



ARTECH TECHNOLOGIES INC
Superior Abrasion Resistant Materials

ACTCHEM[®] Castables

Mixing and Installation Instructions

ACTCHEM[®] Castable Products are supplied in bags as one component, containing aggregate and binder.

The mixing of ACTCHEM[®] is critical to its performance, and particular attention must be paid to the following procedures. This procedure provides the mixing and the hand packing instruction for the following ACTCHEM[®] CASTABLES:

ACTCHEM[®] 45
ACTCHEM[®] 75
ACTCHEM[®] 85

ACTCHEM[®] 85 RST
ACTCHEM[®] FS

STORAGE

ACTCHEM[®] Castables must be stored on pallets in a dry location where temperatures can be kept between 40°F (5°C) and 90°F (30°C). Ventilation is required in order to prevent condensation if the pallets are wrapped in plastic.

Warm storage is recommended in extreme cold conditions.

Due to pressure and settlement in storage, it is possible for the materials to become compacted. These lumps can be broken down by hand. However, hard lumps indicate some setting has occurred due to moisture. Do not use partially reacted castable.

EQUIPMENT AND TOOLS

Mixer: A Hobart type mixer is preferred. However, paddle or high intensity pan type mixer can also be used. The mixer size should be such that each batch of material is installed in no more than 15 to 20 minutes. Therefore, the size of the mixer is related to the number of installers.

A Hobart type mixer provides good results on medium speed setting.

All mixing equipment must be clean and dry. Contaminants, such as Portland cement, can adversely affect the setting rate and physical characteristics of ACTCHEM[®] Castables.

Drum mixers are not recommended for mixing ACTCHEM[®] Castables.

The following tools must be at hand prior to installation:

Rammer: Artech recommends the use of Jet 00 rammer, a 3/8" hose and the ability to deliver 10CFM at 90psi.

Scale: For weighing the ACTCHEM[®] bags and water addition.

Graduated Cylinder: To measure the water addition by volume.

Roller and Serrated Trowel: To level ACTCHEM[®] after placing.

Gloves: For hand protection.



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MIXING

There are two critical aspects of mixing to achieve the maximum abrasion resistance, and these are interrelated.

- a) WATER ADDITION
- b) MIXING TIME

The ACTCHEM[®] BONDING SYSTEM can accommodate a wide range of water additions without sacrificing the ASTM abrasion resistance values. However the bulk density and cold crushing strength values are reduced at water levels above the optimum.

ACTCHEM[®] Castables must be mixed for five to seven minutes (dependent on mixing speed and amount of material) in order to allow the binder system to fully wet. Never add more water during the initial five to seven minutes mixing cycle.

MIXING TIMES BELOW 5 MINUTES MUST NEVER BE USED AS THIS TIME IS REQUIRED FOR THE FULL CHEMICAL REACTION TO OCCUR.

Ambient temperature of 60°F (16°C) to 70°F (21°C) is recommended for mixing.

Surface temperature of >50°F (10°C) is recommended.

Installers should check bag weights, then calculate and measure water requirements before mixing.

When mixing the first batch, the mixer operator should start with the recommended water addition. For subsequent batches, the water additions can be adjusted within the allowable range as detailed below as necessary.

The mixer operator should add the dry ACTCHEM[®] to the mixer and start the mixer on a low speed. After dry mixing 30 to 45 seconds, the mixer operator should pour in the water addition with the mixer running.

ACTCHEM[®] will go through three distinctive phases during the mixing cycle:

At first, the mix will look dry. For 1 ½ to 2 minutes, the mix will have a coarse, damp consistency. From 3 ½ to 5 minutes, the material will knit together and form lobes that will begin to roll. When the 5 - 7 minute cycle is complete, the mix should have a dense, putty-like consistency.

