

TOOLS AND EQUIPMENT

SECTION 10

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1. GENERAL

When using tools and equipment, employees shall:

- Ensure they have received appropriate instruction or training in the safe use of the tools/equipment.
- Always use the safety guards, attachments and systems that are available.
- NOT leave tools where they present hazards such as falling or contacting electric equipment.
- Tag and remove from service any defective tools and equipment until repaired or replaced.
- NOT use conductive tapes or rulers near energised conductors or assets.
- Inspect and test all tools and equipment prior to use.
- Wear appropriate PPE (eye protection, ear muffs, gloves, etc.).
- Lifting equipment shall be tested annually and colour coded per TABLE 1 of Appendix 3.

2. PORTABLE ELECTRIC TOOLS, EXTENSION CORDS AND LIGHTING

NOTE: Insulation earth leakage circuit breakers' should be used whenever a tool is being used outside of a workshop situation and in particular in combination with extension cords and/or a damp environment.

When using extension cords and portable electric tools, employees shall:

- Make a visual inspection of the item to confirm its general safe condition and check the next test date to verify that testing of the item is not overdue. All items should be tested annually.
- Keep the use of extension cords to a minimum, as they are not intended to serve as a substitute for permanent wiring. Extension cords should not be connected one to another to gain additional length.
- When using electric power tools with trailing leads, persons shall remain clear from any live high voltage apparatus.

- Cover or elevate temporary electric cords passing through work areas to protect them from damage and to eliminate tripping hazards.
- Use only leads and hand lamps which are 32 volts or less when working in a damp or confined area (e.g. inside a large tank). The transformer shall be left outside the confinement zone.
- Wear appropriate PPE (eye protection, ear muffs, gloves, etc.).
- To avoid accidental starting – don't carry a plugged in tool with a finger on the switch.
- Large electric drills have a lot of torque – beware of strains or being struck by the handle of an out of control drill.
- Don't operate power tools with loose clothing or long hair as severe injuries can result.
- Do not use electric power tools in a gaseous or explosive atmosphere.
- Secure your work; never try to hold work in your hand while using power tools.
- Disconnect tools when not in use, before servicing and before changing accessories (e.g. blades/bits).
- Remove adjusting keys (e.g. chuck key) and wrenches from the tool before turning on.
- Locate live electrical cables before drilling or cutting into walls, floors, ceilings, etc.

3. LADDERS

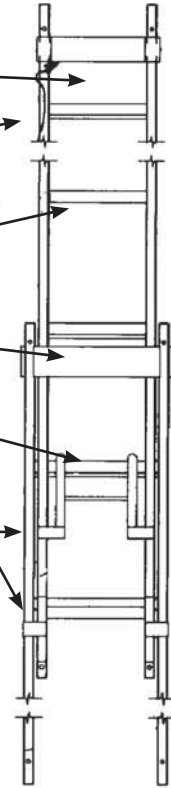
When working with ladders, employees shall:

- Select the ladder on the basis of the type of work to be performed, and the type and quality of ladder that will permit that work to be performed safely.
- Portable ladders are to have a clearly identified load rating of not less than 120kG.
- NOT use a conductive ladder in the vicinity of exposed live electrical apparatus.

- Securely place, hold or tie a ladder on even ground whenever possible to prevent slipping or falling. Ladder chocks may be used.
 - Where a ladder cannot be secured or tied and the employee is working 2m or more above ground level (measured from ground to feet), the ladder **shall be footed at all times**.
 - Head ropes shall be made from 12mm rope.
 - Inspect the ladder at frequent, regular intervals for defects, and before each use. If defects are found, the ladder shall immediately be removed from service, labelled as defective and reported to the Team Leader.
 - Carry a ladder in a horizontal position below shoulder height when in a substation or an area where energised conductors are low enough to be contacted by ladders.
 - Set the base of the ladder a safe distance from the vertical - approximately 25% of the working length of the ladder (i.e. a 4:1 ratio).
 - Always face the ladder when ascending or descending, using both hands.
 - Undertake work from no higher than the second top rung and not stand on stiles.
 - Ladders with an extended length greater than 4.87m shall be carried by two people.
 - Where a ladder is used to gain access to a roof, work platform or landing, the top of the ladder shall extend above the level roof by a distance of at least 1m. The ladder shall be footed by an assistant during ascent and descent unless secured.
 - Where a ladder is used near doorways, the door shall be blocked open, locked closed or a person may be used to guard the base of the ladder. Warning signs may also be displayed.
 - Ladders should not be left unattended while erected in a public area.
 - When using a step ladder user shall not work from the top cap or from the braces on the opposite side of the steps.
- SEC10:** Step ladders shall only be used when in the fully open position.

