Int J Thermophys (2007) 28:2155–2163
DOI 10.1007/s10765-007-0243-6

# EVITHERM: The Virtual Institute of Thermal Metrology

**J. Redgrove · J.-R. Filtz · J. Fischer · P. Le Parlouër · V. Mathot · P. Nesvadba · F. Pavese**

Published online: 22 August 2007


**Abstract** Evitherm is a web-based thermal resource centre, resulting from a 3-year project partly funded by the EU's GROWTH programme (2002–05). Evitherm links together the widely distributed centres of excellence (NMIs, research and teaching institutes, consultants, etc.) and others concerned with thermal measurements and technology to provide a focal point for information exchange and knowledge transfer between all these organizations and industry. To facilitate the quick and easy flow of thermal knowledge to users of thermal technologies, evitherm has a website (www.evitherm.org) through which it disseminates information and by which it also provides access to resources such as training, property data, measurements and experts. Among the resources available from the website are (1) thermal property

J. Redgrove (✉)
National Physical Laboratory, Hampton Road, Teddington, Middlesex TW11 0LW, UK
e-mail: john.redgrove@npl.co.uk

J.-R. Filtz
Laboratoire National de Métrologie et d'Essais, Paris, France

J. Fischer
Physikalisch-Technische Bundesanstalt, Berlin, Germany

P. Le Parlouër
Thermal Consulting, Caluire, France

V. Mathot
SciTe BV, Geleen, The Netherlands

P. Nesvadba
Rubislaw Consulting Ltd, Aberdeen, Scotland

F. Pavese
Istituto Nazionale di Ricerca Metrologica, Torino, Italy

data—offering access to some of the world's leading databases; (2) expertise—evitherm has a database of consultants, an Advice line, a public Forum and a unique Consultancy Brokering Service whereby users are linked to the expert they need to solve their thermal industrial problems; (3) industry resources—thermal information for particular industry sectors; (4) services—information directories on thermal property measurement, training, equipment supply, reference materials, etc.; (5) literature—links to books, papers, standards, etc.; (6) events—conferences, meetings, seminars, organizations and networks, what's happening. A user only has to register (for free) to gain access to all the information on the evitherm website. Much of the thermal property data can be accessed for free and in a few cases we have negotiated affordable rates for access to some leading databases, such as CINDAS, THERSYST and NELFOOD. This article illustrates the aims and structure of the evitherm Society, how it is directed, and how it serves the thermal community worldwide in its need for quick and easy access to the resources needed to help ensure a well resourced industrial work force and clean and efficient thermal processes.

**Keywords** Evitherm · Knowledge transfer · Measurement technology · Thermal processes · Thermal resources · Website

## 1 Introduction to Evitherm

Evitherm, the Virtual Institute for Thermal Metrology, is a web-based thermal resource centre, resulting from a 3-year project [1,2] in the EU GROWTH programme. The aim of evitherm is to improve the uptake of good thermal practice in industry by ensuring that appropriate temperature and thermophysical properties information and expertise are readily available and easily accessible to industrial and research organizations, both large and small. To achieve this, evitherm has a website (www.evitherm.org) and associated dissemination mechanisms which help to ensure that evitherm:

- is an authoritative thermal knowledge transfer focal point
- disseminates new thermal measurement techniques and best practice
- provides a forum for interchange of ideas & knowledge
- identifies the thermal needs and capabilities of users
- facilitates collaborative R&D projects between users
- enables feedback on the needs of industry to assist governments and other funding bodies in formulating their measurements and standards programmes.

The part-EC funded project to create evitherm was coordinated by the National Physical Laboratory (NPL) and involved four other Principal Contractors—namely PTB, LNE and INRIM, the National Metrology Institutes of Germany, France and Italy, respectively, and the Austrian Research Centers, Seibersdorf. In total, 40 organizations, including universities, other centres of technical excellence and SMEs from 12 European nations, signed up to participate in the project.

Towards the end of the EC project, a company was created—the evitherm Society—to ensure that evitherm would be able to continue beyond the lifetime of the EC project as an independent self-financing entity. The evitherm Society, a not-for-profit company limited by guarantee, was formed in July 2005.

