



Eurovent Certita Certification (ECC)
& Cooling Technology Institute (CTI)
together provide industry certification
of Cooling Towers and Closed Circuit
Coolers covering the world.

Performance certification is the basis for End-users, consultants, Contractors, Manufacturers and Government to ensure correct investment in quality products.



THE BASIC REQUIREMENT OF EVAPORATIVE COOLING EQUIPMENT ...

... Is rejecting the heat to the atmosphere of the process that needs to be cooled. At first sight an obvious statement, BUT it is not. By using the right methodology, an amount of heat can be rejected to the atmosphere. However knowing exactly how the evaporative cooling equipment rejects the heat is a challenge. Accurate determination of the heat rejection capability is of utmost importance for the **End-user, Designer, Manufacturer** and the **Government** to determine the efficiency of the heat rejection methodology.

ULTIMATE QUALITY

Evaluating the quality of a product usually concentrates on the evaluation of functionality, maintenance, longevity, durability, safety and even physical appearance. However, the most fundamental aspect of quality for every machine is the ability to fulfill its design function. For evaporative cooling equipment this mission is proper heat rejection.

Quantifying the temperature level at which heat is rejected accurately is a challenge that requires expertise and know-how. National and International Standards for thermal performance testing of cooling towers have been prepared in cooperation with engineering societies, associations and institutes. These standards focus on performance testing as a part of the commissioning process of a specific installation. Manufacturers however have a need for thermal performance testing programs that certify the performance for an entire product line and guarantee to third parties the correct performance in accordance with published data. Depending on the manufacturing locations, a manufacturer also might wish to guarantee consistent and identical reproduction of the base design with a consequential transferrable performance guarantee to the alternate production locations.

For the European HVAC&R industry, Eurovent Certita Certification plays a major role in establishing a level playing field for manufacturers to certify the performance and guarantee the fundamental integrity of their product lines. The Eurovent Certified Performance logo indicates that this quality requirement has been fulfilled and should not require the need to be re-proven after the customer's decision and after the manufacturer's production process. Eurovent certification eliminates the age old practice of including; safety margins, upward rounding of the design loads, wet bulb temperature & flow rate and the budget for capital investment.

ECO-DESIGN

The European Parliament and the council of the European Union have established the climate and energy package which is a set of binding legislation aiming to ensure the European Union meets its ambitious climate and energy targets for 2020. These targets, known as the “20-20-20” targets, set three key objectives for 2020 for the EU:

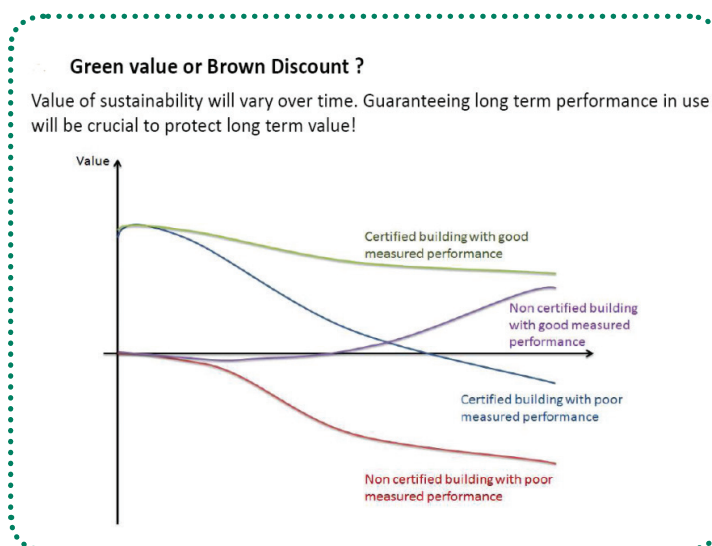
- A 20% reduction in greenhouse gas emissions from 1990 levels
- Raising the share of energy consumption produced from renewable resources to 20%
- A 20% improvement in energy efficiency.

To achieve these targets, the Union has published Directive 2005/32/EC that sets a framework for the eco-design requirements of energy-using products (EUP). Directive 2009/125/EC is a recast of the 2005/32/EC and extends the scope of application to energy related products (ERP). Finally, the directive 2012/27/EC establishes a common framework of measures for the promotion of energy efficiency within the European Union in order to achieve the Union's objectives for 2020 and to ensure less dependence on energy imports from outside the European Union.

