

HE-50

ThermalEx

Thermal Electric Elements

CERTIFIED HAZARDOUS AREA HEATERS

VULCANIC TEE

VERSION 2.0



ABOUT TEE

Thermal Electric Elements was established in 1972 as a father and son operation in Sydney, Australia. Since then, Thermal has relocated its manufacturing facilities to Coffs Harbour and changed its name to Vulcanic TEE after joining the Vulcanic Group.

Vulcanic TEE specialises in custom designed and built electric heating units for all applications and boasts some of the most versatile manufacturing capabilities in the industry, including the ability to produce elements up to 15m in length.



OUR CERTIFICATIONS



The IECEx Scheme is a quality based scheme that requires the issue of a Test Report and a Quality Assessment Report (QAR) in order for a Certificate of Conformity to be issued. A QAR is issued on the basis of a successful on site assessment of a manufacturer's quality system. Surveillance audits of the manufacturer are conducted annually or twice per year. The objective of the International Electrotechnical Commission (IEC) Ex Scheme is to facilitate international trade in equipment and services for use in explosive atmospheres while maintaining the required level of safety.

Vulcanic TEE's IECEx certification ensures the products we supply are of the highest standards in both safety and design as it includes quality standards equivalent to ISO 9001.



The ATEX directive is a European certification designed to ensure that products sold in the European market are of high quality and safety standards (similar to the Ex Scheme). ATEX certification is widely approved and used in both the European and South East Asian markets.

THERMALEX

The ThermalEx range of heaters is growing continually and can be manufactured to suit your requirements.

All Vulcanic TEE heaters, including the ThermalEx range, are manufactured with the highest quality materials, from the magnesium oxide insulation, to the element sheaths and electrical controls.



The ThermalEx range of certified flanged immersion and withdrawable immersion heaters are available in a power rating to suit your application with process temperatures up to 450°C.

Drawing on Vulcanic TEE's extensive electric heating element experience, the elements used in these bundles can be a variety of sheaths to suit your specific applications, including Stainless Steel, Titanium, Incoloy and more. Element lengths can be anywhere from 300mm to 6m depending on your requirements, with varying element quantities within the bundle, giving you the most efficient design.

FEATURES & COMPLIANCE

Flange type is determined by your specifications in order to match your current system or provide the best fit for the heater design.

The ThermalEx range of heaters are rated to IP66 and available in T3-T6 temperature classifications for -20°C to +60°C ambient operating temperatures.

ThermalEx heaters are constructed in accordance with IEC standards 60079-0; 60079-1; 80079-34 and ATEX standards EN 60079-0 and 60079-1.



APPLICATIONS



ThermalEx heaters are designed for hazardous areas where an explosive atmosphere is present. Hazardous areas can be found in a wide variety of places including oil platforms, mines, petroleum processing, sewage treatment and laboratories to name a few.

Some applications our heaters are often used in:

- Fuel Gas
- Natural Gas
- Industrial Gases
- Crude Oils / Hydrocarbon Liquids
- Fuel Oils
- Heat Transfer Oils
- Molecular Sieve Regeneration
- Knockout Drums and more...

Anywhere there's
Hazardous Areas



OPTIONS

Vulcanic TEE can supply you with a part of the heater or the complete unit depending on your requirements. From the heater bundle (with a variety of options including compression fittings and stand-off flanges) to the vessel, control panel, double-bite compression fittings, complete oven and more!



TECHNICAL INFORMATION

All units are provided with full documentation and technical data sheets to assist you with installation and servicing. Vulcanic TEE are always available for technical advice and after-sales service to ensure you continue to experience the benefits of our high quality heaters.



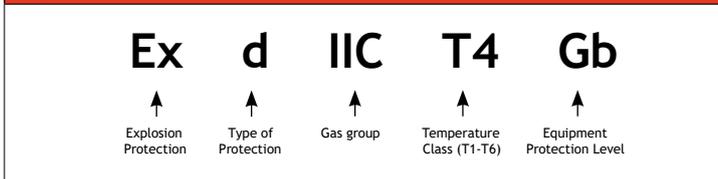
HAZARDOUS AREAS

Hazardous areas are areas or zones that contain an explosive atmosphere. These explosive atmospheres are classified based on the gases, vapours or dusts present and will affect the sort of certification required for electrical equipment.