**Table 1** Evitherm (the virtual institute) is run by the evitherm Society, a not-for-profit company that has a committee of officers and members to manage and develop evitherm

| Management committee officers & members | Organization |
|---|---|
| President: John Redgrove | National Physical Laboratory, Teddington, UK |
| Vice-president: Joachim Fischer | Physikalisch-Technische Bundesanstalt, Berlin, Germany |
| Vice-president: Franco Pavese | Istituto Nazionale di Ricerca Metrologica, Torino, Italy |
| Secretary: Jean-Rémy Filtz | Laboratoire National de Métrologie et d'Essais, Paris, France |
| Treasurer: Paul Nesvadba | Rubislaw Consulting, Aberdeen, Scotland |
| Member: Pierre Le Parlouër | Thermal Consulting, Caluire, France |
| Member: Vincent Mathot | SciTe Consultancy, Geleen, Netherlands |
| Member: Guenther Neuer | IKE-University of Stuttgart, Stuttgart, Germany |

The Society has a General Assembly of members (comprising about 40 organizations), with voting rights, that defines the direction and objectives of the Society; and there are officers and a management committee responsible for day-to-day operation (Table 1).

## 2 Evitherm Resources

There is a range of information directories and services available from the evitherm website. Chief among the resources available are the following.

### 2.1 Technical and Industry Pages of the Evitherm Website

At the heart of the evitherm website there are five technical areas (which reflect the titles of the technical working groups of the evitherm project consortium) having the following titles (Fig. 1):

*Temperature*
*Conductivity and diffusivity*
*Thermal analysis and calorimetry*
*Emissivity and IR optical*
*Expansivity and density*

Each of these technical areas has a collection of sections with the following headings:

Applications
Consultancy
Definitions & qualifiers
Equipment suppliers
Events
Influencing factors
Literature
Measurement good practice
Measurement methods

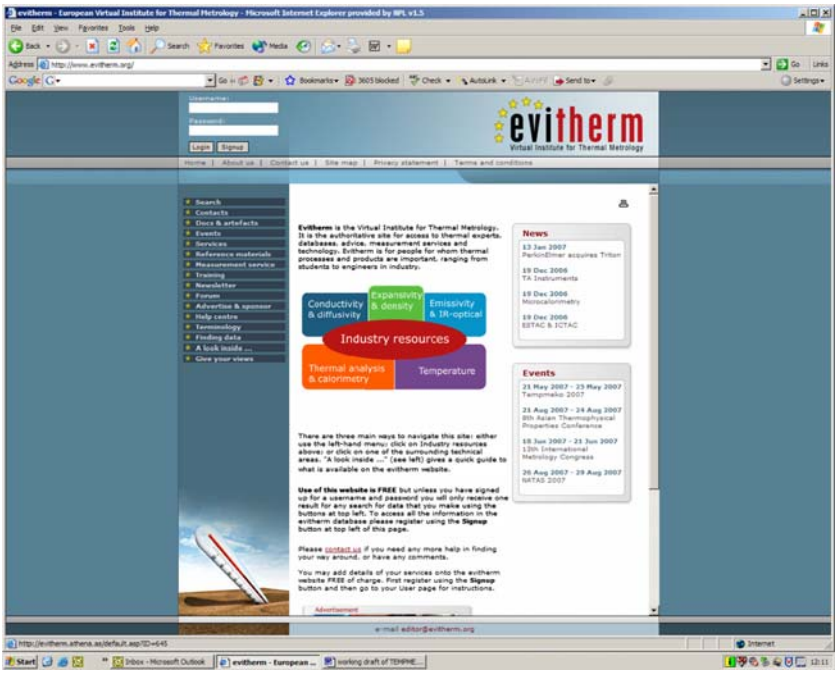


**Fig. 1** Home page of the evitherm website (www.evitherm.org) with hot links to the technical and *Industry resources* areas of the website and, in the left-hand menu, access to data search functions and other resources

Measurement services
Physical principles
Possible problems and solutions
Projects
Reference materials
Training
Units and conversions

Each of the sections with the above headings has some brief comments from the evitherm project team and a sample of content from the evitherm data directories. For instance, one could start at the technical heading *Conductivity and diffusivity* (Fig. 2) and then go to *Measurement services* to see a brief list of thermal conductivity and thermal diffusivity measurement services (not just in Europe but elsewhere). As with all the other technical sections on the website, this will display an illustrative collection of information from one of the evitherm data directories and a much fuller listing can be provided by using the general *Search* or other data search tools (e.g. *Training* or *Measurement service*) listed in the left-hand menu of the website. The content of all these data directories is free—the user only has to register to have full and free access to all the data in the directories.