The above Directives have paved the path for a multitude of specific eco-design directives for machinery. These Directives are applicable for setting energy performance requirements for technical building systems, in particular for testing and calculating energy efficiency of the **Energy Using Products** as described in the Directive 2010/31/EU on the energy performance of buildings.

According to **Mr. Frank Hovorka**, Director of Sustainable Real-Estate at Caisse-de-Depots in Paris: “Energy efficiency is rapidly gaining importance to evaluate the value of a building. Real estate managers recognize the importance of sustainable construction and search for well definable parameters to differentiate quality products with proven energy efficiency”. Thermal performance certification is crucial in the process to have an upfront guidance in determining the current and future value of the investment.

It is obvious that the ambitious energy efficiency targets set forth by the EU will only be met if manufacturers keep the performance promises they make for their products. Thermal performance certification for cooling towers ensures that the promised performance data are actually reached and therefore certification helps to meet the EU energy targets.



THERMAL PERFORMANCE CERTIFICATION FOR EUROPE

Thermal performance certification has remained a recurring item on the agenda of the Eurovent association’s Project Group “Evaporative Cooling Equipment”. The rapidly changing European legislation, the drive for sustainable Eco-design buildings and the awareness that certified cooling tower will improve the credibility of a naturally top-energy efficient evaporative cooling circuit, convinced the cooling tower manufacturers to re-start a certification programme.

Crucial for a successful new certification programme were

- Use of generally accepted certification standards for full product line certification
- Equal accessibility to the programme for European as well as International manufacturers
- Global acceptance to support the export oriented European market
- Certification through laboratory as well as field-testing to increase the programme participation flexibility by all manufacturers

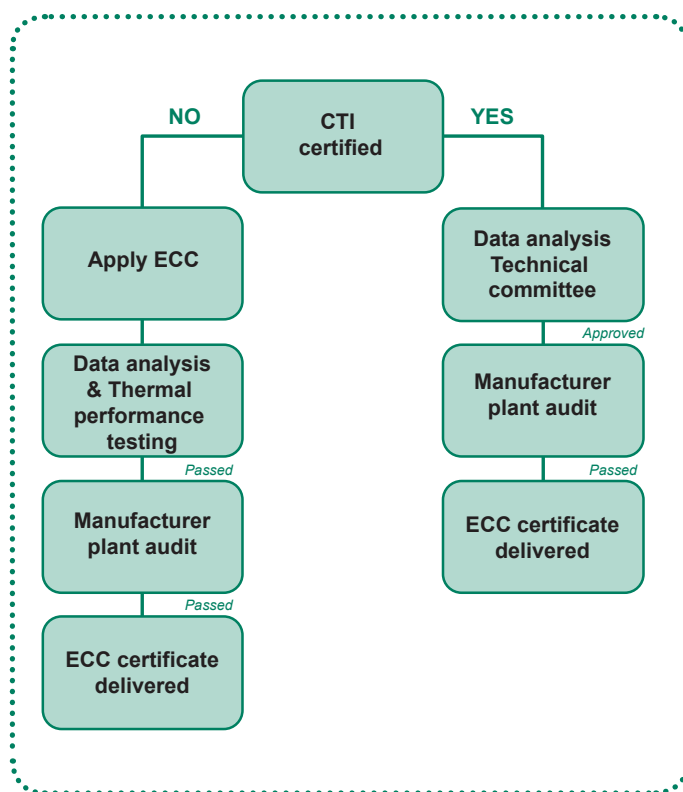
To facilitate the establishment of this programme a Memorandum of Understanding (MoU) was signed between Eurovent Certita Certification (ECC) and the Cooling Technology Institute (CTI). This MoU describes the cooperation between both organisations in which CTI provides the structure and know-how for thermal performance certification and ECC provides the administration to ensure consistency of the certified products and promote the certification programme in Europe. CTI’s strong international reputation and recognition supported by ECC’s solid administration guarantees a top quality effective certification programme.

CERTIFICATION PROCESS

The procedures as described in the documents “Operational Manual OM-4-2014 for the Certification of Cooling Towers” and the “Rating Standard for Cooling Towers RS 9C/001-2014” are applicable.

