



COOPERHEAT



# HEAT TREATMENT EQUIPMENT CATALOGUE

**LEADING INNOVATORS IN THERMAL TECHNOLOGY**

Industry reference in thermal technology.  
Every day, everywhere since 1958.

[www.cooperheat.co.uk](http://www.cooperheat.co.uk)

Cooperheat is a Stork brand



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# INTRODUCTION

## INTRODUCTION TO COOPERHEAT

Cooperheat was established in 1958 to provide on site heat treatment services to various industries. Today, our product range continues to expand into other market sectors.

The benefits that Cooperheat can offer are unparalleled expertise and product excellence throughout the world to businesses in heavy fabrication, oil and gas (on and offshore), forging, power generation, foundry, chemical, and any other industry where a heating process is a requirement.

Cooperheat's policy is to design and manufacture equipment, which best meets the requirements and specifications of our customers' needs. We have the skills and expertise to supply a range of innovative and versatile equipment, specifically designed with the needs of industry and the operator in mind. As the requirements of heat treatment specification, codes and standards become more demanding, there is a growing need for heat treatment equipment which can provide consistently reliable results, which conform to both national and international standards, and regulations.

Cooperheat designs, manufactures and supplies quality heat treatment equipment and furnaces, incorporating innovation, versatility and conformance. Heat treatment requirements are now more demanding than ever. This calls for consistently reliable, quality equipment and consumables, which the customer can be confident in using every time.

Cooperheat equipment provides the user with the flexibility to heat treat a range of pipe welds at the same time. From simple butt welds to complex pipe work and vessel fabrications, the range can give you a solution tailored to your specifications. The range includes all necessary power control units, temperature control and recording instruments, cables, heating elements, insulation and accessories.

As a market leader in the field of heat treatment, our range of heat treatment equipment fulfils both the general purpose and specialised needs of our customers. Our reputation for expertise and excellence is renowned throughout the world, our products are recognised globally for their quality, durability, reliability and high standards of safety.



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Our sales engineers and engineering departments are dedicated to providing the very best services to all our customers. Their extensive experience in the field of heat treatment ensures that they are well placed to discuss the customers' requirements and to provide an after sales support web.

## GLOBAL PRESENCE - LOCAL SUPPORT

For sales and more information contact your local Cooperheat Equipment specialist at your nearest regional office. Full contact details can be found at the back of this guide.

## INTRODUCTION TO HEAT TREATMENT

### 1. WELDING PROCESS EFFECTS

The welding process applied to metals joins two components together by fusion. The surfaces to be joined are raised locally to melting point by a source of heat provided by a variety of welding methods based on electric arc, electric resistance or flame. The process energy creates a localised molten pool into which the consumable is fed, fusing with the component surfaces and/or previously deposited weld metal. As the molten pool is moved along the joint axis the components are heated, non-uniformly and subsequently cooled, also non-uniformly. Neighbouring elements of material try to expand and contract by differing amounts in accordance with the sequence of the localised thermal cycle.

Characteristically, the cooling weld metal contracts under conditions of severe restraint, leading to the introduction of thermally induced stresses. As constraint tries to take place and the stress system strives to reach its lowest level to achieve stability, distortion will occur as yielding takes place. If the joint is restrained and cannot distort, then high levels of stress will occur and may lead to failure in the form of cracking.

In making a joint, gaps would occur at the plate ends if the weld metal was allowed to expand and contract without restraint. A longitudinal force on the weld is required to close the gap giving a tensile stress whilst corresponding compressive stresses in the plate material providing the equilibrium. Residual stresses will act in two principle

directions; longitudinal stresses parallel to the joint and transverse stresses normal to the joint. It should not be forgotten that the value of the tensile stresses can be high, often exceeding yield point magnitude. So far the mechanical effects of welding in the form of residual stresses have been considered, the deposition of weld metal in a molten pool and the localised melting of the joint faces of the components, along with subsequent cooling, all have metallurgical implications affecting the microstructure of these regions.

Cooling after welding can be relatively rapid. From the molten pool of weld metal an 'as cast' type of structure develops. In the region of parent metal at the fusion face raised to melting point, metallurgical restructuring takes place to give the heat affected zone (HAZ). In steel the heat affected zones are generally harder than the parent material with corresponding loss of ductility and resistance to impact.

Since the basic sources of weld failure are a consequence of thermal behaviour, a series of potential solutions arise based on the application of heat. The welding processes have to be controlled so that the residual stresses are minimised to protect the integrity of the overall fabrication and the metallurgical structures of the weld metal and heat affected zones are controlled to give properties which are not inferior to those of the parent material which have been used in the design of the product.

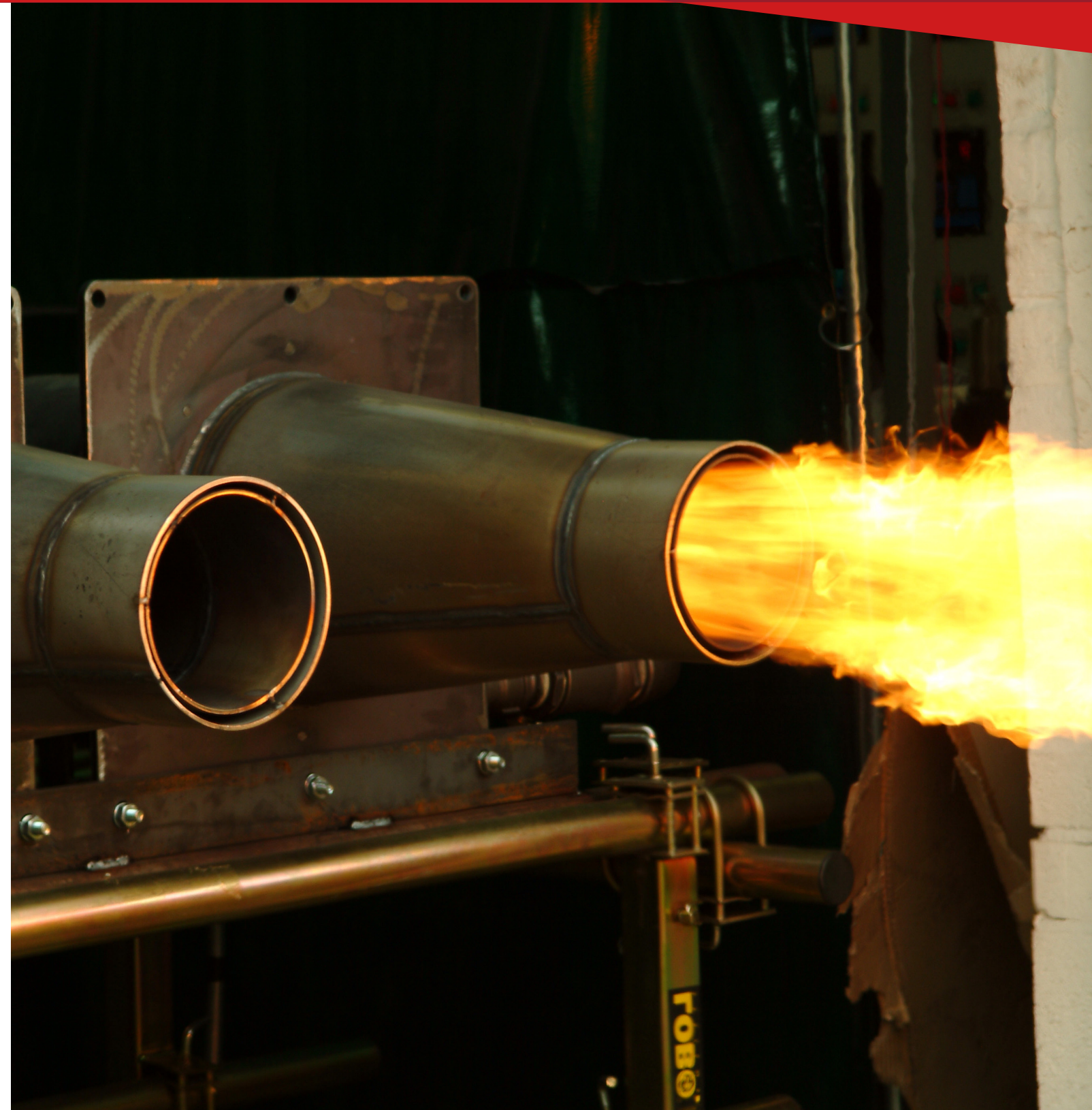
A series of heat treatment operations are associated with the welding processes, arising from the need to control these changes. These form the basis of the subject of Heat Treatment Engineering.

### 2. PREHEAT & POSTHEAT

**Preheating** involves raising the temperature of the parent material locally, on both sides of the joint to a value above ambient. The need for preheat is usually determined by the pertinent fabrication code and verified by the weld procedure qualification test. Preheat may be required as an aid to welding for one of four basic reasons.

**A. To control the rate of cooling**, especially in the heat affected zone, to reduce hardness. High carbon and low alloy steels harden if they are quenched from high temperatures

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(above cherry red). Exactly the same process can happen in a welded joint at the fusion face with the parent material. By raising the temperature of the base metal to be welded, to reduce the temperature differential between ambient and the resultant heat input, hardening may be controlled as the weld cools. Reducing hardness reduces the risk of cracking.

**B. To control the diffusion rate of hydrogen in a welded joint.** The intensity of the electric arc breaks down water, present as moisture, into its base elements of hydrogen and oxygen. Both of these gases are easily dissolved into the weld metal at high temperatures and hydrogen can play an important role in weld and heat affected zone cracking with a phenomenon known as hydrogen or cold cracking. Preheat can also help by ensuring that the weld preparation area is dry and remains dry throughout the welding operation. The presence of preheat, and associated benefits on cooling rate, helps to facilitate the diffusion of the hydrogen molecules out of the metallic structure. Moisture is also introduced from the welding consumables being present in electrode coatings and fluxes. To obtain the maximum benefits from preheat controlling hydrogen, it must be accompanied by careful controls over removal of moisture from the welding consumables by following manufacturers baking and storage instructions.

**C. To reduce thermal stresses.** Thermal strains are set up as the molten weld pool cools. Partially made welds can crack as the parent metal restrains the contraction of the weld metal and the cross sectional area of the joint is insufficient to withstand the resultant stress. Preheat can control the level of strain by reducing temperature differentials and reducing cooling rates.

**D. Compensation for heat loss.** Thicker section steels with high thermal conductivity benefit from preheating during welding improved fusion. Where preheat is applied, every effort should be made ensure the correct levels of particular application are attained, both uniformly over the length of the joint and for the duration of the welding process. Preheat treatments are often specified by the client who has incorporated the heat treatment procedure / welding procedure specification.

**Post Heat.** This is the term given to the extension of preheat on completion of the welding at the same or increased

temperature. Its purpose is to effect diffusion of hydrogen from the joint and reduce susceptibility to the associated form of cracking. It is usually applied to the higher strength carbon manganese steels and the low alloy steels where the risk of hydrogen cracking is higher. Post heat treatments are often specified by the client who has incorporated the heat treatment procedure/welding procedure specification.

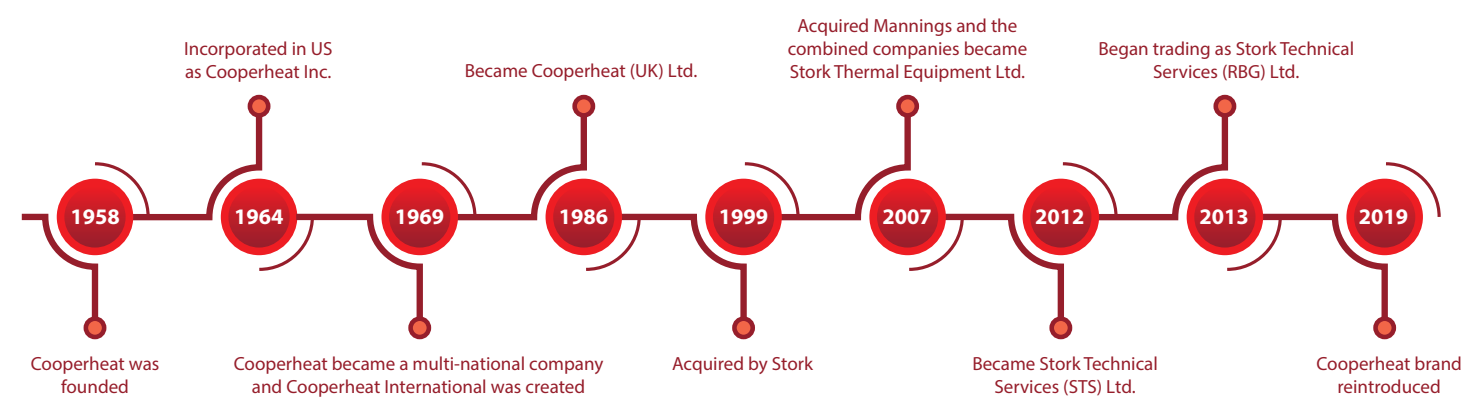
## 3. POST WELD HEAT TREATMENT (PWHT)

**Post weld heat treatment.** This is a process commonly referred to as stress relief, so called because it is carried out at temperatures at which yield strength has fallen to a low value. If the structure is heated uniformly, the yield strength of the material around the weld is unable to support the initial deformation. Creep occurs at the elevated temperatures and strain will occur by a diffusion mechanism, relaxing the residual stresses even further. The extent to which residual stresses are relaxed will depend on temperature for any given material and on material for any given temperature. The stress distributions at the higher temperatures become more uniform and their magnitude reduces to a low level. On cooling, provided it is carried out in a controlled manner, the improved stress distribution is retained. In addition to a reduction and redistribution of residual stresses, post weld treatments at higher temperatures permits some tempering or aging effects to take place. These metallurgical changes are very beneficial in that they reduce the high hardness of the as-welded structures, improving ductility and reducing the risks of brittle fracture. Post weld heat treatment has mandatory significance governed by the national standards and codes, as well as being required to offer acceptable component life in onerous environments. As with preheat, the alloying content of the steel is related to the significance of heat treatment temperature.

**Features of Post Weld Heat Treatment.** There are five aspects to a post weld heat treatment that must be addressed. The hot zone is adequate to raise the weldment to the required temperature and provide a temperature profile therein which is uniform without creating additional undue thermally induced stresses. This aspect has greater significance in the case of localised heat treatments, but nevertheless must also be considered with furnace heat treatments. The heating and cooling rates are at least compliant with the necessary code requirements. These rates will indicate absolute maximum



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values, and are calculated from simple formulae related to component thickness to offer protection against thermally induced stresses. With thicker and more complex structures an experienced heat treatment engineer may wish to consider lower rates than required by the code to ensure acceptable temperature profiles and gradients with a view to keeping these thermally induced stresses to an absolute minimum.

