

SINCE 1960



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Installation, welding and maintenance

COMBI[®]
parts



SAFETY

All persons performing maintenance and welding work must wear O.S.H.A. approved head protection, safety glasses, safety shoes and work gloves suitable to the task being performed. Work pieces must be securely held and supported. Ventilation and fume extraction must accord with good welding praxis.

IMPORTANT

Good ventilation is particularly important when welding manganese steel with austenitic electrodes. Extractors are recommended to remove hazardous fumes.

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SOME ADVICE ABOUT WELDING

Always use electrodes from unopened packets or keep the electrodes in a heating container at 100C.

If the electrodes are from an opened packet or have become damp they should be dried in an oven for 8-10 hours at a temperature of 200-250C. If the electrodes are damaged by humidity to the extent that they begin to rust, they should be discarded.

GENERAL WELDING		
METHOD	STANDARDS	ESAB equiv
NMA	AWS A/SFA 5:1 E7018	OK 67.45
	ASME SFA A5.1 E7018	
	DIN 1913 E51 53 B10	
	ISO 2560 E51 5 B 120 20H	
MAG	AWS A/SFA 5.18:ER 70	OK Autorod 12.51
	DIN 8559:SG 2	
	SS14 3403 3423	
MAG	AWS A/SFA 5.20:E71 T-5	OK Tubrod 15.00

All joints must be dry and free from rust, oil, paint, etc.

Pool cracks can occur when changing electrodes. These should be filled by overlapping with the next electrode or ground out and filled.

Preheat wherever possible to a temperature of 200C before starting to weld, and maintain this temperature throughout the welding process. After welding let the work piece cool down slowly.

Welding Method

NMA welding with coated electrodes or MAG semi-automatic welding.

Austenitic Welding

The welding of manganese steel requires the use of Austenitic electrodes. You can check if the material is manganese steel by testing with a magnet, manganese steel is non magnetic.

Do not preheat manganese steel as this will affect the properties.

Observe the ventilation requirement described in "Safety".

AUSTENITIC WELDING		
METHOD	STANDARDS	ESAB equiv
NMA	DIN 8556:E18.8 Mn B 20+110	OK 67.45
	ISO 3581:E18.8 Mn B	
MAG	DIN 8556:SGX 15Cr Ni Mn 18.8	OK Autorod 16.95

HARD SURFACE WELDING		
METHOD	STANDARDS	ESAB equiv
NMA	DIN 8555:E6-UM-55R	OK 84.58
MAG	DIN 8555:MSG 6-60	OK Autorod 13.91

CUTTING OUT THE LIP

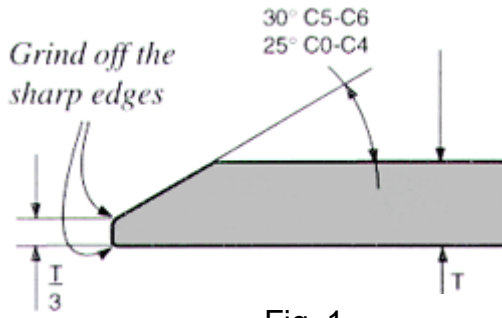


Fig. 1

These dimensions do not apply for bolted shroud C5. See Fig.23

Loaders

The front edge of the lip must be bevelled according to Fig. 1. When a Vee or Spade nose lip is to be produced to establish the exact form of the front edge showing the number and position of the teeth and the total width of the lip, see fig. 2 and table for dim A.