In accordance with OM-4-2014, the certification process starts with the application for certification. The manufacturer submits to ECC all relevant documentation for each applied product range and also declares to accept the general rules as written in the General Eurovent Certification Manual. The most important document to provide is the Data of Record (DOR) that defines technically the exact construction of the cooling equipment models to be thermally certified.

The **qualification** procedure follows a successful application. The manufacturer qualifies a product line by executing an initial thermal performance test in accordance with Eurovent RS 9C-2014 and executed by the CTI licensed thermal certification performance test agency. This rating standard RS 9C-2014 refers directly to the CTI STD201 (OM/RS) – Thermal Performance Certification of Evaporative Heat Rejection Equipment & Performance Rating of Evaporative Heat Rejection Equipment. Cooling tower lines that already are CTI-certified transpose this CTI certification into the Eurovent certifying framework. In order to guarantee exact duplication of construction of the transposed equipment, Eurovent OM-4-2014 defines a factory audit procedure: basically all DOR entries of a randomly selected cooling tower manufactured in the European facility are



audited and confirmed identically compared to the product that has been CTI-certified outside of Europe. A successful thermal performance test in accordance with CTI STD 201(RS/OM) and a successful factory audit result in a Eurovent certification.

Repetition is crucial to guarantee consistence of performance and construction. CTI STD201, and as per consequence also OM-4-2014, define an annually recurring reverification test executed by the CTI licensed thermal certification performance test agency. Positive performance test and factory audit reports result in a renewal of the Eurovent certification. However performance tests and factory audits might conclude with a less than satisfactory result. Failure treatment is therefore an integral part of OM-4-2014 and clear procedures are described on how to implement corrective measures and consequences. Failure treatment can be activated during the qualification and re-verification procedure and as a result of a customer complaint.

Failure treatment cannot be taken lightly by the manufacturer. Unsatisfactory results can bring the certification of the entire product line into question and can lead to revocation of this product line from the Eurovent Certita and CTI website and notification of the failure to the entire CTI membership and to the industry.

CERTIFICATION VERSUS INDEPENDENT FIELD TESTING

The purpose of certification is to set forth a programme to assure users of evaporative cooling equipment that all models from a product line of a specific manufacturer are thermally performing in accordance with the published ratings. The manufacturer is assured that the thermal performance testing as the basis for the certification of the product line responds to the rules of honest competition on a level playing ground. Certification does stand for voluntary participation to thermal performance testing and factory audits applying identical rules for all participating manufacturers. In order to guarantee accurate undisputable test results, all equipment utilised for an initial qualification or re-verification test shall be owned by CTI or the CTI licensed thermal certification test agency and be approved by the CTI Thermal Certification Administrator. Calibration schedules and instrument accuracies are also stipulated.

Only a limited number of CTI licensed certification test agencies have the authority to execute thermal certification qualification and verification tests. All licensed certification test agencies are carefully selected and often can count on decades of experience. They use identical procedures for thermal certification testing and all forward the thermal test results to the CTI Certification Administrator for consistent evaluation of the results.

In Europe, due to the absence of an industrywide participation to a certification programme for many years, owners and consultant used to accept manufacturer's performance declarations. In some cases testing in accordance with standards like "EN13741 Thermal performance acceptance testing of mechanical draught series wet cooling towers" is required. The use of inexperienced, non-licensed test agencies could however result in questionable results, and with undesirable statistical addition of tolerances coming from inaccurate readings taken with contestable equipment to adjust the result.

The independent thermal performance field test is mostly part of the commissioning process and therefore executed immediately after completion of the technical installation. Nevertheless, due to the nature of a building project, the cooling requirements at that stage seldom reaches design conditions. In most cases, achieving a stable operating condition is already a challenge on its own. A valid thermal performance field test, requiring stable fluid flow and process temperatures and a stable wet bulb temperature, is often challenging in the majority of situations. Tests and re-tests can be required, sometimes by an alternative test agent with different measuring equipment, techniques and know-how. On top of these challenges, a limited time slot for a good thermal performance test (typically during mid-summer) complicates it further.

On top of all of that there is the extra cost to the owner of the acceptance test for commissioning. All this demonstrates clearly the benefit of a thermal performance certification programme.

Certification of evaporative cooling equipment guarantees thermal performance prior to shipment of the equipment and at no cost for the owner! The installation of underperforming equipment is prevented and consequential costs for corrective measures or continuous payment of energy consumption penalties over the life of the equipment are avoided.

