

# Registration of Ground Engineering Professionals – A European Perspective

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**ABSTRACT:** Registration of professionals involved in ground engineering including the disciplines of soil mechanics, rock mechanics, geo-environmental science and engineering geology has slowly evolved over the past decade. The paper discusses the history and current status of national registration systems in Europe. The variation in attitudes and legal implications for national registration within Europe is large and some discussion contrasting the various systems, traditions and experience to date is presented. The potential advantages to be gained from ultimately gaining adoption of a “common platform” as a legal definition consistent with the European Directive 2005/36/EC on Recognition of Professional Qualifications are outlined. Lastly, the anticipated development of an Informative Annex to the revised Eurocode EN1997 (expected to be formally adopted after 2020) is described. Member countries of CEN may each choose to adopt or ignore the Informative Annex.

**RÉSUMÉ:** L'inscription des ingénieurs professionnelle qui est impliquée dans l'ingénierie, y compris, les disciplines, la mécanique des sols, la mécanique des roches, et les sciences géo-environnementales a lentement évolué durant la dernière décennie. L'article examine l'histoire et l'état actuelle du système de l'inscription en Europe. Les variations dans l'attitude et les implications légales pour l'inscription en Europe sont vaste et quelques débats font la comparaison entre les divers systèmes, les traditions et les expériences jusqu'à ce jour sont présentés. Le potentielle des avantages pour profiter d'une ultime adoption d'une plate-forme commune avec une définition cohérent et légal de la directive Européen 2005/36/EC sur la reconnaissance des qualifications professionnelle sont aussi résumés. Dernièrement le développement anticipé d'une annexe d'information du code Européen modifié en 1997 (l'adoption de laquelle officiellement attendu en 2020) est décrite. Les pays membres de C.E.N. Peuvent choisir ou ignorer l'annexe.

**Keywords:** Professional, Registration, Competencies, Common platform, Eurocode 7.

## 1 INTRODUCTION

Registration of professionals involved in ground engineering including the disciplines of soil mechanics, rock mechanics, geo-environmental science and engineering geology has slowly evolved over the past decade.

Several countries in Europe either currently operate or are actively considering and developing national registration systems. Around 13 European member societies of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) currently participate in a working group formed following

the ECSMGE held in Edinburgh, Scotland in 2015. The working group has convened two workshops in Leuven, Belgium in 2016 and in Oslo, Norway in 2017, each attended by 10 European member societies and their activities are the primary focus of this paper.

Previous attempts have been made to unify professional qualifications and competence standards in ground engineering both in Europe and internationally. A Joint European Working Group (JEWG) was commissioned by the three international professional bodies IAEG, ISRM and ISSMGE, who set terms of reference in 2003. The JEWG Report (2008) identified a “common scientific and professional platform” of the disciplines of soil mechanics, rock mechanics and engineering geology.

## 2 NEED AND OBJECTIVES OF REGISTRATION

Given the critical role of ground engineering professionals in the planning, design and construction of major infrastructure, industrial, mining, commercial and residential development in the modern world, it is readily apparent that the interests of both public safety and the minimisation of economic losses from failure are served by having qualified and competent persons perform these services. VanDine (2016) argues that current self or peer opinion regulated practices are no longer adequate for a global marketplace where professionals practice in many jurisdictions.

ISSMGE TC304-TF3 (2013) Risk Management reported the top six recommendations for integrating geotechnical and project risk management. Four of these could be directly supported or enhanced by registration systems requiring minimum education, communication and risk management skills and continuous education standards.

The proposed remedy for this is to define the core knowledge and skills that a Chartered Professional Engineer (Geotechnical) is expected

to have and to inform the competence assessment process used by the Registration Authority.

The main beneficiaries of introducing a common international consensus for national registration of Ground Engineering Professionals as suggested by VanDine (2016) could be divided into three categories: society as a whole; the construction industry; and the individual engineer or geologist.

For society, a well developed and adequately regulated system to enforce registration of the responsible professional, ensures a minimum level of competence within the project to protect public safety and minimise economic losses.

For construction and professional consulting firms that employ such professionals, it is necessary that there is some tangible return if they invest time and money in their employees by supporting them to get continuing education and experience to fulfil the requirements of registration. This return only occurs if clients use registration as one of the evaluation criteria in the tender process and it would inevitably lead to an increased interest in education and competence within the relevant professions. Requirements for specialist registration in the tender could also promote competition on an equal basis, where less competent companies with inexperienced professional staff would have reduced possibilities to win.

