

Safety Tek, Inc. presents polymer technology for Reconstruction Projects and New Construction

AGGREBIND INNOVATIVE HOUSING AND ROADS...

.... USING ON-SITE LABOR AND MATERIALS

Aggrebind is an environmentally friendly, water based, acrylic cross-linking polymer that binds on-site materials, rubble or other, to produce:

Hand compacted blocks

Water resistant renders for walls and roofing

Pathways

Roads

Water catchment ponds

Dust and erosion control

And, can be used in Raft Foundations

Aggrebind can be used with any type of water, even sea water, and substantially improves the load-bearing capacity of all on-site sub-soils.

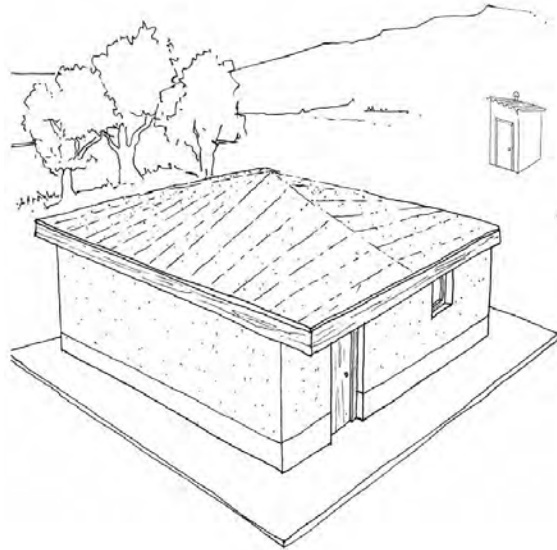
Aggrebind has a bond-back capability that restores the integrity of the stabilised material if any repairs are required.

***Aggrebind is ideal for Low Cost Housing Projects in underdeveloped countries and countries that sustain natural or war-inflicted disasters.
Safe and affordable housing boosts moral and preserves human dignity and health.***



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Low Cost & Affordable Housing using AGGREBIND cross-linked polymer technology



**Based on the principals of adobe & soil housing,
a house can be constructed using on-site materials,
even when clay is not present in the soil.**

A traditional adobe house relies on the cohesive properties of soils with clay for its strength and flexibility. Fibers like straw, stalks, etc., are normally added to the adobe mixture to provide additional tensile strength.

Aggrebind works with or without clay.

- Aggrebind enhances the tensile properties of adobe.
 - Aggrebind lets you create blocks of structural integrity where clay does not exist.
 - Aggrebind lets you create blocks from rubble that has been crushed and made into fines.
 - Aggrebind provides structural solutions with non-cohesive materials such as sand with fines or aggregate.
 - Aggrebind prevents moisture penetration and can add flexible tensile properties that are so important in earthquake areas.
 - Aggrebind can be used to control dust and erosion.
 - Aggrebind can be used to build roads, irrigation ditches, water run-off canals and more....
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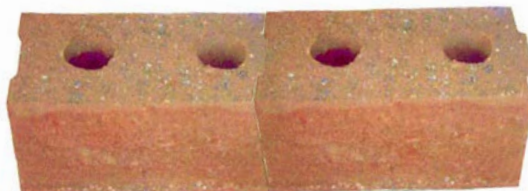
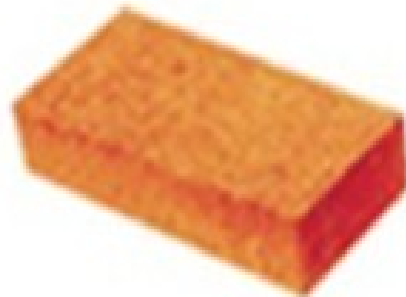
Houses can be built manually by unskilled workers and are fire resistant.



Or, with low tech equipment for higher productivity.



**Various style blocks can be made depending on the structural requirements.
A local engineer and/or architect is recommended for these decisions.**



Interlocking blocks with vertical cane stalks, rebar or poles will add considerable stability

to the structures in seismic-prone zones

SUMMARY OF TEST RESULTS FOR POLYMER BONDED CLAY BLOCKS & BRICKS Performed by AMERAQ in Iraq:

A development trial in regards to the use of a **Aggrebind** water soluble polymer has been undertaken on "UK's format solid bricks" and on "Concrete" block sized hydraulically pressed units. Polymer was added to dry clay and additional water added to achieve workable moisture content (plasticity) for pressing.

