



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
MIDDLE EAST DISTRICT
P.O. BOX 2250
WINCHESTER, VA 22604-1450

23 February 2018

Exova Limited LLC
P.O. Box 869, PC 130
Muscat
Sultanate of Oman

SUBJECT: Exova Limited LLC at Al Musanah Air Base and Muscat, Oman - Laboratory Validations

VALIDATION EXPIRES 5 April 2020

Dear Mr. Freddy Soman,

This letter confirms the completion of inspection and validation for Exova Limited LLC materials testing laboratories located at Al Musanah Air Base and Muscat, Oman.

These laboratories are approved to perform the materials tests listed on the attached Tables 1-6 for Middle East District (MED), U.S. Army Corps of Engineers (USACE) projects. This validation is based on the laboratory inspection performed by MED 12-13 February 2017 and the continued operation of your laboratory.

This validation will be included with records that are maintained at the MED Headquarters in Winchester, Virginia. This validation is valid until 5 April 2020. To maintain validation beyond 5 April 2020, the laboratory must be re-inspected by MED. You must request renewal by 5 April 2020.

This validation applies only to the location(s) listed above and is contingent upon the laboratory's continued adherence to applicable testing and quality control standards, including proper equipment calibrations. MED may revoke this validation or require re-inspection at any time.

The inspection and validation process for the laboratory followed procedures outlined by the Materials Testing Center (MTC), which is located at the Geotechnical and Structures Laboratory (GSL), U.S. Army Engineer Research and Development Center (ERDC) in Vicksburg, Mississippi, USA. To facilitate construction in Gulf Region countries, MED conducts laboratory validations in strict accordance with MTC protocol.

Questions regarding this validation or requests for renewal should be sent to
DLL-CETAM-CONSTRUCTION-LAB@USACE.ARMY.MIL.

UPSON.EDWARD.O.1
387025908

Digitally signed by UPSON.EDWARD.O.1387025908
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI,
ou=USA, cn=UPSON.EDWARD.O.1387025908
Date: 2018.02.23 12:21:28 -05'00'

Edward O. Upson, P.E., PMP
Quality Assurance Branch
Middle East District
U.S. Army Corps of Engineers

Enclosure: Tables 1-6

TABLE 1 - AGGREGATE

Test Method	Test Procedure	No.	Approved
	REQUIRED TESTS PER ASTM C 1077-14		
ASTM C 117-13	Material Finer than 75 μ m (No. 200) Sieve	A1	X
ASTM C 127-12	Specific Gravity & Absorption in Coarse Aggregate	A2	X
ASTM C 128-12	Specific Gravity & Absorption in Fine Aggregate	A3	X
ASTM C 136-06	Sieve Analysis of Aggregates	A4	X
	OPTIONAL TESTS PER ASTM C1077-14		
ASTM C 29-09	Unit Weight and Voids in Aggregate	A5	
ASTM C 40-11	Organic Impurities	A6	
ASTM C 70-13	Surface Moisture in Fine Aggregate	A7	
ASTM C 87-10	Effects of Organic Impurities on Mortar Strength	A8	
ASTM C 88-13	Sulfate Soundness	A9	
ASTM C 123-12	Lightweight Particles	A10	
ASTM C 131-06	Los Angeles Abrasion Resistance on Small-Size Coarse Aggregate	A11	
ASTM C 142-10	Clay Lumps	A12	
ASTM C 227-10	Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar)	A13	
ASTM C 289-07	Alkali-Silica Reactivity of Aggregates (Chemical Method)	A14	
ASTM C 295-12	Petrographic Examination	A15	
ASTM C 441-11	Effectiveness of Mineral Admixtures or GBFS on Preventing	A16	
ASTM C 535-12	Los Angeles Abrasion Resistance on Large Size Coarse Aggregate	A11	
ASTM C 566-13	Total Moisture Content	A17	
ASTM C 586-11	Alkali Reactivity of Carbonate Rocks (Rock Cylinder Method)	A18	
ASTM C 641-09	Staining Materials in Lightweight Aggregates	A19	
ASTM C 702-11	Reducing Samples to Testing Size	A20	
ASTM C 1105-08	Length Change Due to Alkali-Carbonate Reaction	A21	
ASTM C 1138-12	Abrasion Resistance of Concrete (Underwater Method)	A22	
ASTM C 1252-06	Uncompacted Void Content	A23	
ASTM C 1260-07	Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)	A24	
ASTM C 1293-08	Length Change Alkali-Silica Reaction	A25	
ASTM D 75-13	Sampling	A26	X
ASTM D 546-10	Sieve Analysis of Mineral Filler	A27	
ASTM D 2419-09	Sand Equivalent Value	A28	
ASTM D 3744-11	Aggregate Durability Index	A29	
ASTM D 4791-10	Flat or Elongated Particles	A30	
ASTM D 5821-13	Percentage of Fractured Particles in Coarse Aggregate	A31	
CRD-C 104-80	Fineness Modulus	A4	
CRD-C 119-91	Flat and Elongated Particles	A30	
CRD-C 130-89	Scratch Hardness	A32	
CRD-C 171-94	Percentage of Crushed Particles in Aggregate	A33	

