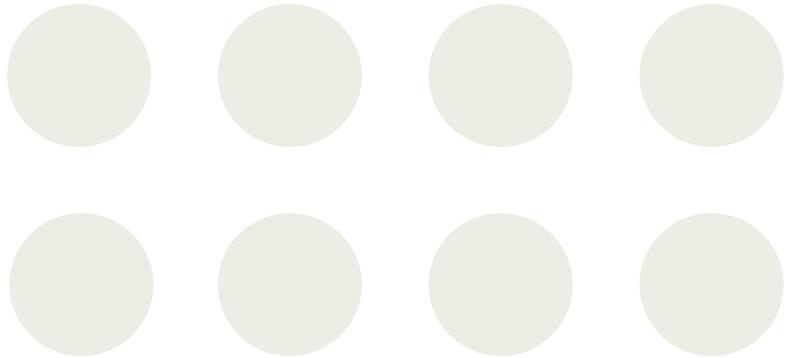


**newmacey**  
*The way we connect*



**introducing the new macey range of waterproof  
and flameproof connectors for the mining industry**



**new macey** manufactures high voltage electrical connectors used in exposed environments such as mines, railways and oil & gas facilities. They are one of the few guaranteed waterproof connectors available in Australia.

**new macey** plugs are used wherever reliable and safe electrical connectors are needed. Typical industry sectors are collieries, metalliferous mines, coal and mineral loaders, quarries and washing plants.



## Introduction

New Macey was established to make connectors for underground coal mines. It was then realised that this technology could effectively withstand the demanding conditions of all types of mines that need connectors that tolerate high humidity, water, drilling fluids, corrosive washing solutions, dirt, vibration and heat.

A key feature of our connectors is they are completely waterproof. Conventional connectors fail when dirt and moisture penetrate the electrical contacts, causing arcing, signal interference and phase asymmetry. By eliminating water, the plugs and receptacles give reliable long term performance.

## Products

We locally manufacture a range of waterproof electrical connectors, from multi-pin low voltage communications and lighting plugs to 22 kV 800 amp high voltage connectors. These are all corrosion free, robust and fully waterproof. Our objective is to supply a complete solution to a customer's problem, not just a box of components. We will therefore not only design and supply electrical connections, but will install them at any location and offer training and maintenance programs for ongoing operations.



## Advanced Features

Developed over the last ten years, the current generation of New Macey plugs have the following advanced features found on no other high voltage electrical plug.

### Waterproof and Flameproof

Moisture penetration of plugs accounts for about 30 per cent of electrical cable failures. By eliminating moisture, New Macey plugs are more reliable than any comparable product available to the Australian mining community.

### Statutory Approvals

The plugs have been intensively tested to relevant Australian Standards and have been approved by SIMTARS and TestSafe.

### Lighter

The plugs have fewer components, so they are about 30% lighter than conventional designs. This makes them easier to handle, causing fewer occupational injuries.

### Positive Anchorage

A continuous resin seal on the cable sheath and conductors means there are no cones or grommets to slip or leak on fully sealed units.

### Permanently Colour Coded

Plugs are pigment coloured to denote different voltages. There is no need to rely on paint to correctly identify them.

### Easy to Assemble

Each plug can be fitted with a knife and Allen keys. On average, it takes about one third the time to fit a New Macey plug.

### Readily Maintained

Plug maintenance is more efficient, saving time in workshops and cable repair facilities. Earth sleeves and all connecting bolts are stainless steel. Most earth sleeves are replaceable and the stainless steel makes them stronger than conventional brass sleeves.

### Quality Materials

Plugs are made from stainless steel, bronze and specially formulated Biphenol A /Epichlorohydrin resin, so there are no corrosion problems.

### Heavy Duty Sockets

Sockets are silver plated and built for maximum heat dissipation. They give positive electrical contact and can be readily replaced during plug renovation.