For the individual engineer or geologist, registration would be a recognition of their competence that would open up opportunities to work not only in their own country but also abroad.

A common objection voiced by professionals and by wider society is that specialist registration of ground engineering is inherently protectionist and anti competitive. The authors’ personal view and typical response is to point out that many failures in ground engineering have resulted from the activities of non-specialist professionals who have become involved in ground investigations, geotechnical designs and construction in challenging or complex ground conditions for which they have inadequate training and

experience (Bracegirdle, 2017). There is however acknowledgement that simple, non complex ground conditions can be adequately addressed by non specialist professionals with sufficient experience in and knowledge of the local geologic conditions. These projects and conditions would generically all fall within Geotechnical Category 1 of EN1997-1.

Another issue that is often voiced is the difficulty to find qualified persons that could evaluate the applications for registration. On what bases are these persons selected and by what right may they evaluate the experience and competence of their peers? From the authors' point of view, this difficulty is mainly an issue in the initial start-up phase of a registration system and in the training of assessors. It should be recognised that it might be beneficial to make the introduction of a system a process, avoiding initially introducing a mandatory registration, but this approach cannot be applied in all countries where differing legal standards apply.

### 3 CURRENT STATUS

The characteristics of current and proposed or draft registration systems in 8 European states are summarised in Table 1 under the general column headings of Professional Designation, Education, Experience, CPD (Continue Professional Development) and Legal Status. A map showing the current status of these countries is shown in Figure 1.

In the UK the Register of Ground Engineering Professionals (RoGEP) has been operational since 2011 and currently has circa 590 members. The three tier UK RoGEP system aims to be broadly inclusive of all ground engineering professionals and is voluntary. Registration is not a mandatory requirement of any public or statute law, but it can be made a stated requirement in contracts for professional services. RoGEP is user driven by the professions and their clients and adaptable to new demands whether coming from regulatory change or industry.

Chartered status is the common entry point to join RoGEP for ground engineering professionals of all disciplines. Each candidate is assessed for their activity and level of responsibility in six areas; innovation, technical solutions, integration, risk management, sustainability and management. Three levels of registration were formed, the lowest (Professional) is suitable for those just chartered who, under direction, can perform and manage as required. As experience is gained so the management role increases and the second level (Specialist) can be gained; this would typically be held by those in middle-management. Those that eventually become responsible for highly complex projects including all the risks associated with them will be recognised as the highest grade (Adviser).

The single tier German system developed by the German Geotechnical Society (DGGT) is being introduced incrementally into the public law of individual states within the Federal Republic since 2013. It is currently adopted in 2 states (North Rhine Westphalia & Berlin) and is actively in negotiation in Bavaria but has a low uptake to date of 60 members due to its very recent promotion. The German system is primarily focussed on defining the minimum competence to meet the specific requirements of EN 1997 and is a mandatory requirement of state law in those jurisdictions that have formally adopted it. There is also an existing higher tier of Checking Expert in Germany who is separately registered through the Federal Chamber of Engineers.

This same contrast in focus on either geo-engineering at large or the more specific requirements of EN1997 and the use of mandatory public law versus voluntary private (contract) law is reflected in the diverse cultural, professional organisational, and legal practices of the other European countries. Austria has a mandatory single tier system which operates in tandem with other civil engineers with a broad focus on geo-engineering at large while FYR Macedonia operates a mandatory 2 tier system focussed on EN 1997 and mining engineering. In

terms of developing registration systems, Ireland has achieved this by means of the mutually agreed expansion of RoGEP in 2018 and the Netherlands is adopting a 3 tier system which closely resembles RoGEP. Belgium has developed a 2 tier draft system but is a little further from formal adoption.

Although there is some general interest elsewhere in Europe, other states have not yet developed draft systems for ground engineering specialists. Finally, there are countries such as France and Norway with little interest in the professional registration of individuals, primarily because professional competence is traditionally addressed in those states by the registration of companies or organisations.

Educational qualifications are stated in terms of ECTS credit points and a distinction is frequently made between B Sc or B Eng and M Sc or M Eng level degrees, with geotechnical core subjects also being required as a part of university studies. Professional experience is usually defined in terms of minimum years of post graduate experience and varies with the level of degree obtained and in terms of the Geotechnical Complexity of the project for those national registration systems with focus on EN 1997 (eg. Belgium, Germany, FYR Macedonia). Minimum requirements for Continuing Professional Development (CPD) are frequently mandatory, although the type of activities acceptable as CPD is not always well defined or consistent between the various systems. Competence requirements vary greatly and are not included in Table 1 due to space limitations. The application process for registration is also quite variable between states, sometimes relying of self assessment but more typically an independent body assesses the individual's competence following a formal submission.