According to **Mr. Roi Wanders**, Mechanical Engineer at Jacobs Engineering in Belgium: “The importance of thermal performance certification lies in the fact that it establishes great confidence in the product and prevents distress and unexpected design flaws once the installation is being commissioned or operated by the end-user”.



CONSEQUENCES OF UNDERPERFORMANCE

A deficiency in cooling tower performance often goes unnoticed in many installations. The evaporative cooling equipment is a part of a cooling circuit, often combining multiple components. Each of the components of this cooling circuit influences the other linked components and the efficiency of the system is dependent on the strength of the weakest link.

Lack of thermal performance of the evaporative cooling equipment has a limited effect on the energy consumption of the evaporative cooling equipment itself. What is often more important is the energy consumption of the overall system which the evaporative cooling equipment serves. In a conventional HVAC cooling system for example the fan (and pump) power of the evaporative cooling equipment is small compared to the electrical power of the chiller (often by a factor of 10). Yet, the compressor power is directly related to the condensing temperature of the chiller and this condensing temperature is directly defined by the performance of the evaporative cooling equipment. The ambient temperature at which an HVAC-system can switch to free cooling also decreases. This dramatic effect of underperforming evaporative cooling equipment on the electrical power of the chiller goes far beyond the few percentage points of gain that a chiller manufacturer can offer by installing highly efficient electrical motors (as required by the EU directive 640/2009/EC). The operating cost impact is equally dramatic and results in a yearly recurring increased electricity invoice. Additionally, the tower must work harder to satisfy the expected thermal performance, resulting in the use of even more electrical power.

Depending on the application, underperformance of evaporative equipment can also lead to an increased temperature in a building. Depending on the building purpose, the consequence can be acceptable for a short period only or simply be unacceptable. Underperformance of evaporative cooling equipment for industrial application (whether or not with a chiller in the cooling circuit) can lead to significant production loss and operational danger and is usually unacceptable.

Capacity deficiencies can lead to risk for a continuous operation and are most of the time difficult to detect prior to commissioning. Most of the time, these deficiencies go undetected and are a continuous energy penalty that must be paid by the owner. Conservative assumptions in building load calculations, reduced building occupancy, off peak ambient conditions and the use of higher than design wet bulb temperatures will often cover effects of undersized evaporative cooling equipment. Yet the negative effects to the owner/end-users will remain. Oversized systems often perform poorly as compared to properly sized cooling systems.

HOW TO SPECIFY THERMAL PERFORMANCE CERTIFICATION

Thermal Performance and Efficiency:

The cooling tower shall be capable of cooling _____ l/s of water from _____ °C to _____ °C at a design entering air wet-bulb temperature of _____ °C.

The thermal performance shall be ECC certified in accordance with ECC and CTI certification standards. Equipment without ECC certification will be subject to a field or factory acceptance thermal performance test executed by a qualified independent third party testing agency in accordance with a recognized standard.

Specification Value

Certification assures the buyer that the tower is not intentionally or inadvertently undersized by the manufacturer. Certification alone is not sufficient to assure you that the tower will perform satisfactorily in a particular situation. Certification is established under relatively controlled siting conditions, as defined in manufacturer's literature, but towers are not always installed under such circumstances. They can be affected by nearby structures, machinery, enclosures, effluent from other cooling towers, etc. Designers and owners must therefore take such site-specific effects into consideration when selecting the tower in order to assure full thermal performance. The buyer must insist, on the written specification (including description of those siting conditions) that the designer/manufacturer is responsible to guarantee this "real world" performance. Nevertheless the installation of a certified product gives the owner assurance that the product itself provides the performance he has paid for. Manufacturers publish layout guidelines, installation manuals, and operating and maintenance manuals, all of which should be followed for a successful installation.

CONCLUSION AND BENEFITS OF THERMAL PERFORMANCE CERTIFICATION

Owner/End-Users are the most important partners of thermal performance certification. They decide the key-requirements of the equipment for the consultant to specify. The end-user is the provider of the capital budget and pays the monthly energy bill of the cooling system. As stipulated in the previous paragraph, the performance of the cooling tower is essential for the performance of the entire cooling system. This is a crucial factor in the evaluation of the sustainability and long term value of the real estate and industrial facilities.

