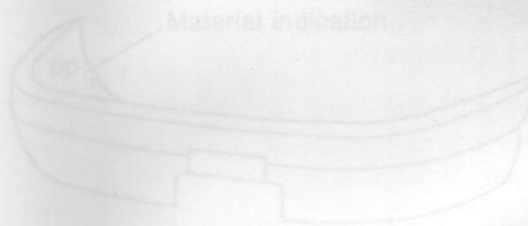
[Example]

# PLASTIC PARTS

Part No.

Material

- Material identification letters are located on a visible place of each part.
- No material identification is provided on parts if such identification letters would ruin their appearance, such as the lens for the combination lamp.





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## PLASTIC PARTS

The methods for repairing plastic automotive parts differ with their respective materials. Therefore, it is important to correctly identify each material and properly follow the specified procedures using the right repair parts.

## MATERIAL IDENTIFICATION OF PLASTIC PARTS FOR MAZDA VEHICLES

The part number and the name of the materials are stamped on the reverse side of the part.

[Example]

H A 7 1 5 0 0 3 1

Part No.

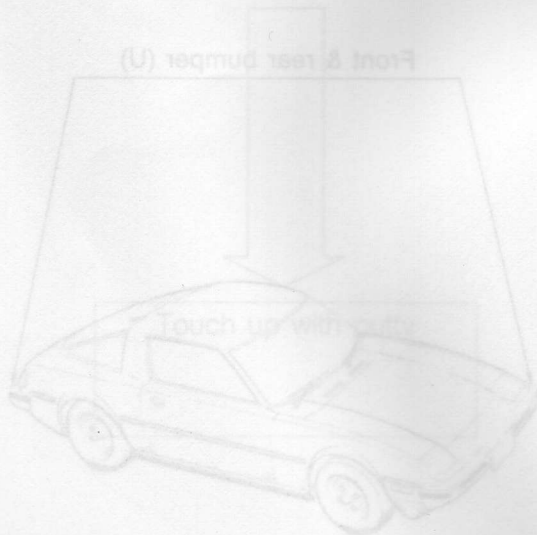
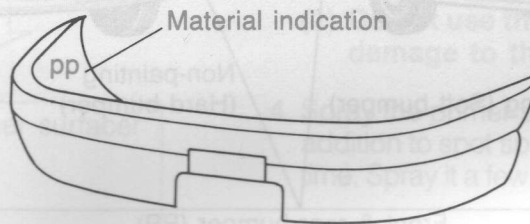
PP

Material

- Material identification letters are located on a visible place of each part.
- No material identification is provided on parts if such identification letters would ruin their appearance, such as the lens for the combination lamp.



3: Decrease the whole surface of the part that needs repair with an appropriate decreasing agent.



Air drying: 30 minutes at 60°C (140°F)  
Forced drying: About 60 hours at 60°C (140°F)

• Paint material for use: Primer or urethane

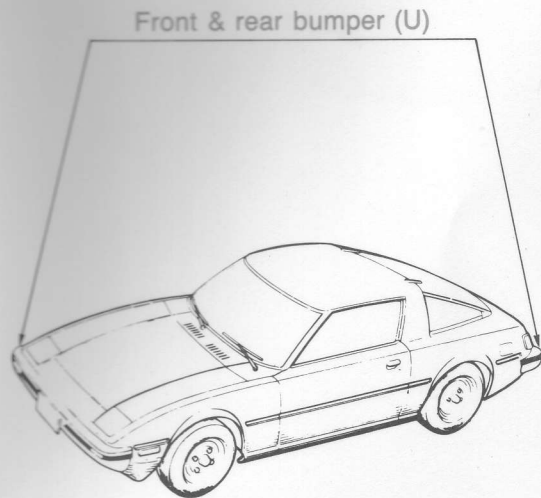
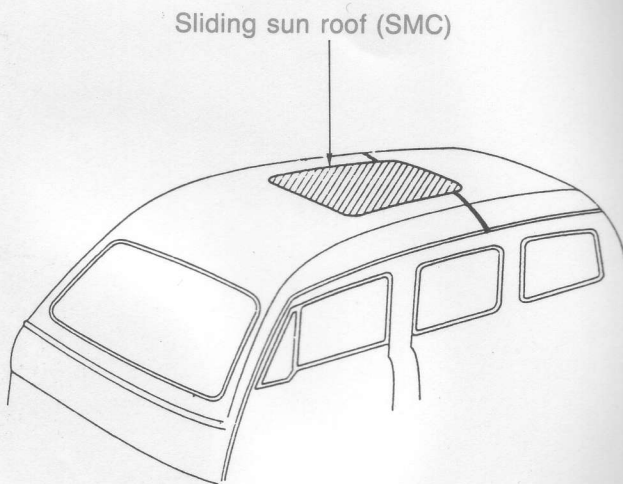
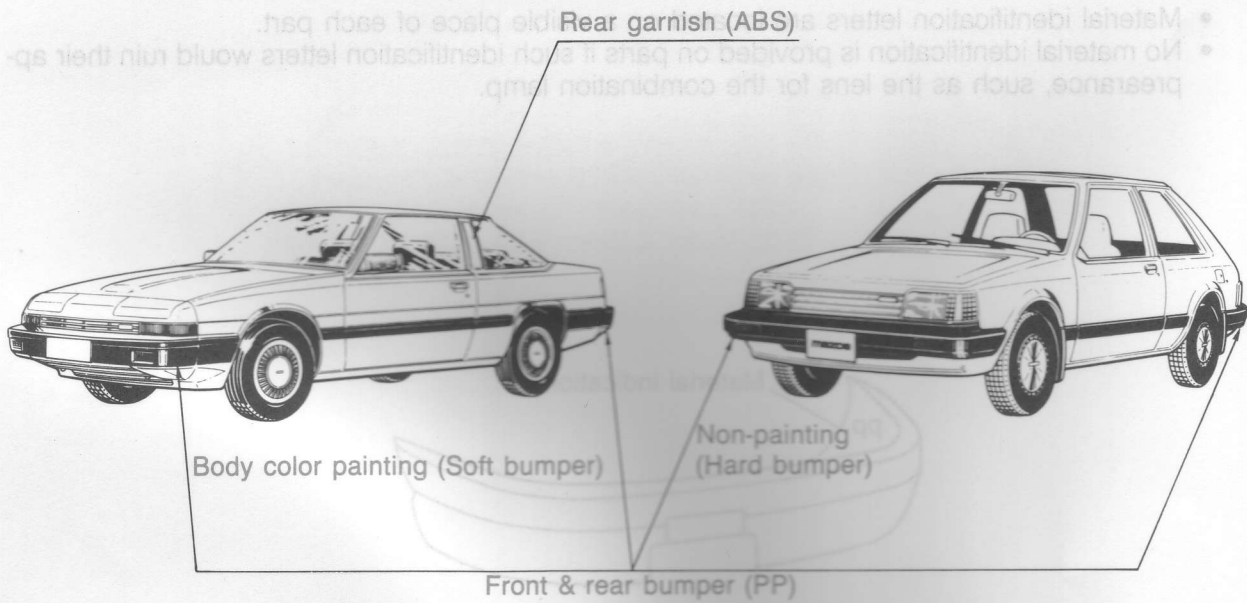
5: If the part that needs repair has concavities, apply primer surface to it and level it alone at 68°F (20°C) for 30 minutes. Then touch it up with putty a few times at intervals of about 10 minutes to make it smooth.

• Drying of touch up with putty: 30 minutes at 20°C (68°F) (Air drying)



# REPAIRABLE PARTS FOR MAZDA VEHICLES AND THEIR MATERIALS

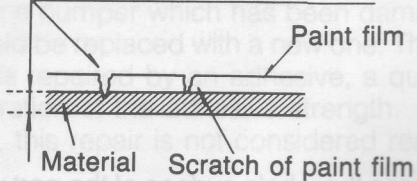
Models	Body parts	Material name	Code
929	Rear pillar garnish	Acrylonitrile Butadien styrene resin	ABS
	Front and rear bumper	Polypropylene	PP
RX-7	Front and rear bumper	Urethane	U
626	Front and rear bumper	Polypropylene	PP
323 GLC	Front and rear bumper	Polypropylene	PP
E-Series	Sliding sunroof	Fiber glass polyastel resin	SMC





## REPAIRING PLASTIC PARTS

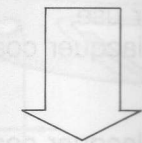
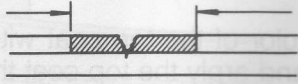
An area less than 1/3 of the material is scratched.



### • Repair procedure

Abrasion of damaged part

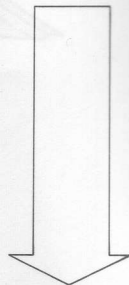
30 ~ 35 mm  
(1.18 ~ 1.38 in)



Degreasing



Coating of primer surfacer



Touch up with putty

### REPAIR FOR ABS AND SMC PARTS

Repairable range for ABS and SMC parts

If the part is damaged as shown in the figure, repair it by painting.

If the damage is more serious, replace the part with a new one.

### • Repairing ABS and SMC Parts

1. Peel off the old paint film around the damaged part with #120 ~ 180 sandpaper.
2. Abrade the old paint film around the damaged part with #240 ~ 280 sandpaper to make it smooth.

### Note

When abrading the old paint film, include an area larger than the place where the primer surfacer is applied.

3. Degrease the whole surface of the part that needs repair with an appropriate decreasing agent.

### Note

- (1) Take care not to degrease the part with a strong solution such as lacquer thinner since it may damage the part.
- (2) Do not use thinners or other chemicals as damage to the surface will result.

4. Spray the primer surfacer on the whole surface in addition to spot spraying. Do not spray it all at one time. Spray it a few times at intervals of five minutes.

### • Drying of primer surfacer

Air drying: 60 minutes at  
20°C (68°F)

Forced drying: About 60 hours at  
60°C (140°F)

### • Paint material for use

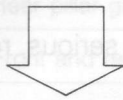
Lacquer primer surfacer or urethane primer surfacer

5. If the part that needs repair has concavities, apply primer surfacer to it and leave it alone at 20°C (68°F) for 30 minutes. Then, touch it up with putty a few times at intervals of about 10 minutes to make it smooth.

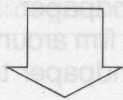
### • Drying of touch up with putty

30 minutes at 20°C (68°F)  
(Air drying)

Abrasion



Degreasing



Top coating

6. Abrade the whole surface of the part with sandpaper that is more than #600.

7. Degrease the whole surface of the part with an appropriate degreasing agent.

**Caution**

**Do not use thinners or other chemicals as damage to the surface will result.**

8. Match the color of the top coat with the vehicle body color and apply the top coat that meets the requirement of Ford viscosity cup No. 4.

- Paint material for use
  - Acrylic lacquer coating or urethane coating
- Drying time
  - Acrylic lacquer coating 60 minutes at 20°C (68°F) (Air drying)
  - Urethane coating
    - Forced drying: 40 minutes at 60°C (140°F)
    - Air drying: 16 minutes at 20°C (68°F)

**Note**

**In the case of forced drying, take care not to put the heat-source excessively close to the object. If it reaches a temperature of 60°C (140°F), it will be deformed.**



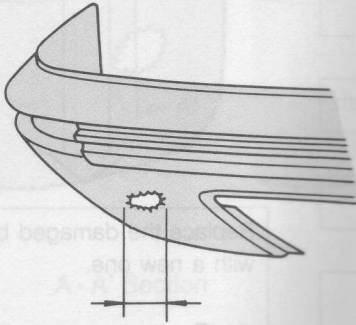
## REPAIRING URETHANE BUMPERS

### REPAIRABLE RANGE FOR URETHANE BUMPERS

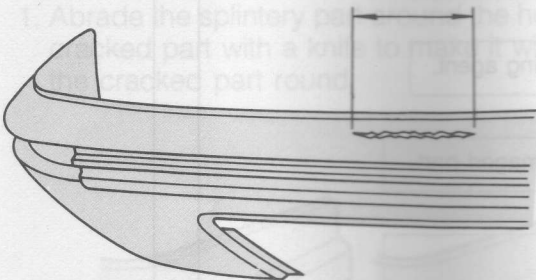
The urethane bumper which has been damaged greater than those shown below should be replaced with a new one. This is because even though such a bumper is repaired by an adhesive, a quality problem will occur due to the deterioration of the adhesive strength.

In addition, this repair is not considered reasonable in terms of workload.

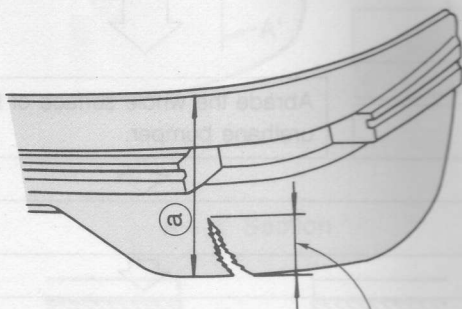
1. A bumper with a hole less than 50 mm (1.97 in) in dia.



2. A bumper with a crack less than 200 mm (7.87 in) in length



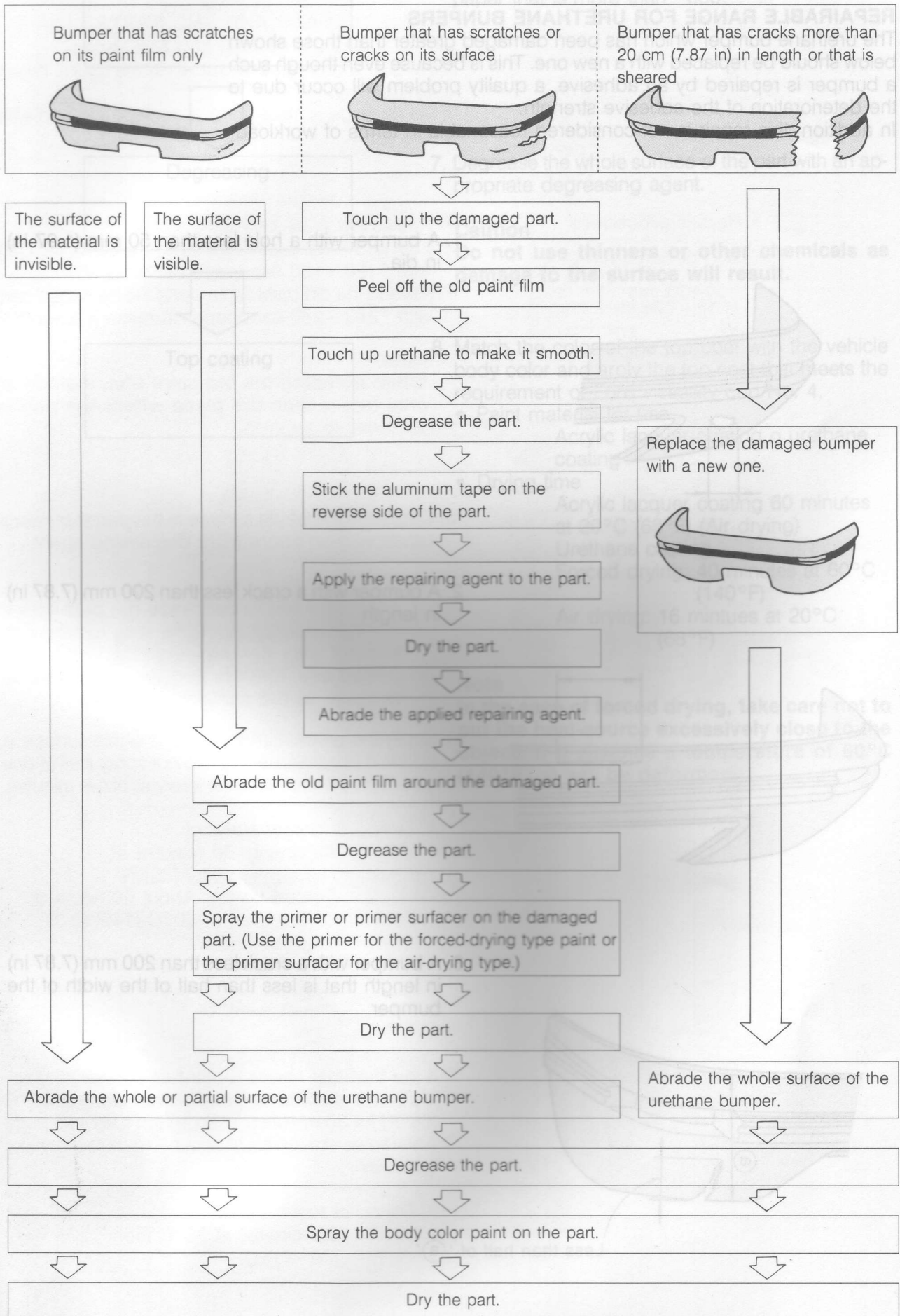
3. A bumper with a crack less than 200 mm (7.87 in) in length that is less than half of the width of the bumper.