Ladder Inspection

- Leather, canvas or synthetic bucket
- Head rope, 12mm at 1.5m length
- Rungs, loose, worn, decayed, damaged rivets and cracks in fibreglass
- Loose or bent guides, top and bottom
- Operation of clutch mechanism
- Stiles not shortened, splintered, cracked or bowed
- Paint and varnish in good condition
- Feet fittings, (where fitted)

**Defective Ladders**

- Remove ladder from service, attach defect tag, and remove all ropes and quarantine.
- Temporary repairs to ladders are not acceptable.

4. PETROL-POWERED TOOLS

When using petrol powered equipment, employees shall:

- Be trained where appropriate.
- Turn the engine off prior to refuelling, making adjustments or repairs.
- NOT transfer petrol from one container to another within 15 metres of the equipment's fuel tank.
- Wear appropriate PPE (eye protection, ear muffs, gloves, etc.).

5. SAWS

1. When using a powered saw, employees shall:
 - Ensure the correct type of saw blade is used for the material being cut.
 - Ensure all guards are in place and fully functional.
 - Keep the material flat on the saw table.
 - Wear appropriate PPE (eye protection, ear muffs, gloves, etc.).
2. When using a chainsaw, employees shall:
 - Conduct pre-operating inspection of fuel, oil, and chain inspection and tension adjustment where necessary.
 - Ensure chain brakes are fitted and in working order.
 - Use all appropriate PPE including, eye & ear protection and chaps.
 - Only use two-stroke fuels and appropriate bar lubricating oils.
 - Safety exclusion zone shall be maintained between the operator and assisting staff. The general rule of thumb is that the safety zone distance is 2½ times the length of the bar of the chainsaw.
 - Not use chainsaws when working from a tree, unless trained and authorised to do so.



6. GRINDERS

When using a grinder, employees shall:

- Ensure that the spindle speed of stationary machines does not exceed the maximum operating speed indicated on the wheel.
- Ensure that grinding wheels are equipped with a safety washer or flanges, as the design requires.
- Ensure that tool rests are adjusted to a maximum of 3mm from the wheel. Adjustments shall not be made with the wheel in motion.
- NOT grind material on the side of a wheel.
- Apply work gradually to a cold wheel.
- NOT use a wheel that is out of round.
- Ensure guards are in place on all grinders.
- Wear appropriate PPE (eye protection, ear muffs, gloves, etc.).

7. COMPRESSED AIR

When working with compressed air, employees shall:

- NOT use compressed air to blow dust, dirt, or any other materials from their clothing or skin.
- NOT use conductive hoses near electrically energised equipment.
- NOT place air hoses on ladders, steps, scaffolds, or walkways so as to create a tripping hazard.
- NOT use compressed air for cleaning purposes other than for cleaning tools.
- NOT exceed the manufacturer's stated safe operating pressure for filters and other fittings.
- Wear appropriate PPE (eye protection, ear muffs, gloves, etc.).
- All compressed air hoses exceeding 10mm internal diameter shall have a safety device at the source of supply or branch line, to shut off or reduce pressure in the event of a hose failure.
- Air hose couplings shall be attached to the hose by means of crimped bands. Water hose clamps shall not be used.

8. DRILL PRESSES

When using a drill press, employees shall:

- Securely clamp or hold in a vice or jig the item, which is to be drilled.
- Remove chuck keys before starting any drill.
- Keep the drill press table free from excessive accumulation of drill cuttings and long shavings.
- Wear appropriate PPE (eye protection, ear muffs, gloves, etc.).

9. HYDRAULIC PRESSES

When using hydraulic presses/crimpers, employees shall:

- Always use them in accordance with the manufacturer's instructions.
- Not use electrically powered crimpers in the vicinity of live conductors.
- Report oil leaks or crimper damage to their Team Leader.
- Not attempt repairs or maintenance in the field.