With localised heat treatment, the temperature gradients away from the hot zone must not be unduly severe, again the objective being the minimisation of thermally induced stresses.

The heat treatment system (including insulation), zonal division and number of thermocouples is such that the energy input and level of control is capable of enabling these objectives to be met ensuring that the integrity of the overall structure is not jeopardised.

For local heat treatments, controls have to be implemented to provide assurance that the engineered system is capable of providing appropriate levels of performance.

### Benefits of Post Weld Heat Treatment

1. Reduced residual stresses.
2. Improved metallurgical structure.
3. improved corrosion resistance.
4. Improved machinability.

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specifies all aspects of the design, including material specification, design calculations to ensure adequate strength, welding methods, and materials, mechanical testing, non-destructive testing of welds, heat treatment, hydro testing, marking.

Generally, by complying with such standards, the end user is assured that the equipment is safe and fit for purpose – which is ultimately required by both the end user, and his insurers.

As is indicated above, included in the standards/codes of construction, are the requirements for heat treatment. All of the primary codes within the industry which we work, have a section relating to heat treatment requirements; these vary greatly in levels of detail provided.

The important point to note, is that any heat treatment work undertaken, must be in compliance with the code of construction that is being used by the client. It is therefore very important that this information is known right at the start of quotation process.

- For most codes, the following information is provided:
- Temperature below which unrestricted heating /cooling is allowed
  - Maximum/ Minimum heating and cooling rates
  - Soak Temperature
  - Soak Time

- The above parameters are generally dependent upon the following:
- Soak Temperature - Material
  - Heating/cooling rates - Maximum thickness of component being heated
  - Soak Time - Weld Thickness

For the major codes, such as ASME VIII mentioned above, the available methods of heat treatment are also identified. Some common standards that are often referred to:

- Unfired Pressure Vessels:
- ASME VIII Div 1 & Div. 2
  - PD5500
  - AS1210

### Process/Power Piping:

- ASME B31.1
- ASME B31.3
- BS2633
- AS4041

### Storage Tanks:

- API 650
- API 620

### Structural:

- AWS D1.1

In general, all of the codes are broadly similar in their specifications for heat treatment; however, there are also many subtle differences.

Soak Temperature: Carbon & Carbon Manganese Steels PWHT temperature is always in the region of 600°C; however, more recent versions of PD5500, quote 550 – 600°C, whereas ASME standards quote 593 ± 5°C minimum, and AS standards require 580 – 620°C (which was the requirement in the pre-2003 PD5500 version).

One of the key differences between the ASME and other standards, is the requirement for temperature gradient control. BS2633, and PD5500, require that the temperature at a distance of 2.5√rt, from the centre of the weld, reaches a minimum of half of the peak soak temperature during soak. This is to ensure that the temperature gradient is not too severe, such that it causes undesirable levels of thermal stresses.

BS2633, also stipulates that thermocouples are positioned at 1.5t, on each side of the weld - these are required to achieve full soak temperature, in addition to thermocouples at 2.5√rt for gradient monitoring.



# MANNINGS TRANSFORMER POWER UNIT (6 OUTPUT CHANNEL)

Choice of 6 channel versions make the units ideally suitable for pre & post weld heat treatment of pipework and vessels. Housed in a Zintec steel wheeled cabinet, the unit is mobile, well balanced and finished in Blue.

These units provide a 65V supply for powering various types of low voltage heating elements. The output channels are controlled by means of energy regulators and temperature controllers, provision is also made for external control from any suitable programmer via a panel mounted control plug. Each channel has its own auto/manual switch so any combination of channels can be operated in either auto or manual mode. The units are protected against over current or over temperature conditions.

- Features:**
- Outputs for 60V heaters
  - Controllers can be set to operate in °C or °F
  - Displays set point and work piece temperature
  - Neon shows 'power on' for each output channel
  - Fitted with temperature controllers and energy regulators as standard
  - Core winding thermostats provide automatic protection against transformer coil overheating
  - Primary over-current protection provided by a 3-phase circuit breaker
  - Multi pin output to connect external programmer
  - Selector switches per channel to allow for internal temperature control or external
  - Safety plugs fitted as standard to all 65V outputs

6 Way	kVA Rating	65V Output	Max Current Per Output Channel	Energy Regulators	Temperature Controllers
11000	50	•	Each heater rated @ 45Amps (Total 135A per channel)	•	•
11100	70	•	Each heater rated @ 45Amps (Total 180A per channel)	•	•

## BASIC SPECIFICATION OF MANNING’S POWER UNITS (6 OUTPUT CHANNEL)

**TRANSFORMER CORE**

- 3-phase, forced air cooled, Class ‘H’, 50 or 70kV
- Primary winding connected in Delta
- Secondary winding connected in Star

**PRIMARY SUPPLY**

- Primary voltage: 380V, 415V, 440V
- Frequency: 50/60Hz

**PROTECTION**

- 3-phase circuit breaker with shunt trip
- Three primary core winding over temperature thermostats thermal trips linked to circuit breaker shunt trip

**SECONDARY OUTPUTS**

- Output: 65V
- Temperature controlled output channels
- Auxiliary outputs: Two 110V, centre tapped @ 5A, output sockets

**CONTROL**

- 110V energy regulators
- 110V temperature controllers

- Multi-pin Bulgin socket for remote programmer
- Mode Selection: Auto/Manual switches
- Indicators: 110V neon channel indicators

**CASE & MOBILITY**

- Case: Robust sheet steel case complete with fitted two off fixed and two off swivel/braked 150mm rubber wheels
- Lifting Method: Fork lift under base

**MAINS CONNECTION**

- The units are complete with 4.5m of four core primary cable

**SWITCHING**

- Contactorised – 200A, 110V a.c. solenoid contactors



# COOPERHEAT TRANSFORMER POWER UNIT (6 & 12 OUTPUT CHANNEL)

Compliance with international heat treatment codes and standards requires equipment that can provide accurate control of the heat treatment specification parameters, including uniformity of temperature throughout the geometry of the work piece. As part of our commitment to continuing innovation, Cooperheat’s 50kVA and 70kVA Heat Treatment Modules include our unique Advantage 3 temperature programmer/controllers which ensure the required temperature uniformity within each control zone. The design of our equipment is based on over 60 years experience as a market leader in the field of heat treatment and has been developed to meet the real needs of the heat treatment engineering industry.

- Features:**
- Outputs per channel for both 30V or 60V heaters (40V and 80V output units also available)
  - Advantage 3 operates in °C or °F
  - Unique Advantage 3 programmer/controller linking

- features allow the operator to carry out up to 6 heat treatment cycles simultaneously
- Each Advantage 3 communicates with other controlling zones on the same heat treatment. This controls and limits the differential between each control zone within the work piece being heated
  - Displays set point and work piece temperature
  - LED shows power on for each output channel
  - Connector block provided for simple connection of primary supply cable
  - Constructed from high-grade stainless steel giving excellent protection against corrosion, including marine offshore applications
  - Core winding thermostats provide automatic protection against transformer coil overheating
  - Primary over-current protection provided by a 3-phase circuit breaker
  - Safe voltages employed. Voltage to earth from any single output socket is 32.5V a.c.



6 Way	12 Way	kVA Rating	32.5V— 0V—32.5V Output	Max Current Per Output Channel	Temperature Controllers
16050		50	•	Each heater rated @ 45Amps (Total 135A per channel)	ADV’3s
16051		70	•	Each heater rated @ 45Amps (Total 180A per channel)	ADV’3s
	16059	70	•	Each heater rated @ 45Amps (Total 90A per channel)	ADV’3s
	16100	100	•	Each heater rated @ 45Amps (Total 135A per channel)	ADV’3s

## BASIC SPECIFICATION OF COOPERHEAT TRANSFORMER POWER UNITS (6 & 12 OUTPUT CHANNEL)

**TRANSFORMER CORE**

- 3-phase, forced air cooled, class H,
- Primary winding connected in Delta
- Secondary winding connected in Star
- Auxiliary winding: 110V a.c. 3.3kVA single phase

**PRIMARY SUPPLY**

- Primary voltage: 380V, 415V, 440V
- Frequency: 50/60Hz

**PROTECTION**

- 3-phase circuit breaker with shunt trip
- Three primary core winding over temperature thermostats thermal trips linked to circuit breaker shunt trip

**SECONDARY OUTPUTS**

- Output: 32.5V – 0V – 32.5V (for 30V and 60V heating element operation)
- Auxiliary outputs: Two 110V, centre tapped @ 5A, output sockets

**CASE & MOBILITY**

- Case: 304 stainless steel case complete with two of fixed and two of swivel/braked 150mm rubber wheels
- Lifting method: Fork lift under base

**TEMPERATURE CONTROL**

- Temperature measurement, display and control
- Degrees fahrenheit or degrees centigrade
- Start temperature
- Temperature ramp up and down in degrees per hour
- Hold/soak temperature set point and hold/soak time period setting

**MAINS CONNECTION**

- The units are complete with 4.5m of four core primary cable

**SWITCHING**

- Double pole, 180A, contactors with 110V a.c. coil



## CONFIGURABLE HEAT TREATMENT POWER SOURCE

Stock Reference: 18 Series (see order code)

The design of our equipment is based on over 60 years' experience as a market leader in the field of heat treatment and has been developed to meet the real needs of the heat treatment engineering industry. As we are aware customers' requirements vary and therefore we have released a configurable range of heat treatment power sources where the customer can specify a unit ranging from a base unit with no control or remote functionality all the way up to a fully programmable unit with built in chart recorder. The best features from all our power sources have been built into this range to give what we feel is the foremost power source available in the market place.

### These features include:

- Stainless Steel construction suitable for the worst environments including marine offshore applications
- Extra safe low output voltage of 32.5 – 0 – 32.5V giving 65V for supplying 60V elements yet only giving 32.5V to earth therefore reducing leakage and any potential for shock

- Earth fault monitoring circuit which will trip the unit out in the event of any earth fault occurring that causes significant earth current to flow
- Integrated lifting points so that the unit can be easily slung for movement around a site
- Quick removal panels with plug and play harness connections so that units can easily be upgraded.
- Industry proven transformer core with thousands in use around the world
- Rubber castors instead of Nylon giving much less vibration when moving the units
- Outputs per channel for both 30V and 60V heaters
- Controllers and programmers operate in °C or °F and display set point and work piece temperature
- Indicator displays Power On for each output channel
- Units supplied with a primary supply cable but internal connector block means that this can easily be changed if required
- Thermal trips embedded in each transformer winding offer protection against overheating
- Primary over-current protection provided by a 3-phase circuit breaker.

## ORDER CODES

## BASIC PRODUCT

**18** 70kVA stainless steel heat treatment power source

## 1/ NUMBER OF CONTROL WAYS

- ```
> 3 3 Output channels
> 6 6 Output channels
> 9 9 Output channels
> 2 12 Output channels
```

## 2/ TYPE OF CONTROL

- > **0** None (external controller required)
- > **1** Energy regulator
- > **2** Set point temperature controller & energy regulator
- > **3** Advantage 3 programmer
- > **4** Cooper6 programmer
- > **5** P256A programmer
- > **6** Cooper8 programmer

### 3/ AUXILIARY 110V SOCKETS & REMOTE CONTROL

- > **2** 2 off Auxiliary sockets
- > **3** 3 off Auxiliary sockets
- > **7** 2 off Auxiliary sockets with remote socket for external controller
- > **8** 3 off Auxiliary sockets with remote socket for external controller

#### 4/ CHART RECORDERS

- > **0** No recorder
- > **1** Chino 3000 series - analogue
- > **2** Chino 4000 series - digital
- > **3** Fuji PHA microjet - digital
- > **4** Eurotherm 6801A - digital



## VARIOUS CONFIGURATIONS FOR THE CONFIGURABLE HEAT TREATMENT POWER SOURCE



## SPECIFICATION FOR CONFIGURABLE HEAT TREATMENT POWER SOURCE

## TRANSFORMER CORE

- 3-phase, forced air cooled, class H, 70kVA
- Primary winding connected in delta
- Secondary winding connected in 6 phase star
- Auxiliary winding: 110V a.c. 3.3kVA single phase

## PRIMARY SUPPLY

- Primary voltage: 380V, 415V, 440V
- Primary current: 106A, 97A, 92A
- Frequency: 50/60Hz

## PROTECTION

- Three phase 125A circuit breaker with shunt trip
- Three primary core winding over temperature thermostats thermal trips linked to circuit breaker shunt trip
- Earth current monitor trip pre-set to 10A

## SECONDARY OUTPUTS

- Output: 32.5V – 0V – 32.5V (for 30V and 60V heating element operation)
- Auxiliary outputs: Two 110V, centre tapped @ 5A, output sockets

- Number of controlled outputs as specified on ORDER CODES
- Maximum load per output channel: 3 Way - 360A; 6 Way - 180A; 9 Way - 120A; 12 Way - 90A

## CASE & MOBILITY

- Case: 304 stainless steel case with galvanised steel base, fitted two off fixed and two off swivel/braked 150mm rubber castors
- Lifting method: Fork lift under base and lifting points

## TEMPERATURE CONTROL

- As specified on order codes
- Degrees fahrenheit or degrees centigrade
- Type K thermocouples

## MAINS CONNECTION

- The units are complete with 4.5m of four core primary cable

## SWITCHING

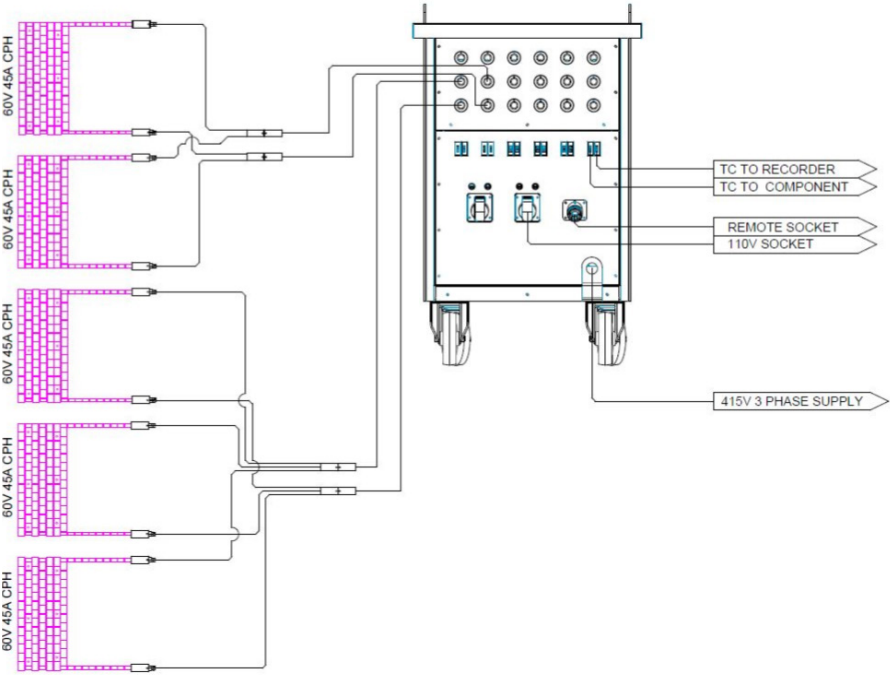
- Six off double pole, 180A, contractors with 110V a.c. coil



