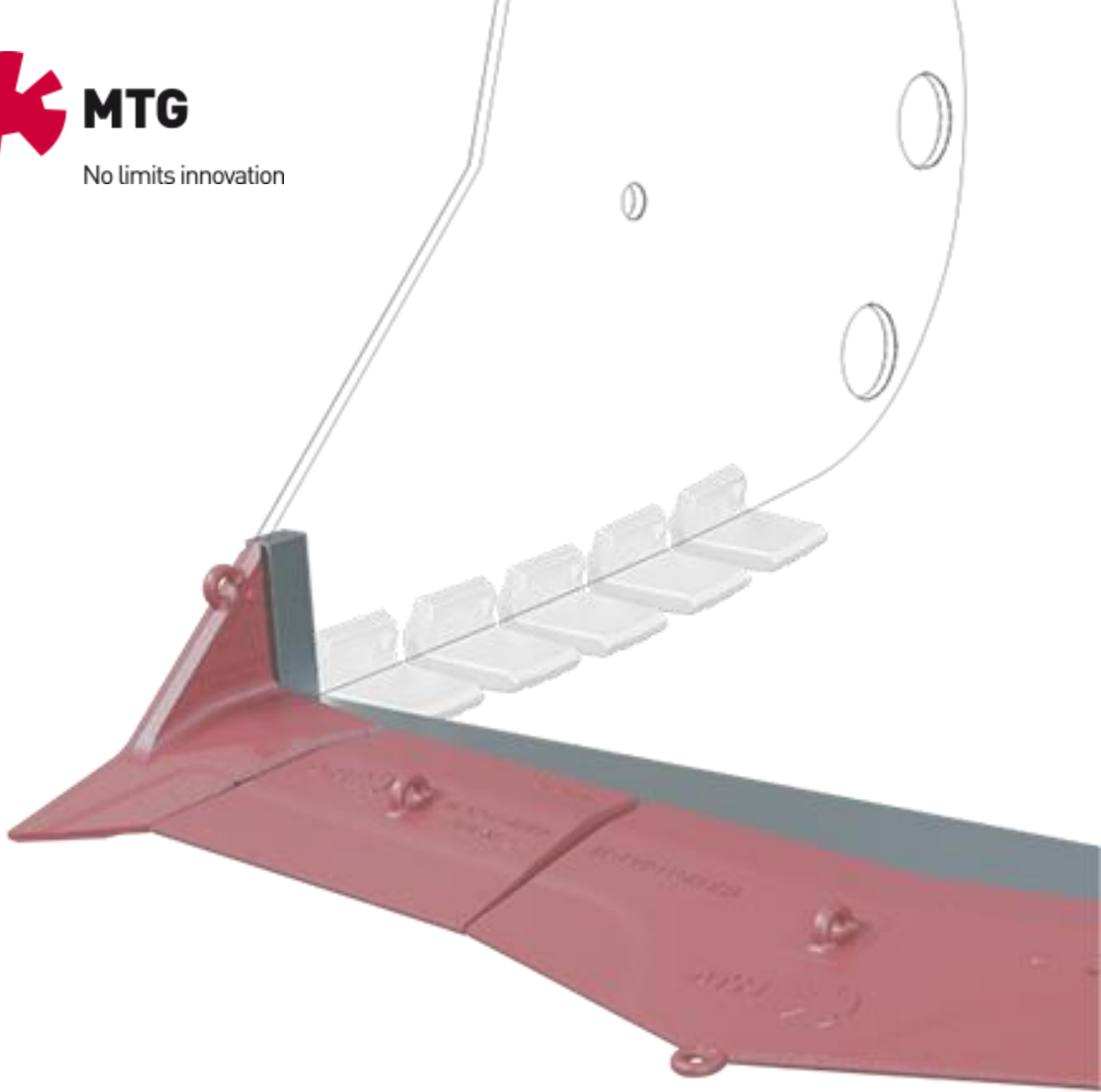




MTG

No limits innovation



INS.3.9.1

PLUS LHD Weld-on Lip Shrouds

Installation procedure

DISCLAIMER

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1. SAFETY

The practices described in this manual can be taken as guidelines for operating safely in many conditions and in addition to the safety standards that are current and enforceable in your area or region.

Your safety and the safety of third parties is the result of putting into practice your knowledge of the correct operational procedures.

Attention, when performing the work described in these instructions, always work safely and use the personal protection elements required to minimize or avoid injury. Always wear:



To avoid eye injury, always wear safety goggles or a protective mask when using any equipment, hammer or similar tool. When equipment is under pressure or when objects are struck, chips or other debris can be thrown out. Make sure no one gets hurt by the debris that is fired before applying pressure or hitting an object. Wear eye protection that complies with ANSI Z87.1 and OSHA standards. Also wear hearing protection and gloves.

Lifting a heavy object can cause serious or fatal injury. DO NOT exceed the maximum rated capacity of lifting and positioning devices: Stay away from the area under a suspended load.

Make sure that the chain is not damaged and that the load is always balanced.



LIFTING LUG

2. WELDING

Following is a quick reference on consumables that can be used to weld MTG products. For a complete reference on welding procedures, refer to the document entitled "General welding recommendations".

WELDING UNALLOYED FILLER CONSUMABLES

| PROCESS | EN CLASS | AWS CLASS |
|---------|---------------------|---|
| SMAW | EN ISO 2560-S E42X | E70X ACCORDING TO A5.1 OR EQUIVALENT UNDER A5.5 |
| | EN ISO 14341-A G42X | E70C-X ACCORDING TO A5.18 OR EQUIVALENT UNDER A5.28 |
| GMAW | EN ISO 14341-A G46X | E70S-X ACCORDING TO A5.18 OR EQUIVALENT UNDER A5.28 |
| | EN ISO 16834-A T42X | E7XT-X ACCORDING TO A5.20 OR EQUIVALENT UNDER A5.29 |
| FCAW | EN ISO 16834-A T42X | E7XT-X ACCORDING TO A5.20 OR EQUIVALENT UNDER A5.29 |

WELDING AUSTENITIC STAINLESS FILLER CONSUMABLES

| PROCESS | AWS CLASS |
|---------|-----------------------------|
| SMAW | E307-X ACCORDING TO A5.4 |
| | ER307T-X ACCORDING TO A5.22 |
| GMAW | ER307 ACCORDING TO A5.9 |
| | 307-X ACCORDING TO A5.22 |
| FCAW | 307-X ACCORDING TO A5.22 |

NOTE: "X" MAY STAND FOR ONE OR SEVERAL CHARACTERS

3. IMPORTANT

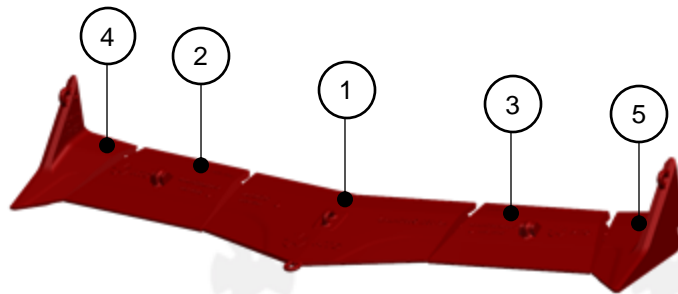
- Preheating temperature for any cut or weld is between 180°C and 200°C (356°F and 392°F)
- Maximum temperature allowed for any cut or weld is 250°C (482°F).
- Preferred method for cutting operations is by cold means.
- Preferred method for preheating is by means of electric heating matts.
- Perform feathering on each tack weld (grind the beginning and the end of each tack).
- The maximum width for any weld, whether tacks or welding runs, including weaving movements is between 10 to 12 mm (0.4" to 0.5").
- Cool down rate should not exceed 55°C/h (131°F/h). If the process is discontinued for any reason, all weldments should be covered with thermal blankets.



4. HIGHLIGHTS

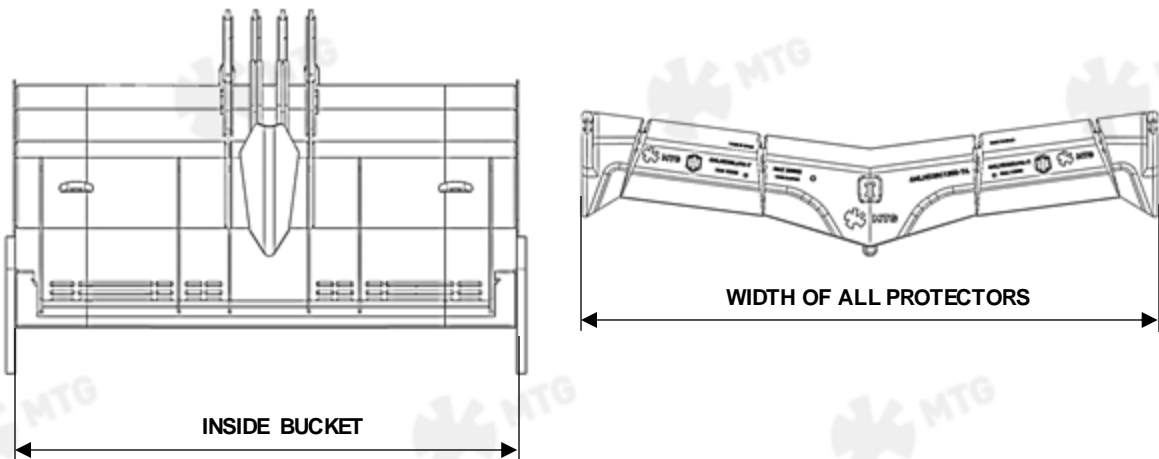
4.1 The basic configuration of MTG weld-on protectors for LHD loaders is composed by the following segments (protectors):

- 1) CENTRAL 2) LEFT INTERMEDIATE 3) RIGHT INTERMEDIATE 4) LEFT CORNER 5) RIGHT CORNER



5. PREVIOUS PREPARATION

5.1 Take your current inside bucket dimension and compare it with the dimension resulting of the sum of widths of all protectors once they are together one after the other.