10. SCAFFOLDING

When using scaffolding, employees shall:

- Be appropriately trained and authorised for the purpose of the work.
- Inspect the scaffolding equipment prior to erection and replace any defective equipment.
- Ensure scaffolding is placed on a firm, level surface.
- Ensure that open sides of the platform are protected by guard rails.
- Use a ladder or equivalent means of safe access to the platform.
- NOT use ladders or makeshift devices to gain added height.
- Ensure caster brakes on rolling scaffolds are locked before any employees climb them.

11. WELDING – ELECTRICAL

1. When using welding equipment, employees shall be appropriately trained and authorised for the purpose of the work.
2. The primary hazards during welding are electric shock, burns, radiant energy, toxic fumes, fires, and explosions. Adequate precautions shall be taken to guard against these hazards by observing the following:
 - Wherever practical, safety shields or barricades shall be placed around welding jobs, to protect others from the direct rays of an electric arc.
 - Before starting operations, all connections to the machine shall be checked to ensure that they are properly made and in sound condition.
 - Gauntlet gloves shall be worn when welding. Outer clothing shall be free from grease and oil. Clothing around the wrists and neck should be fastened, and pants with cuffs turned down.
 - Suitable fire extinguishing equipment shall be immediately available at all locations where welding is in progress.
 - Adequate ventilation or approved respiratory equipment shall be used while welding in poorly ventilated areas or when welding zinc, brass, bronze, galvanised or lead-coated materials.
 - All electric welding machines shall be properly earthed before being operated.
 - To protect the eyes, face, and body, employees engaged in electrical welding shall wear an approved helmet, proper protective gloves and long sleeves or welder's sleeves.
 - Employees shall wear approved eye protection when assisting with or observing electric arc welding work.
 - A welder, unless working behind a screen, shall not strike an arc with an electrode, until nearby persons, who may be exposed to the arc, have been given sufficient warning.
 - Cables with splices within 3 metres of the holder shall not be used. Operators should not coil or loop welding electrode cable around parts of their body.
 - Cables with damaged insulation or exposed bare conductors shall be replaced.

12. WELDING – GAS

1. Approved eye protection, gloves and clothing shall be worn during all welding or cutting operations.
2. Matches or cigarette lighters shall not be used to light a torch. A torch shall not be reignited from hot work. A flint lighter or stationary pilot light shall be used.
3. Hoses shall not be repaired with tape.
4. When gas welding or cutting equipment is not in use, the cylinder valves shall be closed.
5. Flashback arrestors shall be installed on all gas welding and cutting equipment to prevent the flame from entering hoses and/or regulators. The arrestors shall be placed at the regulator and at the hose ends.
6. Valve protection caps shall not be used for lifting cylinders from one vertical position to another.
7. Unless cylinders are secured on a special trolley, regulators shall be removed and valve protection caps installed prior to moving cylinders.
8. Before a regulator is removed from a cylinder valve, the valve shall be closed and the pressure released from the regulator.
9. All hose connections shall be clamped or otherwise secured in a manner that will withstand, without leakage, twice the pressure to which they are normally subjected to in service, but in no case less than a pressure of 300psi.
10. Hoses showing leaks, burns, worn areas, or other defects, which render them unfit for service shall be removed from service until they are repaired or replaced.
11. Pressure reducing regulators shall be used only for the gas and the pressure for which they are intended.
12. Gauges on oxygen regulators shall be marked “USE NO OIL.”

13. An acetylene cylinder valve shall not be opened more than one and a half turns of the spindle.
14. Cylinders not having fixed hand wheels shall have keys, handles, or non-adjustable wrenches on the valve stems whilst they are in use.
15. Under no circumstances shall acetylene be generated, piped (except in approved cylinder manifolds), or utilised at a pressure in excess of 15psi. Free gaseous acetylene is potentially unstable at pressures above 15psi and could decompose with explosive violence.
16. No welding, cutting, or other hot work shall be performed on used drums, barrels, tanks or other containers until they have been thoroughly cleaned so as to absolutely ensure that there is no flammable materials present or any other materials that might produce flammable or toxic vapours.

13. WELDING – FIRE PREVENTION

The basic precautions that shall be used for fire prevention in welding or cutting work are:

- If the object to be welded or cut cannot be readily moved, all movable fire hazards in the vicinity shall be removed to a safe place.
- If the object to be welded or cut cannot be removed and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks and slag, and to protect the immovable fire hazards.
- If the above requirements cannot be met, then welding or cutting operations shall not proceed.

