Heat Treatment

INDUSTRY

invensys
EUROTHERM

Aerospace Standard AS7102

Technical Note

Eurotherm technical response to Aerospace Standard
SAE AS7102 Revision A

Instrumentation Supply and General On Site Services

The specification AS7102 Rev A is the Aerospace Standard for the National Aerospace and Defense Contractors Accreditation Program requirements for heat-treating.

The standard is used in association with AC7102 which is the Audit Criteria document used by officers of the Performance Review Institute Nadcap Heat Treating Task Group to verify the accredited status of suppliers. These regulations are necessary to ensure that parts or raw materials used in the aerospace industry are heat treated in accordance with the applicable specifications.

The following notes offer some guidance on the clauses contained in the specification and the way Eurotherm can help customers to meet the exacting demands of heat treatment accreditation for clauses, which are appropriate to Eurotherm's business.

The notes must be read in conjunction with the specification document AS7102 RevA a copy of which can be purchased from SAE International at the following web address
www.sae.org/servlets/productDetail?PROD_TYP=STD&PROD_CD=AS7102AD

The audit criteria AC7102 can be obtained from the Performance Review Institute at **www.pri-network.org**

Section	Topic	Comment
2.1.1	SAE Publications	Clause defines other SAE publications which bear relevance to AS7102. Of particular interest are: ● AMS2750 Pyrometry ● AS7102/1 Nadcap Requirements for heat treating accreditation programs – Brazing Requirements ● AMS2801 Heat Treatment Titanium Alloy Parts
2.1.2	PRI Publications	Clause defines other PRI publications which bear relevance to AS7102. Of particular interest are: ● AC7102 Nadcap Audit criteria for Heat Treating ● AC7102/1 Nadcap Audit criteria for Heat Treating- Brazing
2.2	Definitions	Clause provides a definition for documents which are used for instructions and procedures associated with specific tasks. It also provides a definition for interpolation of values between two known points.
3.	General Quality System	Clause defines the requirement for a general quality system.
3.1	Quality Policy	Clause defines the need for a clear quality system which must be reviewed at least annually by senior people in the organisation.
3.2	Organisation	Clause and sub clauses define the need for a formal organizational chart and clearly defined roles and procedures. They also define the objective to function without longstanding vacancies with employees working to defined procedures.
3.3	Quality System	Clause and sub clauses define the need for quality systems to be implemented to meet customer requirements and be subject to revision control.
3.4	Document Control	Clause and sub clause defines the need to have a documented system to control standards and other details pertinent to quality. They also define the requirement to hold revision information relating to material processing standards and customer standards on file.
3.5	Communications	Clause and sub clause defines the need to have procedures for communications between management and employees to benefit the development of business and quality.
3.6	Contract Review	Clause and sub clauses define the need to have proper procedures to deal with customer orders, enquiries, quotes and proposals. Also that records support the suppliers business with the customer for commercial, technical and quality requirements.
3.7	Internal Procedure Planning	Clause and sub clauses define the need to have business and shop floor procedures that comply with the contract review.
3.8 and 3.9	Purchasing Supplier selection and Purchasing - Incoming QDA	Clauses and sub clauses define the need to have procedures for selecting and auditing suppliers. Procedures shall also be in place to qualify the source and quality of incoming products and services. Documents supporting incoming goods and service quality and methods to deal with nonconformance must be maintained.
3.10	Product Identification and Traceability	Clause and sub clauses define that procedures are in place to deal with identification of parts and samples with conformance of the items to traceable drawings throughout the process.
3.11	Stamp and Signature Control	Clause and sub clauses define that procedures are in place to deal with all aspects stamps and signatures control.
3.12	Control of Nonconforming Product	Clause and sub clauses define that procedures are in place to deal with all aspects of non-conforming parts including records, parts segregation and reports to customers.
3.13	Corrective Action	Clause and sub clauses define that procedures are in place to deal with causes and notify actions associated with corrective action required for non-conforming parts.
3.14	Delivery and Service	Clause and sub clauses define that procedures are in place to deal with protection and correct actions for shipment of goods which conform to the requirements of the contract review.
3.15	Customer Service and Satisfaction	Clause and sub clauses define that procedures are in place to deal and record actions with regard to customer satisfaction and that discrepancies and authorization for rework are recorded.
3.16	Statistical Methods – Process Integrity	Clause and sub clauses define that procedures are in place to determine that key parameters that effect product quality are maintained under statistical analysis. The analysis must lead to a programme of continuous improvement.

