Evolving the well-established

vdz

Service Offer

Concrete and Mortar

High-quality services from a single source

Synergies from research and expertise

VDZ is a renowned and internationally recognised scientific institution which provides industry-oriented research and a comprehensive service portfolio in the field of cement and concrete and has been contributing to the high quality of concrete and mortar for more than 140 years.

Our interdisciplinary team provides answers to almost any questions about concrete and mortar production according to the current state of science and technology. At the same time we offer our customers a service package that includes all major tests as well as consultancy services and complex expert reports. The combination of current research and competent service leads to synergies which are reflected in the high quality and practical relevance of our work.

In our ”Concrete and Mortar“ division, our research and services engage in the answers to current and important questions in the areas of concrete constituents as well as concrete technology and the application of concrete.

Customer-specific services and approval tests

Customer-specific services and approval tests

Through special tests for technical approvals the suitability of construction products (e.g. cements and concretes) for specific areas of application can be demonstrated. We carry out tests for the following approvals:

- National technical approvals (abZ)
- European Technical Assessments (ETA)
- Investigations in accordance with CUR 48

Our service range comprises all stages of the approval procedure, such as the application, the compilation and implementation of the testing programme, the preparation of the technical report and expert opinion on the suitability of the product. For special construction projects accompanying self-supervision and third party inspection concepts are provided to ensure the quality of the constituents and the building materials. Special concrete and mortar mix formulations (e.g. for self-compacting concrete, high strength concrete etc.) can be developed at the customer's request and, depending on the intended application, be investigated and tested with standardized test methods or with tests specific to the respective task.

VDZ compiles expert reports in order to analyse damage to concrete constructions and to prevent damage in advance. For this, our well-equipped concrete laboratory offers a large variety of possibilities. For example, aggregates or concrete compositions are tested to ascertain if adverse effects on the durability, e.g. due to a harmful alkali-silica reaction (ASR) or a lacking freeze-thaw resistance can be expected. Furthermore, we prepare Life Cycle Assessments including Environmental Product Declarations EPDs for cement and concrete. Our laboratory has modern technical equipment and is accredited according to EN ISO/IEC 17025:2005.

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-18403-01-00

Testing of fresh concrete and fresh mortar

Service	Method
Sampling	EN 12350-1
Consistency – Slump test	EN 12350-2
Consistency – Vebe test	EN 12350-3
Consistency – Degree of compactability	EN 12350-4
Consistency – Flow table test	EN 12350-5
Densitiy of fresh concrete	EN 12350-6
Air content according to the pressure gauge methods	EN 12350-7
Slump flow test – Self-compacting concrete	EN 12350-8
V-funnel test – Self-compacting concrete	EN 12350-9
L box test – Self-compacting conrete	EN 12350-10
Sieve segregation test – Self-compacting concrete	EN 12350-11
J-ring test – Self-compacting concrete	EN 12350-12
Consistence of fresh mortar (Flow table / Hägermann-table)	EN 1015-3
Moisture content (kiln drying)	DIN 1048-1
Expansion and bleeding of freshly mixed grouts for preplaced-aggregate concrete in the laboratory	ASTM C940
Standard specification for flow table for use in tests of hydraulic cement	ASTM C230
Standard test method for flow of hydraulic cement mortar	ASTM C1437, implementation standard to ASTM C230
Standard test methods for time of setting of hydraulic cement by vicat needle	ASTM C191
Rheological measurements on cement paste and mortar: dynamic viscosity yield value saturation point preparation of flow curves	Rotational viscosimeter
Determination of the zeta potential on cement paste	Electroacoustic measuring