Note:

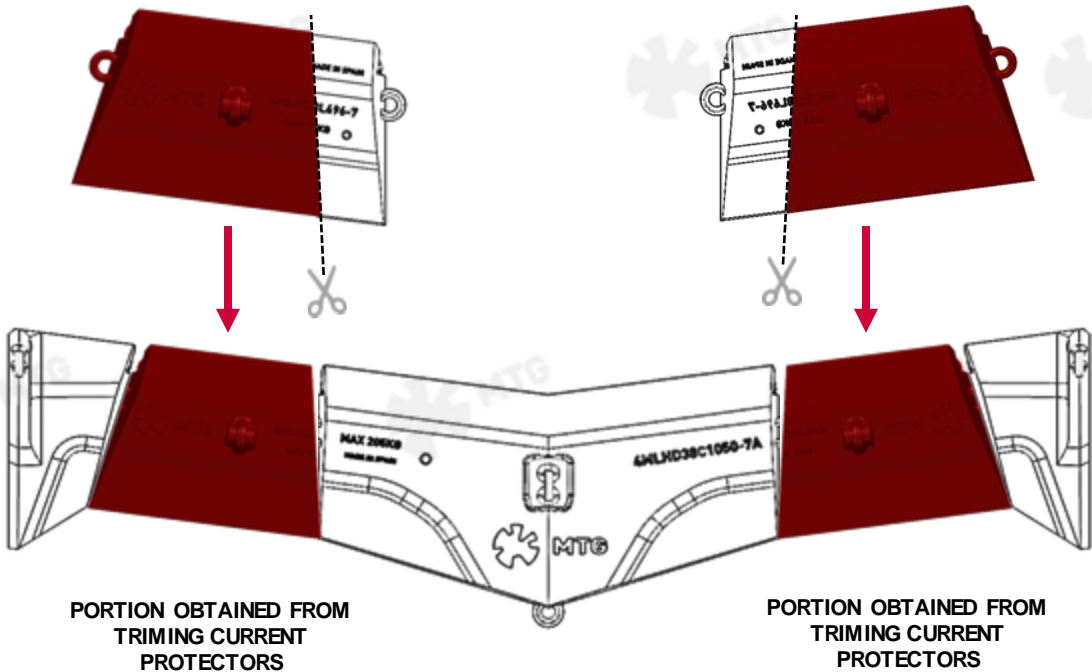
To make easier the operation of matching the inside bucket dimension with the shroud's width, it is highly recommendable to have the blade already prepared and use it as support.

If the inside bucket dimension is shorter than the protector's width sum (case A, shorten), it will be required to trim a portion of shrouds to match the measures.

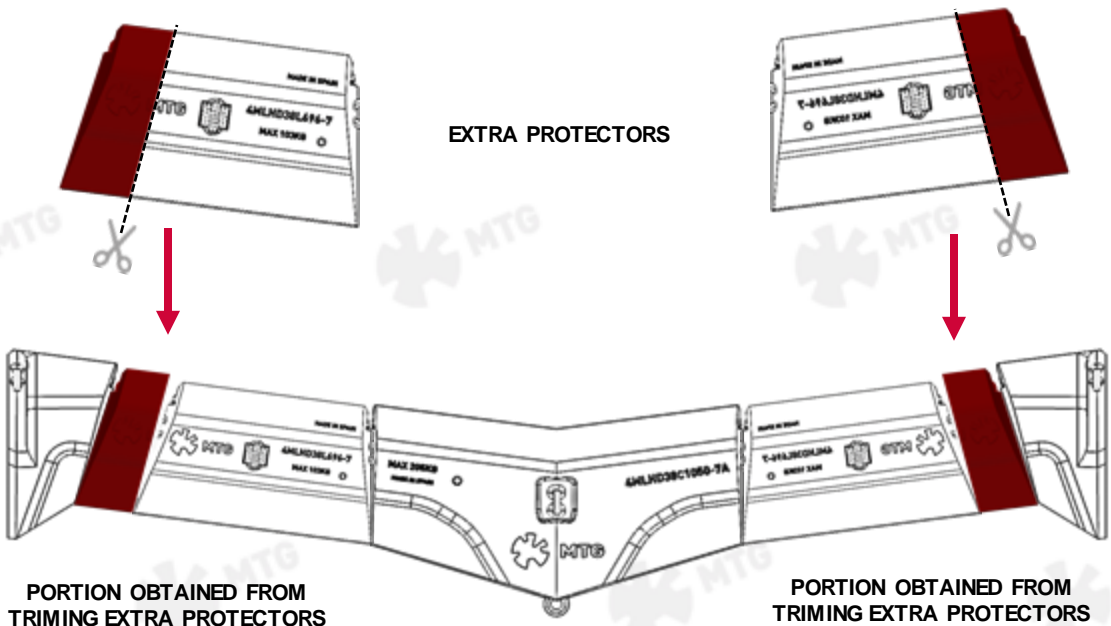
In the other hand if the inside bucket dimension is larger than the protector's width sum (case B, lengthen), it will be required to add a portion of shrouds to match the measures.

To keep the central protector well positioned in the middle of the blade where the delta angle starts from side to side, the operation of shorten or lengthen must be done at both sides of the central protector. Below, some considerations of each case:

- 5.2** **Case A.** Shorten the protector's width sum:
To shorten the overall protector's width, it can be done by cutting the excess of width at both sides of the central protector or at just one side of each intermediate shrouds.



- Case B.** Lengthen the protector's width sum:
To lengthen the overall protector's width, it can only be done by taking the required width from 2 extra intermediate protectors (left and right).



5.3 The following considerations for the shorten and/or lengthen operations must be taken into account:

- It is strongly recommended to perform any cutting operation over the shrouds by cold means as cold saw cutting or waterjet cutting. If oxyfuel cutting, preheating to a temperature between 180°C and 200°C (356°F and 392°F) is of upmost importance.

- The required cuts on the protectors (whether for shorten or for lengthen) should be done parallel to the end of its adjacent protector.

- Once the cut has been done, perform the proper bevels on the cuts to recover the welding shape as close as the original was. Cold means is also the preferred method for this operation. If oxyfuel method or grinding is used, consider the preheating temperatures given.

6. INSTALLATION PROCEDURE

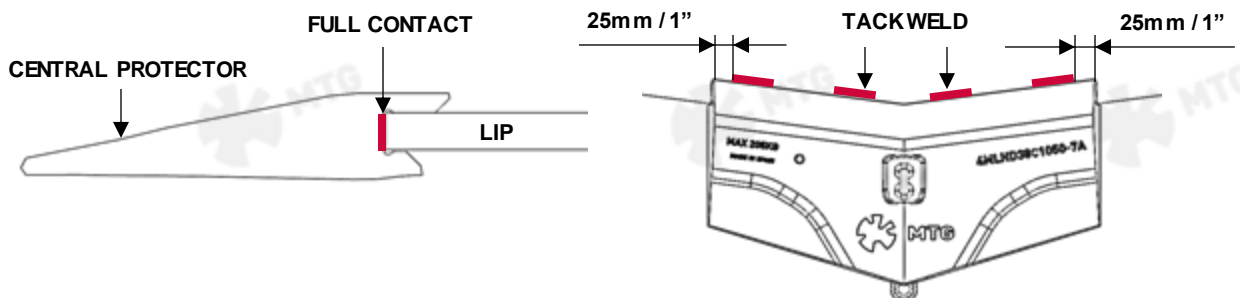
6.1 Prior to any welding, prepare protectors and lip in accordance with what is exposed on the document entitled "General welding recommendations".

6.2 Remove all the unnecessary protectors' lifting lugs (at the sides), then preheat protectors and blade to a temperature between 180°C and 200°C (356°F and 392°F) before applying any welding.

The preheating temperature should be reached and measured at 100mm (4") around of the weld joints or the area being welded. Electrical heating mats are the preferred method for preheating. If flame heating is performed, large diameter heating nozzles should be used and well distributed to ensure even heat input and avoiding overheating at the thinner areas of protectors close to the edges of them.

6.3 Insert the central protector to the lip, being sure that it is in full contact with the lip's blunt and there is no movement from side to side. Check that protector and lip are still within the indicated preheating temperatures. If the temperature dropped below 180°C (356°F) re-heat again to specs.

