

POLYPILE

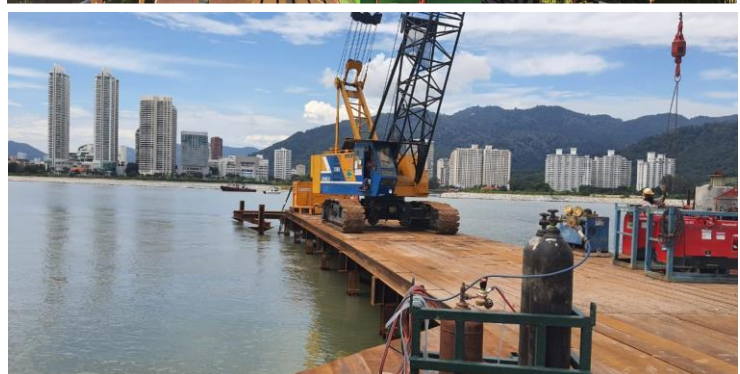


A Strong Foundation For Tomorrow

LLH TRADING & ENGINEERING SDN BHD

LLH TRADING & ENGINEERING SDN BHD

ROC: 202101009345 (1409644-H)



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POLYPILE



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LLH TRADING & ENGINEERING SDN BHD

COMPANY PROFILE

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LLH TRADING & ENGINEERING SDN BHD was incorporated under the COMPANIES ACT 2016 on 16th March 2021. The company has strengthened its position as a specialist in providing one-stop solutions in geotechnical engineering construction.

It is formed by a group of experienced people with competent technological expertise in the work of geotechnical engineering specialists.

Due to its expertise in geotechnical works, LLH TRADING & ENGINEERING SDN BHD will not only focus on the provision of construction services but also strive to provide the most cost-effective solution alternatives to achieve project completion.

We believe that in providing the necessary technical support and consulting services for all geotechnical problems.

In addition, LLH TRADING & ENGINEERING SDN BHD offers the sale and rental of construction equipment, technical advice and engineering support, full maintenance and repair, spare parts services, engineering design services. In addition to equipment, we also offer sales of drilling tools, drilling fluids and related accessories.

At present, LLH TRADING & ENGINEERING SDN BHD has a rental fleet of hydraulic vibratory hammers, hydraulic drilling rigs, steel plates and others.

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LLH TRADING & ENGINEERING SDN BHD

OUR SERVICES

OUR SERVICES

INNOVATIVE PRODUCTS & SERVICES

► ***Sales, Rental & Services of Construction Machinery***

- *Hydraulic Vibratory Hammers*
- *Hydraulic Impact Hammers*
- *Hydraulic Drilling Rigs*
- *Top Drive Rotary Heads & Drills*
- *Hydraulic Crawler Drills*
- *Hydraulic Crawler Cranes*
- *Hydraulic Static Pile Drivers*
- *Reverse Circulation Drilling*
- *Casing Oscillators*
- *Casing Rotators*
- *Jet Grouting Pump*
- *Desander*

► ***Sales & Rental of Mild Steel Plates***

► ***Sales of Drilling Fluid***

- *Polymer **POLYPILE***
- *Bentonite*
- *Soda Ash*
- *Bentonite / Polymer Testing Kits*

► ***Sales of Drilling Tools & Accessories***

- *Teeth / Bullet Teeth / Holder*
- *Roller Bits*
- *DTH Hammer & Bits*

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TECHNICAL DATA SHEET

TECHNICAL DATA SHEET

POLYPILE is a synthetic totally water-soluble polymer and it is mainly used for the preparation of stabilizing and lubricating muds in drilling and civil engineering application. The POLYPILE drilling fluid is easy to prepare and easy to dispose after usage. Its main characteristics are its stabilizing and lubricating properties and the possibility to be recycled many times. The rheological and stabilizing properties of the drilling fluids prepared with POLYPILE are easily to detect during the usage and through easy tests which can also be performed directly on the jobsite.

Benefit / Key Properties

- ✓ Fast Hydration
- ✓ Cost Effective (to be recycled many times)
- ✓ Reduce Clay Sticking
- ✓ Prevent Clogging Risks
- ✓ Bio Degradable Material and Non-Fermenting

General Characteristics

Appearance:	Opaque to White free flowing granular solids
Specific Gravity:	1.00 - 1.01 (Water = 1.0)
Density:	0.6 - 0.7 g/cm ³
Marsh Viscosity:	65 - 70 sec (0.1% in tap water, salt water and hard water)
Filtration Properties:	medium - low

Recommended Dosage and Marsh Funnel Viscosity for Various Type of Soil Condition

Soil Condition	POLYPILE Dosage (kg/m ³)	Marsh Funnel Viscosity (sec/ltr)
Clay & Shale	0.4 to 1.5	50 to 58
Silt & Fine to Medium Sand	0.5 to 0.6	50 to 69
Coarse Sand to Pea Gravel	0.7 to 0.8	69 to 100
Gravels to Cobbles	1.0 to 1.2	100 to 160

**The above are general guidelines only. A qualified site engineer should be engaged to ascertain the exact dosage and marsh funnel viscosity required.*

Application

POLYPILE is highly recommended for the following construction applications:

- 1) Special Foundations : **Drilled Shaft, Bore Piles, Micropile, Barrettes and Diaphragm Wall**
- 2) Vertical Drilling : **Water Well Drilling, Soil Sampling and Tie-Back Drilling**
- 3) Horizontal Drilling : **Pipe Jacking, Slurry Shield Tunnelling, Micro Tunnelling, HDD and TBM**

Usage Guidelines

- 1) The dosage of POLYPILE suitable for low permeability and clayey soils is around 0.5 kg/m³ to 2.0 kg/m³ for jobs on high permeability soils.
- 2) While using the slurry, it is extremely important to keep the pH level not lower than 10 for optimum performance because in this way there might be a risk of losing all stabilizing and lubricating characteristics of fluid itself.

Disposal

Before disposal, POLYPILE can be treated with Sodium Hypochlorite (bleaching agent) or Hydrogen Peroxide in order to be sure that any trace of active material has been eliminated.

Storage and Packaging

- 1) 25 kg x 40 bag industrial plastic bags packed into 1 pallet or according to customer's requirements.
- 2) Keep the product in a dry place and closed in original packaging.

Material Safety Data Sheet (MSDS) - MSDS data is available upon request.

The information provided in this bulletin is based on our knowledge at the date of publication and is reliable accurate, but not a bond or guarantee on our part. Buyers and users have to make them self-assessment in their own circumstances and for their own needs. Information can be changed

STANDARD OPERATING PROCEDURE (S.O.P)

STANDARD OPERATING PROCEDURE (S.O.P)

These SOPs ensure that engineers and contractors can confidently use our **POLYPILE** for better performance by following proper methods in controlling polymer slurry during construction.

POLYPILE is not classified as hazardous to the aquatic environment according to Globally Harmonized System (GHS) and Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013 (***Result Summary by SIRIM Malaysia (Study Code: J196/2021/46)***).

POLYPILE is not categorized as a scheduled waste and is not covered under the First Schedule, Environmental Quality (Scheduled Waste) Regulations 2005 (MY DOE REF: JAS 600-3/25/18 JILID 15 (3)).

POLYPILE offer many advantages over their bentonite counterparts, including

- 1) Improved foundation performance
- 2) Lower environmental impacts
- 3) Smaller site footprint
- 4) Simpler preparation, mixing and final disposal as they are used at much lower concentrations

For better **POLYPILE** performance, kindly refer to the ***Schematic Diagram of Polymer Batching Plant Setup.***

MIXING AND HANDLING OF POLYMER SLURRY

1) WATER TREATMENT

Water tank with a minimum capacity of 30m³ shall be installed near the polymer mixing tank. The purpose of the water tank is to provide the right quality for the slurry make-up water that is always available to support planned operations and unknown possibilities.

SODA ASH or **SODIUM HYDROXIDE** are recommended for pH buffering 8 to 10 and softening of makeup water and preventing contamination from calcium and magnesium ions which is optimum for the performance of **POLYPILE**. However, **POLYPILE** can also be used in water pH 7 to 12. If possible, always use tap water as a source of supply.

2) MIXING POLYMER

The treated water was pumped from the water tank to the splash-plate mixer or hopper mixer of the mixing tank where **POLYPILE** was sprinkled on to flowing water. Splash-plate or hopper mixing was appropriate as base polymer was used at 0.5 kg/m³ to 2.0 kg/m³ (***Please refer to POLYPILE Technical Data Sheet for the recommended dosage and desired viscosity to be achieved.***).



Hopper Mixer



Splash-Plate Mixer

Field Mixing Polymer Slurry by Circulating Between Tanks

However, polymer mixing requires careful attention as the polymer powder tends to clump when wetted and must be sprinkled into running water. If this is not done, clumps may form and remain as undissolved polymer (formation of fish-eyes) in the slurry - a waste of polymer.

After the addition of the polymer powder, the polymer slurry must be kept agitated until it develops a viscosity sufficient to self-suspending and dissolve completely. This usually happens within 15 - 30 minutes. Agitation can be done using an **Air Compressor**.

The air compressor serves as agitation of polymer slurry in the mixing tank for better circulation and proper mixing.



Agitation by an Air Compressor can Improve Mixing and Reduce Waste

Diaphragm pump were used for transfers of polymer slurry between the mixing tank and the storage tank / silo to limit shear damage to the polymer.

****DOT NOT USE high speed mixers and centrifugal pump. High-shear mixing of polymer results in “chopping” of the long-chain molecules, rendering the slurry ineffective, and should be avoided.***

3) DISCHARGE OF POLYMER SLURRY

Storage tanks with a minimum capacity of 30m³ shall be installed near the polymer mixing tank. The purpose of the tank is to store polymer slurry and pumped directly into the borehole through a *diaphragm pump*.

The practical rule for storage tanks in bore piles must be to exceed 50% of the total capacity of the intended borehole.



Polymer Slurry being pumped into borehole through a Diaphragm Pump

4) MAINTENANCE OF POLYMER SLURRY

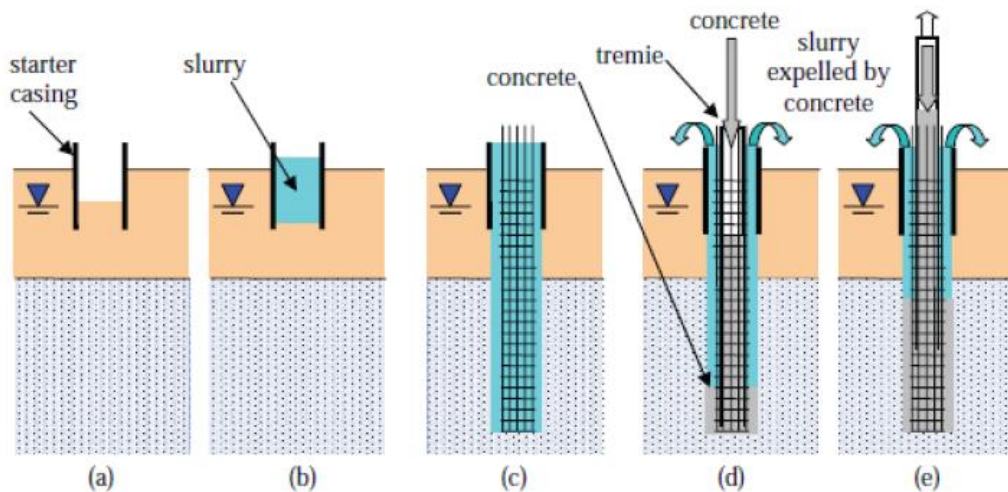
The polymer slurry level shall be maintained at least 1.8 meter (6 feet) above the water table, or as such higher level that is required to overbalance hydrostatic soil pore pressure and maintain soil stability. If the slurry drops below the specified level, the operation shall be paused and the proper slurry level re-established before proceeding.

The point of reference for selection and maintenance of polymer slurry level shall always be the water table. This applies even in situations where casing has been placed to a depth at or below the water table. The presence of casing does not remove the requirement to keep the slurry level above the water table. Attempts to excavate or hold open an excavation in saturated or unstable soils with inadequate slurry head pressure; even with casing extended into the water table, can be expected to result in soil collapse below the casing.

5) PREPARATION FOR CONCRETE PLACEMENT

Prior to concreting, the bottom of the excavation is cleaned to remove loose soil or debris that may have settled during the construction process. Once excavation has been cleaned, the reinforcement cage is placed within the excavated hole. Concrete is then introduced with a tremie placed at the bottom of the borehole. This is to ensure all of the polymer slurry is displaced during the concreting process and mixture of the two materials is avoided. Surface casings are often required to:

- 1) Stabilize surface soils and prevent collapse near the top of the shaft
- 2) Aid in tool alignment and position
- 3) Increase the allowable level of slurry



Construction Method :

- (a) Temporary Casing**
- (b) Polymer slurry introduction**
- (c) Completed excavation and reinforcement placement**
- (d) Concrete introduction through tremie**
- (e) Tremie removal and slurry expulsion during concreting**

Recommended Dosage and Marsh Funnel Viscosity for Various Type of Soil Condition

Soil Condition	POLYPILE Dosage (kg/m ³)	Marsh Funnel Viscosity (sec/ltr)
Clay & Shale	0.4 to 1.5	50 to 58
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Gravels to Cobbles	1.0 to 1.2	100 to 160

Recommended Slurry Parameters:

Parameters	Test Method	Fresh Slurry	*Prior Pouring Concrete
Viscosity (second)	Marsh Funnel Viscosity	50 - 160	50 - 160
Density (kg/m ³)	Mud Balance	1.00 - 1.02	1.040 - 1.085
Sand Content (%)	Sand Content Kit	-	≤ 1.5 %
pH Value	pH Tester	10 - 12	10 - 12

We highly recommend *prior pouring concrete parameters for better pile quality and integrity.

Note: *prior pouring concrete:

- Viscosity : 50 to 160 seconds can be applied if soil conditions require higher viscosity for stability.
- Density : 1.040 to 1.085 kg/m³. The lower the density the better the quality of the pile. Maximum allowed density is not more than 1.085 kg/m³ prior to concrete
- Sand Content : ≤ 1.5%. The lower the sand content the higher the quality of the pile.
- pH Value : 10 - 12

Additives

Below are additives that maybe used as companion products for **POLYPILE** polymer when problem condition arises. Additives shall be used in accordance with the supplier's recommendations.