Below are some charts to assist in explaining the different markings and classifications of IECEx and ATEX equipment, such as our ThermalEx range of heaters.

While Vulcanic TEE's blanket certification covers the more common zones and classifications, we are constantly expanding our range, so contact us for any requirements not shown on our current certificates.

Typical IECEx Marking



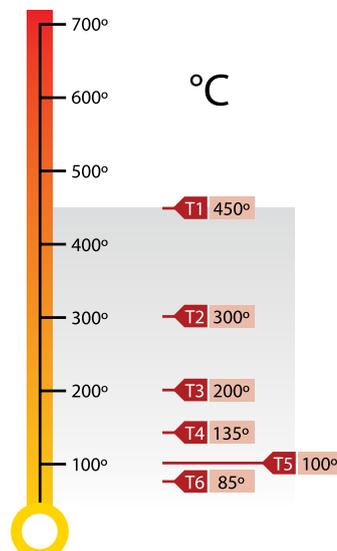
Atmosphere Groups [ATEX and IECEx]

Group	Environment	Location	Typical Substance
I		Coal Mining	Methane (Fire damp)
IIA	Gases, Vapours	Surface and other locations	Acetic acid, Acetone, Ammonia, Butane, Cyclohexane, Ethanol (ethyl alcohol), Gasoline (petrol), Kerosene, Methane (natural gas) (non-mining), Methanol (methyl alcohol), Propane, Propan-2-ol (iso-propyl alcohol), Toluene, Xylene
IIB			Di-ethyl ether, Ethylene, Methyl ethyl ketone (MEK), Propan-1-ol (n-propyl alcohol)
IIC			Acetylene, Hydrogen

Temperature Classification

Classification of maximum surface temperatures for Group II Electronic Equipment (T Class).

IIA	T1	Ammonia	630°
IIC	T1	Hydrogen	560°
IIA	T1	Methane	537°
IIA	T1	Propane	470°
IIB	T2	Ethylene	425°
IIA	T2	Butane	372°
IIC	T2	Acetylene	305°
IIA	T3	Cyclohexane	259°
IIA	T3	Kerosene	210°
IIB	T4	Di-ethyl Ether	160°
IIC	T6	Carbon Disulphide	95°

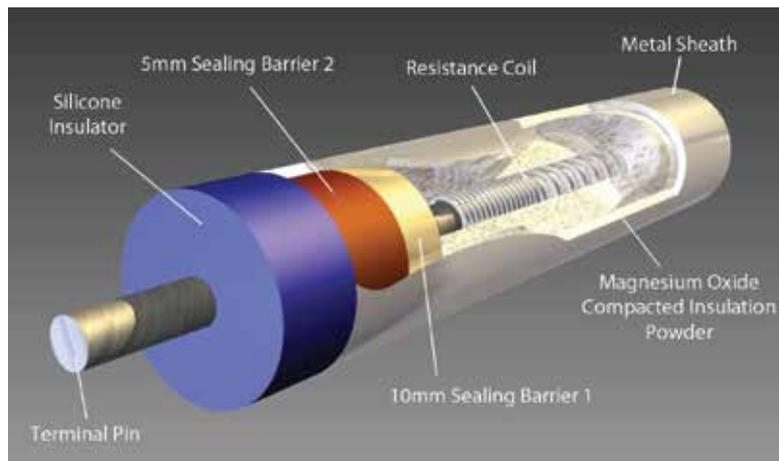


ELEMENT END SEALING

THE IMPORTANCE OF END SEALING

The main cause of earth leakage trip issues is moisture ingress through the element end seal. This leads to low insulation readings and subsequent element failure over time.