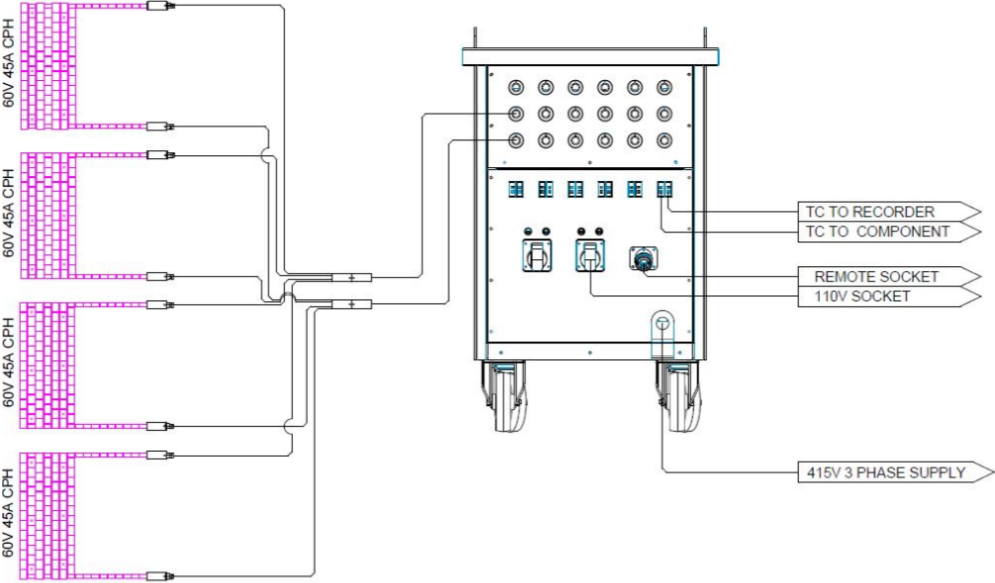
# COOPERK9 – COMPACT 9KVA HEAT TREATMENT UNIT (3 OUTPUT CHANNEL)

Stock Reference: 16200

## SCHEMATIC OF A TYPICAL TWO & THREE HEATER CONTROL CIRCUIT



## SCHEMATIC OF A TYPICAL FOUR HEATER CONTROL CIRCUIT



Cooperheat's CooperK9 has been developed in response to the demand within the heat treatment industry. Traditional heat treatment modules are heavy and require mobilisation using forklifts and large transport vehicles. The newly launched CooperK9 is a mobile and portable 9kVA three output channel heat treatment unit that can be loaded and off loaded from a pick up vehicle without the need for heavy lifting equipment such as a powered fork lift truck or crane. The CooperK9 splits into two halves. The top half contains the six point recorder and three programmer/controllers and contactors. The lower half contains the power transformer and air circulation fan. The compact module not only avoids the use of heavy lifting equipment, in addition it avoids mobilising valuable 50kVA or 70kVA assets to smaller heat treatment work scopes which may require less than 10kVA of power.

To complement and extend the range of compact heat treatment modules, Cooperheat has also developed the CooperK9-3. This module is so lightweight incorporating the power source/contactor unit in three stackable parts. Each part weighs 20kg, which is within the capacity for one person to load and off load from transportation.

As with the standard CooperK9, the units are simple to stack and then easily transported by means of a pull out (trolley suitcase type) handle and wide roller wheels suitable for use on all typical industrial surfaces. Furthermore, a unit with no inbuilt recorder is available for operators that wish to use their own portable recorders or where chart recording is not required. A six channel unit, using six 30V heaters is also offered with or without an inbuilt recorder.



### BASIC SPECIFICATION OF COOPERK9 – COMPACT 9KVA HEAT TREATMENT UNIT (3 OUTPUT CHANNEL)

#### TRANSFORMER CORE

- Single phase natural air cooled, class H, 9kVA
- Auxiliary winding: 110V a.c. 0.5kVA single phase

#### PRIMARY SUPPLY

- Primary voltage: 380V, 415V, 440V
- Primary current: 24A
- Frequency: 50/60Hz

#### PROTECTION

- Double Pole, 32A Miniature Circuit Breaker (MCB) with shunt trip
- Core winding over temperature thermostats linked to MCB shunt trip

#### SECONDARY OUTPUTS

- Output: 32.5V – 0V – 32.5V (for 30V and 60V heating element operation)
- Auxiliary Output: 110V @ 1A, for TAU recharging
- Number of temperature controlled output channels: 3 channels
- Maximum load per output channel: 2.7kW (e.g. one 60V, 2.7kW heating element per output channel)
- Maximum current per output channel: 45A

#### TEMPERATURE RECORDER

- 6 channel dot matrix strip chart recorder
- LED digital display of channel number, temperature value °C or °F and recording and alarm status

- Chart scale 0-1200°C (0-2200°F)
- Chart width: 100mm
- Chart length: 16m
- Recorder door rated to IP65

#### ADVANTAGE 3, TEMPERATURE PROGRAMMER/ CONTROL PARAMETERS

- Temperature measurement, display and control: °C or °F
- Start and end temperature
- Temperature ramp up and down in degrees per hour
- Hold/soak temperature set point and hold/soak time period setting

#### CONSTRUCTION (ALL DIMENSIONS ARE NOMINAL)

- |                                           |                                    |
|-------------------------------------------|------------------------------------|
| • Cases material: Brushed Stainless Steel |                                    |
| • Upper control unit weight: 17kg         | • Lower power unit weight: 52kg    |
| • Upper control unit height: 390mm        | • Lower control unit height: 470mm |
| • Upper control unit width: 335mm         | • Lower control unit width: 335mm  |
| • Upper control unit depth: 410mm         | • Lower control unit depth: 410    |

#### SWITCHING

- Three single pole, 60A contactors with 110V a.c. coil



# COOPER36 (50KVA, 36 OUTPUT CHANNEL)

Stock Reference: 16080

Cooperheat's Cooper36 has been specifically designed to heat treat up to 36 small tubes and pipes simultaneously.

With Cooperheat's extensive industry knowledge, it was recognised that there was a requirement for a unit with a higher number of control channels that would be capable of controlling one heater per output specifically designed for small tubes/pipes (i.e. 1" to 5" diameter pipe welds).

Traditionally, these pipes are heat treated using multiple standard (6 channel) heat treatment units which results in tying up 300kW of machine output power. However, with the development of Cooper36, one machine with 36 control channels can treat up to 36 pipes at one time using 50kW output power for 36 small diameter pipe welds.

Not only does Cooper36 reduce costs and time associated with using multiple units to heat treat large volumes of pipe and tubing but it also provides added safety benefits by working in conjunction with 30V heaters rather than the standard 60V heaters.

Set up time and materials required for the 36 output unit also achieves further cost savings. The feed and return cables are required to supply 45A, allowing lighter, lower cost cable to be



used. In addition, by using only one unit instead of six, reduces environmental impact with less transportation requirements and using only one off-load electrical losses instead of six.

## BASIC SPECIFICATION OF COOPER36

### TRANSFORMER CORE

- 3-phase, forced air cooled, class H, 50kVA
- Primary winding connected in Delta
- Secondary winding connected in Star
- Auxiliary winding: 110V a.c. 3.3kVA single phase

### PRIMARY SUPPLY

- Primary voltage: 380V, 415V, 440V
- Primary current: 76A, 70A, 66A
- Frequency: 50/60Hz

### PROTECTION

- 3-phase 80A circuit breaker with shunt trip
- Three primary core winding over temperature thermostats thermal trips linked to circuit breaker shunt trip

### SECONDARY OUTPUTS

- Output: 32.5V for 30V heating element operation
- Auxiliary outputs: Four 110V, centre tapped @ 5A, output sockets
- Number of temperature controlled output channels: 36 channels
- Maximum load per output channel: 1.35kW
- Maximum current per output channel: 45A

### CASE & MOBILITY

- Case: 304 Stainless steel case with galvanised complete with fitted two off fixed and two off swivel/braked 150mm rubber wheels
- Weight: 362kg
- Height: 1420mm
- Width: 680mm
- Depth: 665mm
- Lifting Method: Fork lift under base

### TEMPERATURE CONTROL

- Temperature measurement, display and control: Fahrenheit or Centigrade
- Temperature ramp up and down in degrees per hour
- Hold/soak temperature set point and hold/soak time period setting

### MAINS CONNECTION

- The units are complete with 4.5m of four core primary cable

### SWITCHING

- 36 single pole, 80A, contractors with 110V a.c. coil

# 3-PHASE CONTROL TROLLEY

Stock reference: 14003

The 3-phase control trolley, when used in combination with 4-Bank Channel Elements, is an ideal mobile unit for providing power, switching and temperature control for internal vessel heat treatments and temporary furnaces.

Six circuits of three elements can be controlled (connected in star) to the 3-phase control trolley providing a maximum power output from eighteen 4-bank channel elements of 238kW from a 415V supply and 218kW from a 380V supply.

Each of the six power and control channels are protected by three, 60A, miniature circuit breakers and controlled by an Advantage 3 temperature programmer/controller.

For safe connection the unit is fitted with six, 3-phase, neutral and earth panel mounted sockets rated at 63A each. Fully loaded, the unit requires 360A per phase. The incoming supply

is protected by a 3-phase and neutral, 400A isolator. The unit provides power distribution and control, via six control channel outputs, for up to eighteen 240V, 13.2kW, (or 220V, 12.1kW) 4-bank channel elements.

Designed for supply and control of mains voltage type heaters - 4-bank channel heaters, or ceramic pad heaters.



| REQUIRED CABLES |                                                                          |                   |
|-----------------|--------------------------------------------------------------------------|-------------------|
| Stock Reference | Description                                                              | Quantity Per Unit |
| 35060           | 30m 3-phase control trolley quad cable c/w 63A 5 pin plug and connectors | Six               |
| 32002           | 3 way splitter                                                           | Six               |
| 34000           | 30m compensating cable with thermocouple plug/socket                     | Six               |

## BASIC SPECIFICATION OF 3-PHASE CONTROL TROLLEY

### PRIMARY SUPPLY

- 380V or 415V, 360A, 3-phase, neutral and earth

### PROTECTION

- 400A, 4 pole mains isolator

### OUTPUTS

- Six control channels
- Each channel controlled via triple pole 63A contactors
- Each channel phase protected via single pole MCB
- Control Inputs from separate programmer via 6 x 3 pin cannon sockets (110V).
- Outputs: 6 x 63A, 5 Pin Sockets
- Auxiliary Outlets: 3 x 110V @ 5A

### CONTROL

- Temperature measurement, display and control: Fahrenheit or Centigrade
- Temperature ramp up and down in degrees per hour
- Hold/soak temperature set point and hold/soak time period setting

### CASE & MOBILITY

- Case: 304 stainless steel case complete with fitted two off fixed and two off swivel/braked 150mm rubber wheels
- Weight: 105kg
- Height: 840mm
- Width: 970mm
- Depth: 590mm
- Lifting Method: Fork lift under base



# COOPER8, 6 CHANNEL PROGRAMMER/CONTROLLER/DATA RECORDER

Stock Reference: 12420

**Introduction**

High quality control equipment at realistic prices contribute to Cooperheat’s continued success in the thermal industry. The company’s latest concept is the introduction of the Cooper8, 6 channel Programmer/Controller/Data Recorder

Cooperheat’s innovative Cooper8 is a heat treatment programmer/controller and digital recorder combined unit which is designed to work in conjunction with standard heat treatment equipment. The Cooper8 can be used as a separate modular unit or can be built into a bespoke heat treatment unit. The most versatile heat treatment unit on the market, the Cooper8 can be used as a six channel programmer module which is compatible with any standard heat treatment transformer power source with inputs for contactor control. In addition, it can also be used as a sophisticated programmer with the capacity to download data for analysis and print temperature charts. The controls of the Cooper8 are extremely intuitive and can be operated and monitored by the operator locally or via remote control and remote data monitoring. To meet specific or bespoke heat treatment requirements, the Cooper8 can be customised with your needs in mind.

**Features:**

- The unit is capable of control via Wi-Fi, 3G/4G or LAN hardwire connection from a smart phone, tablet or computer
- Controls six thermocouple channels
- Monitors an additional six channels

- Runs one or two independent heat treatment programs (controls 3+3 or 2+4 control zones) at the same time
- Selectable holdback to control temperature differentials
- Heat treatment profiles up to ten segments
- Operates and records in °F or °C
- Six output thermocouple sockets (for use with separate recorder if required)
- Range 0-1200°C (0-2200°F)
- Max ramp 1200°C or F° per hour
- Max soak length 99 hours 59 minutes
- Chart can be viewed from the LCD screen in real time
- Chart and job specifications can be printed using any Windows compatible device and Cooper8 software
- Multiple languages available on request
- Colour, 7 inch, LCD screen, with touch screen control



**SPECIFICATIONS**

**GENERAL**

- Case material: stainless steel
- Case dimensions: width 32.5cm, height 26cm, depth 43cm
- Display: colour, 7 inch, LCD screen, with touch screen control
- Weight total unit: 13kg
- Environment: operating temperature 0-50°C
- Storage: temperature -20°C to 60°C - relative humidity 10%-90%
- Supply: 110Va.c., 5A, 50/60Hz

**RECORDING AND CONTROL**

- Sensor: type K thermocouple to BS EN 60584-1

- Accuracy: ± 0.1% of span ± 1°C
- Control: PID
- Units: °C or °F
- Channels: 6 control channels plus 6 monitoring channels

**PROGRAM**

- Ten segment program profiles. Each segment can be temperature level, ramp up, ramp down or hold period
- In addition to all six zones running to a common program, two independent programs can be run simultaneously controlling 3+3 control zones or 2+4 control zones

# COOPER6 PROGRAMMER/CONTROLLER

Stock Reference: 12060

Please note: The FGH P256 Programmer has now been discontinued by the manufacturer and is no longer available from any supplier in the world market.