- Calcium Carbonate (CaCO₃) : is a non-hazardous mineral as a weighting material to increase the mud density and as a loss circulation material for polymer.
- Sodium Bentonite powder : to increase mud density, fast swelling, reduce fluid loss and provides a membrane against which the hydrostatic pressure of the slurry.
- Sodium Bicarbonate (NaHCO₃) : is used to lower the pH of drilling slurry.
- Soda Ash (Na₂CO₃) : is used to raise the pH in tough water and treat out calcium (Ca) and magnesium (Mg) contaminants that are detrimental to polymer.
- Sodium Silicate (Na₂SiO₃) : is used for soil stabilization.
- Barium Sulphate (BaSO₄) : is used to increase mud density in drilling slurry.

6) SAMPLING AND TESTING

At the end of excavation, there will be some suspended solids in the polymer slurry, solids dispersed into the slurry by the excavation process. To verify that the properties of the excavation slurry are within specifications, samples of the polymer slurry should be taken from within 2 feet or 0.5 meter from the bottom of the borehole and from the mixing tank (if any) to facilitate control of the properties of the slurry

Samples should be collected with a ***bentonite / polymer sampler kit*** that captures representative samples of sufficient volume (≥ 1.5 liter) to perform required testing of the slurry. Samples collected shall be tested for determine *sand content, viscosity, pH, and specific weight*.

The maximum specified limit for *density* was **1.085 kg/m^3** and the maximum *sand content* was **$\leq 1.5\%$** . After the bottom of the borehole is cleaned, placement of the rebar and concrete may proceed.

7) RECYCLING OF POLYMER SLURRY

During concreting, the displaced polymer slurry was pumped back to the sedimentation tanks through a submersible *centrifugal pump* for treatment before reuse or discarded. It was necessary to use *centrifugal pump* to match the concrete placement rate. The polymer molecules may have been damaged by passage through the *centrifugal pump* but this was redressed by rejuvenating the slurry.

Avoid pumping the last 1 meter (3 feet) of polymer slurry above the concrete interface, as this slurry will be contaminated from contact with the concrete. The impacted slurry looks like oatmeal and only occurs at the contact with the concrete. The last 1 meter of impacted slurry should be pumped off to a waste tank, or if allowed the cement contaminated slurry can be released over the top, or can onto the ground to be mixed into the spoil pile by the loader.

The recycled polymer slurry is tested for viscosity and pH. While adding water to restore the original volume, additional SODA ASH is added to adjust the pH. Next, fresh **POLYPILE** that has been mixed with water is added to restore the slurry to full strength. Usually, it requires about $\frac{1}{4}$ the amount of **POLYPILE** added to the water filling the tank to restore the slurry to its original strength for reuse in the next borehole.

8) BREAKDOWN OF POLYMER SLURRY FOR DISPOSAL

Upon completion of a job, any remaining **POLYPILE** slurry can be broken down with a chemical oxidizer. The most common oxidizer for this purpose is 5% Sodium Hypochlorite solution (bleaching agent); 3% Hydrogen Peroxide (household use concentration) can also be used.

The Hypochlorite solution should be added to the **POLYPILE** slurry at a rate of 1 kg/5m^3 of slurry to be treated. After the breaker is added, the entire system should be circulated to insure complete oxidation of all polymer molecules.

When breakdown is complete, all that remains is acrylate molecules and water. This is often safely discharged into sewer systems, percolated into the ground, or simply left to evaporate. Always check local regulations before disposal.

POLYMER SLURRY TESTING EQUIPMENT

Marsh Funnel Viscosity (API RP 13B-1) - Viscosity is the measure of slurry thickness, polymer concentration and the slurry's ability to stabilize surrounding soils. This test should be performed both initially and at frequent intervals during use of the slurry. The time in seconds for one quart of slurry to pass through the funnel is reported as viscosity in seconds per volume. ***At standard mixing rates, POLYPILE slurry will yield a viscosity of 50+ seconds per quart (0.95 liter).***



Procedure:

The test requires a Marsh Funnel and Viscosity Cup

While holding a finger over the tip of the Marsh Funnel, fill the funnel by pouring the slurry sample through the screen located in the top of the funnel. The screen will filter out any particles that may clog the tip of the funnel. The funnel should be filled to the bottom of the screen. Place the Viscosity Cup on a level surface and while holding the funnel over the cup, remove your finger allowing the fluid to flow into the cup. Using a stop watch or wrist watch, time the number of seconds it takes to fill the cup to the top line marked 32 oz. (1 quart). MFV is reported in seconds per quart.

Mud Balance (API RP 13B-1) - This test determines the weight of the slurry and is performed with a standard mud balance, also known as a mud scale or density scale. ***POLYPILE slurry, regardless of viscosity, have the same density as water, specific gravity of 1.0. The slurry density prior to concreting should be 1.040 to 1.085 kg/m³.***

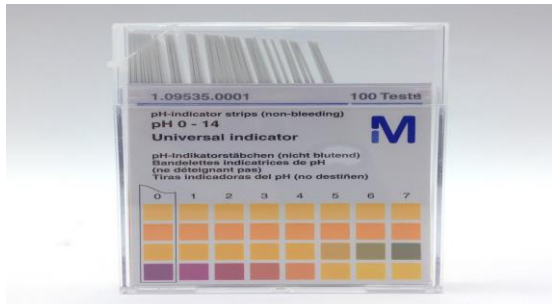


Procedure:

The test requires a Metal Mud Balance Complete with Carrying Case

Fill the reservoir of the mud balance with the slurry sample and replace the lid. Wipe off any excess mud from the reservoir and place the balance on the fulcrum or knife edge. Slide the weight along the balance arm while using the level located on the arm just behind the reservoir to determine when the balance is level. Once the balance is levelled, the result can be read and reported in specific gravity, pounds per gallon, pounds per cubic foot, or pounds per square inch.

pH Tester (API RP 13B-1) - This test is performed by dipping a piece of litmus paper (pH paper) into the slurry and comparing the colour change to a chart. The result is reported in a number from 1 to 14, 1 to 6 acidic, 7 is neutral, and 8 to 14 is alkaline; 1 is the most acidic, 14 the most alkaline. ***POLYPILE fresh slurry has a pH of 7 to 8 (without additives). Prior before pouring concrete, pH 10 to 12 is acceptable.***



Procedure:

The test requires a pH Paper

At this level, polymer molecules can fully hydrate and extend, creating more viscosity. The carbonate ion present in alkaline solutions also buffers the slurry against calcium and magnesium contamination. Acidic soil and groundwater can be extremely detrimental to a slurry and should be corrected by additions of a safe pH conditioner

such as soda ash (Na_2CO_3). In extreme cases potassium or sodium hydroxide may be used, however extreme caution should be taken.

Sand Content Kit (API RP 13B-1) - This test measures the amount of sand suspended within the slurry and is performed with a standard sand content kit. The results are reported as percent sand. Testing is normally performed at the completion of excavation and just prior to placing concrete. ***The sand content for POLYPILE fresh slurry is nil and recycle prior to concreting should be $\leq 1.5\%$.***



Procedure:

This test requires the glass and content tube, the 200 mesh sieve with funnel, and the wash bottle. Due to the binding effect the polymer has on then mesh sieve, the wash bottle should be filled with water containing 10% regular household bleach.

Fill the glass and content tube with the slurry sample to the point marked MUD TO HERE. Then fill tube with clean water to the point marked WATER TO HERE. While holding your finger over the tip of the tube, shake the tube for several seconds, mixing the water and slurry sample.

Pour the diluted slurry sample on top of the sieve, invert the sieve and with the wash bottle (containing clean water) wash the sand particles that were trapped in the screen back into the glass sand content tube. When all the sand particles have dropped to the bottom of the tube, the result can be read and reported in percent sand.

Bentonite / Polymer Sampler Kits - The Fluid Sampler permits its user to sample at any depth of the excavation for accurate analysis. It is equipped with a double ball check valve allowing for fluid extraction from desired depths and also features a threaded midsection for easy cleaning and storage.



Procedure:

This test requires a Bentonite / Polymer Sampler Kit with 80mtr nylon rope

Hold the right circular cylinder with one hand. With the other hand, let the bottom of the sampler slowly descend until it reaches the bottom of the hole containing bentonite slurry. While holding the rope above the cylinder, let the right circular cylinder drop into the slurry.

After the right circular cylinder reaches the bottom, pull up the sampler slowly. Place the contents of the sampler in a container of approximately 1-2 gal.

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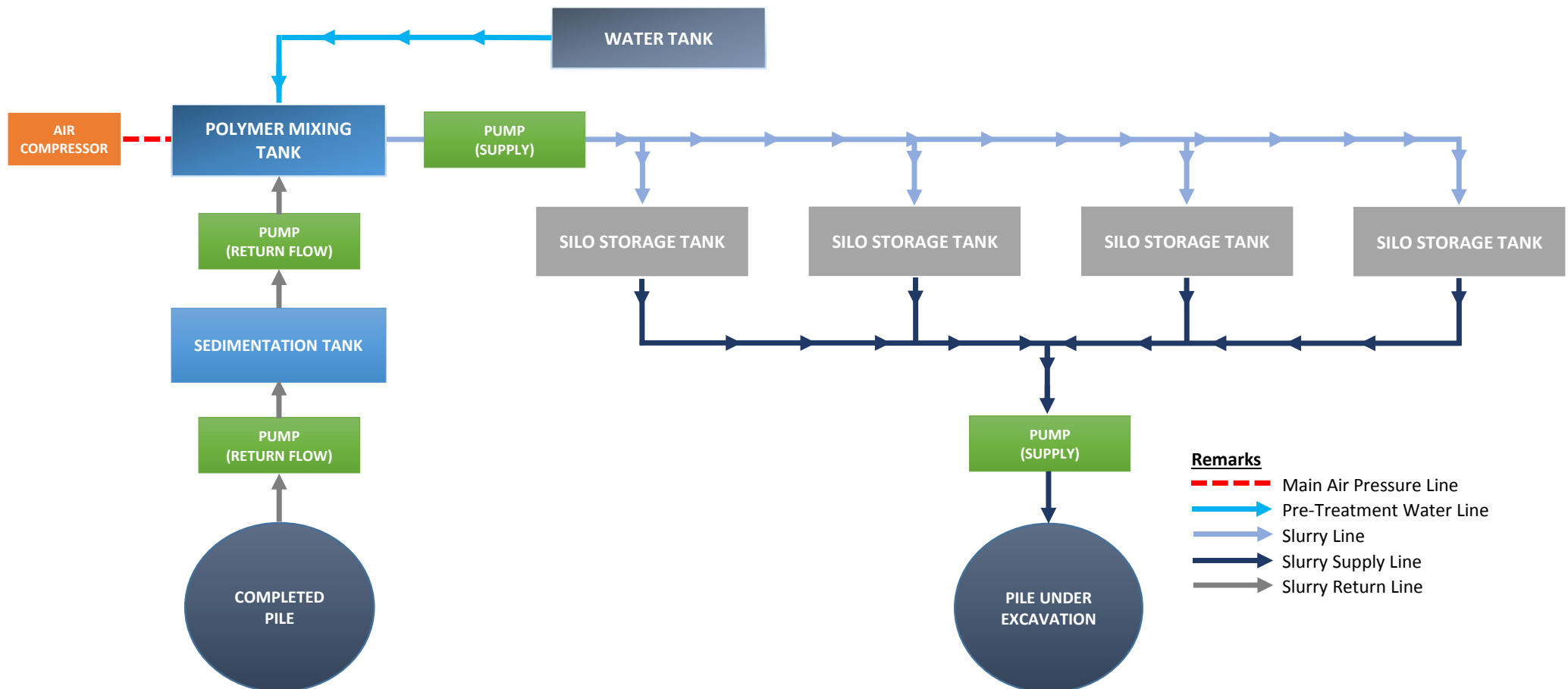


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SCHEMATIC DIAGRAM OF POLYMER BATCHING PLANT SETUP

Schematic Diagram of Polymer Batching Plant Setup



POLYPILE



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MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET

SECTION 1 : PRODUCT AND THE COMPANY INFORMATION

Product Name : POLYPILE

Recommended Use : Applications in and as an aid to the building industry.
Additive for sealing systems.
Additive for oil drillings.

Company Name and Address : LLH TRADING & ENGINEERING SDN BHD (ROC: 1409644-H)
No. 22, Jalan Simfoni 1
Balakong
43300 Seri Kembangan, Selangor

Telephone No. : +603 8962 1808 / +6017 269 1788 / +6012 537 0583

Email Address : jackson.lim@llhtrading.com / sales@llhtrading.com

SECTION 3 : HAZARDS IDENTIFICATION

Hazard Classification : Not classified as hazardous according to the criteria of ASCC.
This product does not require an SDS or hazard warning label.

SECTION 2 : COMPOSITION / INFORMATION OF INGREDIENTS

Description : Anionic Water-Soluble Polymer

CAS No. : 25987-30-8

The exact percentage (concentration) of the composition has been withheld as proprietary.

SECTION 4 : FIRST AID MEASURES

Contact with Skin : Wash off immediately with water.
Take off contaminated clothing.

Contact with Eyes : Rinse immediately for at least 15 minute with plenty of water.
Seek medical advice.

Ingestion : Rinse mouth thoroughly with water.

Inhalation : Remove affected person to fresh air.

General Information : Seek medical assistance if discomfort continues.

SECTION 5 : FIRE-FIGHTING MEASURES

- Suitable Extinguishing Media** : The product itself doesn't burn.
Carbon Dioxide (CO²), Foam, Dry Powder and Water Spray.
- Unsuitable Extinguishing Media** : None
- Hazards from Combustion Products** : In case of fire can formed: nitrogen oxides (NO_x)
- Special Protective Equipment for Firefighters** : In the event of fire, wear self-contained breathing apparatus.
Standard procedure for chemical fires.

SECTION 6 : ACCIDENTAL RELEASE MEASURES

- Emergency Procedures** : Ensure adequate ventilation.
Avoid dust formation.
Use personal protective equipment.
Avoid contact with skin, eyes and clothing.
Do not flush into surface water or sanitary sewer system.
- Containment and Clean-up** : Take up uncontaminated material and pass on for further processing.
Take up contaminated material by mechanical means, load into clean containers and dispose of in accordance with legal regulations.
- Further Accidental Release Measures** : See point 8 & 13.
Avoid dust information.

