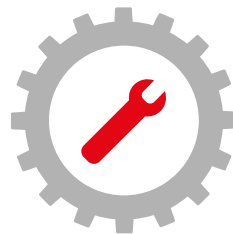


Repair Instruction
Loader Crane

PW Crane

Crane base repair welding



PALFINGER

RA9-53

Version: 2021/08

English

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Version	Remarks
2021/08	Creation of this document

1 General

1.1 Introduction and handling of this document

This PALFINGER original repair instruction is a technical description of repairs on a loader crane. It will be handed out at PALFINGER and should serve as a reference book for service and repair work.

This document is mainly addressed to specialized companies and PALFINGER service workshops. Appropriate product knowledge and basic product education is required. A corresponding product understanding and a basic training for the respective products are required.

1.2 Validity

This repair instruction is valid without any time limitation for the described system.

However, it is possible, that through further developments new versions of this document could be available. PALFINGER reserves the right to change this document at any time.

No legal claims can be derived from this document. Country-specific laws, standards and directives must be observed.

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1.3 Symbols in this document

The following symbols and signal words are mentioned in this document:

**DANGER**

Situation, that will lead to death or serious injuries.

**WARNING**

Situation, that could lead to death or serious injuries.

**CAUTION**

Situation, that could lead to minor injuries.

ATTENTION

Situation, that could lead to material damage.

**PLEASE NOTE**

Information, which makes working with the unit easier.

**IMPORTANT INFORMATION**

Important information for the user.

1.4 General safety instructions

**WARNING**

During all service and repair work the appropriate safety devices must be worn.

**WARNING**

When working in conjunction with electrical and/or electronic components, ensure that no voltage is applied.

**WARNING**

Before carrying out service and/or repair work the unit must be pressure less.

**WARNING**

After service and/or repair work a function/pressure test must be carried out.

2 Introduction

This instruction refers to the PALFINGER Recall R-NC-2103_PW Range Base Cracks and explains how to weld a reinforcing plate (2, drawing) onto the connection plate (1) on crane base **S419G30SA** respectively **S419G30SB** used on the following PW crane models:

- PW 38001
- PW 42001-SH
- PW 38001EL
- PW 50001-SH

The following illustrations localizes the area of the reinforcement.