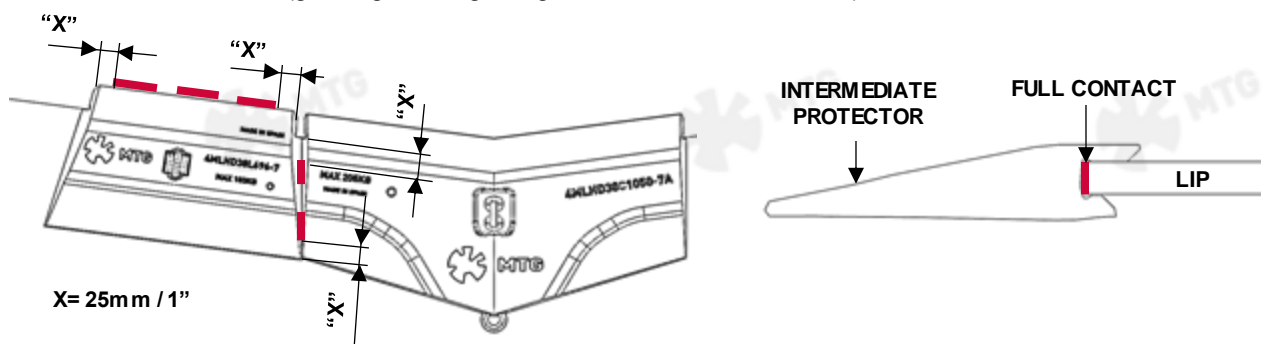
Perform several tack welds from the top and from the bottom side. Tack welds should be of a length of 50mm (2") each and distributed along all the protector's width. Do not tack weld within 25mm (1") of the protector's side edges. Once tack-welded, perform a feathering on each tack weld (grinding the beginning and the end of each tack).



6.4 Insert one of the intermediate protector next to the central protector, being sure that it is in full contact with the lip's blunt and is also contacting the central protector's edge. Check that protectors and lip are still within the indicated preheating temperatures. If the temperature dropped below 180°C (356°F) re-heat again to specs.

Tack weld the intermediate protector to the lip, at the top and bottom surface, and then the protectors among them (also at the top and at the bottom surface).

Tack welds should be of a length of 50mm (2") each and distributed along all the protectors. Do not tack weld within 25mm (1") of any protector's side edges. Once tack-welded, perform a feathering on each tack weld (grinding the beginning and the end of each tack).

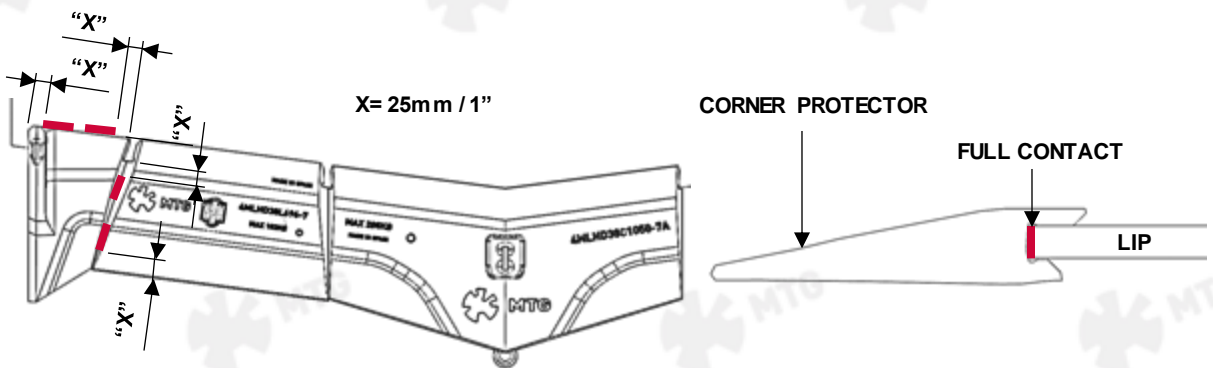


- 6.5** Repeat the previous step for the intermediate protector of the other side taking special care in maintaining the specified preheating temperatures prior to any weld and performing a feathering on each tack weld.
- 6.6** In case of installing extra protector portions to lengthen the overall protection width, repeat steps 6.4 and 6.5 to tack weld them distributing the tacks evenly according to the dimension of these extra portions. Same specs for temperatures, tack lengths and feathering apply.
- 6.7** Insert one of the corner protectors being sure that it is in full contact with the lip's blunt and it is also contacting its adjacent protector's edge.

Check that protectors and lip are still within the indicated preheating temperatures. If the temperature dropped below 180°C (356°F) re-heat again to specs.

Tack weld the corner protector to the lip, at the top and at the bottom surface. DO NOT tack weld the lateral protector to the bucket cheek yet at this stage.

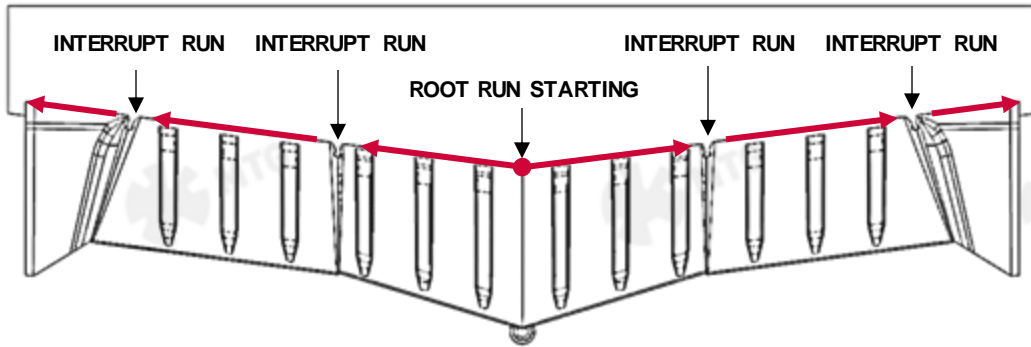
Then, tack weld the protectors among them (top and bottom).



Tack welds should be of a length of 50mm (2") each and distributed along all the protectors. Do not tack weld within 25mm (1") of the protector's side edges. Once tack-welded, perform a feathering on each tack weld (grinding the beginning and the end of each tack).

- 6.8** Repeat the previous step for the corner protector of the other side taking special care in maintaining the specified preheating temperatures prior to any weld and performing a feathering on each tack weld.
- 6.9** Once all the protectors have been already tack welded among them and to the lip, it is time to perform a root run of all protectors to the lip and also among them. Prior to start, if the temperature has drop below 180°C (356 °F), reheat the weld area to a temperature between 180°C and 200°C (356 °F and 392 °F).

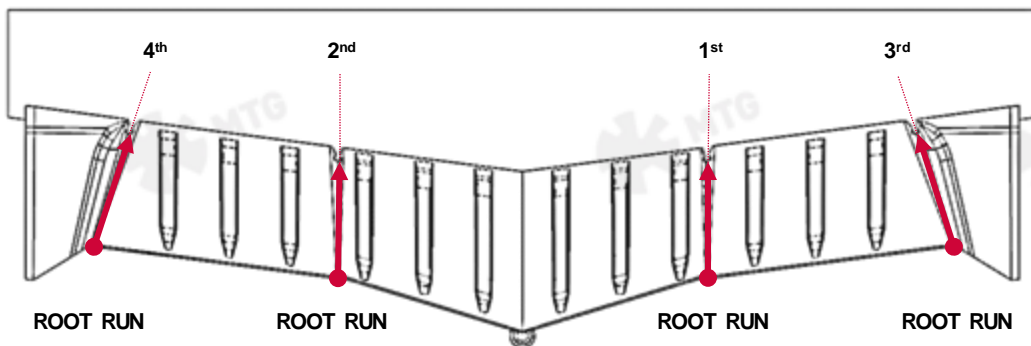
Begin with a root run at the bottom of the lip starting at the middle of the central shroud towards one side and then from the middle of the central protector towards the other side as the picture shows. Interrupt the root run 25mm (1") before each protector's side edges and start again 25mm (1") at the following protector. Do not overpass 250°C (482°F).


6.10

Taking advantage of the current position of the lip assembly, perform a root run among protectors.

Prior to start, if the temperature has drop below 180°C (356 °F), reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F).

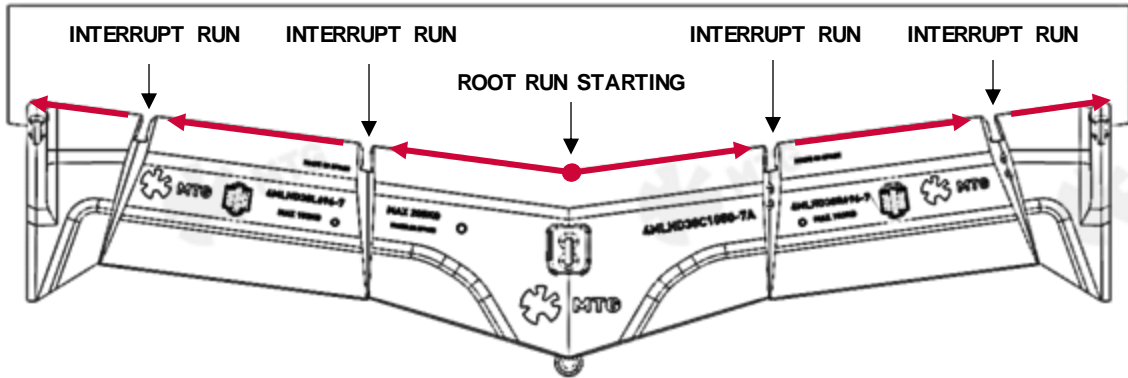
Begin with a root run among protectors from the bottom following an alternating sequence. All these root runs should start at the edge of each protector (see drawing) and finish at the end of them. Do not overpass 250°C (482°F).