To eliminate this problem, Vulcanic TEE uses a twin sealing process on all its ThermalEx heaters, which guarantees high insulation resistance readings for years to come. Vulcanic TEE's twin sealing process complies to IECEx standard IEC 60079-7.



VULCANIC TEE'S SEALING PROCEDURE

- Heating elements are placed into a vertical dehydration oven for a minimum of 48 hours and allowed to completely dry out.
- Insulation tests are performed and must be greater than 500M Ω before the sealing process is carried out.
- Sealing process 1 (10mm) is carried out while the heating elements are in the hot state (110°C minimum surface temperature).
- Heating elements are placed for the second time into the oven for a minimum of 36 hours.
- Insulation tests are performed - minimum reading of greater than 500M Ω allowable.
- Sealing process 2 (5mm) is carried out while the elements are in the hot state.
- Once sealed, insulation and Hi pot tests are performed.

Vulcanic TEE's in house test results have verified the quality of the twin sealing process and guarantees the reliability and longevity of the unit.

- Squeeze test and then immersed in 20-24°C water for 45 minutes.
Result: 200M Ω Insulation test
- Environmental chamber test at 90°C, 95% relative humidity for 4 weeks.
Result: 200M Ω
- Immersed in 20-24°C water for 28 days.
Result: 200M Ω
- High temperature oven at 125°C for 6 weeks, removed and placed in sub-zero temperatures for 72 hours.
Result: 200M Ω

WITHDRAWABLE HEATERS

Vulcanic TEE's withdrawable tubular heaters are suitable for applications where replacements, maintenance or repairs are to be carried out without disturbing the contents of the tank.

The stainless steel removable core easily slides out of the flange mounted thermowell, minimising disruption to your process or tank contents.



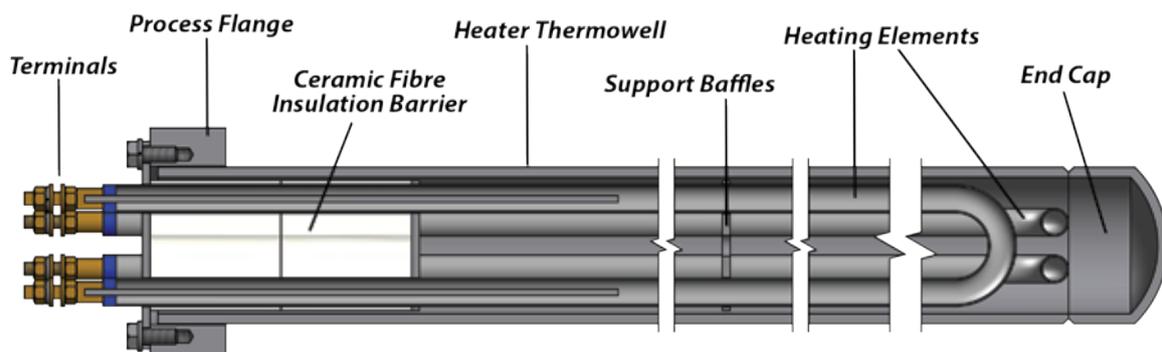
ThermalEx withdrawable heaters feature multiple 50NB stainless steel thermowells up to 6 metres in length welded to the process flange.

The SS removable core heating bundles are enclosed within and the complete unit is designed to offer maximum serviceability with minimum disruption to your process or the need to drain storage tanks.



Withdrawable heaters are very resistant to physical, mechanical or vibration damage and are suitable for solutions where drainage of the tank is impractical.

Materials such as bitumen, wax, fats and oils require low element surface temperatures to prevent product degradation, which makes withdrawable heaters ideal to protect your product and process quality.