SIZE	DIM A
C0	10 mm
C1	10 mm
C2	10 mm
C3	15 mm
C4	20 mm
C5	20 mm
C6	25 mm

V and Spade nose lips

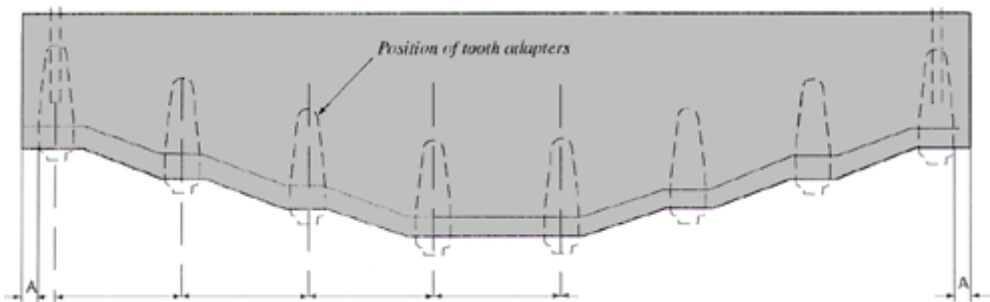


Fig. 2 - Equal distance between tooth adaptors

Excavators

The front edge of the lip must be prepared according to the type of adaptors to be used, see figs 3 and 4. The dimensions of the lip plate must include the welding allowance for the corner adaptors see fig. 5 and table for dim A.

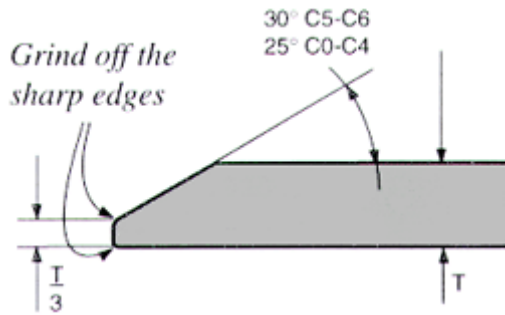


Fig. 3

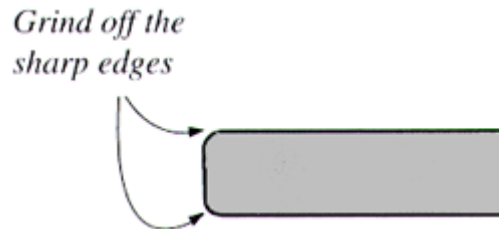


Fig. 4

These dimensions do not apply for bolted shroud C5. See Fig. 23

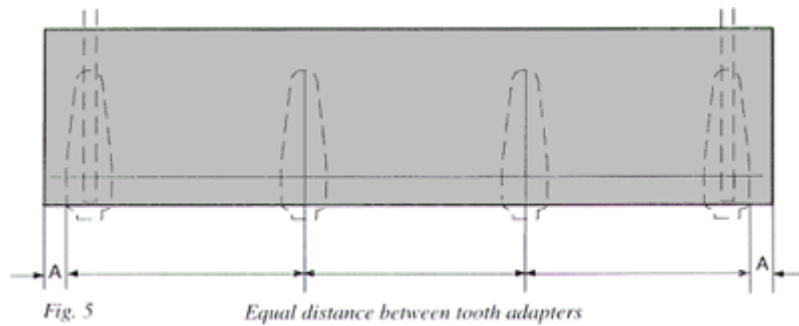


Fig. 5

WELDING ON THE ADAPTORS

Type A1

Position the adaptors along the lip according to figs 6,7 and 8. Track weld the prepared corner plates to the end adaptors. All welds must be made using small multiple runs.

Care must be taken around the critical zones figs 9 and 10 to avoid cracks with weld starts and stops. Any cracks, slag inclusions and undercutting must be ground away and rebuilt by welding, and the critical zones ground smooth.