SECTION 7 : HANDLING AND STORAGE

- Precautions for Safe Handling** : Avoid formation of dust and aerosols.
Handle with care to avoid abrasion or breakage.
- Condition for Safe Storage including any Incompatibilities** : Keep tightly closed in a dry and cool place.
No materials to be especially mentioned.
Keep in a dry place.

SECTION 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

- National exposure standards** : No Exposure Standard allocated.
No Biological Limit allocated.
- Personal Protective Equipment**
- Hygiene Measures** : Wash off with warm water and soap.

Respiratory Protection	: Half mask with a particle filter P2 (EN 143).
Hand Protection	: Chemical-resistance protective gloves according to EN 374, EN 388 and EN 420.
Eye Protection	: Safety glasses
Body Protection	: Not required under normal use.
Engineering Controls	: Provide appropriate exhaust ventilation at machinery and at place where dust can be generated.

SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES

Form	: Granular
Colour	: White
Odour	: None
Melting Point	: Not applicable
Boiling Point	: Not applicable
Flash Point	: Not applicable
Ignition Temperature	: Not applicable
Oxidizing Properties	: Not tested
Self-Ignition Temperature	: Not tested
Minimum Ignition Energy	: Not tested
Flammability	
Upper Explosion Limit	: Not tested
Lower Explosion Limit	: Not tested
Combustion Number	: Not tested
Density	: Not tested
Bulk Density	: 0.6 - 0.9 g/cm ³
Vapour Pressure	: Not tested
Vapour Density	: This information is not applicable for solids.
Solubility in Water	: Soluble
Miscibility in Water	: Not tested
Soluble in ...	: Not tested
pH Value	: 6 - 8 (5.0 g/l) Method: Solution
Octanol / Water Partition Coefficient (Log Pow)	: Not determined
Viscosity (Dynamic)	: 1,100 - 1,400 mPa.s Method: Brookfield 0.5% solution
Viscosity (Kinematic)	: This information is not applicable for solids.
Particle Size	: Not tested

SECTION 10 : STABILITY AND REACTIVITY

Chemical Stability	: No decomposition if stored and applied as directed.
Hazardous Reactions	: Reactions with oxidizing agents.
Hazardous Decomposition Products	: No decomposition if stored and applied as directed. In the event of a hazardous fire, decomposition products can be produced such as: see heading 5.
Condition to Avoid	: Avoid dust formation.
Material to Avoid	: Acids and bases.

SECTION 11 : TOXICOLOGICAL INFORMATION

Acute Oral Toxicity	: LD ₅₀ > 5,000 mg/kg Method: OECD 420 (rat)
Irritant Effect on Skin	: Not irritating to skin Method: OECD 404 (rabbit)
Irritant Effect on Eyes	: Not irritating to eyes Method: OECD 405 (rabbit)
Sensitization	: Not sensitizing Method: OECD 406 (guinea pig)

SECTION 12 : ECOLOGICAL INFORMATION

Biodegradability	: Biodegradable Material.
Toxicity to Fish	: LC ₅₀ > 100 mg/l (96h) Method: OECD 203 (Brachydanio Rerio)
Toxicity to Daphnia	: EC ₅₀ > 100 mg/l (48h) Method: OECD 202 (Daphnia Magna)
Toxicity to Algae	: EC ₅₀ > 100 mg/l (72h) Method: OECD 201 (Scenedesmus Subspicatus)
Transport Between Environment Compartments	: No data available.
Bioaccumulation	: None
Additional Ecotoxicological Remarks	: Slightly water endangering.

SECTION 13 : DISPOSAL CONSIDERATIONS

Disposal Method

Product : Can be landfilled, when in compliance with local regulations.
Contact waste disposal services.

Uncleaned Packaging : Dispose of as unused product.

SECTION 14 : TRANSPORT INFORMATION

Road (ADR) : Not restricted
Rail (RID) : Not restricted
Sea (IMDG / IMO) : Not restricted
Air (ICAO / AITA) : Not restricted

SECTION 15 : REGULATORY INFORMATION

Regulatory Information (Austria)

The Poisons Standard (SUSMP) : None allocated

SECTION 16 : OTHER INFORMATION

Literature References:

National Code of Practice for the Preparation of Material Safety Data Sheets, 2nd Edition [NOHSC: 2011(2003)]

Approved Criteria for Classifying Hazardous Substance [NOHSC: 1008(2004)]

This MSDS summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this MSDS and consider the information in the context of how the product will be handled and used in the workplace, including in conjunction with other products.

If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact this company.

Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available on request.

The information provided in this bulletin is based on our knowledge at the date of publication and is reliable accurate, but not a bond or guarantee on our part. Buyers and users have to make them self-assessment in their own circumstances and for their own needs. Information can be changed without any notice. For mandatory features and performance, please see our Sales Specifications.

**DEPARTMENT OF
ENVIRONMENTAL (DOE) -
FIRST SCHEDULE,
ENVIRONMENTAL QUALITY
(SCHEDULED WASTE)
REGULATIONS 2005**



Jabatan Alam Sekitar
Department of Environment
**Kementerian Sumber Asli, Alam Sekitar
dan Perubahan Iklim**
Aras 1-4, Podium 2 & 3, Wisma Sumber Asli
No. 25, Persiaran Perdana, Presint 4
62574 PUTRAJAYA
MALAYSIA

Tel 03-8871 2000 (Am)
Faks 03-8889 1040/8888 9987 (Pentadbiran)
03-8888 9964 (Teknologi Maklumat)
03-8888 2693 (Integriti)
03-8888 4151 (Udara)
03-8889 1042 (Komunikasi Strategik)
03-8889 1045 (Penilaian)
03-8888 4070 (Air & Marin)
03-8888 6120 (Bahan Berbahaya)
03-8888 0067 (Penguatkuasa)
03-8888 1973/1975 (Bilik Operasi)
Laman Web : www.doe.gov.my

Ruj. Kami : JAS 600-3/25/18
Jilid 15 (3)
Tarikh : 21 September 2023

Pengurus
LLH Trading & Engineering Sdn. Bhd.
No. 22-2, Jalan Simfoni 1
Balakong
43300 SERI KEMBANGAN
(u.p : En. Jackson Lim)

Tuan,

PERMOHONAN PENGKELASAN BUANGAN TERJADUAL BAGI POLYPILE POLYMER

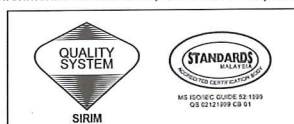
Saya diarah merujuk kepada permohonan tuan yang diterima oleh Jabatan ini pada 13 Disember 2022 mengenai perkara tersebut di atas.

2. Setelah meneliti dan mengkaji permohonan tuan, Jabatan ini mendapati produk *Polypile* daripada premis tuan **tidak dikategorikan sebagai buangan terjadual** dan tidak tertakluk di bawah Jadual Pertama, Peraturan-Peraturan Kualiti Alam Sekeliling (Buangan Terjadual) 2005.

3. Walau bagaimanapun, ketetapan ini adalah berdasarkan maklumat buangan sedia ada yang dimaklumkan dan sekiranya terdapat sebarang perubahan di dalam proses, keadaan buangan dan jenis bahan mentah yang digunakan yang mana boleh menyebabkan perubahan komposisi kimia buangan, ketetapan ini adalah terbatal dan premis dikehendaki menjalankan analisis kimia bagi menentukan klasifikasi buangan berdasarkan sifat berbahaya yang terdapat pada buangan tersebut dan hendaklah

...2/-

"Pemuliharaan Alam Sekitar, Tanggungjawab Bersama"
"Environmental Conservation, Our Shared Responsibility"



PENGKERTIFIKAN MS ISO 9001:2015
NO. SIJIL : QMS 03475

mengemukakan semula permohonan kepada Jabatan ini untuk ketetapan lanjut.

Sekian, terima kasih.

**“MALAYSIA MADANI”
“BERKHIDMAT UNTUK NEGARA”**

Saya yang menjalankan amanah,



(THAHIRAH BINTI KAMARULZAMAN)

b.p Ketua Pengarah
Alam Sekitar Malaysia

s.k:

1. Pengarah
Jabatan Alam Sekitar Negeri Selangor
Tingkat 12-14 Wisma SunwayMas
Jalan Tengku Ampuan Zabedah C9/C
Seksyen 9,
40100 SHAH ALAM
2. Fail Pengkelasan Buangan Terjadual

SIRIM TEST REPORT

Daphnia Magna

ACUTE IMMOBILISATION

TEST OF POLYPILE



Pusat Penyelidikan Teknologi Alam Sekitar
Environmental Technology Research Centre

Building 15, SIRIM Berhad, Shah Alam, Selangor Darul Ehsan

Tel: 60-3-5544 6550 / 6598 Fax: 60-3-5544 6590 / 6579

RESULTS SUMMARY

Company Name : LLH Trading & Engineering
Sdn. Bhd.

Address : No. 217, Jalan USJ9/5Q
Subang Business Centre
47260 Subang Jaya, Selangor
(Attn: Mr. Jackson Lim)

Contact No : 012-5370583

Request : Analysis on *Daphnia sp.*, Acute Immobilisation Test for Polypile.

Your Ref No.	QG21001663
SIRIM Ref. No.	ETRC 257/16/1774
Job No.	J196/21
Report No.	R391/21
Date of Issue	10 September 2021
No. of pages	2

SAMPLE DESCRIPTION:

One (1) solid sample was received from LLH Trading & Engineering Sdn. Bhd. on 11 August 2021 and coded as below:

Sample name	Internal coding	Physical appearance
Polypile	J196/21	White powder

TEST METHOD

(1) OECD Guideline for Testing of Chemicals Method 202 (Adopted 13 April 2004), *Daphnia sp.*, Acute Immobilisation Test.

RESULT

Table 1: Results EC₅₀ of *Daphnia sp.*, Acute Immobilisation Test of Polypile

Exposure time	EC ₅₀ value	Date of Analysis
48-hour	>1000 mg/L	25 Aug- 9 Sept 2021

INFERENCE

Refer to page 2

The results contained in this report relate only to samples/ items received and analysed by SIRIM Environmental Technology Research Centre. This report shall not be reproduced except in full without the written approval of SIRIM Berhad.

Name: Karimah Muhamad
Designation: Researcher
Tel.No: 03-5544-6583
Fax No: 03-5544-6590


Siti Aishah Asmah Yusob
Researcher
Environmental Technology Research Centre
SIRIM Berhad

SIRIM Berhad (Company No. 367474 - V)

1, Persiaran Dato' Menteri, Section 2, P. O. Box 7035, 40911 Shah Alam, Selangor Darul Ehsan, MALAYSIA

Tel : 603-5544 6000 Toll Free : 1 300 88 7035 Fax : 603-5510 8095

Website : www.sirim.my



INFERENCE

The Polypile is **not classified** as hazardous to the aquatic environment according to Globally Harmonised System (GHS) and Occupational Safety and Health (Classification, Labeling and Safety Data Sheet of Hazardous Chemical Regulations) CLASS 2013. Classification categories for substances hazardous to the aquatic environment as shown below.

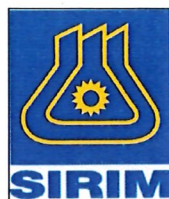
Table 2: Hazardous categories to the aquatic environment according to Globally Harmonised System (GHS)

Hazard category	Concentration limit
Category 1	$\leq 1 \text{ mg/L}$
Category 2	$\geq 1 \text{ mg/L}$ but $\leq 10 \text{ mg/L}$
Category 3	$\geq 10 \text{ mg/L}$ but $\leq 100 \text{ mg/L}$

Table 3: Hazardous categories to the aquatic environment according to Occupational Safety and Health Classification, Labeling and Safety Data Sheet of Hazardous Chemical Regulations (CLASS) 2013

Hazard category	Concentration limit
Category 1	$\leq 1 \text{ mg/L}$





TEST REPORT

Daphnia magna ACUTE IMMOBILISATION TEST OF POLYPILE

Prepared for

LLH Trading & Engineering Sdn. Bhd.
No 21-7 Jalan USJ9/5Q
Subang Business Centre
47620 Subang Jaya
Selangor

Prepared by

Environmental Technology Research Centre (ETRC)
Building 15, SIRIM Berhad
No.1, Persiaran Dato Menteri
Section 2, 40700 Shah Alam
Selangor

September 10, 2021

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Study Information

Study Title

Daphnia magna, Acute Immobilisation Test of POLYPILE.

Study Director

Karimah Muhamad
Environmental Technology Research Centre
Building 15, SIRIM Berhad
No. 1, Persiaran Dato' Menteri
Section 2, 40700 Shah Alam, Selangor
Phone: 603-5544 6583
Fax: 603-5544 6590

Study personnel

- i. Muhammad Iylia Rozali

Study period

- i. Experimental start date : 25 August 2021
- ii. Experimental completion date : 9 September 2021

Sponsor

LLH Trading & Engineering Sdn. Bhd.
No 21-7 Jalan USJ9/5Q
Subang Business Centre
47620 Subang Jaya
Selangor

Testing Facility

Ecotoxicity Laboratory 2
Environmental Technology Research Centre
Block 15, SIRIM Berhad
No. 1, Persiaran Dato' Menteri, Section 2
40700 Shah Alam
Selangor

Report Information

Study Title:

Daphnia magna, Acute Immobilisation Test of POLYPILE.

This report was prepared by

Karimah Muhamad
Environmental Technology Research Centre
Block 15, SIRIM Berhad
No. 1, Persiaran Dato' Menteri
Section 2, 40700 Shah Alam, Selangor
Tel: 603-5544 6583



Name: Karimah Muhamad
Study Director

Date: 10 Sept 2021

Summary

The *Daphnia magna*, Acute Immobilisation test of POLYPILE is described in this report. The test was conducted from August 25, 2021 to September 9, 2021 according to Method 202, *Daphnia magna*, Acute Immobilisation Test (Adopted 13 April 2004), OECD Guideline for Testing of Chemicals.

The limit test was performed at the concentration of 1000 mg/L and dilution water as control. The daphnids were exposed to the test concentration for a period of 48 hours.

No immobility and abnormal responses were recorded at 48 hours. The POLYPILE is **not classified as hazardous to the aquatic environment** based on Globally Harmonised System and Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemical) CLASS, Regulation 2013.

1 Introduction

This study was conducted in accordance with Method 202 (Adopted 13 April 2004), *Daphnia magna*, Acute Immobilisation Test, OECD GUIDELINE for Testing of Chemicals.