After mixing, moisture contents were measured. 2 clay only bricks were produced as a direct comparison to the **Aggrebind**. Mixes were made on 2 clay types, both routine raw materials. The only difference was the particle size, one mix was based on a works ground material (coarse) and the other on a fine ground material (Fine = <0.5mm) Steel moulds were required to allow the press pressure to be loaded onto the plunger without risk of the mould box bursting. A load of between 180 and 220 kN was used for bricks and between 21 and 24 tonnes for the blocks.

Results

After air drying for 5 days the bricks and blocks were forced dried in a ventilated dryer for 48 hours prior to testing.

| Unit | Brick Units Block Units | | | | | | | |
|-----------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------|---------------------------|--|
| Mix Type | Clay Alone | | Clay + Polymer | | Clay Alone | | Clay + Polymer | |
| Clay size | Coarse | Fine | Course | Fine | Fine | Fine | | |
| Dimensions | 215 X 102.5 X 65 mm | | | | 440 X 215 x 100 mm | | | |
| Moisture when pressed | 13.70% | 19.10% | 19.60% | 21.90% | 20.70% | | 22.00% | |
| Linear Shrinkage | 2.48% | 3.62% | 4.83% | 4.96% | | | | |
| Compressive Strength | 4.2 N/mm ² | 3.83 N/mm ² | 13.1 N/mm ² | 12.3 N/mm ² | 1.37 N/mm ² | | 4.67 N/mm ² | |

The mode of failure was different between the sample with and without polymer additions, the clay alone samples tended to crumble when the failure occurred however the polymer samples showed a fracture indicating a unit with greater structural bonding.

Conclusions:

The addition of polymer significantly improves the strength under compression of the clay pressed bodies despite the only thermal process being a normal drying process as would be achieved through a commercial brick dryer. In terms of fired equivalents (bricks) the compressive strength of the dried clay units with polymer are similar to those of stock and handmade fired bricks in the UK and Lowland Europe.

The compressive strength of the clay block containing polymer is mid way between the 2 commonly produced concrete blocks (3.6 N/mm² and 7.6N/mm²). On this basis both brick sand blocks appear directly comparable with fired or set (in the case of concrete) equivalents.

Bricks Samples in different material mixtures



Soil mixed with debris

1 part of **Aggrebind** polymer
8 parts of Soil with debris
1 part of water



Pure Sand with Colorant

1 part of **Aggrebind** polymer
8 parts of pure Sand
1 part of water



Pure Gravel adhered on Plastic surface (solid smooth Surface)

Using **Aggrebind** polymer



Pure clay Brick

Using **Super-Brick** polymer

New construction methods available include reinforcing the walls with inexpensive bamboo or eucalyptus poles anchored to the foundation, together with horizontal canes tied to the poles at every fourth row of bricks. The poles are secured to parallel wooden beams on top of the walls, which also act as roof supports. These structural changes allow the walls and roof to react to the vibrations of an earthquake as a structural unit rather than as separate elements.

Environmental and Cost Considerations for using AGGREBIND polymer in soil stabilization and on-site block making

Cement is widely used in soil stabilizing and block formation and is sometimes added to various liquid based polymers, as an additive, to create polymer /cement stabilized soil base layers, with about 3% cement added per 50kg per cubic meter of soil treated. **Cement is the highest energy user in the world, consuming around 40% of the world's total energy consumption**

AGGREBIND uses **NO** cement, just water based environmentally friendly polymers to create durable , affordable roads and blocks for housing.

AGGREBIND's embedded energy content is insignificant when compared to installations where cement is used.

Technical Points on Aggrebind for Roads

AGGREBIND cures by evaporation, and the compaction of the soil, which typically achieves 99.7 to 99.9% maximum density and is capable of sustaining 20 Ton trucks within a couple of hours, and 100 Ton truck in about 24 hours, depending on ambient humidity. Effectively this means that as soon as it is compacted, and sealed, the base becomes operational as a road. All wear surface treatments will bond to an Aggrebind stabilized base layer.

AGGREBIND eliminates the necessity for logistical support vehicles and heavy equipment for dispersing construction materials. Therefore the flow of the construction process is more sequential as it is a series of continuous operations.

AGGREBIND can use any type of manufacturers' equipment, automated or manual, from anywhere in the world.

AGGREBIND claims substantial reductions in CO2 emissions both from the embedded energy necessary to construct the road, plus the additional savings by eliminating the cement or asphalt distributing construction equipment, handling and delivery of same, plus fuel savings, plus vehicle maintenance and capital investment costs of equipment purchase etc. Equipment required for using AGGREBIND is 25% - 95% less in cost than equipment requirements for cement and asphalt, depending on local conditions.

