

TEST REPORTS & MSDS OF GCEM & BENTOEARTH



ZEEMAX VENTURE

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TESTING LABS

CELP-MALAYSIA & AL FUTTAIM EXOVA LLC (UAE / UK)

Zeemax Venture's Earthing Products were Tested & Analyzed

- For Physical & Electrical Properties at H.V. Laboratory, Department of Electrical and Electronic Engineering, UPM-Universiti Putra Malaysia, which operates under the purview of **CELP-Centre for Electromagnetic and Lightning Protection Malaysia**.
- For Chemical Composition, at Chemical Laboratory, Department of Chemical Engineering, UPM-Universiti Putra Malaysia, Under the directives of **CELP-Centre for Electromagnetic and Lightning Protection Malaysia**.

CELP Malaysia - Centre for Electromagnetic & Lightning Protection

Centre for Electromagnetic and Lightning Protection (CELP) is one of the few institutions in the world that is dedicated to the research and promotion of the scientifically proven engineering and physics of lightning safety and protection. It operates under the Faculty of Engineering, UPM-Universiti Putra Malaysia (<http://research.upm.edu.my/CELP>)

Universiti Putra Malaysia (UPM), is ranked the Second Top university in Malaysia by Uni Rank World University Ranking, the ranking also places UPM at the seventh rank in Southeast Asia, and is also recognized as one of Malaysia's leading Research Universities offering undergraduate & postgraduate courses. As per the decision taken by the Advisory Committee Members of CELP (then called Centre of Excellence in Lightning Protection) in the late 2008, the institution was officially transferred to the Faculty of Engineering, UPM-Universiti Putra Malaysia. This decision is seen by many scholars as a big leap in the development of lightning science, taken at the right time and right place. With the invaluable support and effort extended by the well-known scholars and scientists, who lined up as the Advisory Committee Members, the CELP is now blossoming as one of the leading institutions in the world in promoting the scientifically proven methodologies and techniques in Research, Education and Applications of Lightning and related subjects.

AL Futtaim Exova LLC (UAE / UK)

Also included in this document Test Reports of Zeemax Product, from AL Futtaim Exova LLC, a JV between Exova (UK) Ltd & Al Futtaim Group of Dubai-UAE.

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Exova operates 142 labs & offices in 32 countries throughout Europe, the Americas, the Middle East & Asia/Asia Pacific.



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ELECTRICAL EARTHING / GROUNDING MATERIAL TEST REPORT

(This report contains 04 Pages)

Product Description	One Sample of BENTOEARTH
Product Owner / Client	Zeemax Venture
Sample Size and nature	25 kg sealed sac with production/brand logo and company details printed in the cover
Sample Submitted by	Zeemax Venture (Malaysia)
Sample Received Date	07 March, 2015
Date Tested	09 March, 2015
Date Reported	18 March, 2015
Lab Report Number	CELP-ZEEMAX-032015-001

TEST – RESULTS

Physical Properties

TEST	UNIT	RESULT / REMARKS
VISUAL APPEARANCE	-	DARK TAN (POWDERED FORM)
DRY BULK DENSITY (AVERAGE) @ 47.7N COMPACTION FORCE	g/cm ³	1.17
RESISTIVITY (AVERAGE) @ 100% MOISTURE CONTENT SAMPLE MIXED WITH WATER (1:1 RATIO BY VOLUME)	Ω - m	0.8
WET BULK DENSITY (AVERAGE) @ 1:1 RATIO BY VOLUME	g/cm ³	1.58
CONDUCTIVITY (AVERAGE) @ 100% MOISTURE CONTENT SAMPLE MIXED WITH WATER (1:1 RATIO BY VOLUME)	S/m	1.25

Sample has been Tested and Analyzed for Physical properties at H.V. Laboratory, CELP, UPM



Signature & Stamp

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 Professor, Department of Electrical and Electronics Engineering, Universiti Putra Malaysia
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CENTRE for ELECTROMAGNETIC and LIGHTNING PROTECTION

ELECTRICAL EARTHING / GROUNDING MATERIAL TEST REPORT (Contd)

Chemical Composition

Spectroscopic / Microscopic Analysis of BENTOEARTH (BENTONITE) for Chemical Composition

Materials Tested for Chemical Composition at Department of Chemical Engineering, UPM

Element Line	Weight %	Weight % Error	Atom %	Atom% Error	Compnd %	Norm. Compnd%
O K	4.99	---	9.1	+/-0.07	---	---
Na K	1.15	+/-0.08	1.46	+/-0.11	1.15	1.15
Mg K	0.9	+/-0.08	1.08	+/-0.09	0.9	0.9
Al K	27.36	+/-0.26	29.62	+/-0.28	27.36	27.36
Si K	44.46	+/-0.36	46.25	+/-0.38	44.46	44.46
Si L	---	---	---	---	---	---
Cl K	2.24	+/-0.10	1.85	+/-0.08	2.24	2.24
Cl L	---	---	---	---	---	---
K K	0.84	+/-0.08	0.63	+/-0.06	0.84	0.84
K L	---	---	---	---	---	---
Ca K	---	---	---	---	---	---
Ca L	---	---	---	---	---	---
Ti K	6.45	+/-0.26	3.94	+/-0.16	6.45	6.45
Ti L	---	---	---	---	---	---
Fe K	11.61	+/-0.33	6.07	+/-0.17	16.6	16.6
Fe L	---	---	---	---	---	---
Total	100		100		100	100

CONCLUDING REMARKS:

1. Chemical Description of the material: Hydrated Sodium Calcium Aluminum Magnesium Silicate Hydroxide (Montmorillonite / Bentonite)
2. No Toxic Substance found in the Chemical Composition of the material.
3. The product is Eco-Friendly / Environment- Friendly and a Green product