14. GENERAL HAND TOOL SAFETY

Personal protective equipment

Use the correct PPE when using tools which, for general line work, could include:

- rough working gloves – light or heavy duty
- safety eyewear – glasses, goggles or full face shield – tinted or clear
- hearing protection – ear muffs or plugs
- breathing protection – respirator or disposable mask

Don't forget your regular safety gear, including wrist to ankle clothing, safety footwear and safety helmet.

Use tools carefully

When using hand tools:

- Always consider contact with yourself your workmate or other objects due to unexpected tool movement.
- Cut in a direction away from your body.
- When handing a tool to another person, direct sharp points and cutting edges away from yourself and other persons.
- When possible, only use insulated tools (e.g. screwdriver or pliers) near electricity.
- Keep close track of tools when working at height - do not leave them on cross-arms and other structures – a falling tool can kill!
- Don't carry tools up a ladder in your hands or pockets - use a dilly bag/hand line/pole bag.
- Carry and store sharp tools such as chisels in a sheath or holster – never in your pocket.
- Don't throw tools from one location to another, from one employee to another or from ladders, scaffolds or EWP's.
- Be alert for signs of strain or repetitive stress.
- Stretch and warm up before using large tools or heavy force.
- Make sure your grip and footing is secure when using large tools.

Use the correct tool for the job

Take the time to locate the correct tool – it will make the job much easier as well as safer.

For example:

- Use a shifting spanner to fasten or undo odd sized nuts and bolts, not as a hammer.
- Use a ring or set spanner rather than a shifting spanner.
- Use a screw driver for screwing, not chiselling.

Look after your tools

Keep your tools, clean, lubricated and sharp - a dull or blunt blade can lead to injury.

Don't use broken or damaged tools – mark or tag them as unsafe to use.

Don't use impact tools such as hammers, chisels, steel pins and punches if they have a "mushroom" head – have the tool properly restored.

Store tools properly when you stop work.

Shifting spanner use



Adjust the spanner whilst placed on the nut/bolt to remove slack in the jaws.

Use the tool in such a manner that if the bolt/nut breaks or spanner slips you don't 'wear the spanner' (push away from yourself).

Use lubricant to help free up corroded/tight nuts.

Try not to work at face height.

Users should check shifting spanners prior to use for:

- Excessive wearing/damage on the jaws.
- Wear in the adjuster.
- Damaged condition (used as a hammer).
- Retaining pin.

15. LV TEMPORARY CROSSARM



The LV temporary crossarm is designed to support LV (415/240V) lines only, to enable quick replacement of a faulty LV crossarm.

- It can support LV conductors at intermediate poles with small line deviation angle;
- Hold conductor tensions at termination poles with slack-strung mains only.
- Supporting of conductors at strain poles (only where loads are not excessive and equal on each side of the crossarm).

NOTE: The newer version has PVC bearing surfaces which allow the crossarm to sustain loads under a small deviation angle in the line. Older models with heatshrink bearing surfaces shall not be used on lines with a deviation angle.

The cable support snap shackles and hooks:

- Open hooks hanging down for conductor weight only.
- Snap-shackles to be used where there is conductor uplift.
- If in doubt about possible uplift, hold the conductors (up or down) in the snap-shackles.

Working load limits

The user must determine in each case whether the loads applied in the field fall within the working load limits of the crossarm.

The working load limit of the temporary crossarm depends on the length of the crossarm and the number of conductor attachment points, and is expressed as a “working load limit per attachment point”:

Working Load Limits per Attachment Point for Temporary X-Arm shown

(5-wire, equal loads all points)

Product Code	Crossarm 2.1-5	Crossarm 2.4-5	Crossarm 2.7-5
Arm length	2100mm	2400mm	2700mm
Arm weight	14kg	15kg	15.5kg
Maximum line load (conductor weight / line tension)	195kg or 1.9kN	180kg or 1.75kN	137kg or 1.35kN
Maximum deviation load (conductor pull-off force due to line angle)	1kN	1kN	1kN