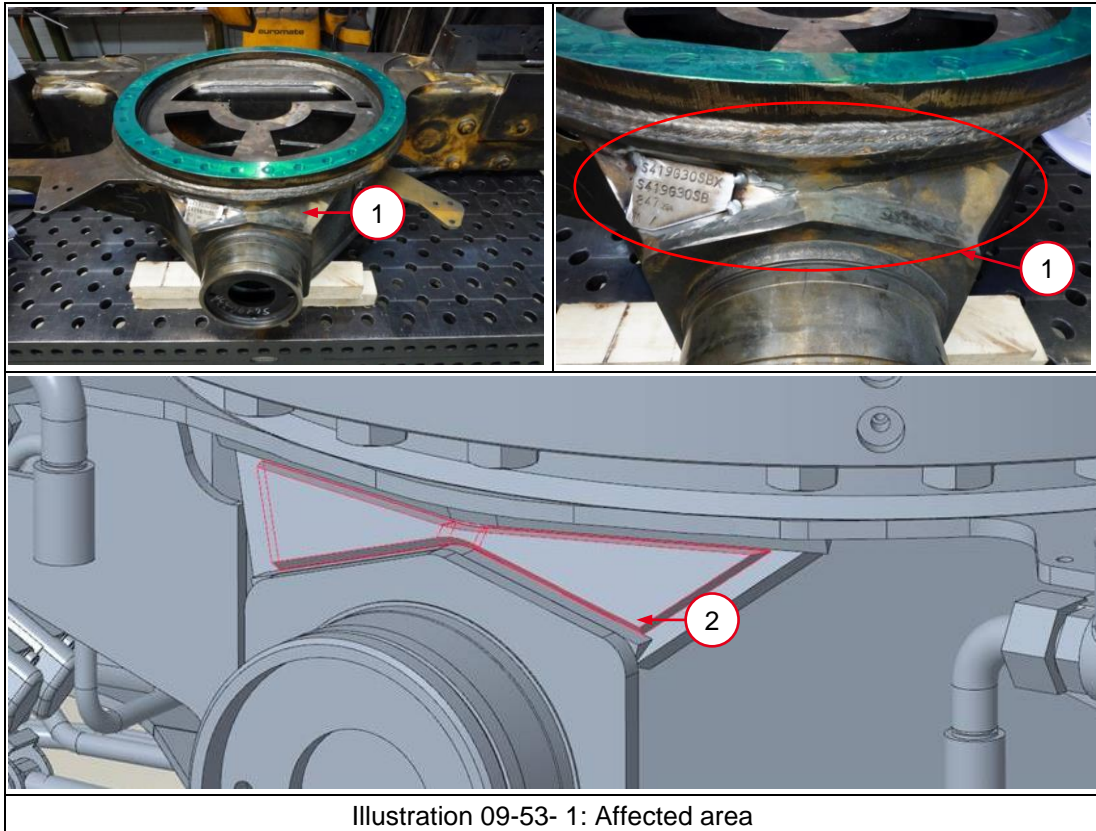


Illustration 09-53- 1: Affected area

Further information about welding can be found in chapter 4 of the mounting instruction “Welding on bodywork and crane”. This instruction must be obeyed.

With the help of this document, the repair can be carried out from appropriate trained and certified persons.



PLEASE NOTE

Only qualified welders with an valid certificate according to EN ISO 9606-1 respectively EN287-1 or an adequate national standard is allowed to carry out the repair.

The certificate must be valid for the full range of the executed welding task.

Preparation work, such as dismounting of crane from vehicle, remounting etc. is not explained in detail in this instruction. All preparation work must be carried out self-reliant.

This instruction explains the repair welding and all the connected tasks step by step.

3 Important information about welding repairs

**PLEASE NOTE**

Chapter 4 of the installation guideline “Welding on bodywork and crane” must be obeyed.

The installation guideline is available on PALDESK.

Chapter 3 includes important facts about welding related to the repair which must be obeyed. Ensure to clearly understand those basic guidelines.

3.1 General

- Working- and safety standards must be respected, especially the issue fire prevention.
- Provide fire extinguisher during the repair work.
- Ensure repair area is clean and free of paint before starting welding works.
- Grind out cracks according to specifications in this instruction.
- Clean and process the welding gap.
- Welding under the terms of available WPS (Welding Procedure Specification) according to EN ISO 15613 or EN ISO 15614 or similar valid regulations.
- After the repair the area must undergo a verification.

3.2 Welder’s qualification, documentation

The needed welder’s qualification for the repair are following:

- EN 9606-1 135 P FW FM2 S s8 PF ss sl mb
- EN 9606-1 135 P BW FM2 S s10 PC ss ml nb
- In case of other country specific standards and regulations, the valid welder qualification must be at least the same level or an higher level as the standards mentioned above.
- In general the welder is self-responsible to ensure appropriate welding quality.

PALFINGER requires the following documentation for each case:

- To proof the carried out repair work and to document the case, a picture of the final repair work has to be taken before painting.
- This has to be included to the warranty claim (refer to recall R-NC-2103).

3.3 Component material

The crane base and the reinforcing plate are both made of the following material:

- Sheet metal S690

3.4 Reinforcing plate

To carry out the repair, a reinforcing plate has been designed and has to be ordered from the PALFINGER parts center.

The part number of the reinforcing plate is HA22914.



3.5 Filler material

The welding must be carried out using the following filler material:

- Welding wire (PALFINGER standard „Z2“) Böhler X70-IG / ISO 16834-A: G 69 5 M Mn3NiCrMo with 1 mm wire diameter.
- Welding wire (PNAG standard „E110“) Lincoln Electric SUPERARC LA-100 / AWS A5.28: ER110S-G.
- PALFINGER part number for the welding wire (Böhler) is W10007363 (18kg coil).
- For MAG M welding, protective gas M20 or M21 according to EN 14175 must be used.

3.6 Preheating temperature / interpass temperature

- The temperature in the welding area must be at least 20 °C (68 °F). If the environment temperature is less than this, preheating is required.
- The allowed maximum interpass temperature is 150 °C (302 °F).
- In general the definition of the correct temperature range is the responsibility of the welding supervisor in charge.

3.7 Welding parameter

- The welding parameters must be selected and set by the responsible welding engineer who is performing the repair welding.

4 Preparation work

4.1 Accessibility

It is of essential importance to have access to the affected area during all repair works. Therefore removing the crane might be necessary (especially on front mounted cranes, as on most vehicles in the US). On rear installations (as most common in Canada), sufficient accessibility might be given by just removing the balance.

It is in the responsibility of the welder and his supervisor, to decide, if a removal is necessary or not.

