



INSTITUTE OF CONCRETE TECHNOLOGY

AGGREGATES IN CONSTRUCTION

Learning Objectives Revision 2 (2019)

<p>1.00.00</p>	<p>Introduction to the course</p> <p>1.00.01 Outline the aims, objectives and content of the course. 1.00.02 State methods of teaching and learning to be used on the course. 1.00.03 Plan for career progression and further training following successful completion of the course.</p>
<p>1.01.00</p>	<p>Health and safety</p> <p>1.01.01 Identify the risks to health and safety within the aggregate industry. 1.02.02 Identify and state sources of danger in the operation of aggregate extraction and processing and list precautions to be taken to ensure safe working.</p>
<p>1.02.00</p>	<p>Geology and Geological Processes</p> <p>1.02.01 Define and explain the structure of the earth and tectonic processes. 1.02.02 Define and discuss the formation of igneous rocks. 1.02.03 Define and describe the formation of sedimentary rocks. 1.02.04 Define and describe the formation of metamorphic rocks. 1.02.05 Define and explain factors affecting the distribution of rocks. 1.02.06 Define and describe the common types of rocks used in the construction industry. 1.02.08 Describe tectonic forces and their implications upon rock structures. 1.02.09 Explain the terms dip, strike, folds, faults and joints as applied to secondary geological structures. 1.02.10 Demonstrate a practical application of structural geology to quarrying.</p>
<p>1.03.00</p>	<p>Field Implementation of Aggregate Deposits</p> <p>1.03.01 Explain how a desk study is carried out in evaluating a potential resource. 1.03.02 Explain how the following types of maps are produced: topographic, geological and aggregate resources maps. 1.03.03 Describe how marine deposits are explored by using echo sounder, side scan sonar, seismic and acoustic surveys. 1.03.04 Describe the use of satellite, geophysical and remote sensing tools in assessing resources. 1.03.05 Demonstrate the use of topographic, geological and aggregate resources maps in assessing potential sites, both land and marine. 1.03.06 Explain how samples are collected in pits, trenches and also using various drilling techniques. 1.03.07 Describe and present field results using supplied materials. 1.03.08 Plot a cross section and resource map to indicate an estimation of reserves and quantities. 1.03.09 Describe the importance of the use of aggregates in the economy. 1.03.10 Discuss the cyclical nature of aggregate demands.</p>

<p>1.04.00</p>	<p>Aggregate Extraction</p> <p>1.04.01 Describe the necessary preparations before extraction of aggregates.</p> <p>1.04.02 Describe the extraction of hard rock through blasting.</p> <p>1.04.03 Explain the terms borders, bench, toe, face, stemming and charge length as applied to hard rock blasting.</p> <p>1.04.04 Describe the methods of extracting marine aggregates.</p> <p>1.04.05 Describe the methods of extracting land based sand and gravel.</p> <p>1.04.06 Describe the equipment used in the extraction of aggregates taking economic factors into considerations.</p> <p>1.04.07 Determine the haulage mechanism for a given method of extraction.</p>
<p>1.05.00</p>	<p>Aggregate Processing</p> <p>1.05.01 Explain the importance of aggregate processing.</p> <p>1.05.02 Describe the main types of feed and the benefits of each type.</p> <p>1.05.03 Describe the four types of crushers (cone, impactors, gyratory and jaw), their benefits and effects on aggregate properties.</p> <p>1.05.04 Describe the benefits of mobile crushing and when applicable.</p> <p>1.05.05 Describe the theory of screening and selection of screen types.</p> <p>1.05.06 Explain the terms 'pegging' and 'blinding'.</p> <p>1.05.07 Explain the principles of classification and how it is applied to the processing of aggregates.</p> <p>1.05.08 Identify types of classifiers and their application.</p> <p>1.05.09 Describe washing and drying principles and their application.</p> <p>1.05.10 Describe the methods of transporting processed materials indicating their technical, economic and environmental benefits.</p>
<p>1.06.00</p>	<p>Testing of Aggregates</p> <p>1.06.01 Outline the principles behind quality assurance systems.</p> <p>1.06.02 State the importance of correct sampling procedures and describe sampling at rock face and stockpiles.</p> <p>1.06.03 Explain the terms 'repeatability' and 'reproducibility' as related to aggregate testing.</p> <p>1.06.04 Describe the main Standard tests on aggregates for physical, mechanical and chemical properties indicating their limiting values.</p> <p>1.06.05 Describe the various methods of determining the water content of aggregates and compare the results and their application.</p> <p>1.06.06 Prepare a combined grading curve from two or more aggregate gradings.</p> <p>1.06.07 Determine the uniformity coefficient for a given grading of aggregate.</p> <p>1.06.08 Explain how the source and production of an aggregate influences its physical properties.</p> <p>1.06.09 Explain European Standards related to aggregates and their implications on the market.</p>
<p>1.07.00</p>	<p>Aggregates for Concrete</p> <p>1.07.01 Describe the key EN 12620 tests for aggregates and state limiting values in EN 12620.</p> <p>1.07.02 Explain the importance of aggregate absorption, mechanical properties, soundness and alkali reactivity in the design of durable concrete.</p> <p>1.07.03 List the main impurities associated with aggregates and state their possible effects on concrete.</p> <p>1.07.04 Explain the influence of aggregate grading and maximum aggregate size on the properties of concrete.</p> <p>1.07.05 Explain the influence of aggregate moisture content on the quality of concrete.</p> <p>1.07.06 Determine methods of producing cement bound materials (CBMs) and its aggregate specification requirements.</p>