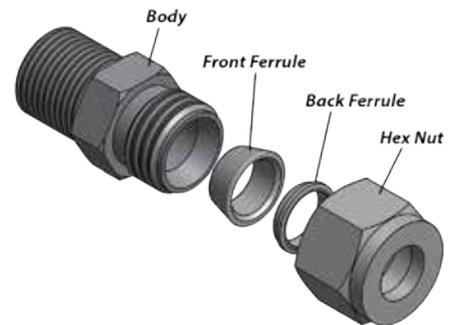


ASSEMBLY

DOUBLE FERRULE/DOUBLE BITE COMPRESSION FITTING FOR EASY INDIVIDUAL HEATER ELEMENT REPLACEMENT

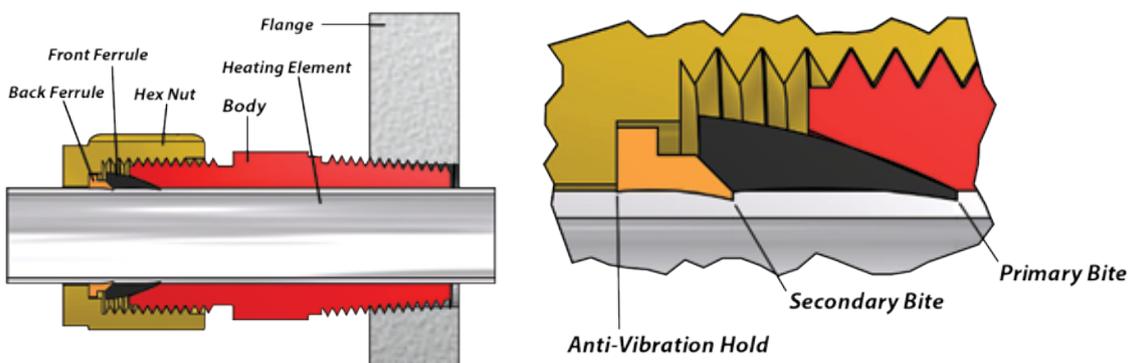
Double Ferrule compression fittings are self-aligned mechanical grip fittings that are an industry standard for the chemical, bio-technology, semi-conductor, oil and gas industries to name a few.

The complete assembly is made up of four parts (body, front ferrule, back ferrule and nut) that offer excellent leak-proof performance in a vacuum as well as in low and high pressure applications.



The back ferrule provides an anti-vibration hold on the heating element and leak-proof sealing is guaranteed at high operating temperatures.

The double ferrule design offered provides a leak-proof seal at three separate points and can adjust to temperature cycling while eliminating damage to the element sheath normally caused by inferior fittings.



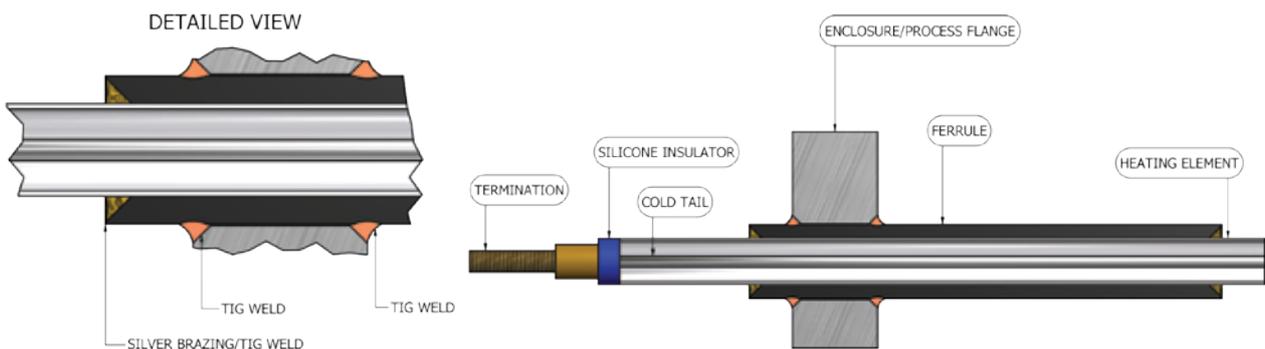
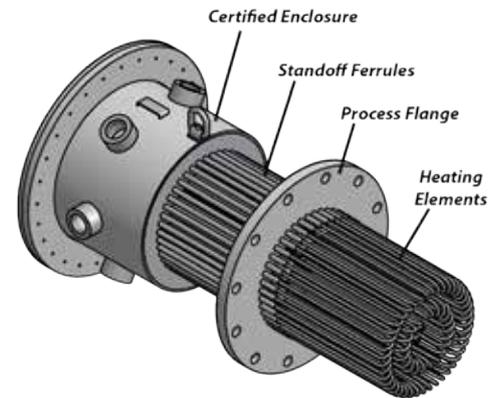
- The heater element is inserted into the process flange or Ex'd enclosure via means of the four piece stainless steel compression fitting.
- The body of the compression fitting has an NPT thread that is designed for high pressure applications.
- The general arrangement and layout of the fitting entry points have been designed so the integrity of the flange is maintained to the existing design codes.
- Easy removal and replacement of individual heating elements can be achieved without the need to replace the complete flanged heater bundle.