6.11

Flip the lip over to perform the root run at the top side.

Check that protectors and lip are still within the indicated preheating temperatures. If the temperature dropped below 180°C (356°F) re-heat again to specs.

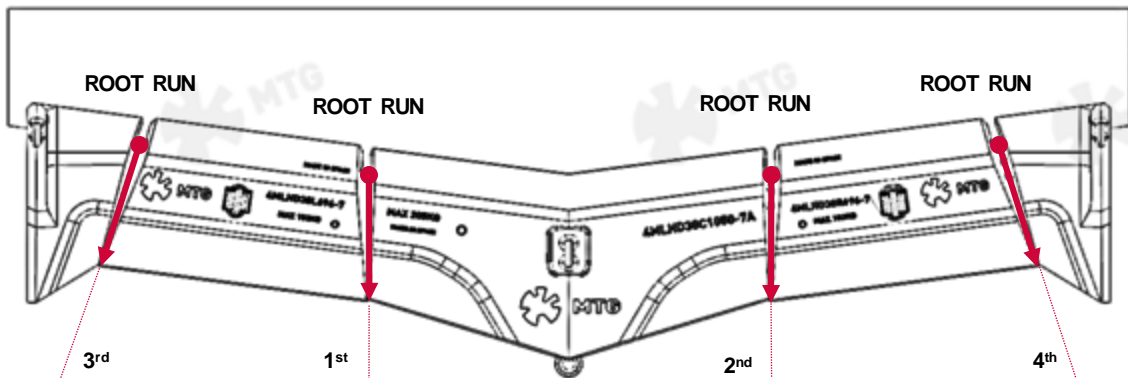
Begin with a root run at the top of the lip starting at the middle of the central shroud towards one side and then from the middle of the central protector towards the other side as the picture shows. Interrupt the root run 25mm (1") before each protector's side edges and start again 25mm (1") at the following protector. Do not overpass 250°C (482°F).


6.12

Once the root runs of the protectors to the lip have been completed, it is time to perform a second root run among protectors.

Prior to start, if the temperature has drop below 180°C (356 °F), reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F).

Clean the previously applied root runs from the bottom by means of a grinder and begin with a root run between protectors from the top following an alternating sequence. All these root runs should start at the indicated spot of each protector (see drawing) and finish at the end of them. Do not overpass 250°C (482°F).

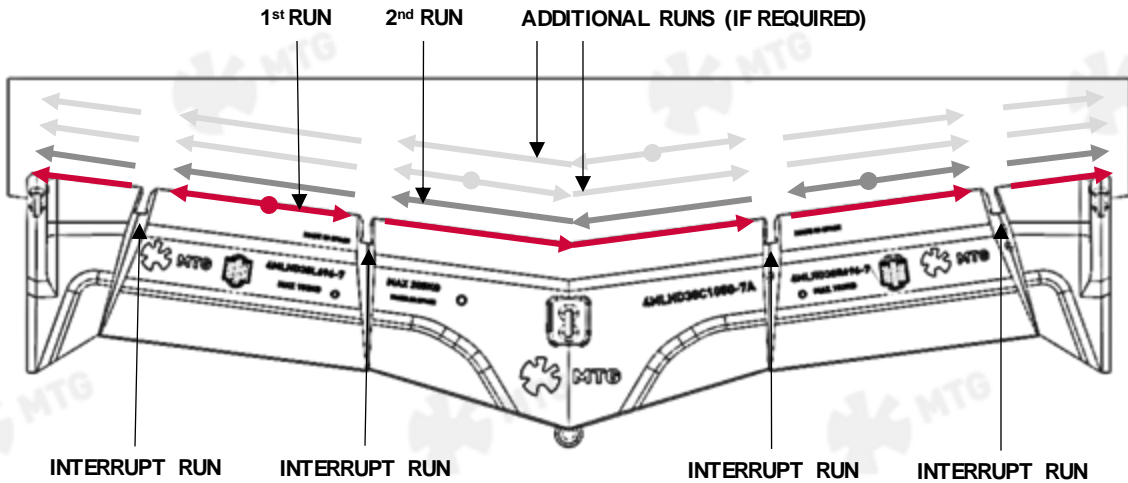

6.13

Once the protectors' position has been secured among them and against the lip with a root run, it is time to complete the welding of protectors to the lip and among them.

Prior to start, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F).

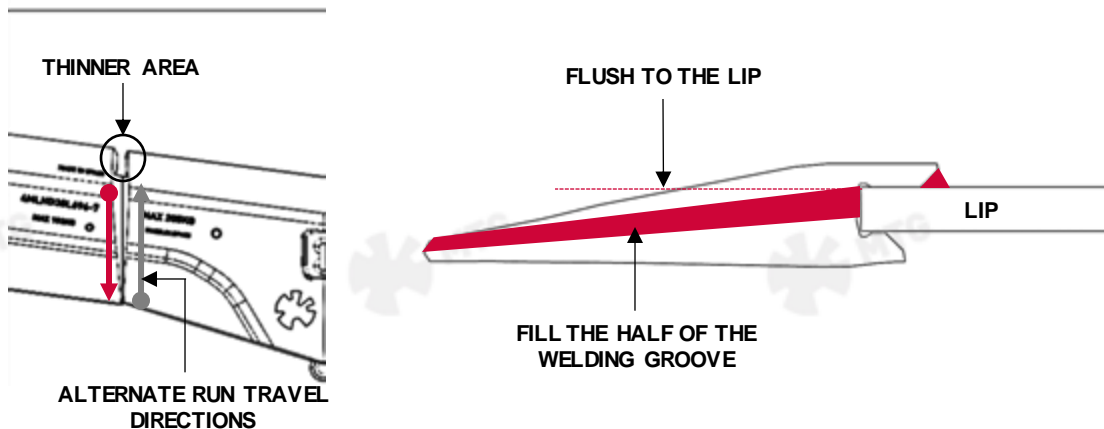
Taking advantage of the current position of the lip assembly, fill the half of the welding groove by performing a welding run from the middle of one intermediate protector towards one side and then from the same spot towards the opposite side. Interrupt the run 25mm (1") before each protector's side edges and start again 25mm (1") at the following protector. Once completed the first run, perform a second run, with the same considerations, from the middle of the opposite intermediate protector through the sides as described on the previous run. Do not overpass 250°C (482°F).

6.14 If additional passes are required to complete the half of the welding groove, follow the same criteria as described previously.



6.15 After completing the half of the welding groove of protectors to the lip at the top side, it is time to do the same among protectors taking advantage of the current position of the lip assembly. Prior to start, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F).

Start the welding between protectors from the top, out of the thinner area and alternating the travel direction of the weld runs until completing the half of the thickness of the welding groove (filling until the welding is flush to the lip). Alternate the location of the stop/start of each run. Do not overpass 250°C (482°F).



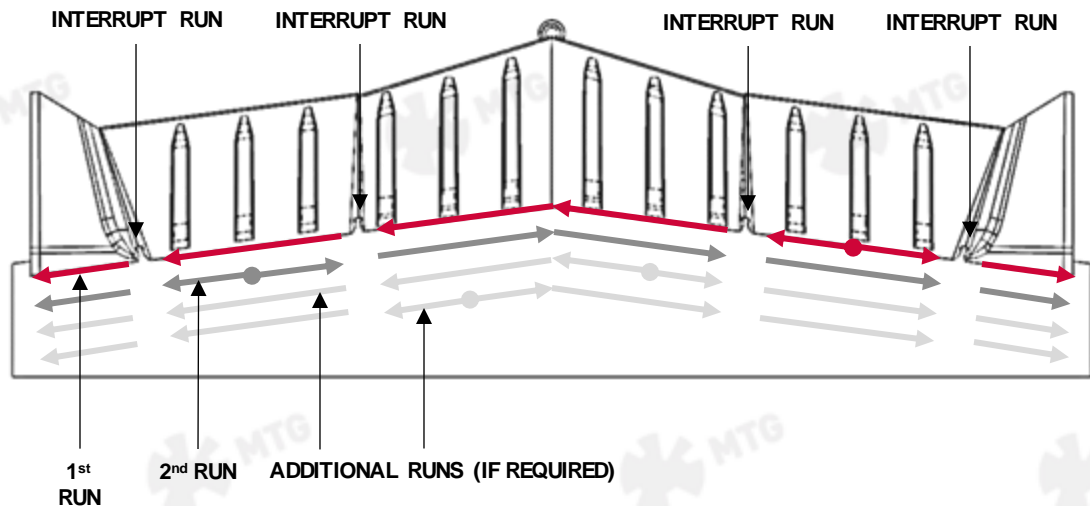
6.16 Following the sequence indicated on step 6.12, repeat the previous step for all the welding grooves among protectors until complete the half of the groove thickness on each. Before proceeding, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F). Do not overpass 250°C (482°F).