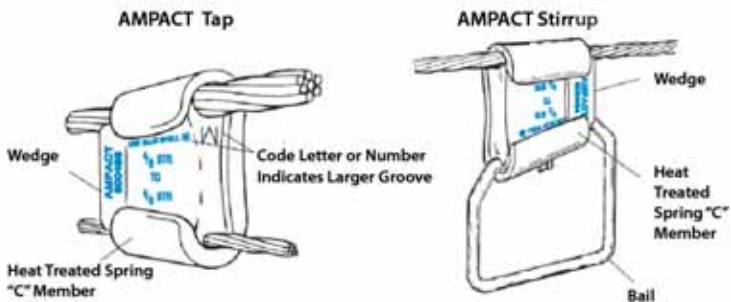
A 5-wire line with a smaller streetlight switchwire may carry heavier loads at each conductor attachment point, but care must be taken to keep the loads as balanced as possible. There will be a small load unbalance always on a 5-wire crossarm, and care should be taken when using it in a strain application to avoid gross load imbalance.

16. AMPACT TOOLS

The Ampact connections require installation by a shell fired tool.

The common Ampact connections are either conductor taps or stirrups.

When installing the Ampact connectors it is important to know the conductor sizes as this will determine which connector is used.



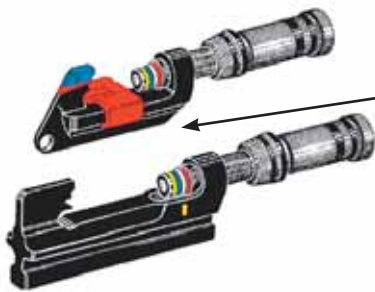
When connecting two different size conductors the wedge will have a letter or number that indicates the larger groove (see picture above)

As per any copper to aluminium connection the aluminium cable shall always be above the copper.

Installation

The Ampact connectors are supplied in colour coded packets as this determines:

- Which shell is used in the tool for the connection.
- The use of the small or large tool head.



Small tool head for Red, White & Blue connectors.

NOTE: Auxiliary platform to be used when installing Red connectors.

Large tool head for Yellow connectors.

Fit connector onto cables ensuring the wedge is inserted correctly (mark to largest cable).

Load power unit with the appropriate shell for application.

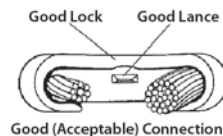
Have the tool fully opened up to allow for correct fitting.

Fit the tool to the connector ensuring it is properly seated for correct application. Tighten the gas release cap ready for firing.

NOTE: Wedge section facing towards the tool body.

Hold the breech assembly and hit the gas release cap with a hammer to fire the wedge. Undo gas release cap then undo the breech assembly and remove the tool.

Check that the connector has been installed correctly. The wedge should have a lance that locks the wedge in place.



Removal

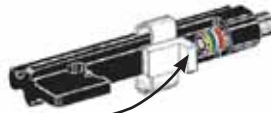
For the removal of any Ampact connector or Stirrup a take-off clip needs to be fitted. There is a clip for each colour coded connector.

When removing a connector the correct shell shall be selected:

- For Red, Blue or White connectors a Red shell is used.
- For a Yellow connector a blue shell is used.

NOTE: An incorrect selection may cause damage to the tool.

Select the appropriate take-off clip and fit to the tool head.

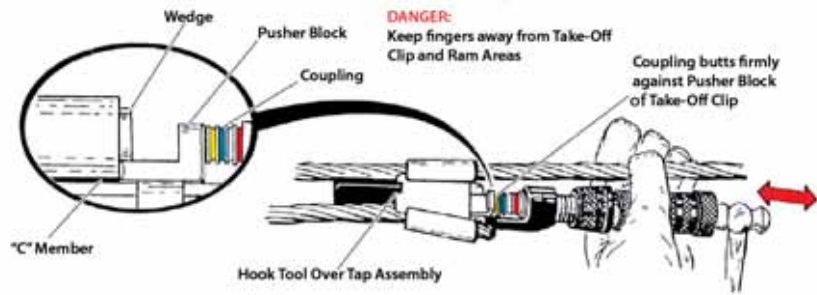


The pushing block facing the power unit.

Load the tool with the appropriate shell.



Fit the tool to the connector ensuring the wedge faces out and the bottom section of the take-off clip is against the "C" member.

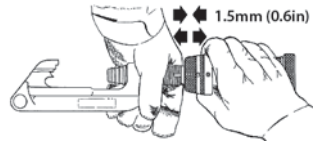


Tighten the gas release cap then hold the breech assembly and hit the gas release cap with a hammer to fire the "C" member away from the wedge. Undo gas release cap then undo the breech assembly and remove the tool.