ASSEMBLY

STANDOFF FLANGE HEATER FERRULE ARRANGEMENT FOR USE ON COMPACT HIGH POWERED THERMALEX HEATERS

Tungsten Inert Gas (TIG) welding is highly resistant to corrosion and cracking over long time periods and is ideal for use when working with many of the exotic materials that are required for the Petrochemical, Chemical, Oil and Gas industries.

It is the preferred choice when ThermalEx heaters are required to be installed into a process area that allows for the maximum kilowatt rating achievable with the minimal space utilised.



- Thorough cleanliness and preparation are imperative in achieving the best results with numerous inspections and quality checking performed before a single weld is committed to.
- 316SS standoff ferrules are TIG welded into the process flange or base of the ThermalEx enclosure that guarantee a high quality, strong and clean weld to prevent the occurrence of oxidisation.
- All element ends are heat treated and normalised numerous times prior to being TIG welded or silver brazed into position. This process relieves stress on all element to ferrule contact points ensuring stress fractures do not occur during the assembly and most importantly at the customers process facility.
- Various exotic flange and ferrule materials are available to suit customers requirements.
- The general arrangement and layout of the ferrule/element entry points have been designed so as to maintain the integrity of the flange and to comply with existing design codes and pressures.

HAZARDOUS AREA OVENS



Vulcanic TEE's popular industrial ovens, used in a wide range of industries for decades, are also available certified for hazardous areas.

ThermalEx hazardous area ovens are available in temperatures up to 450°C and can be custom designed to suit your specific needs, tailoring the size, temperature and fittings to maximise heat efficiency for your particular process.

Each oven is designed with the customer's process in mind. Things like doors, forklift access, shelving, compartments and more are all tailored to provide the most efficient solution for your process.

All ThermalEx ovens can be made weatherproof and lockable, giving you more than just a highly efficient heating unit.

FEATURES & OPTIONS

- Suitable for waxes, oils, chemicals, greases, plastics, paints, minerals, carbon fibre and much more
- Standard designs or fully customised
- Stainless steel heating elements
- IECEx certified heaters, control panel and fans
- Portable free standing design
- Single or multiple chamber options
- Suitable for indoor and outdoor use
- Fully insulated
- Temperatures up to 450°C
- Quick temperature recovery
- Evenly distributed heat
- Chequer plate flooring
- Fan speed control
- Heavy duty locking hardware
- Also available for safe areas



