

Eurocode Part 2 BS EN 1997-2 THE ATTACHMENTS

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COVERAGE OF THE ATTACHMENTS

- **A series of Standards on:**
 - **Qualifications**
 - **Drilling and sampling**
 - **Field tests**
 - **Laboratory tests**
 - **Soil and rock description and classification**
 - **(Geotechnical works)**

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STANDARDS

- 22475 - SAMPLING METHODS AND GROUNDWATER MEASUREMENT
- 22476 - FIELD TESTING
- 22477 - GEOTECHNICAL STRUCTURE TESTS
- 22282 - GEO-HYDRAULIC TESTS
- 17892 - LABORATORY TESTING
- 14688 & 14689 - SOIL AND ROCK DESCRIPTION

- /1 Technical principles for execution
- /2 Qualification criteria for enterprises and personnel – TS

PUBLISHED IN UK

- /3 Conformity assessments of enterprises and personnel by third parties – TS

FORMAL VOTE SOON

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- /1 Cone penetration tests App
- /2 Dynamic probing IMP
- /3 Standard Penetration test IMP
- /4 Menard Pressuremeter Enq #2
- /5 Flexible dilatometer FV
- /6 Self boring p/meter Enq ?
- /7 Borehole Jacking test FV
- /8 Full displacement p/meter Enq ?
- /9 Field vane test Enq ?
- /10 Weight sounding test TS
- /11 Flat dilatometer test TS
- /12 Mechanical CPT cone App
- /13 Plate Loading test WD

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- Pile tests
- /1 Static axial compression Voted
 - /2 Static axial tension WD
 - /3 Transverse tension WD
 - /4 Dynamic axial compression WD
 - /5 Testing of anchorages Voted
 - /6 Testing of nails WD
 - /7 Testing of reinforced fill WD
 - /8 Statnamic testing New item

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- /1 General rules
 - /2 Water permeability test in borehole without packer
 - /3 Water pressure test in rock
 - /4 Pumping tests
 - /5 Infiltrometer tests
 - /6 Closed packer systems
- ALL FOR ENQUIRY
2007/08**

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- /1 Water content
- /2 Density of fine grained soils
- /3 Density of solid particles
- /4 Particle size distribution
- /5 Oedometer test
- /6 Fall cone test
- /7 Compression test
- /8 Unconsolidated triaxial test
- /9 Consolidated triaxial test
- /10 Direct shear test
- /11 Permeability test
- /12 Atterberg limits

ALL TS – not published in UK

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14688 - SOILS		
/1 Description		2002
/2 Classification		2003
14689 - ROCKS		
/1 Desc & Class		2004
IMPLEMENTED		
14688/3 Transfer of data (XML)		WD
14689/2 Transfer of data (XML)		WD

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5 STANDARDS IMPLEMENTED

- 22476/2 Dynamic Probing 2005
- 22476/3 Standard Penetration Test 2005
- 14688/1 Soil Description 2002
- 14688/2 Soil Classification 2003
- 14689/1 Rock Description and Classification 2004

- Implement within 6 months of publication

1 July 2007 = rather late

- Information posted in
 - Ground Engineering
 - BSI notices and indexes

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22476/2 and /3 DYNAMIC PROBING and SPT

- BS1377 Part 9 Clause 3.2 (DP) and 3.3 (SPT)
WITHDRAWN
- BS EN ISO implemented 1 July 2007
- However

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SPT - CALIBRATION

- Energy ratio = % ratio of actual to theoretical energy of the hammer
- Energy losses occur. Therefore the energy ratio of the equipment has to be known if the N values are going to be used for the quantitative evaluation of foundations or comparison of results.
- A certificate of the calibration of the energy ratio immediately below the driving head or anvil **shall** be available

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DP - CALIBRATION

- DP – Energy losses occur. Therefore for each new driving device the actual energy transmitted to the drive rods should be determined if the blow counts are going to be used for quantitative evaluation