Signature & Stamp

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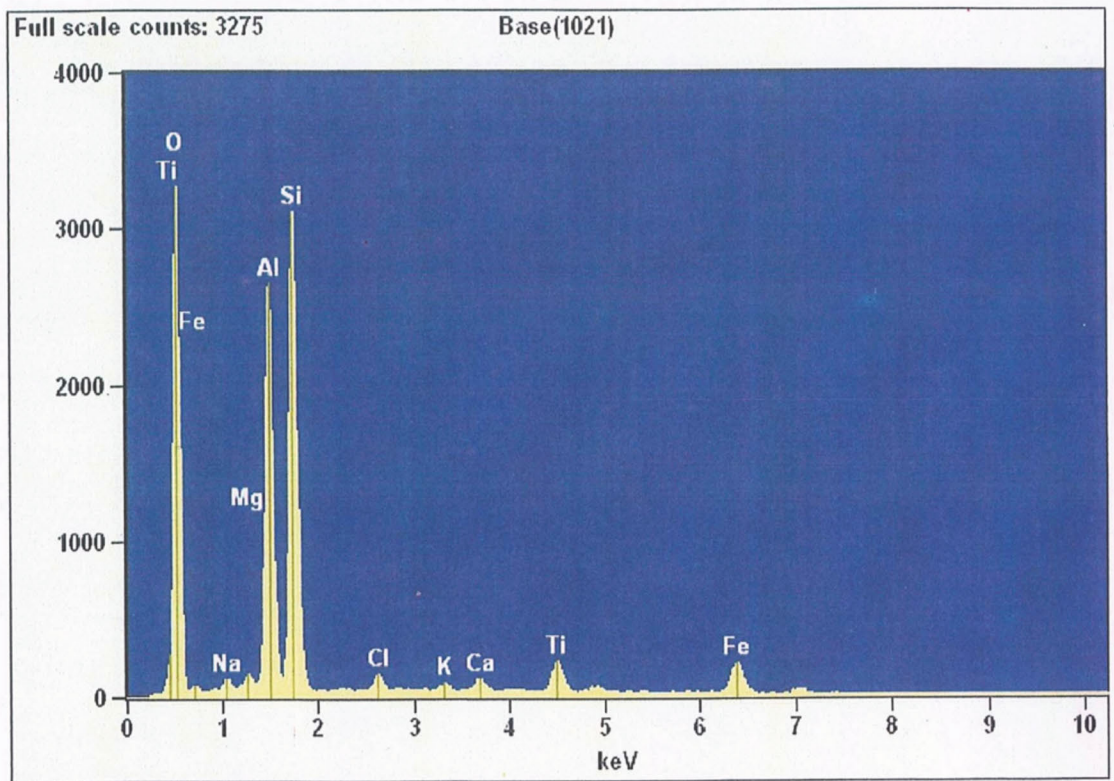
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CENTRE for ELECTROMAGNETIC and LIGHTNING PROTECTION

SPECTRAL LINES OF ELEMENTS IN THE MATERIAL SAMPLE



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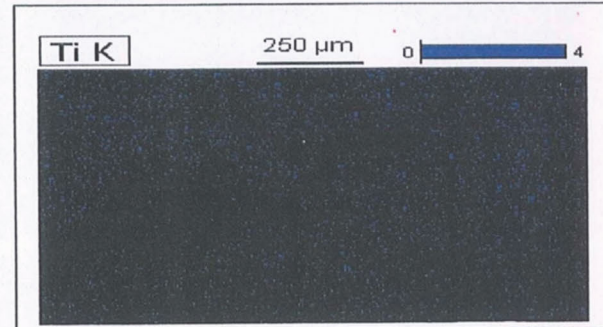
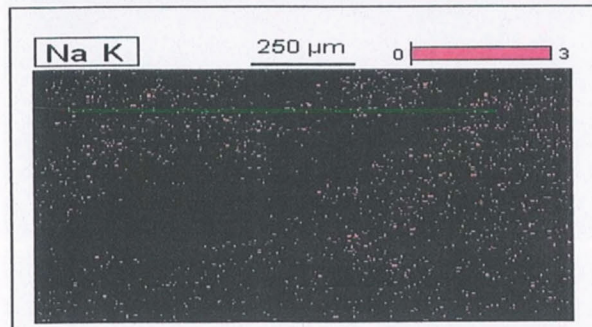
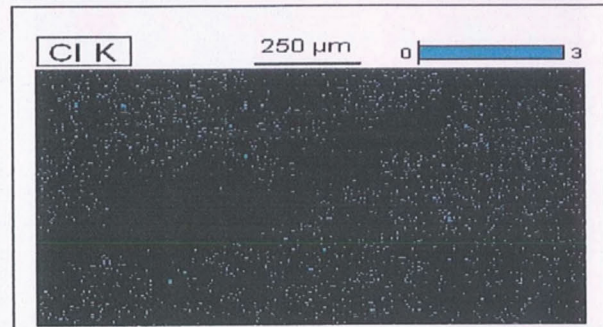
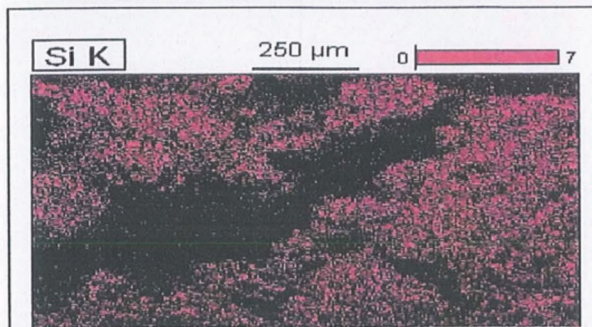
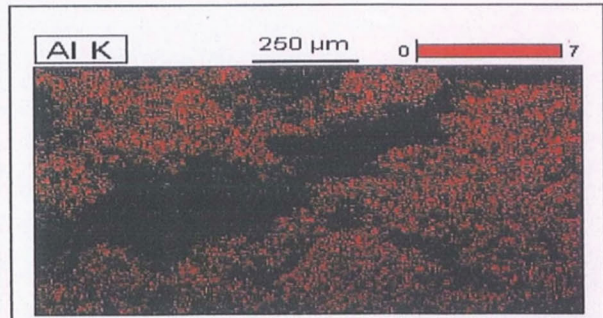
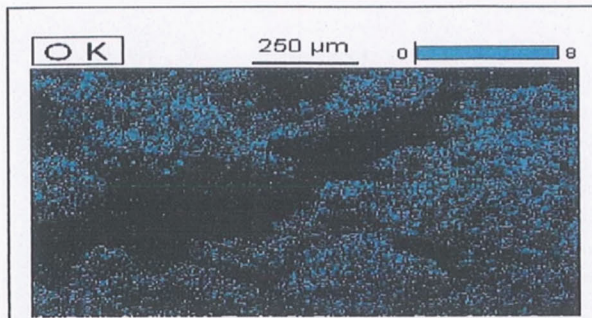
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CENTRE for ELECTROMAGNETIC
and LIGHTNING PROTECTION