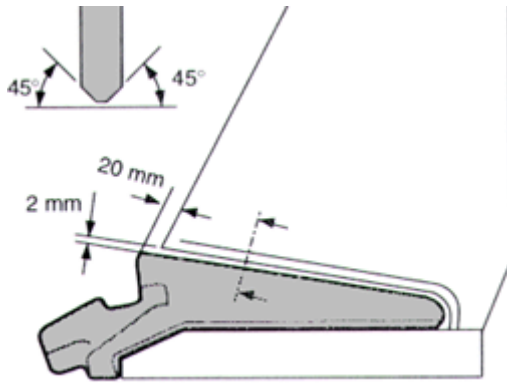


Fig. 6

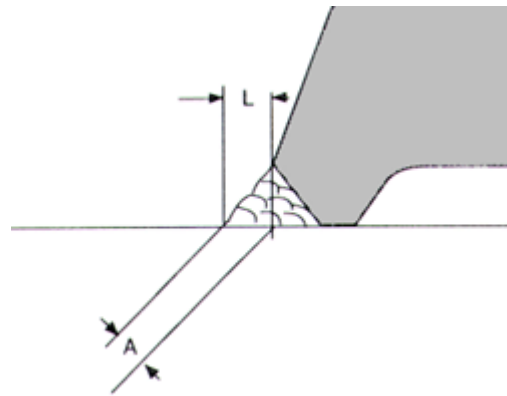
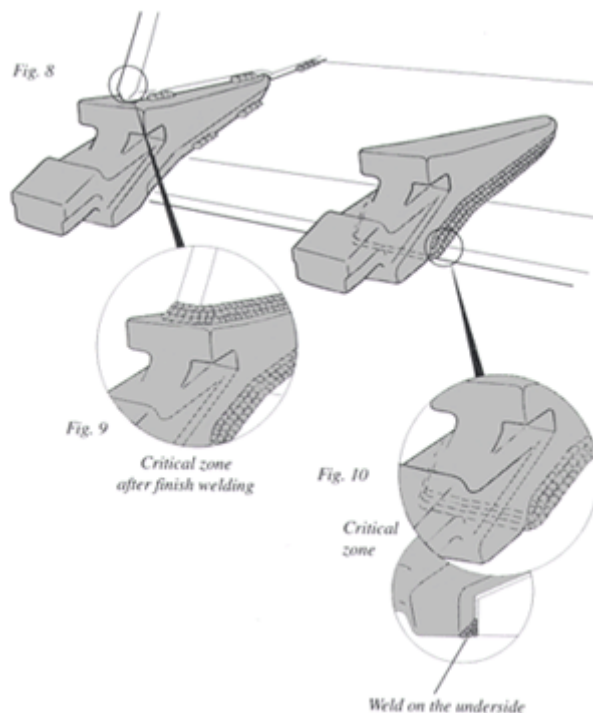


Fig. 7
Do not over weld



SIZE	L mm	A mm
C0	9	7
C1	9	7
C2	13	9
C3	14	10
C4	16	12
C5	18	13
C6	20	14

SIZE	TOOTH TYPE	NOMINAL	EDGE THICKNESS
C0	T1	20	16-25
C1	T1	25	20-25
	T3		25-30
C2	T1	30	30-35
	T3		30-35
C3	T1	40	35-40
	T2		40-45
C4	T1	50*	45-50
	T3		50-60
C5	T2	65**	60-70
	T8		60-75
	T9		75-90

* Thicknesses can be reduced by 10 mm if arrow head profiles are used.

** Thicknesses can be reduced by 15 mm if arrow head profiles or shrouds are used for underside protection.

Type A5

The bucket side plates must be prepared according to fig. 11 to accommodate the corner adaptor and make a strong connection between the bucket sides and the lip.