AGGREBIND have developed a tracer that is now integrated into the polymer. This enables the polymer content in any area of treated soil, **current or future**, to be analyzed on site. This provides the site engineer with excellent quality and control reference points. **AGGREBIND is the ONLY product in the world that has this facility.**

AGGREBIND, in essence have taken conventional cement soil stabilization to a higher level by the addition of the polymer to help provide a water resistant stabilized soil and blocks.

AGGREBIND has taken soil stabilization to the next level, achieving similar results, using no cement, and providing a water resistant bound layer of soil which is then sealed at the surface. Water penetration is a major cause of road failure throughout the world.

AGGREBIND can produce a stabilized soil road without any wear course additions for the more rural applications. These roads can, if required at a later date, have an asphalt wear course added.

AGGREBIND stabilized soil, without any asphalt base & wear course added, has been used on mine haul roads for 200 Ton trucks: British Military landing strips (Hercules & C31's): Plantation haul roads: Chinese Military, SSSI sites: and even a mixture of palm nut shells and soil in the Ivory coast to provide wear characteristics like asphalt - ALL without any cement.

AGGREBIND has provided solutions for soil types from many Countries and have produced viable results using only sand, beach coral/shells and sea-water.

AGGREBIND: EXTRACTS FROM TEST RESULTS

1) Adhesion;

Excellent to various stones; marble; cement; slate; tested using cross-hatch tape test.

The coating is scored using a sharp knife or special tool;

Scotch tape applied and pulled off. An estimation of the amount of coating remaining is made. This is a standard test for paint lacquers.

2) Longevity;

This is a polymer and therefore will not degrade readily.

Coatings have been exposed to air and light for many years without any signs of deterioration.

3) UV resistance:

No observed deterioration has been observed.

4) Environmental:

The polymeric content has a molecular weight of much greater than 1000 and is therefore deemed to be not bio-available. It is therefore considered to have a minimal impact on the environment.

5) Surface abrasion:

Good resistance as a film; this will be enhanced by the mineral content in construction.

6) Surface spills:

2 coats of polymer allowed 48 hrs to dry. 24 hr spot test

Petrol: film slightly dulled; no effect on film integrity

Light mineral oil: no effect

15W/50 Motor oil: no effect

Hydrochloric acid: film dulled and slightly swollen; adhesion to tile reduced

Phosphoric acid: film destroyed

7) Compatibility:

This is an anionic dispersion and therefore will be coagulated by cationic surfactants, acids and high ion concentrations particularly of trivalent metal salts.

Various other water miscible chemicals can be added without causing undue problems especially if pre-diluted.

8) Cured film recovery and memory characteristics:

This is a styrene-acrylate polymer and not an elastomeric. The film is flexible and has some recovery.

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For century's creativity, art, and cultural has been an important part of life.

Why is it not being considered for inclusion in the designs for new self-built community housing?

Finally there is a solution for providing modern, individually designed, environmentally friendly homes, produced by local communities, from on-site soils and waste materials.

Welcome to Aggrebind[®] a water based, environmentally friendly product, that turns soil into a construction material for the manufacture of hand pressed bricks, and soil compacted roads.

Aggrebind[®] is available in a wide range of colours, providing the home builder with unlimited design options.

Communities can finally participate together to provide, homes, clinics, schools, shops, factories, roads and recreational areas for sport etc.

Training, basic business plans, finance and technical support, would be required to ensure that the projects complied with local regulations. Organisations like the ASISA (Association for Savings and Investments) could offer assistance with establishing credible financial structures.

Self income generating co-operatives could be established from within the community to handle the purchase of product and the rental of block making and road construction equipment.

This would bind the communities to work together to create a better future for themselves, and their children.



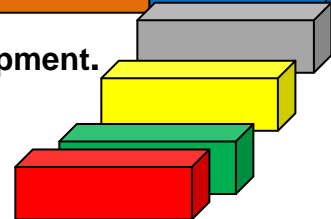
Step into the exciting new world of Community Development.

Aggrebind is leading the way for families to secure a happier and healthier future

Please refer your questions to:

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Safety Tek, Inc., USA – Tel. +1 203 785 1808, email: rd@safty-tek.com



Color my world with Aggrebind[®]

*With the addition of Holcolex colorant you can create vibrant walkways, blocks and structures.
Your limit is your imagination.*



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