Daily inspection

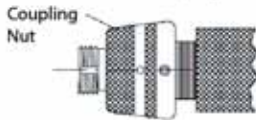
To maintain the tool in optimal working condition the unit should be cleaned regularly and inspected prior to use.



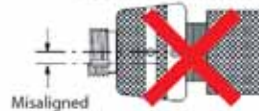
Inspection:

- **Check power unit coupling movement.** Grasp the head in one hand and the breech cap in the other. Pull out and push in as shown. There should be 1.6mm of movement for correct use.
- **Visual inspection of fail safe position.**

Pass Slot aligned with Pin and Setscrew on Coupling Nut



DANGER Fail Slot not Aligned with Pin and Setscrew on Coupling Nut. "Fail Safe" is Broken. **Do Not Fire Tool.**



Pass Coupling Taper does not extend beyond Coupling Nut

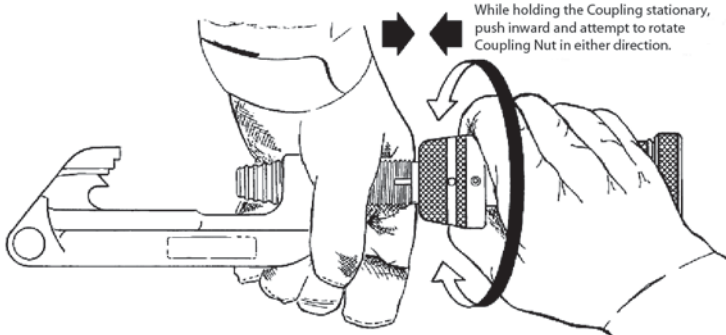


DANGER Fail Coupling Taper extends beyond Coupling Nut. "Fail Safe" is Broken. **Do Not Fire Tool.**



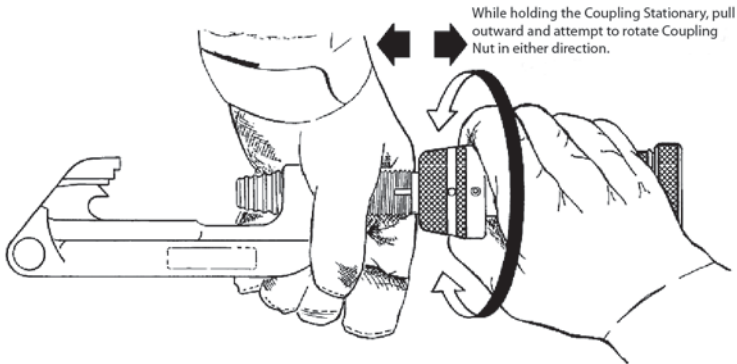
- **Manual fail safe inspection**

Push-and-Turn Inspection



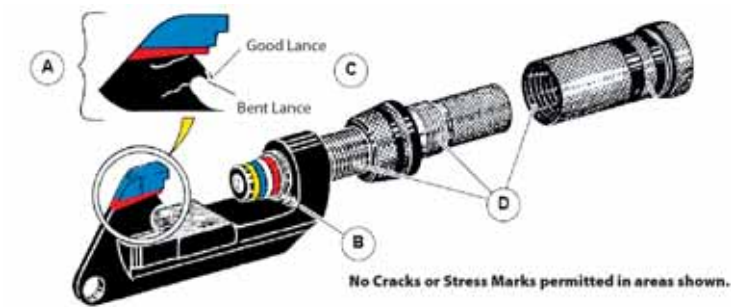
DANGER If coupling nut turns more than 4° (about 3.2mm [1/8in]), the "Fail Safe" is broken.
DO NOT FIRE THE TOOL.