In addition to the five technical areas above (*Temperature*, *Conductivity and diffusivity*, etc.) there is also an area entitled *Industry resources* and, like the technical areas,

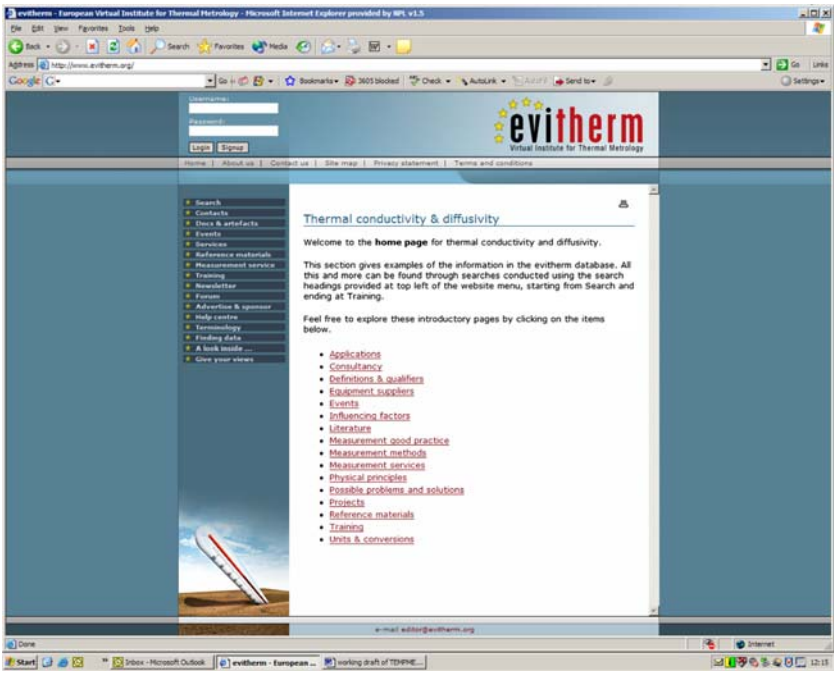


**Fig. 2** Home page of the *Thermal conductivity & diffusivity* technical area of the evitherm website, with headings of the various sections dedicated to this technical area

this has a collection of sections—in this case industry sectors—with the following titles:

Aerospace
Biotechnology
Ceramics, glass, refractory materials
Chemicals
Construction (including building materials)
Cryogenics
Electronics, IT, Telecommunications
Food
Medical
Metals
Nuclear
Petrochemical, fossil fuels
Pharmaceuticals
Plastics, composites
Precision engineering and optics
Raw materials, minerals
Rubber and elastomers
Temperature measurement and control
Transportation (automotive, railways)
Waste treatment (incineration, recycling)

Each of the above industry sectors has a collection of sub-sections with the following titles:

Case studies
Consultants
Industry guides
Organizations
Projects
Temperature measurement
Thermal property data
Useful links (modelling, safety, quality, training, reference materials)

Having a list of industry sectors allows a user to approach the website from his or her particular industry sector. So, for instance, someone from the food industry can take the route *Industry resources* > *Food* > *Consultants* to find a list of consultants specializing in food. Again, this will show an illustrative collection of information that can be found through the evitherm website and a fuller listing is available using the data search tools accessible from the left-hand menu of the website.

## 2.2 Information Directories

As explained above, evitherm has a number of data directories and search headings with which to access the data available from the evitherm website. For instance, there is a completely general *Search* but also more specific search headings such as *Contacts*, *Measurement service*, *Training* and others whereby users can look up the data they need, with or without qualifiers, such as language, or temperature range when seeking a measurement service. All of these data search routes are available from the left-hand menu of the website.