SPECTROSCOPIC IMAGING OF THE MATERIAL SAMPLE

Data Type: Counts Mag: 100 Acc. Voltage: 20.0 kV Detector: Nanotrace



Signature & Stamp

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ELECTRICAL EARTHING / GROUNDING MATERIAL TEST REPORT

(This report contains 02 Pages)

Product Description	One Sample of GCEM (Ground Conductivity Enhancing Material)
Product Owner / Client	Zeemax Venture
Sample Size and nature	25 kg sealed sac with production/brand logo and company details printed in the cover
Sample Submitted by	Zeemax Venture (Malaysia)
Sample Received Date	07 March, 2015
Date Tested	09 March, 2015
Date Reported	18 March, 2015
Lab Report Number	CELP-ZEEMAX-032015-002

TEST – RESULTS

Physical Properties

TEST	UNIT	RESULT / REMARKS
VISUAL APPEARANCE	-	DARK TAN (POWDERED FORM)
DRY BULK DENSITY (AVERAGE) @ 47.7N COMPACTION FORCE	g/cm ³	1.07
RESISTIVITY (AVERAGE) @ 100% MOISTURE CONTENT SAMPLE MIXED WITH WATER (1:1 RATIO BY VOLUME)	Ω - m	0.60
WET BULK DENSITY (AVERAGE) @ 1:1 RATIO BY VOLUME	g/cm ³	1.49
CONDUCTIVITY (AVERAGE) @ 100% MOISTURE CONTENT SAMPLE MIXED WITH WATER (1:1 RATIO BY VOLUME)	S/m	1.70

Sample has been Tested and Analyzed for Physical properties at H.V. Laboratory, CELP, UPM



Signature & Stamp

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CENTRE for ELECTROMAGNETIC and LIGHTNING PROTECTION

Chemical Composition

1. Metal elements exist in the material sample: Fe, Na, Mg, Al, Ca, Ti
2. Non-metal solid elements exist in the material sample: Si
3. Gaseous elements exist in the material sample: O, Cl

Equipment at Chemical Laboratory, Department of Chemical Engineering, UPM, has been used to Test and Analyze Chemical Composition of the sample.

CONCLUDING REMARKS:

1. Chemical Description of Major Component found: Hydrated Sodium Calcium Aluminum Magnesium Silicate Hydroxide (Montmorillonite)
2. No Toxic Substance found in the Chemical Composition of the material.
3. The product is Eco-Friendly / Environment- Friendly and a Green product



Signature & Stamp

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IEC 62561-7 COMPLIANCE

CELP MALAYSIA TEST REPORT - 003



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CENTRE for ELECTROMAGNETIC and LIGHTNING PROTECTION

ELECTRICAL EARTHING / GROUNDING MATERIAL TEST REPORT

(This report contains 01 Page)

Product Description	Samples of GCEM & BENTOEARTH
Product Owner / Client	Zeemax Venture
Sample Size and nature	25 kg sealed sacs with production/brand logo and company details printed in the cover
Sample Submitted by	Zeemax Venture (Malaysia)
Sample Received Date	07 March, 2015
Date Tested	09 March, 2015
Date Reported	18 March, 2015
Lab Report Number	CELP-ZEEMAX-032015-003

1. **GCEM-Ground Conductivity Enhancing Material**

RESISTIVITY (AVERAGE) = 0.6 Ω -m (CELP-Lab Report # CELP-ZEEMAX-032015-002)
@ 100% Moisture Content (Sample mixed with Water in 1:1 ratio by Volume)

2. **BENTOEARTH – Basic form of Conductivity Enhancing Material**

RESISTIVITY (AVERAGE) = 0.8 Ω -m (CELP-Lab Report # CELP-ZEEMAX-032015-001)
@ 100% Moisture Content (Sample mixed with Water in 1:1 ratio by Volume)

GCEM & BENTOEARTH were Tested for Chemical Composition at Department of Chemical Engineering, UPM & the results are (CELP-Lab Report # CELP-ZEEMAX-032015-001 & 002):

- No Toxic Substance Found in the Chemical Composition of both materials.
- Both products are Eco-Friendly, Environment-Friendly and Green Products.
- Major ingredient in both products is MONTMORILLONITE, a non-corrosive material, with acceptable corrosion protection performance

3. **CONCLUDING REMARKS:** GCEM & BENTOEARTH, both have low resistivity & contain non-corrosive material, with acceptable corrosion resistance performance, conform to IEC 62561-7 Standard.



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AL FUTTAIM EXOVA LLC

TEST REPORTS - (Page 1/5)

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Testing. Advising. Assuring.

REPORT OF TESTS

Description	One Sample of Bentoeearth		
Tested for	Steelman Electro Mechanical Company (L.L.C), P.B.No.47461, Dubai		
Lab Report No.	WR12-04940 (Rev.01)(Page 1 of 1)	Request No.	D12-01658
Date Received	01.07.2012	Date Reported	12.07.2012

Client's reference : Requisition dated 01.07.2012
Product name : Bentoeearth
Product Owner : Zeemax Venture
Exclusive distributor : Steelman Electro Mechanical Company (L.L.C)
AFE sample no. : D12-01658/01

1.0 Introduction

Further to the test work instructions received from M/s. Steelman Electro Mechanical Company (L.L.C.), dated 01.07.2012, one sample of Bentoeearth /Bentonite provided has been analysed for the following by Al Futtaim Exova LLC;

2.0 Results

Test	Test Method	Unit	Results
Colour	Visual	-	Tan
pH value @ 20°C (8% solution)	pH Meter	pH Unit	8.6

(11)
إكسوكفا الفطيم
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المطعم إكسوكفا المحدودة
Al Futtaim Exova LLC
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PAUL WILSON
Chemistry Laboratory Manager

For and on behalf of Al Futtaim Exova (L.L.C)

Tested by: BV/GG, Date tested: 04.07.2012-08.07.2012

Sampled by the client, certificate of sampling was not given.