THERMALEX VESSELS

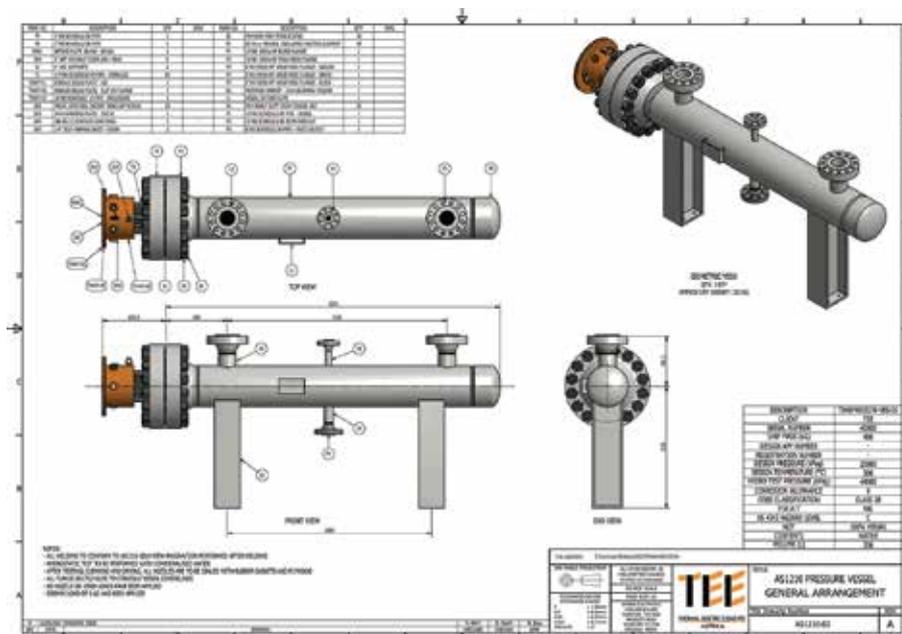


Vulcanic TEE can supply vessels of all shapes and sizes to suit your certified heaters. As part of our complete solution for hazardous area heating, vessels are available for all ThermalEx heaters in a variety of materials, including:

- Carbon Steel
- Low Temperature Steel
- Various ranges of Stainless Steel
- Duplex and Super Duplex Stainless Steel
- Hastelloy
- Zirconium
- Titanium
- Nickel Alloys

Vessels are designed in accordance with the following codes:

- AS1200 - AS1210 - AS1228
- AS1170 - AS1554 - AS1665
- AS3992 - AS4037
- ASME Section VIII. Div 1 and 2
- PD5500 / BS5500



CONTROL SYSTEMS

The operation of an electric heater is only as good as its control system, therefore a tailor made, first class control system is offered by Vulcanic TEE with a range of options from the simple on/off control, to the most sophisticated burst fire/single cycle thyristor control.

Load splitting requirements can be divided into stages to give multi-thyristor control and in addition, combinations of thyristor and contactor control can be supplied to provide a fully synchronised system and limit impact on the power generation system.

Vulcanic TEE offers a total control system service including:

- Thyristor control system design
- Factory testing and quality control
- Step contactor sequence control
- Documentation
- PLC programming
- Spares and after sales service
- Engineering planning
- Ingress protection up to IP66 (IEC), NEMA 4X (NEC)
- Manufacture
- Designs suitable for outdoor installation



In-House Testing - in compliance with IEC439-1:1992 AS3439.1-1993

- Full load / Heat soak testing
- Harmonic analysis
- RF Interference testing
- Dielectric checks - including HV test with 500/1000V Megger test before and after
- Visual checks - including all labels and door earths
- Mechanical checks - including mechanical interlock operation checks
- Electrical checks - including MCCB/ACB setting, Fuse & conductor ratings, functionality and overloads

FLAMEPROOF CONTROL PANELS



Flameproof control panels can be supplied by Vulcanic TEE. To enable local control of ThermalEx hazardous area heaters these control panels are an ideal solution.

Features:

- EEx'd' IIB T1 to T6 Zone 1 & 2 to IP65 (in accordance with IEC529)
- From -20 to +40°C
- Marine grade aluminium cast alloy

IECEX CERTIFICATE - TIH



IECEX Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEX SIM 11.0004X	Issue No: 3	Certificate history:
Status:	Current	Page 1 of 5	Issue No. 3 (2015-06-12)
Date of Issue:	2015-08-12		Issue No. 2 (2012-09-03)
Applicant:	Thermal Electric Elements Pty Ltd 7 Buckman Close TOORMINA NSW 2452 Australia		Issue No. 1 (2012-01-18)
Electrical Apparatus:	Range of Thermal Immersion Heaters Type TIHnn nnn nnnn EXD -s		Issue No. 0 (2011-10-19)
Optional accessory:			
Type of Protection:	d		
Marking:	Ex d IIB T* Gb IP66 Ex d IIB+H ₂ T* Gb IP66 Ex d I Mb IP66 -20 °C ≤ Ta ≤ +60 °C IECEX SIM 11.0004X * T rating T6, T5, T4 or T3 dependant on maximum setting on thermal protection		

Approved for issue on behalf of the IECEx
Certification Body:

Geoffrey Bamler

Position:

Principal Engineer - Certification

Signature:
(for printed version)

Date:

12 June 2015

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3. The Status and authenticity of this certificate may be verified by visiting the [Official IECEx Website](http://www.iecex.com).