4.2 Working steps

The following steps are required in any case, whether a crack is present or not.

- Remove the crane if necessary (refer to point 4.1) using proper equipment and place it safely.
- Remove the balance to grant accessibility.
- Dismount attached parts interfering the working area.



IMPORTANT INFORMATION

The repair weld can be carried out with the column in place. There is no need to take out the column on assembled cranes.

- Clean the working area properly, especially remove all grease.
- To avoid damage to the surrounding area, take appropriate precautions.
- Protect the nearby area with welding blankets or something similar while carrying out the repair work.
- Provide fire extinguisher (refer to point 3.1).
- Take off the part identification plate (1). This plate must be reinstalled on a different position after the work is finished.
- Use grinder to remove the paint, the area has to be blank, clean and free of grease (2).



Illustration 09-53- 3: Remove part plate



Illustration 09-53- 4: Grinded welding area, ready for repair work

The preparation work is now completed.

5 Repair work

The following chapter describes how to carry out the repair work in detailed steps. The chapter is divided in two sub-chapters:

- ➔ Crack repair (only applicable, if a crack is present)
- ➔ Reinforcing plate (always applicable)

If no crack is present, skip chapter "5.1 Crack repair".



IMPORTANT INFORMATION

If the situation is uncertain whether a crack is present or not, use a dye penetration test for verification (if this method is not clear, contact PALFINGER for guidance).

5.1 Crack repair

This chapter is only valid, if a crack is present (before adding the reinforcing plate HA22914 it is essential to repair the crack).

- Grind out the crack (1) over its entire length with a minimum depth of 6 mm ($\frac{1}{4}$ "") and a maximum depth of 10 mm ($\frac{3}{8}$ "").
- It is allowed, that a lack of penetration of 2 mm ($\frac{1}{16}$ "") is still visible after grinding in a depth of 10 mm ($\frac{3}{8}$ "").
- Be aware that the plate has a thickness of 12 mm ($\frac{1}{2}$ ""). Do not grind completely through the plate.
- Grind out the crack over its entire length.



Illustration 09-53- 5: Area after grinding



CAUTION

Only cracks not touching the critical zone are repairable. If a crack touches the critical zone, the base must be changed.

Definition of the critical zone

A crack (2) is in the critical zone if it reaches into the critical area (1) in either the right or the left side.

This area (1) is 70 mm (2¾”) long on each side, measured on the welding seam from the outside towards the center.