When the mixing cycle is complete, the mixer operator should obtain a sample for evaluation. If the ACTCHEM[®] sticks to the hand, too much water was added, and less water should be added to the next mix. If the ACTCHEM[®] appears too dry or does not flow properly, add one half of the remaining allowable water and mix two more minutes. If after two minutes the ACTCHEM[®] still appears too dry, add the remaining allowable water and mix for two more minutes. Finally, if after adding all of the allowable water the mix does not obtain a dense, putty-like consistency, discard the mix. *Do not, under any circumstances, install defective material.*

Please note that a long total mixing time is not desirable. Heat is generated in the mixing process. This can cause the material to set more rapidly. The wet mixture temperature of ACTCHEM[®] Castables should be between 60° F to 90° F (15°C and 30°C).



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WATER

Use only clean, fresh potable water with a pH between 6 and 8, and a temperature between 40°F (ONLY IN HOT WEATHER) and 90°F (ONLY IN COLD WEATHER) (5°C and 30°C, respectively). Mixing water should be accurately weighed or measured. Refer to the charts provided below for water requirements.

US Customary Units

PRODUCT	BAG SIZE Lbs. (kg)	Recommended Wt% WATER	Recommended quarts (pounds)	Maximum Wt% WATER	Maximum quarts (pounds)
ACTCHEM [®] 45	50 (22.7)	6.0	1.4 (3.0)	7.0	1.7 (3.5)
ACTCHEM [®] 75	55 (25)	4.5	1.2 (2.5)	5.0	1.3 (2.8)
ACTCHEM [®] 85	55 (25)	4.5	1.2 (2.5)	5.0	1.3 (2.8)
ACTCHEM [®] FS	45 (20.4)	6.5	1.4 (2.9)	7.0	1.5 (3.2)

SI Units (Metric)

PRODUCT	BAG SIZE Lbs. (kg)	Recommended Wt% WATER	Recommended liters (kg)	Maximum Wt% WATER	Maximum liters (kg)
ACTCHEM [®] 45	50 (22.7)	6.0	1.36 (1.36)	7.0	1.6 (1.6)
ACTCHEM [®] 75	55 (25)	4.5	1.13 (1.13)	5.0	1.25 (1.25)
ACTCHEM [®] 85	55 (25)	4.5	1.13 (1.13)	5.0	1.25 (1.25)
ACTCHEM [®] FS	45 (20.4)	6.5	1.33 (1.33)	7.0	1.43 (1.43)

Notes: Volume and Weight percent additions are additions to 100% weight of material. Also, calculations assume 1 Liter of water weighs 1 Kg, and 1 Quart of water weighs 2.08 pounds.

Phosphates and carbonates, etc. in the water can affect the water demand. Furthermore, humidity can affect water demand. Working outside when a thunderstorm is approaching typically results in the need to reduce the water addition due to the ACTCHEM[®] absorbing water from the ambient air.

⚠ CAUTION

The following will adversely affect the density, strength and setting properties of ACTCHEM[®] Castables:

- Dirty and/or hot water
- Admixtures
- Over mixing
- Excessive water
- Dirty mixing equipment
- Cement contamination



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INSTALLATION (HEXMESH)

Roll the ACTCHEM[®] Castable by hand into a sausage shape. Push this material into the HEX opening and strip off the excess. The installers should firmly press the ACTCHEM[®] into the HEX with their thumbs, taking care not to wand the material. Slowly ram a large area with broad sweeping passes. Artech would recommend using a circular pattern, swirling around in just a couple biscuits at a time. Then, finish by sweeping the area to level out just the top for trimming. The critical area is the back of the biscuit. The material must be in intimate contact with the shell and HEX. These things are critical for the correct installation of material. The HEX as well as any interlocking holes, voids or openings should be completely filled in one step. Do not fill an opening in two steps. This practice can lead to lamination of the lining.

If needed, the material can be cut back with a serrated trowel. Smooth the top off so that it is flush with the HEXMESH with a roller or by patting with a hardwood block or the palm of your hand. Do no use a wiping action; this will pull the material away from the HEXMESH.