6.17

Flip the lip over to complete the welding of protectors to the lip at the bottom. Prior to start, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F).

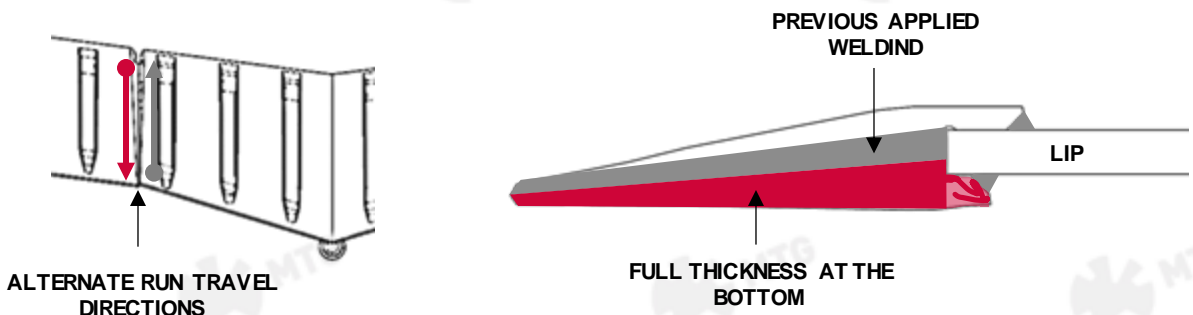
Complete the full welding groove starting with a welding run from the middle of one intermediate protector towards one side and then from the same spot towards the opposite side. Interrupt the run 25mm (1") before each protector's side edges and start again 25mm (1") at the following protector. Once completed the first run, perform a second run, with the same considerations, from the middle of the opposite intermediate protector through the sides as described on the previous run. Do not overpass 250°C (482°F).

The additional passes until complete the full welding groove, must follow the same criteria as described previously.

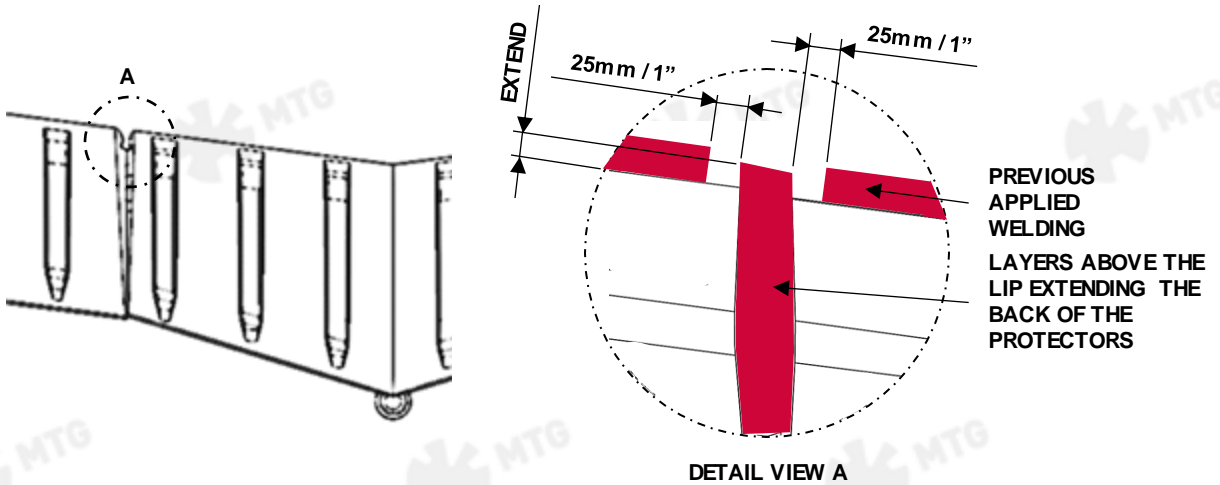

6.18

After completing the full welding groove of protectors to the lip at the bottom side, it is time to do the same among protectors taking advantage of the current position of the lip assembly. Prior to start, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F).

Start the welding between of protectors from the bottom alternating the travel direction of the weld runs until completing the full thickness of the welding groove. Alternate the location of the stop/start of each run. Welding above the lip should extend the back of the protectors. Do not overpass 250°C (482°F).

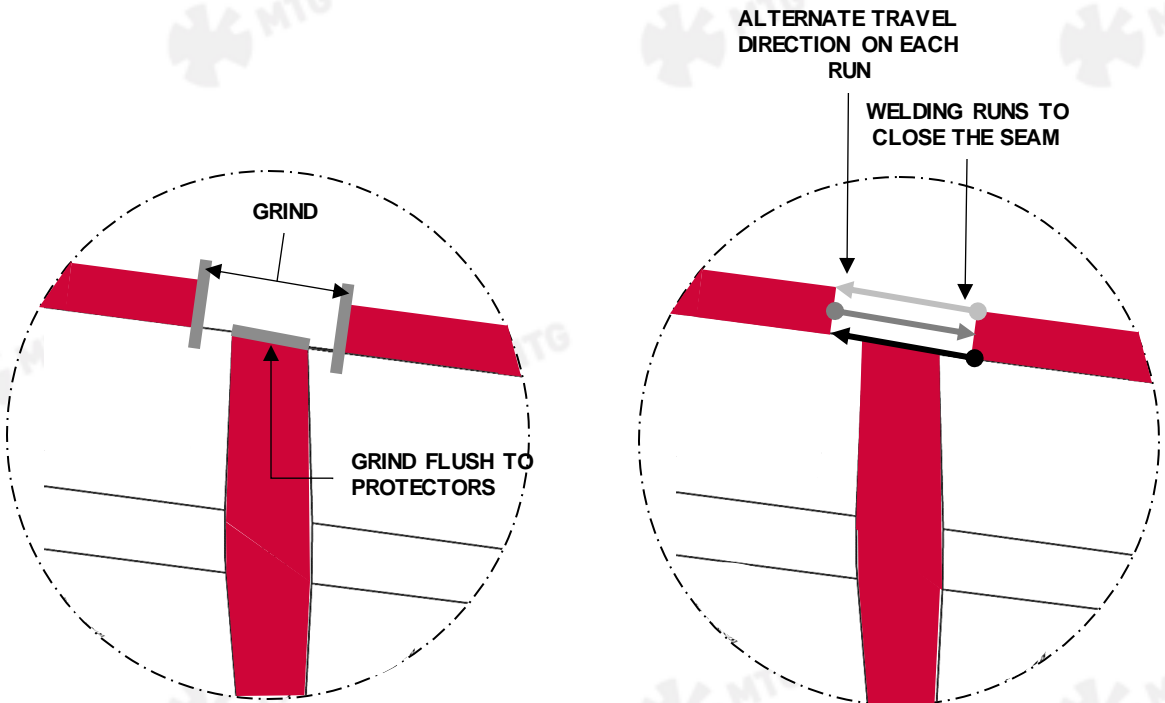


6.19 Layers above the lip should extend the back of the protector as the picture shows.



6.20 Finally, to close the seam between the protector and the lip at the bottom, grind the starts/ends of the welding runs applied to attach the protector to the lip at the back and among them and then perform several welding runs, alternating the travel direction, until complete the space available leaving all welds flush at the same level.

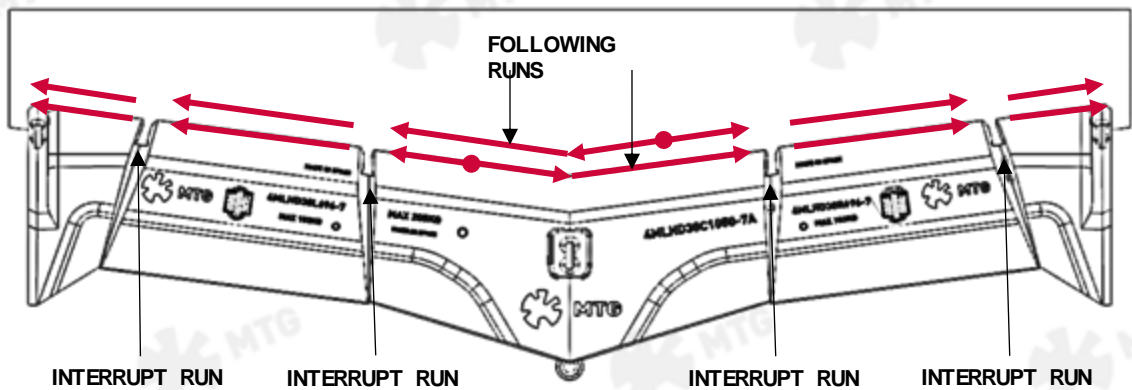
Prior to start, even for grinding, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F). Do not overpass 250°C (482°F).



6.21 Following the sequence indicated on step 1.9, repeat steps 1.16 and 1.17 for all the welding grooves among protectors to complete the full welding at the bottom of the lip assembly. Before proceeding, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F). Do not overpass 250°C (482°F).