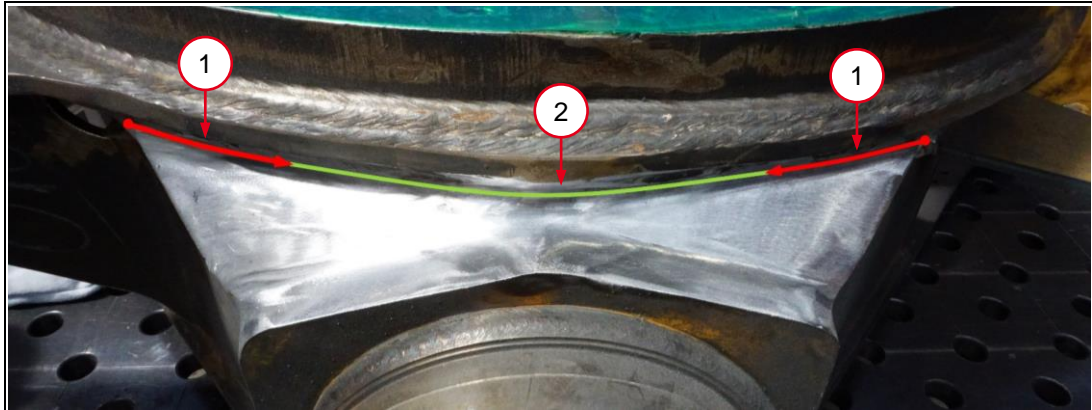
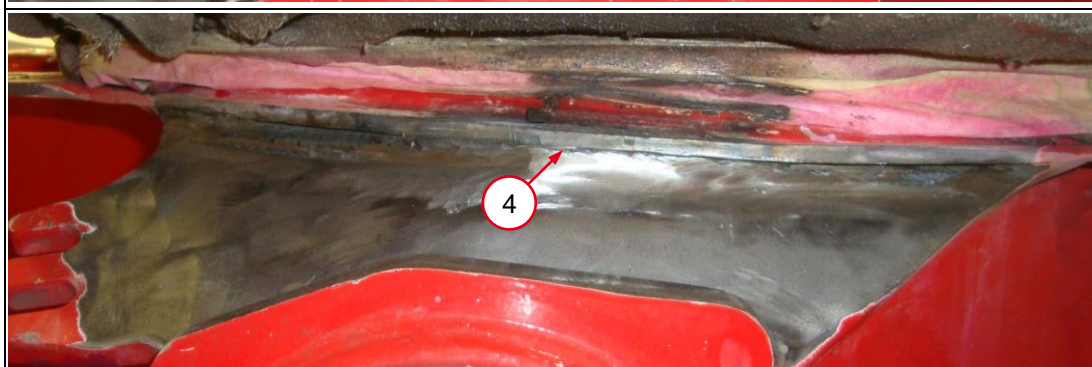
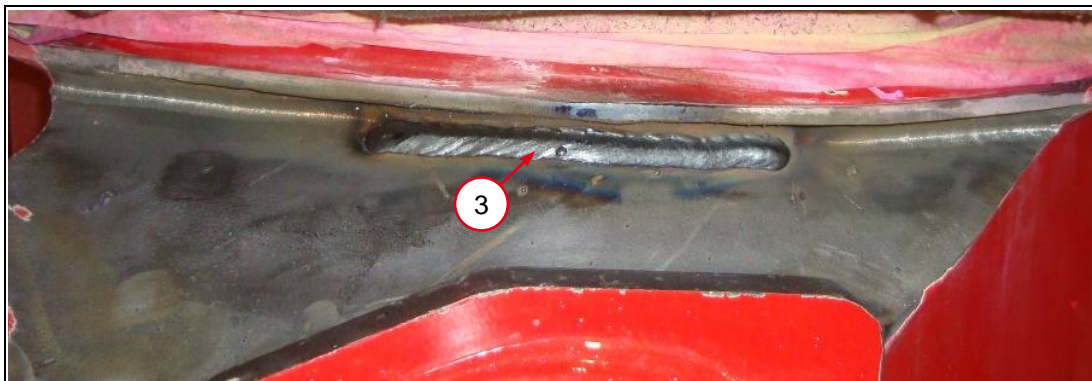


Illustration 09-53- 6:

- In uncertain cases, use a dye penetration test to clearly identify whether a crack touches the zone or not.
- Place an appropriate welding seam (3) onto the grinded out area.
- Grind area even (4) so the reinforcing plate can be placed properly afterwards.



3	Welding seam	4	Grinded weld
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Illustration 09-53- 7: Affected area

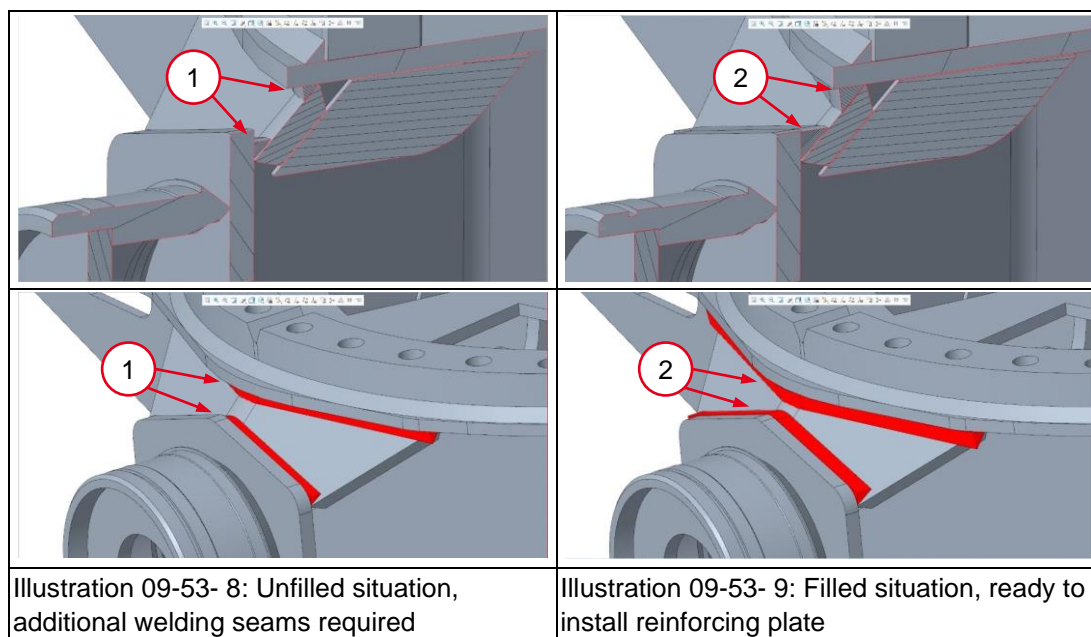
After the crack is rewelded and grinded even, further points must be checked before the reinforcing plate is installed.