Less than half of 'a'

## Procedure for Repairing Urethane Bumpers

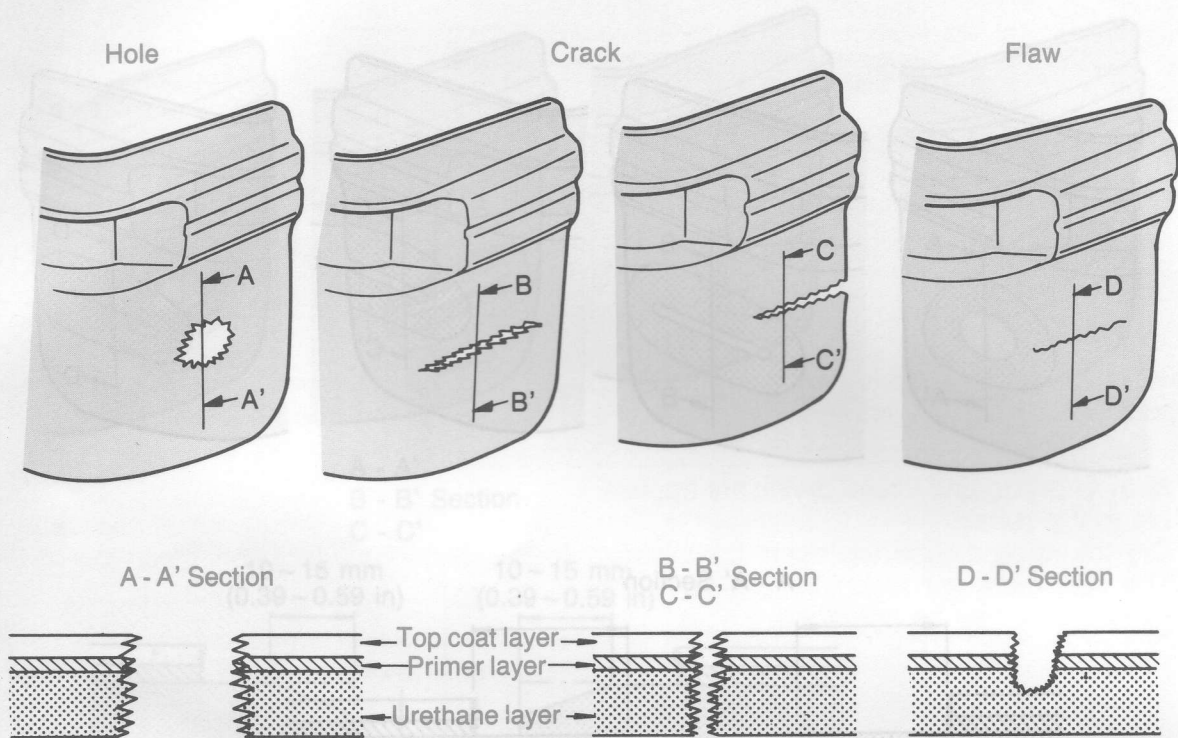
To repair urethane bumpers, take the following procedures:



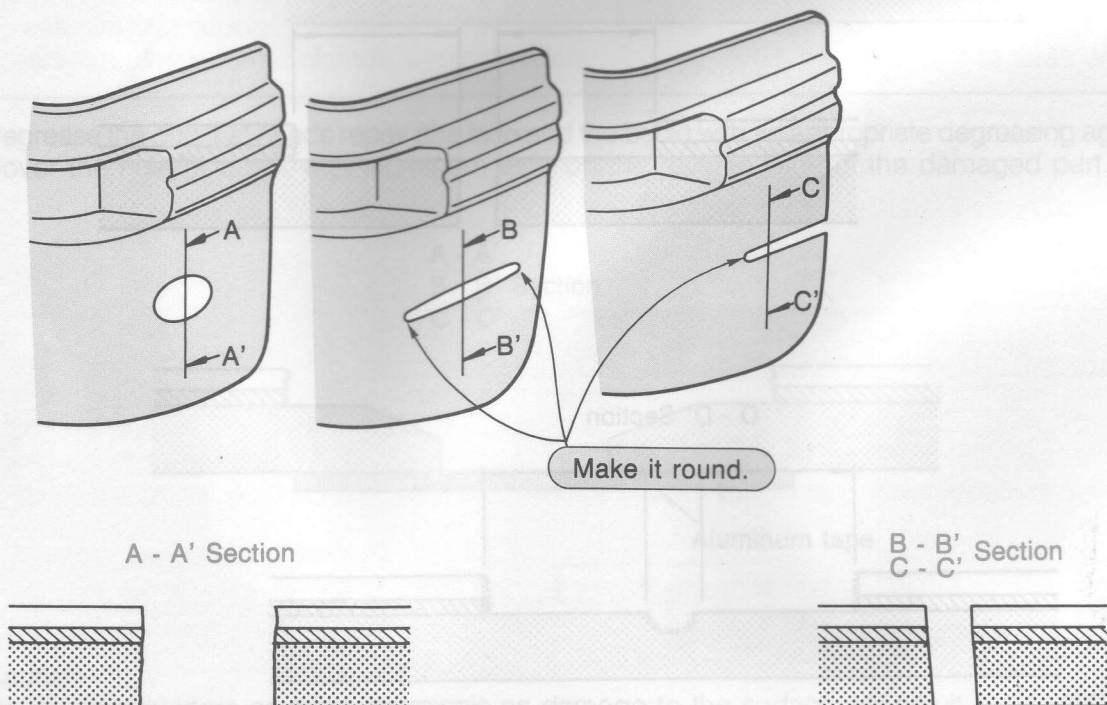


## Repair Manual for Urethane Bumpers

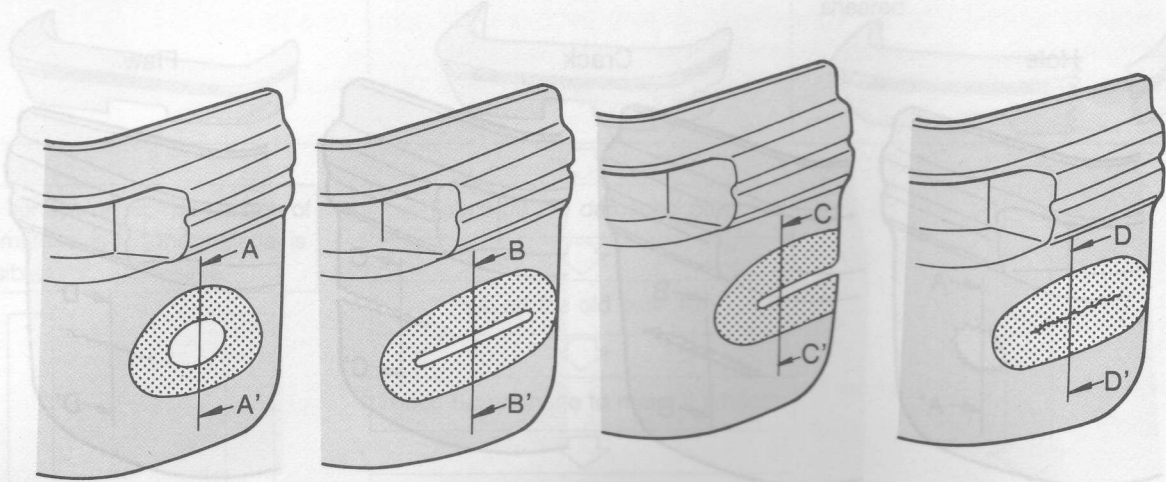
This manual describes the repair for urethane bumpers having flaws that have reached the surface of the urethane and are too serious to be restored by the paint film repair method.



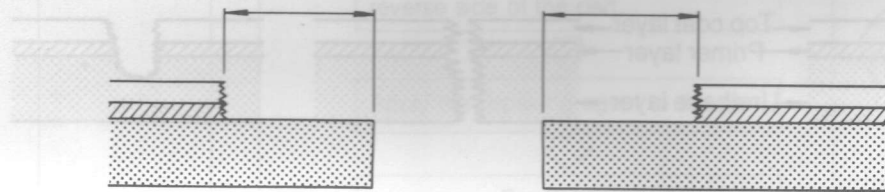
1. Abrade the splintery part around the hole or crack with a knife to make it smooth. Abrade the cracked part with a knife to make it wide enough to fill with an adhesive. make each end of the cracked part round.



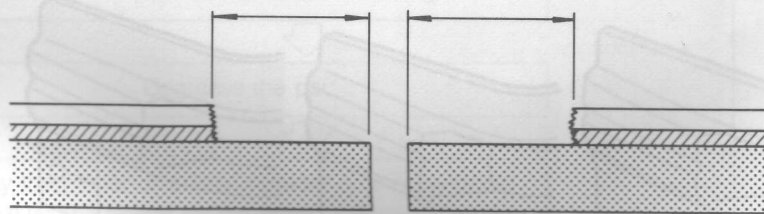
2. Peel off the old paint film around the damaged part (in the range of 30 ~ 35 mm (1.18 ~ 1.38 in)) with #40 ~ #80 sandpaper.



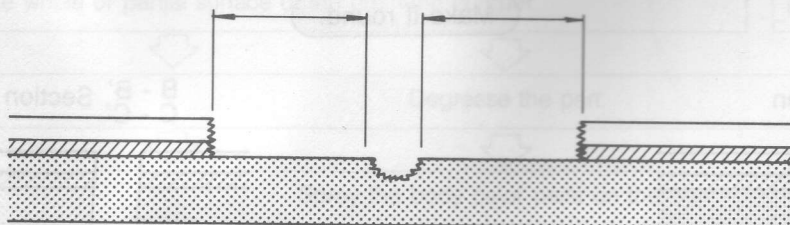
A - A' Section



B - B' Section  
C - C' Section

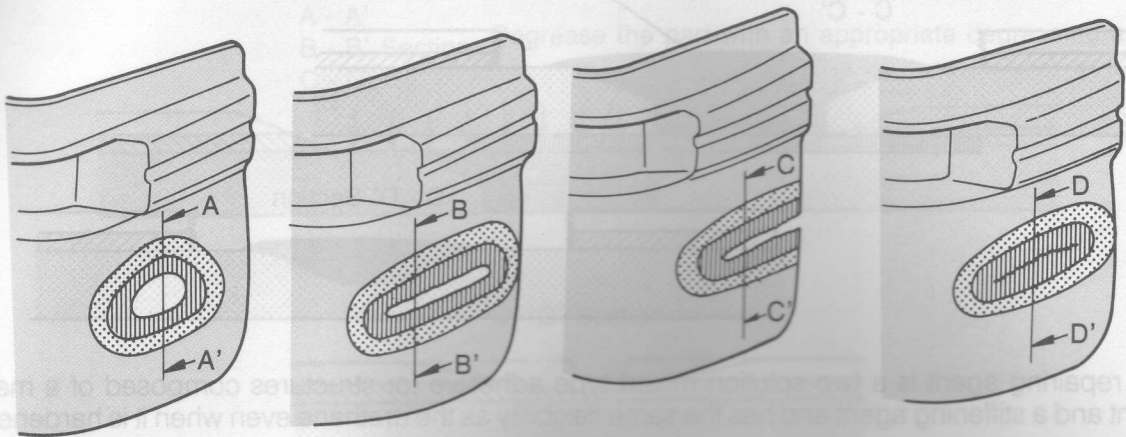


D - D' Section

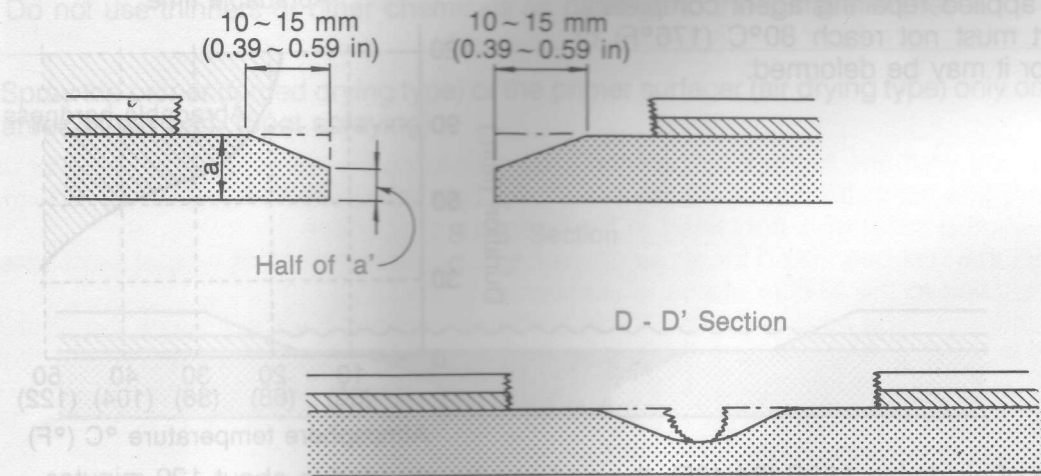




3. Abrade the urethane around the damaged part with #36 ~ #50 sandpaper to make it taper. (Make the adhesive surface wide.)