2 Materials and Methods

2.1 Test Item

(Information as provided by the sponsor)

Name:	POLYPILE
Other name:	Not applicable
CAS No.:	Not applicable
Sponsor:	LLH Trading and Engineering Sdn. Bhd.
Lot/Batch No.:	Not available
Date of receipt:	11 August 2021
Expiry date:	No information
Structural formula or rational formula:	No information
Purity:	No information
Contents of Impurities:	No information
Physicochemical properties as follows:	
Appearance at ordinary temperature:	White powder
Molecular weight:	Not applicable
Stability:	No information
Melting Point:	Not applicable
Boiling Point:	No information
Flash Point:	No information
Vapor Pressure:	No information
Partition Coefficient:	Not applicable
Solubility:	Not fully soluble
Degree of Solubility:	No information
Homogeneity:	No information
Storage condition:	Room temperature
Stability of test concentrations:	No information
Handling care:	Wear gloves and lab coat

The product formulation and other information provided by the manufacturer was not validated in this study. Neither any supporting documentation eg. Certificate of Analysis was provided to the test facility by the manufacturer.

2.2 Reference Items

Potassium dichromate was used as a reference item for *Daphnia sp.*, Acute Immobilisation Test. However, in this study, potassium dichromate was not conducted simultaneously with the test item. The latest study conducted was J252/20 (Non-GLP) conducted on 30 Oct - 1 Nov 2020: EC50 value of Potassium dichromate with 95% confidence limit at 24-hour exposure was established at 1.05 mg/L (CL: 0.9-1.2). The EC50 24 hours of potassium dichromate is within the range of Technical Corrigendum to ISO 6341 stated in OECD 202.

2.3 Test Methods

Method 202 (Adopted 13 April 2004) *Daphnia magna*, Acute Immobilisation Test, OECD Guideline for Testing of Chemicals.

2.4 Test System

Daphnia magna was used as the test system based on recommendation in OECD Test Method No. 202. The *Daphnia magna* stock culture was sourced from Pusat Penyelidikan Perikanan Air Tawar (PPPAT), Batu Berendam, Melaka on April 2000. This culture originated from Rijksuniversiteit Gent, Laboratorium voor Ecologie der Dieren, Belgium. The culture has been continuously maintained at Ecotoxicity Laboratory 2 ETRC, SIRIM Berhad under controlled environmental conditions.

Daphnia magna culture was maintained in a water bath at $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$ under controlled photoperiod of 16-hour light and 8-hour dark cycle. Adult *Daphnia* are cultured in one beaker containing 10 (ten) healthy daphnids in 100 mL holding water. Daphnids were fed once daily with a 2.5 mL combination of yeast and fish powder food. Signs of stress were observed and recorded daily, except on weekends. Progeny was removed daily, except on weekends.

Healthy neonate daphnids, aged less than 24 hours derived from *Daphnia* Batch Culture Number B35 (GN2) was selected as test system in this study.

2.5 Holding and dilution water

Dechlorinated tap water with adjusted hardness of batch No M-030821 was used as holding and dilution water for the test. The water was stored in glass tank and aerated prior to use for the test so that the dissolved oxygen concentration can reached the saturation level. The characteristics of the holding and dilution water as shown below:

Table 1: Holding and dilution water characteristic

Parameter	Unit	M-030821
Free chlorine	mg/L	<0.001
Total hardness (as CaCO_3)	mg/L	206
Dissolved oxygen (DO)	mg/L	8.78
pH	N.A	7.48
Conductivity	$\mu\text{S}/\text{cm}$	483
Alkalinity	mg/L	48

Note: N. A: not applicable

3 Experimental Design and Procedures

3.1 Preparation of test item

The test solutions were prepared by dissolving specified weight, g of POLYPILE to a final volume of 100 mL for range finding and 500 mL for limit test using dilution water. The test solution was stirred for 24-hours.

3.2 Condition of exposure

Healthy neonate daphnids (age < 24 hour) were exposed to 100 mL test solutions for 48 hours. The test was conducted in 250 mL glass beakers, which were placed in a water bath at $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$ throughout the test with a daily 16-hour light and 8-hour dark cycle. The test solutions were not aerated and the daphnids were not fed during the test.

3.3 Range Finding Test

Three (3) test concentrations prepared were (mg/L); 30, 100 and 1270. Five (5) daphnids were introduced per 100 mL test solution at each test concentration. Observations were carried out at 24- and 48-hour intervals.

3.4 Limit test

Based on immobility recorded at range finding test, the limit test was conducted at 1000 mg/L. A set of four replicates at 1000 mg/L of 100 mL test solution and control were performed.

Twenty (20) daphnids, randomly divided into four (4) groups of five (5) daphnids each, were exposed at 100% concentration and for the control. Each group of daphnids was exposed to 100 mL test solution for a period of 48 hours. Observation was carried out at 24- and 48-hour intervals.

3.5 Observation and examination

The following physical-chemical measurements were recorded at the beginning and at the end of test:

- (a) pH of the test solutions;
- (b) Concentrations of dissolved oxygen (mg/L) of the test solutions;
- (c) Temperature ($^{\circ}\text{C}$) of the water bath and water in the control beaker; and
- (d) Light intensity (LUX) of the experimental area.

Daphnids were observed and examined for immobility and abnormal behaviour. The test organism was considered immobilised if it was not able to swim within 15 seconds after gentle agitation of the test beakers. Cumulative immobility was recorded including abnormal behaviour where the *Daphnia magna* showed a hyperactive or erratic swimming behaviour (HYP) usually in the early stages, and later migrated to the bottom of the beaker (AB) or towards the water surface (AS). Physical appearance of daphnids looking pale or discoloured (DC) were also recorded.

3.6 Statistical method

The standard statistical calculation for EC_{50} is not applicable to the data obtained. Only approximation for the EC_{50} of the limit test was derived based on > 1000 mg/L concentration causing no immobility to the test system.

4. Results

Results on no immobility of daphnids from the range finding test and limit tests were presented in Table 2 and Table 3 respectively. Immobility was recorded at 24- and 48-hour exposure. Within 48 hours, no immobility and abnormal behaviour were observed in the control and at all concentrations.

Table 2. Range finding test- Immobilisation of daphnids

Concentration of test item (mg/L)	Cumulative Immobility (%)		
	24 hr	48 hr	Total
Control	0	0	0
30	0	0	0
100	0	0	0
1270	0	0	0

Table 3. Limit Test – Immobilisation of daphnids

Concentration of test item (mg/L)	Cumulative Immobility at 24-hour		Cumulative Immobility at 48-hour	
	Total number	Percentage	Total number	Percentage
Control	0	0	0	0
1000	0	0	0	0

5. CONCLUSION

Under the conditions of this study and based on the analysis from the 48-hour limit test, the EC_{50} value of POLYPILE was established at > 1000 mg/L. POLYPILE is not classified as hazardous to the aquatic environment based on Globally Harmonised System (GHS) ab Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemicals) CLASS, Regulation 2013.

6. STORAGE & RETENTION OF RECORDS/MATERIALS

Data sheets and records are retained in the Filling Cabinet at the Environmental Technology Research Centre, SIRIM Berhad for 10 years following completion date of this study.

7. REFERENCE DOCUMENTS

OECD Guideline for the Testing of Chemicals. Guideline 202: *Daphnia magna*, Acute Immobilisation Test, adopted 13 April 2004.

APPENDIX A. Test Conditions

Table A.1. Limit Test – pH and Dissolved Oxygen

Concentration of test item (%)	pH		Dissolved Oxygen (mg/L)	
	Initial	Final	Initial	Final
Control	7.48	7.70	8.78	9.04
1000	7.19	7.78	8.26	8.65

Table A.2. Temperature of Water bath

	Limit Test (°C)	
	Initial	Final
Water bath	20.2	20.2
Control beaker	20.7	20.5

Table A.3. Light intensity of Experimental Area

Limit Test (LUX)	
Initial	Final
799	798

APPENDIX B. Limit Test – Cumulative Immobility and Abnormal Behaviour

Concentration of test item (mg/L)	Replicates	Immobility (number)		Abnormal Behaviour (number)	
		24 hr	48 hr	AS At the surface AB At the bottom	HYP Hyperactive DC Discoloured
Control	A	0	0	5:OK	5:OK
	B	0	0	5:OK	5:OK
	C	0	0	5:OK	5:OK
	D	0	0	5:OK	5:OK
	Total	0	0		
	%	0	0		
1000	A	0	0	3: AB, 2:AS	4: AS, 1: OK
	B	0	0	5:AS	2:AS, 2:AB, 1:OK
	C	0	0	5:AS	4: AS, 1: OK
	D	0	0	4: AS, 1:AB	3: AS, 2: OK
	Total	0	0		
	%	0	0		

SIRIM TEST REPORT

METHOD OF TEST

BS EN 1536 : 2010

EXECUTION OF SPECIAL

GEOTECHNICAL WORK

(BORE PILES)



SIRIM QAS International Sdn. Bhd.
(Company No.: 199601037981 (410334-X))
No.1, Persiaran Dato' Menteri, P.O.BOX 7035, Section 2,
40700 Shah Alam, Selangor Darul Ehsan, Malaysia
Tel: 03-55445872
Fax: 03-55445886
www.sirim-qas.com.my

TEST REPORT

REPORT NO : 2022CB0293	PAGE : 1 OF 8
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THIS TEST REPORT IS ISSUED IN SECURED PDF SOFTCOPY

Applicant : LLH TRADING & ENGINEERING SDN BHD
No: 21, Jalan USJ 9/5Q,
Subang Business Centre,
47620 Subang Jaya,
Selangor.

Manufacturer : LLH TRADING & ENGINEERING SDN BHD

Product : POLYPILE

Reference Standard / Method of Test : BS EN 1536: 2010
Execution of special geotechnical work. Bored piles
Clause 6.2.2: Polymer Solution
Clause 6.2.2.3: Manufacturer instruction

Description of sample : Two (2) types of (1) litres of Fresh and Recycle Mixed Polypile were received for testing.
Brand: POLYPILE
Type:
1) Fresh mixed contain Polypile only
2) Recycle mixed contain Polypile collected from Working Pile / Borehole
Product description: Polymer

Date Received of Complete Application : 14 September 2021

Job No. : J20211430362

Description of Test Results : The test results of the submitted test samples are described in Page 2, 3, 4, 5, 6 & 7 of this test report.

Issued Date : 27 April 2022

Approved Signatory;

(HANON NAZIR BIN MOHD BASRI)
Senior Testing Executive



(Signature)

(RAJANOR SIHA BINTI RAJA ABDUL HANAN)
Head
Civil & Construction Section
Testing Services Department

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TEST RESULTS:

Product : POLYPILE
 Method of Test : BS EN 1536: 2010
 Execution of special geotechnical work. Bored piles
 Clause 6.2.2: Polymer Solution
 Clause 6.2.2.3: Manufacturer instruction

INTRODUCTION

The performance of Polypile was evaluated based on manufacturer instruction for slurry specification such as Viscosity, Density, Sand Content, and pH value. The samples were tested on 30rd March 2022 by LLH Trading & Engineering Sdn Bhd under the observation and witnessed by SIRIM QAS International Sdn. Bhd. Below the sample information of Fresh and Recycle Mixed before tested.

Sample	Mix ratio of the slurry	Time of sample collection	Time of sample preparation	Location where the sample is collected	How the sample is collected and transported
Fresh Mixed	0.8 kg/m ³ : Polypile (kg) /fresh water (m ³)	8.30 am (29/3/2022)	9.30 am (29/3/2022)	ECRL Section 3, Kuala Terengganu	Sample is taken from Polymer mixing tank and stored in a plastic jar. Approx. 1L of sample is collected.
Recycle Mixed	Sample from Working Pile/Borehole 0.8 kg/m ³ Polypile	5.30 pm (29/3/2022)	6.30 pm (29/3/2022)	ECRL Section 3, Kuala Terengganu	Sample is taken from Working Pile/Borehole at final depth of 38.0 meter using polymer sampler kits and stored in a plastic jar. Approx. 1L of sample is collected.



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SCOPE OF TESTING

The scope of testing method details is described as follows.

1. Viscosity

a) Apparatus

- i) Graduated jug 1L (1 qt).
- ii) API Marsh Funnel (calibrated to outflow 1 qt. of fresh water at a temperature of $21 \pm 3^\circ\text{C}$ in 33 ± 0.5 seconds); refer Figure 1: Apparatus for API Marsh Funnel
- iii) Stopwatch.

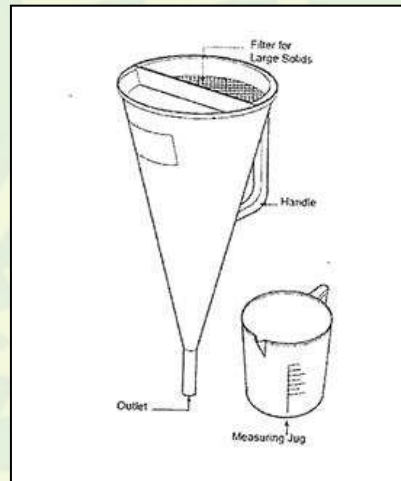


Figure 1: Apparatus for API Marsh Funnel

b) Procedure

- i) Cover the funnel outlet with a finger and pour freshly sampled drilling fluid through the filter into the clean, upright funnel. Fill until fluid reaches the bottom of the screen.
- ii) Remove finger and start stopwatch. Measure the time for the mud to fill to the 1 qt. (946 cm³) mark on the measure jug.
- iii) Report the time to nearest second as Marsh funnel viscosity.
- iv) Clean and dry the instrument thoroughly after each use.



Photo 1: Test procedure using API Marsh Funnel for Fresh & Recycle Mixed

--	--	--

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2. Density

a) Apparatus

- i) Mud Balance with sufficient accuracy to permit measurement within $\pm 0.01 \text{ g/cm}^3$; refer to Figure 2: Apparatus for Mud Balance
- ii) The mud balance consists of a mud cup attached to one end of a beam, which is balanced on the other end by a fixed counterweight and a rider free to move along a graduated scale.