5.2 Reinforcing plate

5.2.1 Filled welding seam area

Because of the design and the welding specifications, the affected area can show itself with or without a “filled” welding preparation.

A filled welding preparation is given, if the welding seams completely fill the welding seam area to the edge of the plates (refer to picture situation 2).



To assure a proper connection between the connection plate and the reinforcing plate, a filled situation must be given.

For this reason it is possible, that the welding area must be filled with additional welding seams (1) before the reinforcing plate gets installed.



IMPORTANT INFORMATION

The steps mentioned above are not necessary in all cases but could be needed in some. In most cases a “filled” situation is given so the reinforcing plate can be installed straight away.

- Grind the area after filling to ensure an even surface for the reinforcing plate.

Welding seams are ready (1) to install the reinforcing plate in order to get a perfect connection in between the connection plate and the reinforcing plate and also with the other parts affected by the reinforcing action.



Illustration 09-53- 10: Welding seams ready to install reinforcing plate

5.2.2 Adjust and tack reinforcing plate

As soon as the area is prepared properly, the reinforcing plate can be fitted and tacked onto the connection plate.



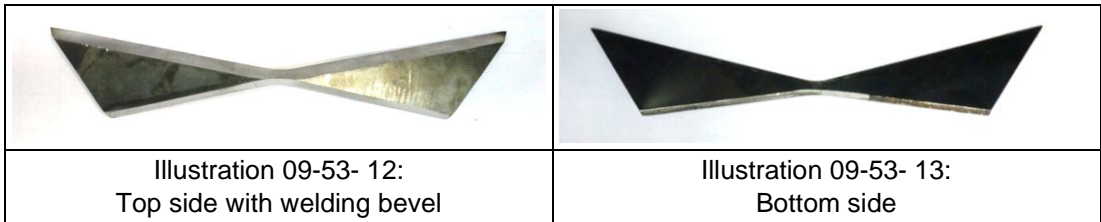
Illustration 09-53- 11: Working area prepared for installation of reinforcing plate

The part number of the reinforcing plate is: HA22914. It can be ordered from the PALFINGER parts center.



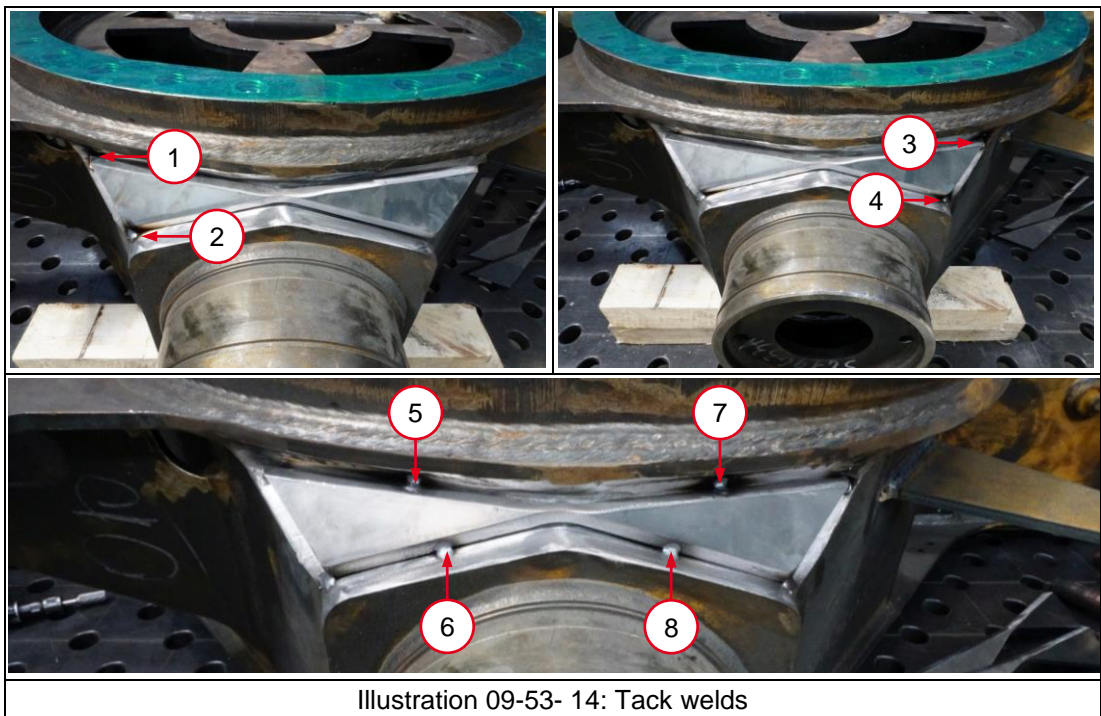
CAUTION
The reinforcing plate must be clean and free of any contamination. It must fit flat and even on the reinforcing area. There must be no gap in between the plates.