TABLE 2 - BITUMINOUS

Test Method	Test Procedure (ASTM D 3666-13)	No.	Approved
ASTM D 5-13	Penetration	B1	
ASTM D 36-14	Softening Point	B2	
ASTM D 70-09	Density of Semi-Solid Bituminous Mat'ls (Pycnometer Method)	B3	
ASTM D 113-07	Ductility	B4	
ASTM D 139-12	Float Test	B5	
ASTM D 140-09	Sampling Bituminous Materials	B6	
ASTM D 242-09	Mineral Filler for Bituminous Paving Mixtures	B7	
ASTM D 243-08	Penetration Residue	B8	
ASTM D 244-09	Emulsified Asphalts	B9	
ASTM D 402-08	Distillation of Cut-Back Asphalts	B10	
ASTM D 979-12	Sampling Bituminous Paving Mixtures	B11	
ASTM D 1074-09	Compressive Strength	B12	
ASTM D 1075-11	Effect of Water on Compressive Strength	B13	
ASTM D 1188-07	Bulk Specific Gravity & Density Using Coated Samples	B14	
ASTM D 1461-11	Moisture or Volatile Distillates in Bituminous Paving Mixtures	B15	
ASTM D 1560-09	Resistance to Deformation & Cohesion by Hveem	B16	
ASTM D 1561-13	Preparation by CA Kneading Compactor	B17	
ASTM D 1754-09	Effect of Heat & Air by Thin Film Oven	B18	
ASTM D 1856-09	Recovery of Asphalt by Abson	B19	
ASTM D 2041-11	Theoretical Maximum Specific Gravity & Density (Rice)	B20	
ASTM D 2042-09	Solubility by Trichloroethylene	B21	
ASTM D 2170-10	Kinematic Viscosity	B22	
ASTM D 2171-10	Viscosity by Vacuum Capillary Viscometer	B23	
ASTM D 2172-11	Quantitative Extraction	B24	
ASTM D 2726-14	Bulk Specific Gravity and Density	B25	
ASTM D 2872-12	Effect of Heat & Air on Moving Film by Rolling Thin Film Oven	B26	
ASTM D 2950-14	Density of Bituminous Concrete in Place by Nuclear Methods	B27	
ASTM D 3142-11	Density of Liquid Asphalts by Hydrometer	B28	
ASTM D 3203-11	Percent Air Voids	B29	
ASTM D 3289-08	Density by Nickel Crucible	B30	
ASTM D 3665-12	Random Sampling of Construction Materials	B31	
ASTM D 4125-10	Asphalt Content by Nuclear Method	B32	
ASTM D 4867-09	Effect of Moisture	B33	
ASTM D 5404-12	Asphalt Recovery by Rotary Evaporator	B34	
ASTM D 5444-08	Mechanical Size Analysis of Extracted Aggregate	B35	
ASTM D 6307-10	Asphalt Content of Hot-Mix Asphalt by Ignition Method	B36	X
ASTM D 6926-10	Preparation of Bituminous Specimens using Marshall	B37	X
ASTM D 6927-06	Marshall Stability and Flow of Bituminous Mixtures	B38	
CRD-C 650-95	Density and Percent Voids	B39	