Push-and-Turn Inspection



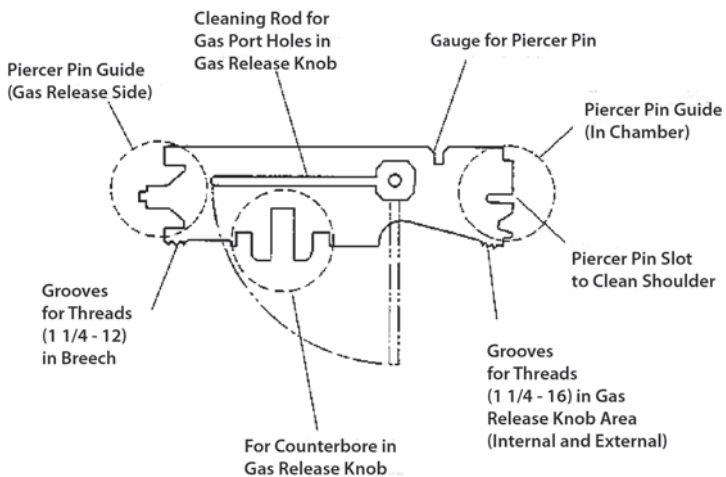
DANGER If coupling nut turns more than 4° (about 3.2mm [1/8in]), the "Fail Safe" is broken.
DO NOT FIRE THE TOOL.

- **Inspection of stress areas**
 - A. Lance area of tool head
 - B. Radius at the threaded end of tool.
 - C. Tip of the lance.
 - D. The threaded areas of the power unit.

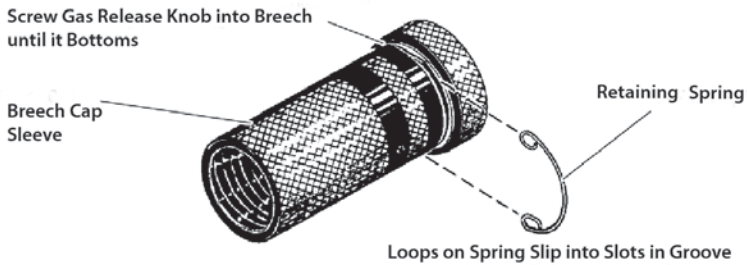


Cleaning

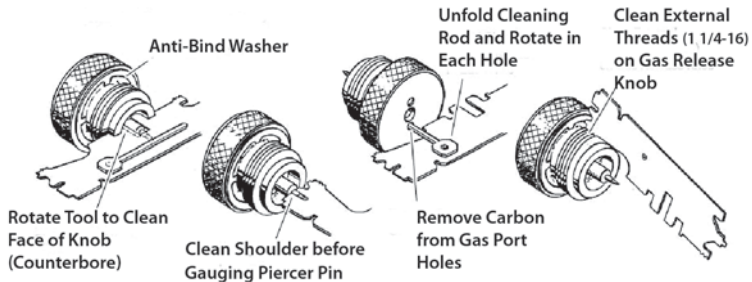
The Ampact cleaning tool is used to maintain the tool in good working condition.



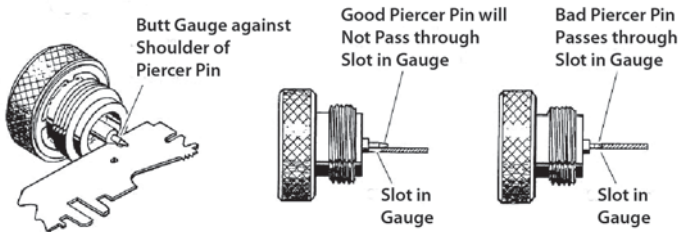
- To remove the gas release knob pry out the retaining spring from the breech cap assembly and unscrew the gas release knob.

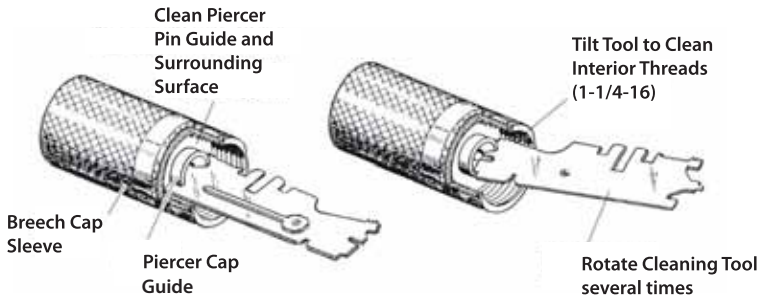
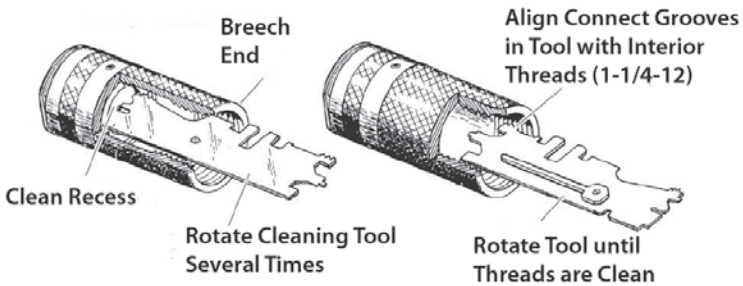