If it is not, it has to be adapted until it does fit properly. For this it could be necessary that the plate needs to be bent additionally. It also is possible, that it needs to be grinded in some areas in order to make it fit properly.



5.2.3 Tack weld reinforcing plate

Align the plate and tack it. Start tacking on the left side (1, 2), continue on the right side (3, 4). Tack the reinforcing plate with 8 tack welds in total.



NOTE
Make sure, the tack welds are placed as shown on the picture above. Otherwise there could be an incomplete fusion during the welding procedure.

5.2.4 Requirements of welding parameters and conditions

This chapter explains basic settings, requirements and conditions which have to be obeyed during the welding work.

The following illustrations are showing the order of the different layers. The execution is explained in the next chapter.

A photograph showing the front view of a crane hook's throat. The hook is made of thick metal plates joined by a complex weld. Eight red arrows point to specific weld layers, numbered 1 through 8. The sequence starts at the outer edges (1 and 2) and moves towards the center, with layers 3, 4, 5, 6, 7, and 8 forming the central throat area.

Illustration 09-53- 15: Welding sequences front view

A 3D CAD model of the crane hook throat, rendered in a light blue color. The model shows the internal structure and the weld lines. Red arrows point to weld layers 3, 4, 5, 6, 7, and 8, illustrating their spatial arrangement from a side perspective. Layers 3, 5, and 7 are on the upper side, while layers 4, 6, and 8 are on the lower side.

Illustration 09-53- 16: Welding sequences side view

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- The specifications on the chart below defining gas flow and allowed temperature range must be obeyed during the repair. Small deviations due to different welding equipment used on site are allowed.

Gas M21-ArC-18	15 l/min
Filler material "Z2" Böhler X 70-IG	1 mm
Min. preheating temperature	20 °C (68 °F)
Max. interpass temperature	150 °C (302 °F)

- The following parameters / settings are guide values and have to be used to carry out the repair. Also here, small deviations due to different welding equipment used on site are allowed. If other welding equipment will be used, the parameters must be qualified according to the welding standards and must be verified before starting the repair welding. It is in the responsibility of the local welding engineer to fulfil the welding standard requirements (AWS, ISO).

Pass	Process	Pos.	Filler material diameter	Amperage A	Voltage V	Wire feed m/min	Welding speed cm/min
1	135	PF	1,0	144	16,8	6,4	8,2
2	135	PF	1,0	144	16,8	6,4	8,2
3	135	PC	1,0	250	25,5	12,6	46,0
4	135	PC	1,0	220	24,9	11,1	46,0
5	135	PC	1,0	220	24,9	11,1	46,0
6	135	PC	1,0	220	24,9	11,1	46,0
7	135	PC	1,0	250	25,5	12,6	46,0
8	135	PC	1,0	220	24,9	11,1	46,0

**IMPORTANT INFORMATION**

Always obey the weld preparation in between the layers (cleaning of welding seam, grinding overlap area etc.).

**IMPORTANT INFORMATION**

The authorized person on site is responsible for the correct execution of the repair and welding procedure.

5.2.5 Step by step execution of welding

The following pictures show the welding process step by step. This picture documentation is equal to the welding order explained at the beginning of this chapter.



PLEASE NOTE

To avoid incomplete fusion, all welding seams must be executed in one step without stop.

- The first welding seams on the left and right side of the reinforcing plate are carried out as uphill weld. Make sure that the welding is continued on over the edge of the plate to avoid incomplete fusion on further welding seams.
- Welding seam 1 lateral uphill on the left side (1).
- Welding seam 2 lateral uphill on the right side (2).