TABLE 3 - CONCRETE

Test Method	Test Procedure	No.	Approved
	Required Tests Per ASTM C 1077-14		
ASTM C 31-12	Making and Curing Test Specimens in the Field	C1	X
ASTM C 39-14	Compressive Strength of Cylindrical Specimens	C2	X
ASTM C 138-14	Unit Weight and Air Content by Gravimetric	C3	
ASTM C 143-12	Slump	C4	X
ASTM C 172-14	Sampling	C5	X
ASTM C 173-14	Air Content by Volumetric	C6	
ASTM C 231-14	Air Content by Pressure	C7	X
ASTM C 1064-12	Temperature of Concrete	C8	X
ASTM C 42-13	Drilled Cores and Sawed Beams	C9	
ASTM C 78-10	Flexural Strength by Third Point Loading	C10	X
ASTM C 157-08	Length Change of Concrete and Mortars	C11	
ASTM C 174-13	Concrete Thickness by Drilled Cores	C12	
ASTM C 192-14	Making and Curing Test Specimens in Laboratory	C13	
ASTM C 215-08	Fundamental Frequencies of Concrete	C14	
ASTM C 232-14	Bleeding of Concrete	C15	
ASTM C 293-10	Flexural Strength by Center Point Loading	C16	
ASTM C 341-13	Length Change of Drilled or Sawed Concrete	C17	
ASTM C 403-08	Time of Setting by Penetration Resistance	C18	
ASTM C 418-12	Abrasion Resistance by Sand Blasting	C19	
ASTM C 457-12	Air-Void System by Microscopic Determination	C20	
ASTM C 469-14	Static Modulus of Elasticity and Poisson's Ratio	C21	
ASTM C 470-09	Molds for Forming Concrete Test Cylinders Vertically	C22	
ASTM C 490-11	Apparatus for Length Chge of Cement Paste, Mortar, & Concr	C23	
ASTM C 495-12	Compressive Strength of Lightweight Insulating Concrete	C24	
ASTM C 496-11	Splitting Tensile Strength	C25	
ASTM C 511-13	Moist Cabinets, Moist Rooms, Water Storage Tanks	C26	
ASTM C 512-10	Creep of Concrete in Compression	C27	
ASTM C 567-14	Unit Mass of Structural Lightweight Concrete	C28	
ASTM C 597-09	Pulse Velocity Through Concrete	C29	
ASTM C 617-12	Capping Cylindrical Specimens	C30	
ASTM C 642-13	Density, Absorption, and Voids	C31	
ASTM C 666-03 (08)	Freezing & Thawing Concrete Specimens	C32	
ASTM C 672-12	Scaling Resistance by Deicing Chemicals	C33	
ASTM C 779-12	Abrasion Resistance of Horizontal Surfaces	C34	
ASTM C 803-03 (10)	Penetration Resistance of Hardened Concrete	C35	
ASTM C 805-13	Rebound Number of Hardened Concrete	C36	
ASTM C 823-12	Examination and Sampling Hardened Concrete in Cnstrctn	C37	
	Test Procedure (ASTM C 1077-14)		
ASTM C 856-14	Petrographic Examination of Hardened Concrete	C38	
ASTM C 873-10	Compressive Strength of Cast in Place Cylinders	C39	X
ASTM C 876-09	Half-Cell Potentials of Uncoated Reinforcing Steel	C40	

ASTM C 900-13	Concrete Pullout Strength	C41	
ASTM C 918-13	Early Age Compression Test	C42	
ASTM C 944-12	Abrasion Resistance by Rotating-Cutter Method	C43	
ASTM C 1040- 08 (13)	Density of Concrete by Nuclear Method	C44	
ASTM C 1074-11	Estimating Concrete Strength by Maturity Method	C45	
ASTM C 1084-10	Portland Cement Content of Hardened Concrete	C46	
ASTM C 1152-04 (12)	Acid-Soluble Chloride in Concrete	C47	
ASTM C 1202-12	Electrical Indication of Concrete to Resist Chloride Ion	C48	
ASTM C 1218-99 (08)	Water-Soluble Chloride in Concrete	C49	
ASTM C 1231-14	Unbonded Caps	C50	
CRD-C 114-97	Soundness by Freezing and Thawing of Concrete	C51	

TABLE 4 - MASONRY

Test Method	Test Procedure (ASTM C 1093-13)	No.	Approved
ASTM C 109-13	Compressive Strength of Cmnt Mortars Using Cube Specimens	M1	
ASTM C 140-14	Sampling and Testing Concrete Masonry and Related Units	M2	
ASTM C 151-09	Autoclave Expansion of Portland Cement	M3	
ASTM C 185-08	Air Content of Hydraulic Cement Mortar	M4	
ASTM C 187-11	Normal Consistency of Hydraulic Cement	M5	
ASTM C 266-13	Time of Setting of Hydraulic-Cmnt Paste by Gillmore Needles	M6	
ASTM C 305-13	Mech Mixing of Cmnt Pastes & Mortars of Plstc Consistency	M7	
ASTM C 780-14	Evaluation of Mortars for Plain and Reinforced Unit Masonry	M8	
ASTM C 1019-13	Sampling and Testing Grout	M9	