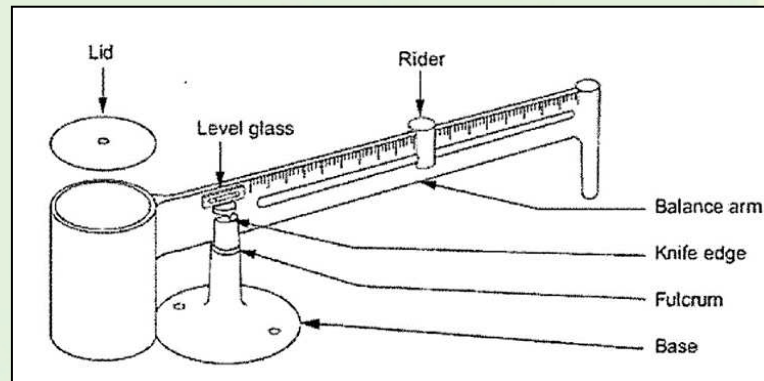


Figure 2: Apparatus for Mud Balance

b) Procedure

- i) Set up the instrument base approximately level.
- ii) Fill the clean, dry cup with slurry to be tested.
- iii) Place the cap on the cup and rotate until firmly seated. Make sure some of the slurry is expelled through the hole in the cap to free trapped air or gas.
- iv) Wash or wipe excess slurry from the outside of the cup; Place the beam on the support and balance it by moving the rider along the graduated scale. The beam is horizontal when the levelling bubble in level glass is on the centre line.
- v) Read the density at the side of the rider toward the knife-edge.
- vi) Clean and dry the instrument thoroughly after each use.



Photo 2: Reading test result: 1.00 kg/m^3 using Mud Balance apparatus for Fresh & Recycle Mixed

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3. Sand Content

a) Apparatus

- i) Sieve N^o200 (75 μ m), 2 in. (50 mm) in diameter; refer to Figure 3: Apparatus for Sieve N^o200 (75 μ m), 2 in. (50 mm) in diameter
- ii) Funnel, to fit sieve and glass measuring cylinder.
- iii) Glass measuring cylinder marked from 0 to 20% volume.

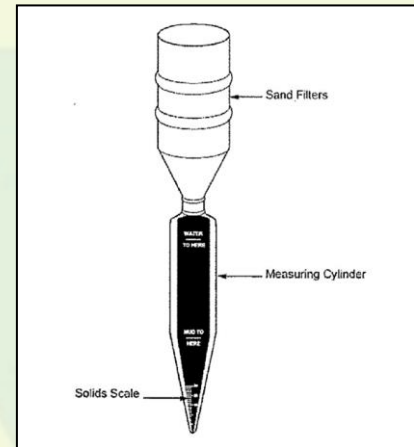


Figure 3: Apparatus for Sieve N^o200 (75 μ m), 2 in. (50 mm) in diameter.

b) Procedure

- i) Fill the glass measuring tube to the designated mark with slurry; Add water to the designated mark.
- ii) Close the mouth of the tube and shake vigorously; Pour the mixture into the clean, wet No. 200 (75 μ m) sieve.
- iii) Discard the liquid that passes through the sieve; Add more water to the tube, shake, and pour into the sieve. Repeat until the water, which passes through the sieve, is clear.
- iv) Wash the sand retained on the sieve to clean any remaining slurry; Attach the funnel upside down over the top of the sieve.
- v) Carefully invert assembly and insert tip of funnel into the mouth of glass measuring tube; With a fine spray of water, wash the sand retained on the sieve back into the measuring tube.
- vi) Allow the sand to settle; Read the volume of the sand from the graduation on the glass tube as a percent of the volume of slurry originally added.
- vii) Clean and dry the instrument thoroughly after each use.

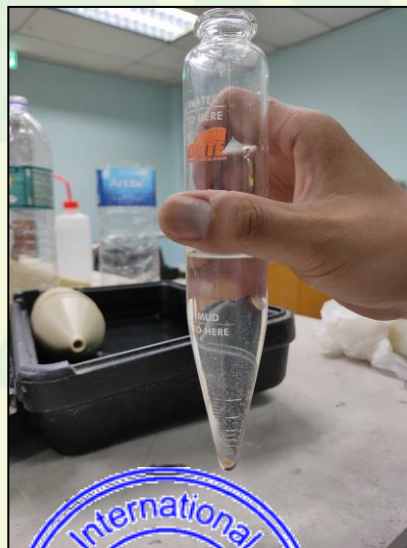


Photo 3: Test procedure & reading test result 0.125 % Using Sieve N^o200 (75 μ m), 2 in. (50 mm) in diameter for Recycle Mixed

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This Test Report refers only to samples submitted by the applicant to SIRIM QAS International Sdn. Bhd. and tested by SIRIM QAS International Sdn. Bhd. This Test Report shall not be reproduced, except in full and shall not be used for any purpose by any means or forms (including but not limited to advertising purposes) without written approval from the Head of Quality, Occupational Safety and Health & Environment (QOSHE), SIRIM QAS International Sdn. Bhd. Please refer to the last page of this Test Report for Conditions Relating to the Use of Test Report.

4. pH

a) Apparatus

i) pH indicator strips (4 colours); refer to Figure 4: Apparatus for pH indicator strips (4 colours)

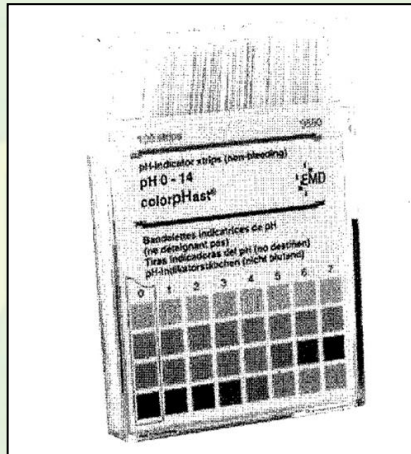


Figure 4: Apparatus for pH indicator strips (4 colours)

b) Procedure

- i) Drip the coloured point of the strip into the polymer slurry.
- ii) Wait 3 seconds.
- iii) Read the pH value (between 0 to 14) in the box.



Photo 4: Reading test result: 10 using pH indicator strips (4 colours) for Fresh & Recycle Mixed



This Test Report refers only to samples submitted by the applicant to SIRIM QAS International Sdn. Bhd. and tested by SIRIM QAS International Sdn. Bhd. This Test Report shall not be reproduced, except in full and shall not be used for any purpose by any means or forms (including but not limited to advertising purposes) without written approval from the Head of Quality, Occupational Safety and Health & Environment (QOSHE), SIRIM QAS International Sdn. Bhd. Please refer to the last page of this Test Report for Conditions Relating to the Use of Test Report.

TEST RESULTS: -

The summary test results are mentioned below: -

NO.	Parameter	Test method	Fresh Mixed	Recycle Mixed
1.	Viscosity (second)	Marsh Funnel (API)	68 second	54 second
2.	Density (kg/m ³)	Mud Balance	1.00 kg/m ³	1.00 kg/m ³
3.	Sand Content (%)	200 Mesh Net and Graduated Flask	0 %	0.25 %
4.	pH	4 colours pH Strips	10	10

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This Test Report refers only to samples submitted by the applicant to SIRIM QAS International Sdn. Bhd. and tested by SIRIM QAS International Sdn. Bhd. This Test Report shall not be reproduced, except in full and shall not be used for any purpose by any means or forms (including but not limited to advertising purposes) without written approval from the Head of Quality, Occupational Safety and Health & Environment (QOSHE), SIRIM QAS International Sdn. Bhd. Please refer to the last page of this Test Report for Conditions Relating to the Use of Test Report.

CONDITIONS RELATING TO THE USE OF SIRIM QAS INTERNATIONAL TEST REPORT

1. A Test Report will be issued in respect of Testing Services conducted and shall relate only to the sample actually tested. SIRIM QAS International makes no warranty whatsoever and the Applicant shall not represent in any manner that any duplication or mass production of the Product is same as the sample actually tested or that SIRIM QAS International has tested any of the duplicated or mass-produced Product. Measurement uncertainty shall be included in the Test Report when there is no statement of conformity required. When a statement of conformity to a specification or standard is applied, the Simple Acceptance Rule is used. Unless otherwise stated, the Acceptance Rule with Guard Band is used.
2. The Test Report shall not be misused, amended, changed, varied or modified in any manner whatsoever by the Applicant or otherwise.
3. If the Test Report is to be furnished to any third party or to the public, each such Test Report shall be furnished in full, legible and in its entirety.
4. The Test Report shall not be reproduced and shall not in any event be used for any advertising purposes or whatsoever without written approval from the Head of Quality, Occupational Safety and Health & Environment (QOSHE) of SIRIM QAS International of No 1, Persiaran Dato' Menteri, Building 8, Section 2, P.O. Box 7035, 40700 Shah Alam, Selangor Darul Ehsan.
5. Customer (Applicant/Manufacture/Factory,etc.) is not permitted to use any SIRIM QAS International, SIRIM or other SIRIM's subsidiaries logo or words on packaging, sample's manual, technical specification, items and products.
6. Subject to consent and written approval from the Head of Quality, Occupational Safety and Health & Environment (QOSHE) of SIRIM QAS International, the customer (Applicant/Manufacture/Factory,etc.) may use SIRIM QAS International logo or word on the promotional materials and the Applicant shall only include the phrase, "A sample of this product has been tested by SIRIM QAS International ...(Test Report No) ...(dated) ...(for what test) ...(to which standard)" or such similar words which stress that only the sample was actually tested. This phrase shall only be used for the purpose of product advertisement or product promotion (eg; brochures/flyers/official website). For avoidance of doubt, the statement shall not be used on the sample, packaging of the sample, items and products.
7. In the event there is an investigation from a Government Regulatory Agency concerning the Applicant's Test Report, SIRIM QAS International may disclose the information pertaining to the Test Report for purposes of such investigation.
8. In the event the Applicant is found in breach of this provision, SIRIM QAS International, SIRIM and/or other SIRIM's subsidiaries without prejudice to any other rights and remedies may take whatever action necessary including but not limited to:
 - a) Informing and placing a notice in the media;
 - b) Obtaining an injunction from Court (cost on a solicitor-client basis to be borne by the Applicant);
 - c) Refusing to accept any further Product for Testing Services from the Applicant or whosoever related to the Applicant, whether subsidiary or otherwise;
 - d) Instructing the Applicant to withdraw and recall the advertisement, statement or document in question and advertise a clarification and apology to SIRIM QAS International, SIRIM and/or other SIRIM's subsidiaries twice in a national publication of SIRIM QAS International's choice at the Applicant's sole cost; and
 - e) Informing or lodging a report pertaining the Applicant's Test Report with the relevant authorities.
9. SIRIM QAS International is committed in supporting an environmentally-friendly business practices by reducing paper consumption, therefore we do not issue any hard copy of Test Report to the Applicant. However, additional certified true copy(ies) or softcopy of the Test Report may be issued upon request by the Applicant upon payment of the relevant fee. The certified true copy(ies) or softcopy of test report shall only be given for test report issued not more than three (3) years from the date of issuance.
10. Issuance of Amendment Report due to the following reasons are chargeable to the Applicant :
 - a) Changes in details of the Applicant name and/or address;
 - b) Changes in details of the Manufacturer's name and/or address;
 - c) Changes in details of the Factory location name and/or address;
 - d) Changes in details of the model and/or type designation
11. However, issuance of Supplementary Report due to the following reasons are FOC :
 - a) Misprints and typo errors;
 - b) Missing technical information as agreed in PP1 form;
 - c) Test data not reported;
 - d) Mistake in reporting of test data
12. Corrections to report shall only be allowed if the date of issuance of the original report has not exceeded 6 months and shall be limited to a maximum 3 times, after either case whichever occurs earlier, an Amendment or a Supplementary Report shall not be issued.

POLYPILE



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PROJECT REFERENCES

PROJECT		Gurney Bridge Project - bored piling works		DATE	4/8/2021
PILE NO.	Test Pile	PILE DIAMETER	1200 mm	RAKE	
BORING PLANT & OPERATOR		DEPTH (M)	DESCRIPTION		
Boring Time Start	10:39	0	Time		
Boring Time End	18:10				
Concrete Time Start					
Concrete Time End		5			
Boring Platform Level					
Top of Casing Level					
Bore Depth	46.5 m				
Toe Level		10			
Cut-Off Level					
Pile Length					
Total Rock Length					
Length of Casing	18.0 m	15			
Depth Water Encountered					
Main Reinforcement					
Binders					
Main Reinf. Length		20	19.5 m	Light grey silty sand	10:40
Concrete Grade	G40J ³				
Concrete Slump					
Direct / Tremie Discharge		25	24 m	Light grey silty sand	13:10
REMARKS					
Lunch break (11:48 - 13:00)					
Adding polymer to fresh mix (14:06 - 15:40)					
RECORDED BY:					
Kerjaya Gamuda Joint Venture					
SIGNATURE: 					
NAME:					
DATE:					
CONFIRMED BY:					
RE/ COW					
SIGNATURE:					
NAME:					
DATE:					
CERTIFIED CORRECT BY:					
Jurutera TSSC Lim Sdn Bhd					
SIGNATURE:					
NAME:					
DATE:					
		30	29 m	Pale yellow to light grey silty sand	14:05
			31 m	Yellowish to light grey silty sand	15:43
			32.5 m	Yellowish silty sand	16:04
		35			
			38 m	Yellow silty sand	16:56
		40			
		45			
			46.5 m	Pale yellow silty sand	18:10
		50			



KERJAYA GAMUDA JOINT VENTURE

No. 1, Jalan Wangsa Permai, 1st Floor, Bangunan One Wing to, Taman Wangsa Permai,
7300 Kuala Lumpur. Tel: +603 6271 1100, Fax: +603 6271 1101



2

PROJECT		Gurney Bridge Project - bored piling works		DATE	5/8/2021
PILE NO.	Test P/L	PILE DIAMETER	1200 mm	RAKE	
BORING PLANT & OPERATOR		DEPTH (M)	DESCRIPTION		
Boring Time Start	09:50	45	Time		
Boring Time End	19:00	46m	start; pale yellow silty SAND 09:50		
Concrete Time Start		47m	Pale grey with light yellow silty SAND 10:17		
Concrete Time End		50			
Boring Platform Level					
Top of Casing Level					
Bore Depth	70 m	53m	Pale orange silty SAND 10:49		
Toe Level		55			
Cut-Off Level					
Pile Length		57m	Light grey with light yellow silty SAND 11:25		
Total Rock Length		60			
Length of Casing					
Depth Water Encountered					
Main Reinforcement		62m	Light grey with pale orange silty SAND 12:31		
Binders		63m	Light orange silty SAND 13:12		
Main Reinf. Length		65			
Concrete Grade		66m	Dark orange sandy silt SILT 14:03		
Concrete Slump					
Direct / Tremie Discharge					
REMARKS		70	70m Dark orange silty SAND 16:17		
Lunch break (12:31 - 13:00)			6/8/2021 start 06:25		
Safety induction (13:21 - 13:40)			71.5m Light orange with light grey silty SAND 06:58		
Polymer mixing (14:14 - 15:40) } 5/8			72m Finish cleaning 07:20		
RECORDED BY:					
Kerjaya Gamuda Joint Venture					
SIGNATURE:					
NAME:					
DATE:					
CONFIRMED BY:					
RE/ COW					
SIGNATURE:					
NAME:					
DATE:					
CERTIFIED CORRECT BY:					
Jurutera TSSC Lim Sdn Bhd					
SIGNATURE:					
NAME:					
DATE:					