#### 4 COMMON PLATFORM

The objective of EU Directive 2005/36/EC is to facilitate the mobility of EU citizens in the

single market by defining a set of rules allowing professionals qualified in one Member State to exercise their profession in another. An evaluation of the functioning of the rules was published by the EU (2011) which acknowledged that the most benefits to date have been derived by mutual recognition in health, architecture, teaching, social / cultural professions and craftsmen. The variation in engineering disciplines and national organisations between Member States resulting in significant differences in duration and content of training was cited as a difficulty in applying the regulation. Engineering organisations also concluded that the complexity of implementing a common platform was simply too great.

A “Common Platform” is defined by the Directive as a set of criteria such as training, adaptation periods, aptitude tests, professional practice, or combinations which compensate for variations in individual state practices. No common platform has yet been achieved for the engineering profession within the EU. The common platform can be initiated by a Member State or by professional organisations representative at national and European level and requires two-thirds of EU member states to agree i.e. 18 states from a total of 27 EU states (following the planned UK departure in 2019). An inventory of legal situations is required in two-thirds of EU states. Table 2 is a draft of a common platform developed by the ISSMGE working group which tries to reach a common basis for minimum professional competence within ground engineering. One of the agreed minimum target competencies in developing this common platform was to be able to develop a Ground Investigation Report (GIR) or Geotechnical Design Report (GDR) for a Geotechnical Category 2 project within the meaning of EN 1997.

There has been broad agreement following much discussion within the group on the minimum educational qualifications, duration of post academic experience, CPD and application requirements.

Table 1. Registration of Ground Engineering Professional – overview of national systems [updated at workshop in Oslo, 2017]

Country	Professional Designation	Educational qualification	Professional experience	CPD	Remarks Registration Legal Status (p) = under private (contract) law (P) = under Public Law (see NOTE 4)
Austria	Registered Engineer (“Ziviltechniker”) (geo-engineering at large)	Master in Civil or Mining Engineering or Natural Sciences	3 years	3-week course & examination on law, tech.standard and management	(P) mandatory - registration with Chamber of Engineers (“Ziviltechnikerammer”) - liability insurance:
Belgium	Geotechnical (2 tiers). Specialist & Expert (draft; to comply with EN 1997)	BEng./BSc. (180-240) MEng./MSc. (300)	Specialist G1, G2, G4, D1: 5 years Expert G3, D1 – D4: 10 years	acknowledged but not quantified	(p) intended: through Belgian member body of the ISSMGE
Germany	Geotechnical Expert (“Sachverständiger für Geotechnik” EASV) (to comply with EN 1997) Checking expert (“Prüfsachverständiger”) (ground engineering at large)	BEng./BSc. (180-240) MEng./MSc. (300) Note 2 Master in Civil or Geotechnical Engineering or Engineering Geology	GC2: 4 years GC3: 7 years  GC2: 2 years GC3: 5 years 9 years in-depth and specialized knowledge	8 hrs / year (mandatory)  “shall be up to date with the developments in ground eng.”	(p) self assessment; in operation since 2013 Objective: (P) registration with State Chamber of Engineers (P) Federal German Chamber of Engineers (“Bundesingenieur-kammer)
Ireland	Objective: Joint UK & Ireland RoGEP-Scheme.(see UK below)	Minimum: BEng./BSc. plus: C Eng or P Geol title (Membership with EI or IGI)	Variable number of years depending on registrat. grade.	40 - 60 hrs / year (mandatory)	(p) RoGEP (Registration of Ground Engineering Professionals) Scheme sponsors EI (Engineers of Ireland) & IGI (Institute of Geologists of Ireland).
FYR Macedonia	Geotechnical Expert (to comply with EN 1997 and Mining requirements)	BEng. (Civil or Mining)/BSc.(180-240) MEng. (Civil or Mining)/MSc. (300)	Level B: GC 1-2: 2 years Level A: GC 1-3: 5 years	not defined  required, but hours not defined	(P) Macedonian Chamber of Certified Architects and Certified Engineers 2 sponsors
Netherlands	Geotechnical (3 tiers).Profes.; Special. & Adviser.(to comply EN 1997)	BEng./BSc.Note 2. (180-240) MEng./MSc. (300)	Variable numb. of years, dependingmg registrat grade. Min 5 yr.	8 hrs / year (mandatory)	(p) pending adjustment of the Charter of the KIVI (Koninklijk Instituut Van Ingenieurs”) to include Geotechnics Expected to be operational in 2018.
Sweden	Three levels of competence: Aware;	Bachelor or Master	Variable number of years	Acknowledged but not defined	(p) self assessment of competence