Section	Topic	Comment
3.17	Statistical Methods – Process Control	Clause and sub clauses define that a documented system must be employed to monitor key process parameters and that the statistical quality system moves the company to improved processes and reduced out of control conditions.
3.18	Data Analysis	Clause defines that statistical analysis shall be applied to appropriate test data to aid a programme of continuing improvement.
3.19	Internal Quality Audits	Clause and sub clauses define that procedures are in place to carry out internal but independent quality audits where actions are taken and reviewed by management.
4.	Process Planning and Control	
4.1	Process Planning	Clause and sub clauses define that procedures are in place to ensure supplier can meet and carry out the requirements of the work and that instructions are available to the shop floor.
4.2	Quality Planning	Clause and sub clauses define that procedures are in place to incorporate quality requirements into the planning process and that evidence is available of quality requirements on the job travelers.
4.3	Job Documentation	Clause and sub clauses define that procedures are in place to document operations, part numbers, process status, inspection status, engineering changes and other relevant data. *Eurotherm Digital Data Management control and recording products and supervisory systems support the association of product batch information with the process and process parameter data. Eurotherm products support barcode readers and local or remotely communicated entry of test data, engineering changes and operator notes. Result are compounded in a secure file for local access and reports.*
4.4	Change Control	Clause and sub clauses define that procedures are in place to maintain change control and the revision of travelers is carried out in accordance with authorized requests. *Eurotherm produce digital data management and control products, which support password protected audit features for the secure access to recipes and process selection. The audit features are supported by multiple user login and access, which is fully documented in the stored data files.*
4.5	Specification Changes	Clause and sub clauses define that procedures are in place to control the use and introduction of new specifications and the use of old or retired specifications. *Eurotherm produce digital data management and control products, which can track specification revision and secure access to current or retired process recipes. Automated equipment supports remote access from online supervisory equipment to control the revision and updating of programs and recipes.*
4.6	Process Control	Clause and sub clauses define that procedures are in place to ensure that parts are processed and data is recorded in accordance with information on the traveler. *Eurotherm produce digital data management and control products with batch management routines, to ensure products are processed to the correct traveler instruction. Secure data files are produced to show that parameter data associated with the process conform to the instructions on the traveler. Process information associated with batches and product can be appended to the records through batch fields or operator notes.*
4.7	Automated Processes and Recordings	Clause and sub clauses define that procedures are in place: To ensure that magnetically stored programmes cannot be altered with out authorization and can be stored when requested in separate location. That records are tamperproof and cannot be altered. *Eurotherm automated control and data management products support password protected audit features, which restrict the access to programmes to authorized personnel. Program information can be transferred in a clone file for storage in a separate secure location. Automated equipment supports remote access from online supervisory equipment to control the revision and updating of programs and recipes* *Automated data management equipment supports tamperproof, binary, check summed, write once, read only data files which can be archived to multiple destinations.*
4.8	Furnace Malfunctions/Cycle Interruptions	Clause and sub clauses define that procedures are in place to deal with and document actions required for furnace malfunctions. *Eurotherm Digital data management and controlling equipment can include procedures or operator instructions to deal with furnace malfunctions.* *Operator notes can be added to the secure data file to record the actions associated with any specific malfunction for future analysis.*