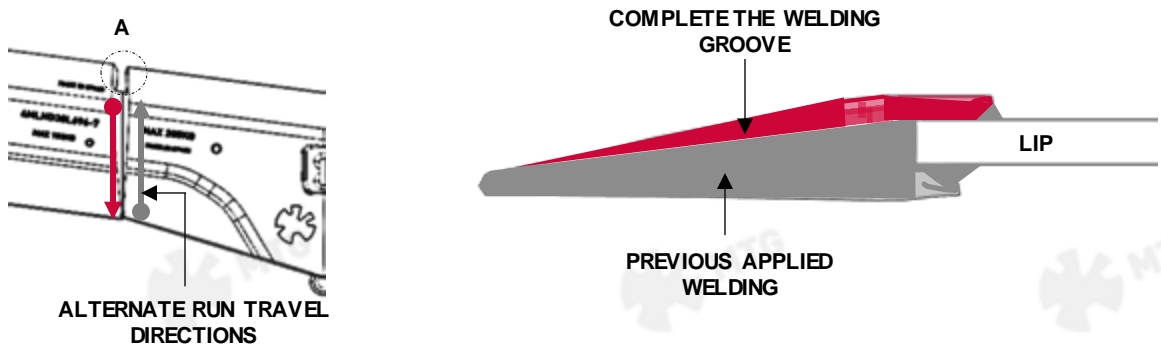
6.22 Flip the lip over again to complete the welding of protectors to the lip at the top side. Prior to start, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F).

Complete the full welding groove (the remaining half) starting with a welding run away from other previously layer starts through the sides. Interrupt the run 25mm (1") before each protector's side edges and start again 25mm (1") at the following protector. Then, apply the following runs following the same criteria until the welding groove has been completed. Do not overpass 250°C (482°F).

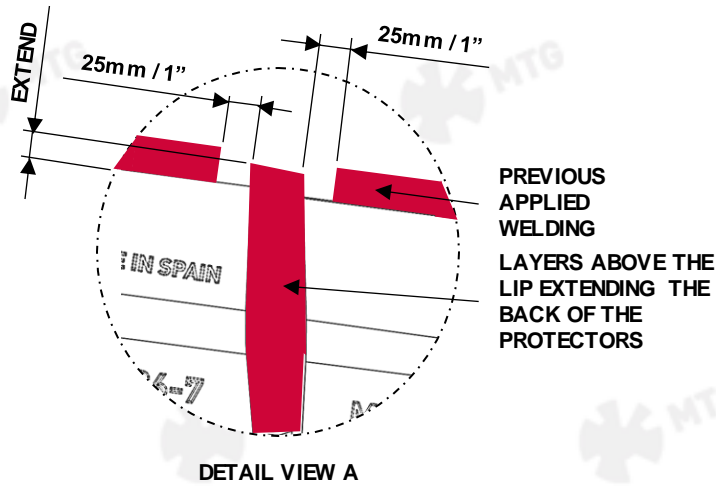


6.23 After completing the full welding groove of protectors to the lip at the top side, it is time to do the same among protectors taking advantage of the current position of the lip assembly. Prior to start, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F).

Start the welding between of protectors from the top alternating the travel direction of the weld runs until completing the full thickness of the welding groove. Alternate the location of the stop/start of each run. Welding above the lip should extend the back of the protectors. Do not overpass 250°C (482°F).

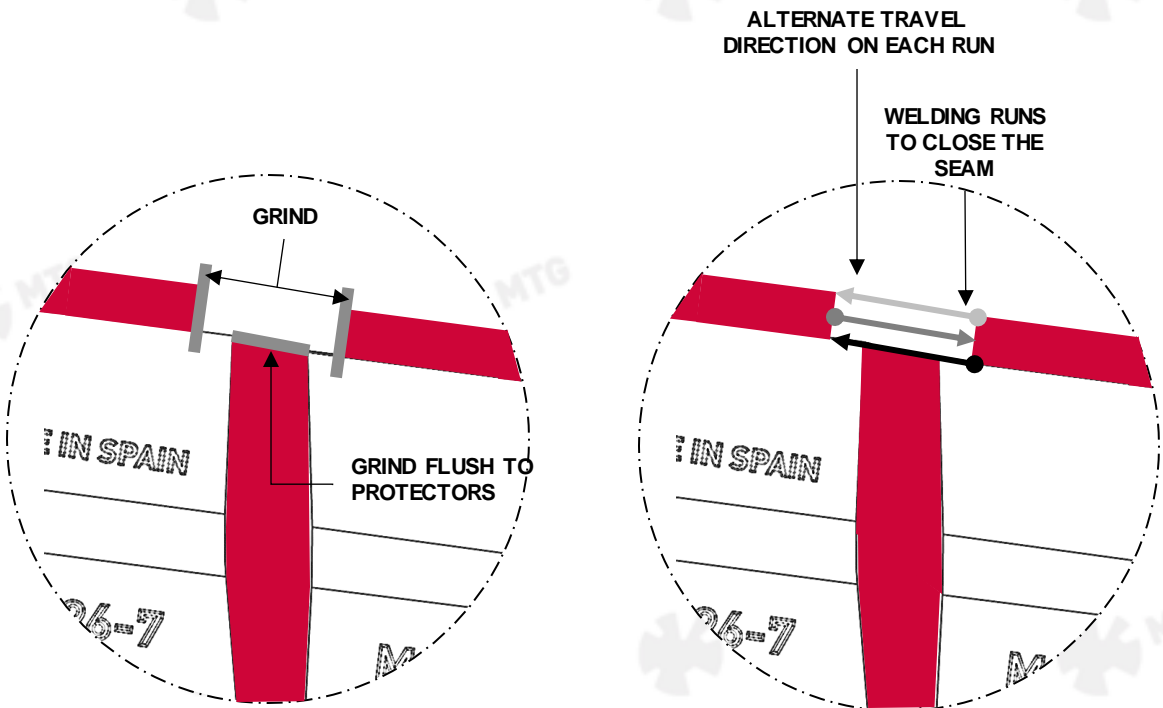


6.24 Layers above the lip should extend the back of the protector as the picture shows.



6.25 Finally, to close the seam between the protector and the lip at the top, grind the starts/ends of the welding runs applied to attach the protector to the lip at the back and among them and then perform several welding runs, alternating the travel direction, until complete the space available leaving all welds flush at the same level.

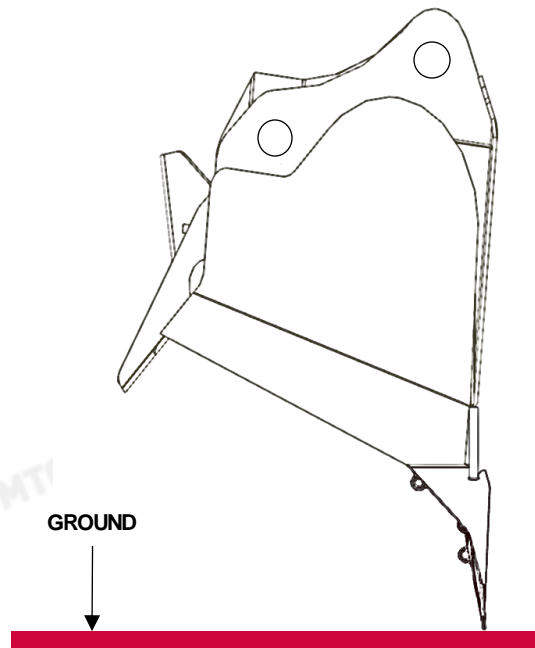
Prior to start, even for grinding, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F). Do not overpass 250°C (482°F).



6.26 Following the sequence indicated on step 6.12, repeat steps 6.23 to 6.25 for all the welding grooves among protectors to complete the full welding at the bottom of the lip assembly. Before proceeding, check that the temperature has not dropped below 180°C (356 °F), if so, reheat the weld areas to a temperature between 180°C and 200°C (356 °F and 392 °F). Do not overpass 250°C (482°F).

6.27 Once all the protectors have been already welded to the lip and among them, it is time to weld the lip assembly into the bucket.

For this step it is recommendable to place the bucket and lip assembly as the picture shows to ease the operation.