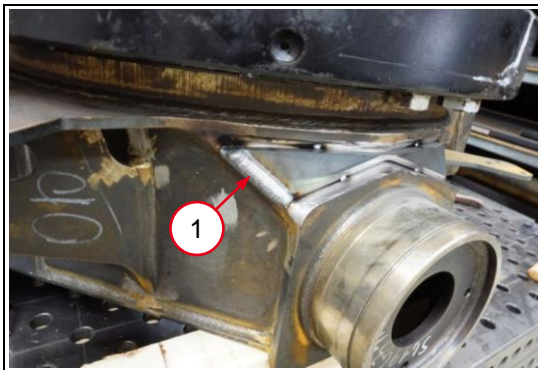


Illustration 09-53- 17: Left side

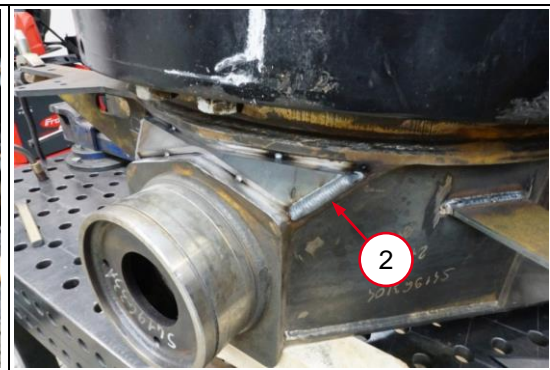


Illustration 09-53- 18: Right side

- Welding seam 3 top edge from the right to the left (3).
- Welding seam 4 lower edge from the right to the left (4).



Illustration 09-53- 19: Upper side



Illustration 09-53- 20: Lower side

- Make sure that the welding seam is cleaned with a brush or an angle grinder before placing the next layer.



Illustration 09-53- 21: Cleaning

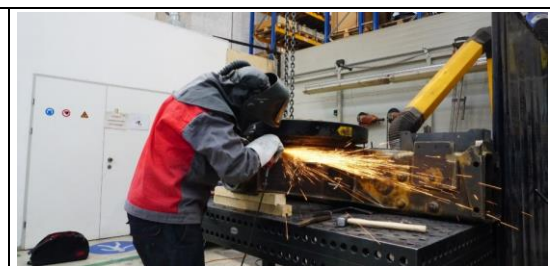
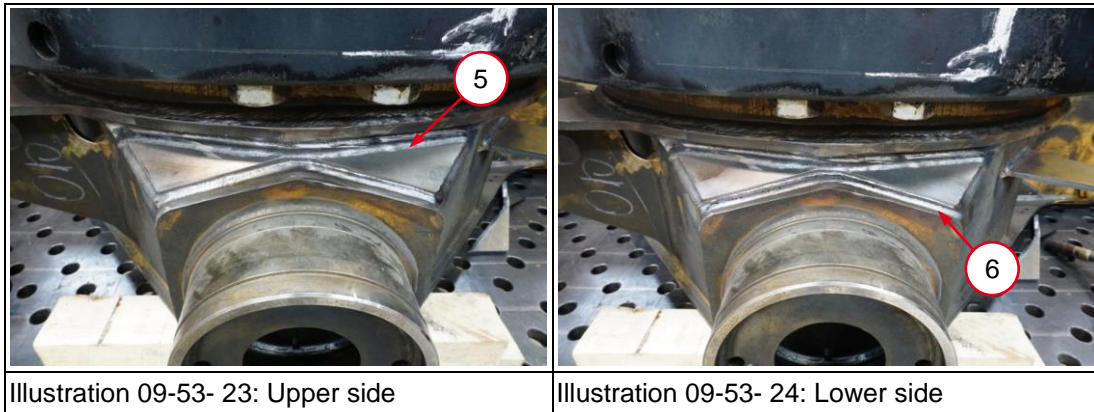
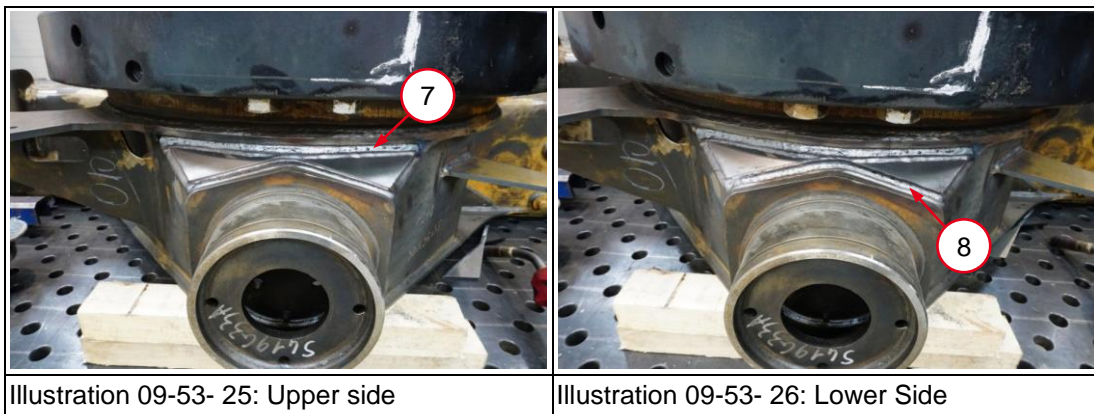