Cooperheat are pleased to advise, that they have an alternative unit available, the Cooper6 which provides the same heat treatment profile programming and temperature control capabilities as the P256. The Cooper6, 6 channel programmer/controller has been developed for use in conjunction with our range of Transformer Units, providing automatic temperature process control for up to six output channels. The Cooper6 unit can control temperatures both manually and automatically, depending on user requirements. In automatic mode, the channel controller will ensure that the control zone temperature closely follows the temperature rise, hold

and fall segment parameters programmed by the operator. Programming and operation of the unit is kept uncomplicated and user friendly through the use of a simple operator interface with easy to read displays showing both the set point and process actual temperatures. The display provides visual indication of the running heat treatment program status and control zone output. In addition, individual neon lights indicate when a control zone contactor is energised. The Thermocouple Fault feature ensures the 6 channel programmer/controller automatically cuts out the heater power when any control zone thermocouple input indicates a temperature below -30°C or open circuit. This negative temperature level could indicate a reversed thermocouple fault condition which would compromise the integrity of the heat treatment process.

**Features:**

- 6 channel digital temperature controller / programmer
- Each channel can be set to automatic, manual or OFF modes
- Operator interface providing visual indication of heat treatment programme status
- Thermocouple fault’s stops control zone contactor and heating power when temperature reaches -30°C which could indicate hazardous reversed thermocouple condition or is open circuit



**SPECIFICATIONS**

**GENERAL**

- Case material: stainless steel
- Case dimensions: width 26.5cm, height 22.5cm, depth 31cm
- Display: LED panel
- Weight: 7kg
- Enclosure: front IP64, rear IP20

**CONTROLLER PROFILE**

- Start temperature: 0°-1200°C (2000°F) in 1 degree increments
- Heating rate: 1°-1000°C per hour in 1 degree increments
- Soak temperature: 0°-1200°C (2000°F) in 1 degree increments
- Soak time: 0-100 hours in 0.1 increments
- Cooling rate: 0°-1000°C per hour in 1 degree increments
- End temperature: 0°-1200°C (2000°F) in 1 degree increments
- Proportional band setting: 5, 10, 20 and 40°C
- Hold-back setting: 10, 20, 40 and 60°C



# TEMPERATURE CONTROLLER

Stork Reference: see below



### Spare Temperature Controller

The set point temperature controller provides temperature control to a single output channel. The controller raises the temperature of the work piece to the selected temperature and maintains it at that level. The unit displays both work piece and set point temperatures.

**Stock reference & description:**  
548-045 THC-400C temperature controller

### Spare Advantage 3 Programmer/Controller

Cooperheat's Advantage 3 temperature programmer controller with its unique linkable control zone feature, is fast becoming the heat treatment industry standards. Providing the user with versatility, flexibility, cost savings and time. The Advantage 3 can be used individually or combined to control temperature differentials in a number of user selectable configurations. This control of temperature differential is an important requirement of international heat treatment codes and standards including ASME, BS, EN, ANSI & DIN. The Advantage 3 is fitted as standard to Cooperheat's heat treatment modules. It can also be purchased separately as a spare or to upgrade any make or model heat treatment transformer, module or unit. Specifically designed for localised heat treatment industry, the Advantage 3 reduces the number of standard six channel (single program) programmers normally required to heat treat work pieces requiring different heat treatment cycles and where only one standard 6 channel (single program) programmer is available, eliminates the need for multiple shift working to carry out several separate heat treatment processes for each heat treatment specification.

**Stock reference & description:**  
548-055 Advantage 3 linkable, programmer/controller

### Advantage 3 Programmer/Controller Heat Treatment Unit Upgrade Kit

Contains the necessary parts and instructions required for upgrading any 6 channel make or model of heat treatment unit to provide the additional functionality, user benefits and cost savings provided by the Advantage 3 linkable programmer/controller.

**Stock reference & description:**  
12300 Advantage 3 programmer/controller heat treatment unit upgrade kit (for six control channels)

### Spare Advantage 1: Programmer/Controller

Cooperheat's Advantage 1 temperature programmer/controller provides the user with versatility, flexibility, cost savings and time. The Advantage 1 is used individually to control temperature differentials in a number of user selectable configurations. This control of temperature differential is an important requirement of international heat treatment codes and standards including ASME, BS, EN, ANSI & DIN. The Advantage 1 is an alternative to the Advantage 3 which is fitted as standard to Cooperheat six channel heat treatment modules and does not have the linkable feature. It can also be purchased separately as a spare or to upgrade any make or model heat treatment transformer, module or unit. Specifically designed for localised heat treatment industry, the 6 off Advantage 1's in each heat treatment module allows several separate heat treatment processes to occur at the same time therefore eliminating the need for multiple shifts working.

**Stock reference & description:**  
548-050 Advantage 1 programmer/controller

# CHINO AH4712 & AH4724 (12 OR 24 POINT) HYBRID TEMPERATURE CHART RECORDER

Stock References: 40010 AH4712 & 40004 AH4724

The AH Series Chino hybrid temperature recorder is a popular recorder which gives the option of printing to chart and also saving the data to an SD card which can then in turn be downloaded to you PC. The recorder has bright and clear, easy to read LCD display. Various measuring and recording setting can be easily set by the operator on the control panel. The unit is designed for pre and post weld heat treatment processes utilising type K thermocouples. Contained within a rugged, cost effective, mild steel case, the recorder is designed and built to withstand normal site conditions.

For process monitoring by the operator in any site light conditions, the level of illumination of the chart and the scale plate can be adjusted by the operator.

The AH Series Chino Recorder can also be supplied as a panel mounted version.

### Features:

- Standard scale supplied is 0-1000°C
- Type K polarised sockets fitted to the rear of the case
- SD card to export data to PC
- Ethernet port for Web viewer and email alarm notifications
- Chart end notification
- The chart drive speed can selected to be 12.5, 25, 50, 75, 100 or 150mm per hour
- Chart and scale illuminates for viewing in low light
- Reliable
- Simple to calibrate



## GENERAL SPECIFICATIONS

### POWER REQUIREMENT

- Power supply voltage: 100-240V a.c
- Power supply frequency: 50Hz/60Hz

### OPERATING ENVIRONMENT

- Ambient temperature: 0°C-50°C
- Ambient humidity: 30%-90% RH

### PHYSICAL

- Scale length: 180mm
- Accuracy: +/- 0.5% of input scan
- Dead band: 0.4% of input span
- Balancing time: Approximately 2 seconds
- Chart: Fanfold 20 metres long
- Channels: 12 or 24
- Stamping interval: 6 seconds
- Stamping system: 12 colour
- Weight: 17.5kg
- Illumination : 3 x L.E.D's



# CHINO EH3000 (12 POINT) TEMPERATURE CHART RECORDER

Stock Reference: 40005



The EH Series Chino temperature recorder is a popular, basic, analogue alternative to digital recorders. The Chino temperature chart recorder is designed for pre and post weld heat treatment processes utilising type K thermocouples. Contained within a rugged, cost effective, mild steel case, the recorder is designed and built to withstand normal site conditions. Each input is individually recorded on the

chart paper using a multi coloured printing system for clear identification of each thermocouple input trace. For process monitoring by the operator in any site light conditions, the level of illumination of the chart and the scale plate can be adjusted by the operator.

The EH Series Chino Recorder can also be supplied as a panel mounted version.

**Features:**

- Standard scale supplied is 0-1200°C
- Type K polarised sockets fitted to the rear of the case
- Alternative scales available upon request
- Easy access to power supply and chart drive switches
- The chart drive speed can selected to be 12.5, 25, 50, 75, 100 or 150mm per hour
- Manual fast forward chart advance
- Printer refill warning visible on chart
- Ease of operation
- Reliable
- Low maintenance
- Simple to calibrate

| SPECIFICATIONS                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>POWER REQUIREMENT</b> <ul style="list-style-type: none"><li>• Power supply voltage: 100-240V a.c</li><li>• Power supply frequency: 50Hz/60Hz</li></ul> | <b>PHYSICAL</b> <ul style="list-style-type: none"><li>• Scale length: 180mm</li><li>• Accuracy: +/- 0.5% of input scan</li><li>• Dead band: 0.4% of input span</li><li>• Balancing time: approximately 2 seconds</li><li>• Chart: Fanfold 20 metres long</li><li>• Channels: 12</li><li>• Stamping interval: 6 seconds</li><li>• Stamping system: 12 colour</li><li>• Weight: 17.5kg</li><li>• Illumination: 3 x LEDs</li></ul> |
| <b>OPERATING ENVIRONMENT</b> <ul style="list-style-type: none"><li>• Ambient temperature: 0°C-50°C</li><li>• Ambient humidity: 30%-90% RH</li></ul>       |                                                                                                                                                                                                                                                                                                                                                                                                                                 |

# AUTOMATIC THERMOCOUPLE ATTACHMENT UNIT (TAU)

Stock Reference: 41756 for 100-125V unit / 41757 for 220-240V unit

Cooperheat's Automatic Thermocouple Attachment Unit (TAU) enables direct attachment of thermocouples to a work piece using the capacitive discharge method. This technique was pioneered by Cooperheat and has since become a recognised global standard.

By reducing the risk of expensive rework, due to thermocouples breaking off during the heat treatment process, this innovation provides a high integrity welded connection which provides reliable and accurate temperature control and recording.



The Cooperheat TAU has a unique automatic operation feature overcoming difficulties associated with manual attachment units which require both hands to operate. Cooperheat's TAU requires only one hand to operate which is an important safety feature when working at elevated levels or inaccessible locations.

**Features:**

- Three power output settings enable attachment of wire diameters 0.5, 1.0 and 2.0 mm: equivalent to 24, 18 and 12 AWG
- Non-corrosive, stainless steel casing
- Battery or mains operated
- Capable of over 1000 discharges from a fully charged integral nickel cadmium battery
- Available for use with 110V or 230V battery recharging supplies
- Third party tested to ensure Electro-Magnetic Compatibility (EMC)

**Benefits:**

- Single handed, one person operation in automatic mode
- Operator friendly
- Light weight and portable
- No welding skills required
- LEDs indicate unit charging and battery status
- Automatic switch off after 3 minutes to save battery power
- Three power settings can be selected

| SPECIFICATIONS                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>POWER REQUIREMENT</b> <ul style="list-style-type: none"><li>• Power consumption: 5.0VA</li><li>• Battery voltage: 12 Volts</li><li>• Battery capacity: 3.0Ah</li><li>• Thermocouple diameters: 0.5, 1 &amp; 2mm selectable</li><li>• Discharge voltages: 50/70/83Vd.c nominal</li><li>• Battery monitor: monitoring LED and automatic full discharge protection</li></ul> | <ul style="list-style-type: none"><li>• Number of discharges: approximately 1000 on setting 2 at a rate of 200 discharges per day with fully charged battery</li><li>• Height: 210mm</li><li>• Width: 215mm</li><li>• Depth: 90mm</li><li>• Weight: 4.25kg</li></ul> |



CERAMIC PAD  
HEATING ELEMENTS (FCP)

We incorporate the highest quality materials available in the construction of our (FCP) heating elements. These materials make the heating elements highly durable, which extends the usable life of Cooperheat heating elements beyond that normally expected.

This extended life, high durability and reliability combine to save you money by:

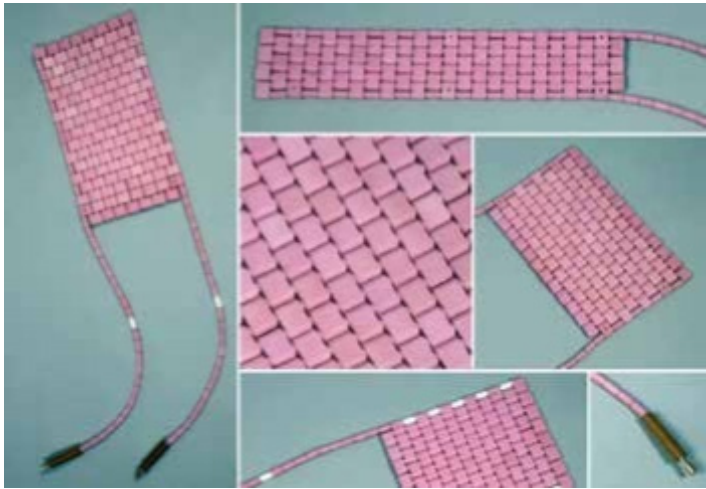
- Reducing reworks and lost time due to heating element failures
- Reducing your annual costs for replacing or repairing failed or damaged heating elements

Cooperheat ceramic heating elements are constructed from high grade sintered alumina ceramic beads, nickel chrome core wire and nickel cold tail wire. The construction allows the heating element to be flexible and provides high heat transfer efficiency.

We insist on using high quality, ceramic beads, with a high resistance to thermal and physical shock, in the construction of the FCP.

The important physical properties, which make these beads superior to other beads used in the heat treatment industry, are as detailed below:

- Alumina content - 95%
- Bulk density fired - 3.7Mg/m<sup>3</sup>
- Grain size - 6µm
- Vickers hardness - 12.5
- Rockwell hardness - 78 (R45N)
- Compressive strength - 2000MPa
- Flexural strength - 320MPa (ASTM C1161, 3 point)
- Young's modulus - 325Gpa
- Thermal conductivity - 21W/m<sup>3</sup>



These beads are supplied to us by one of the leading specialist ceramic manufacturers in the ceramic industry. The cold tails of Cooperheat ceramic heating elements are butt welded to the heater core wire which eliminates the cold tail/core wire junction failures often seen with low quality heaters which use steel ferrules.

By selection, from the extensive range of the Cooperheat FCP, any pipe size or pipe configuration can be covered so that the correct amount of heating power can be applied to successfully heat treat the pipe weld or other fabrication. Our FCP's are manufactured with a range of power ratings for use with a selection of standard voltages.

If you require any special heating element configuration, voltage or power rating, we will use our heat treatment engineering expertise to provide you with a heating element custom built to meet your exact needs.