F.2 - Developments and innovations in geotechnical engineering, education and practice

	Apply & understand; Evaluate (Matrix of Competence)		depending on the area of competence		
U.K.	Geotechnical (3 tiers) Professional; Specialist & Adviser (ground engineering at large)	B Sc / B Eng M Eng / M Sc Note 2 <i>plus</i> : Chartered title C Eng or C Geol (Membership with GSL or ICE or IoM <sup>3</sup> )	Variable number of years the grade of registration	40 - 60 hrs / year (mandatory) AFT	p) RoGEP (Registration of Ground Engineering Professionals) joint scheme of:GSL – The Geological Society of London ICE – Institution of Civil Eng. IoM3 – Institute of Materials, Minerals & Mining, Administered by the ICE, 2 sponsors ,

NOTE 1 Traditional university degrees such as Dipl.-Ing. or Dipl.-Geol. (in Austria and Germany) or the diploma Industrial Engineer (in Belgium and Netherlands), are not considered. The EASV-Recommendations of the German Geotechnical Society DGGT provides guidelines for assessing tertiary studies outside of the ECTS System.

NOTE 2 Geotechnical core subjects such as soil mechanics, foundation engineering and engineering geology are required as part of the university studies.

NOTE 3 The professional experience is measured by a variety of criteria, such as the number of years spent on a geotechnical construction site, the Geotechnical Category (GC) of the project, the level and field of competence and application of geotechnical methods.

NOTE 4 Common features in the registration process of geotechnical professionals are: Lodging of an application form together with a CV and other documents in support of the application, assessment and examination of the applicant by an independent professional panel and, if the application was successful, a revalidation of the registration after 5 years.

Table 2. Characteristics of Common Platform

Objectives	Professions Note 1	Educational Qualifications (ECTS credit points)	Professional Qualifications	Public (Statute) Law	Expected Post Academic Experience	Technical Compe- tencies	CPD (hrs /year)	Application / Review
Informative Annex EN1997 Professional Recognition. Minimum complexity as per EN 1997 GC2.	All	B Sc / B Eng (180 – 240)  M Sc / M Eng (300) (1*)Majors in Civil Engineering/Geology /Earth Sciences plus specialist subjects e.g. soil mechanics and engineering geology, etc.	Varies with National Practice	No	B Sc/B Eng 5 years– GC2  M Sc/M Eng 3 years –GC2 and demonstrated appropriate competence	To be Agreed	Content to be specified by national body ≥ 20 h/year	Documented independent assessment, statement and CV. Revalidation at 5 year intervals.

Note 1: Geotech Eng/Eng Geologist/Mining/ Rock Mechanics

Defining minimum competency has proven more difficult, with a diverse range of opinions being expressed.

## 5 INFORMATIVE ANNEX G TO prEN1997-1

Despite the many problems and hurdles to be overcome to achieve a legally binding common platform compliant with the EU Directive, there is a second goal which can serve a similar consensus through the revisions to the EN 1997.

Both the core Eurocode EN 1990: Basis of Structural Design and EN 1997: Geotechnical Design make references in Clause 1.3 Assumptions to design by “appropriately qualified and experienced personnel”. The text is retained in the draft code revisions but critically no further guidance or definition of the

qualifications or experience of these personnel is given. The ISSMGE working group identified that national registration systems for ground engineering professions could play a valuable role in providing this definition, at least on a voluntary basis for those countries who either had active registers or were developing them. The mechanism by which this is being proposed is as an Informative Annex to the revised code. Opening the possibility that any national standardisation body can choose not to adopt the definition offered in the Annex, in which case the code requirements revert to the existing rather vague description given in Clause 1.3.

A draft Informative Annex, see Table 3, was included in the PT2-final draft of prEN 1997-1, submitted in April 2018. While not ideal for use in a true “common platform”, this arrangement gives maximum flexibility to each state.