Rev.01 Title amended

This report shall only be reproduced in full. Approval of the testing laboratory is required for partial reproduction.
Samples will be retained for a period of one month only, unless otherwise requested.
The test results relate only to the samples tested.

AL FUTTAIM EXOVA LLC

TEST REPORTS - (Page 2/5)

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Report No: D12-02876

Issue No: 1

Material Test Report

Client: Steelman Electro Mechanical Company LLC
Post Box: N.G.
Contact: Muhammad Umair
Project No: N.G.
Project Name: Analysis of Bentonite
Consultant: N.G.
Owner: Zeemax Venture
Contractor: Steelman
Project Location: Dubai
Tel/ Fax No: +971 (0)4 2575591



Mahesh Hingorani

Approved Signatory: Mahesh Hingorani
(Civil Sites Manager)
Date of Issue: 15/07/2012

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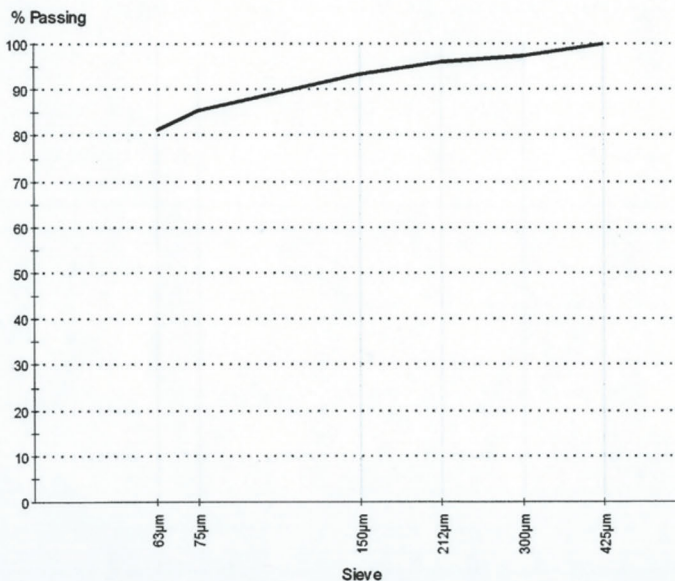
Sample Details

Received Date: 01/07/2012	Client Sample ID: 1
Work Order ID: D12-01658	Date Sampled: N/A
Sample ID: D12-01658-S1	Sample Submitted By: Client
Sampling Method: N.G.	Source: ZEEMAX VENTURE
Sample Location: N.G.	Sampled By: Client
Sample Cert No: N.G.	Sample Preparation: see below
Lot No: N/A	Sample Size(Kg): 30
Lot Size: N/A	Date Tested: 09/07/2012
Order No: N/A	Test Method Variation: None
Client Sample Desc.: BENTOEARTH/BENTONITE	Lab Sample Desc.: Clay Material

Particle Size Distribution

Method: BS 1377-2: 1990 cl 9.3

Initial Sample Preparation:
BS 1377-1:1990 cl 7.3 & 7.4.5

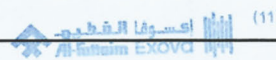


Sieve Size	% Passing	Limits
425µm	100	
300µm	97	
212µm	96	
150µm	93	
75µm	85	
63µm	81	

Comments

Tested by: Rajeev
This test is also accredited by DAC

Form No: 18909.V1.00, Report No: D12-02876



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TEST REPORTS - (Page 3/5)

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Report No: D12-02873

Issue No: 1

Material Test Report

Client: Steelman Electro Mechanical Company LLC
Post Box: N.G.
Contact: Muhammad Umair
Project No: N.G.
Project Name: Analysis of Bentonite
Consultant: N.G.
Owner: Zeemax Venture
Contractor: Steelman
Project Location: Dubai
Tel/ Fax No: +971 (0)4 2575591

Approved Signatory: Mahesh Hingorani
(Civil Sites Manager)
Date of Issue: 15/07/2012

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Sample Details

Received Date: 01/07/2012	Client Sample ID: 1
Work Order ID: D12-01658	Date Sampled: N/A
Sample ID: D12-01658-S1	Sample Submitted By: Client
Sampling Method: N.G	Source: ZEEMAX VENTURE
Sample Location: N.G	Sampled By: Client
Sample Cert No: N.G.	Sample Preparation: see below
Lot No: N/A	Sample Size(Kg): 30
Lot Size: N/A	Date Tested: 09/07/2012
Order No: N/A	Test Method Variation: None
Client Sample Desc.: BENTOEARTH/BENTONITE	Lab Sample Desc.: Clay Material

Test Results

Method	Test / Parameter	Result	Spec. Limits
Aggregate Uncompacted Bulk Density	Uncompacted Bulk Density (Mg/m ³)	0.82	
BS 812-2: 1995	Voids (%)	N/A	
Condition of Aggregate: Oven Dried	Bulking (%)	N/A	

Comments

Initial sample preparation: BS 812 part 102: 1989
Tested by: Rajeev

Form No: 18909.V1.00, Report No: D12-02873

AL FUTTAIM EXOVA LLC

TEST REPORTS - (Page 4/5)

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Report No: D12-02875
Issue No: 1

Material Test Report

Client: Steelman Electro Mechanical Company LLC
Post Box: N.G.
Contact: Muhammad Umair
Project No: N.G.
Project Name: Analysis of Bentonite
Consultant: N.G.
Owner: Zeemax Venture
Contractor: Steelman
Project Location: Dubai
Tel/ Fax No: +971 (0)4 2575591