Section	Topic	Comment
5	Personnel	Clause and sub clauses define that procedures are in place to train personnel involved in heat treatment duties in accordance with ARP1962.
5.2	Training	Clause and sub clauses define that procedures are in place to define and record training regimes for personnel involved with heat treatment duties including required competencies and records of training attendance and attainment.
5.3	Evaluation of Personnel	Clause and sub clauses define that procedures are in place to evaluate skills and proficiency of approved personnel. Records shall be maintained of results of evaluation working towards a program of continuous improvement.
6	Material Handling and Protection	
6.1	Receiving Procedure	Clause and sub clauses define that procedures are in place to record information on incoming material and to report discrepancies on the count and quality on the received goods. Procedures shall also be in place and documented regarding handling packaging and protection of the goods.
6.3	Lot Integrity	Clause and sub clauses define that procedures are in place to specify lots and sub lots and procedures to eliminate mixing of lots and that information of lots is maintained on travelers for in process and finished goods.
6.4	Housekeeping	Clause and sub clauses define that procedures are in place to define plant cleanliness; space control; Titanium cleaning handling regimes, and handling of parts. The procedures should be supported by documentation.
6.7	Plating and Cleaning	Clause and sub clauses define that records should be in place to record defined process data about plating processes and the periodic review of test results of plating processes. *Eurotherm provide data monitoring equipment for the acquisition, retrieval and long-term storage of plating bath data. Process information associated with batches and product can be appended to the records through batch fields or operator notes. Results of test data can be entered locally or remotely over digital communications and embedded with the stored parameter data files.*
6.8	Refrigeration	Clause and sub clauses define that procedures should be in place for the use and time temperature routines of refrigerators in the cooling of aluminium and steel alloys and records must be maintained that the procedures are followed. *Eurotherm provide data monitoring equipment for the acquisition, retrieval and long-term storage of refrigerator data. Process information associated with batches and product can be appended to the records through batch fields or operator notes.*
7	Test and Inspection	
7.1	Survey for Hardness Testing	Clause and sub clauses define procedures for hardness testing and the relevant specifications associated with PRI AC7101/5 accreditation for hardness testing. The clauses define audit/verification requirement for hardness testing equipment and the need to demonstrate repeatability, reproducibility and any dimensional scale conversions.
7.2	Metallography/Microhardness	Clause and sub clauses define procedures for metallography/microhardness testing and the relevant specifications associated with PRI AC7101/4 accreditation. The clauses define test requirements for surface contamination and surface chemistry associated with partial decarburizing, intergranular oxidation, carburization and Nitriding. Current records must be maintained and frequency of test regimes must comply with the specifications.
7.2.3	Titanium	Clause and sub clauses define that systems must be in place to control and record the use of test coupons when processing Titanium to AMS2801 or MIL-H-81200.
7.3	Mechanical Testing	Clause defines that SAE AS7101/3 applies when conducting mechanical testing and that SAE AS7101 shall satisfy the requirement.
7.4	Non-conventional and Engineering Tests	Clause and sub clauses define that systems must be in place to carry out non-conventional tests in accordance with customer instructions.
7.5	Preparation of Mechanical Test Specimens	Clause and sub clauses define that if mechanical testing specimens are prepared, SAE AS7101/7 shall apply and that SAE AS7101 shall satisfy the requirement.
7.6	Conductivity Testing	Clause and sub clauses define procedures for periodic testing, calibration and recording of data associated with relevant standards for conductive test equipment and test blocks. Records, drawings and evidence must be maintained to show that procedures regarding the location and orientation of the test meet the requirements of the specification.
7.7	Periodic Maintenance of Testing Equipment	Clause and sub clauses define procedures for periodic maintenance of equipment and that records are kept to show that maintenance is undertaken according to the procedures and relevant standards.