Certificate issued by:

Safety in Mines Testing and Research Station (Simtars)
2 Robert Smith Street
REDBANK QLD 4301
Australia



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IECEX CERTIFICATE - TWIH



IECEX Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEX SIM 13.0013X	Issue No: 1	<u>Certificate history:</u> Issue No. 1 (2015-06-12) Issue No. 0 (2013-12-16)
Status:	Current	Page 1 of 5	
Date of Issue:	2015-06-12		
Applicant:	Thermal Electric Elements Pty Ltd 7 Buckman Close TOORMINA NSW 2452 Australia		
Electrical Apparatus: <i>Optional accessory:</i>	TWIH range of Flameproof Heating Assemblies		
Type of Protection:	Flameproof Ex d		
Marking:	Ex d IIB+H2 T* Gb IP66 -20 °C ≤ Ta ≤ +60 °C * T rating T6, T5, T4 or T3 dependant on maximum setting on thermal protection Ex d IIB T* Gb IP66 -20 °C ≤ Ta ≤ +60 °C * T rating T6, T5, T4 or T3 dependant on maximum setting on thermal protection Ex d IMb IP66 -20 °C ≤ Ta ≤ +60 °C		

Approved for issue on behalf of the IECEx
Certification Body:

Geoffrey Barnier

Position:

Principal Engineer - Certification

Signature:
(for printed version)



12 June 2015

Date:

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2 Robert Smith Street
REDBANK QLD 4301
Australia



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ATEX CERTIFICATE



1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 12ATEX1322X** Issue: **0**

4 Equipment: **Thermal Immersion Heaters Type TIHnn nnn nnnn EXD-s**

5 Applicant: **Thermal Electric Elements**

6 Address: 7 Buckman Close
Toormina
New South Wales
Australia

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 60079-0:2012 EN 60079-1:2007

The above list of documents may detail standards that do not appear on the UKAS Scope of Accreditation, but have been added through Sira's flexible scope of accreditation, which is available on request.

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:



I M2
Ex d I Mb



II 2G
Ex d IIB T* Gb
Ex d IIB+H₂ T* Gb

*T rating is governed by thermal protection setting and ranges from T6 to T3

Project Number 26175

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Form 9400 Issue 3

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C Ellaby
Deputy Certification Manager

Sira Certification Service

Rake Lane, Eccleston, Chester, CH4 9JN, England

Tel: +44 (0) 1244 670900

Fax: +44 (0) 1244 681330

Email: info@siracertification.com

Web: www.siracertification.com

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VULCANIC TEE

THE SPECIALISTS IN CUSTOM HEATING

HEAD OFFICE

7 Buckman Cl, TOORMINA NSW 2452

☎ +61 2 6659 6200 🖨 +61 2 6653 3839

✉ sales@thermalelectric.com.au

BRISBANE

1/8 Hopper Ave, ORMEAU QLD 4208

☎ +61 7 5547 3300 🖨 +61 7 5540 7194

✉ brisbane@thermalelectric.com.au

MELBOURNE

6/310 Governor Rd, BRAESIDE VIC 3195

☎ +61 3 8587 6600 🖨 +61 3 9580 6333

✉ melbourne@thermalelectric.com.au

PERTH

9/17 Prowse St, WEST PERTH WA 6005

☎ +61 8 9363 8700 🖨 +61 8 9467 1465

✉ perth@thermalelectric.com.au

www.thermalelectric.com.au

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