



Technical Data Sheet

Alkyd Resin Systems

DESCRIPTION

The Alkyd Resin systems are being used to produce castings in all types of ferrous and non-ferrous foundries. They are used to produce small to large cores and molds. They are especially useful in making very large molds that can take several hours to complete. The Alkyd Resins can have a very long work time and still achieve maximum strength when completely cured.

Alkyd no-bake binders are two component liquid binder and coreactant (hardener) systems that can be easily adapted to any type of foundry sand system. The various Alkyd Resin products differ from each other in reactivity or strip time. Each product has a strip time in minutes equal to the last two or three digits of its number, i.e. 18-430 has a 30 minute strip time at 75 deg F., 18-3100 has a 100 minute strip time. The formulated strip time can be adjusted by adding a third part catalyst, 17-17NL Alkyd Activator.

The second part, 23-217 Alkyd Coreactant, is isocyanate based. The reaction of the coreactant with the resin results in enough strength to strip the core or mold. At this stage the reaction is not complete and the core or mold still has limited plasticity. Removal from patterns is relatively easy. Over the next 24-48 hours the resin reacts with oxygen from the air and the core or mold develops its ultimate strength.

PRODUCTS

Alkyd Resins are dark colored liquids with low viscosities. Depending on the aggregate 1-2% resin, based on aggregate, is used. The Coreactant is also a dark colored liquid and is added at 20% of the resin weight.

Temperature of the sand and ambient temperature in the foundry will affect the cure speed obtained with each resin. Lower temperatures result in slower cure times and higher temperatures result in faster cure times.

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The speeds of the various Alkyd Resins are listed in the following table.

ALKYD RESIN	STRIP TIME ON 75°F SAND
18-415	12-18 mins.
18-430	25-35 mins.
18-445	40-50 mins.
18-460	50-70 mins.
18-4100	80-100 mins.
18-4150	130-170 mins.
18-4000	Requires Activator

Mixing

Alkyd Resins are normally added at 1-1.5% by weight of sand. As the amount of fines in the sand increases, the percentage of resin should also be increased. Large or chunky cores may require less handling strength, offering opportunities for decreased binder levels. Medium to large size cores have been made with 0.8- 1% Alkyd Resin using washed and dried silica sands.

As in any sand mix, the use of dry additives will increase the percent of Alkyd Resin necessary to produce an acceptable core or mold. Reclaimed sand and different types of sands such as zircon, olivine, and chromite have been used with the Alkyd Resin with no difficulty. The percent of binder should be adjusted according to the grain fineness and bulk density of each type of sand.

Alkyd Resins and Coreactants can be mixed in all conventional mullers and mixers or in continuous mixing equipment. For low speed mullers and mixers, add the Alkyd Resin first and mix until the resin is completely dispersed. Then add the Coreactant and mix an additional 2 minutes.

Continuous mixers may also be used. Both Resin and Coreactant are low in viscosity and can be pumped by any commercial pump furnished on continuous mixers. The Resin should be added to the mixing tube first with the Coreactant added after the resin. Calibration of continuous mixers should be performed daily on both Resin and Coreactant pumps. Weighing of raw sand on a steady flow basis is also necessary.

PRODUCTION

Core boxes and patterns intended for use with Alkyd Resin sands should be coated with an adequate parting. Nix Stix 18, a rapid drying liquid parting is recommended. It leaves a dry white residue on the core box or pattern surface. This parting gives good release even if the core or mold has been left in the box too long.

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The bench life of the mixed sand is approximately 50% of the strip time. Mixed sand that is past its work time should not be used to make a core or mold. All packing of the sand and vibrating of the pattern should be complete prior to reaching the work time.

As with all no-bake binders, Alkyd Resin sands are very flowable and do not require ramming to produce high densities. However, the best core and mold surface is produced by some mechanical means of increasing the density of the sand. This can be accomplished with hand tucking, ramming, vibrating, or some other means available to the foundry. Normal use of rods and vents is recommended.

After the core or mold is rammed, the strike-off surface of the core or mold will develop a crust, which is a false indication of the throughcure of the mixed sand. As mentioned before, the cure of the sand mass will be affected not only by the sand temperature, but also by the temperature in the foundry. A lower temperature will slow the cure; a higher temperature will increase the speed of cure.

Care must be taken when removing the core box or pattern so that the draw is even and the strip has progressed far enough to insure sufficient strength of the sand mass. When the core or mold is stripped, the sand surface that was next to the pattern is somewhat plastic. After the sand surface has been exposed to the air, it will rapidly develop a dry feeling and a high surface hardness.

HANDLING OF FINISHED CORES OR MOLDS

Cores and molds made with Alkyd Resins develop strength rapidly after strip. Cores will tend to be plastic and delicate lacy cores can deform even if they are stripped at the prescribed time. In this case, it is advised to allow the core to cure further on a plate for another half-hour to one hour. Bulky shaped cores and molds can be handled with some care immediately after stripping. At this time the core is still developing strength and, right after strip, it has developed approximately 20% of its ultimate strength.

Water or alcohol carried coatings are recommended for coating Alkyd Resin cores and molds. In many cases, the coatings are not necessary and the casting finish resulting from an uncoated core or mold is excellent.

Alcohol carried coatings may be dried by torching, or possibly, lit off. If a water carried coating is used, oven drying of the core or mold is necessary. Drying should be done at 300° F for 20-30 minutes. In addition, heat application to the core after strip will increase the tensile strength of the core. In some cases, this may be necessary for handling. Heating of the core or mold to 300 to 400° F to eliminate possible gas defects in certain metal alloys should be done as soon as possible after strip. Time of exposure at these temperatures should be kept to the minimum necessary to eliminate the possibility of defects.

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CASTING AND CLEANING

Alkyd Resin cores and molds should be allowed to cure for at least 24 hours after stripping before pouring so that the core or mold can develop its full strength and surface properties.

Shakeout of Alkyd cores and molds is normally good but some difficulty may be encountered with internal cores, which are surrounded by metal. The shakeout sand is hard but brittle, and it breaks up easily into small chunks and loose sand.

Casting finish, as mentioned before, is good even without the use of refractory coatings. However, the use of coatings is recommended in any areas where burn in and penetration would be a problem.

CONCLUSION

This discussion of the Alkyd Resin no-bake binder system is intended as an operating aid to provide the necessary information for a successful evaluation of the system. Further questions regarding the Alkyd Resin no-bake binder system should be referred to your local HA International sales representative or distributor.

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