Section	Topic	Comment
7.8	Test Materials and Specimens	Clause and sub clauses define that procedures must be in place to deal with test materials and specimens. Records must show the correct use of test coupons and that there is periodic review of results to aid a programme of continuing improvement.
7.9	Dimensional Testing	Clause and sub clauses define that procedures must be in place to deal with dimensional testing.
7.10	Sampling Plans	Clause and sub clauses define that procedures must be in place to deal with Sampling Plans.
7.11	Acceptance/Rejection Standards	Clause and sub clauses define that procedures must be in place to deal with acceptance and rejection standards.
7.12	Test Reports and Records	Clause and sub clauses define that procedures must be in place to deal with test reports and records for hardness and conductivity records. Procedures need to specify periodic review and a programme of continuing improvement.
8	Furnace Control and Maintenance	*Eurotherm supply Control and Data management products, which meet the requirements of "Field Test Instruments" and "Control Monitoring and Recording Instruments" suitable for use in Nadcap compliant heat treatment applications.* *Regionally Eurotherm supply accredited services to meet the demands of thermal processing equipment compliance and to aid the effective use of plant.*
8.1	Furnace Document Control	Clause and sub clauses define that operating manuals and instructions are available to personnel requiring access to the information *All Eurotherm products are supported by installation and operating manuals which define the correct use of products within a Nadcap audited environment.*
8.1.2	Heating Times	Clause and sub clauses define that procedures are in place to determine the correct heating/cooling times for processes and that records are kept which show the compliance of the heat cycle. Where required, records must show that the actual metal followed the correct heat/cool profile. *Eurotherm manufacture control products which accurately define and control the process to the required thermal profile - including workpiece holdback routines and guaranteed soak times.* *Data management products record details of the thermal profile selected and accurately monitor and record the setpoint point demands and the actual process temperature of the process.* *Eurotherm control and data management solutions provide cascade/thermal head or override control algorithms which enable the furnace to be accurately controlled from the work-piece metal temperature with recorded data to prove that the metal achieved the required thermal profile.*
8.1.3	Maintenance	Clause and sub clauses define that furnace equipment shall be maintained and inspected in accordance with the defined schedule and that records are maintained to demonstrate compliance and a programme of improvement. *Eurotherm control and data management products can be configured to include maintenance period/scheduling alarms and user help screens to aid maintenance and test actions. Operator notes can be added to recorded parameter data on the furnace records to indicate the results of periodic maintenance and test routines.*
8.2	Furnace Condition	Clause and sub clauses define the need for inspection and the determination of sound furnace operating conditions of all internal and external furnace components.
8.3	Control of Heating Environment	Clause and sub clauses define the need to determine how furnace atmospheres are to be controlled, maintained and monitored and that records are kept to verify that procedures are met. *Eurotherm manufacture atmosphere sensors and control equipment which allow furnace and generator atmosphere control to be part of the component specific recipe. Atmosphere parameters are always available to the data management products to monitor and record that atmosphere values follow the defined process recipe.*
8.3.4	Metering	Clause and sub clauses define the requirement and procedures for using and checking the use of flow meters. *Eurotherm control products include digital events, which can initiate metered gas flow as part of the process cycle. The events are included as part of the furnace log and operator notes can be attached to the log to record the test regime for flow meter equipment.*
8.3.5	Purging	Clause and sub clauses define the requirement for purging to eliminate the effects of previous atmospheres and the requirement for ammonia cut off and purge during Nitriding cycles. Records must indicate that the procedure is followed *Eurotherm provide data management products where actions can be included as part of the furnace log and operator notes can be attached to the log to record the test regime for purging.*

Section	Topic	Comment
8.3.6	Salt Baths	Clause and sub clauses define the requirement for testing and verifying the performance and conformance of salt baths and that records are to kept to indicate that procedures are followed.
8.3.7	Aluminum Alloys	Clause and sub clauses define the procedure, requirement and precautions for processing aluminium alloys and that records are maintained to show the procedures are met.
8.4	Carbon Control – Steels	Clause and sub clauses define the procedures for the correct maintenance, calibration, use and testing of Carbon control systems. Also that the accuracy of the system is controlled through the results of tests from the heat treatment specification and that records show that procedures are followed. *Eurotherm provide discrete and integrated control and data management solutions for Gas Carburising and Atmosphere controlled furnaces which operate in a Nadcap compliant environment.* *Instrumentation provides accurate control and recording of carbon atmospheres. User booklets include routines for the calibration of the equipment.*
8.5	Quench Systems	Clause and sub clauses define the requirement for quench system operation and delay recording. *Eurotherm control and data management products include routines to determine the delay time between the thermal carbon process and quenching. The results are monitored and recorded and alarms can be linked to identify out of tolerance delay time.*
8.5.2	Quenchant Control	Clause and sub clauses define the requirement for control, operation, compliance use and records of quench equipment and polymer quenchants. *Eurotherm provide control and data management equipment to ensure that the quenchant temperatures and quench tank agitation are in accordance with the requirements of the process traveler before and after the process and that the parameters are recorded as part of the process secure data file.* *Instructions are provided in the operator documentation to aid calibration of the control and recording instrumentation.*
8.5.3	Quench Effectiveness	Clause and sub clauses define the requirement and frequency for evaluating the effectiveness of quenchants and that records must be kept to show procedures are followed.
8.5.4	Press Quench Checklist	Clause and sub clauses define the requirement for location and press attributes for quench presses and that the settings shall be in accordance with information on the traveler. Procedures must eliminate actions which add to local cooling or mechanical probems associated with the equipment.
8.6	Racks, Fixtures and Baskets	Clause and sub clauses define the requirement and procedures for controlling the design, use authorization and integrity of racks fixtures and baskets and that records must be kept to show that procedures are followed.
8.7	Pyrometry Testing	Clause and sub clauses define the requirement and procedures for applying and conforming with the demands of AMS2750 pyrometry specification or other defining specifications for heat treatment.
8.7.1	Temperature Uniformity Tests	Clause and sub clauses define the requirement and procedures for carrying out temperature uniformity survey (TUS) tests on thermal processing equipment. *Eurotherm supply products and services to aid the compliance of furnace equipment to AMS2750D including:* ● *Regionally available accredited on-site TUS services* ● *Supply of Field Test TUS recording and control equipment* ● *Supply of TUS reporting software* ● *Onsite furnace optimization services to aid TUS compliance* ● *Special control routines to aid TUS compliance* ● *Password protected products to ensure security of control monitoring and recording equipment* ● *Site surveys to verify suitability of control instruments to operate in a Nadcap environment*
8.7.2	System Accuracy (Probe) Tests	Clause and sub clauses define the requirement and procedures for carrying out System Accuracy (Probe) Tests (SATs) Eurotherm supply products and services to aid System Accuracy probe Tests including: ● *Regionally available accredited on-site (SATs) services* ● *Supply of Field Test (SATs) recording and control equipment* ● *Supply of records and certificates to show compliance of the tests to AMS2750D* ● *Advice and training on System Accuracy Tests compliance*