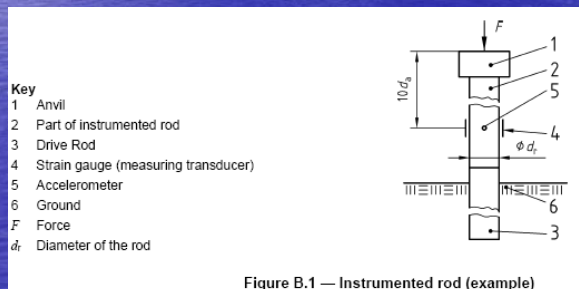


Figure B.1 — Instrumented rod (example)

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SPT – SEATING DRIVE

- The sampler shall penetrate over an initial or seating drive of 150 mm
- This loses the UK system of starting a test after a short 50 blow seating drive

SOIL AND ROCK DESCRIPTION

- 14688 distinguishes between description and classification for soil
 - Part 1 covers Description and provides "a flexible system for immediate (field) use"
 - Part 2 covers the classification based on the results of measurement from field and/or laboratory testing.
- 14689 includes classification with rock description

CLASSIFICATION ON LOGS

UK VIEW

- The only items of classification to be included on field logs are:
 - Relative density for coarse soils (using SPT)
 - Strength for fine soils (using vane & triaxial tests)

SOIL DESCRIPTION

- Improvements by defining all terms
- No word order prescribed
- No % terms for secondary constituents
- Plasticity terms included – low and high
- Re-introduce 'silty CLAY' and 'clayey SILT'
- More organic soils terms
- Six angularity terms
- Consistency terms by hand test only - CHANGE
- Some other differences but no conflict

SOIL DESCRIPTION

- Improvements by defining all terms
- No word order prescribed
- No % terms for secondary constituents
- Plasticity terms included – low and high
- 'silty CLAY' and 'clayey SILT' replace 'CLAY/SILT'
- More organic soils terms
- Six angularity terms
- Consistency terms by hand test only = CHANGE
- Some other differences but no conflict

CONSISTENCY and STRENGTH (CLAY and SILT)

- **14688/1 Description - Consistency from Hand tests**
 - Soft – firm - stiff
 - Familiar definitions
 - No quantitative connotation
- **14688/2 Classification - Strength from Test results**
 - Low - medium - high strength
 - Familiar categories (plus < 10 kPa)
 - No descriptive element

CONSISTENCY TERMS

- **Very soft** Finger pushed in up to 25 mm, exudes between fingers
- **Soft** Finger pushed in up to 10 mm, moulds by light finger pressure
- **Firm** Thumb makes impression easily, cannot be moulded by fingers, rolls to thread
- **Stiff** Can be indented slightly by thumb, crumbles, breaks, remoulds to lump
- **Very stiff** Can be indented by thumbnail, crumbles, does not remould
- **Hard** Can be scratched by thumbnail

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SOIL STRENGTH TERMS

c_u , kPa

- **Extremely low** < 10
- **Very low** 10 – 20
- **Low** 20 – 40
- **Medium** 40 – 75
- **High** 75 – 150
- **Very high** 150 – 300
- **Extremely high** >300

Strength terms also defined on Consistency index, but this is classification not description

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CONSISTENCY & STRENGTH EXAMPLES

Where no strength test results available

Soft grey CLAY

Where test results are available, may insert
strength class after discontinuity descriptor

Stiff fissured medium strength CLAY

FIELD EQUIPMENT

- No need for pocket penetrometers or hand vanes in field description (ie to determine consistency)
- Do not recommend use of PP at all
- Can use vane to measure strength and thus enhance field log

ROCK DESCRIPTION

- Improvements by defining all terms
- Terms generally ISRM, not BS
 - Strength terms
 - Roughness terms
 - Aperture terms
- Weathering classifications are those discarded in 1999