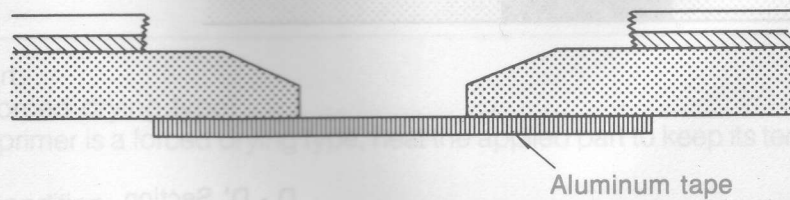


A - A'  
B - B' Section  
C - C'



4. Degrease the part that needs repair (the face and the back) with an appropriate degreasing agent. Cover the hole or crack with aluminum tape on the reverse wide of the damaged part.

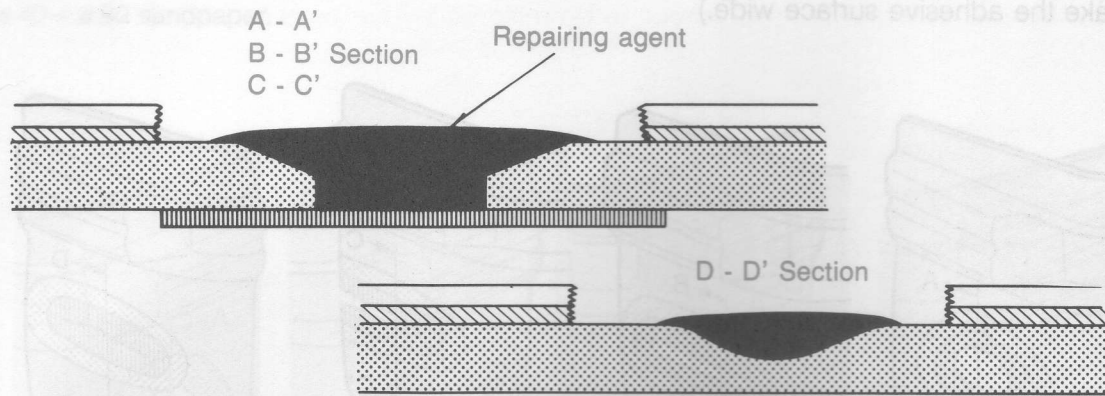
A - A'  
B - B' Section  
C - C'



Caution

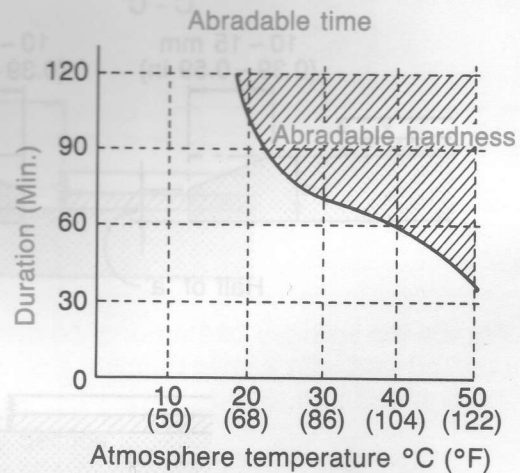
Do not use thinners or other chemicals as damage to the surface will result.

5. Application of repairing agent



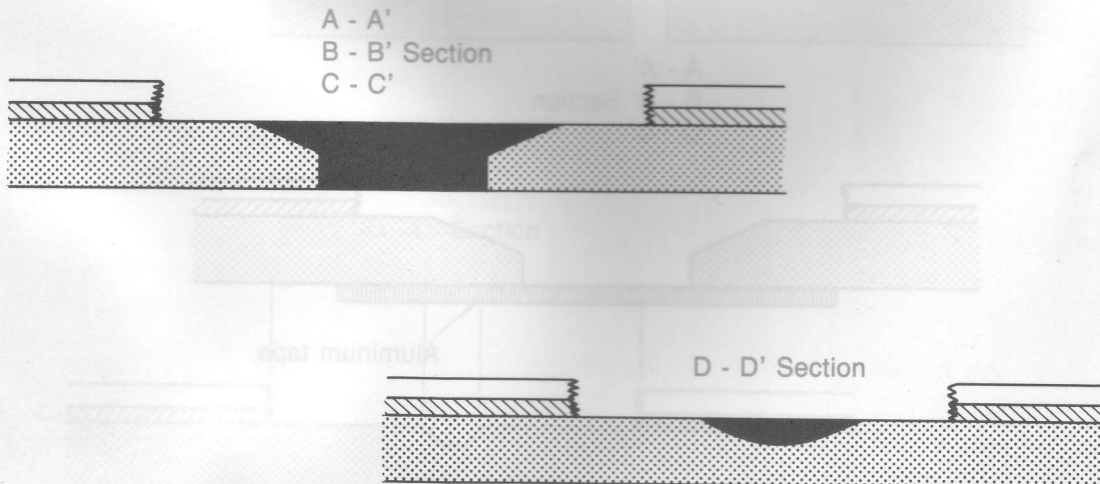
The repairing agent is a two solution mixed type adhesive for structures composed of a main agent and a stiffening agent and has the same flexibility as the urethane even when it is hardened.

6. Both air drying and forced drying are applicable to this repair.  
Dry the applied repairing agent completely.  
The part must not reach 80°C (176°F) or higher, or it may be deformed.



In the case of air drying 18°C (64.4°F), the part can be abraded in about 120 minutes.  
In the case of forced drying 50°C (122°F), the part can be abraded in about 40 minutes.

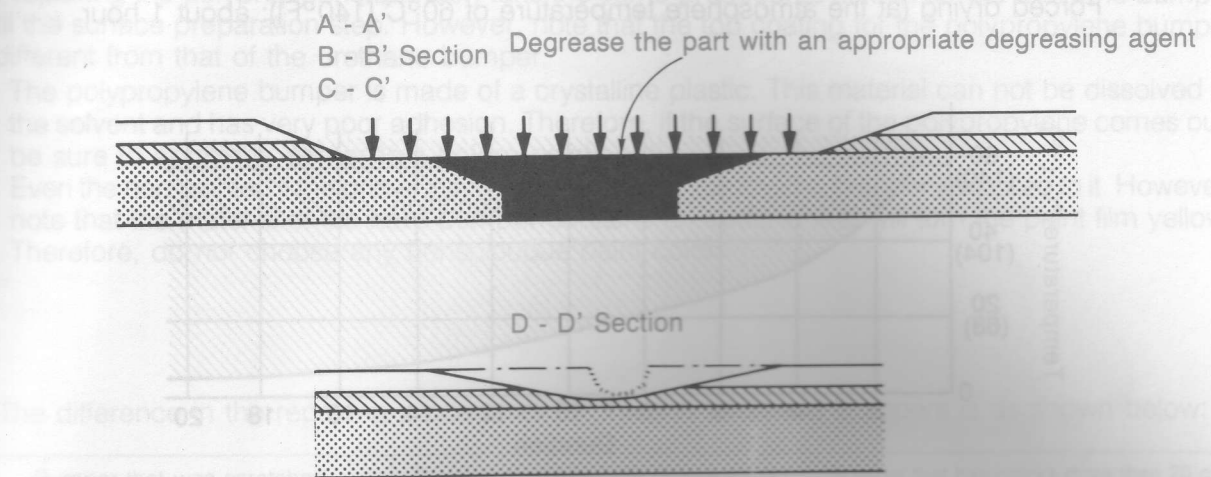
7. After the applied repairing agent is completely dried, abrade the repaired part with #120, #180, and #240 sandpaper in order to make it smooth.



Note  
If the repaired part is made porous, apply the repairing agent to it again as a touch up.



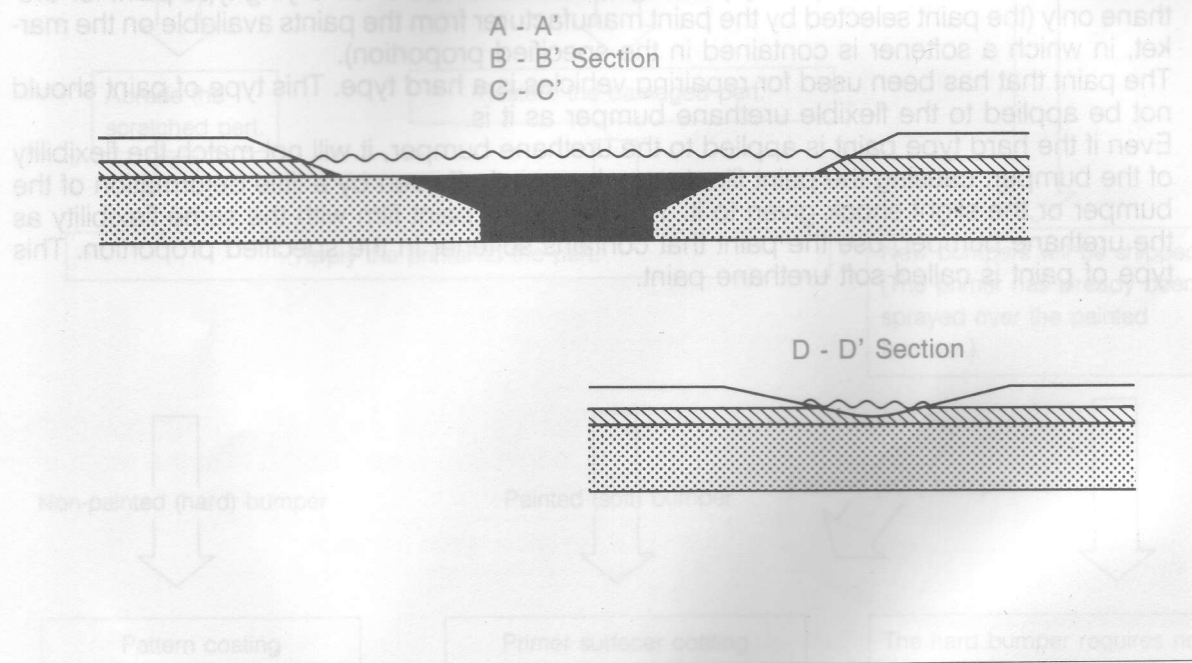
8. Abrade the old paint film around the damaged part with #240 sandpaper to make it smooth. Do the same for bumpers having the damaged paint film only.



**Caution**

Do not use thinners or other chemicals as damage to the surface will result.

9. Spray the primer (forced drying type) or the primer surfacer (air drying type) only on the visible areas of the part. (Spot spraying)



10. Dry the part.

- 1) Primer (Forced drying type)

Since the primer is a forced drying type, heat the applied part to keep its temperature uniform.

Heating condition:

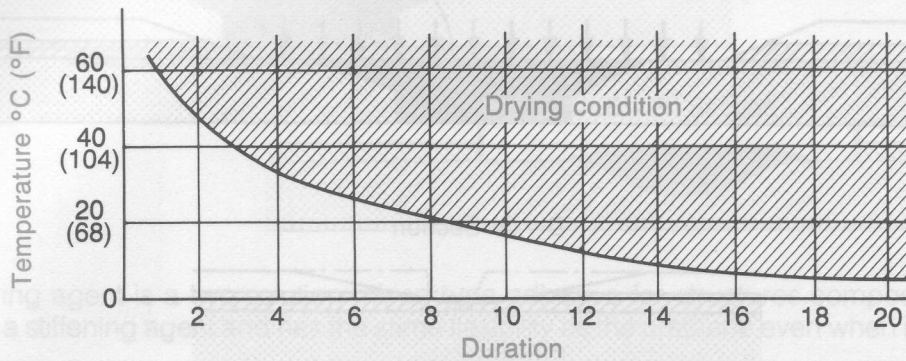
80°C (176°F) (The temperature of the part) × 20 minutes

2) Primer surfacer (Air drying type)

The time required for drying the applied part:

Air drying (at the room temperature of 20°C [68°F]): about 8 hours

Forced drying (at the atmosphere temperature of 60°C [140°F]): about 1 hour



11. Abrade with #400 ~ #600 sandpaper the whole or partial paint film surface of the bumper which was scratched. If the surface of the urethane comes out, touch it up by spraying the primer or primer surfacer over it again.
12. First degrease and then put a top coat on the urethane bumper.

Note

To repair the urethane bumper by painting it, use the forced or air drying type paint for urethane only (the paint selected by the paint manufacturer from the paints available on the market, in which a softener is contained in the specified proportion).

The paint that has been used for repairing vehicles is a hard type. This type of paint should not be applied to the flexible urethane bumper as it is.

Even if the hard type paint is applied to the urethane bumper, it will not match the flexibility of the bumper, causing the paint film to crack or peel off even by a little deformation of the bumper or the slight shock given to it. To provide the paint film with the same flexibility as the urethane bumper, use the paint that contains softener in the specified proportion. This type of paint is called soft urethane paint.



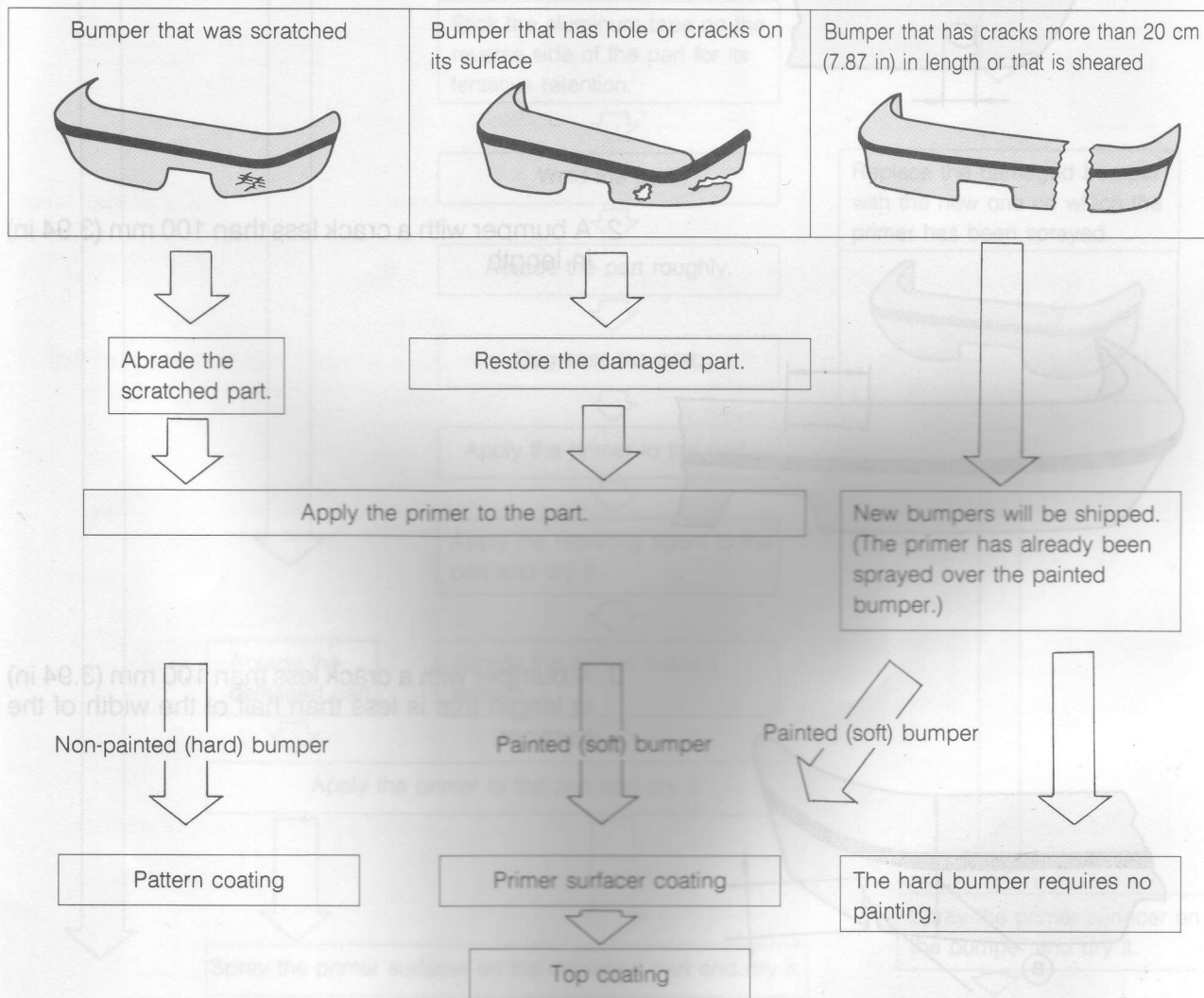
## REPAIRING POLYPROPYLENE BUMPERS

There are two types of polypropylene bumpers for Mazda 929 cars; one is the painted bumper (soft bumper) and the other is the non-painted bumper (hard bumper).