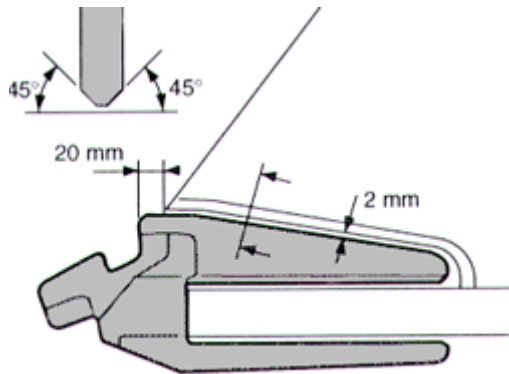


Fig. 11

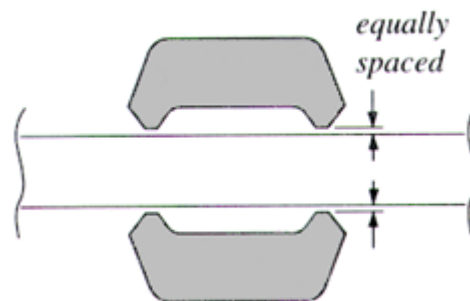


Fig. 12

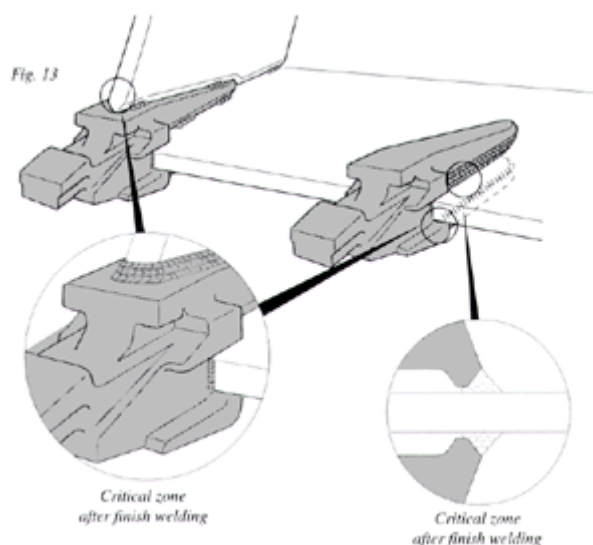
The adaptors are positioned on the lip, see figs 12 and 13.

Care should be taken to ensure an equal distance between the adaptors, (this will simplify the cutting and fitting of the shrouds).

Tack weld the adaptors in position and weld the adaptors with small multiple runs.

Fill the weld bevel to the dimensions A and L shown in the table under Fig. 10.

Starts and stops should be avoided in the critical zone, any cracks or slag inclusions should be ground away and filled again with weld and the critical zones ground smooth.



Type A8

There are two versions of the adaptor:

- long top leg.
- long bottom leg.

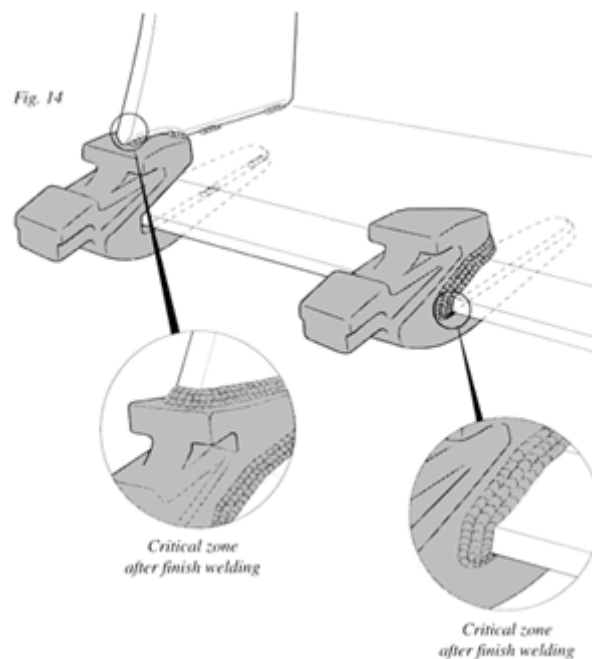
Both are welded using the same procedure.

Prepare the bucket side plates to fit over the adaptor placed in the bucket corner (see Fig. 11).

Position the adaptors with equal spacing along the lip and tack weld them into position Fig. 14.

Weld the adaptors with small multiple runs to the dimensions A and L shown in the table under Fig. 10.

Avoid starts and stops in the critical areas shown in Fig. 14. Any cracks, slag inclusions and undercutting should be ground away and filled again with weld and the critical zones ground smooth.



WELDING ON THE ADAPTORS

Types A9, A10, A11

Adaptor types A9 and A10 are used to convert a bucket (normally with a cast lip) from insert teeth to COMBIPARTS.

A9/A10

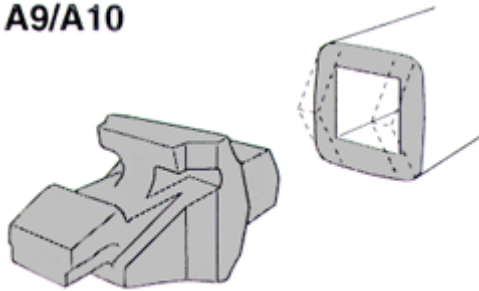


Fig. 15

A11

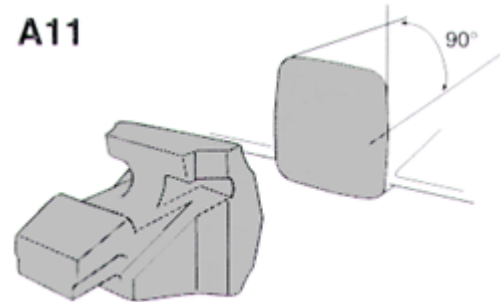


Fig. 16

Cut off around the lip sockets to give a suitable joint surface (see Fig. 15) and grind off any defects that might be present.