Testing of hardened concrete and hardened mortar

Testing of concrete and mortar

Service	Method
Production and storage of specimens	EN 12390-2
Compressive strength	EN 12390-3
Flexural strength	EN 12390-5
Tensile splitting strength	EN 12390-6
Density of hardened concrete	EN 12390-7
Depth of penetration of water under pressure	EN 12390-8
Surface tensile strength, bond strength, adhesive tensile strength	DIN 1048-2; ZTV-ING, DAfStb* directive “Protection and repair of concretebuilding materials” part 3, Annex C
Static modulus of elasticity	EN 12390-13 / DIN 1048-5 / ASTM C469
Dynamic modulus of elasticity	Grindosonic method
Moisture content and oven-dry density	DIN 1048-5
Cored specimens – taking, examining, and testing in compression	EN 12504-1
Non-destructive testing of compressive strength (determination of rebound number)	EN 12504-2
Determination of composition of hardened concrete	DIN 52170
Crack absorption, placing plaster marks	
Extraction of pore solution and chemical analysis	
Non-destructive determination of the concrete cover	electromagnetic
Determination of creep of concrete in compression	EN 12390-17 ASTM C512 in cooperation with third parties
Flexural tensile strength on steel fibre reinforced concrete beams to determine performance classes	DAfStb Directive “Steel fibre concrete”
Flexural tensile strength on steel fibre reinforced concrete beams	EN 14651
Modulus of Elasticity and Poisson’s Ratio	ASTM C469

*DAfStb = German Committee for Structural Concrete

Testing of pore structure and heat of hydration

Service	Method
Determination of air void characteristics in hardened concrete	EN 480-11 DAfStb series no. 422
Water absorption under atmospheric pressure / at 15 MPa	DAfStb series no. 422
Capillary water absorption	DAfStb series no. 422 EN 480-5
Pore content and pore distribution in concrete, mortar and hardened cement paste by mercury intrusion porosimetry	DIN ISO 15901-1
Water binding in hardened cement paste, mortar and concrete by means of water vapour sorption isotherms	VDZ method
Measuring permeability	DAfStb series no. 422 RILEM TC 116-PCD, part B
Determination of heat of hydration of cement	EN 196-9
C-value determination of cement	DAfStb series no. 422
Release of heat of hydration – Semi-adiabatic method	EN 12390-14
Release of heat of hydration – Adiabatic method	EN 12390-15

Testing the shrinkage of concrete and mortar

Service	Method
Autogenous shrinkage	Corrugated tube method ASTM C1698 Shrinkage cone method Shrinkage ring test
Drying shrinkage	ISO 1920-8 DAfStb series no. 422 Shrinkage ring test DIN 52450 EN 12617 ASTM C157 / C157M ASTM C490 / C490M
Shrinkage	EN 12390-16
Restraint stresses due to shrinkage	Restrained ring test
Determining age at cracking and induced tensile stress under restrained shrinkage	ASTM C1581

Durability testing

Service	Method
Testing of freeze and freeze-thaw resistance CIF/CDF test Slab test Cube test (VDZ) Beam test	CEN/TS 12390-9 CEN/TR 15177 BAW Code of Practice “Frost Resistance Tests for Concrete”
Chloride diffusion coefficient (profile grinding)	EN 12390-11
Chloride migration coefficient	EN 12390-18 – draft BAW Code of Practice “Resistance of concrete to chloride penetration”, NT Build 492
Carbonation resistance of concrete at atmospheric levels of carbon dioxide	EN 12390-10
Carbonation resistance of concrete – accelerated carbonation method	EN 12390-12 EN 13295
Testing of abrasion (grinding wheel according to Böhme)	DIN 52108 EN 13892-3
Testing of resistance of mortars against sulfate attack and sea water	Civieltechnisch Centrum Uitvoering Research en Regelgeving Aanbeveling 48 (CUR 48)
Sulphate resistance	SIA 262, Annex D
Testing the resistance to penetration of concrete against water polluting substances (FD- and FDE-concrete)	DAfStb Guideline
Electrical Indication of Concrete’s Ability to resist Chloride Ion Penetration	ASTM C1202
Tests with regard to alkali-silica reaction	see page 17