Mahesh Hingorani
Approved Signatory: Mahesh Hingorani
(Civil Sites Manager)
Date of Issue: 17/07/2012
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Sample Details

Received Date: 01/07/2012	Client Sample ID: 1
Work Order ID: D12-01658	Date Sampled: N/A
Sample ID: D12-01658-S1	Sample Submitted By: Client
Sampling Method: N.G.	Source: ZEEMAX VENTURE
Sample Location: N.G.	Sampled By: Client
Sample Cert No: N.G.	Sample Preparation: see below
Lot No: N/A	Sample Size(Kg): 30
Lot Size: N/A	Date Tested: 09/07/2012
Order No: N/A	Test Method Variation: None
Client Sample Desc.: BENTOEARTH/BENTONITE	Lab Sample Desc.: Clay Material

Test Results

Method	Test / Parameter	Result	Spec. Limits
Moisture Content BS 1377-2: 1990	Moisture Content (%)	7.8	
Drying Temperature of Soil (°C): 79			

Comments

Initial sample preparation: BS 812 part 102: 1989
Tested by: Rajeev

Form No: 18909.V1.00, Report No: D12-02875

AL FUTTAIM EXOVA LLC

TEST REPORTS - (Page 5/5)

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Report No: D12-02874

Issue No: 1

Material Test Report

Client: Steelman Electro Mechanical Company LLC
Post Box: N.G.
Contact: Muhammad Umair
Project No: N.G.
Project Name: Analysis of Bentonite
Consultant: N.G.
Owner: Zeemax Venture
Contractor: Steelman
Project Location: Dubai
Tel/ Fax No: +971 (0)4 2575591

Mahesh Hingorani

Approved Signatory: Mahesh Hingorani
(Civil Sites Manager)
Date of Issue: 15/07/2012

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Sample Details

Received Date:	01/07/2012	Client Sample ID:	1
Work Order ID:	D12-01658	Date Sampled:	N/A
Sample ID:	D12-01658-S1	Sample Submitted By:	Client
Sampling Method:	N.G	Source:	ZEEMAX VENTURE
Sample Location:	N.G	Sampled By:	Client
Sample Cert No:	N.G.	Sample Preparation:	see below
Lot No:	N/A	Sample Size(Kg):	30
Lot Size:	N/A	Date Tested:	09/07/2012
Order No:	N/A	Test Method Variation:	None
Client Sample Desc.:	BENTOEARTH/BENTONITE	Lab Sample Desc.:	Clay Material

Test Results

Method	Test / Parameter	Result	Spec. Limits
Liquid Limit BS 1377-2: 1990 cl 4.3	Liquid Limit	105	
Plastic Limit BS 1377-2: 1990 cl 5.3	Plasticity Index	Not determinable	
Plasticity Index BS 1377-2: 1990 cl 5.4	Retained on 425µm (%)	N/A	
Preparation:			

Comments

Tested by: Shameer



MSDS (Material Safety Data Sheet)

BENTOEARTH

Based on Regulation (EC) no. 1907/2006 (REACH) Article 31 Annex II &
OSHA Hazard Communication Standard 29 CFR 1910.1200

SHEET # 1/4

HMIS RATING (Hazardous Materials Identification System Rating)

HEALTH	1 (MINIMAL HAZARD)
FLAMMABILITY	0 (NON COMBUSTIBLE)
REACTIVITY	0 (STABLE)
PERSONAL PROTECTION	E

SECTION 1 : PRODUCT & COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION:

Product Name: **BENTOEARTH**
 Brand Name: **BANTOEARTH**
 Harmonized System Codes (**HS Code**) : 2508.1000
 Chemical Family: Naturally Occurring Mineral, Montmorillonite
 Formula: Naturally occurring Hydrated Aluminosilicate of Sodium, Calcium, Magnesium, and Iron
 Product Use: Used in Electrical Earthing (Grounding) to achieve Low Resistance of an Earthing (Grounding) System.

PRODUCT OWNER:

Product Owner: **ZEEMAX VENTURE (JOINT VENTURE BETWEEN MALAYSIAN, SOUTH AFRICAN & USA UNIVERSITY RESEARCH AFFILIATES)**
 Email: info@zeemaxventure.com
 Web Site: www.zeemaxventure.com

SECTION 2 : COMPOSITION & INFORMATION ON INGREDIENTS

HYDROUS ALUMINIUM SILICATE	CAS R No 1302-78-9		98 % BY WEIGHT		
HAZARDOUS INGREDIENTS	CAS R No	OSHA PEL(RF)	ACGIH TLV (RF)	NIOSH REL (RF)	TSCAC
CRYSTALLINE QUARTZ	14808-60-7	0.100 mg/m ³	0.025 mg/m ³	0.050 mg/m ³	YES
CRYSTOBALITE	14464-46-1	0.050 mg/m ³	0.050mg/m ³	0.050 mg/m ³	YES
TRIDYMIT	15468-32-3	0.050 mg/m ³	0.050mg/m ³	0.050 mg/m ³	YES

ABBREVIATIONS AND ACRONYMS

CAS R No: Chemical Abstracts Service Registration Number
OSHA PEL (RF): OSHA Permissible Exposure Limit (Respirable Fraction), 8 hour TWA (Time-Weighted-Average)
ACGIH TLV (RF): American Conference of Governmental Industrial Hygienists Threshold Limit Value (Respirable Fraction), 8hrTWA, 40hr/week
NIOSH REL (RF): National Institute for Occupational Safety & Health, Recommended Exposure Limit(Respirable Fraction), 10hr TWA, 40hr/ week
TSCAC : Toxic Substance Control Act Compliance

SECTION 3 : HAZARDOUS IDENTIFICATION**PERSONAL HEALTH EFFECTS:****ROUTES OF EXPOSURE**

- ✓ EYE: Dust or Powder of BENTOEARTH may cause mild irritation to eye tissues.
- ✓ SKIN: Non irritating to the skin
- ✓ INHALATION: Repeated or Prolonged inhalation may cause toxic effects.
- ✓ INGESTION: No adverse effects expected for normal, incidental ingestion.