Adaptor type A11 is used to convert a cap type tooth system to COMBIPARTS. Cut off the worn cap system adapter noses at 90 to the lip centre line and grind off any defects that might be present.

Place the conversion adaptors into their correct position, use teeth on the adaptors to give accurate alignment. Preheat if necessary and weld using multiple stringer runs. Cast lips of manganese steel must be welded with austenitic electrodes (see safety instructions, at top of page). Do not preheat.

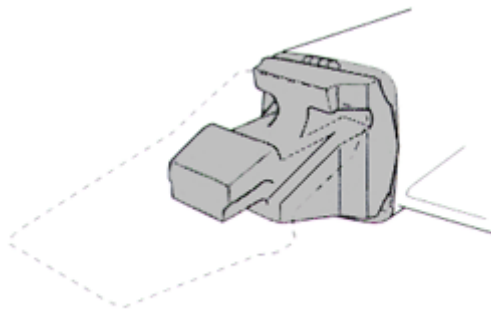


Fig. 17

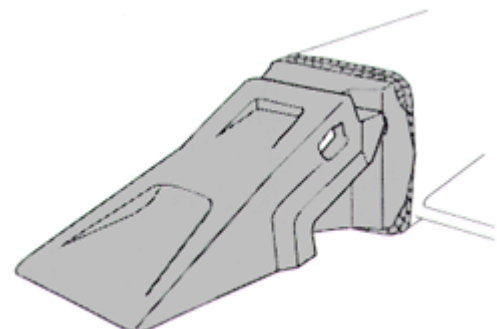


Fig. 18

Installing the shrouds

For Adaptor A5

Measure the distance A between the adaptors (Fig. 19).

Cut off a suitable piece of shroud profile S1 to a length equal to A minus 3mm, fig. 20. The shroud is fitted into the recesses of the adaptors and held in place by the teeth, Fig 21.

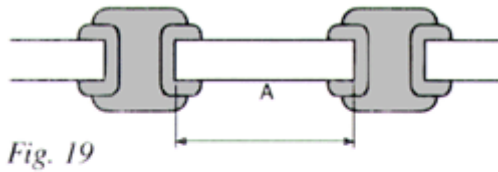


Fig. 19

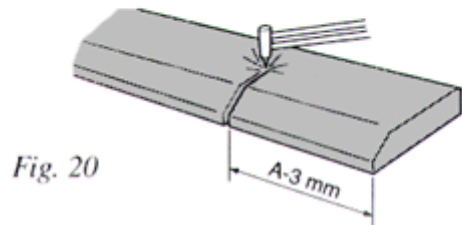


Fig. 20

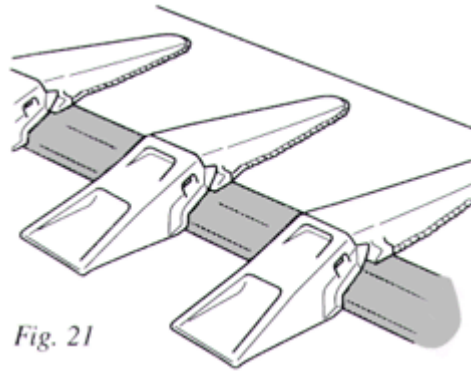


Fig. 21

Welded Shroud

The shroud should be pressed tightly into the edge and care taken to ensure that there is good contact.

Tack weld into position and preheat to 200C. Stitch weld on the top and underside with 50 mm intervals.

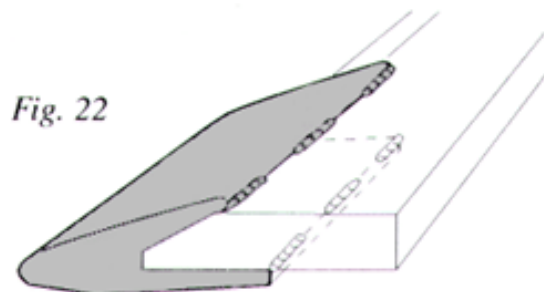


Fig. 22

C5 Bolted Shroud

Mark out and drill the lip plate according to fig. 23.