KERJAYA GAMUDA JOINT VENTURE
No. 1 Jalan Wangsa Permai, 3rd Floor, Bangunan Oluh, Wangsa, Taman Wangsa Permai,
47000 Kuala Lumpur, Tel: +603 6277 1192, Fax: +603 6277 4430/1172



DRILLING MUD TEST RECORD

Project: Gurney Bridge Project - bored piling works

Pile Reference: **TEST PILE 1200φ (poly pile)**

Date:

No.	DATE & TIME	Density (g/ml)	Viscosity (sec)	Sand Content (%)	pH	Remarks
1	4/8/2021 14:14		33			From the top of casing
2	14:19		41		8-9	Fresh sample
3	14:22	1.0	43		9	Fresh sample after bubbling
4	14:49		34		8	44.9 Sample at 28 m
5	17:43	1.02	53.6		9-10	Fresh sample
6	5/8/2021 07:40	1.01	43		8	Sample at 46m
7	15:15		43.6			Fresh sample
8	15:36		44.7			Fresh sample after adding polymer
9	15:39		44.3			Fresh sample after adding polymer
10	16:49	0.99	48.2		8-9	Sample at 40 m
11	17:12	1.00	46.0		8-9	Sample at 65 m
12	6/8/2021 14:41	1.00	43	0.05	7-8	Sample at 72 m before air lift

Recorded by:

Name:

Date:

Kerjaya Gamuda Joint Venture

Confirmed by:

Name:

Date:

RE / COW

Verified by:

Name:

Date:

Jurutera TSSC Lim S/B

BORED PILE DIPPING RECORD

Date:

Location: Test Pile 1200mm diam. (Near Abut B)

Pile diam 1.20 m

Pile length below ground 72.00 m

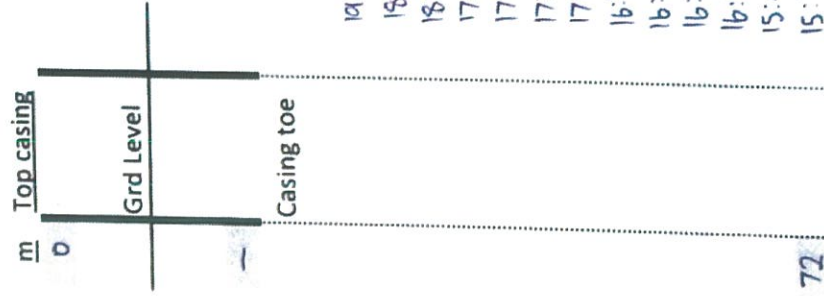
Theoretical:

Vol per m height 1.13 m³

Total concrete Vol 81.44 m³

concrete rise / m³ 0.88 m

$$7 \text{ m}^3 = 6.16 \text{ m rise}$$



Truck No	m ³ poured	Theoretical dip (m)	Actual Dip (m)	No	Tremie Pipe (m)	Depth
21				24		
20				23		
19				22		
18				21		
17				20		
16				19		
15				18	4	0
14				17	3	4
13	91	overflow	overflow	16	3	7
12	84	overflow	overflow	15	3	10
11	77	4.24	3.0	14	4	13
10	70	10.40	10.0	13	4	17
9	63	16.56	16.0	12	4	21
8	56	22.72	21.5	11	4	25
7	49	28.88	27.0	10	4	29
6	42	35.04	34.0	9	4	33
5	35	41.20	40.5	8	3	37
4	28	47.36	546.0	7	4	40
3	21	53.52	55.5	6	2	44
2	14	59.68	60.5	5	3	46
1	7	65.84	—	4	4	49
				3	4	53
				2	4	57
				1	8.6	61

16:00 {
16:22 {
16:44 {
17:25 {
17:44 {
18:03 {
18:16 {
18:30 {
19:00 {

19:37
18:36
18:20
17:54
17:37
17:30
17:02
16:54
16:36
16:27
16:04
15:41
15:32

Toe

Recorded by Contractor's Representative:  CTSM GEOTECHNOLOGY SDN BHD (560497-D) SYAFIAH BT MOHD SOHAIMI 7804 NAME : DATE :	Witness by IOW:  NAME : MOHD ASRAR DATE : 25.10.2021
---	---

POLYPILE



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OTHER SUPPORTING DOCUMENTS / CERTIFICATE



UEC GEOENGINEERING SDN BHD (817819-D)

38-B, Jalan BPU 9, Bandar Puchong Utama, 47100 Puchong, Selangor Darul Ehsan

Tel: 603-5882 5389 Fax: 603-5882 4389

DATE : 15th September 2021

LLH TRADING & ENGINEERING SDN BHD

No. 21-7, Jalan USJ 9/5Q

Subang Business Centre

47620 Subang Jaya, Selangor

Tel: +603 2780 3885

Attn: Mr. Jackson Lim

Dear Sir,

Re: SUPPLY OF POLYMER POLYPILE

For the above reference, LLH Trading & Engineering Sdn Bhd has supply POLYPILE for our project of Taman Pertama, Cheras and Double Track at Johor Bahru. First of all we would like to thank you for working with us.

POLYPILE works well and meets our needs and helps us improve overall performance.

Finally, we are satisfied and will work with your company again in future projects with your expertise needs and your POLYPILE products.

Your Sincerely,

UEC GEOENGINEERING SDN BHD

A handwritten signature in black ink, appearing to read 'Guan'.



Tan Chee Guan
Project Director



SUNWARD INTERNATIONAL ENGINEERING (M) SDN BHD 1343481-P

山河智能国际工程（马来西亚）有限公司

DATE : 15th September 2021

LLH TRADING & ENGINEERING SDN BHD

No. 21-7, Jalan USJ 9/5Q
Subang Business Centre
47620 Subang Jaya, Selangor
Tel: +603 2780 3885

Attn: Mr. Jackson Lim

Dear Sir,

Re: SUPPLY OF POLYMER POLYPILE

We would like to extend our sincere recommendation for POLYPILE as our polymer drilling fluid supplier and also our desire to cooperate with them in the future.

We were use POLYPILE to achieve daily production and this helps us improve overall performance.

We have used their POLIPILE, we have found that their commitment to product quality and technical knowledge to be very effective, professionally responsible and we are always pleasure to work with them.

For and on behalf of

SUNWARD INTERNATIONAL ENGINEERING (M) SDN BHD

WANG XIAO LEI
Vice General Manager



Date : 1st October 2021

TO WHOM IT MAY CONCERN

Dear Sir,

RE: USAGE OF LLH TRADING'S POLYMER, POLYPILE

With reference to the above, we wish to confirm that our projects namely **CSR 4C (Raub) and Sepang Hospital** are currently using Polymer: POLYPILE which is supplied by;

Company Name : LLH TRADING & ENGINEERING SDN BHD

Address : No. 21-7, Jalan USJ 9/5Q
Subang Business Centre
47620 Subang Jaya, Selangor

Person in Charge & Tel : Mr.Jackson Lim & +603 2780 3885

We had been successfully using POLYPILE in the above projects as the stabilizing fluid for our bored piles works with pile size ranged from 600mm diameter to 1800mm diameter and upto 40m deep. With the proper usage of POLYPILE, we have achieved our targeted production and most importantly the quality of end product resulted from it.

In addition, their team's commitment to product quality and technical support have helped us to achieve our targeted objectives.

Thank you.

Yours sincerely,
ADVANCE GEOTECHNICS SDN BHD


ANG SWEE KEAT
Managing Director





PERMATANG BAKTI SDN. BHD.

(402271-U)

No.1 Jalan Wangsa Permai, 3rd Floor Bangunan One Wangsa, Taman Wangsa Permai,
52200 Kuala Lumpur. Tel: +603 6277 5192 (Hunting Line) Fax: +603 6277 5443/5772

Date : 6th December 2022

TO WHOM IT MAY CONCERN

Dear Sir,

RE: USAGE OF LLH TRADING'S POLYMER, POLYPILE

With reference to the above, we wish to confirm that our project namely **Gurney Bridge** are currently using Polymer, Polypile brand which supplied by;

Company Name : LLH TRADING & ENGINEERING SDN BHD

Address : No. 21-7, Jalan USJ 9/5Q,
Subang Business Centre,
47620 Subang Jaya, Selangor.

Person in Charge : Mr. Jackson Lim (+603-27803885)

We had been successfully using POLYPILE by LLH TRADING & ENGINEERING SDN BHD in the above projects as the stabilizing fluid for our bored piles works with pile size ranged from 1500mm diameter and up to 82m deep. With the proper usage of POLYPILE, we have achieved our targeted production and most importantly the quality at the end of result.

In addition, the team's commitment to product quality and technical support have helped us to achieve our targeted objectives.

Thank you.

Sincerely,

PERMATANG BAKTI SDN BHD



PERMATANG BAKTI SDN. BHD.

(402271-U)

No.1 Jalan Wangsa Permai, 3rd Floor Bangunan One Wangsa, Taman Wangsa Permai,
52200 Kuala Lumpur. Tel: +603 6277 5192 (Hunting Line) Fax: +603 6277 5443/5772

Date : 6th December 2022

TO WHOM IT MAY CONCERN

Dear Sir,

RE: USAGE OF LLH TRADING'S POLYMER, POLYPILE

With reference to the above, we wish to confirm that our project namely **587 Sentul** are currently using Polymer, Polypile brand which supplied by;

Company Name : LLH TRADING & ENGINEERING SDN BHD

Address : No. 21-7, Jalan USJ 9/5Q,
Subang Business Centre,
47620 Subang Jaya, Selangor.

Person in Charge : Mr. Jackson Lim (+603-27803885)

We had been successfully using POLYPILE by LLH TRADING & ENGINEERING SDN BHD in the above projects as the stabilizing fluid for our bored piles works with pile size ranged from 600mm to 1500mm diameter of cavity foundation. With the proper usage of POLYPILE, we have achieved our targeted production and most importantly the quality at the end of result.

In addition, the team's commitment to product quality and technical support have helped us to achieve our targeted objectives.

Thank you.

Sincerely,

PERMATANG BAKTI SDN BHD

Our Ref.: OCM/NKVE/ICE-RW/DE/PLUS/00231-21

24 September 2021

PROJEK LEBUHRAYA USAHASAMA BERHAD

Menara Korporat, Persada PLUS
Persimpangan Bertingkat Subang
Km15, Lebuhraya Baru Lembah Klang
47301 Petaling Jaya
Selangor

Dear Pn. Awariah Binti Idris,

THE INDEPENDENT CHECK ENGINEER (ICE) FOR DESIGN & BUILD CONTRACT FOR CONSTRUCTION OF RETAINING WALL AND ASSOCIATED WORKS AT KM28.1 TO KM28.3 (JALAN DUTA – BUKIT LANJAN BOUND) OF THE NEW KLANG VALLEY EXPRESSWAY (NKVE)

- ICE Response to Submission of Standard Operating Procedure (SOP) of Polymer Polypile for Approval

We refer to the above subject matter, CTSM's letter vide ref. no.: CTSM/P099/L085/PLUS dated 25 August 2021, online presentation by LLH Trading & Engineering Sdn Bhd on 20 September 2021, and the revised SOP emailed on 21 September 2021.

The abovementioned submission is in order and we have no further comments on the polymer.

Please do not hesitate to contact the undersigned should you require further clarification.

Thank you.

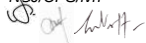
Yours faithfully,

OPUS CONSULTANTS (M) SDN BHD



IR. DR. SOO KIAN SIN
Chief Executive Officer

NSJ/CPS/vh



cc.	PLUS Project Delivery Department	–	En. Abd Jalil Bin Hj Abd Samad/ Pn. Nordalhiyana Binti Kadir
	CTSM Geotechnology Sdn Bhd	–	Ir. Yong Kok Wai



TRADE OF WORK: Civil and Structural Works									
Main Building and External Works	CLIENT (JDSB)	C&S (SSP)	M&E (SSP)	LANDSCAPE (LDSB)	QS (UCSB)	ENVIRONMENTAL CONSULTANT (GASB)	OTHERS		
Main Building Acknowledge Receipt									
Date Received									
DESCRIPTION OF ITEM FOR WHICH APPROVAL IS SOUGHT:									
General/Other									
SPECIFICATION REFERENCE:				Polymer Polypipe					
ENCLOSED PLEASE FIND THE FOLLOWING FOR REVIEW:									
ITEM	CODE	DESCRIPTION					REMARK		
1	PPIPE	Polymer Polypipe					A / B / C / D		
CONSULTANT'S REVIEW:									
✓	A - Reviewed and Approved								
	B - Approved with Comment (No Resubmission Required)								
	C - Reviewed and Comment (Resubmission Required)								
	D - Rejected								
COMMENTS:									
The use of Polypile polymer as stabilizing fluid for bored piling work is acceptable.									
SUBMITTED BY					REVIEWED BY				
Signature :  Name: Muhammad Aliff Bin Afandi Date: 23/06/2022					Signature :  Name: Ir. SEK FOOK KEONG Engineering Manager Date: 29 JUN 2022				



Document Transmittal

Project Number: MRTS **Transmittal No:** RTS-MRTS-TRM-003983
Project Title: PROJEK RAPID TRANSIT SYSTEM LINK (RTS LINK) ANTARA JOHOR BAHRU DAN SINGAPURA
Work Package: PKG5 - Package 5 (Terrestrial Viaducts and ancillary structures)
Subject: MSA - POLYMER (POLYPILE) FOR BORE PILED – LLH TRADING & ENGINEERING SDN BHD
Transmitted by: Document Controller MRTS, Malaysia Rapid Transit System Sdn Bhd

Transmitted To:

Company	Name
Adil Permata Sdn Bhd	DC APSB
Adil Permata Sdn Bhd	Nur Shahlil Farahin Ahmad
Adil Permata Sdn Bhd	Mohammed Hakimi Bin Abdul Razak
Adil Permata Sdn Bhd	KASTURA EDWARD

Transmitted Cc:

Company	Name
Malaysia Rapid Transit System Sdn Bhd	Ravindran A/L N. Keerthisingam
Malaysia Rapid Transit System Sdn Bhd	Salina Binti Md Wazir
Malaysia Rapid Transit System Sdn Bhd	Salman Bin Mohd Badri
Malaysia Rapid Transit System Sdn Bhd	Mohd Fauzi Mazuki

Date: 04 October 2022, 09:12:45 AM +08:00

Reason for Issue:

[Click here to download all Transmittal files.](#)

Click on Document Nos to download them individually.