For repairing the polypropylene bumper, take the same procedures as that for the urethane bumper until the surface preparation step. However, note that the top coating for the polypropylene bumper is different from that of the urethane bumper.

- (1) The polypropylene bumper is made of a crystalline plastic. This material can not be dissolved in the solvent and has very poor adhesion. Therefore, if the surface of the polypropylene comes out, be sure to apply the primer to it before painting it.
- (2) Even the non-painted if the primer developed for the polypropylene bumper is applied to it. However, note that the material of the hard bumper contains an additive that will turn the paint film yellow. Therefore, do not choose any conspicuous paint color.

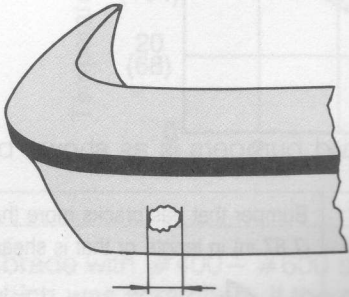
The difference in the repairing procedures for the soft and hard bumpers is as shown below:



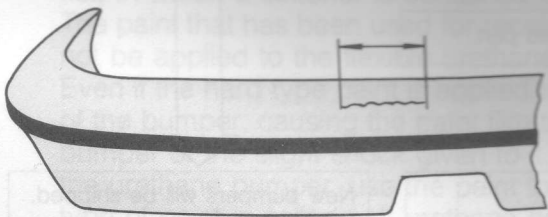
## REPAIRABLE RANGE FOR POLYPROPYLENE BUMPERS

The three types of damaged bumpers shown below are considered repairable. Although the bumper which has been damaged greater than these three could also be repaired, it should be replaced with a new one. This is because such repair would deteriorate the beauty and quality of the bumper due to the decrease of the adhesive strength, etc. In addition, such repair is not considered reasonable in terms of workload.

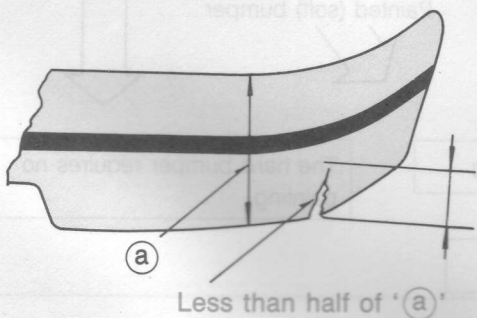
1. A bumper with a hole less than 50 mm (1.97 in) in dia.



2. A bumper with a crack less than 100 mm (3.94 in) in length

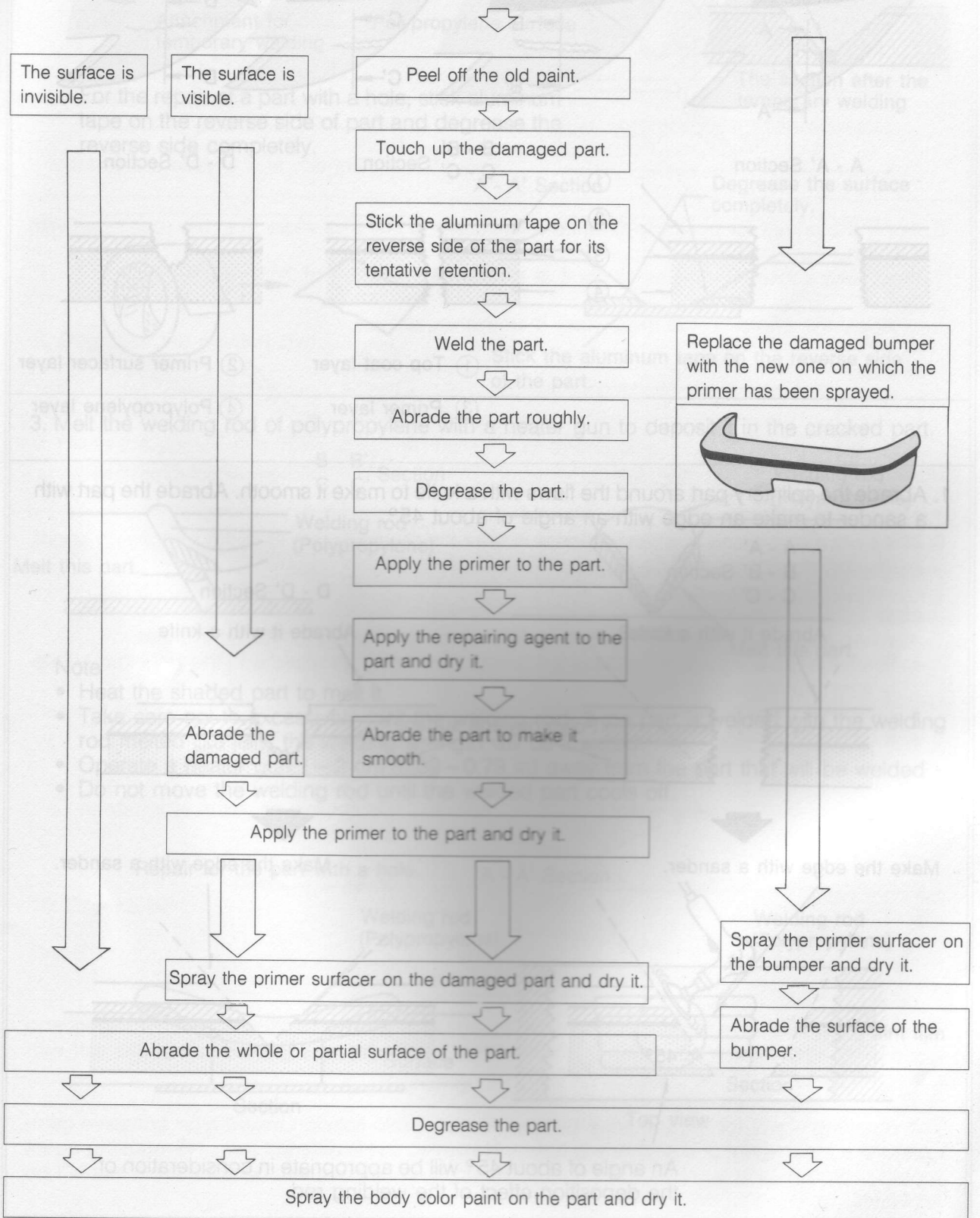
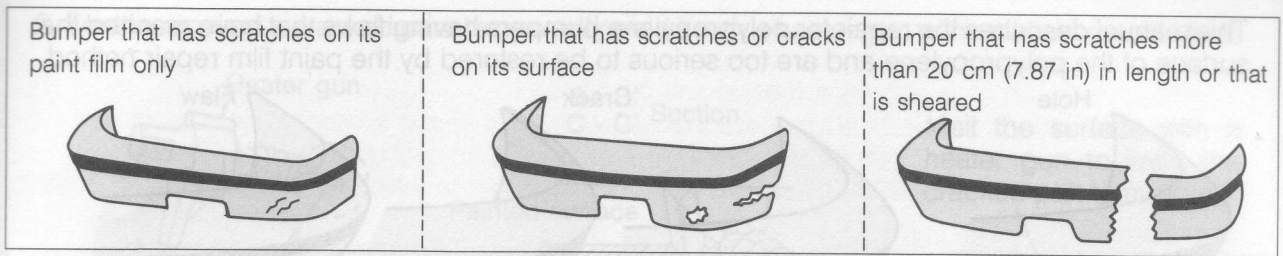


3. A bumper with a crack less than 100 mm (3.94 in) in length that is less than half of the width of the bumper.



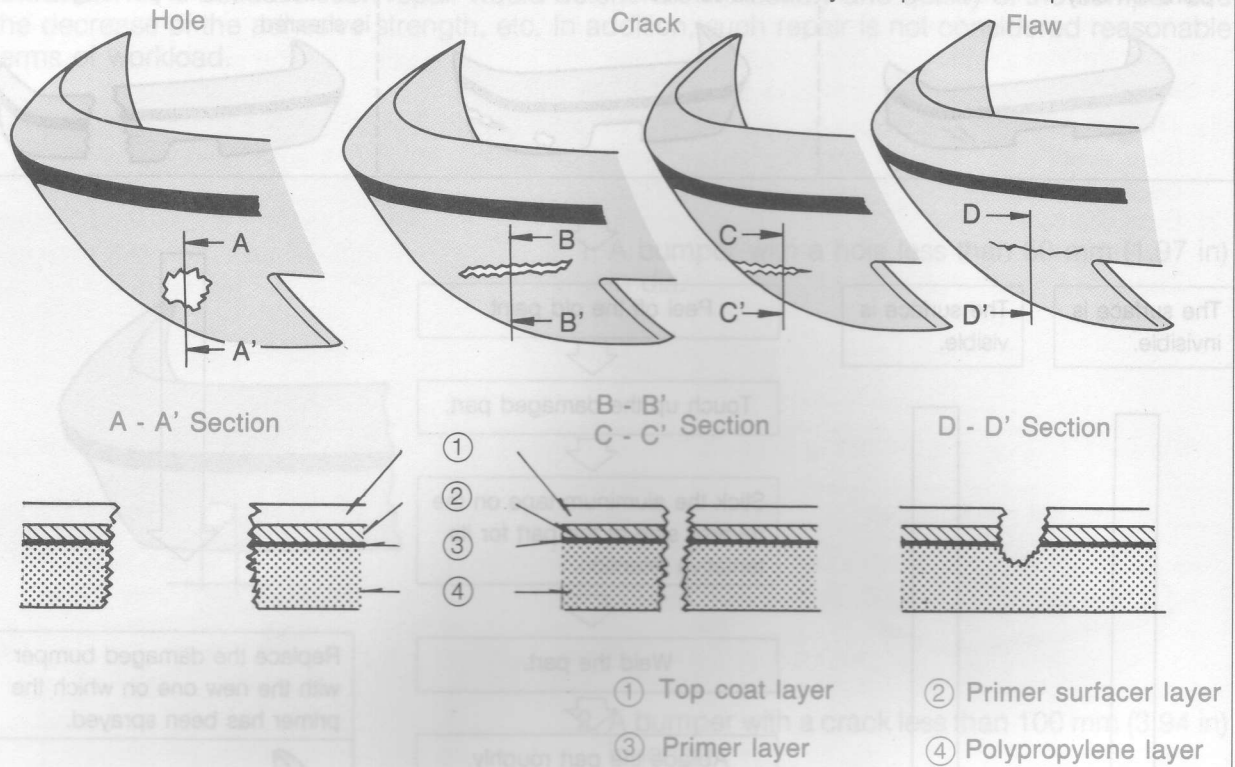


# Procedure for Repairing Polypropylene Bumpers

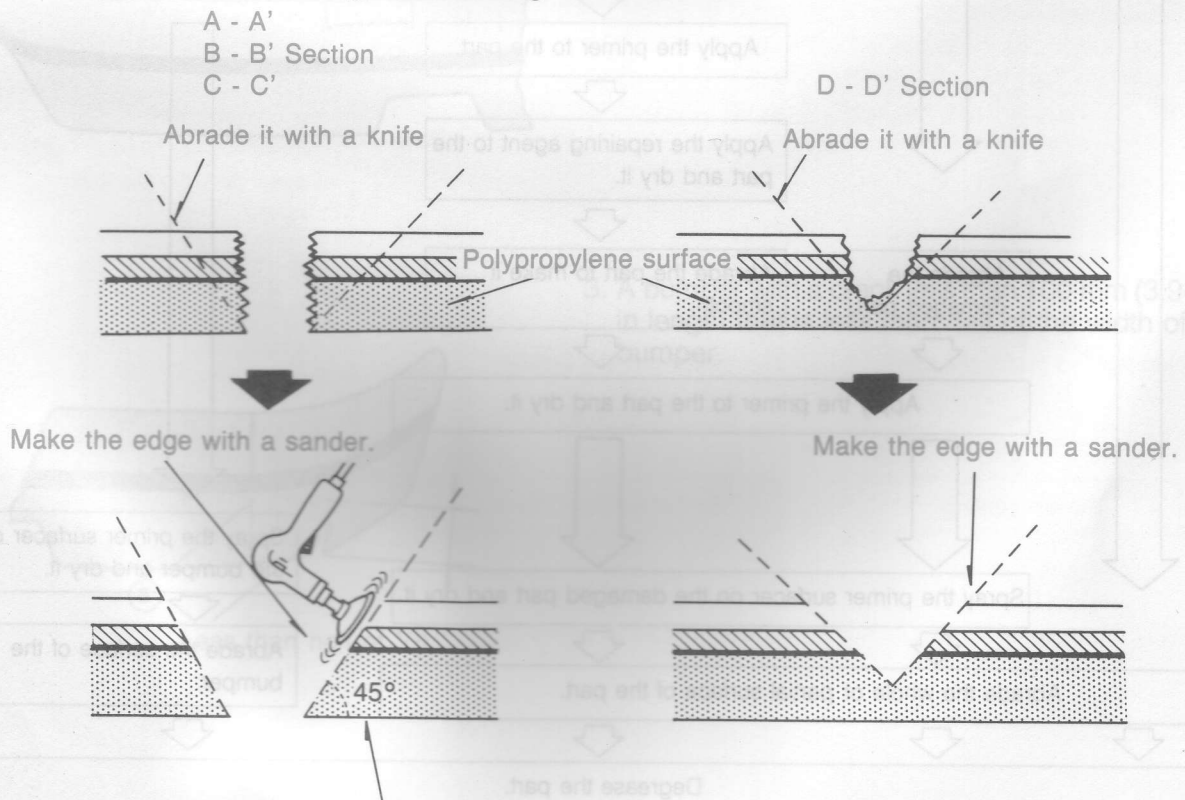


## Repair Manual for Polypropylene Bumpers

This manual describes the repair for polypropylene bumpers having flaws that have reached the surface of the polypropylene and are too serious to be restored by the paint film repair method.