Below you can find a summary that lists the specific benefits of Eurovent-CTI thermal performance certification for cooling towers and closed circuit coolers.

- **Owners and end-users:** Thermal performance guarantee of the equipment at no additional cost. Installation of equipment that is rated and evaluated on equal terms enabling honest evaluation of competing offers on a level playing ground with a 100% thermal capacity return for the investment.
- **Government, EU regulators:** Reliable independent basis for the efficiency evaluation of the energy using product. Full scale programme accessible for all manufacturers in a global market.
- **Design engineers:** Reliable standards to specify and avoid deficiencies attributed to the design of the cooling system. Similar as for the owner/end-user, thermal performance certification is a key decision making factor that guarantees honest comparison of suppliers at no additional cost for the owner/end-user.

- **Contractors:** No costly call back due to capacity deficiencies. Exclusion of capacity doubts for the certified components in case of cooling system under performance due to third party issues. Basic requirement to build relationships with trustworthy suppliers.
- **Cooling tower manufacturers:** Honest competition based upon standards established by evaporative cooling experts resulting in faster product development and sustainable innovation.

Thermal performance certification is a basic element of a successful, sustainable design and offers significant benefits to all segments of the industry.



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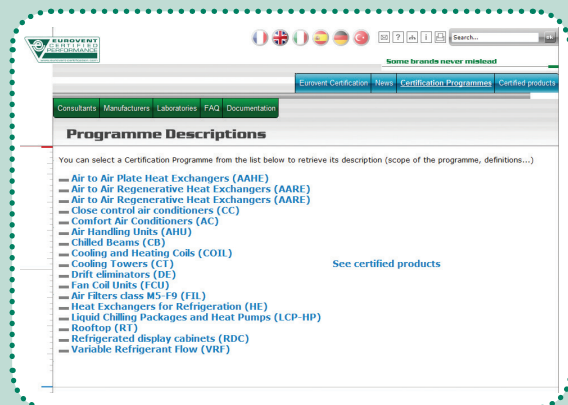
Eurovent is Europe's Industry Association for Indoor Climate, Process Cooling, and Food Cold Chain Technologies. Its members from throughout Europe, the Middle East and Africa represent more than 1.000 companies, the majority small and medium-sized manufacturers. Based on objective and verifiable data, these account for a combined annual turnover of more than 30bn Euros, employing around 150.000 people within the association's geographic area. This makes Eurovent one of the largest cross-regional industry committees of its kind. The organisation's activities are based on highly valued democratic decision-making principles, ensuring a level-playing field for the entire industry independent from organisation sizes or membership fees.

Eurovent's roots date back to 1958. Over the years, the Brussels-based organisation has become a well-respected and known stakeholder that builds bridges between manufacturers it represents, associations, legislators and standardisation bodies on a national, regional and international level. While Eurovent strongly supports energy-efficient and sustainable technologies, it advocates a holistic approach that also integrates health, life and work quality as well as safety aspects. Eurovent holds in-depth relations with partner associations around the globe. It is a founding member of the ICARHMA network, supporter of REHVA, and contributor to various EU and UN initiatives.

The main objective of the **Eurovent Certita Certification** (ECC) programme is to certify cooling equipment (and/or components) independently from Eurovent Association. ECC has its own dedicated Technical, Marketing, Sales and Legal department and is structurally independent from Eurovent Association. Eurovent Certita Certification is widely established and well known in the European Cooling industry and defends a strong position of being a credible well organized and trustworthy partner



focusing on a mutual European approach establishing a level playground amongst all players on the European market. Currently, 17 performance certification programs are active and monitored by dedicated auditors and program managers.



Eurovent Certita Certification established the first cooling tower certification programme during the early 90's. The Eurovent 9.2 manual "Thermal Performance Acceptance Testing of Mechanical Draught Standardized Water Cooling Towers" was created by all main cooling tower manufacturers in Europe at that time. However, the program suffered from lack of participation and did not succeed to gain leverage in the market. At the beginning of 2012, ECC has established its new certification programme for Evaporative Heat Rejection Equipment in collaboration with CTI. The programme is in its 3rd year with manufacturer participation covering a substantial percentage of the European market.