Section	Topic	Comment
8.7.3	Instrument Calibration	Clause and sub clauses define the requirement and procedures and accuracy associated with instrument calibrations according to AMS2750 or more stringent regulations as they apply. *Eurotherm supply products and services to aid the compliance of Instrument calibration including the following:* ● *Regionally available accredited on-site instrument calibration services* ● *Supply of Field Test instruments and control monitoring and recording instruments that meet the requirements of AMS2750D tables 3, 6 and 7* ● *Supply of records and certificates to show compliance of instrument calibration to AMS2750D* ● *User instructions for the introduction and use of offsets* ● *User calibration and recalibration instructions* ● *Supply of products, which meet the sensitivity tests for analogue and digital Field Test instruments and control monitoring and recording instruments* ● *Site instrument audits to verify suitability of instruments to operate in a Nadcap environment* ● *Advice and training on instrumentation calibration compliance*
8.7.4	Aluminum Solution Heat Treating Furnaces Having Heat Source in Walls	Clause and sub clauses define the requirement for preventing radiant heating in aluminium solution heat treatment furnaces and to provide radiation test prior to initial use and after repairs or refurbishment.
8.7.5	If offsetting is used, there shall be a procedure that specifies the use of offsets	Clause and sub clauses define procedures for introducing and use of offset and that procedures must be in line with customers requirements and records kept to confirm that procedures have been followed. *Eurotherm supply control and data management products suitable for use in Nadcap compliant heat treatment applications which support the introduction and use of offsets.* *Offsets are under password protection such that only authorized adjustment is made within the limit of the customer requirement and the relevant specification.*
8.8	Vacuum Furnaces	Clause and sub clauses define requirement and procedures for use and validation of vacuum furnaces, vacuum furnace equipment and quench gas purity and system integrity. *Eurotherm supply discrete and integrated control systems for use in vacuum furnace applications, which meet the demands of Nadcap compliant solutions.* *Control and data management equipment interfaces directly with vacuum gauges and sensors.* *Routines are included in the instrumentation to verify the following:* ● *Furnace pump down performance* ● *Automatic leak rate test routines* ● *Gauge head swap-over* ● *Furnace vacuum pressure levels and partial pressure control* *Recording of the vacuum pressure levels pump down rates and leak rate test can be included with the furnace recorded secure logged data file.* *User manuals include procedures for calibration of the instrumentation.* *Regionally Eurotherm provide On-site services for the calibration of vacuum gauges and vacuum instrumentation.* *Certificates and reports support calibration records.*
8.9	Vacuum Procedures	Clause and sub clauses define requirement and procedures for use of vacuum furnace including furnace furniture and fixings, cleaning, loading and shielding, heat/cool/pressure profiles and measurement and procedures or photographic evidence of the placement of load sensors and racking/location of parts to meet the required specification. *Eurotherm provide vacuum furnace control and data management solutions, which provide secure recipes that include temperature heat/cool and pressure profiles.* *Control systems can accommodate work load thermocouples which are used to provide guaranteed conformance of the work piece to the requirements of the recipe profile.* *User screens can be incorporated to include furnace loading instructions.*

Section	Topic	Comment
9	Brazing	Clause and sub clause specify that brazing must be carried out to AS7102/1.
10	Compliance	Clause and sub clause specify that the compliance of this specification is controlled by the Nadcap heat treating task force.