Examples of the types of data that users may find in the evitherm databases are:

*Contacts*: consultants, institutes, organizations, equipment supplier, etc., that can provide the product or service required by the user, and these can be found in the region and language of interest to the user

*Documents and artifacts* : books, scientific papers, standards, journals, trade magazines, websites, etc., including artifacts such as software or reference materials. This could be helpful, for instance, to a person new to the field, who wishes to quickly become acquainted with the subject of interest

*Events*: conferences, meetings, seminars; what's happening and what organizations and networks can be joined

*Training*: various training options, either tailored for individual users or as advertised, including (downloadable from the evitherm website) a free thermal analysis course from Professor Wunderlich, a leading expert in the field

*Measurement services*: calibration, temperature measurement and thermal property measurement services. The user can search by property, temperature range, measurement method, country, and other criteria

*Reference materials*: materials that have well characterized properties, and can be used to assess the performance of measurement apparatus or to compare measurement capabilities. These can be searched by property, reference material title or other criteria.

Searches through the databases can be narrowed, if required, according to the language, geographic location, temperature range (for measurement services), thermal property, service type (e.g. measurement, consultancy or equipment supply), and other qualifiers. Typically, the data search results are accompanied with notes from members of the evitherm project team and these are designed to give further help to the user.

## 2.3 Thermal Property Data

Thermal property data are vital for engineering design and other applications where the storage and flow of heat is important—which applies to most of industry—and so it was recognized early in the evitherm project that free or affordable access to thermal property data would be important to users. So evitherm has provided links to a number of thermal property databases, many of which are free. However, in addition, specially low rates have been arranged for evitherm users to access some of the world's leading online thermal properties databases, namely:

*EVITHERM*: based on the *THERSYST* database developed at IKE, University of Stuttgart, and now available online for the first time only through the evitherm website (Fig. 3)

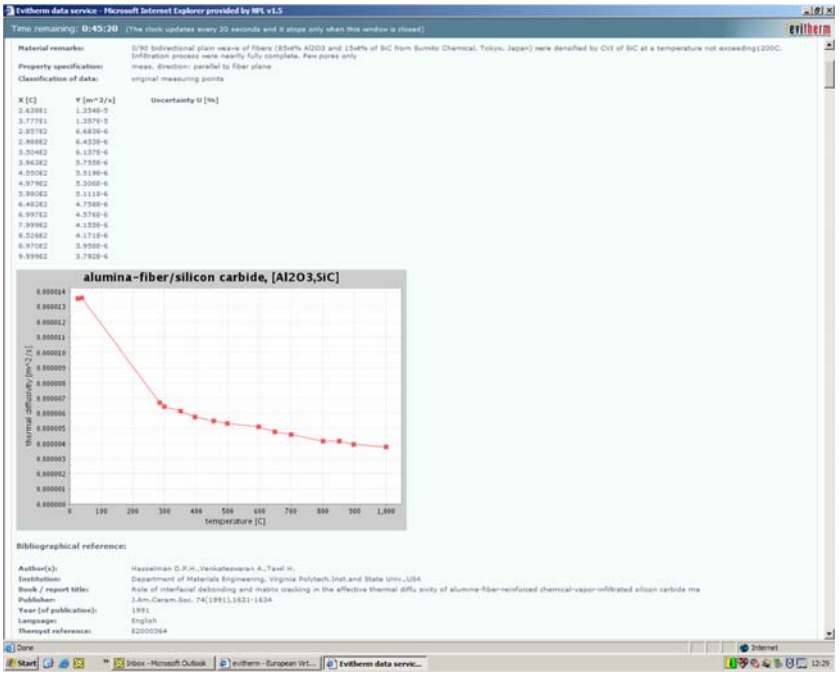


**Fig. 3** Thermal property data can be obtained from the evitherm website. The figure shows a dataset from evitherm's own database, which is based on the *THERSYST* database developed at IKE, University of Stuttgart. Access can also be obtained to *CINDAS*, *NELFOOD*, *ATHAS* and other thermal property databases

*CINDAS*: an engineering materials data source normally available only by annual subscription or on CD-ROM but now uniquely available from evitherm at an affordable hourly or annual rate

*NELFOOD*: a specialist foods database hosted by the National Engineering Laboratory, Scotland

Although the above are pay-for-access (though by the hour and not the usual annual subscription) most of the property databases listed on the evitherm website are free and downloadable direct from the supplier websites.

In addition to providing the numbers, there is information provided on the evitherm website by the evitherm team on how to choose and interpret the thermal property data that users may find. The relevance of property data to the proposed *application* is an issue that is often not appreciated by users, and the team has provided comments listed according to material type—such as food, glasses, insulation materials, metallic alloys, polymers—and thermal property, e.g., thermal conductivity or emissivity. There is also guidance on what to do when data cannot be found on the material of interest, which is a common experience.