TARGET ORGANS

- LUNGS: Normal exposure during application of the material will not result in serious adverse effects if application is done as prescribed in BENTOEARTH / GCEM / IEC brochure. However this product has the potential for generation of respirable dust during use if not handled properly with gross negligence. Excessive occupational, uncontrolled and prolonged inhalation of dust may cause lung disease. Dust may contain respirable crystalline silica. Over exposure to these dusts may result in Pneumoconiosis, a respiratory disease caused by severe or prolonged exposure to the dust. Occupational exposure to respirable crystalline silica should be monitored and controlled.

SECTION 4 : FIRST AID MEASURES

EYE CONTACT: Flush eyes immediately with large amounts of water. If irritation persists get medical attention.

SKIN CONTACT: No special measures required. Get medical attention if irritation develops or persists.

INHALATION: Prolong inhalation may cause toxic effects. Remove to fresh air for any signs of breathing problem. If not breathing, give artificial respiration or give oxygen by trained personnel. Get medical attention if needed.

INGESTION: No special measures required. If ingestion of a large amount does occur, seek medical attention.

NOTES TO PHYSICIAN: Provide general supportive measures and treat symptomatically

SECTION 5 : FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES: This material is non-combustible & will not burn.

UNUSUAL FIRE & EXPLOSION HAZARDS: None known

EXTINGUISHING MEDIA: Use any media suitable for the surrounding fires. Dry-Chemical, CO₂, water spray or regular foam.

INSTRUCTIONS FOR FIREFIGHTERS: Material can be slippery when wet

PROTECTIVE EQUIPMENT FOR FIREFIGHTERS: For the surrounding fires, the protective equipment is same as in any fire wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 : ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Vacuum if possible to avoid generating airborne dust. Avoid breathing dust. Wear an approved respirator.

PERSONAL PRECAUTIONS: Material can be slippery when wet. Wear a dust mask & safety glasses or goggles if dust is generated above exposure limits accidentally or unintentionally during handling.

ENVIRONMENTAL PRECAUTIONS: No special environmental precautions required

SECTION 7 : HANDLING AND STORAGE

PRECAUTIONS: No specific safety phrase has been found applicable for this product

HANDLING: Keep formation of airborne dusts to a minimum and do not breathe dust. Use normal precautions against bag breakage or spills of bulk material. Provide appropriate exhaust ventilation at places where dust is formed. In case of insufficient ventilation, wear suitable respiratory equipment. Launder clothing that has become dusty. Empty containers (bags, bulk containers, storage tanks, etc.) retain silica residue and must be handled in accordance with provisions of this Material Safety Data Sheet.

STORAGE: Use good housekeeping in storage and guard against dust accumulation of this material. No special storage conditions required, however care should be taken to keep the material dry before use. No special restrictions on storage with other products.

SECTION 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE GUIDELINES: Occupational exposure to respirable crystalline silica should be monitored and controlled. For extra precaution in case of repeated, excessive & prolonged applications, use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

PERSONAL PROTECTION

EYE PROTECTION: Wear Safety glasses with side shields to avoid any accidental spill or dust formation beyond normal limits during the application of material that may cause mild irritation to the eye tissues.

RESPIRATORY PROTECTION: Normal application of the material does not require this; however use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit.

SKIN AND BODY PROTECTION: No special protective equipment required.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: As appropriate for work environment. Normal Working Gloves are recommended for Hand Protection. Dusty clothing should be laundered before reuse.

GENERAL HYGIENE CONSIDERATIONS: Use good industrial hygiene practices in handling this material.

WASTE DISPOSAL METHOD : No Special Method , Dispose in accordance to Local / State / Federal Regulations

SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Powder
COLOUR / ODOUR	Colour Varies (Tan to Grey)/ Odorless
BULK DENSITY	820-900 Kg / m ³
DRY PARTICLE SIZE [TO PASS THROUGH 150µM SIEVE	98 %
RESISTIVITY	0.8 to 2.5 (Ω / m)
pH SLURRY (8%)	7.5 to 8.5
CONDUCTIVITY	0.4 to 0.1.25 (S / m)
FLASH POINT	Non-Flammable
FLAMMABILITY LIMITS IN AIR, LOWER % BY VOLUME	Non-Explosive
AUTO-IGNITION TEMPERATURE	N / A
SOLUBILITY IN WATER	Slight but negligible
BOILING POINT	2192° F (1200°C) Estimated
SPECIFIC GRAVITY	0.82-0.90
AVERAGE MOISTURE CONTENT & LIQUID LIMIT	≤ 13 % & ≥ 100 %
VAPOR PRESSURE / VAPOR DENSITY / EVAPORATION RATE	N / A
FREEZING / MELTING TEMPERATURE	N / A

SECTION 10 : STABILITY AND REACTIVITY	
CHEMICAL STABILITY	Stable at normal conditions
CONDITIONS TO AVOID	Keep dry until used
INCOMPATIBILITY (MATERIALS TO AVOID)	None known
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS	None Known
HAZARDOUS POLYMERIZATION	Will not occur

SECTION 11 : TOXICOLOGY INFORMATION	
INHALATION	Prolonged exposure, crossing limits specified in Section 2 may cause Pneumoconiosis, Silicosis & other respiratory diseases.
SKIN CONTACT	It is not considered as skin irritant but may cause irritation
EYE CONTACT	May cause mild irritation to Eyes
INGESTION	Not possible normally but if taken accidentally may not cause death (not poisonous)

SECTION 12 : ECOLOGICAL INFORMATION
<p>ECOTOXICITY: This material is not expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.</p> <p>ENVIRONMENTAL EFFECTS: Based on the physical properties of this material , it does not contain any heavy metal or toxic material and is completely "Environment Friendly"</p>

SECTION 13: DISPOSAL CONSIDERATIONS
The material has NOT regulated as HAZARDOUS waste. Disposal should be in accordance with the principles of "Duty of Care", observing local and national applicable regulations.