**Please note: the width of the heater is the first measurement (ceramic bead width—tail to tail)**

CERAMIC PAD  
HEATING ELEMENTS (FCP)

| HEATING ELEMENT SELECTION GUIDE: (FOR HEAT TREATMENT CYCLES UP TO 800°C)                                                                                                                                                                                   |                          |                             |                             |                             |                             |                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Suggested applications for ceramic pad elements on straight pipe butt welds in carbon steel / chromium molybdenum Vanadium steel. To be used as a guide only: Reference should always be made to specific code or specification heated width requirements. |                          |                             |                             |                             |                             |                             |
| Nominal Bore<br>Inches — (mm)                                                                                                                                                                                                                              | 0 — 0.8 Inch<br>(0-20mm) | 0.8 — 0.9 Inch<br>(20-23mm) | 0.9 — 1.1 Inch<br>(23-28mm) | 1.1 — 1.4 Inch<br>(28-36mm) | 1.4 — 1.8 Inch<br>(36-46mm) | 1.8 — 2.4 Inch<br>(46-61mm) |
| 1.0 Inch<br>(25.4mm)                                                                                                                                                                                                                                       | 1 x CP48                 | N/A                         | N/A                         | N/A                         | N/A                         | N/A                         |
| 2.0 Inch<br>(50.8mm)                                                                                                                                                                                                                                       | 1 x CP48                 | N/A                         | N/A                         | N/A                         | N/A                         | N/A                         |
| 3.0 Inch<br>(76.2mm)                                                                                                                                                                                                                                       | 1 x CP12                 | N/A                         | N/A                         | N/A                         | N/A                         | N/A                         |
| 4.0 Inch<br>(101.6mm)                                                                                                                                                                                                                                      | 1 x CP15                 | N/A                         | N/A                         | N/A                         | N/A                         | N/A                         |
| 6.0 Inch<br>(152.4mm)                                                                                                                                                                                                                                      | 2 x CP12                 | 2 x CP12                    | N/A                         | N/A                         | N/A                         | N/A                         |
| 8.0 Inch<br>(205.2mm)                                                                                                                                                                                                                                      | 2 x CP15                 | 3 x CP10                    | 3 x CP10                    | N/A                         | N/A                         | N/A                         |
| 10.0 Inch<br>(254.0mm)                                                                                                                                                                                                                                     | 3 x CP12                 | 4 CP8                       | 4 x CP8                     | Two Rows<br>3 x CP12        | N/A                         | N/A                         |
| 12.0 Inch<br>(304.8mm)                                                                                                                                                                                                                                     | 4 x CP10                 | 4 x CP10                    | 4 x CP10                    | Two Rows<br>4 x CP10        | N/A                         | N/A                         |
| 14.0 Inch<br>(355.6mm)                                                                                                                                                                                                                                     | 3 x CP15                 | 4 x CP12                    | 6 x CP8                     | 6 x CP8                     | Two Rows<br>4 x CP12        | N/A                         |
| 16.0 Inch<br>(406.4mm)                                                                                                                                                                                                                                     | Two Rows<br>4 x CP12     | Two Rows<br>4 x CP12        | Two Rows<br>4 x CP12        | Two Rows<br>5 x CP10        | Two Rows<br>5 x CP10        | N/A                         |
| 18.0 Inch<br>(457.2mm)                                                                                                                                                                                                                                     | Two Rows<br>4 x CP15     | Two Rows<br>4 x CP15        | Two Rows<br>4 x CP15        | Two Rows<br>5 x CP12        | Two Rows<br>5 x CP12        | N/A                         |
| 20.0 Inch<br>(508.0mm)                                                                                                                                                                                                                                     | Two Rows<br>5 x CP12     | Two Rows<br>5 x CP12        | Two Rows<br>5 x CP12        | Two Rows<br>5 x CP12        | Two Rows<br>6 x CP10        | Two Rows<br>6 x CP10        |
| 22.0 Inch<br>(558.8mm)                                                                                                                                                                                                                                     | 7 x CP10                 | 7 x CP10                    | 8 x CP6                     | N/A                         | N/A                         | N/A                         |
| 24.0 Inch<br>(609.6mm)                                                                                                                                                                                                                                     | Two Rows<br>5 x CP15     | Two Rows<br>5 x CP15        | Two Rows<br>6 x CP12        | Two Rows<br>6 x CP12        | Two Rows<br>6 x CP12        | Two Rows<br>7 x CP10        |
| 47.0 Inch<br>(1,193.8mm)                                                                                                                                                                                                                                   | Two Rows<br>12 x CP12    | Two Rows<br>12 x CP12       | Two Rows<br>12 x CP12       | Three Rows<br>2 x CP12      | Three Rows<br>12 x CP12     | Three Rows<br>12 x CP12     |
| 63.0 Inch<br>(1,600.2mm)                                                                                                                                                                                                                                   | Two Rows<br>15 x CP12    | Two Rows<br>15 x CP12       | Two Rows<br>15 x CP12       | Three Rows<br>15 x CP12     | Three Rows<br>15 x CP12     | Three Rows<br>15 x CP12     |



CERAMIC PAD  
HEATING ELEMENTS (FCP)

| Ceramic Pad Heating Elements 30V - 1.35kW - 45A (80/20 Ni-Cr Core Wire)<br>(All dimensions are nominal) |          |                     |                                                |
|---------------------------------------------------------------------------------------------------------|----------|---------------------|------------------------------------------------|
| Stock Reference                                                                                         | Type Ref | Ceramic Beads Width | Ceramic Bead Height<br>(Length of heater body) |
| 20040                                                                                                   | CP10     | 10                  | 4                                              |
| 20042                                                                                                   | CP20     | 20                  | 2                                              |
| 20047                                                                                                   | CP12     | 12                  | 4                                              |
| 20048                                                                                                   | CP7      | 7                   | 7                                              |
| 20049                                                                                                   | CP3      | 3                   | 14                                             |
| 20052                                                                                                   | CP4      | 4                   | 11                                             |

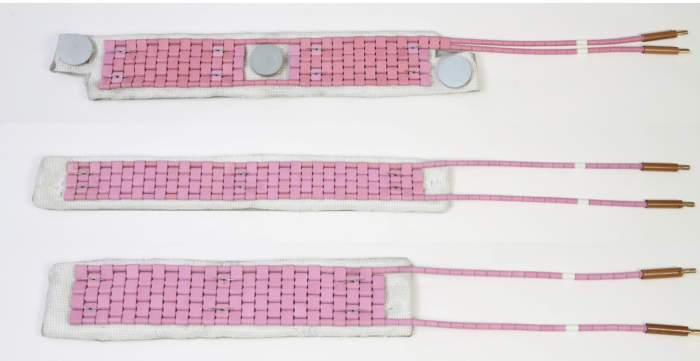
| Ceramic Pad Heating Elements 60V - 2.7kW - 45A (80/20 Ni-Cr Core Wire)<br>(All dimensions are nominal) |          |                     |                                                |
|--------------------------------------------------------------------------------------------------------|----------|---------------------|------------------------------------------------|
| Stock Reference                                                                                        | Type Ref | Ceramic Beads Width | Ceramic Bead Height<br>(Length of heater body) |
| 20030                                                                                                  | CP3      | 3                   | 32                                             |
| 20031                                                                                                  | CP4      | 4                   | 24                                             |
| 20032                                                                                                  | CP6      | 6                   | 16                                             |
| 20033                                                                                                  | CP8      | 8                   | 12                                             |
| 20034                                                                                                  | CP10     | 10                  | 10                                             |
| 20035                                                                                                  | CP15     | 12                  | 8                                              |
| 20036                                                                                                  | CP15     | 15                  | 7                                              |
| 20037                                                                                                  | CP16     | 16                  | 6                                              |
| 20038                                                                                                  | CP21     | 21                  | 5                                              |
| 20039                                                                                                  | CP24     | 24                  | 4                                              |
| 20041                                                                                                  | CP48     | 48                  | 2                                              |

CERAMIC PAD  
HEATING ELEMENTS (FCP)

| Ceramic Pad Heating Elements 80V—3.6KW—45A (80/20 Ni-Cr Core Wire)<br>(All dimensions are nominal) |          |                     |                                                |
|----------------------------------------------------------------------------------------------------|----------|---------------------|------------------------------------------------|
| Stock Reference                                                                                    | Type Ref | Ceramic Beads Width | Ceramic Bead Height<br>(Length of heater body) |
| 21630                                                                                              | CP3      | 3                   | 47                                             |
| 21631                                                                                              | CP4      | 4                   | 35                                             |
| 21632                                                                                              | CP6      | 6                   | 24                                             |
| 21633                                                                                              | CP8      | 8                   | 18                                             |
| 21634                                                                                              | CP10     | 10                  | 15                                             |
| 21635                                                                                              | CP12     | 12                  | 12                                             |
| 21636                                                                                              | CP15     | 15                  | 10                                             |
| 21637                                                                                              | CP18     | 18                  | 8                                              |
| 21638                                                                                              | CP21     | 21                  | 7                                              |
| 21639                                                                                              | CP24     | 24                  | 6                                              |
| 21640                                                                                              | CP29     | 29                  | 5                                              |
| 21641                                                                                              | CP36     | 36                  | 4                                              |



FLEXIBLE INSULATED  
PREHEATERS (FIP’S)



**Application**  
Flexible Insulated Preheaters (FIP’s) can be used either flat or laid over curved surfaces, they are equally suitable for preheating pipework, fabrications and vessels either longitudinally or circumferentially.

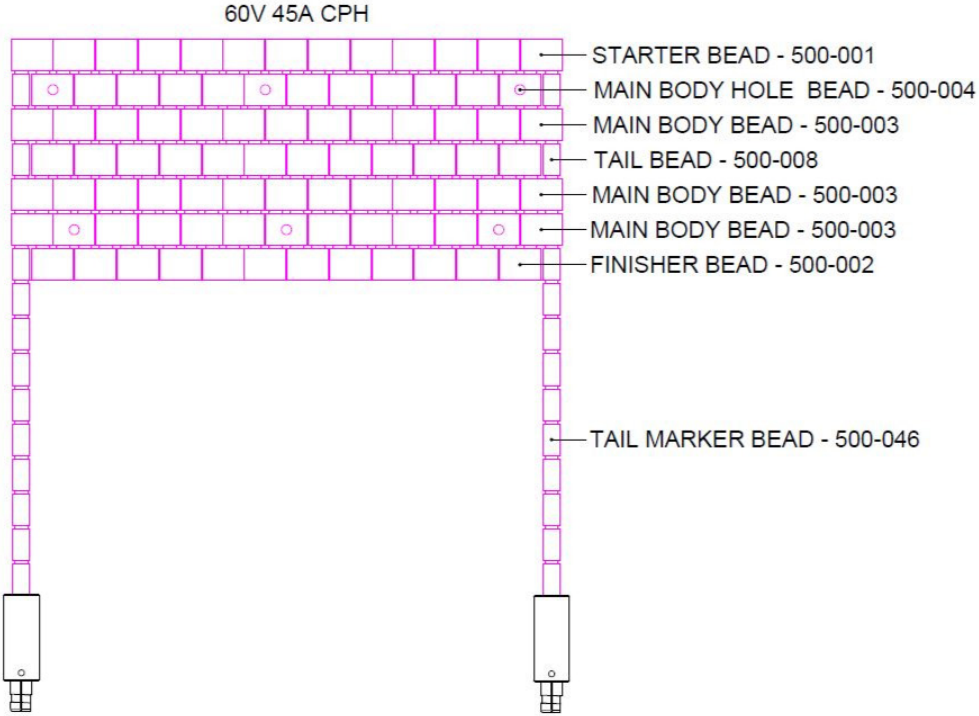
**Specification**  
The FIP is designed to provide preheating up to a temperature of 250°C. The element is identical to that used in the FCP heater, but has a high grade thermal insulating mat protected by a stainless steel backing. A feature of this heater are that limpet magnets can be used for fast adhesion to the work piece. These can be supplied either as a separate item (29269-Assembled pair of high strength limpet magnets with Cross bar) OR built into the preheater (22062).

**User Benefits**  
As with all Cooperheat products, the FIP heater is competitively priced and in addition: has magnetic attachment for fast, low cost installation. It has protection from weld splatter, operates on low voltage for operator safety and is strongly constructed for on site reliability.

| Flexible Insulated Preheaters (FIP's) 60V - 2.7kW - 45A (80/20 Ni-Cr Core Wire)<br>(All dimensions are nominal) |                                             |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Stock Reference                                                                                                 | Type Ref                                    |
| 22062                                                                                                           | Complete with three built in limpet magnets |
| 22070                                                                                                           | FIP 295                                     |
| 22071                                                                                                           | FIP 235                                     |

| Flexible Insulated Preheaters (FIP's) 80V - 3.6kW - 45A (80/20 Ni-Cr Core Wire)<br>(All dimensions are nominal) |                                             |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Stock Reference                                                                                                 | Type Ref                                    |
| 22063                                                                                                           | Complete with three built in limpet magnets |
| 22072                                                                                                           | FIP 395                                     |
| 22073                                                                                                           | FIP 305                                     |

SPARE REPLACEMENT BEADS / WIRE FOR  
FLEXIBLE CERAMIC PAD HEATING ELEMENTS



**Ceramic Pad Heater Beads**  
Ceramic, sintered alumina beads for repair and manufacture of ceramic pad heating elements.

**Stock reference & description:**  
500-001 starter bead  
500-002 finisher bead  
500-003 main body bead  
500-004 main body hole bead  
500-008 tail bead  
500-046 tail marker bead (white)

**Heating Element Wire**  
Heating element core wire and cold tail wire for repair and manufacture of ceramic pad heating elements.

**Stock reference & description:**  
502-001 19 strand 60/16 Ni-Cr core wire  
502-003 19 strand nickel 212 cold tail wire  
502-050 19 strand 80/20 Ni-Cr core wire





# ROPE HEATERS

## 30V, 40V, 60V & 80V (80/20 Ni-Cr CORE WIRE)

**Application**

Cooperheat rope heaters can be wound onto pipe diameters between 152mm and 508mm. They provide an excellent and reliable means of preheating when positioned each side of the weld joint to be welded.