Illustration 09-53- 22: Cleaning

- Welding seam 5 top edge from the right to the left (5).
- Welding seam 6 lower edge from the right to the left (6).



- Grind out (clean) welding seam before starting welding.
- Welding seam 7 top edge from the right to the left (7).
- Welding seam 8 lower edge from the right to the left (8).



- Welding of reinforcing plate is finished.



6 Finalization of work

- Check and grind weld run outs (1).
- Make sure, that the area is free of notches (remove all stress raisers).

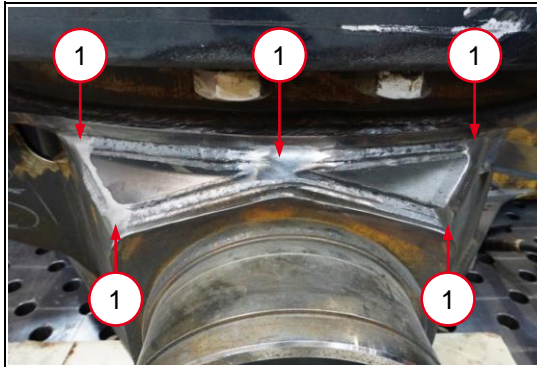


Illustration 09-53- 28: Grinded weld run outs

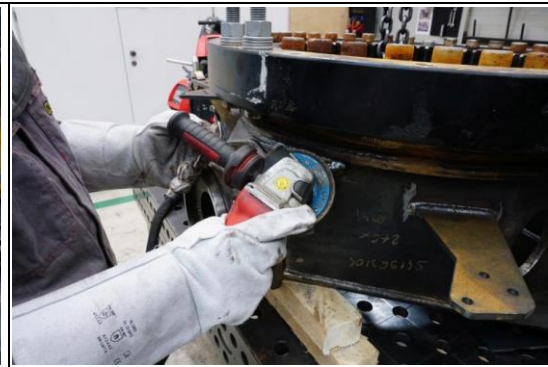


Illustration 09-53- 29: Angle grinder

- Welding finished and finalized with grinded weld run outs.



Illustration 09-53- 30: Grinded weld run outs

- Clean the complete welding area with wire brush or similar tool.
- Take off paint on the side plate of base and reinstall part identification plate at the new position (2).

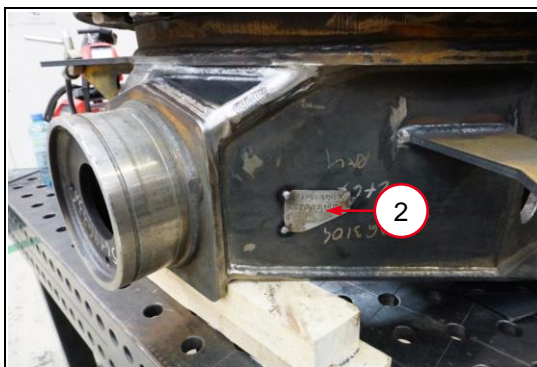


Illustration 09-53- 31:
New position of the part identification plate
(2) on the side of the crane base.

- Let the area cool down (do not use water or similar to cool it down in a quicker way).
- Clean welding area completely and repaint with primer and final coat.
- Remount all parts which have been removed earlier.
- Grease balance bearing and install balance.
- Remount crane on truck again.

**PLEASE NOTE**

After the work is finished and the crane is mounted on the truck again, carry out a function test to ensure proper crane functionality.

Only when assured that all systems are working correctly, the vehicle can be handed over to the customer again.