Secure the shroud to the lip using 1¼" Plow bolts tensile grade 12.9 and tighten to a torque value of 2720 Nm. Check the tightness after a few hours of operation.

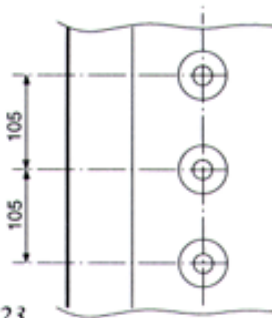
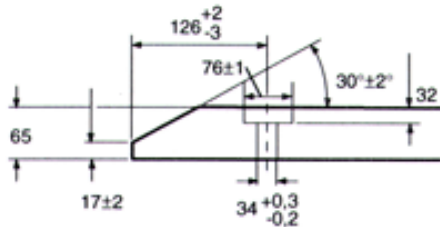


Fig. 23

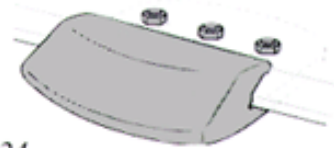


Fig. 24

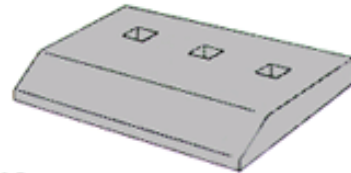


Fig. 25

Welded Shroud C6

Measure the distance and the lip angles between the teeth and cut the shroud profiles to length.

Tack weld the shroud supports into position fig. 26. The underside of the shroud support is on the same level as the underside of the lip.

Weld them into position using small multiple runs. The shrouds are fitted between the adaptors and held in place by the teeth.

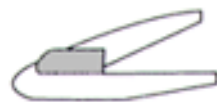


Fig. 26

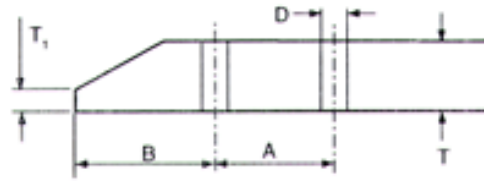
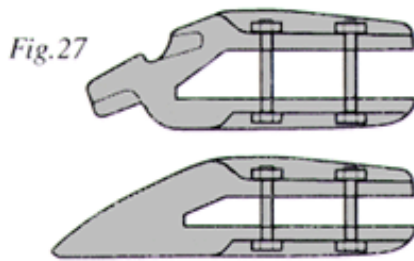


Bolted Teeth and Adaptors

Mark out the positions of the adaptors along the lip and drill according to fig. 28 and the dimensions in the table.

Fit the teeth/adaptors on the lip, it is important that there is contact on the underside of the edge and the lip bevel. Secure with hexagon bolts grade 8.8, tighten alternately.

Apply final torque first to the rear bolt and then to the front bolt. Check for tightness after a few hours of operation.



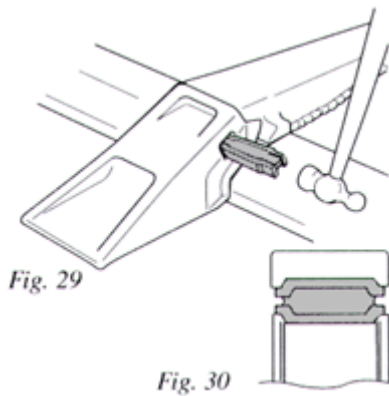
PART No.	T	T1	B	A	D
49 151	20	6	69	86,6	19
49152	25	8	78	86,6	19
12 052	30	10	78	86,6	23
12 053	35	12	100	111,2	23
13 051	35	12	100	111,2	23
13 052	40	14	110	100	27
14 052	40	14	110	100	27

PART No.	Bolt 8,8	Torque
49 151	M16	197 Nm
49152	M16	197 Nm
12 052	M20	385 Nm
12 053	M20	385 Nm
13 051	M20	385 Nm
13 052	M24	635 Nm
14 052	M24	635 Nm