SECTION 14: TRANSPORT INFORMATION
<p>GENERAL: Not classified as "Hazardous" for any kind of transport.</p> <p>Not regulated as dangerous goods by IATA (International Air Transport Association)</p> <p>Not regulated as dangerous goods by IMGD (International Maritime Dangerous Goods)</p> <p>Not regulated as dangerous goods by IMO (International Maritime Organization)</p> <p>Not regulated as dangerous goods by ADR (European License for Transporting Goods)</p> <p>Not regulated as dangerous goods by DOT (Department of Transportation)</p>

SECTION 15: REGULATORY INFORMATION
This material is not known to be hazardous by any international standard and hence this material is not classified as dangerous substance under the Classification, Packaging and Labeling of dangerous substances regulations.

SECTION 16: OTHER INFORMATION
This Material Safety Data Sheet contains <u>Confidential Proprietary Information</u> & is not to be disclosed to the general public or to competition except as required by law. The information accumulated herein is believed to be accurate to the best of ZEEMAX VENTURE'S knowledge. This information is offered solely for use in customer's evaluation of this material in respect to <u>Safety, Health, and Environmental Hazards</u> . Customers should satisfy themselves, that the product which they have selected is entirely suitable for their purpose under their conditions of use. For any further information, please contact the product owner ZEEMAX VENTURE

MSDS (Material Safety Data Sheet) GCEM (Ground Conductivity Enhancing Material)

Based on Regulation (EC) no. 1907/2006 (REACH) Article 31 Annex II &

OSHA Hazard Communication Standard 29 CFR 1910.1200

SHEET # 1/4

HMIS RATING (Hazardous Materials Identification System Rating)

HEALTH	1 (MINIMAL HAZARD)
FLAMMABILITY	0 (NON COMBUSTIBLE)
REACTIVITY	0 (STABLE)
PERSONAL PROTECTION	E

SECTION 1 : PRODUCT & COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION:

Product Name: **GCEM (Ground Conductivity Enhancing Material)**

Chemical Family: Naturally Occurring Minerals / Substances

Product Use: Used in Electrical Earthing (Grounding) to achieve Low Resistance of an Earthing (Grounding) System.

PRODUCT OWNER:

Product Owner: **ZEEMAX VENTURE (JOINT VENTURE BETWEEN MALAYSIAN, SOUTH AFRICAN & USA UNIVERSITY RESEARCH AFFILIATES)**

Email: info@zeemaxventure.com

Web Site: www.zeemaxventure.com

SECTION 2-a : COMPOSITION & INFORMATION ON INGREDIENTS

BASIC INGREDIENTS	HALITE	HYDROUS ALUMINUM SILICATE
CAS (Chemical Abstracts Service) Registration Number	7647-14-5	1302-78-9
Compliance with TSCA (Toxic Substance Control Act)	YES	YES

SECTION 2-b : COMPOSITION & INFORMATION ON HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENTS	CRYSTALLINE QUARTZ	COLLOIDAL SILICA	CRYSTO-BALITE
CAS (Chemical Abstracts Service) Registration Number	14808-60-7	7631-86-9	14464-46-1
OSHA Permissible Exposure Limit (Respirable Fraction)	<u>10 mg/m³</u> (%SiO ₂ +2)	5 mg/m ³	<u>5 mg/m³</u> (%SiO ₂ +2)
ACGIH Threshold Limit Value (Respirable Fraction)	0.1 mg/m ³	5 mg/m ³	0.05mg/m ³
NIOSH Recommended Exposure Limit (Respirable Fraction)	0.05 mg/m ³	6 mg/m ³	0.05mg/m ³
Compliance with TSCA (Toxic Substance Control Act)	YES	YES	YES
%	< 2%	< 1%	<1%

OSHA PEL - OSHA Permissible Exposure Limit, 8-hour Time-Weighted Average

ACGIH TLV - American Conference of Governmental Industrial Hygienists Threshold Limit Value, 8hrTWA, 40hr/week

NIOSH REL - National Institute for Occupational Safety & Health, Recommended Exposure Limit, 10hr TWA, 40hr/week

SECTION 3 : HAZARDOUS IDENTIFICATION**PERSONAL HEALTH EFFECTS:****ROUTES OF EXPOSURE**

- ✓ EYE: Dust or Powder of GCEM may cause mild irritation to eye tissues.
- ✓ SKIN: Non-irritating to the skin but wet GCEM can cause skin dryness with prolonged contact with skin.
- ✓ INHALATION: Repeated or Prolonged inhalation may cause toxic effects.
- ✓ INGESTION: No adverse effects expected for normal, incidental ingestion.

TARGET ORGANS

- LUNGS: Normal exposure during application of the material will not result in serious adverse effects if application is done as prescribed in GCEM brochure. However this product has the potential for generation of respirable dust during use if not handled properly with gross negligence. Excessive occupational, uncontrolled and prolonged inhalation of dust may cause lung disease. Dust may contain respirable crystalline silica / nuisance dust (carbon fumes & colloidal silica). Over exposure to these dusts may result in Pneumoconiosis, a respiratory disease caused by severe or prolonged exposure to the dust. Occupational exposure to nuisance dust and respirable crystalline silica should be monitored and controlled.

SECTION 4 : FIRST AID MEASURES

EYE CONTACT: Flush eyes immediately with large amounts of water. If irritation persists get medical attention.

SKIN CONTACT: No special measures required. Get medical attention if irritation develops or persists.

INHALATION: Prolong inhalation may cause toxic effects. Remove to fresh air for any signs of breathing problem. If not breathing, give artificial respiration or give oxygen by trained personnel. Get medical attention if needed.

INGESTION: No special measures required. If ingestion of a large amount does occur, seek medical attention.

NOTES TO PHYSICIAN: Provide general supportive measures and treat symptomatically

SECTION 5 : FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES: This material is non-combustible & will not burn.

UNUSUAL FIRE & EXPLOSION HAZARDS: None known

EXTINGUISHING MEDIA: Use any media suitable for the surrounding fires. Dry-Chemical, CO₂, water spray or regular foam.