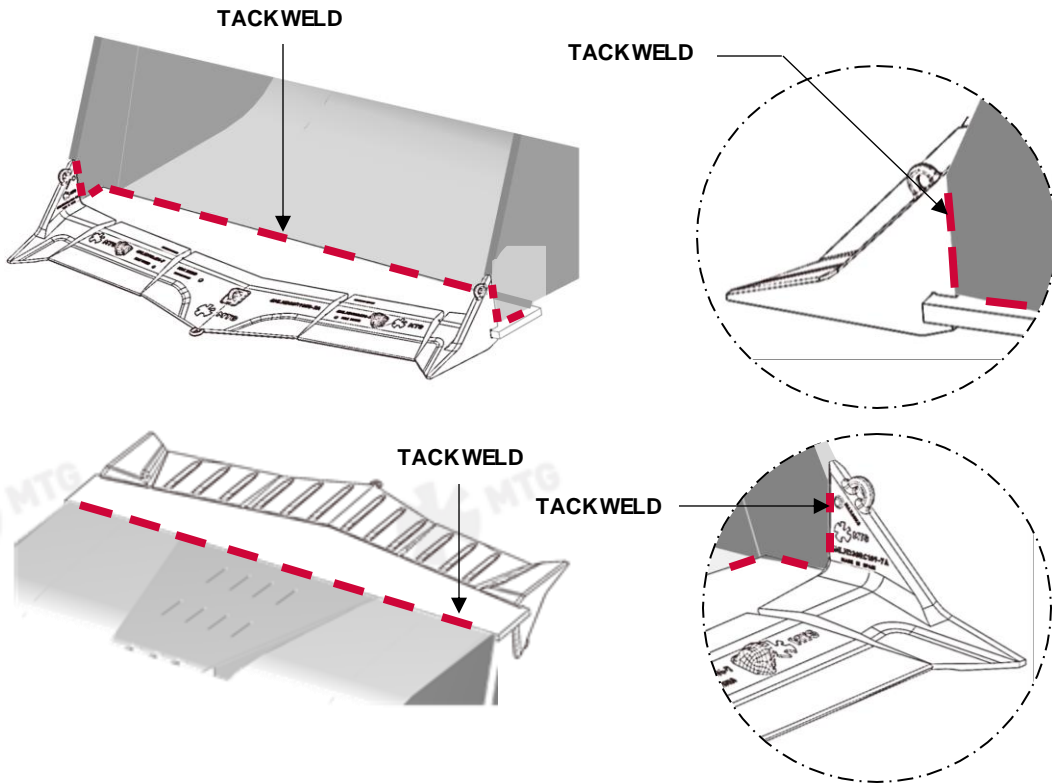


Make sure the bucket already has the proper weld preps to receive the lip assembly. Present the lip assembly into the bucket and perform several tack welds from the inside bucket and from the outside to attach the back of the lip to the bucket and the corner protectors to the bucket cheeks.

Prior to any welding, preheat protectors (where applicable) and blade to a temperature between 180°C and 200°C (356°F and 392°F). The preheating temperature should be reached and measured at 100mm (4") around of the weld joints or the area being welded.

Tack welds should be of a length of 50mm (2") each and distributed along all the protector's width (where applicable). Do not tack weld within 25mm (1") of the protector's side edges. Once tack-welded, perform a feathering on each tack weld (grinding the beginning and the end of each tack) at least on tacks applied to protectors.

6.28

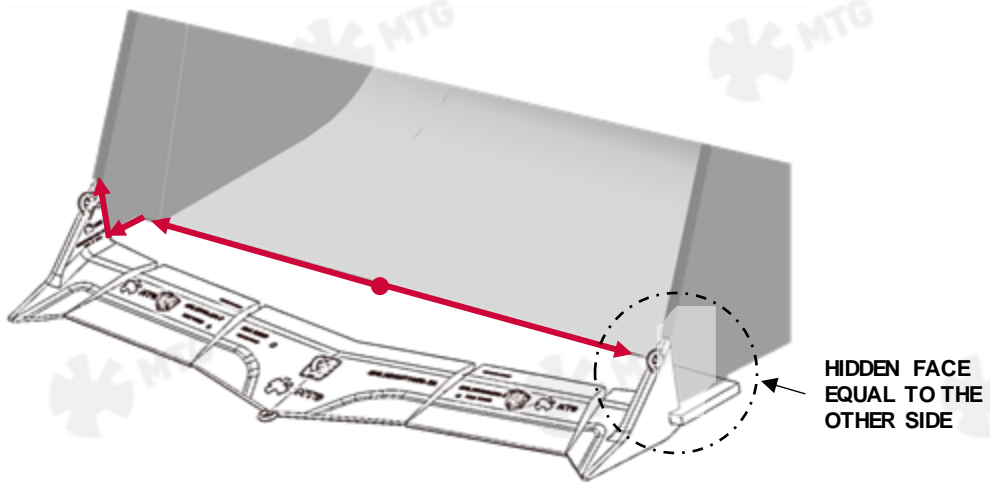


6.29

Once the lip assembly has been tack welded into the bucket is time to complete the process of welding.

Verify that the temperature of the protectors is still between 180°C and 200°C (356 °F and 392 °F). If the temperature has drop below what specified, reheat again to specs.

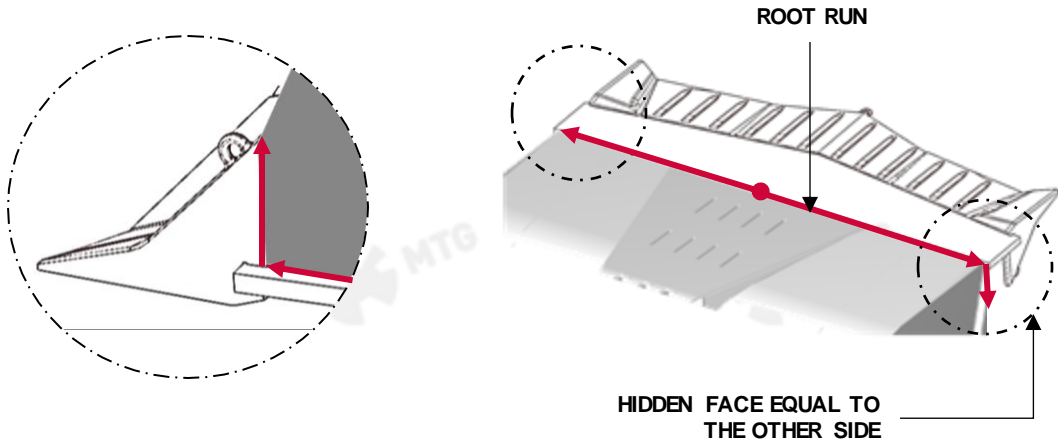
Begin with a root run from the inside bucket at the back of the lip. This run should travel from the center of the lip to the sides. Once the run reaches the bucket cheeks at the sides, they should continue along them until reaching the corner protector where it should travel until the end of the protector as the picture shows. Do not overpass 250°C (482°F).



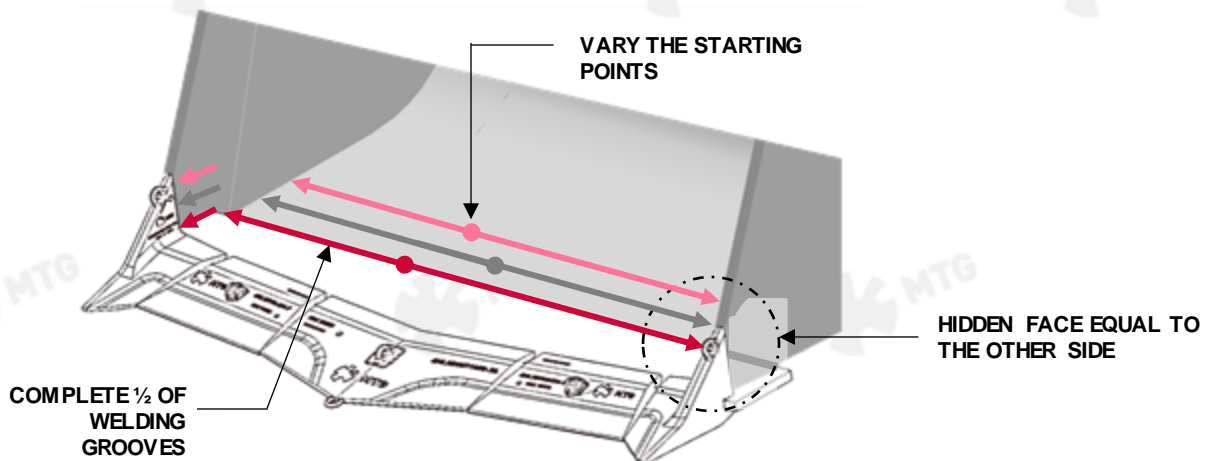
6.30

Verify again that the temperature of the protectors is still between 180°C and 200°C (356°F and 392°F). If the temperature has drop below what specified, reheat again to specs.

Perform a root run from the outside of the bucket at the back of the lip. This run should travel from the center of the lip to the sides. Once the runs reach the bucket cheeks at the sides, they should continue along them until reaching the corner protector where they should travel until the end of the protector as the picture shows. Do not overpass 250°C (482°F).

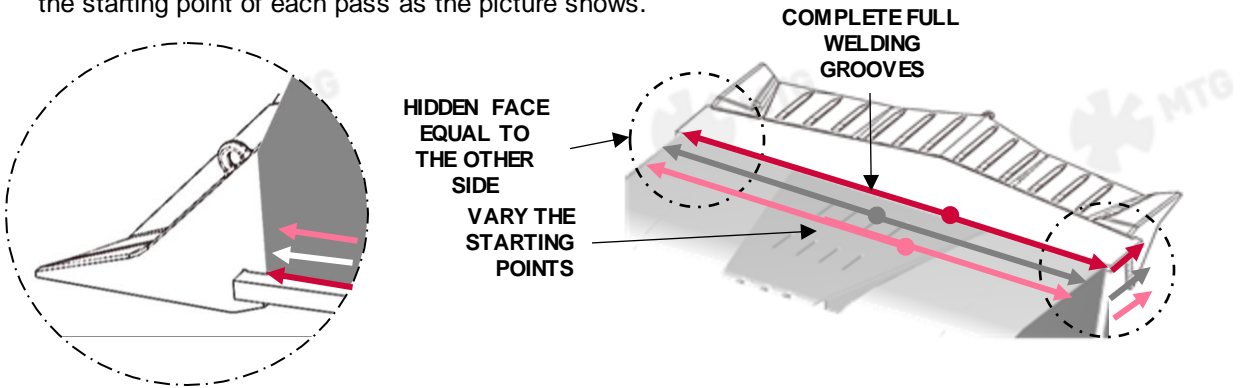
**6.31**

Weld the back of the lip and the lip to the bucket cheeks from the inside bucket until completing the half of the welding grooves. The runs should travel from the center of the lip through the sides varying the starting points as the picture shows.