Fitting Teeth

Mounting

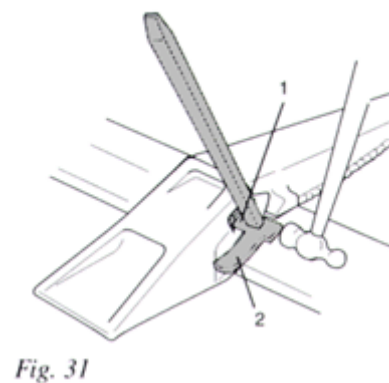
Drive the C-LOCK into the tooth locking hole and ensure that the lock is centralised. See safety instructions - top of page.



Dismounting

Drive out the C-LOCK using the tool, start by using projection 1 and continue with projection 2.

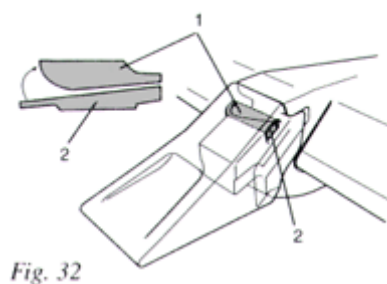
Dismounting



Slag Rock

Position part 1 into the tooth as shown in fig. 32. Drive the part 2 of the lock and secure by bending up the tongue.

Slag Lock



Tooth T6

Trim the wings of the tooth according to fig. 33 so that the mounted teeth build a straight edge.

Tooth T6

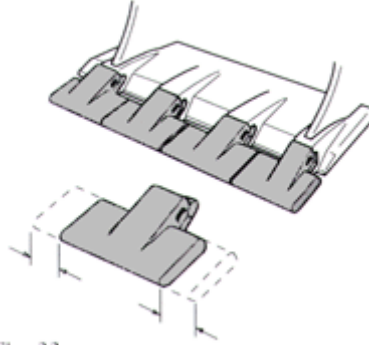


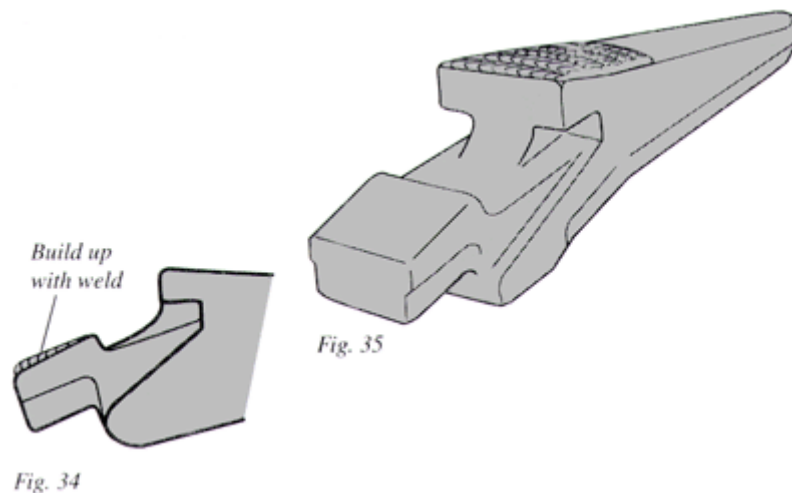
Fig. 33

MAINTENANCE

If the joint between the teeth and the adaptor becomes loose this normally means that the adaptor nose has become worn.

Use a new tooth as a guide and build up the top surface of the adaptor nose with electrode type OK 67.45. Grind smooth so that a new tooth fits tightly onto the adaptor.

The top and bottom surfaces of the adaptors can be built up if worn by welding on a thin plate. This can be protected with hard surface welding.



How to weld cracks

Check for cracks using dye penetration fluid. The cracks must be removed by grinding or by Carbon-arc.

Grind the surfaces to make sure they are clean and to remove the hardened top of the surfaces. Check with dye penetration again to make sure you have removed the cracks.

Preheat the area to 200C and weld the cracks using filler material according to welding advice at top of page.

Use thin electrodes and weld with multiple runs. Let the area around the repair cool down slowly, and finally grind to a smooth surface.

End of document