## Materials

### Resin

Two pack epoxy resin

### Plug Body & Cover

High tensile bronze or stainless steel or marine grade aluminium

### Earth Sleeve

Stainless steel

### Contact Sockets, Pins & Terminals

147 grade copper or brass

### Phase Barriers

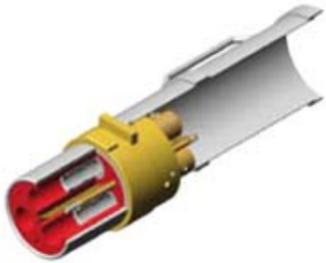
Extruded 380 alloy brass



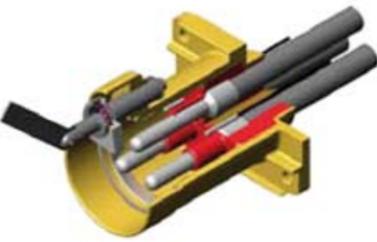


**Restrained Plugs**

A full range of restrained plugs are available that meet the requirements of AS 1299 – 1993.



**Restrained & Back to Back Receptacles**



60A 660V Plug



60A 1,100V Plug



150A Cable Reeler Plug



60A 660V Receptacle



150A 1,100V Receptacle



150A 1,100V Sealed Plug



300A 1,100V Plug



300A 1,100V 3 Pilots Plug



425A 660V Receptacle



425A 1,100V Receptacle



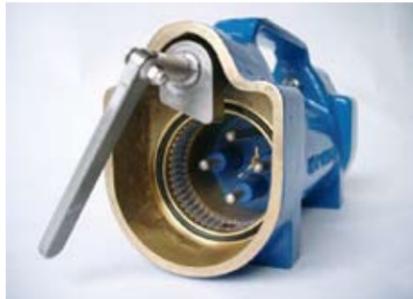
150A 1,100V Re-Enterable Plug



300A 3,300V 3 Pilots Plug



600A 3,300V Plug



60A 1,100V Back to Back Receptacle



600A 3,300V Receptacle

New to the market, these larger capacity plugs can be considered where maximum power demand is required, especially for modern 3.3kV longwall systems that employ extra large conductors. All plugs can be locked to the receptacle.





## Bolted Couplers and Adaptors

### 300 Amp Bolted Coupler

Supplying power to fixed mining equipment, the bolted coupler fully complies with Australian Standards.

### 425 Amp Bolted Coupler

The 425 Amp bolted coupler uses heavier pins and sockets to safely carry the higher current without overheating.

### Adaptors

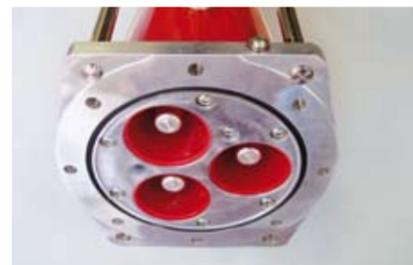
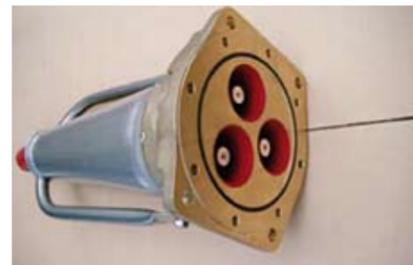
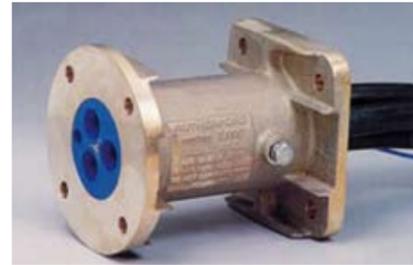
300 Amp and 425 Amp adaptors have the same long life design as all New Macey connectors. They are light and flameproof, while being 100% waterproof to IP68 rating.