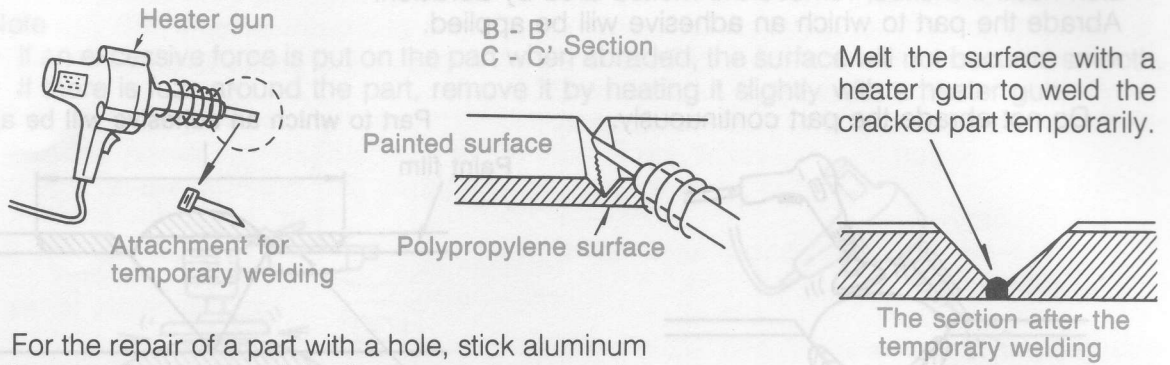
1. Abrade the splintery part around the flaws with a knife to make it smooth. Abrade the part with a sander to make an edge with an angle of about 45°.



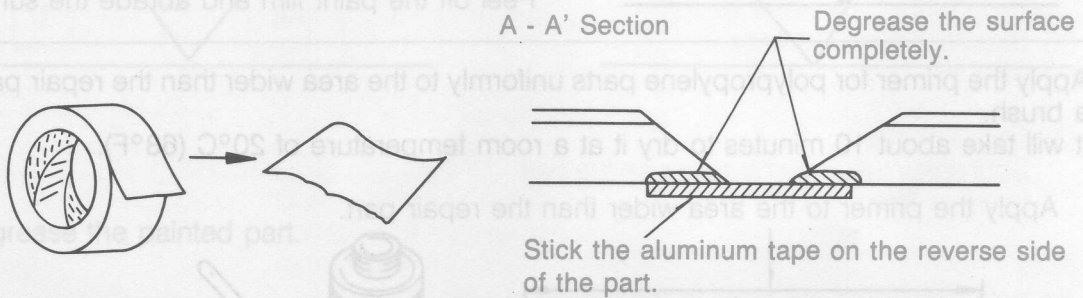
An angle of about 45° will be appropriate in consideration of the deposition effect of the welding rod.



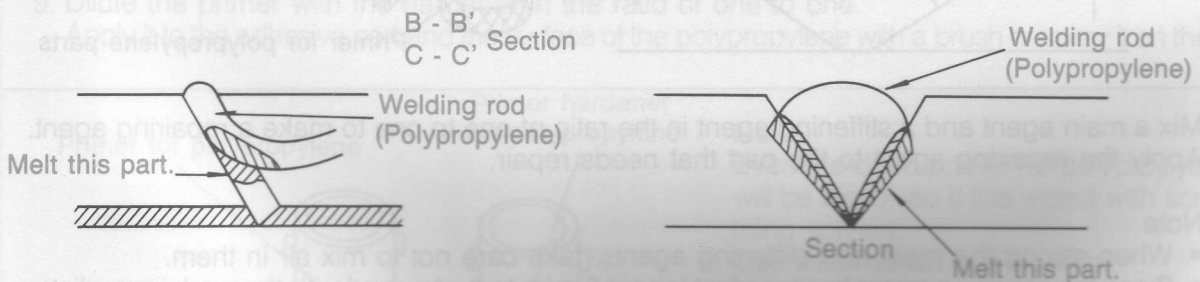
2. For the repair of a cracked part, temporarily weld it with a heater gun with an attachment to fix it.



For the repair of a part with a hole, stick aluminum tape on the reverse side of part and degrease the reverse side completely.



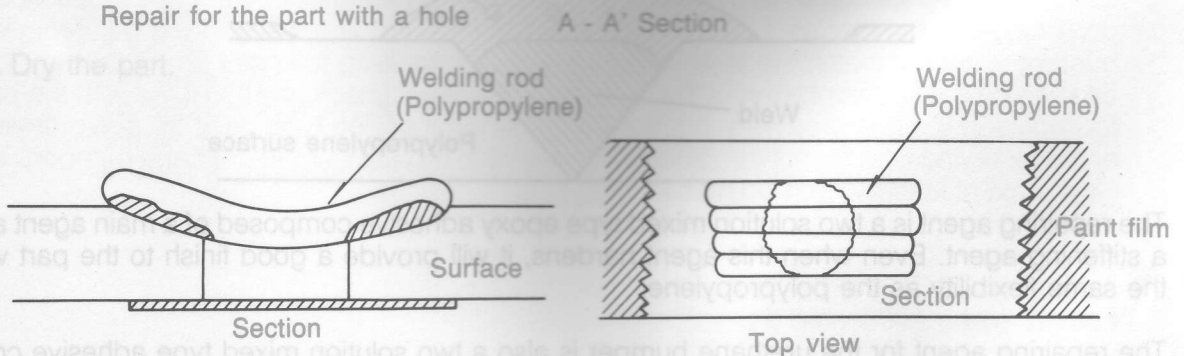
3. Melt the welding rod of polypropylene with a heater gun to deposit it in the cracked part.



**Note**

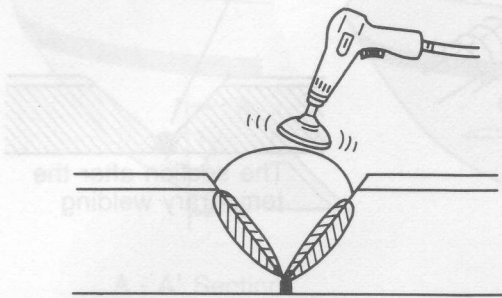
- Heat the shaded part to melt it.
- Take care not to excessively melt the welding rod. If the part is welded with the welding rod melted like jelly, the welding strength will be lowered.
- Operate a heater gun 1~2 cm (0.39~0.79 in) away from the part that will be welded.
- Do not move the welding rod until the welded part cools off.

Repair for the part with a hole

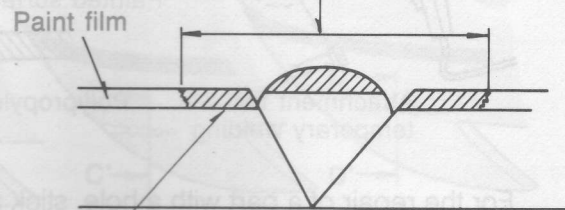


4. Abrade the surface of the polypropylene little by little since it is easily melted even by the abrasion heat. If melted, remove the melted area by abrasion. Abrade the part to which an adhesive will be applied.

Do not abrade the part continuously.



Part to which an adhesive will be applied.

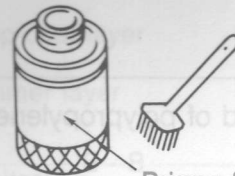
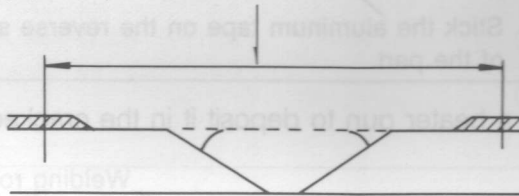


Peel off the paint film and abrade the surface.

5. Apply the primer for polypropylene parts uniformly to the area wider than the repair part with a brush.

It will take about 10 minutes to dry it at a room temperature of 20°C (68°F).

Apply the primer to the area wider than the repair part.

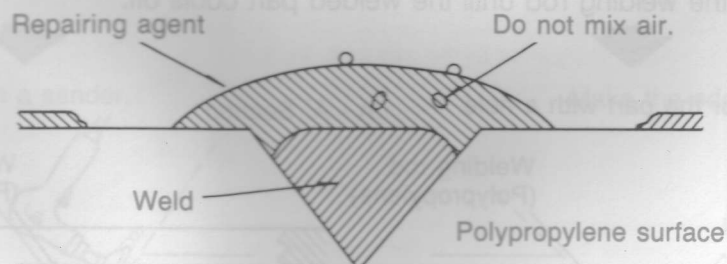


Primer for polypropylene parts

6. Mix a main agent and a stiffening agent in the ratio of one to one to make a repairing agent. Apply the repairing agent to the part that needs repair.

#### Note

- When mixing the main and stiffening agents, take care not to mix air in them.
- Since the repairing agent hardens fast (about 5 minutes), proceed with the work immediately after the mixture of the agents.
- Sufficiently mix the repairing agent to remove bubbles from it before applying it to the part.
- It will take about 30 minutes to dry it at 20°C (68°F) until it can be abraded.



The repairing agent is a two solution mixed type epoxy adhesive composed of a main agent and a stiffening agent. Even when this agent hardens, it will provide a good finish to the part with the same flexibility as the polypropylene.

The repairing agent for the urethane bumper is also a two solution mixed type adhesive composed of a main agent and a stiffening agent. However, this is different from the repairing agent for the polypropylene bumper. If the right repairing agent is not used, no adhesive effect will be provided.

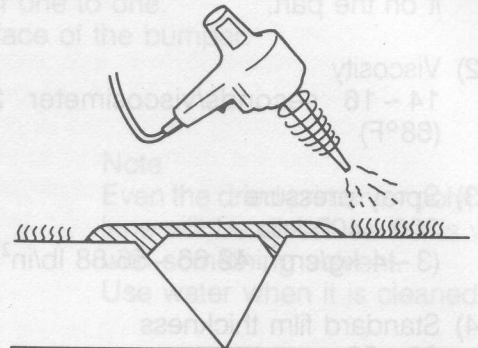
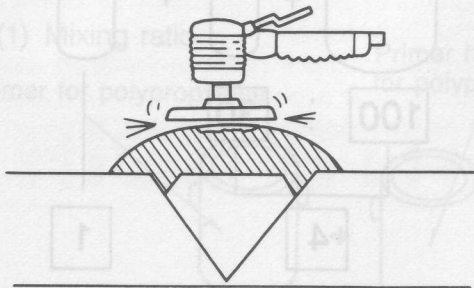


## REPAIR MANUAL FOR HARD BUMPERS (NON-PAINTED TYPE)

7. After abrading the part with # 120 sandpaper, make it smooth with # 180 ~ # 240 sandpaper.

**Note**

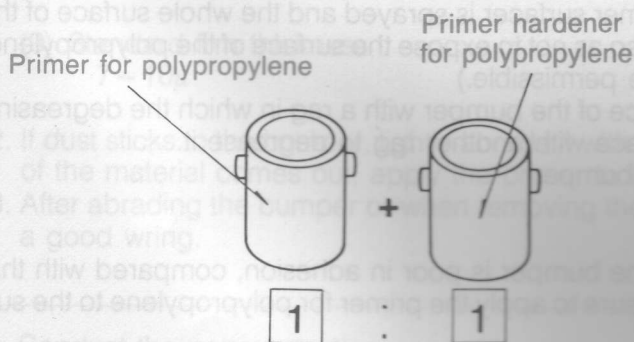
- If an excessive force is put on the part when abraded, the surface will not become smooth.
- If there is fuzz around the part, remove it by heating it slightly with a heater gun.



8. Degrease the painted part.

9. Dilute the primer with the hardener in the ratio of one to one.

Apply it to the adhesive part and the surface of the polypropylene with a brush or spray it on them.



**Note**

- Even the dried primer for polypropylene will be dissolved if it is wiped with something solvent.
- Use water when it is cleaned.

Use the primer within 16 hours once the hardener is mixed in it.

10. Dry the part.

**Note**  
As described for the drying of the primer surface, conduct the air drying when possible since forced drying could cause bubbles in the top coat.

11. Add the softener in the urethane primer surfacer and spray it on the part that needs repair.

(1) mixing method

Urethane primer surfacer +  
Softener ..... Solution A  
Solution A + hardener ..... Solution B  
Dilute solution B with thinner and spray  
it on the part.

(2) Viscosity

14~16 seconds/viscosimeter 20°C  
(68°F)

(3) Spray pressure

300~400 kpa  
(3~4 kg/cm<sup>2</sup>, 42.66~56.88 lb/in<sup>2</sup>)

(4) Standard film thickness

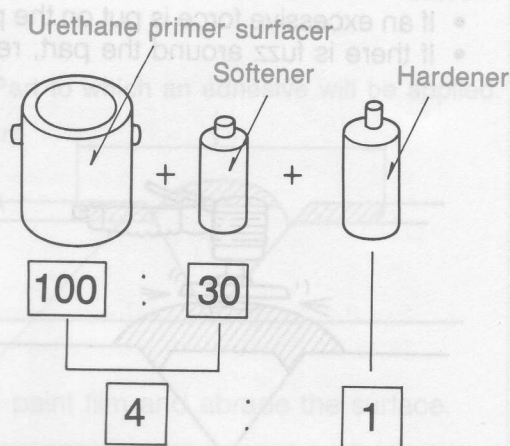
30~50μ

(5) Spray method

Spot spray the primer surfacer on the part  
three or four times.

Note

Be sure to mix the solutions in the specified ratio.



12. Air drying 20°C (68°F) — 8 hours at min.

Forced drying 60°C (140°F) — 1 hour

13. Lightly abrade the part on which the primer surfacer is sprayed and the whole surface of the bumper with #400~#600 sandpaper so as not to expose the surface of the polypropylene. (Both wet sanding and dry sanding are permissible.)

14. Prepare two rags. Wipe the whole surface of the bumper with a rag in which the degreasing agent is soaked. Quickly wipe the surface with another rag to degrease it.

15. Apply a top coat to the polypropylene bumper.

Note

The paint for repairing the polypropylene bumper is poor in adhesion, compared with that for the urethane bumper. Therefore, be sure to apply the primer for polypropylene to the surface of the bumper.

Other paints for repairing the polypropylene bumper are the same as those for the urethane bumper.

As described in the repair manual for the urethane bumper, the paint that has been used for repairing vehicles is a hard type. This type of paint should not be applied to the flexible polypropylene bumper as it is. Even if the hard type paint is applied to the polypropylene bumper, it will not match the flexibility of the bumper, causing the paint film to crack or peel off even by a little deformation of the bumper or the slight shock given to it. As with the paint for repairing the polypropylene bumper, use the force drying type paint for polypropylene or the air drying type for polypropylene (this can also be used for the urethane bumper). This type of paint is called soft urethane paint.