<p>1.08.00</p>	<p>Aggregates for Mortars 1.08.01 State the EN 13139 requirements for mortar sand. 1.08.02 Describe how the above (1.08.01) is related to masonry, render, plaster and screeds. 1.08.03 Describe the effect of sand on the properties and final characteristics of mortar.</p>
<p>1.09.00</p>	<p>Unbound Aggregates 1.09.01 State the difference between engineered fill and non-engineered fill. 1.09.02 Describe the key characteristics of general fill and list the EN 13242 and Highways Agency 'Specification for Highway Works' (SHW) requirements. 1.09.03 Describe the key characteristics of fill for capping and starter layers and list the SHW specification requirements. 1.09.04 Explain the use of capping layers on sub grades. 1.09.05 Describe the key characteristics of fill to structures and list the SHW specification requirements and limits. 1.09.06 Describe the key characteristics of granular sub-base materials and state the requirements for Type 1, 2, 3, 4 & 5 materials. 1.09.07 Determine volumes of fill materials required for earthworks. 1.09.08 Compare stabilization techniques using cement or lime and give indications of where and when each method is used. 1.09.09 Describe the key characteristics of aggregates for drainage and service ducts as stated in the SHW 1.09.10 Describe the role of aggregates in biological percolating filters. 1.09.11 Determine the requirements for filter drain materials indicating limiting factors.</p>
<p>1.10.00</p>	<p>Bituminous Bonding Materials (Note: European Standards refer to bituminous materials as 'asphalt' which cover asphalt and macadam mixes) 1.10.01 Describe the EN 13043 tests for suitability in bituminous bound materials (asphalt). 1.10.02 List and describe the key properties of aggregates used in the production of bituminous bound materials (asphalt). 1.10.03 Describe the function of aggregates, its properties, types and aggregate specifications requirements for macadam and asphalts. 1.10.04 Describe the importance of aggregate moisture content and cleanliness in the production of bituminous bound materials (asphalts). 1.10.05 Explain the effect of aggregate properties on the skid resistance of roads. 1.10.06 Explain the terms micro and macro textures. 1.10.07 For each of the above (in 1.10.06) state the aggregate requirements. 1.10.08 Describe the concept of surface dressing and aggregate specification requirements.</p>
<p>1.11.00</p>	<p>Specialist Products 1.11.01 Identify the key criteria in track ballast design and given examples of possible markets. 1.11.02 Assess aggregate properties for suitable use as track ballast. 1.11.03 Interpret EN 13450 requirements for track ballast. 1.11.04 Compare British practice in track materials to either U.S. practice or European practice. 1.11.05 Define armourstone and determine the properties of aggregate to be used. 1.11.06 Describe the tests for armourstone. 1.11.08 Explain how beaches are recharged and the importance of recharging. 1.11.09 Describe aggregate requirements for recharging beaches. 1.11.10 Describe the key characteristics of sands used on sports turf including winter games pitches and golf bunkers. 1.11.11 Describe the properties and the importance of aggregates for top dressing of golf and bowling greens.</p>

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| | <ul style="list-style-type: none">1.11.12 Describe the requirements for sands and foundry and the molding industry.1.11.13 Explain the importance of recycling aggregates.1.11.14 Describe possible uses for recycled aggregates.1.11.15 Outline the benefits of using heavy-weight or lightweight aggregates.1.11.16 Describe the EN 13055 requirements for lightweight aggregates |
| <p>END OF AGGREGATES IN CONSTRUCTION</p> | |

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