And finally there is a data mask whereby users may submit data (e.g. from the literature or from their own laboratory) for consideration for entry into the evitherm thermal property database. This can be done separately or in parallel with publication—journals often do not have the space to publish all the property data submitted by authors and so it is useful to be able to enter all the thermal property data into the evitherm database for ready access by would-be users of the data.

## 2.4 Help and Support

In addition to the directories of consultants, service providers and other resources, the website has a *Help centre* providing a number of ways to help the user find the information or assistance needed:

*FAQs*: *Frequently asked questions* provides answers to a number of common queries

*Public forum*: users may post their questions publicly and anyone may post an answer

*Advice line*: whereby users may type in their questions for answers by the evitherm project team, the correspondence can be private if required

*Evitherm consultancy service*: not all enquiries can be answered by email or in a public forum setting. Sometimes a personal consultancy is needed. Evitherm has developed a consultancy brokering scheme that brings together an enquirer with an expert or consultant who speaks their language, is in their geographic region, and understands their needs. The experts may or may not be members of the evitherm team, and there is a form provided on the website whereby people from outside the evitherm project team may apply to become an expert providing consultancy for evitherm users who require that kind of support.

In addition to the above forms of assistance, there is an e-newsletter that can be received for free by anyone who registers interest in receiving it. This keeps people up to date on developments and the services and other resources available from evitherm.

## 3 Next Steps for Evitherm

The 3-year project to set up evitherm ended in 2006 and so evitherm is now self-supporting, achieving its funding through sale of advertising (e.g. links from hot-linked logos of service providers), sponsorship and membership fees of the evitherm Society. Members of the Society's Management Committee perform day-to-day running of evitherm, and the Society's members, comprising officers and members of the Society meet annually to give strategic steer for evitherm's development.

Evitherm, as a worldwide thermal resource centre, has the potential to bring together the widely distributed resources—namely, the experts, databases, training, measurement services and other resources—that will assist people in industry, in particular, to gain quick and easy access to the things they need to help them be effective and efficient in applications concerned with heat and temperature.

**Acknowledgments** Development of evitherm was funded jointly by the evitherm project member organizations and by the EC Competitive and Sustainable Growth Programme, Project No. GTC1-2002-73009, 30 September 2002.

## References

1. The European Virtual Institute for Thermal Metrology, EC Competitive and Sustainable Growth Programme, Proposal No. GTC1-2002-73009, 30 September 2002
2. J. Redgrove, in: *Proceedings of the XVII IMEKO World Congress: Metrology in the 3rd Millennium*, Dubrovnik, Croatia, 2003
3. J. Fischer, J. Seidel, J. Hollandt, E. Tegeler, in *Proceedings of the Temperatur 2003*, VDI-Berichte 1784, S. 201–206, Berlin, Germany, 8–9 September 2003
4. J. Redgrove, P. Le Parlouër, G. Della Gatta, *Evitherm Workshop at the ICTAC (International Conference for Thermal Analysis and Calorimetry) Conference*, Chia Laguna, Italy, 2004
5. J. Fischer, in *Proceedings of the 19th International CODATA Conference, The Information Society: New Horizons for Science*, Berlin, Germany, 7–10 November 2004
6. G. Neuer, J. Redgrove, D. Talebi, in *Proceedings of the 17th European Conference on Thermophysical Properties*, Bratislava, Slovakia, 5–8 September 2005
7. F. Pavese, in *Proceedings of the International Workshop on Combining and Reporting Analytical Results*, Rome, Italy, 6–8 March 2006
8. J. Fischer, J. Seidel, S. Rudtsch, D. Talebi, in *Proceedings of the Temperatur 2006*, ISBN 3-9805741-7-2, Berlin, Germany, 16–17 May 2006
9. F. Pavese, in *IIF/IIR-CryoPrague Conference*, Prague, July 2006
10. M. Houška, P. Nesvadba, Z. Mayer, J. Texture Stud. **32**, 155 (2001)
11. P. Nesvadba, M. Houška, W. Wolf, V. Gekas, D. Jarvis, P.A. Sadd, A.I. Johns, J. Food Eng. **61**, 497 (2004)