Item	Document No	Rev	Sts	Title
1	RTS-APSB-PKG5-OVPR-MSA-000001	00	IFR	MSA - POLYMER (POLYPILE) FOR BORE PILED – LLH TRADING & ENGINEERING SDN BHD

Message:

Dear DC APSB,

Please find the attached transmittal as below details:

- 1- Title : MSA - POLYMER (POLYPILE) FOR BORE PILED – LLH TRADING & ENGINEERING SDN BHD
- 2- Review Status : Code 2 - Accepted / Approved with comments

Thanks.

	Issued By	Approved By
Name	MRTS - Noorulhuda Binti Mohamed Noor	MRTS - Ravindran A/L N.Keerthisngam
Designation	Document Controller	HOD
Department	Document Control Centre, ORRM	Operational Requirement & Records Management

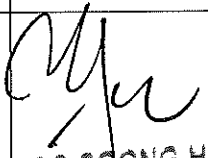


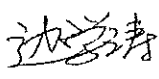
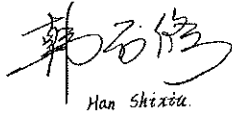
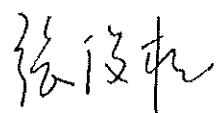
**CHINA COMMUNICATIONS CONSTRUCTION
COMPANY**
EAST COAST RAIL LINK PROJECT

MATERIAL SUBMISSION APPROVAL

FOR

Activity:	POLYMER POLYPILE
Location:	SECTION 3

Document No:	ECRL-S3-BR-MSA-0022		
Revision No:	01		
Date Issued:	10 AUGUST 2022		
SC Signature:	 NGO SONG HOE SECTION LEADER HSS INTEGRATED SDN BHD ECRL SECTION 3	Date: 16/08/2022	Code: 1

Prepared by	Reviewed by	Reviewed by	Approved by
	 Han Shixiu		
Bian Xuetao	Han Shixiu	Zhang Junsong	Liu Yang
Deputy Manager of Procurement	QAQC Manager	Chief Engineer	Project Manager



**CHINA COMMUNICATIONS CONSTRUCTION (ECRL)
SDN BHD**
EAST COAST RAIL LINK PROJECT OF MALAYSIA

**MATERIALS SUBMISSION APPROVAL Form MSA- (A)
Non-KEY MATERIALS / EQUIPMENT**

Document No.:	ECRL-S3-BR-MSA-0022		
From:	CCC(ECRL)SDN BHD (SECTION 3)		
To:	HSS INTEGRATED SDN BHD		
Date:	10 AUGUST 2022	Signature:	

Document Submission Data

☐ New Submission ☒ Re-submission,

Document Title: MSA FOR POLYMER POLYPILE

Material Information

Required Information	Details Provided
Supplier's Name:	LLH TRADING & ENGINEERING SDN BHD
Supplier's Address:	NO. 17-2, BLOCK C PLAZA SINAR, JALAN 6/38D TAMAN SRI SINAR, SEGAMBUT, 51200 KUALA LUMPUR
Name of Material / Product/ Manufacturer:	POLYMER POLYPILE / LLH TRADING & ENGINEERING SDN BHD
Applicable Technical Specification/Drawing:	TECHNICAL SPECIFICATION 12, TABLE 12.8.1-1
Applicable Standard:	OECD GUIDELINE
Test Data:	REFER TO ATTACHMENT V
Previous History of Use:	REFER ATTACHMENT V
Proposed Location for Use:	SECTION 3 (CH87+946.6-CH151+365.2) BORED PILE
Proposed Date for 1 st Use:	-ASAP-
Environmental, Safety and Health Data Provided:	-NA-

☒ Locally Procured ☐ Imported

Comments/Remarks

--

LEVEL 3

Supervising Consultant (RE)	
Code	1
Code 1 – Approved; Code 2 – Approved with comments; Code 3 – Reject	
Name:	
Designation:	NGO SONG HOE SECTION LEADER HSS INTEGRATED SDN BHD ECRL SECTION 3
Signature:	
Date:	16/08/2022



**CHINA COMMUNICATIONS CONSTRUCTION
COMPANY**
EAST COAST RAIL LINK PROJECT

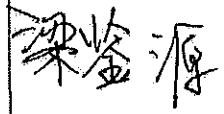
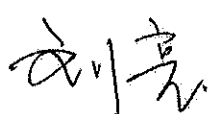
MATERIAL SUBMISSION APPROVAL

FOR

ACTIVITY	POLYMER POLYPILE
LOCATION	: SECTION 4

Document No	: ECRL-S4-BR-MSA-0057		
Revision No	: 00		
Date Issued	: 01 NOVEMBER 2021		
SC Signature	: 	Date: 03.11.2021	Code: 1

ZULKIFLI CHE NGAH
ACTING SECTION LEADER
HSS INTEGRATED SDN. BHD.
ECRL SECTION 4

Prepared by	Reviewed by	Reviewed by	Approved by
			
Cheng Xuejia	Liang Jianyuan	Liu Liang	Feng Rongxian
Head of Material Department	Head of QAQC Department	Chief Engineer	Infrastructure Deputy General Manager



**CHINA COMMUNICATIONS CONSTRUCTION (ECRL)
SDN BHD**
EAST COAST RAIL LINK PROJECT OF MALAYSIA

MATERIALS SUBMISSION APPROVAL Form MSA- (A)			
Non-KEY MATERIALS / EQUIPMENT			
Document No.:	ECRL-S4-BR-MSA-0057		
From:	CCC (ECRL) SDN BHD – SECTION 4		
To:	HSSI		
Date:	01 NOVEMBER 2021	Signature:	
Document Submission Data			
☒ New Submission ☐ Re-submission,			
Document Title:	MSA For Polymer Polypile		
Material Information			
Required Information		Details Provided	
Supplier's Name:	LLH Trading & Engineering Sdn Bhd		
Supplier's Address:	No 17-2, Block C Plaza Sinar, Jalan 6/38D Taman Sri Sinar, Segambut, 51200, Kuala Lumpur		
Name of Material / Product/ Manufacturer:	Polymer Polypile Manufacturer: LLH Trading & Engoneering Sdn Bhd		
Applicable Technical Specification/Drawing:	Technical Specification 12, Table 12.8.1-1		
Applicable Standard:	OECD guideline		
Test Data:	REFER ATTACHMENT V		
Previous History of Use:	REFER TO ATTACHMENT VI		
Proposed Location for Use:	Section 4		
Proposed Date for 1 st Use:	N/A		
Environmental, Safety and Health Data Provided:	N/A		
☒ Locally Procured ☐ Imported			
Comments/Remarks			
LEVEL 3			
Supervising Consultant (RE)			
Code	1		
Code 1 – Approved; Code 2 – Approved with comments; Code 3 – Reject			
Name:	GP		
Designation:	ZULKIFLI CHENGAH ACTING SECTION LEADER		
Signature:	HSS INTEGRATED SDN. BHD. ECRL SECTION 4		
Date:	03.11.2021		



CHINA COMMUNICATIONS CONSTRUCTION (ECRL) SDN BHD

EAST COAST RAIL LINK PROJECT OF MALAYSIA

DOCUMENT / DRAWING REVIEW COMMENT SHEET (DRS)

DRS Ref. No.	ECRL-HSSI-S1-BR-DRS-0274	DRS Revision No.	00	Date Issued	14 Nov 2022
Transmittal Ref. No.	S9-WTRAN-000032 / (WF-013306)	Date Received	12 Nov 2022		
Document Ref. / Title	ECRL-S9-BR-MSA-0001 / MSA for Polymer polypile				
Reviewer's Company Name	HSS INTEGRATED SDN. BHD.				
Reviewer's Name & Initial	MOHD SHUKRI ISMAIL	Section Leader Name & Initial	IR. TAN TUAN YANG	Division/ Discipline	HSSI SC
Date Responded by Responder		Responder's Name & Initial		Division/ Discipline	

Code Category**
Code 1
Code 2
Code 3

FINAL CODE FOR THIS SUBMISSION

1

** Please refer to respective Contract Document for further details on the Definition of Codes.

NO.	DESCRIPTION/COMMENT	APPLICABLE CLAUSE	CONTRACTOR RESPONSE	CODE
ECRL-S9-BR-MSA-0001 / MSA for Polymer polypile				
1	- No objection on the proposed material. - To ensure that materials are stored and applied in accordance with supplier recommendations.	TS Clause: 12.8.2.8 Drilling Fluid and Soil Tests		1

Note: Code 1: Denotes Approved
 Code 2: Denotes Approved in principal with comments
 Code 3: Denotes Disapproved

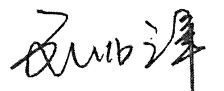
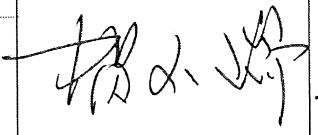
**CHINA COMMUNICATIONS CONSTRUCTION
COMPANY**
EAST COAST RAIL LINK PROJECT

MATERIAL SUBMISSION APPROVAL

FOR

ACTIVITY	: POLYMER POLYPILE
LOCATION	: SECTION 9

Document No	: ECRL-S9-BR-MSA-0001		
Revision No	: 00		
Date Issued	: 10 th November 2022		
SC Signature	: 	Date: 14/11/2022	Code: 1

Prepared by	Reviewed by	Reviewed by	Approved by
		 BIP: LIU ZHONGFENG	
Zhang Wei	Song XinYuan	Ding YouYin	He YuRui
Procurement Manager	QAQC Manager	Chief Engineer	Executive Manager



中国交建
CHINA COMMUNICATIONS CONSTRUCTION

CHINA COMMUNICATIONS CONSTRUCTION (ECRL)
SDN BHD
EAST COAST RAIL LINK PROJECT OF MALAYSIA

MATERIALS SUBMISSION APPROVAL Form MSA- (A)
Non-KEY MATERIALS / EQUIPMENT

Document No.:	ECRL-S9-BR-MSA-0001		
From:	CCCC SECTION 9		
To:	HSSI		
Date:	10 th NOVEMBER 2022	Signature:	
Document Submission Data			
☒ New Submission ☐ Re-submission,			
Document Title:	MSA FOR POLYMER POLYPILE		
Material Information			
Required Information	Details Provided		
Supplier's Name:	LLH TRADING & ENGINEERING SDN BHD		
Supplier's Address:	No. 17-2, Block C Plaza Sinar, Jalan 6/38D, Taman Sri Sinar, 51200 Kuala Lumpur.		
Name of Material / Product/ Manufacturer:	Polymer Polypile Manufacturer: LLH TRADING & ENGINEERING SDN BHD		
Applicable Technical Specification/Drawing:	Technical Specification 12, Table 12.8, 1-1		
Applicable Standard:	OECD guideline		
Test Data:	Refer Attachment V		
Previous History of Use:	Refer Attachment VI		
Proposed Location for Use:	Section 9		
Proposed Date for 1 st Use:	N/A		
Environmental, Safety and Health Data Provided:	N/A		
☒ Locally Procured ☐ Imported			
Comments/Remarks			
- Approved .			
LEVEL 3			
Supervising Consultant (RE)			
Code 1			
Code 1 – Approved; Code 2 – Approved with comments; Code 3 – Reject			
Name:	Tan Tuan Yang		
Designation:	SL		
Signature:			
Date:	14/11/2022		



OSD ALLIANCE SDN BHD (Co. No. 1303588-V)

OSD Consultants (M) Sdn Bhd

Optimum Structural Design Civil & Structural Consulting Engineers

C713A to C718, Centum Oasis Corporate Park, Jalan PJU 1A/2, Oasis Damansara, 47301
Petaling Jaya, Selangor, Malaysia. Tel: 603-7610 3365 Fax: 603-7610 3367



Ref No: OSD/CSR/1C/SM/011

Date: 04th April 2023

SITE MEMO

Attention: Ts.Kamal Rozi bin Yaakob

CC:

Ir Mohd Hamizi Bin Abdullah

En.Fadhil Wafi Bin Nordin

Dato' Ir.Dr.Adanan Shukri Bin Musa

Mr.Leong Chen Foong

Company: Landasan Angsana Sdn.Bhd

Company:

JKR CSR 1C

OSD Consultants HQ

Fax/Phone: 03-8768 6457

Email:

hamiziabdullah@jkr.gov.my

fadhilwafi@jkr.gov.my

adnanmusa2001@gmail.com

leongcf@osdconsultants.com.my

Email: Landasan.csr1c@gmail.com

Pages:

1 of 1

☒ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

☒ **For Action** ☒ **For Information**

RE: Kelulusan Bahan bagi Drilling Fluid Polymer (LLH Trading & Engineering Sdn.Bhd)

We refer to the Contractor's Site Memorandum ref. no. LASB/CSR/1C/OSD/MEMO/018 dated 30th March 2023 and our comments are as follows:

- 1) The proposed materials for the fluid polymer polypile are acceptable.
- 2) It was noted that the slurry parameter for sand content should be $\leq 1\%$ as per JKR specification.

