

## Germany

### Member of ICHMT, AIHTC, EUROTHERM

#### (1) Overview

(Central European Time Zone, CET: UTC+1 (winter) and UTC+2 (summer), Population: 83.2 million)

#### 1. Major Societies

The largest and leading engineering network in Germany is the VDI – The Association of German Engineers (Verein Deutscher Ingenieure). It has approximately 150.000 personal members from all engineering disciplines in all professional functions including students, scientists, and engineers in industry. It serves as a knowledge and competence platform for new technologies and technical solutions. The VDI comprises 12 professional sub-societies which host a large number of working groups addressing specific topics. The most relevant sub-societies for thermal sciences and engineering are: (i) Energy and Environment, (ii) Process and Chemical Engineering (GVC). ‘Energy and Environment’ hosts a working group *Thermodynamics* with elected members from academia and industry. It is closely collaborating with DECHEMA, an independent expert society for chemical engineering and biotechnology in Germany with about 5.800 members. VDI-GVC and DECHEMA jointly initiated and run PROCESSNET, a professional platform for process engineering, chemical engineering and technical chemistry. PROCESSNET hosts several subject divisions among which *Heat and Mass Transfer* and *Thermodynamics* are the most relevant to thermal science and engineering.



#### 2. Major Meetings

On a national level, major meetings related to thermal science and engineering are

- the joint annual meeting ‘Thermodynamics’ of the above mentioned VDI working group and ProcessNet subject division,
- the annual meeting ‘Heat and Mass Transfer’ of the above mentioned ProcessNet subject division.

#### 3. Major Journals and the VDI Heat Atlas

Formerly Springer published a journal entitled ‘Wärme- und Stoffübertragung’ with papers also in German. Since 1995 this journal is publishing under the title ‘Heat and Mass Transfer’ with papers in English only.

For more than 50 years now, the VDI-Wärmeatlas (VDI Heat Atlas) is established as an indispensable working tool for German engineers in industry and academia dealing with heat transfer issues. Today it is published by Springer Publishing Company. More than 60 authors present state of the art calculation methods in different chapters on all topics relevant for the design of technical apparatus and plants, e.g. in process and power engineering. The 12th German edition (VDI-Wärmeatlas) was published in 2019, the 2nd English edition (VDI Heat Atlas) in 2010.



#### 4. University System and Engineering Education

Germany has a system with two types of universities: (i) Universities of Applied Sciences (formerly called Fachhochschulen), (ii) Universities. Universities of Applied Sciences are mainly focused on

engineering subjects and educate their students more towards application-oriented professionals. Universities address the full range of academic professions and educate their students more towards science-oriented professionals.

The course programs are subdivided according to the Bachelor level and Master level. The Bachelor degree typically needs 3 years of full-time studies, the Master degree another 2 years.

The academic degree ‘Dr.-Ing.’ is awarded after successful research studies and examination by all Universities and some Universities of Applied Sciences. In engineering science, doctoral candidates are typically employed in nonpermanent full-time positions as junior scientists by their institutions. The typical duration is 3 to 5 years. Apart from their research studies they quite often also assist approximately 2 hours per week in teaching, e.g. by supervising student exercise classes.

Quite atypical in comparison to international customs, professors in engineering sciences in Germany are relatively often appointed back to the university from positions in industry. At Universities of Applied Sciences this practical experience is even a prerequisite for an appointment.

#### 5. Foundations of Scientific Research

The German Research Foundation (DFG) is the main organization funding basic research in Germany. Researchers can apply with individual proposals as well as with joint proposals for collaborative research. Proposals are always peer-reviewed, before the DFG committees make a final decision.

Several ministries, e.g. the Federal Ministry of Education and Research or the Federal Ministry of Economic Affairs and Climate Action, have their funding programs focusing on more application-oriented research.

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