16. Air drying 20°C (68°F) — 8 hours at min.

Forced drying 60°C (140°F) — 1 hour

Note

As described for the drying of the primer surfacer, conduct the air drying when possible since forced drying could cause bubbles in the top coat.

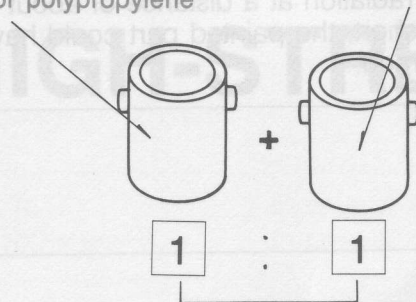


## REPAIR MANUAL FOR HARD BUMPERS (NON-PAINTED TYPE)

For the soft and hard bumpers that have been damaged to the surfaces of their respective materials, do the same procedures and use the same materials do for the surface preparation (the application of the primer). This manual describes only the procedure for the top coat. (For the procedures for the surface preparation, refer to the preceding description.)

1. Dilute the primer with the hardener in the ratio of one to one.  
Spray it on the adhesive part and the whole surface of the bumper.

(1) Mixing ratio  
Primer for polypropylene  
Primer hardener  
for polypropylene



Note

Even the dried primer for polypropylene will be dissolved if it is wiped with something solvent.

Use water when it is cleaned.

Use the primer within 16 hours once the hardener is mixed in it.

- (2) Spray the primer on the bumper at a pressure of 200 ~ 300 kpa (2 ~ 3 kg/cm<sup>2</sup>, 28.44 ~ 42.66 lb/in<sup>2</sup>) a few times.
  - (3) Standard film thickness  
7 ~ 10 $\mu$
2. If dust sticks to the bumper, lightly abrade it with more than # 1000 sandpaper. If the surface of the material comes out, apply the primer to it again.
  3. After abrading the bumper or when removing the dust from it, wipe it with the wet cloth given a good wring.

#### 4. Conduct the pattern coating

##### (1) Spray conditions

Air pressure (initial pressure)

150 kpa (1.5 kg/cm<sup>2</sup>, 21.33 lb/in<sup>2</sup>)

Spray amount

4 turns

Spray distance

15 ~ 20 cm (5.91 ~ 7.87 in)

Number of sprays

4 times at intervals of 5 minutes (Each coat should be thin.)

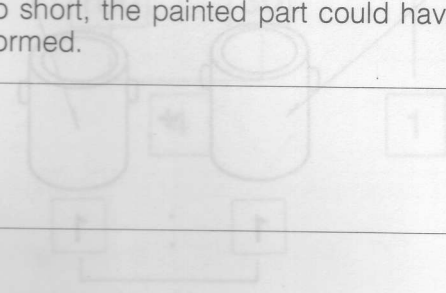
(2) Spray procedure for pattern coating

- Before pattern coating, conduct a trial coating to make sure of the pattern.
- Spray the paint repeatedly to make the pattern. Do not spray it all at one time.
- Note that if the number of sprays are increased (the film thickness becomes thick), the sprayed surface will become glossy.
- When the temperature is low, spray the paint at intervals of 10 minutes, which are a little longer than usual. If the period of intervals is short, the pattern will become large or be deformed.
- When the temperature is low, warm up the material of the bumper to a temperature of 40~50°C (104~122 °F) to proceed with the work faster.
- When conducting the forced drying on the delustering black paint by infrared radiation, expose the painted part to the infrared radiation at a distance of about more than 50 cm (19.69 in). If the distance is too short, the painted part could have an uneven luster or the bumper could be deformed.

5. Dry the sprayed part.

Air drying: 20°C (68°F) × 16 hours

Forced drying: 60°C (140°F) × 1 hour



(5) Spray method

Spot spray the primer surface on the part three or four times.

Note

Be sure to mix the solutions in the specified ratio.

(2) Spray the primer on the bumper at a pressure of 200~300kPa (2~3kg/cm<sup>2</sup>, 28.4~42.6psi) a few times.

13. Lightly sand the whole surface of the bumper with 400 # sandpaper so as to expose the primer surface. (Both wet sanding and dry sanding are permissible.)

14. Prepare two rags. Wipe the whole surface of the bumper with a rag in which the degreasing agent sticks to the bumper lightly. Wipe the bumper with a rag which has been dipped in the solvent.

15. Apply a top coat to the polypropylene bumper or when removing the dust from it with the wet cloth given a good wipe.

Note

The paint for repairing the polypropylene bumper is poor in adhesion, compared with that for repairing the urethane bumper. Therefore, be sure to apply the primer to the face of the bumper.

4. Conduct the pattern coating under the following conditions.

(1) Spray conditions

Air pressure (initial pressure): 200~300kPa (2~3kg/cm<sup>2</sup>, 28.4~42.6psi)

As described in the repair manual for urethane bumper, the repair manual for repairing urethane bumper is applicable to repairing polypropylene bumper.

Number of sprays: 2~3 times (Spray at intervals of 5 minutes (Each coat should be dried for 10 minutes at intervals of 5 minutes))

16. Air drying 20°C (68°F) — 16 hours at min.

Forced drying: 60°C (140°F) — 1 hour

Note

As described in the repair manual for urethane bumper, when possible, forced drying could cause bubbles in the top coat.



## HIGH-STRENGTH STEEL

One of the effective measures to improve the fuel economy of automobiles is to reduce vehicle weight. Although plastic materials have been used for vehicle weight reduction, however, until the use of plastic materials is limited, it is more effective to reduce the weight of the steel, which constitutes most parts of the vehicle body.

Whereas this, the thickness of the vehicle's steel should be reduced without drawing in strength. To meet this requirement, high-strength steel has begun to be used for the vehicle body. In recent years, high-strength steel with the weight of 30~100 kg/mm<sup>2</sup> is used as shown below. This has been helping reduce vehicle weight and improve shock resistance and safety.

	Low strength steel	Mid strength steel	High strength steel
Tensile strength	kg/mm <sup>2</sup>	26~30	30~100
Thickness to strength 100 kg/mm <sup>2</sup>		In case of 1.2mm (0.047in) In case of 1.4mm (0.055in)	About 1.0mm (0.039in) About 1.2mm (0.047in)
Rate of weight reduction		—	About 10%

(2) Spray procedure for pattern coating

- Before pattern coating, conduct a trial coating to make sure of the pattern.
- Spray the paint repeatedly to make the pattern. Do not spray it all at one time.
- Note that if the number of sprays are increased (the film thickness becomes thick), the sprayed surface will become glossy.
- When the temperature is low, spray the paint at intervals of 10 minutes, which are a little longer than usual. If the period of intervals is short, the pattern will become large or be deformed.
- When the temperature is low, warm up the material of the bumper to a temperature of 40 ~ 50°C (104 ~ 122 °F) to proceed with the work faster.
- When conducting the forced drying on the delustering black paint by infrared radiation, expose the painted part to the infrared radiation at a distance of about more

**HIGH-STRENGTH STEEL**

5. Dry the sprayed part.

Air drying: 20°C (66°F) × 16 hours

Forced drying: 60°C (140°F) × 1 hour



## HIGH-STRENGTH STEEL

One of the effective measures to improve the fuel economy of automobiles is to reduce vehicle weight. Aluminium and plastic materials have been used for vehicle weight reduction. However, since the use of these light materials is limited, it is more effective to reduce the weight of the steel, which occupies about 50% of the vehicle body.

To achieve this, the thickness of the vehicle's steel should be reduced without drawing its strength. To meet this requirement, high-strength steel has begun to be used for the vehicle body.

For Mazda vehicles, high-strength steel with the weight of 30 ~ 100 kg/mm<sup>2</sup> is used as shown below. This has been helping reduce vehicle weight and improve shock resistance and safety.

Item	Mild steel	High-strength steel
Tensile strength    kg/mm <sup>2</sup>	28 ~ 30	30 ~ 100
Thickness to strength 100 kg/mm <sup>2</sup>	In case of 1.2mm (0.047in) In case of 1.4mm (0.055in)	About 1.0mm (0.039in) About 1.2mm (0.047in)
Rate of weight reduction	_____	About 10%

## VEHICLE BODY PARTS TO WHICH HIGH-STRENGTH STEEL IS APPLIED

Powerfulness to pull and stretch	portion	parts	models		
			323	626	
35 ~ 45 kg/mm <sup>2</sup>	Body outer-panel	Front fender		○	
		Hood		○	
		Trunk lid			
		Back door	○		
			Cross member NO. 1		
			Front side frame	○	○
			Front side frame (B)		○
			Front side frame lower	○	
			Rear side frame		○
			Rear side frame (A)	○	
			Rear side frame (B)	○	
		Body frame	Front wheel aprons Reinforcement	○	
			Hinge pillars inner		
			Front pillars inner	○	
			Roof rails inner		
			Center pillars inner		
			Front header		
			Roof reinforcement	○	
			Tunnel reinforcement		○
			Rear end plate		
50 ~ 100 kg/mm <sup>2</sup>		Disk wheel	○	○	
		Door impact bar	○	○	
		Bumper beam	○	○	



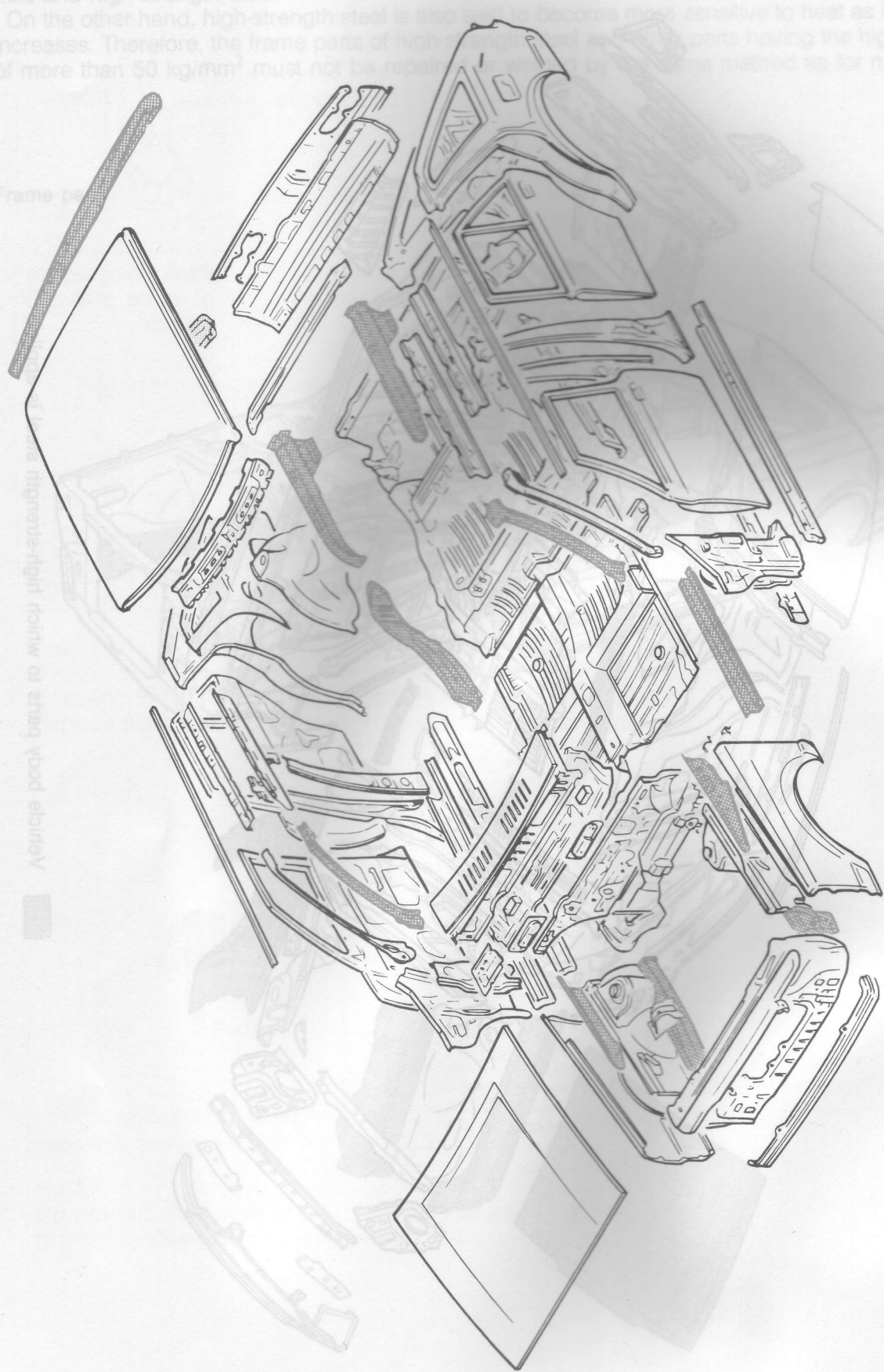
## REPAIRING HIGH-STRENGTH STEEL

### MAZDA 323

High-strength steel is said to be so hard that it is difficult to repair. However, recently developed high-strength steel is superior in ductility and formability. Therefore, there has been little difference between mild and high-strength steel.

On the other hand, high-strength steel is also said to become more sensitive to heat as its strength increases. Therefore, the frame parts of high-strength steel and other parts having the high strength of more than 50 kg/mm<sup>2</sup> must not be repaired by the same method as for mild steel.