### 11kV Bolted Coupler

New Macey bronze bolted couplers are suitable for working currents up to 800 amps. With adaptor pins, they can connect to 150 amp and 300 amp couplers made in accordance with Australian Standards. They are easy to lift and align, having two, or even three, handles.

### Aluminium Bolted Couplers

Some customers prefer aluminium couplers for surface applications.



## Communications Plugs & Receptacles

We manufacture a range of compact multipin plugs and receptacles for waterproof applications, particularly for underground lighting, control circuits and communications.

The original 12 pin plugs and receptacles have now been expanded to include connectors with anything from two to seventy three pins. The photograph top right is a 30 pin unit.

The units are made from high tensile manganese bronze or stainless steel for superior corrosion resistance.

They are based on well tried Camlock technology, where the plug and receptacle are coupled together with eccentric cam handles. These lock the two components into a sealing gasket which cannot be pulled or vibrated apart.

The pin layout can be altered to a customer's requirements to give secure and waterproof electrical connections. When properly coupled, the plugs and receptacles have been designed to remain waterproof up to 100 metres immersion depth. This makes them ideal for high quality communications applications under submerged conditions.

Plugs and receptacles are keyed to ensure that they can only be connected in the correct orientation. The photograph bottom right shows a 73 pin plug.



30 pin plug & receptacle



12 pin Receptacle, Back to Back and plug



12 pin plug



73 pin plug





## Accessories

### Remote Termination Units

New Macey plugs can include Remote Termination Units. We have worked with major equipment suppliers such as Ampcontrol to integrate their remote termination units into a lightweight, waterproof and flameproof plug body to check and program IPB relay systems.

### Protective Covers

Most mines use plates to protect bolted couplers from accidental damage or water penetration. However, restrained plugs are usually only protected by plastic caps or light weight moulded units. We produce a range of lockable bronze covers with 'O' rings to allow safe lockout procedures for cables and to protect the flamepath of restrained plugs from damage.



### Pins, Sockets and Sleeves

Replaceable extra heavy duty silver plated pins and sockets are robust and give maximum heat dissipation. Earth sleeves are made from stainless steel, giving superior strength and corrosion resistance.



### Cable Springs & Stockings

Mines using stainless steel or webbing cable stockings are becoming dissatisfied with the cost of these consumables. In addition, frayed stainless steel wires are a safety hazard to workers handling cables. New Macey supplies a range of cable supports and stockings made from high strength nylon. The range includes single ties to stockings for 300 mm<sup>2</sup> cables.

Anchor springs are available to minimise cable damage and to avoid cables being pulled from the back of plugs.



## Fitting New Macey Plugs

As can be seen from the following photographs, New Macey plugs can be fitted in a series of simple steps using only a knife and Allen keys.

### Sealed Plugs

#### Kit For Restrained Plugs

A typical sealed restrained plug comes ready to assemble with specially formulated containers of two pack epoxy resin.

#### Clean Cable Sheath

To ensure a full bond between the plug and connecting cable, the cable sheath must be cleaned with solvent.

#### Attach Terminals

Insulators are cut back and the conductors, pilot wire and earths are connected by stainless steel screws. Multiple screws are used on each conductor to optimise electrical continuity.

#### Mix Resin

The specially formulated resin comes with premeasured quantities of hardener and epoxy in containers. Add entire contents of hardener with epoxy and mix for a minimum of three minutes with spatula provided.

#### Fill Plug

When the resin is properly blended, pour the resin into the rear of the plug. This fills all voids in the plug, giving a strong waterproof connection.

#### Finished Plug

The resin automatically cures and the plug is ready to use.

### Re-Enterable Plugs

A Re-Enterable Restrained Plug comes complete with the correct size cable gland.

#### Clean Cable Sheath

The cable sheath is first cleaned with solvent.

#### Attach Terminals

Insulators are cut back and the conductors, pilot wire and earths are connected by stainless steel screws. Multiple screws are used on each conductor to optimise electrical continuity.

#### Attach Cover

The stainless steel cover is screwed into position, being careful to engage the sealing 'O' ring.