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ROCK STRENGTH q_u , MPa

TERM	2007	1999
• Extremely weak	• 0.6 – 1.0 in UK	• -
• Very weak	• 1 – 5	• <1.25
• Weak	• 5 – 25	• 1.25 – 5
		• 5 – 12.5
• Medium strong	• 25 – 50	• 12.5 - 50
• Strong	• 50 – 100	• 50 - 100
• Very strong	• 100 – 250	• 100 – 200
• Extremely strong	• > 250	• > 200

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SURFACE FORM

- Small scale = millimetres - Rough, Smooth, Striated
- Medium scale = centimetres - Planar, Stepped, Undulating
- Large scale = metres - Wavy, Curved, Straight
- These are an order of magnitude less than BS5930

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APERTURE TERMS

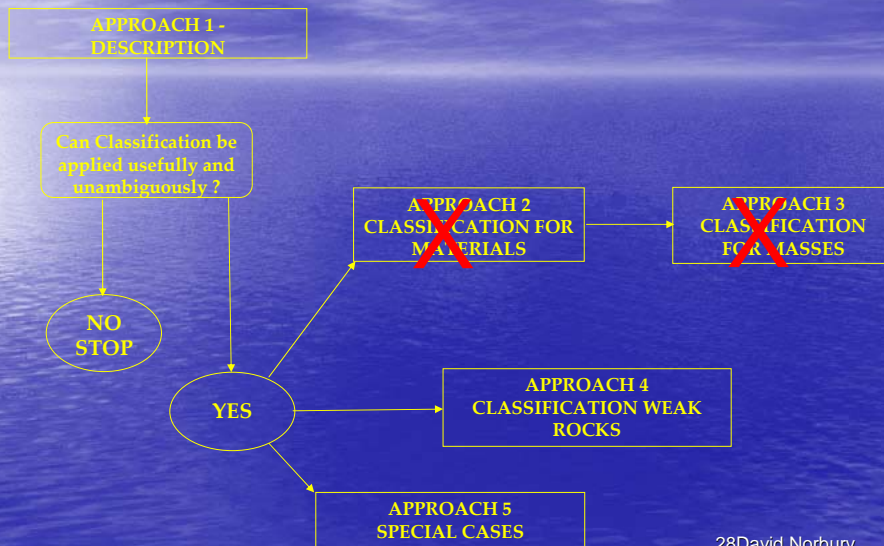
- | | |
|-------------------|---------------|
| • Very tight | < 0.1 mm |
| • Tight | 0.1 – 0.25 mm |
| • Partly open | 0.25 – 0.5 mm |
| • Open | 0.5 – 2.5 mm |
| • Moderately wide | 2.5 – 10 mm |
| • Wide | 10 – 100 mm |
| • Very wide | 100 – 1000 mm |
| • Extremely wide | > 1000 mm |

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WEATHERING APPROACHES

- Approach 1 Factual description OK
- Approach 2 Uniform strong DROP
- Approach 3 Heterogeneous strong DROP
- Approach 4 Combined weak OK
- Approach 5 Others (Chalk) OK

TO CLASSIFY OR NOT TO CLASSIFY?



IMPLEMENTATION of DESCRIPTION

- Implementation 3 to 5 years late
- B/526/3 suggested implementation 1 July 2007
- Explanatory papers in Ground Engineering
 - June 2007 - Powell & Norbury
 - July 2007 - Baldwin, Gosling & Brownlie
- Revision of BS5930 Section 6 on the way

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EFFECT ON 5930

- BS EN ISO Standards are very brief
- We will retain the more discursive BS 5930:1999 style, provided we obey supercession rules
- Revisions on the way – others to follow

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IMPLEMENTATION

- New Standards - be aware of existence
- read and understand
- Update specification clauses
- Deploy procedures into practice
- Inform and Train staff
- Notify clients
- Update recording and reporting templates
- Adjust interpretation routines as necessary
- Implementation achieved – months?
- Parallel systems in the meantime?

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**GET ON WITH THE
CHALLENGE**

....and good luck