Thank you,

ISSUED BY:

Signature :

Name :

Date :

MUHAMMED SAPAWI ISMAIL

Assistant Resident Engineer

OSD Consultants Sdn.Bhd, CSR 1C

04-04-2023

Company Stamp :



RECIPIENT ACKNOWLEDGEMENT:

Signature

Name

Date

04 APR 2023

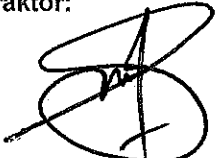
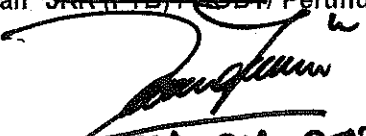
Company Stamp :



 JKR MALAYSIA	PROSEDUR PEMBINAAN DAN PENYELIAAN TAPAK BINA	No. Dokumen : JKR.PK(O).04-5
		No. Keluaran : 07
		No. Pindaan : 00
		Tarikh : 14 Januari 2022
		Muka Surat : 1 / 2

LAMPIRAN 5

BORANG KELULUSAN BAHAN/ PERALATAN/ PEMERIKSAAN MOCK-UP

PROJEK: LINGKARAN TENGAH UTAMA: KUALA KRAI KE JAMBATAN SG. LAKIT: KG. LALOH KE PERSIMPANGAN FT66		No. Rujukan : LT11C MSA1003
No. Kontrak : JKR/IP/CKUB/111/2022		Kontraktor : LANDASAN ANGSA SDA SDN BHD
Butiran Kerja: *Kelulusan Bahan/ Peralatan/ Mock-Up/ Deskripsi Item/ Sampel: DRILLING FLUID POLYMER		Lokasi: *Mock-up/ Bahan/ Kerja : BORED PILE WORK
Bidang: ☐ Sivill ☒ Struktur ☐ Senibina ☐ Mekanikal ☐ Elektrik ☐ Lain-Lain:.....		
Model: POLYMER POLYPILE	Pengilang: LUT TRADING & ENGINEERING SON BIRD	Pengedar : LUT TRADING & ENGINEERING SON BIRD
Dilampirkan: ☐ Katalog ☐ Sijil ☐ Sampel Bahan ☒ Spesifikasi ☐ Sampel Kerja ☒ Method Statement ☐ Warranty ☐ Lukisan/Shop Drawing ☐ Mock-Up ☒ Lain-lain : <u>TEST REPORT</u>		
PERAKUAN KONTRAKTOR: Saya dengan ini berjanji akan mematuhi kehendak JKR/ Perunding* dan memastikan cadangan *bahan/ peralatan/ mock-up kerja adalah berfungsi sebagaimana spesifikasi dan lukisan seperti di dalam kontrak.		
Tandatangan Kontraktor: 		Nama & Jawatan / Cop Rasmi: TS. KAMAL ROZI BIN YAAKOB PROJECT MANAGER LANDASAN ANGSA SDA SDN BHD (COMPANY NO: 903000-K)
Tarikh :		
SEMAKAN JKR (PTB) / HODT*(Arkitek/ M&E/ C&S) jika perlu/ PERUNDING*(Arkitek/ M&E/ C&S): (Rujuk Nota Semakan Pembinaan dan Penyeliaan Tapak Bina sekiranya perlu) Cadangan *bahan/ peralatan/ mock-up adalah: ☒ Mematuhi ☐ Tidak Mematuhi		
Ulasan: *JKR (PTB)/ HODT/ Perunding: <u>Ujian ke atas Polymer perlu mengikuti spesifikasi JKR Klaus 10.9.2.8 Table 2.</u>		
Tandatangan *JKR (PTB) / HODT/ Perunding: 		Nama & Jawatan / Cop Rasmi: MUHAMMED SAPAWI ISMAIL Assistant Resident Engineer OSD Consultants Sdn.Bhd, CSR 1C
Tarikh : <u>04-04-2023</u>		

 JKR MALAYSIA	PROSEDUR PEMBINAAN DAN PENYELIAAN TAPAK BINA	No. Dokumen : JKR.PK(O).04-5
		No. Keluaran : 07
		No. Pindaan : 00
		Tarikh : 14 Januari 2022
		Muka Surat : 2 / 2

Nota: * Potong yang tidak berkenaan

No. Rujukan :	
KEPUTUSAN PP/WPP: i. ☐ Dipersetujui Walaupun perkara di atas telah dipersetujui, adalah menjadi tanggungjawab kontraktor bagi memastikan *bahan/ peralatan/ mock-up/ kerja mematuhi kehendak spesifikasi dan berfungsi seperti yang telah dinyatakan di dalam kontrak. ii. ☐ Tidak dipersetujui dan perlu dikemukakan semula Ulasan *PP/WPP/PD/VPD: _____ _____ _____	
Tandatangan *PP/ WPP/PD/VPD Tarikh :	Nama/Jawatan/Cop Rasmi:

Nota: * Potong yang tidak berkenaan

Bagi Projek R&B, borang ini hanya diisi bagi bahan/ peralatan/ pemeriksaan *mock up* tertentu yang memerlukan kelulusan PD/VPD sahaja.

Fwd: IHC - Submission of Material and Method Statement- Polypile

Hanif Safiei (CPSB-IHC) <hanif.ihc@chaseperdana.com.my>

Mon 11-Sep-23 2:55 PM

To: HUEY TIAN ENGINEERING SAMALAJU ENGINEERING <hueytian@hotmail.com>

Dear Mr Chua

Attached email loop from consultant regarding approval polymer usage

Best regards,

Muhamad Hanif Bin Mohamad Safiei
Sr Site Engineer - IHCKL



Chase Perdana Sdn Bhd

Suite 7.3, Level 7, Wisma Chase Perdana
Changkat Semantan, Damansara Heights
50490 Kuala Lumpur
Tel: +6-03-2718 3700
Fax: +6-03-2094 0503
Malaysia Mob: +6013-7589220
e: hanif.ihc@chaseperdana.com.my

----- Forwarded message -----

From: **Dhanapal (Structure)** . <dhanapal87@hss.com.my>

Date: Wed, Jul 5, 2023 at 7:34 PM

Subject: Re: IHC - Submission of Material and Method Statement- Polypile

To: Mohd Hisham bin Mohamed (CPSB) <hisham@chaseperdana.com.my>

Cc: HSS-IHC Group <9620-ihcp@hss.com.my>, <rpm-ihckl@realpm-intl.com> ,

VeritasIHCProject <vaki.17-ihc@theveritasdesigngroup.com> , Ir S Sivakumar (CP)

<sivakumar@chaseperdana.com.my> , Shahrul Hisham bin Lassim (CPSB-IHC)

<shahrul.ihc@chaseperdana.com.my> , Hanif Safiei (CPSB-IHC)

<hanif.ihc@chaseperdana.com.my> , Khairul Amree (CPSB)

<khairulamree@chaseperdana.com.my> , Fazliana (CP) <fazliana@chaseperdana.com.my> ,

Norsidah Bt Saleh (CP) <norsidah@chaseperdana.com.my>

Dear Hisham,

Reference is made based on the above email, 'Polypile' polymer is deemed acceptable based on the technical data sheet submitted.

However, actual performance during bored piling works needs to be verified.

Thanks & Regards,

Dhanapal N.

Senior Structural Engineer, Structures Division.

**HSS Integrated Sdn. Bhd.**

(Associate Company of HSS Engineers Berhad)

B1 (1-4) Block B, Plaza Dwitasik,
[No. 21 Jalan 5/106](#), Bandar Sri Permaisuri,
56000 Kuala Lumpur, Malaysia
H/P [+6011 1662 6193](#) **T** [+603 9173 0355](#) | **F** [+603 9173 0939](#)

www.hssgroup.com.my

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Please consider the environment before printing this email.

On Mon, Jul 3, 2023 at 10:39AM Mohd Hisham bin Mohamed (CPSB)

<hisham@chaseperdana.com.my> wrote:

Dear Mr. Dhanapal,

Please find attached our reply to your comment on the above submission (ref: IHC-STF-CPSB-0017) dated 3/7/2023 for your reference.

Thank you.

Regards,

Mohd Hisham bin Mohamed

Chase Perdana Sdn Bhd

Suite 7.3, Level 7, Wisma Chase Perdana,
Changkat Semantan, Damansara Heights,
50490 Kuala Lumpur.

Tel : +603-2718 3700

Fax : +603-2094 0503



Virus-free. www.avg.com



Please consider the environment before printing this email.

Our Ref: BPM/PHP/F422 (SM/C&S038)

Project : CADANGAN UNTUK MEROBOH BANGUNAN ANNEX 1 TINGKAT DAN MENDIRIKAN 1 BLOK BANGUNAN PERUBATAN 7 TINGKAT KEPADA HOSPITAL 4 TINGKAT SEDIA ADA (PANTAI HOSPITAL PENANG) SECARA BERFASA: - A) FASA 1: 1 BLOK BANGUNAN PERUBATAN 7 TINGKAT YANG MENDUNGHI: I) 6 TINGKAT KEMUDAHAN HOSPITAL, RUANG RAWATAN DAN WAD PESAKIT (TINGKAT G-5) II) 1 TINGKAT RUANG PENGURUSAN HOSPITAL (TINGKAT 6) B) FASA 3: BANGUNAN ANNEX 11 TINGKAT YANG MENDUNGHI: I) FASA 3A: a) 1 TINGKAT PENCAWANG TNB, BILIK M&E DAN KEMUDAHAN HOSPITAL (TINGKAT G) b) 2 TINGKAT TEMPAT LETAK KENDERAAN (TINGKAT 1 – 2) II) FASA 3B: 5 TINGKAT TEMPAT LETAK KENDERAAN (TINGKAT 3-7) DI ATAS FASA 3A DI ATAS SEBAHAGIAN LOT 11546, NO. 82, JALAN TENGAH, MUKIM 12, D.B.D, PULAU PINANG UNTUK: TETUAN SYARIKAT TUNAS PANTAI SDN. BHD. (241-297-H).
- DEMOLITION, SITEWORKS AND ANCILLARY WORKS, PILING & PILECAPS, MAIN BUILDING, EXTERNAL WORKS AND DECANTING WORKS

Date : 24th August 2023

M/S : Arup Jururunding Sdn Bhd

Attn : Ms. Chan Y.L. / Mr. Chew B.G.

Tel No. : 04-293 3800/ 04-293 3828

Fax No. : 04-293 3810

c.c. : Syarikat Tunas Pantai Sdn Bhd (Pantai Hospital Penang)

☒ Attn: Mr. Ganesh Rao / En. Mohd Izzat Bin Abd Ghalib
(Tel: 04-643 3888 Fax: 04-643 2888)

c.c. : IHH Healthcare Malaysia (Project Management Office)

☒ Attn: Mr. Shawn Yu / Mr. Tan G.S. (Tel: 03-2298 1000 Fax: 03-2298 1001)

c.c. : Arkipac Sdn Bhd

☒ Attn: Ar. Siow K.M. / Ar. Ng P.L. / Mr. Tan K.W.
(Tel: 03-5635 8353/ 03-5636 0143 Fax: 03-5631 7276)

c.c. : aLM Architects

☒ Attn: Ar. Mei C.S. / Mr. Jeff Lau J.F. / Ms. Tan Z.J.
(Tel: 04-656 6870 Fax: 04-656 6871)

c.c. : Perunding PLA

☐ Attn: Ir. Ts. Wong K.N. / Mr. Ho K.W. (Tel: 04-333 7990 Fax: 04-331 7337)

c.c. : Perunding Kos T&K Sdn Bhd

☐ Attn: Sr. Khor P.S. / Ms. Joey Tham / Ms. Chloe Lee
(Tel: 03-6203 5113 Fax: 03-6203 5112)

☐ Urgent

☒ Please Reply

☒ For Review

No. of Pages: 2 + 16 pages

☒ For Confirmation ☐ Other (Please specify)

(including this page)

Subject: PROPOSED SAMPLES & MATERIAL SUBMISSION NO.38 – POLYMER FOR PHASE 1C'S BORE PILING WORKS

With reference to the above, we would like to submit herewith our proposed samples & material no.38 – polymer for phase 1c's bore piling works, together enclosed herewith the catalogue for your kind consideration and approval.

Your early reply to the above is much appreciated.

Thank you.

Yours faithfully,



KELLY TAN

Contract Manager



LETTER / FAX SENT

Date : 24/08/2023

- ☐ By Courier
☐ By Post
☒ By Fax / E-mail
☒ By Hand / Despatch

WE BUILT TO LAST

PROPOSED SAMPLES & MATERIALS SUBMISSION NO. 38

 Submission No. : **SM/C&S016**

 Attention to: **ARUP**

 Date : **24.08.2023**

 Issued by : **BPM**

Project: **CADANGAN UNTUK MEROBOK BANGUNAN ANNEX 1 TINGKAT DAN MENDIRIKAN 1 BLOK BANGUNAN PERUBATAN 7 TINGKAT KEPADA HOSPITAL 4 TINGKAT SEDIA ADA (PANTAI HOSPITAL PENANG) SECARA BERFASA: - A) FASA 1: 1 BLOK BANGUNAN PERUBATAN 7 TINGKAT YANG MENGANDUNGI: I) 6 TINGKAT KEMUDAHAN HOSPITAL, RUANG RAWATAN DAN WAD PESAKIT (TINGKAT G-5) II) 1 TINGKAT RUANG PENGURUSAN HOSPITAL (TINGKAT 6) B) FASA 3: BANGUNAN ANNEX 11 TINGKAT YANG MENGANDUNGI: I) FASA 3A: a) 1 TINGKAT PENCAWANG TNB, BILIK M&E DAN KEMUDAHAN HOSPITAL (TINGKAT G) b) 2 TINGKAT TEMPAT LETAK KENDERAAN (TINGKAT 1 – 2) II) FASA 3B: 5 TINGKAT TEMPAT LETAK KENDERAAN (TINGKAT 3-7) DI ATAS FASA 3A DI ATAS SEBAHAGIAN LOT 11546, NO. 82, JALAN TENGAH, MUKIM 12, D.B.D, PULAU PINANG UNTUK: TETUAN SYARIKAT TUNAS PANTAI SDN. BHD. (241-297-H). - DEMOLITION, SITEWORKS AND ANCILLARY WORKS, PILING & PILECAPS, MAIN BUILDING, EXTERNAL WORKS AND DECANTING WORKS**

List of Proposed Samples & Materials		Attachments:
1	Polymer for phase 1 C's bore piling works	SM/C&S038 (1 page) Technical Data Sheet (1 page) Standard Operating Procedure of POLYPIPE Polymer for Bore piling (9 pages) Schematic Diagram of Polymer Batching Plant Setup (1 page) Material Safety Data Sheet (5 pages)

Consultant Approval	☒ REVIEWED WITH MINOR COMMENTS ☐ DISAPPROVED
Comment	1. To confirm if the VIS-CX Trol or Polybond polymer will be still used at site or the POLYPIPE polymer will be superseding it. 2. To revise to all the clouded items from page 3 to page 18 for your onward action. 3. To comply to APPENDIX E - SPECIFICATION FOR BORED CAST IN PLACE PILE attached. (page 19 & 20)

Consultant	
signature	Name: SANJAY A/L BOSS
 	Position: GEOTECHNICAL ENGINEER
	Date: 05 SEPTEMBER 2023