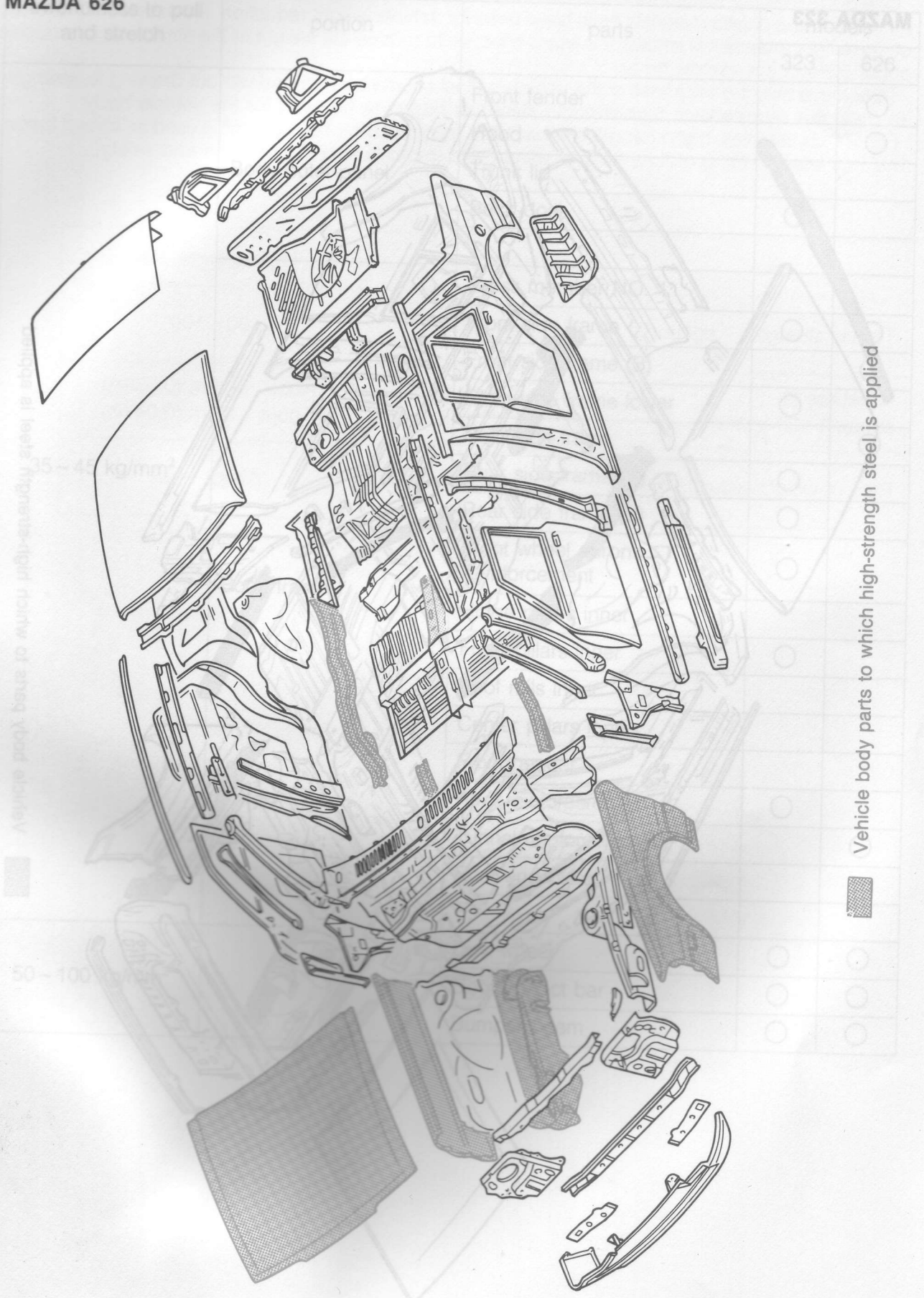
Frame parts



Vehicle body parts to which high-strength steel is applied

# VEHICLE BODY PARTS TO WHICH HIGH-STRENGTH STEEL IS APPLIED

MAZDA 626



Vehicle body parts to which high-strength steel is applied

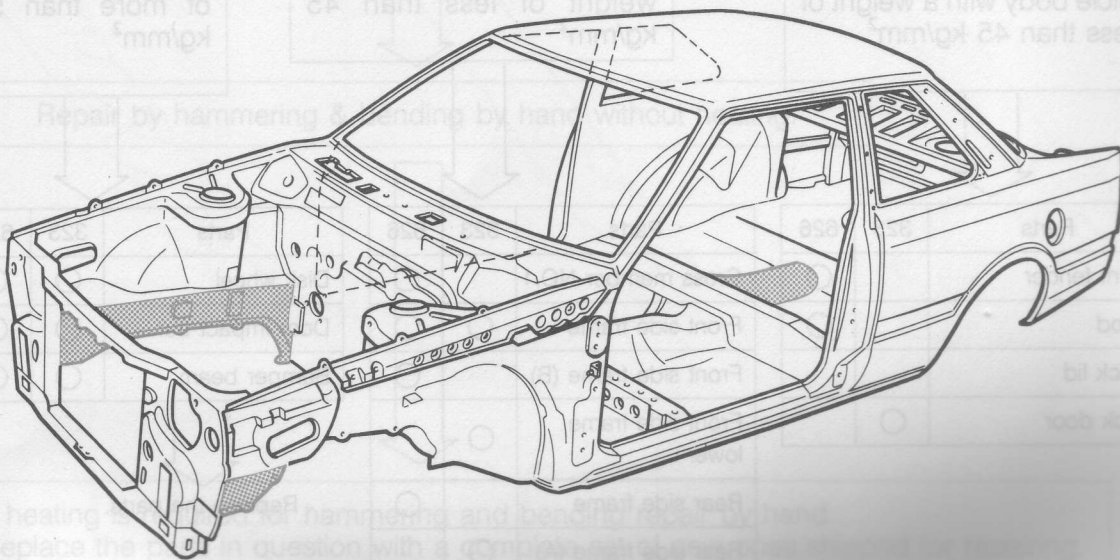


## REPAIRING HIGH-STRENGTH STEEL

High-strength steel is said to be so hard that it is difficult to repair. However, recently developed high-strength steel is superior in ductility and formability. Therefore, there has been little difference between mild and high-strength steel.

On the other hand, high-strength steel is also said to become more sensitive to heat as its strength increases. Therefore, the frame parts of high-strength steel and other parts having the high strength of more than 50 kg/mm<sup>2</sup> must not be repaired or welded by the same method as for mild steel.

Frame parts



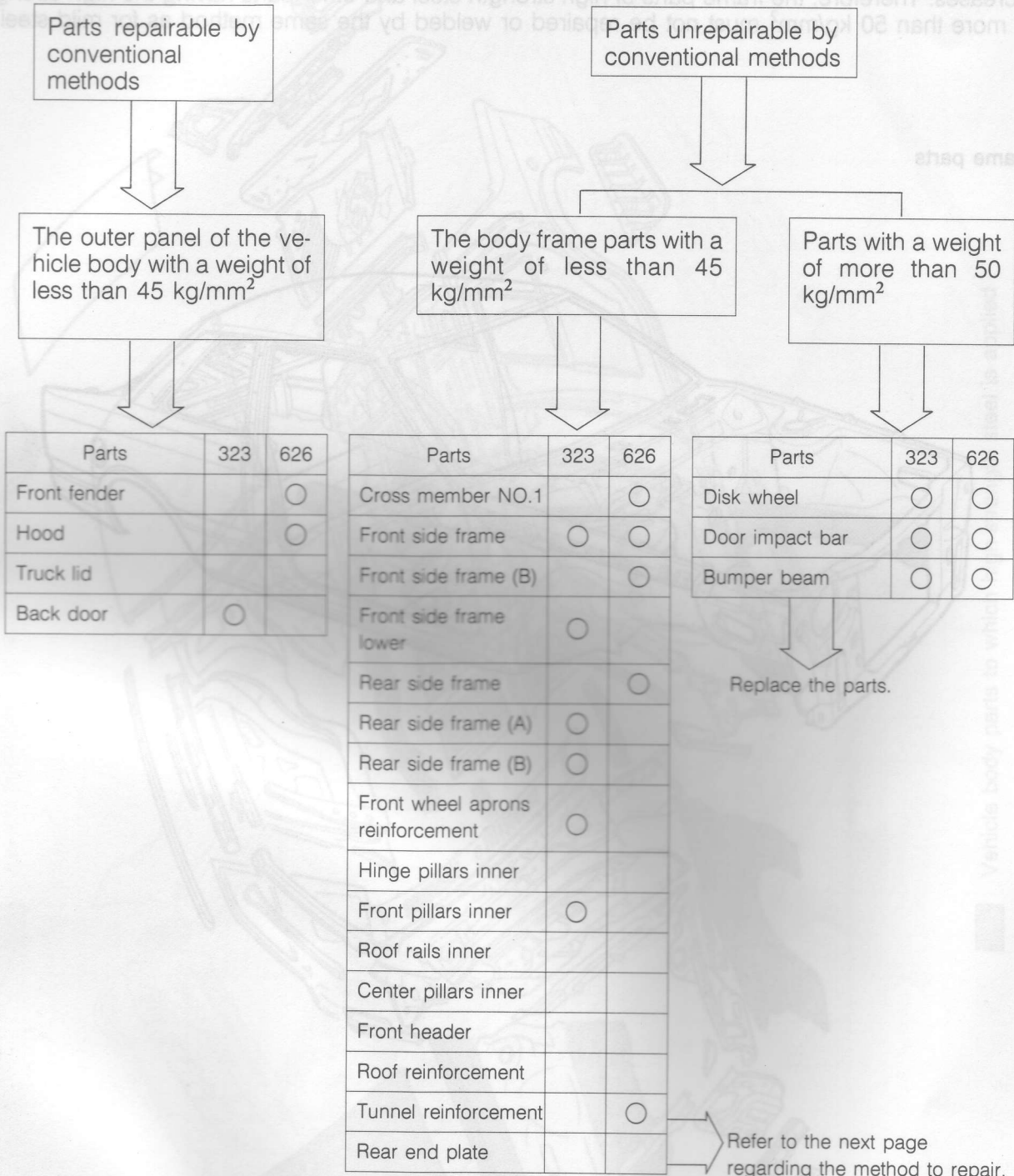
Note

Do not cut the parts or joint them by welding.  
(Partial replacement is prohibited.)

# METHOD FOR REPAIRING HIGH-STRENGTH STEEL PARTS

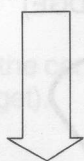
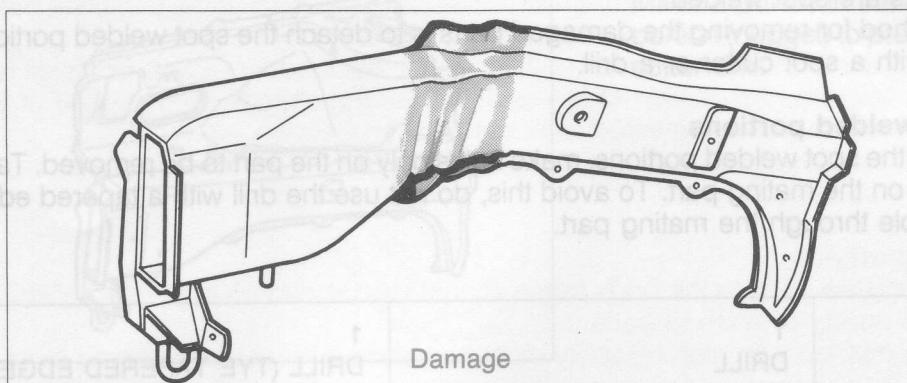
Since high-strength steel parts are sensitive to heat, pay attention to the following before repairing them:

## 1 Decision on repairing methods

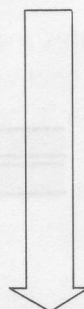




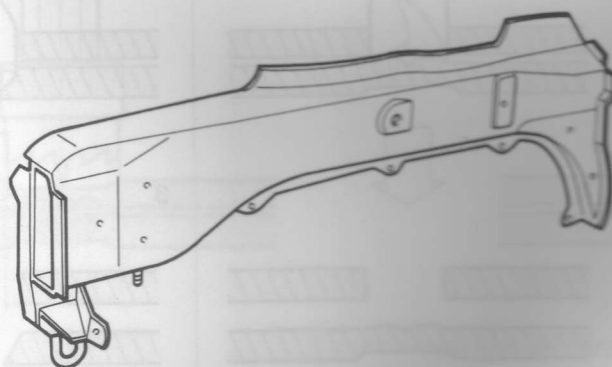
## 2 Repairing body frame parts



Repair by hammering & bending by hand without heating.



If heating is required for hammering and bending repair by hand.  
Replace the parts in question with a complete set of new ones shipped for repairing.



### Note

Do not cut the parts or joint them by welding.  
(Partial replacement is prohibited.)

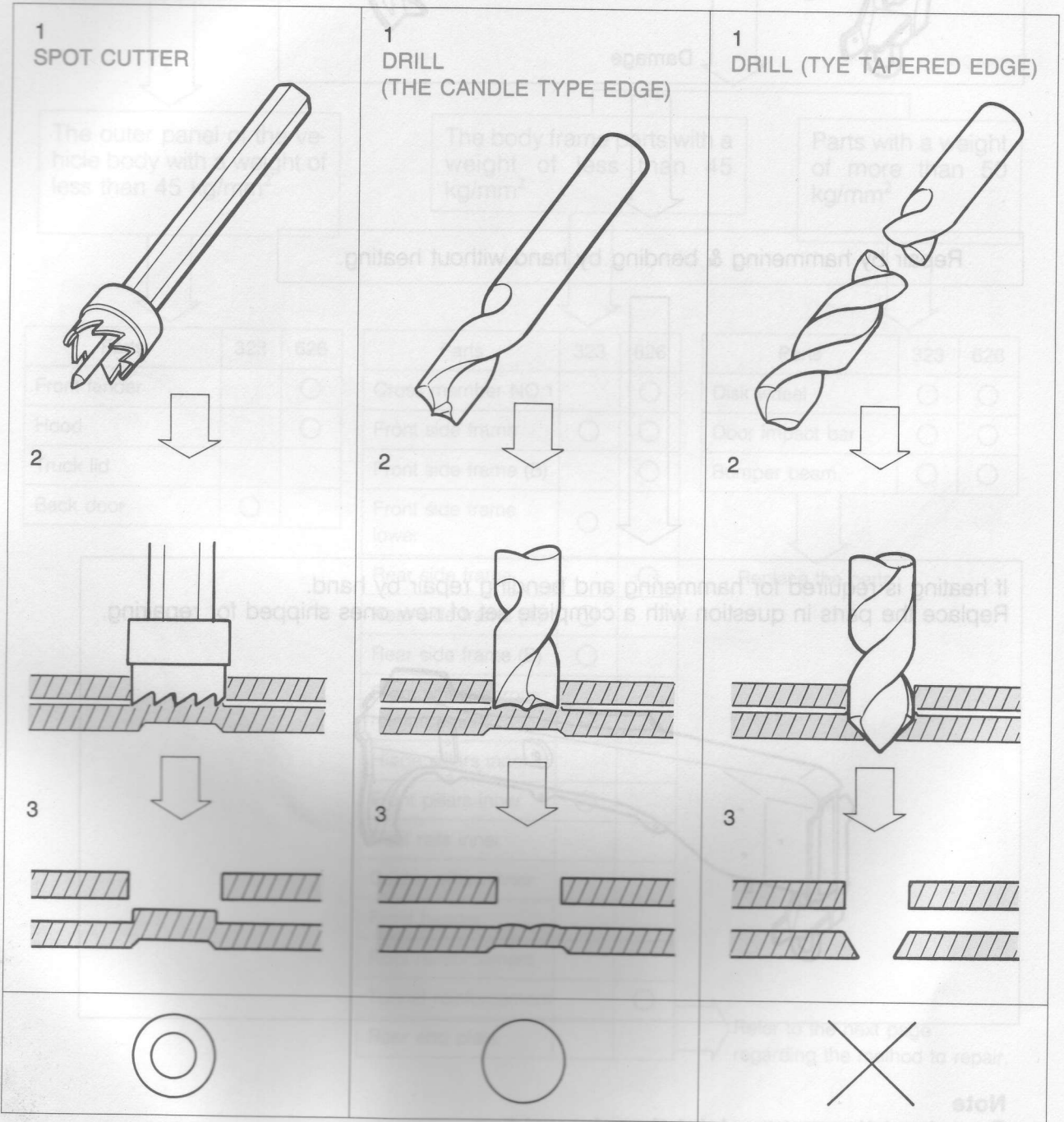
### 3 Removal of body frame parts

Most of the body parts are spot welded.

