

K-X Test Report

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Preface:

In the K-X process the wood chips should have a maximum moisture content of 35 % before the treatment. If the moisture is higher the material has to be dried. Recycled pinchips have mostly low moisture (10-18%), which is ideal for the K-X free aggregate production.

In the K-X process we add 10 % more moisture to the wood particle, spraying them during thoroughly mixing cycles with the mineral solutions.

During the following 2 days the aggregate has to mature on a pile or in a container, before being mixed with portland cement. The free K-X aggregate is now a impregnated wood fiber and will not decay for a long time.

The latest test confirms that after we have filled in June 1990 a metal box (on the top open to air) with K-X aggregate shows no signs of decay, and we can use the material in the wood concrete production any time.

An other test shows the same portion of K-X aggregate and untreated chips after being a year in a jar filled with water. The water in the jar with the untreated chips is dark brown and smells bad. In the jar filled with the K-X aggregate the water is very clean and clear.

The raw material used for K-X aggregate has to be clean wood chips without sawdust, dirt and no more then 2% bark content. The metal parts (recycled pallets) have to be collected by a magnet after the screening of the raw pin chips.

In the wood concrete products as FASWALL permanent wall forms and for the cast of the highway sound absorption panels, we use 1/4" - 1" long wood sticks which are much stronger then the flex shavings or chips and planner shavings mixed.

Too fine fiber and sawdust in the aggregate would absorb to much of the cement, needed for the coating of the pinchips to make a strong product.

In the K-X process we do not soak the wood fibers in chemical

solution as used in early wood-cement technologies.

1. Tested material mailed by Mr. Larry Swan, USDA
Long bark strands from Western Juniper grown in the Wenema
National Forest, Klamath Falls, Oregon, dry and strong
smelling.

We have cut the up to 12" long hairy strands in smaller
pieces. We screened out in 1" - 1 1/2" long fibers for test
A and in shorter fiber including the fine dust for test B.

2. K-X process: June 14, 1994

Both mixes have resisted to absorb the moisture. *The bark has
to protect the tree and as a protective shield is not porous.*

We have diluted the mineral solutions by 20%, so doing it was
possible to moist the hairy fiber already in the first
treatment so the second coating would penetrate better.
After a prolongation mixing time of total 4 minutes for each
cycle, we achieved the desired K-X aggregate.

3. Wood concrete mixing: June 16, 1994. Temperature 89 ° F
K-X aggregate could mature in this 2 days and was again dry.

A - Sample:

The A mix with the longer and dust free bark fibers was
reacting normal. After cement was added with the water we
have observed a faster hydrating as with wood fibers.
Cement ratio 2 = 1 weight volume oven-dry fibers, 2 weights of
portland cement and 1 weight volume of water.

The mix was very moist so the flex fibers could be filled
better into the 9" round form. We were able to compact the
mix about for 45% of the volume. During the 12 hours we noted
a temperature on the green test sample of 95° F (a violent
hydration phase) after 18 hours the sample has hardened
enough to be handled but was still very moist and warm.

After the 34 days seasoning the sample has been cut in 2
pieces. We would give 9 points (best 10 points). We can see a
good distribution of the cement and we could produce a strong
panel if the necessary compacting is used.

The B sample

The B mix (1/2 sawdust + 1/2 fine fibers) was more difficult
to mix because of the very fine flex and hairy material.

Including even some longer but thinner fibers the cement has been absorbed at last for 33% by the dusty material forming so clusters of cement (see cut sample). We have taken the same cement formula as for test A, adding 1/3 more water.

It was very difficult to fill the 10" form and we compacted the form the same way as sample A. The mix was very flex and elastic but the fibers have not been coated enough.

Despite this facts the green sample did heat up to 90° F which is the sign for a good hydration and bonding of the product. After 18 hrs the product was still very flex (it is still today) but we could handle it which is a good sign. We would give the note 6.

We have cut the sample in two after 34 days the 7-20-1994. You can observe very good the different texture and distribution of the two samples.

Of course the fire rating of the B sample is not as good because the coating of the wood fibers is not sufficient. This panel is still flex and elastic.

Feasibility to manufacture light roof tiles using extruding equipment is positive if the fiber is not long (1-1 1/2") and the sawdust and superfine fibers are eliminated. In a roof tile as in any other wood concrete product we do not need fine filler material.

Please contact me for further tests. I believe this bark material is showing again the value of the K-X process even in extreme cases as this.

Sincerely



Hansruedi Walter/ CEO



Mr. Larry Swan
USDA
Wenema National Forest
2819 Dahlia Street

Klamath Falls, Oregon 97601

7-25-1994/hrw

Dear Larry,

With separate package I mailed you report and samples of the interesting K-X test using the bark from the Western Juniper tree.

Also enclosed you will find the latest issue of the "WOOD RECYCLER" with an article about our K-X and FASWALL program.

I hope you can use the result of the test. We bill you \$ 150.00 for our expenses and time.

Sincerely

Hans

Hansruedi Walter/ CEO