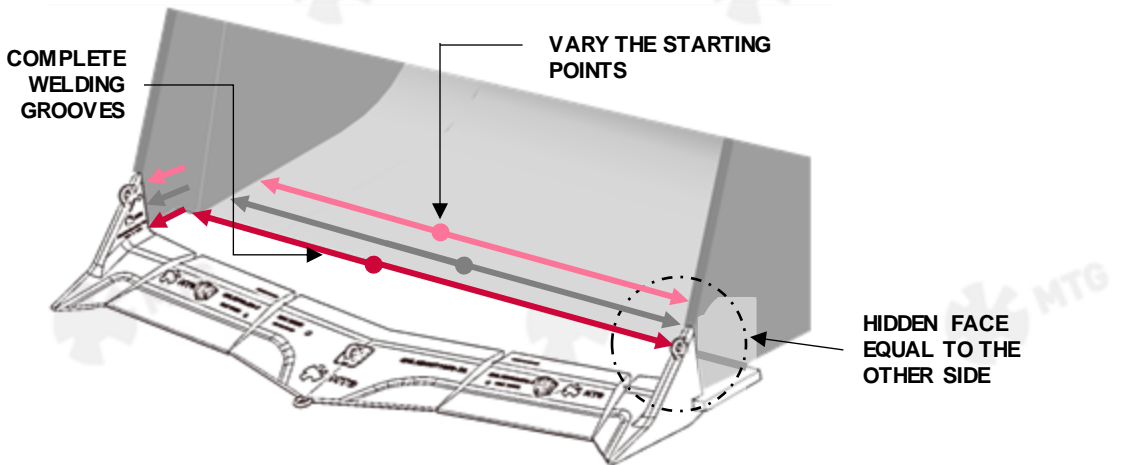


6.32

Weld the back of the lip and the lip to the bucket cheeks from the outside bucket until completing the full welding grooves. The runs should travel from the center of the lip through the sides varying the starting point of each pass as the picture shows.

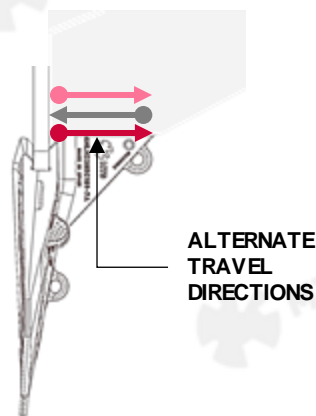

6.33

Weld the remaining half of the welding groove at the inside bucket. The runs should travel from the center of the lip through the sides varying the starting point of each pass as the picture shows.


6.34

Weld the back of one corner protector to the bucket cheek from the inside of the bucket until completing the half of the welding groove. Prior to any weld, verify that the temperature of the protector is still between 180°C and 200°C (356°F and 392°F). If the temperature has drop below what specified, reheat again to specs.

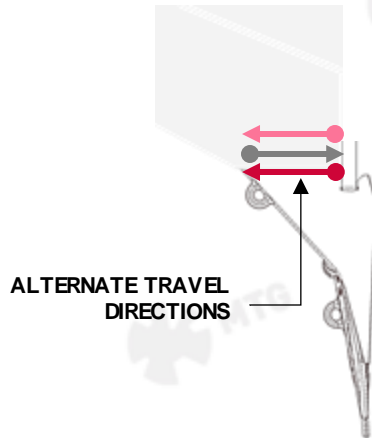
Alternate the runs travel direction as the picture shows. Do not overpass 250°C (482°F).



6.35

Weld the back of the same corner protector to the bucket cheek from the outside of the bucket until completing the welding groove. Prior to any weld, verify that the temperature of the protector is still between 180°C and 200°C (356 °F and 392 °F). If the temperature has drop below what specified, reheat again to specs.

Alternate the runs travel direction as the picture shows. Do not overpass 250°C (482°F).


6.36

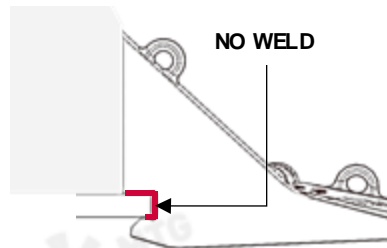
Complete the remaining half of the welding groove of the corner protector to the bucket cheek from the inside of the bucket, verifying preheating temperatures, alternating the directions of the travel runs and avoiding temperatures above 250°C (482°F).

6.37

Repeat steps from 6.33 to 6.35 to complete the welding of the other corner protector. After welding the other corner protector, the welding process is already finished.

6.38

To avoid areas prone to cracking, it is not indicated closing the seams at the outside of the corner protectors where they match the lip blunt.


6.39

After completing the welding process and always that the process is discontinued, for shift changes or during the night in example, all weldments should be covered with thermal blankets to grant a slow cool down. The cool down rate should not exceed 55°C/h (131°F/h). If the room insulating is at or below 5°C (41°F) it would be advisable to use electric blankets.

6.40

After the welding process has finished, check all the welding by means of magnetic particles or dye penetrants. Any crack found must be cleaned and repaired.

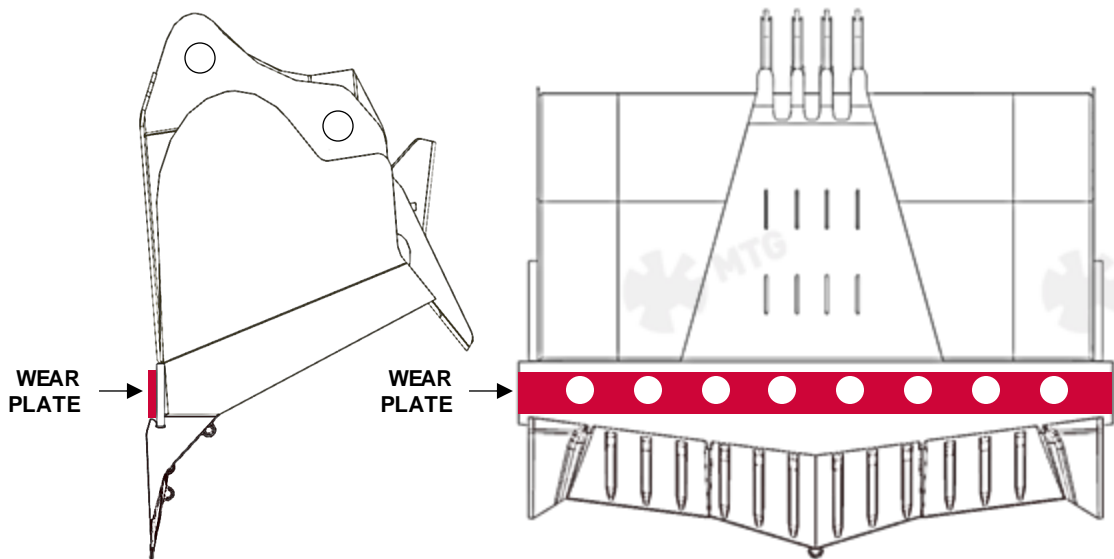
For cracks repairing, bring the area to be repaired, and 100mm (4") all around it, to a temperature between 180°C and 200°C (356 °F and 392 °F) prior to start the repair. This temperature should be kept during all the process of opening, cleaning, filling, and finishing. Slow cool down rates and re-verification of the reparation with magnetic particles or penetrant liquids must be performed.

7. PROTECTION (OPTIONAL)

7.1 If extra protection against wear is required, welding areas can be protected with a wear resistant overlay. Two layers of EN 14700: E Fe6 or EN 14700: E Fe8 can be deposited to achieve hardness between 482 and 560 HB (50 and 55 HRc).

Follow the recommendations of the manufacturer of the wear resistant material and maintain the interpass temperature at the minimum permitted. In some cases, the application of a layer of stainless steel may be required as buttering between the general weld and the anti-wear layers.

7.2 Depending on the application, it would be recommendable to weld an additional 50mm (2") thickness wear plate (Hardox 400 or similar) at the back of the shrouds on the bottom side of the lip as the picture shows.



The dimensions of the wear plate should be according to the room available at the back of the shrouds.

To protect the weldments of the plate from wearing, it is also recommendable to perform several holes into the plate and perform the welding on these holes.



Service Instructions

The latest welding recommendations and assembly / disassembly instructions can be found online:

www.mtgcorp.com/manuals

Please contact Technical Services in case of questions:

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