For additional information of the Eurovent Certita Certification programme for Cooling Towers, visit www.eurovent-certification.com website or contact Mr. Ian Butler MSc. (ECC Programme Manager for Cooling Towers).

COOLING TECHNOLOGY INSTITUTE (CTI)

The Cooling Technology Institute (CTI) is a nonprofit, self-governing technical association of manufacturers, suppliers, owners, operators and designers. Membership is open to all parties with an interest in heat rejection technology. Among CTI's stated objectives are a dedication to the advancement of technology, design and performance of heat rejection equipment, the prevention of water and air pollution, and the conservation of water as a natural resource.



CTI was founded in 1950 and has provided a medium of information and data exchange among manufacturers and users of Evaporative cooling equipment and associated products for over sixty years. CTI meets semi-annually to conduct business, technical paper presentations and advance committee work on CTI guidelines, standards, codes, and white papers. It also develops standardized testing codes and standards and engages in and supports research. A key objective of CTI has been to establish and promulgate the use of codes, standards, and specifications aimed at obtaining uniformly good quality in heat rejection technology.

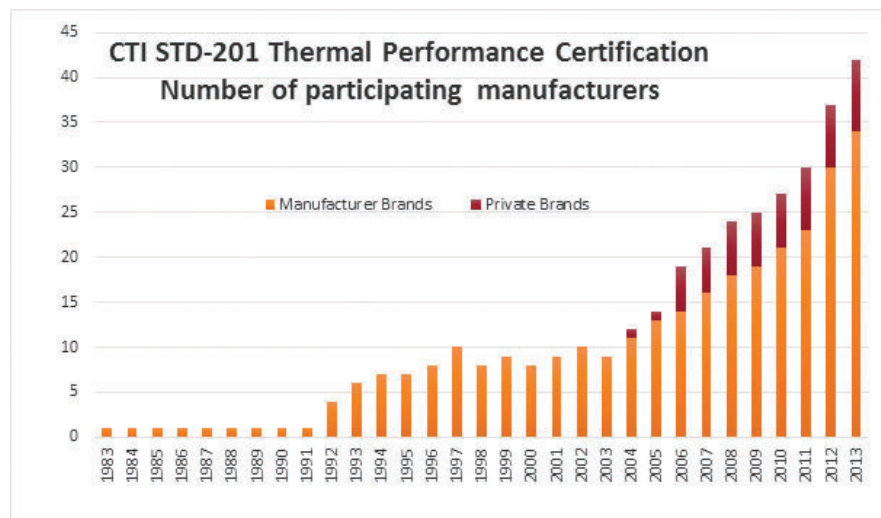
For over sixty years, the CTI also provided cooling tower performance testing services to members and non-members. Starting in January 1993, the CTI has provided these testing services through multiple testing agencies, each examined, qualified, and licensed by the CTI to conduct such tests. The documents establishing the program, and under which it currently operates, are developed by a task force under the auspices of the CTI Board of Directors.

The mission of CTI is to advocate and promote the use of environmentally responsible Evaporative Heat Transfer Systems (EHTS), cooling towers and cooling technology for the benefit of the industry by encouraging education, research, standards development and verification, government relations, and technical information exchange

CTI Objectives:

- Maintain and expand a broad-base membership
- Identify and address emerging and evolving issues
- Encourage and support cooperative research
- Assure acceptable minimum quality levels and performance
- Establish standard testing and performance analysis systems and procedures
- Communicate with and influence governmental entities
- Encourage and support forums and methods for exchanging technical information

CTI published their first STD-201, the "Certification Standard for Commercial Water Cooling Towers" in 1962. Later this standard became the "Standard for Thermal Performance Certification of Evaporative Heat Transfer Equipment". The latest revision created an OM & RS as mentioned previously. Initially, this standard described an extensive matrix of tests to qualify. Similar to the first Eurovent Cooling Tower Certification program, the initial CTI program also required substantial resources that many manufacturers could not justify. After a period of evaluation and revisions of STD-201, the participation to the program started in 1981. The program started to grow significantly from 1992 onward as seen in the graphs. Currently, 34 manufacturers and 8 private brands are listed with one or more CTI certified product lines.



For additional information on the CTI, visit www.cti.org or contact Mrs. Virginia A. Manser, CTI Administrator at vmanser@cti.org

WWW.EUROVENT-CERTIFICATION.COM



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