**Specification**

The core of the element is stranded Ni-Cr wire insulated with porcelain beads and protected with a closely braided Ni-Cr wire outer covering, which has an even heat distribution along its surface eliminating any hot spots. Uniform maximum temperatures of up to 250°C can be achieved. Cold tails are welded for durability and terminated with 60A connectors.

| Stock Reference | Type Reference | Voltage | Length (mm) | Diameter (mm) | kW   | Pipe Size (NB Inch) |
|-----------------|----------------|---------|-------------|---------------|------|---------------------|
| 26001           | RH84           | 30      | 2,135       | 16.5          | 1.35 | 3 to 6 Inch         |
| 26010           | RH84LD         | 30      | 2,135       | 9.5           | 0.67 | ¾ to 3 Inch         |
| 26003           | RH117          | 40      | 2,970       | 16.5          | 1.8  | 3 to 6 Inch         |
| 26011           | RH117LD        | 40      | 2,970       | 9.5           | 0.90 | ¾ to 3 Inch         |
| 26000           | RH168          | 60      | 4,270       | 16.5          | 2.7  | 6 to 10 Inch        |
| 26012           | RH168LD        | 60      | 4,270       | 9.5           | 1.35 | ¾ to 3 Inch         |
| 26020           | RH168HD        | 60      | 4,270       | 16.5          | 5.4  | 10 Inch and up      |
| 26002           | RH234          | 80      | 5,940       | 16.5          | 3.6  | 6 to 10 Inch        |
| 26013           | RH234LD        | 80      | 5,940       | 9.5           | 1.8  | ¾ to 3 Inch         |
| 26021           | RH234HD        | 80      | 5,940       | 16.5          | 7.2  | 10 Inch and up      |

# SINGLE, DOUBLE & 4-BANK CHANNEL ELEMENTS

The channel element can be used to preheat and post heat large welded fabrications including steam drums and pressure vessels, they can also be used as a heat source in temporary furnace installations where multiple heat treatments need to be carried out

A coiled element manufactured from solid drawn 9 SWG ICA135 or Ni-Cr core wire and insulated with 95% sintered alumina beads, is supported in a stainless steel tray.

The supply voltages for single channels are 30V, 60V or 80V and a range of multi-bank elements can be made up from single elements connected either in series or parallel. These elements are powered directly from the incoming 380V or 415V 3-phase supply, via a 6-Way, 3-phase control trolley (stock reference 14003)

Channel elements can also be supplied utilising 60V or 80V supplies which can be powered and controlled via standard 60V and 80V output, 50kVA or 70kVA heat treatment machines.

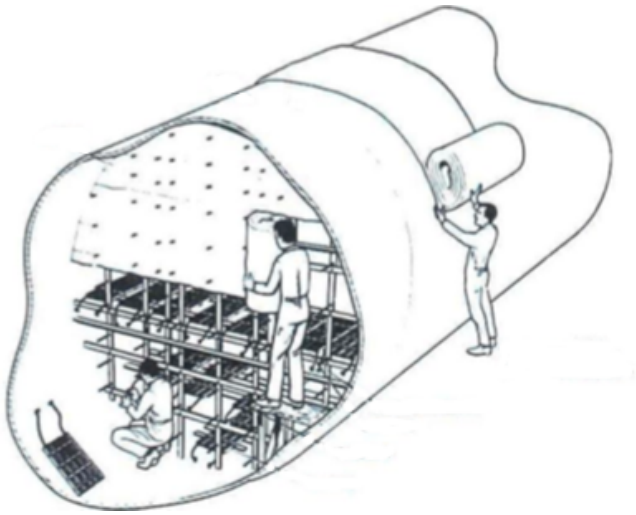
Working temperatures of up to 750°C can be achieved, the heaters are capable of higher temperatures using Kanthal core wire. Cold tails are welded not crimped for durability and safe working. Strongly constructed of high grade materials the channel element is designed to withstand a long on site working life and in addition has the following features: portable, designed for extended periods of operation, suitable for a wide range of heat treatment applications, selection of sizes, can be used for temporary furnace applications for large fabrications.

For Post Weld Heat Treatment (PWHT) of large, welded constructions, including steam drums and vessels or for use in furnaces, channel heaters are often more practical than applying large numbers of 60V ceramic heating pad elements. The most common channel element is known as the 4-bank. Their rugged construction comprises of a stainless steel channel which contains the 9 SWG ICA135 element coil. Dependent upon customer preference we can also produce, upon request, channel elements with cores formed using Ni-Cr 60/16 or 80/20 as the core material.

**Application – Internal bulk head heat treatment of vessel seams (see illustration below)**

In specific cases, the post weld heat treatment of welded seams of large vessels it is sometimes more practical to make a thermally insulated compartment inside the vessel and then heat the compartment by means of channel elements such as 4-banks.

These elements are used to heat the insulated compartment by resting on transversely placed mild steel channels. The compartment is produced by insulating the outside area of the vessel to be heat treated and then enclosed internally by means of two mild steel insulated bulkhead fitted inside the vessel.

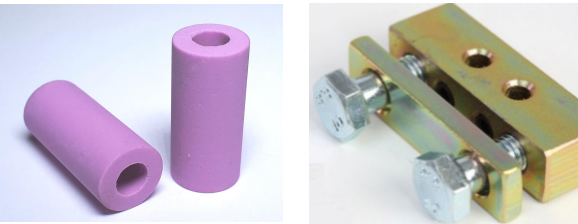
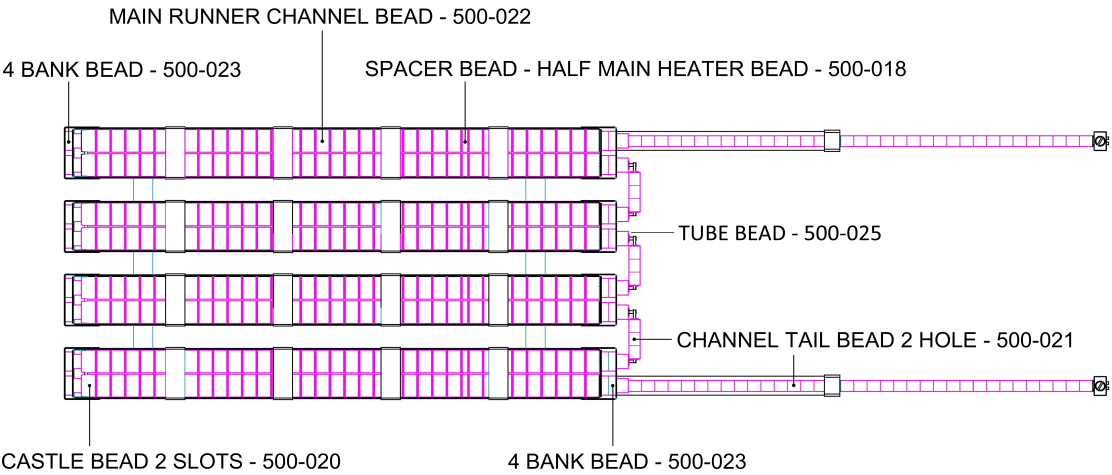


CHANNEL ELEMENTS

| Stock Reference | Item Description                                    | Voltage | Current | Power  |
|-----------------|-----------------------------------------------------|---------|---------|--------|
| 27750           | 4-bank channel element - 60/16 Ni-Cr                | 240V    | 55A     | 13.2kW |
| 27850           | 4-bank channel element - ICA 135                    | 240V    | 55A     | 13.2kW |
| 27851           | 4-bank channel element - ICA 135                    | 220V    | 55A     | 12.1kW |
| 27901           | Single channel element - 60/16 Ni-Cr                | 30V     | 55A     | 1.65kW |
| 27902           | Single channel element - 60/16 Ni-Cr                | 60V     | 55A     | 3.3kW  |
| 27932           | Single channel element - ICA 135                    | 60V     | 55A     | 3.3kW  |
| 27911           | Single channel element - 60/16 Ni-Cr                | 80V     | 55A     | 4.4kW  |
| 27933           | Single channel element - ICA 135                    | 80V     | 55A     | 4.4kW  |
| 27975           | Hot leads for use with channel elements (per metre) | -       | -       | -      |



REPLACEMENT BEADS/WIRE FOR CHANNEL ELEMENTS



500-025

536-022/1

**Channel Element Beads**  
Ceramic, sintered alumina beads for repair of channel elements.

- Stock reference & description:**
- 500-018 spacer bead - half main heater bead
  - 500-020 castle bead 2 Slots
  - 500-021 channel tail bead 2 hole
  - 500-022 main runner channel bead
  - 500-023 4-bank bead
  - 500-025 tube bead



500-018

500-021

**Channel Element Wire & Mild Steel Connectors**  
Channel element core wire and cold tail wire for repair and manufacture of channel element heating elements.

- Stock reference & description:**
- 502-011 60/16 nickel chrome 9 SWG (1kg=11.56m) core wire
  - 502-012 60/16 nickel chrome 10 SWG (1kg=14m) tail wire
  - 502-013 80/20 nickel chrome 9 SWG (1kg=11.56m) core wire
  - 502-014 80/20 nickel chrome 10 SWG (1kg=14m) tail wire
  - 27921 60/16 nickel chrome spare coil for channel element
  - 536-022/1 2 hole mild steel connector



500-022

500-023



Replacement coil for channel elements



THERMAL INSULATION



**Superwool Insulation**  
Superwool is a high temperature insulating fibre blanket manufactured from Calcium Magnesium Silicate. This material has a thermal performance equivalent to refractory ceramic fibre up to 1200°C. However, unlike ceramic fibre, Superwool is body soluble and has a larger needle particle size.

These qualities mean that Superwool represents a lower respiratory hazard than ceramic fibre, although, as with all high temperature insulating fibre, normal respiratory protection in the form of an appropriate dust mask should be worn during handling. Superwool is available in a range of mat sizes, protected by a stainless steel mesh to extend the working life of the insulation. Alternatively, Superwool is also supplied in unmeshed rolls.

| Superwool Insulation in Stainless Steel Mesh |                 |                  |                  |            |             |
|----------------------------------------------|-----------------|------------------|------------------|------------|-------------|
| Stock Reference                              | Density 96kg/m² | Density 128kg/m² | Thickness (25mm) | Width (mm) | Length (mm) |
| 29797                                        | •               |                  | 25               | 100        | 400         |
| 29798                                        | •               |                  | 25               | 125        | 600         |
| 29799                                        | •               |                  | 25               | 100        | 750         |
| 29800                                        | •               |                  | 25               | 300        | 750         |
| 29801                                        | •               |                  | 25               | 300        | 600         |
| 29802                                        | •               |                  | 25               | 300        | 900         |
| 29803                                        | •               |                  | 25               | 600        | 600         |
| 29804                                        | •               |                  | 25               | 600        | 900         |
| 29805                                        | •               |                  | 25               | 600        | 1,200       |
| 29806                                        | •               |                  | 25               | 600        | 1,800       |
| 29808                                        |                 | •                | 25               | 600        | 3,600       |
| 29900                                        |                 | •                | 25               | 300        | 750         |
| 29901                                        |                 | •                | 25               | 300        | 600         |
| 29902                                        |                 | •                | 25               | 300        | 900         |
| 29903                                        |                 | •                | 25               | 600        | 600         |
| 29904                                        |                 | •                | 25               | 600        | 900         |
| 29905                                        |                 | •                | 25               | 600        | 1,200       |
| 29906                                        |                 | •                | 25               | 600        | 1,800       |
| 29908                                        |                 | •                | 25               | 600        | 3,600       |

| Unmeshed Superwool Insulation Rolls |                 |                  |                  |            |             |
|-------------------------------------|-----------------|------------------|------------------|------------|-------------|
| Stock Reference                     | Density 96kg/m² | Density 128kg/m² | Thickness (25mm) | Width (mm) | Length (mm) |
| 29601                               | •               |                  | 25               | 600        | 7,300       |
| 29611                               |                 | •                | 25               | 600        | 7,300       |

THERMAL INSULATION



**Ceramic Fibre Insulation**  
Ceramic fibre is a high temperature insulating fibre blanket. This material has a thermal performance equivalent to refractory ceramic fibre up to 1200°C.

Ceramic fibre is available in a range of mat sizes, protected by a stainless steel mesh to extend the working life of the insulation. Alternatively, ceramic fibre is also supplied in unmeshed rolls.

| Ceramic Fibre Insulation in Stainless Steel Mesh |                 |                  |                  |            |             |
|--------------------------------------------------|-----------------|------------------|------------------|------------|-------------|
| Stock Reference                                  | Density 96kg/m² | Density 128kg/m² | Thickness (25mm) | Width (mm) | Length (mm) |
| 29519                                            | •               |                  | 25               | 300        | 300         |
| 29513                                            | •               |                  | 25               | 300        | 600         |
| 29511                                            | •               |                  | 25               | 300        | 900         |
| 29512                                            | •               |                  | 25               | 600        | 600         |
| 29508                                            | •               |                  | 25               | 600        | 900         |
| 29509                                            | •               |                  | 25               | 600        | 1,200       |
| 29510                                            | •               |                  | 25               | 600        | 1,800       |
| 29514                                            | •               |                  | 25               | 600        | 2,200       |
| 29515                                            | •               |                  | 25               | 600        | 3,600       |
| 29517                                            | •               |                  | 25               | 600        | 7,300       |
| 29500                                            |                 | •                | 25               | 300        | 300         |
| 29501                                            |                 | •                | 25               | 300        | 600         |
| 29502                                            |                 | •                | 25               | 300        | 900         |
| 29507                                            |                 | •                | 25               | 300        | 1,800       |
| 29503                                            |                 | •                | 25               | 600        | 600         |
| 29504                                            |                 | •                | 25               | 600        | 900         |
| 29505                                            |                 | •                | 25               | 600        | 1,200       |
| 29506                                            |                 | •                | 25               | 600        | 1,800       |
| 29518                                            |                 | •                | 25               | 600        | 7,300       |

| Unmeshed Ceramic Fibre Insulation Rolls |                 |                  |
|-----------------------------------------|-----------------|------------------|
| Stock Reference                         | Density 96kg/m² | Density 128kg/m² |
| 29601                                   | •               |                  |
| 29601/128                               |                 | •                |

THERMAL INSULATION



**Cooperknit Insulation**  
Cooperknit insulation is a cost effective knitted, silica fibre with many user benefits including reusability, long life and low risk to user health and safety and minimal skin irritation compared with most other high temperature insulating fibres. Independent tests on Cooperknit have shown that no respirable fibres were found in any samples after exposure to 1000°C for 24 hours.