Tests and expert reports with regard to alkali-silica reaction

Testing of aggregates

Service	Method
Accelerated mortar bar test at 80 °C (reference method)	Alkali Guidelines TP B-StB 1.1.11 RILEM AAR-2
Accelerated mortar bar test at 70 °C (alternative method)	Alkali Guidelines (ed. 2007) TP B-StB 1.1.12
Concrete test with fog chamber storage (40 °C)	Alkali Guidelines
60 °C concrete test	Alkali Guidelines RILEM AAR-4.1
60 °C concrete test with external alkali supply	General circular for road construction No. 04/2013 TP B-StB 1.1.09

Testing of concrete compositions (ASR performance test)

Service	Method
60 °C concrete test without external alkali supply	RILEM AAR-11 AFNOR P 18-454
60 °C concrete test with external alkali supply	TP B-StB 1.1.09 RILEM AAR-12
38 °C concrete test	RILEM AAR-10
60 °C concrete test on two drilled core halves (with or without alkali supply)	According to TP-B-StB 1.1.09 and DAfStb Alkali Guidelines
40 °C fog chamber storage of drilled cores	DAfStb recommendation

Export reports for the suitability of aggregates and concrete compositions

Service	Method
Preparation of expert reports	In accordance with the general circular for road construction No. 04/2013 DBS 918 143, Annex G Decree WS 13/5257.6/2, 19 June 2015 Air fields

Testing of aggregates

Service	Method
General properties of aggregates	EN 932-1 up to -3
Geometrical properties of aggregates	EN 933-1 up to -11
Chemical properties of aggregates	EN 1744-1, Sections 7, 10-13, 15.1
Mechanical and physical properties of aggregates	EN 1097-1 up to -10
Particle size distribution	DIN ISO 3310 DIN 52098
Thermal and weathering properties of aggregates	DIN V 18004 EN 1367-1 up to -6
Tests with regard to alkali-silica reaction	see page 17

Testing of admixtures, grouts and additions

Testing of concrete additions

Service	Method
Fly ash	EN 450-1
Silica fume admixtures	EN 13263-1
Ground granulated blastfurnace slag (ggbs)	EN 15167-1

Testing of concrete admixtures and grouts

Service	Method
Electro-chemical test for corrosion	EN 480-14
Suitability tests of concrete admixtures	EN 480 EN 934
Suitability tests of grout for prestressing tendons	EN 934-4 EN 445

Structural diagnostics, service life design and monitoring of concrete on-site

Structural diagnostics and service life design

The objective of structural inspection is to obtain information on the overall condition of the structure. In the process, we identify possible damage mechanisms and then plan together with you the further course of action required to maintain and repair the structure.

The probability of the occurrence of reinforcement corrosion arising from the carbonation of the concrete cover or the penetration of chlorides into the concrete can be estimated by way of probabilistic serviceability limit state studies.

For further details please see our service offer “Structural diagnostics and service life design”.

Monitoring of concrete on-site

Service	Method
Permanent concrete testing laboratory	DIN 1045-3, Annex NC
Consulting of the construction company and the construction sites	
Provision of equipment for testing of fresh concrete	DIN 1045-3, Annex NB
Training of site staff regarding the tests for the fresh concrete properties	DIN 1045-3, Annex NB
Checking the records of the site staff, periodic supervision of the testing of fresh concrete	
Collection of test specimens on the construction site, testing of hardened concrete (particularly compressive strength)	
Accredited supervisory agency	DIN 1045-3, Annex ND

Life cycle assessment and sustainability assessment

Life cycle assessment and sustainability assessment

The service range of VDZ also includes the preparation of Life Cycle Assessments and Environmental Product Declarations (EPD) according to EN ISO 14040 and EN 15804 for cement and concrete. The rules developed by CEN/TC 350 for the construction sector are taken into account. The Life Cycle Assement can be prepared for a specific product in consultation with the customer or for an average of various products and production sites.

In addition, VDZ employees are authorized as “DGNB auditors”. With the certification system of the German Sustainable Building Council (DGNB) buildings are assessed taking into account such aspects as environmental protection, cost effectiveness and user-friendliness with regard to sustainability. The services necessary for the audit can be coordinated with the customers individually.

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