INSTRUCTIONS FOR FIREFIGHTERS: Material can be slippery when wet

PROTECTIVE EQUIPMENT FOR FIREFIGHTERS: For the surrounding fires, the protective equipment is same as in any fire wear self contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 : ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Vacuum if possible to avoid generating airborne dust. Avoid breathing dust. Wear an approved respirator.

PERSONAL PRECAUTIONS: Material can be slippery when wet. Wear a dust mask & safety glasses or goggles if dust is generated above exposure limits accidentally or unintentionally during handling.

ENVIRONMENTAL PRECAUTIONS: No special environmental precautions required

SECTION 7 : HANDLING AND STORAGE

PRECAUTIONS: No specific safety phrase has been found applicable for this product

HANDLING: Keep formation of airborne dusts to a minimum and do not breathe dust. Use normal precautions against bag breakage or spills of bulk material. Provide appropriate exhaust ventilation at places where dust is formed. In case of insufficient ventilation, wear suitable respiratory equipment. Launder clothing that has become dusty. Empty containers (bags, bulk containers, storage tanks, etc.) retain silica residue and must be handled in accordance with provisions of this Material Safety Data Sheet.

STORAGE: Use good housekeeping in storage and guard against dust accumulation of this material. No special storage conditions required, however care should be taken to keep the material dry before use. No special restrictions on storage with other products.

SECTION 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE GUIDELINES: Occupational exposure to nuisance dust (total and respirable) as well as respirable crystalline silica should be monitored and controlled. For extra precaution in case of repeated, excessive & prolonged applications, use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

PERSONAL PROTECTION

EYE PROTECTION: Wear Safety glasses with side shields to avoid any accidental spill or dust formation beyond normal limits during the application of material that may cause mild irritation to the eye tissues.

RESPIRATORY PROTECTION: Normal application of the material does not require this; however use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit.

SKIN AND BODY PROTECTION: No special protective equipment required.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: As appropriate for work environment. Normal Working Gloves are recommended for Hand Protection. Dusty clothing should be laundered before reuse.

GENERAL HYGIENE CONSIDERATIONS: Use good industrial hygiene practices in handling this material.

WASTE DISPOSAL METHOD : No Special Method , Dispose of in accordance to Local / State / Federal Regulations

SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Powder
COLOUR / ODOR	Colour Varies from Cream , Yellow to Pale Grey / Odorless
DENSITY (Varies depending upon the level of	820-900 Kg / m ³
PARTICLE SIZE (DRY) TO PASS THROUGH 150µM SIEVE	90-95 %
RESISTIVITY	0.6 (Ω-m)
pH SLURRY (8%)	7.5 to 9.0
CONDUCTIVITY	1.67 (S / m)
FLASH POINT	Non-Flammable
FLAMMABILITY LIMITS IN AIR, LOWER % BY VOLUME	Non-Explosive
AUTO-IGNITION TEMPERATURE	N / A
SOLUBILITY IN WATER	Slight but negligible
BOILING POINT	2192° F (1200°C) Estimated
SPECIFIC GRAVITY	0.9
AVERAGE MOISTURE CONTENT & LIQUID LIMIT	≤ 13 % & ≥ 100 %
VAPOR PRESSURE / VAPOR DENSITY / EVAPORATION	N / A
FREEZING / MELTING TEMPERATURE	N / A

SECTION 10 : STABILITY AND REACTIVITY	
CHEMICAL STABILITY	Stable at Normal Conditions
CONDITIONS TO AVOID	Keep Dry Until Used
INCOMPATIBILITY (MATERIALS TO AVOID)	None Known
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS	None Known
HAZARDOUS POLYMERIZATION	Will Not Occur

SECTION 11 : TOXICOLOGY INFORMATION	
INHALATION	Over & Prolonged Exposure crossing Limits Specified in Section 2b may cause Pneumoconiosis, Silicosis & other respiratory diseases.
SKIN CONTACT	It is not considered as skin irritant but may cause irritation
EYE CONTACT	May Cause mild irritation to Eyes
INGESTION	Not possible normally but if taken accidentally may not cause death (not poisonous)

SECTION 12 : ECOLOGICAL INFORMATION	
<p>ECOTOXICITY: This material is not expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.</p> <p>ENVIRONMENTAL EFFECTS: Based on the physical properties of this material , it does not contain any heavy metal or toxic material and is completely Environment Friendly</p>	

SECTION 13 : DISPOSAL CONSIDERATIONS	
<p>The material has NOT regulated as HAZARDOUS waste. Disposal should be in accordance with the principles of Duty of Care, observing local and national applicable regulations.</p>	

SECTION 14 : TRANSPORT INFORMATION	
<p>GENERAL: Not classified as Hazardous for Any Kind of Transport.</p> <p>Not regulated as dangerous goods by IATA (International Air Transport Association)</p> <p>Not regulated as dangerous goods by IMGD (<i>International Maritime Dangerous Goods</i>)</p> <p>Not regulated as dangerous goods by IMO (International Maritime Organization)</p> <p>Not regulated as dangerous goods by ADR (European License for Transporting Goods)</p> <p>Not regulated as dangerous goods by DOT (Department of Transportation)</p>	

SECTION 15 : REGULATORY INFORMATION	
<p>This material is not known to be hazardous by any International Standard and hence this material is not classified as dangerous substance under the Classification, Packaging and Labeling of dangerous substances regulations.</p>	

SECTION 16 : OTHER INFORMATION	
<p>This Material Safety Data Sheet contains Confidential Proprietary Information & is not to be disclosed to the general public or to competition except as required by law. The information accumulated herein is believed to be accurate to the best of PLAKAR SDN BHD's knowledge. This information is offered solely for use in Customer's Evaluation of this Material in respect to <u>Safety, Health, and Environmental Hazards</u>. Customers should satisfy themselves, that the product which they have selected is entirely suitable for their purpose under their conditions of use and in compliance with their current local regulations. For any further information, please contact the product owner, ZEEMAX VENTURE.</p>	