Cooperknit can be used repeatedly at continuous operating temperatures up to 950°C without loss of thermal or mechanical properties. Cooperknit is available in a range of standard mat sizes detailed below, we are also able to supply special mat sizes or configurations to meet your exact requirements. Alternatively, Cooperknit is also supplied in 7.5m long rolls.

| Cooperknit Insulation |                |            |             |
|-----------------------|----------------|------------|-------------|
| Stock Reference       | Thickness (mm) | Width (mm) | Length (mm) |
| 29700                 | 10             | 300        | 600         |
| 29701                 | 10             | 600        | 600         |
| 29702                 | 10             | 600        | 900         |
| 29703                 | 10             | 600        | 1,200       |
| 29704                 | 10             | 600        | 1,800       |
| 29699                 | 10             | 600        | 7,500       |

INFRARED HEATERS

Cooperheat’s electrical infrared heater is an economical and highly efficient infrared, radiant heater that provides a radiant heat source for pre-heating metal fabrications. The heater is ideal for preheat of large welded constructions including steam drums, vessels and rotating equipment and are an alternative to our range of infrared Gas Surface Combustion Units (SCUs).

Specifically designed to replace the costly and heavy induction equipment including SCU’s required to deliver preheats on vessels and large constructions, the infrared heater has an exceptionally fast heat up time and is lightweight in comparison to induction alternatives.

Infrared panels can be mounted on internal or external support rigs or on separate stands as single units.

As single units the heater can be strategically positioned during the rotating operation necessary for welding circumferential seams of large heavy walled pressure vessels.

The infrared heater is rugged, lightweight and comprises of a stainless steel container tray, a layer of silica fibre insulation and a shallow concave strip element manufactured in high temperature Kanthal.

- Technical Information:**
- The heater can achieve preheating temperatures of up to 350°C
  - Rated at 60V, 180A, 10.8kW
  - The panels can be used in vertical or horizontal positions
  - Our 70kVA Heat Treatment Modules can supply and control up to six infrared heaters (one heater per output channel)



| Stock Reference | Item Description                               | Voltage | Current | Power  |
|-----------------|------------------------------------------------|---------|---------|--------|
| 27981           | Infrared Preheater                             | 30V     | 180A    | 5.4kW  |
| 27980           | Infrared Preheater                             | 60V     | 180A    | 10.8kW |
| 27984           | Infrared Preheater                             | 60V     | 180A    | 10.8kW |
| 6261/1          | Adjustable Pedestal Stand for SCU & IR Heaters | -       | -       | -      |
| 6261/2          | Adjustable Pedestal Stand for SCU & IR Heaters | -       | -       | -      |



# SURFACE COMBUSTION UNIT (SCU)

The Cooperheat Surface Combustion Unit (SCU) is an economical and highly efficient infrared gas radiant heater that provides a radiant heat source for pre-heating metal fabrications. The SCU is available in a range of sizes.

### Applications

- Pre heat of rotating circumferential seams on fabrications, vessels and storage tanks etc, using floor mounted stands
- Preheat of longitudinal welded seams
- Preheat of sections of fabrications, vessels and storage tanks etc, requiring repair
- Preheat of castings
- Expansion of rotor rings for removal

Infrared energy is radiated by the hot face of the SCU. Liquefied Petroleum Gas (LPG) or high pressure natural gas enters the rear of the unit drawing in air, mixing inside the plenum chamber and then burns efficiently on the front face of the perforated ceramic tiles. Complete combustion is achieved without flaming. Compared with open flame gas burners, the SCU can save one-third or more of the gas input as there is the absence of flame management. The simplest setup involves one burner connected to a bottle of propane and positioned near the work piece at a distance of 50mm. An optional piezoelectric device can be used to ignite the gas air mixture on the burner. Other burners may be added to the circuit by means of rapid connect/disconnect couplings. Revolving seams may be temperature controlled using an optical pyrometer and a control unit.

### Overview

Open flame burners are still used in some workshops for pre-heating heavy components. Therefore, environmental protection and energy conservation becomes increasingly relevant.

Bottled or piped propane or natural gas enters the rear of the burner by means of a self-sealing, quick release coupling. Combustion air is entrained by gas as it passes through the injector. A deflector in the burner case spreads out the mixture over the full hot face which is made up of rectangular ceramic plaques, each containing hundreds of tiny holes. As the gas/air mixture emerges on the front plate of the plaques, it is ignited

with an electric spark and continues to burn on the plaque surface. The plaques become intensely hot therefore being made from a modern ceramic material will withstand 1000°C (1800°F) on the hot face and yet run cold on the back face where the gas/air mixture enters.

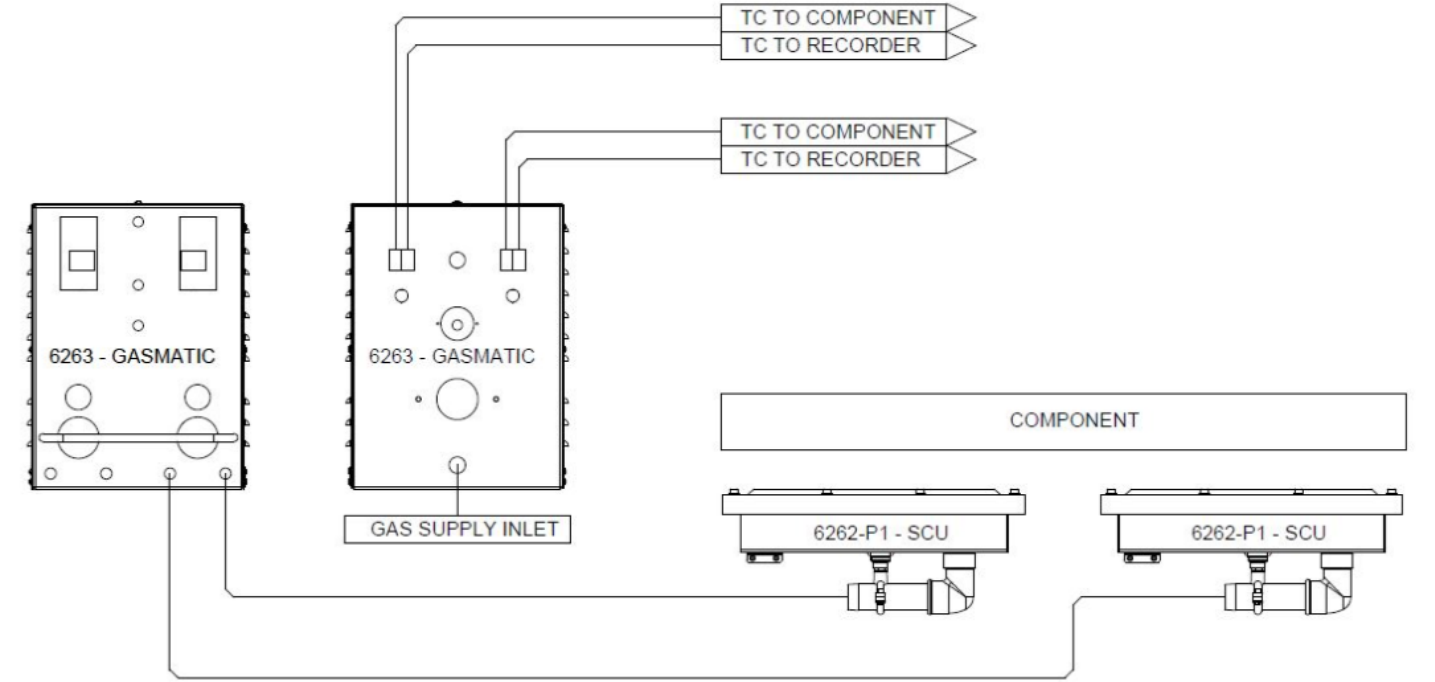
A domed, expanded Inconel mesh grill which protects the plaques from mechanical damage also helps to retain combustion loss to the hot face. When positioned 50-75mm (2-3") away from the work piece to be heated, 15kW (50 thousand BTU/hr) of energy will be directed at it's surface by a 600mm x 150mm SCU. Heat transfer is mainly by radiation therefore the 1000°C (1800°F) radiating surface of the burner permits rapid heating to be achieved. A range of Cooperheat stands and accessories can be supplied as optional extras.



# SURFACE COMBUSTION UNIT (SCU)

| Components for Surface Combustion Unit (SCU) |                 |
|----------------------------------------------|-----------------|
| Description                                  | Stock Reference |
| SCU Burner 300 x 150mm (12" x 6") Hot face   | 6262/P/1        |
| SCU Burner 300 x 300mm (12" x 12") Hot face  | 6262/P/2        |
| SCU Burner 600 x 150mm (24" x 6") Hot face   | 6262/P/3        |
| SCU Burner 900 x 150mm (36" x 6") Hot face   | 6262/P/4        |
| Series Link Fitting                          | 6262/19         |
| Thermal-Magnetic Flame Failure               | 6262/20         |
| Piezo Spark Ignition Kit                     | 6262/25         |
| Replacement set of six SCU plaques & gaskets | 6262/P/15       |
| Twin Outlet Manifold & Pressure Regulator    | 6263/2          |
| 4 Outlet Manifold & Pressure Regulator       | 6263/4          |
| 1.5m link hose with fitted couplings         | 6264/L/1/C      |
| 6m link hose with fitted couplings           | 6264/L/6/C      |
| 10m supply hose with fitted couplings        | 6264/S/1/C      |

Schematic of Typical Two Burner Surface Combustion Unit (SCU) Gas Preheat System





**1. Compensating Cable Link Cables**  
To link controller/programmer thermocouple input to the recorder input.

**Stork reference & description:**  
34013 - 3m jumper' compensating lead fitted with two type K thermocouple plugs



**2. Compensating Cable Control Leads**  
To connect separate, external controller/programmer unit's output to power source control input.

**Stork reference & description:**  
33009 - 3m 3-core, programmer/contractor control lead



**3. Thermocouple Compensating Cable**  
Suitable for use with type K thermocouples where monitoring thermocouples, in addition to the control thermocouples, are required for temperature monitoring purposes. Available in 30m lengths complete with type K thermocouple plug and socket or in 100m rolls without plug and socket (plugs and sockets can be supplied separately as required).

**Stork reference & description:**  
34000 - 30m compensating cable c/w type K thermocouple plug and socket  
504-062 - 100m roll of compensating cable without thermocouple plug or socket (green)  
304-065 - 100m roll of compensating cable without thermocouple plug or socket (red)



**4. Splitter Cables**  
For use with triple cable sets. Splitters are used where the operator needs to connect multiple heating elements, in parallel, to triple cable sets to enable the control of multiple heating elements. this enables the heating elements to be grouped to a single control output from a heat treatment unit to allow accurate zonal temperature control.

**Stork reference & description:**  
32001 2 Way splitter  
32002 3 Way splitter  
32003 4 Way splitter  
32004 5 Way splitter



**5. Triple Cable Sets**  
For use with treatment units controlling 30V, 40V, 60V and 80V heating elements. Includes two double insulated cables for power feed and return, fitted with 300A plug and socket connectors and one compensating cable fitted with type K thermocouple plug and socket.

| Stock Reference | Item Description                                                                 | Cable (mm²) | Length (m) | Rating (amps) |
|-----------------|----------------------------------------------------------------------------------|-------------|------------|---------------|
| 35010/10        | Triple cable set (2x 50A cables + 1x compensating cable) with plugs and sockets  | 6           | 10         | 50            |
| 35010/20        | Triple cable set (2x 50A cables + 1x compensating cable) with plugs and sockets  | 6           | 20         | 50            |
| 35010/25        | Triple cable set (2x 50A cables + 1x compensating cable) with plugs and sockets  | 6           | 25         | 50            |
| 35010           | Triple cable set (2x 50A cables + 1x compensating cable) with plugs and sockets  | 6           | 30         | 50            |
| 35020           | Triple cable set (2x 135A cables + 1x compensating cable) with plugs and sockets | 16          | 15         | 135           |
| 35024           | Triple cable set (2x 135A cables + 1x compensating cable) with plugs and sockets | 16          | 30         | 135           |
| 35048           | Triple cable set (2x 180A cables + 1x compensating cable) with plugs and sockets | 25          | 15         | 180           |
| 35032           | Triple cable set (2x 180A cables + 1x compensating cable) with plugs and sockets | 25          | 30         | 180           |
| 35033/15        | Triple cable set (2x 280A cables + 1x compensating cable) with plugs and sockets | 50          | 15         | 280           |
| 35033           | Triple cable set (2x 280A cables + 1x compensating cable) with plugs and sockets | 50          | 30         | 280           |

**Quad Cable Sets**  
For use with the 3-phase control trolley, to connect ceramic heating elements or channel elements.

| Stock Reference | Item Description                                                              | Cable (mm²) | Length (m) |
|-----------------|-------------------------------------------------------------------------------|-------------|------------|
| 35060           | Quad cable (3x 60A socket connectors, 1x300A plug connector, 5 Pin 415V plug) | 16          | 30         |



# ACCESSORIES



**1. Elastic Straps**  
Used to temporarily hold ceramic pad heating elements in place whilst they are correctly positioned and spaced prior to fixing in place with tie wire or banding.

**Stock reference & description:**  
29253 Elastic, 850mm strap with hooks



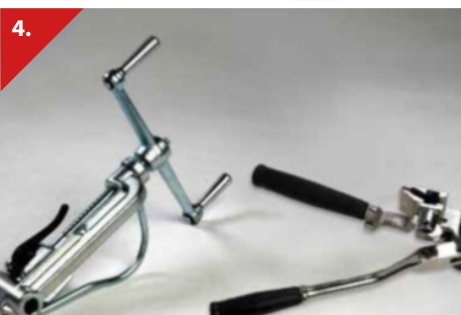
**2. Banding Tape**  
For bands of more than 4 heating elements, Cooperheat recommends that steel banding and banding clips are used to ensure the heaters remain in full contact with the pipe. For temperatures in excess of 650°C we recommend using stainless steel banding and clips. Please note that mild steel banding should not be used on Chrome Molybdenum post weld heat treatments.

**Stock reference & description:**  
29257 Mild steel banding (30m roll)  
29259 Stainless steel banding (30m roll)



**3. Banding Clips**  
Mild and stainless steel clips for fastening mild and stainless steel banding.

**Stock reference & description:**  
29258 Mild steel banding clips (box of 100)  
29260 Stainless steel banding clips (box of 100)



**4. Banding Tools For Metal Banding Tape**  
For tightening, cutting off and clipping mild and stainless steel banding.

**Stock reference & description:**  
29256 Winder banding machine  
29255 Ratchet banding machine



**5. Recorder Spares**  
Stock reference & description for EH Series Chino:  
542-230 0-1200°C 180mm Fan fold chart ET-201  
542-230/1 0-1200°C 180mm Fan fold chart EH-05035  
542-234 Ink pad case complete with ink pads  
542-231 Ink (12 Colours)

**Stock reference & description for Fuji:**  
542-266 0-1200°C 180mm Fan fold chart  
542-277 Print head cartridge

# ACCESSORIES



**1. Single Pole Contactors**  
Replacement single pole contactors and contacts for 0-65V and 0-85V output heat treatment modules and units.