Table 3. Table G.1 (NDP) of prEN 1997-1:2018

<b>Educational Qualifications</b> (ECTS credit points)	<b>Professional experience</b>	<b>Continuous Professional Development (CPD)</b>	<b>Professional Competence</b>	<b>Remarks</b> <b>Registration</b> <b>Professional qualifications and application</b>
<b>NOTE 1</b>	<b>NOTE 2</b>	<b>NOTE 3</b>	<b>NOTE 4 and 5</b>	
B Sc / B Eng (180 –240)	B Sc/B Eng 5 years– GC2	≥ 20 hours /year	General requirements are defined in Note 5.	National requirements for registration may be enforced by private or public law.  Applications for professional registration should be documented, subject to independent assessment and include a statement of professional competency and curriculum vitae.
M Sc / M Eng (300)	M Sc/M Eng 3 years –GC2 and demonstrated appropriate competence			
This table is an NDP and the NSB can clarify the following for its application. - Additional requirements for Geotechnical Category 3 structures - Additional acceptable academic qualification and associated professional experience - Specification of criteria for CPD - Additional general requirements on professional competence - Specific requirements on professional competence for different technical areas				

NOTE 1 Core subjects such as soil / rock mechanics, foundation engineering and engineering geology are required as part of university studies.

NOTE 2 The professional experience is measured in number of years demonstrating appropriate competence in the application of the relevant clauses of EN 1997.

NOTE 3: The criteria for valid CPD hours varies nationally. Learned Societies can give input to the specification.

NOTE 4 The required professional competence, including level of competence, depends on which clauses of EN 1997 a person will apply. Specific requirements for different technical areas can vary. Examples of relevant technical areas include planning of field and laboratory investigation, evaluation of ground investigation results, pile design, ground reinforcement, numerical methods. The professional competence also includes general professional competence related to documentation, project management, risk management, and communication.

NOTE 5 The General requirements are defined in the following statement. *“Competence is the ability to carry out a task to an effective standard. To achieve competence requires the right level of knowledge, understanding and skill, and a professional attitude. Competence is developed by a combination of formal and informal learning, and training and experience, generally known as initial professional development. However, these elements are not necessarily separate or sequential and they may not always be formally structured. There are five generic areas of competence and commitment for all ground engineering professionals, broadly covering: A) Knowledge and understanding; B) Design and development of ground engineering processes, systems, services and products; C) Responsibility, management or leadership; D) Communication and inter-personal skills; E) Professional commitment”*

## 6 . CONCLUSION

Registration of ground engineering professionals on a national basis is increasing in Europe by means of a combination of voluntary and mandatory practices. By 2020 at least seven European jurisdictions are expected to have operating registers. Although there is very significant diversity in national practices and the characteristics of individual registration systems, the development and adoption of an Informative Annex to the revised EN 1997 based on a common platform is actively being pursued. It is hoped that this recommended minimum standard would be adopted as a baseline for all future national registration systems in Europe and perhaps also serve as a useful reference for consideration of a more global approach to registration in due course. Adoption of a common platform fully compliant with EU Directive 2005/36/EC is a much more distant aspiration which requires many more countries to participate and is unlikely to be achieved in the short term.

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## 8 REFERENCES

- Bock, H., Herten, M., Schwerter, R. and Thuro, K. (2014) “Unified qualification requirements for ground engineering and engineering geology professionals” Eng. Geology for Society and Territory – Vol 7: pp 207 – 211.
- Bracegirdle, T. (2017) “Grounds for Dispute” Engineers Ireland, Geotechnical Society of Ireland Presentation, April 2017.
- EU (2011) “Evaluation of the Professional Qualifications Directive (2005/36/EC)”, Brussels 5 July 2011, 89 p.
- IPENZ (2013) “Guidelines for Engineering Geologists” Version 1.0, 14 p.
- ISSMGE TC304-TF3 (2013) “Integration of Geotechnical Risk Management and Project Risk Management”, Part 1. November 2013, 51 p.
- JEWG Report (2008) “Professional Tasks, Responsibilities and Cooperation in Geo-Engineering” IAEG, ISRM, ISSMGE, 30 p.
- NZ Geomechanics News December 2016 “Evolution of the CPEng (Geotechnical) Body of Knowledge and Skills” pp 98 – 107.
- Turner, A.K. and Rengers, N. (2010) “A Report Proposing the Adaptation of the ASCE Body of Knowledge Competency-based Approach to the Assessment of Education and Training Needs in Geo-Engineering, a progress report, FedIGS, Joint Technical Committee (JTC-3: Education and Training), 37 p.
- VanDine D.F. (2016) “What is a Geotechnical Professional ?” 17th Nordic Geotechnical Meeting, Reykjavik, Iceland pp 43 – 52.