Clean the gas release knob

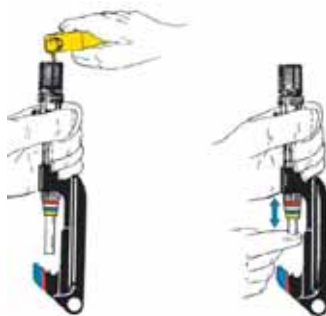


Gauge the piercer pin



Clean the gas release end of the sleeve**Clean the breech end of the sleeve****Cleaning the ram**

Remove the breech cap and apply some lubricant/solvent and work ram up and down until movement is free.

**NOTE:**

Maximum travel allowed in the ram is 51mm.

For further information refer to the Ampact customers manual.

ALUMINIUM TO ALUMINIUM AMPACT SELECTION CHART

	3/12 SC/GZ	7/2.5	7/3.0	7/3.75	7/4.75	19/3.25	19/3.75	19/4.75	37/3.75	DEES
3/12 SC/GZ	602283-3	602283-1	602283-1	600456	600456					
7/2.5		602283-1	600403	600411	600411	602380-2				602586
7/3.0			600403	600411	600458	602380-4	602001	1-602031-7		275436-1
7/3.75				600411	600459	602380-4	602003			275435-1
7/4.75				600466	600466	602046-7	602004	1-602031-5	602121-9	602502
19/3.25						602046-9	602007	1-602031-4	602121-7	602047
19/3.75							1-602031-4	1-602031-3	602121-6	602174
19/4.75								1-602031-2	602121-1	602174
37/3.75									602121-1	602174
Switch LUG	600456	600411	600458	600459	600466	602046-7	602004	1-602031-5	602121-9	

“White” Stirrups (DEES) have a 8mm Tinned Copper Bail.

“Blue & Yellow” Stirrups (DEES) have a 10mm Tinned Copper Bail.

ALUMINIUM TO COPPER AMPACT SELECTION CHART

	3/12 SC/GZ	7/2.5	7/3.0	7/3.75	7/4.75	19/3.25	19/3.75	19/4.75	37/3.75	DEES
7/080°Cu	602283-3	602283-1	602283-1	600456	600456					602586
7/104°Cu	602283-1	602283-1	600403	600411	600411	602380-2				602586
19/083°Cu	602283-1	600403	600403	600411	600458	602380-4	602001	1-602031-7		275436-1
19/101°Cu	600456	600411	600458	600459	600466	602046-7	602004	1-602031-5	602121-9	275435-1
37/2.52°Cu			602001	602003	602004	602007	1-602031-4	1-602031-3	602121-6	602047

NOTE: When connecting aluminium to copper, ensure that the aluminium is always on top of the connection.

RED CARTRIDGE 69338-2	WHITE CARTRIDGE 69338-5	BLUE CARTRIDGE 69338-1	YELLOW CARTRIDGE 69338-4
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SWITCH LUGS	STRAIGHT 279035-1	90 deg ANGLE 279035-2
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17. PORTABLE WINCHES (LUG ALLS)

For any work where straining is to be carried out on Live Conductors a webbing winch shall only be used.

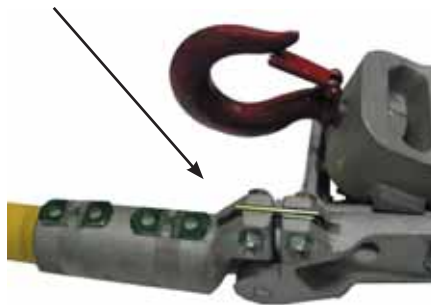


The use of wire rope winches on live conductors is not acceptable.



Overstraining in the older wire rope units will be visible by the bending of the metal handle.

With the newer webbing units there is a sheer link that operates. If this has operated replace with a new link.



These items are to be used for straining only.

They must have the SWL stamped on the body of the unit.

TOOLS AND EQUIPMENT

SEC10:

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