Eurotherm: International sales and service

Understanding and providing local support is a key part of Eurotherm's business. Complementing worldwide Eurotherm offices are a whole range of partners and a comprehensive technical support team... a soothing melody to ensure you get a service you will want to go back to.

AUSTRALIA *Sydney*
Eurotherm Pty. Ltd.
Telephone (+61 2) 9838 0099
Fax (+61 2) 9838 9288
E-mail *info@eurotherm.com.au*

AUSTRIA *Vienna*
Eurotherm GmbH
Telephone (+43 1) 7987601
Fax (+43 1) 7987605
E-mail *eurotherm@eurotherm.at*

BELGIUM & LUXEMBURG *Moha*
Eurotherm S.A/N.V.
Telephone (+32) 85 274080
Fax (+32) 85 274081
E-mail *info@eurotherm-belgium.be*

BRAZIL *Campinas-SP*
Eurotherm Ltda.
Telephone (+5519) 3707 5333
Fax (+5519) 3707 5345
E-mail *eurothermltda@eurothermltda.com.br*

DENMARK *Copenhagen*
Eurotherm Danmark AS
Telephone (+45 70) 234670
Fax (+45 70) 234660
E-mail *info@eurotherm.se*

FINLAND *Abo*
Eurotherm Finland
Telephone (+358) 22506030
Fax (+358) 22503201

FRANCE *Lyon*
Eurotherm Automation SA
Telephone (+33 478) 664500
Fax (+33 478) 352490
E-mail *ea@automation.eurotherm.co.uk*

GERMANY *Limburg*
Eurotherm Deutschland GmbH
Telephone (+49 6431) 2980
Fax (+49 6431) 298119
E-mail *info@regler.eurotherm.co.uk*

HONG KONG & CHINA
Eurotherm Limited *North Point*
Telephone (+85 2) 28733826
Fax (+85 2) 28700148
E-mail *eurotherm@eurotherm.com.hk*

Guangzhou Office
Telephone (+86 20) 8755 5099
Fax (+86 20) 8755 5831

Beijing Office
Telephone (+86 10) 6567 8506
Fax (+86 10) 6567 8509

Shanghai Office
Telephone (+86 21) 6145 1188
Fax (+86 21) 6145 1187

INDIA *Chennai*
Eurotherm India Limited
Telephone (+91 44) 24961129
Fax (+91 44) 24961831
E-mail *sales@eurothermdel.com*

IRELAND *Dublin*
Eurotherm Ireland Limited
Telephone (+353 1) 4691800
Fax (+353 1) 4691300
E-mail *info@eurotherm.ie*

ITALY *Como*
Eurotherm S.r.l
Telephone (+39 31) 975111
Fax (+39 31) 977512
E-mail *info@eurotherm.it*

KOREA *Seoul*
Eurotherm Korea Limited
Telephone (+82 31) 2738507
Fax (+82 31) 2738508
E-mail *help@eurotherm.co.kr*

NETHERLANDS *Alphen a/d Rijn*
Eurotherm B.V.
Telephone (+31 172) 411752
Fax (+31 172) 417260
E-mail *sales@eurotherm.nl*

NORWAY *Oslo*
Eurotherm A/S
Telephone Oslo (+47 67) 592170
Fax (+47 67) 118301
E-mail *info@eurotherm.se*

SPAIN *Madrid*
Eurotherm España SA
Telephone (+34 91) 6616001
Fax (+34 91) 6619093
E-mail *ventas@iberica.eurotherm.co.uk*

SWEDEN *Malmo*
Eurotherm AB
Telephone (+46 40) 384500
Fax (+46 40) 384545
E-mail *info@eurotherm.se*

SWITZERLAND *Freienbach*
Eurotherm Produkte (Schweiz) AG
Telephone (+41 55) 4154400
Fax (+41 55) 4154415
E-mail *epsag@eurotherm.ch*

UNITED KINGDOM *Worthing*
Eurotherm Limited
Telephone (+44 1903) 268500
Fax (+44 1903) 265982
E-mail *info@eurotherm.co.uk*
Web *www.eurotherm.co.uk*

U.S.A. *Leesburg VA*
Eurotherm Inc.
Telephone (+1 703) 443 0000
Fax (+1 703) 669 1300
E-mail *info@eurotherm.com*
Web *www.eurotherm.com*

ED48

Part No. HA029289 Issue 1 Aerospace Standard AS7102 Technical Note Printed in England 06.06