INSTALLATION (NON-HEXMESH)

For a lining thickness greater than 1 inch that utilizes a "V" or "Y" type anchor design, roll the ACTCHEM[®] Castable by hand into an oblong ball shape and firmly press the material between anchor spacings. Fill ACTCHEM[®] Castable around anchors and ensure that there are no voids created when installing the material. The use of a wooden or rubber mallet or blunt faced tool is recommended to force material into the desired space.

ACTCHEM[®] Castable should be installed at the full thickness to ensure no lamination of the lining.

If needed, the material can be cut back with a serrated trowel. Smooth the top off at the desired thickness with a roller or by patting with a hardwood block or the palm of your hand. Do not use a wiping action as this will tend to tear or rip the lining.

TEST SAMPLES

If required, test samples are to be made so that the material density is consistent and that no layers are visible when the mold is stripped away.

One way to make samples is to install the ACTCHEM[®] into a mold in thirds. Each layer should be installed pressing very hard with the thumbs into the corners and middle of the mold. The installer should leave thumbholes in the middle, and roughen the material between layers for better joining of layers two and three. Sufficient pressure must be applied to avoid laminations. The final layer of material must also be pressed in firmly but leave a smooth top surface.

SETTING AND CURING

ACTCHEM[®] differs from conventional castables in that when ACTCHEM[®] obtains a complete set it is considered to be "cured." Typically, the easiest way to determine the set of ACTCHEM[®] is as follows:

- When installing, hand form and set aside 2"-2 1/3" (50-60mm) diameter balls of ACTCHEM[®].
- Keep or store the balls of ACTCHEM[®] in the same environment as the actual lining.



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- When these balls can be bounced off of a rigid surface (such as a concrete floor), the ACTCHEM[®] has set, and drying and firing can begin.

Please note that the time required for ACTCHEM[®] to completely set is temperature dependent. The recommended temperature range for curing/setting is 60°-100°F (15°-40°C). ACTCHEM[®] Castables will set in approximately 24 hours at 75°F (25°C). ACTCHEM[®] will set faster at temperatures greater than 75°F (25°C) and more slowly at temperature below 75°F (25°C).

If the temperature falls below 60°F (15°C) or exceeds 120°F (50°C), corrective action is necessary to rectify the condition. Extreme temperature conditions during the curing period can adversely affect the strength of ACTCHEM[®].

Cyclone Linings

ACTCHEM[®]-lined cyclones can be rolled or turned during installation before the ACTCHEM[®] is fully set. However, cyclones must not be rolled before 6-12 hours depending on humidity and temperature. As with any other unfired refractory, care must be maintained, and lifting or moving ACTCHEM[®]-lined cyclones must be avoided before the ACTCHEM[®] is fully set in order to prevent stress on the lining.

Never spray or wet the surface of ACTCHEM[®] before it has fully set.

HYDRO-TESTING

ACTCHEM[®] may be hydro-tested. Please contact Artech for assistance.

GENERAL

1. Any porous backup material should be waterproofed to prevent absorption of water from the ACTCHEM[®] Castable.
2. The surface against which the ACTCHEM[®] Castable is to be applied must be cleaned of all oil, grease, rust, loose mill scale and any foreign matter that might contaminate the castable.
3. ACTCHEM[®] Castables must be protected from freezing from the time of placement until the full thickness has been dried to a minimum 250°F (120°C). Depending on the extent of setting or curing, ACTCHEM[®] that freezes prior to the removal of the free moisture can crack. Furthermore, ACTCHEM[®] should be protected from freezing until the drying and firing schedule has been completed.

DISCLAIMER

Artech Technologies, Inc. assumes no liability for the use of this data and provides no warranty expressed or otherwise for its accuracy. Guidelines provided herein are given and accepted at Buyer's own risk.