TABLE 5 - ROCK

Test Method	Test Procedure (ASTM D 3740-12)	No.	Approved
ASTM D 2845-08	Pulse Velocity and Ultrasonic Elastic Constants	R1	
ASTM D 2936-08	Direct Tensile Strength of Intact Rock Core	R2	
ASTM D 3967-08	Tensile Strength, Splitting (Brazilian) Method	R3	
ASTM D 4435-13	Rock Bolt Anchor Pull Test	R4	
ASTM D 4543-08	Preparing Rock Core Specimens and Determining Tolerances	R5	
ASTM D 4644-08	Slake Durability of Shales and Weak Rocks	R6	
ASTM D 5312-12 (13)	Durability of Rock to Freezing and Thawing	R7	
ASTM D 5313-12 (13)	Durability of Rock to Wetting and Drying	R8	
ASTM D 5607-08	Laboratory Direct Shear Tests on Rock Under Cnst Normal	R9	
ASTM D 5731-08	Point Load Index	R10	
ASTM D 5878-08	Rock-Mass Classification for Engineering Purposes	R11	
ASTM D 7012-13	Compr Strgth & Elastic Moduli of Rock Core Specimens	R12	
CRD-C 144-92	Resistance of Rock to Freezing and Thawing	R7	
CRD-C 148-69	Expansive Breakdown on Soaking in Ethylene Glycol	R13	
CRD-C 169-97	Resistance of Rock to Wetting and Drying	R8	

TABLE 6 - SOIL

Test Method	Test Procedure (ASTM D 3740-12)	No.	Approved
ASTM D 421-85 (07)	Dry Preparation for Particle Size Distribution & Soil Constants	S1	
ASTM D 422-63 (07)	Particle Size Analysis	S2	X
ASTM D 558-11	Moisture-Density of Soil-Cement	S3	
ASTM D 559-03	Wetting & Drying Soil-Cement	S4	
ASTM D 560-03	Freezing & Thawing Soil-Cement	S5	
ASTM D 698-12	Compaction Characteristics by Standard Effort	S6	
ASTM D 854-10	Specific Gravity of Soils	S7	
ASTM D 1140-00 (06)	Material Finer than 75 μ m (No. 200) Sieve	S8	X
ASTM D 1556-07	Density & Unit Weight by Sand Cone	S9	X
ASTM D 1557-12	Compaction Characteristics by Modified Effort	S10	X
ASTM D 1883-07	CA Bearing Ratio (CBR)	S11	
ASTM D 2166-13	Unconfined Compressive Strength	S12	
ASTM D 2167-08	Density & Unit Weight by Rubber Balloon	S13	
ASTM D 2168-10	Calib of Laboratory Mechanical-Rammer Soil Compactors	S14	
ASTM D 2216-10	Water Content	S15	X
ASTM D 2434-68 (06)	Permeability by Constant Head	S16	
ASTM D 2435-11	One-Dimensional Consolidation Properties	S17	
ASTM D 2487-11	Classification of Soils	S18	
ASTM D 2488-09	Descr & ID of Soils (Visual-Manual Procedure)	S19	
ASTM D 2850-03 (07)	Unconsolidated, Undrained Strength in Triaxial Compression	S20	
ASTM D 2937-10	Density by Drive Cylinder Method	S21	
ASTM D 2974-13	Moisture, Ash, & Organic Matter of Peat & Othr Org Soils	S22	
ASTM D 3080-11	Direct Shear Test in Consolidated Drained Conditions	S23	
ASTM D 4220-14	Preserving & Transporting Samples	S24	
ASTM D 4253-00 (06)	Maximum Index Density by Vibratory Table	S25	
ASTM D 4254-00 (06)	Minimum Index Density	S26	
ASTM D 4318-10	Liquid & Plastic Limits & Plasticity Index	S27	X
ASTM D 4546-08	One-Dimensional Swell or Settlement Potential	S28	
ASTM D 4643-08	Determination of Water Content of Soil by Microwave Oven	S29	
ASTM D 4767-13	Consolidated-Undrained Triaxial Compression	S30	
ASTM D 5084-10	Hydraulic Conductivity using a Flexible Wall Permeameter	S31	
ASTM D 6938-10	Density and Wtr Content by Shallow Depth Nucl Method	S32	X