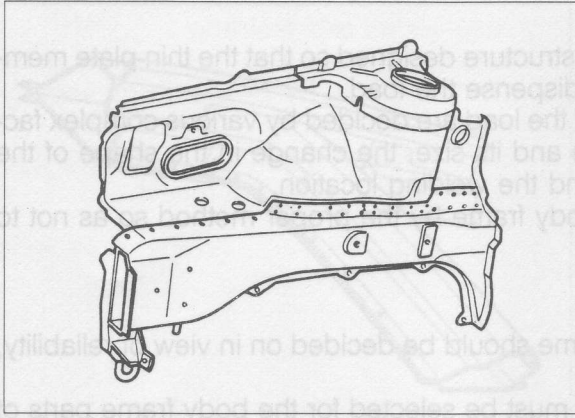
Therefore, the best method for removing the damaged parts is to detach the spot welded portions from the body frame with a spot cutter or a drill.

#### Detachment of spot-welded portions

For the detachment of the spot welded portions, make holes only on the part to be removed. Take care not to make holes on the mating part. To avoid this, do not use the drill with a tapered edge since it may make a hole through the mating part.





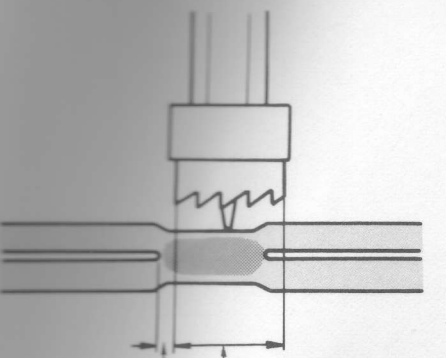
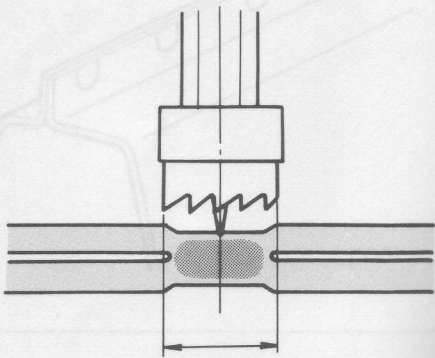
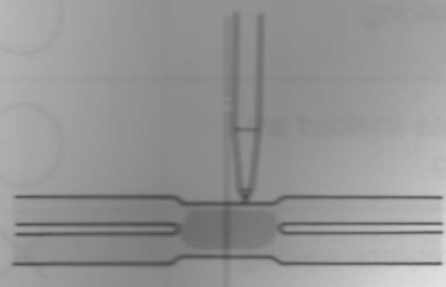
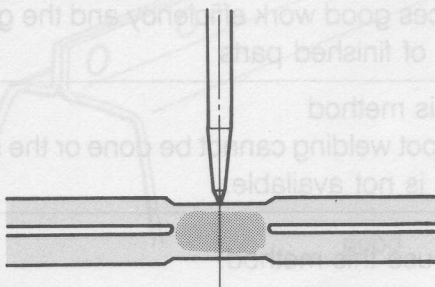


**Use of spot cutter drill**

Make a punch in the center of the spot welded portion (nugget) to prevent un-drilling by the spot cutter drill.

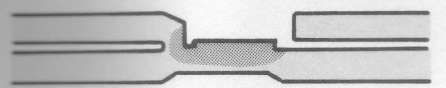
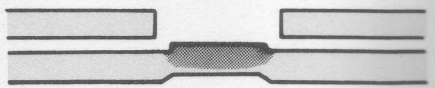
It is important to make a punch in the center of the spot welded portion (nugget).

If a punch is not made in the center.



this portion cannot be detached.

this portion can be detached.



The spot welded portion can be detached from the body frame.

The spot welded portion cannot be detached from the body frame.

#### 4 Installation of new body frame parts

The vehicle body of the Mazda 323 has a Rahmen structure designed so that the thin plate members are welded to the body shell to transmit and dispense the load.

The efficiency of the transmission and dispersion of the load are decided by various complex factors, such as the plate thickness, the section shape and its size, the change in the shape of the part, the shape of the joint, the welding method, and the welding location.

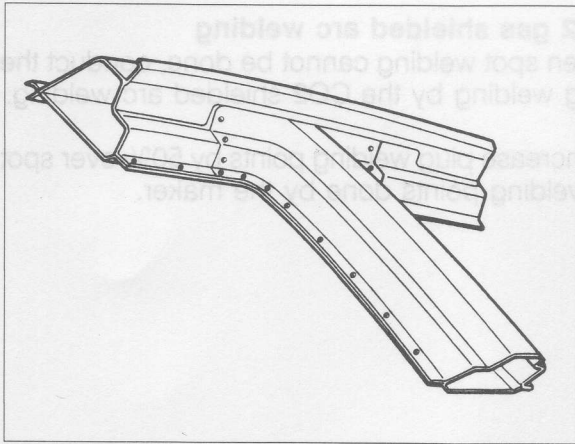
Therefore, new parts should be installed on the body frame by the proper method so as not to lower the body strength.

#### Decision on welding methods

The method for welding new parts to the body frame should be decided on in view of reliability, work efficiency, and the quality of finished parts.

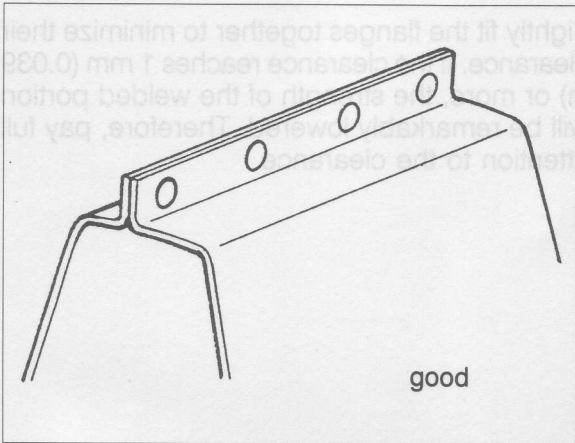
Particularly, a welding method with high reliability must be selected for the body frame parts of high-strength steel.

	Reliability	Remarks
Spot welding	○	The most reliable welding method that produces good work efficiency and the good quality of finished parts
CO2 gas shielded arc welding	○	Use this method If the spot welding cannot be done or the spot welder is not available.
Oxy-acetylene welding	×	Never use this method.



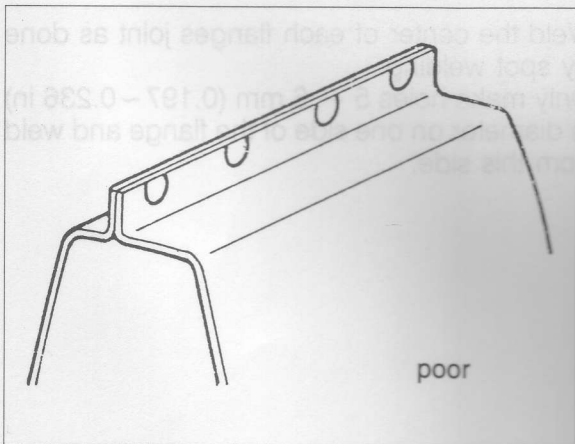
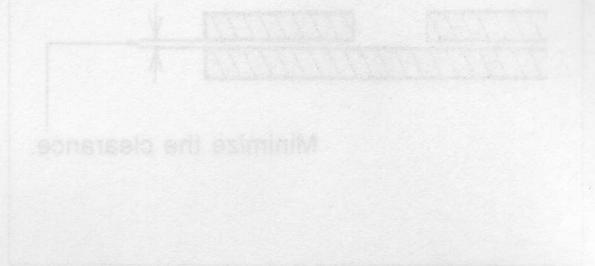
**Spot welding**

- a The spot welder for repairing is inferior in performance to that of the manufacturer. Therefore, make more welding points than those done by the maker.
- b Particularly, add welding points to critical parts and the corners of the vehicle body to provide them with sufficient strength.

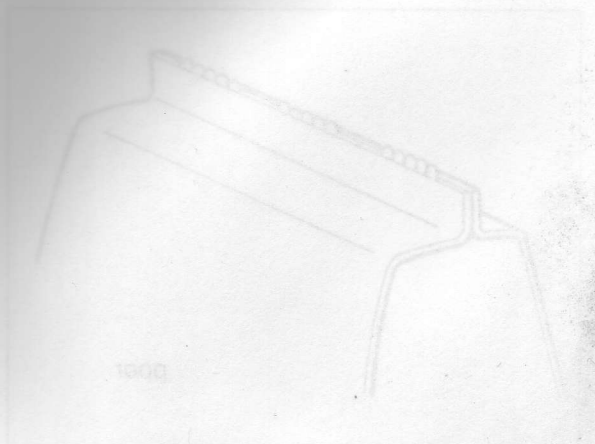
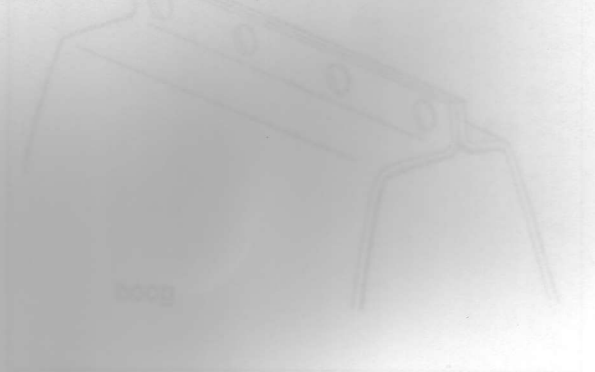


- c Tightly fit the flanges together and spot weld to the center of each flange joint.

It is important to spot weld the center of each flange joint.



If spot welded to the edge of each flange joint, the strength of the welded portion would be lowered.

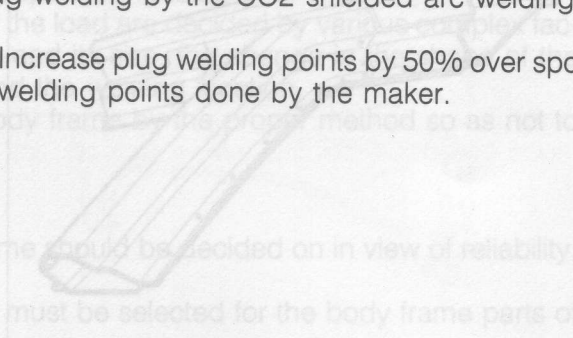




### CO2 gas shielded arc welding

When spot welding cannot be done, conduct the plug welding by the CO2 shielded arc welding.

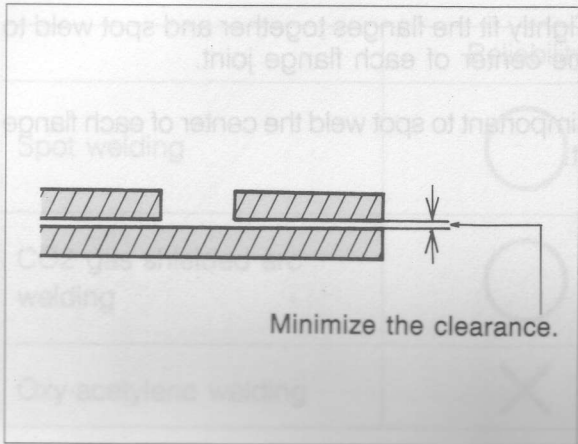
- a Increase plug welding points by 50% over spot welding points done by the maker.



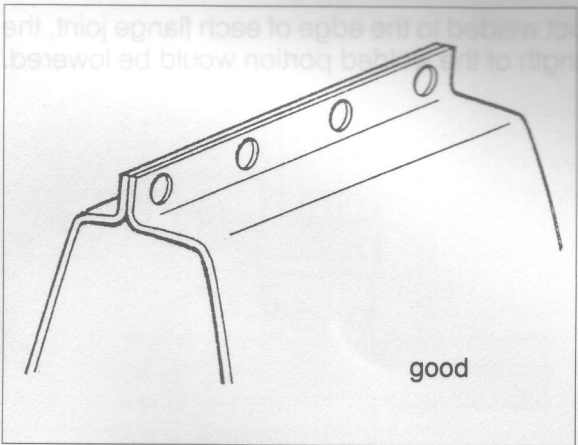
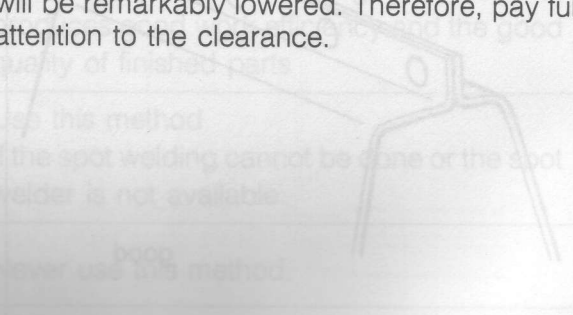
### Decision on welding methods

The method for welding new parts to the body frame should be decided on in view of reliability, work efficiency, and the quality of finished parts.

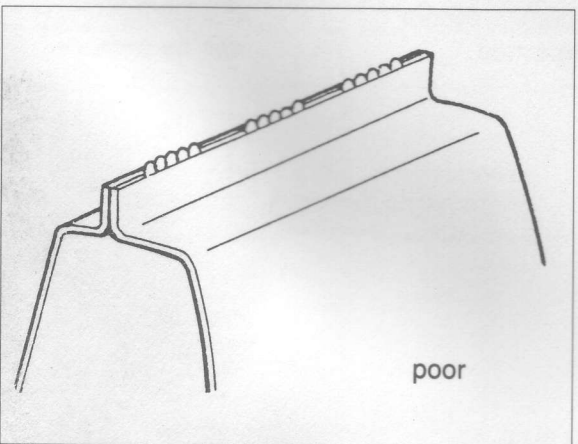
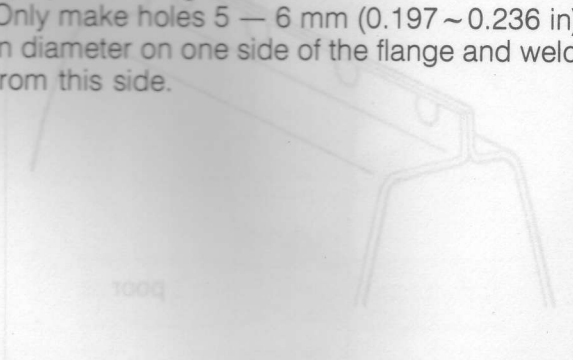
Particularly, a welding method with high reliability must be selected for the body frame parts of high-strength steel.



- b Tightly fit the flanges together to minimize their clearance. If the clearance reaches 1 mm (0.039 in) or more, the strength of the welded portion will be remarkably lowered. Therefore, pay full attention to the clearance.



- c Weld the center of each flanges joint as done by spot welding. Only make holes 5 — 6 mm (0.197 ~ 0.236 in) in diameter on one side of the flange and weld from this side.



Never weld the edges as illustrated above.





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