#### Secure Cable Gland

Cable gland nut is tightened to complete fitting.



Kit for Restrained Plugs



Clean Cable Sheath



Attach Terminals



Finished Plug





## Innovations

### EARTH TEST® Plugs

This is a patented way of testing earth wires without dismantling plugs. Earth wires are permanently isolated from the plug body by insulating liners at the earth terminals.

Stainless steel screws give full electrical continuity under normal operating conditions. For testing, these screws are removed from outside the plug and replaced by insulated test connectors. Each wire can then be independently tested. EARTH TEST® plugs can be tested accurately, without manual disassembly, in just a few minutes



### Lamella Sockets

The heart of the latest generation electrical sockets is specially manufactured silver plated beryllium copper lamella contacts. These give a secure multi-point connection with pins that have low insertion force, resistance to vibration and continuous contact for cooler running under full electrical load. They can be replaced if necessary during service and can tolerate slight misalignment without loss of efficiency.



### Enlarged Thimbles

Mines are making increased use of 240 and 300 mm<sup>2</sup> cables to reduce voltage drops on long supply lines. Thimble adaptors are now available to accommodate these larger conductors.

### Camlock Couplers

Using the well tried Camlock technology, the plug and receptacle are coupled together with eccentric cam handles. These lock the two components into a sealing gasket which cannot be pulled or vibrated apart.

### One-off Connectors

Customers often need specialised connectors that cannot be bought off the shelf. New Macey is able to custom build couplers to your exact specifications to accommodate variable pin layouts and connection numbers.

## Saving Money

How many things can go wrong with equipment in underground mines? It is like a chain, where every link is needed for the mine to operate properly. Each time your electrical cables fail, production ceases and the cost is enormous. Typically, the combined availability of all equipment in an underground mine can be less than 55 per cent per year.

Statistics from cable repair shops show that about 30% of cables fail by moisture penetrating into the connecting plugs. Making plugs easier to fit, simpler to repair and more reliable in operation can yield significant savings to mine owners.

### Plug Fitting

A conventional plug takes about one hour to fit, given the number of components involved and the tools needed. New Macey plugs only require a knife and Allen keys. These tools are included with each connector. They can be completely assembled in 20 minutes, saving valuable labour time in the workshop.

### Plug Maintenance

All plugs must be cleaned and checked regularly for optimal performance. However, in harsh conditions, they are often dismantled, cleaned and checked up to four times a year. The most frequent reason is to remove water that penetrates into the plug, affecting electrical integrity. By totally eliminating moisture penetration, it is no longer necessary to dismantle plugs to dry them out. Pins, sockets and earth sleeves can be replaced in the field in a few minutes.

The cost and inconvenience of plug maintenance should be factored into the original plug purchase decision. Avoiding even one dismantling over the life of a plug is worth several hundred to several thousand dollars.

### Cable Operations

By excluding moisture from plugs, cable availability can be improved by about 30%. This seemingly minor element can increase cumulative equipment availability by about three per cent. On a three million tonne per annum coal mine, this single initiative can be worth several million dollars per year in increased mine output.

## Industry Experience

Moulded New Macey plugs have now been in continuous service for more than nine years. Electrical engineers have been impressed with their robust and reliable performance.

Companies that have used our plugs include:

- Ampcontrol
- BP
- BHP Billiton
- Centennial Coal
- EDI
- Illawarra Cables Services
- ITT Flygt
- Lithgow Cable Repairs
- MainTrain
- Minera Alumbra
- NSW State Rail Authority
- Pacific National
- RailCorp
- Rio Tinto
- Shell
- Thiess
- United Goninan
- Vale Statutory & Mining
- Vales Point Power Station
- Xstrata

One of the reasons for the developing popularity of New Macey plugs is their streamline and lightweight design. This, coupled with their patented use of epoxy resin to fully seal components, gives superior performance under harsh operating conditions.



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