**Stock reference & description:**  
526-054/SA Single pole contactor SU280 - 250A (Assembled)  
526-056 Fixed contact for 526-054/SA single pole contactor  
526-057 Moving contact for 526-054/SA single pole contactor  
526-073/SA Single pole contactor SW200N - 250A (Assembled)  
526-073/1 Fixed contact for 526-073/SA single pole contactor  
526-073/2 Moving contact for 526-073/SA single pole contactor  
526-052/SA Single pole contactor SW60 - 80A (Assembled)



**2. Double Pole Contactors**  
Replacement single pole contactors and contacts for 32.5-0-32.5V and 42.5-0-42.5V output, heat treatment modules and units.

**Stock reference & description:**  
526-074/SA Double pole SW190 - 200A contactor (Assembled)  
526-059/1 Fixed contact for 526-074/SA double pole contactor  
526-059/2 Moving contact for 526-074/SA double pole contactor



**3. Circuit Breakers**  
Replacement mains circuit breaker for heat treatment modules and units.

**Stock reference & description:**  
522-050 125A circuit breaker for 50kVA heat treatment modules and units  
522-051 160A circuit breaker for 70kVA heat treatment modules and units



**4. Thermocouple Attachment Unit Spares**  
Replacement parts for Thermocouple Attachment Units (TAUs).

**Stock reference & description:**  
558-027 TAU rechargeable battery, 3 Amp hour, 12V d.c  
536-128 Pliers and magnet set for TAU  
536-058 Replacement TAU shoulder strap and clip  
ZY-41756 Replacement, populated printed circuit board for 110V thermocouple attachment unit (41756)  
ZY-41757 Replacement, populated printed circuit board for 230V thermocouple attachment unit (41757)



**5. Thermocouple Wire**  
Type K nickel chrome/nickel aluminium thermocouple wire, insulated with high temperature glass braid. Recommended maximum temperature 800°C. A consumable item, which is used to convert the thermal energy at the hot junction of the thermocouple to an electrical mV signal which can then be used by temperature control and recording instruments to accurately control and record the temperature of the item being heat treated.  
Conforms to: BS EN 60584-1 : 1996 Part 4  
BS EN 60584-2 : 1993 Class 1 & ANSI-MC96  
The thermocouple wire is attached directly to the work piece using the 'thermocouple attachment unit' stock reference: 41756 (110V unit) or 41757 (220V unit).

**Stock reference & description:**  
43000 100m roll of type K thermocouple wire (Yellow/Red)  
43000/G 100m roll of type K thermocouple wire (Green/White)



**1. Thermocouple Connectors**  
Type K plug and socket thermocouple connectors. We offer two types of thermocouple plugs, 516-111 (green) being the standard type normally used with compensating cable. Whereas 516-115 quick connection plugs are ideally suited for use with thermocouple wire where regular connections are required.

| Stock reference & description: |                                                   |
|--------------------------------|---------------------------------------------------|
| 516-111/Y                      | Type K inline plug (standard connection) (Yellow) |
| 516-112/Y                      | Type K inline socket (Yellow)                     |
| 516-115                        | Type K inline plug (quick connection)             |
| 516-125                        | Type K panel mounted socket                       |



**2. Tubular, Stainless Steel Sheathed Thermocouples**  
Commonly used for temperature measurement in furnaces and ovens.

| Stock reference & description: |                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------|
| 42000                          | 8.0m stainless steel sheathed type K thermocouple with fitted thermocouple plug |
| 42001                          | 0.6m stainless steel sheathed type K thermocouple with fitted thermocouple plug |
| 42002                          | 1.8m stainless steel sheathed type K thermocouple with fitted thermocouple plug |



**3. High Temperature Putty**  
A small portion of the soft putty is fixed over the hot junction of the thermocouple, which is attached to the item being heat treated. Once the putty dries (approximately 20 minutes) it hardens to protect the hot junction and helps avoid possible short circuit of the thermocouple wires which would result in temperature control and recording errors.

| Stock reference & description: |                               |
|--------------------------------|-------------------------------|
| 43007                          | Jar of high temperature putty |



**4. Digital Thermocouple Calibration Unit**  
The hand held thermocouple calibration unit is an accurate measurement and millivolt source instrument, which is used to calibrate thermocouple instrumentation. It can measure or simulate 8 different thermocouple types and be used as a millivolt source. The instrument comes complete with the carrying bag, user's manual and a calibration certificate.

| Stock reference & description: |                                     |
|--------------------------------|-------------------------------------|
| 41511                          | VA710 thermocouple calibration unit |



**5. True RMS Digital Clamp Meter**  
The digital clamp meter is an AC/DC multifunction clamp meter capable of measuring a.c or d.c voltage to 600V, a.c current up to 400A, input impedance for DCV: 10MΩ and temperature up to 1000°C using a type K thermocouple. Features include: Jaw capacity 30mm. LCD backlight, auto and manual ranging, diode test and continuity buzzer, data hold, flashlight, auto power off, low battery indication: ≤ 3.6V, input protection. Standard accessories are test leads, point contact temperature probe, carrying bag and user manual.

| Stock reference & description: |                              |
|--------------------------------|------------------------------|
| 44007                          | True RMS Digital Clamp Meter |



**1. 60A In-Line Connectors**  
Spare connectors for repair of splitters and heating elements.

| Stock reference & description: |                                                          |
|--------------------------------|----------------------------------------------------------|
| 508-009                        | 60A brass male connector                                 |
| 508-010                        | 60A brass female connector                               |
| 508-019                        | 60A fibre male sleeve for use with 508-009               |
| 508-020                        | 60A fibre female sleeve for use with 508-010             |
| 508-022                        | 60A fibre pin for use with 508-019 and 508-020           |
| 508-040                        | 12.7mm wide copper shim for use with 508-009 and 508-010 |



**2. 300A In-Line Connectors**  
Spare connectors for repair of triple cable sets and splitters.

| Stock reference & description: |                                                        |
|--------------------------------|--------------------------------------------------------|
| 508-006                        | 300A brass male connector                              |
| 508-007                        | 300A brass female connector                            |
| 508-015                        | 300A fibre male sleeve for use with 508-006            |
| 508-016                        | 300A fibre female sleeve for use with 508-007          |
| 508-021                        | 300A fibre pin for use with 508-015 and 508-016        |
| 508-041                        | 19mm wide copper shim for use with 508-006 and 508-007 |



**3. 300A Panel Mounted Connectors**  
Spare panel mounted connector sockets for repair of heat treatment modules and units. Supplied complete with fibre washer and lock nut.

| Stock reference & description: |                                                        |
|--------------------------------|--------------------------------------------------------|
| 508-001                        | 300A panel mounted sockets                             |
| 508-002                        | 300A panel mounted plugs                               |
| 508-003                        | 300A panel mounted connector plug with neoprene sleeve |



**4. Energy Regulator & Aluminium Knob**  
Energy regulator for 110V use c/w aluminium knob and replacement dial.

| Stock reference & description: |                  |
|--------------------------------|------------------|
| 552-012                        | Energy regulator |
| 552-014                        | Aluminium knob   |
| 552-015                        | Replacement dial |



**5. 110V 6 Way Control Plug & Socket**  
Spare in line plug and panel mounted socket, for repair of 110V control cables and control inputs and outputs.

| Stock reference & description: |                               |
|--------------------------------|-------------------------------|
| 516-300                        | 7 pin panel mounted male plug |
| 516-301                        | 7 pin in line female socket   |



**6. 110V Control Plugs & Sockets**  
Spare in-line XLR plugs and panel-mounted sockets for repair of 110V control cables and control inputs and outputs.

| Stock reference & description: |                                                                 |
|--------------------------------|-----------------------------------------------------------------|
| 516-100                        | 3 pin XLR type panel mounting plug for 110V contactor control   |
| 516-101                        | 3 pin XLR type panel mounting socket for 110V contactor control |
| 516-102                        | 3 pin XLR type in-line socket for 110V contactor control        |
| 516-103                        | 3 pin XLR type in-line plug for 110V contactor control          |





**1. Electrical Fittings - Various**  
All wiring and cable accessories as used in our equipment are available for purchase. The more common parts detailed below.

| Stock reference & description: |                                  |
|--------------------------------|----------------------------------|
| 558-001                        | Large cable ties                 |
| 558-002                        | Small cable ties                 |
| 558-003                        | Large stick on bases             |
| 558-004                        | Small stick on bases             |
| 520-018                        | 35 x 8mm copper cable lugs       |
| 520-019                        | 35 x 10mm copper cable lugs      |
| 520-013                        | 25 x 8mm copper cable lugs       |
| 520-030                        | 70 x 10mm copper cable lugs      |
| 520-069                        | 6.3mm insulated red receptacles  |
| 520-070/1                      | 6.3mm insulated blue receptacles |



**2. Fuses - Various**  
Various fuses and holders available as spares for our equipment. Common parts detailed below.

| Stock reference & description: |                                  |
|--------------------------------|----------------------------------|
| 530-001                        | Panel mounting fuse holder 1.25" |
| 530-023                        | 200A SIBA flat fuse              |
| 530-032                        | 200A semiconductor fuse T350     |
| 530-053                        | 5A glass fuse 1.25"              |
| 530-054                        | 10A glass fuse 1.25"             |
| 530-080                        | DIN rail mounting fuse holder    |



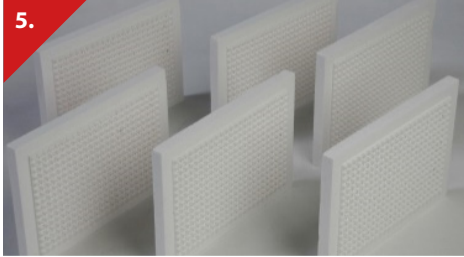
**3. 110Vac Plugs and Sockets**  
Spare in-line plugs and panel mounted sockets for repair of 110V supply cables and supply outputs.

| Stock reference & description: |                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------|
| 516-040                        | Large yellow, 110V, 16A, 3 round pin, Industrial (BS4343) panel mounting socket |
| 516-040/1                      | Yellow, 110V, 16A, 3 round pin, Industrial (BS4343) panel mounting socket       |
| 516-041                        | Yellow, 110V, 16A, 3 round pin, industrial (BS4343) in-line plug                |



**4. Flexible Insulated Preheat Magnets**  
Pair of powerful limpet magnets with cross bar used to quickly clamp Flexible Insulated Preheaters (FIPs) to the work piece being preheated.

| Stock reference & description: |                                                 |
|--------------------------------|-------------------------------------------------|
| 29269                          | Assembled pair of limpet magnets with cross bar |
| 536-001                        | Replacement, single, limpet magnet              |



**5. Surface Combustion Unit Spare Plaque & Gasket Set**  
Replacement parts for repair of Surface Combustion Units (SCU).

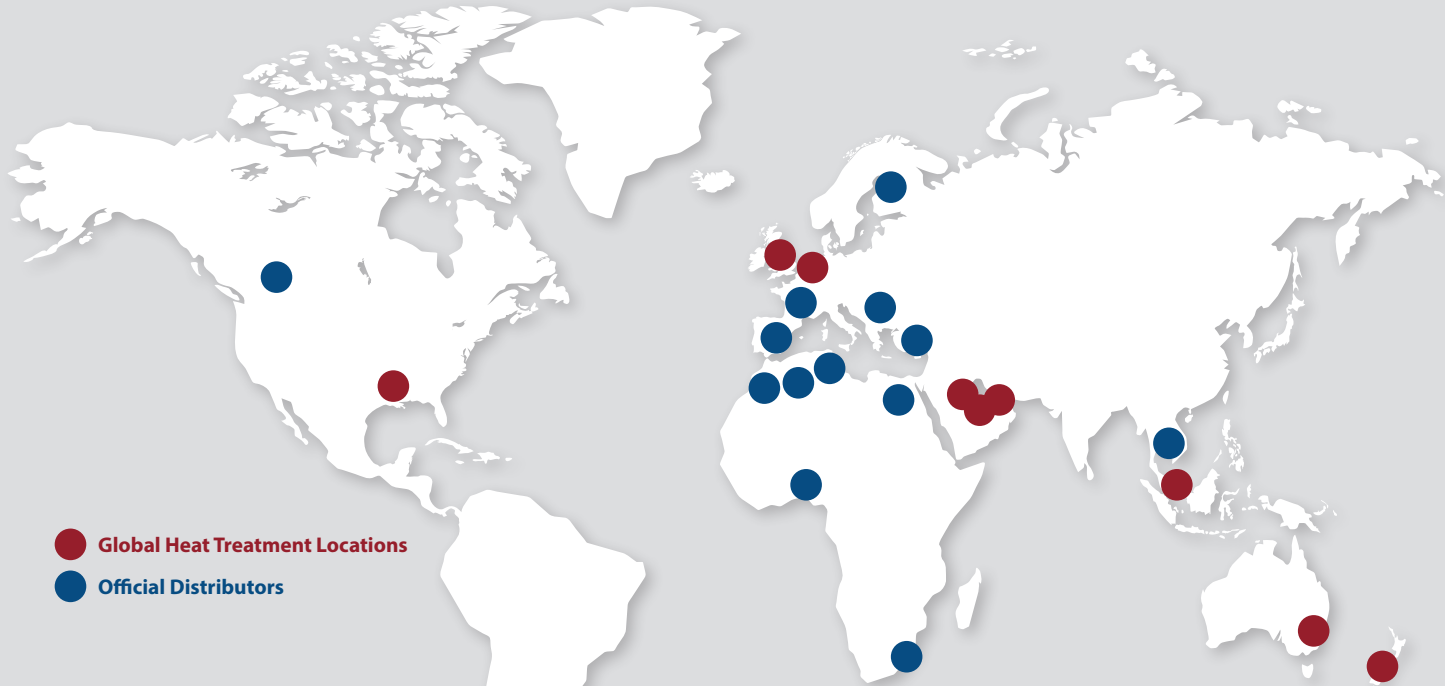
| Stock reference & description: |                                            |
|--------------------------------|--------------------------------------------|
| 6262/P/15                      | Replacement set of 6 SCU plaques & gaskets |



**6. Soft Iron Tie Wire**  
For heating element bands of less than 4 heating elements, soft iron wire is adequate to fix the heating elements and insulation around the workpiece.

| Stock reference & description: |                            |
|--------------------------------|----------------------------|
| 29266                          | Soft iron wire (25kg roll) |

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