SETEC GROUP

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SETGLUE

PLASTICIZER FOR GLAZES

1. PROPERTIES

The SETGLUE is a plasticizer for glazes. It avoids the formation of cracks on the surface and reduces the glaze shrinkage. It increases the adhesion of powder particles and it regulates the viscosity of the suspensions. It is recommended for sanitary glazes in order to improve their quality especially when they are sprayed on vertical surfaces.

TECHNICAL FEATURES

ASPECT:	Fine powder of cream color
HUMIDITY (packed)	Max: 7,5%
VISCOSITY (sol 2%)	Between 1500 and 10000 cps (at 25°C)
PH (sol 2%)	Between 7,00 and 9,00 (at 25°C)

APPLICATIONS

The product increases the adherence of the glaze and its fixation to the support, it also regulates the viscosity and it provides a perfect behaviour to the glaze. As a good plasticizer, it avoids surface defects of the glaze after firing.

WORKING CONDITIONS

The SETGLUE can be dispersed in water by a quantity within 5 ÷ 7 % up to have a gelatin that will be added to the liquid glaze before its application.

DOSAGE

The suggested dosage is 0,25 ÷ 0,30 % of product for every 100 kg. of dry glaze but it is necessary to specify that there is not a standard dosage of the product, it depends of its application.

PRESENTATION & STORAGE

Sacks of 25 Kg. The product is stable to a storage prolonged under normal conditions. Avoid extreme temperatures of storage.

Instructions for SETGLUE use

In the sanitaryware and tableware use, the SETGLUE glue is not usually putted directly in the ball mill but is added to the glaze after the sieving and de-ironing process and before the spray application.

GEL PREPARATION

The gel is prepared with water in a ratio that normally is 5-7%. The only recommendation is don't go too over the 7% because otherwise the gel density will be too high and the dissolving time too long.

The preparation is divided in different steps:

- **Glue powder and water weighing**: for instance, in order to prepare 100 Kg of gel at 7% we have to weight 7 kg of SETGLUE powder and 100 kg of water (in a strong tank)

- **Mixing**: we have to begin to stir the water with a fast stirrer (300-600 rpm). We begin the addiction of SETGLUE slowly in order to avoid the presence of big lump in the solution. We will note that the solution is not immediately homogeneous, but it's normal.

- **Homogenization**: we have to continue the mixing until the complete dissolving of the lumps. The necessary time is depending to various factors as the type of fast stirrer used, the propeller diameter and more over.

- **Stocking**: when the dissolving is finished, the glue is ready to use. Despite the SETGLUE is not an organic CMC and then is not affected to the aging action, we suggest to avoid long storage in order to use the SETGLUE with the maximum of effectiveness. A proper procedure is to prepare the gel day by day. For instance today we will prepare the gel that will be used tomorrow. In any case 1-2 days of storage have effect on the gel properties. It's better to avoid the storage in ambiences with high temperatures

Another procedure for the gel preparation is to put the powder in the water without stirring and leave it for around 12 hours in order to facilitate the powder hydration.
Spent this time, we have to stir the solution in order to create the homogeneous gel.

Both of the procedure are effective and the resulting gel have the same properties.

GLAZE PREPARATION

Before to proceed to the industrial use of the SETGLUE, it's better to make some test in order to understand the optimal ratio between gel and glaze. Each factory have his glazing parameters dependents especially to the glaze composition, spray guns, pressure of glazing, temperature humidity and more over.

In order to have an idea for the quantity of glue that normally we use we can say that we have to put around 3 kg of gel at 7% (210 gr of dry powder) in 100 kg of liquid glaze (around 67 kg of dry glaze). Changing the percentage of gel solution we have to increase/decrease the quantity of gel as consequence.

Procedure for glaze preparation:

1. To add the gel in the glaze tank (in this case is not important how to put it)
2. To stir the solution until the complete dissolving of the gel
3. To check the density and viscosity of the solution
4. To adjust the viscosity and density adding water or more gel. If the viscosity should be decreased but is not possible to correct with water, to use little quantity of a deflocculant like the our SETFLUX.
5. The glaze is ready to use

Just for give some examples for the most used final glaze characteristics used in our industrial district:

1) Manual Glazing Density: 1700 g/l Viscosity 35-40 (ford cup with hole 4mm)

2) Robot Glazing Density: 1740 g/l Viscosity 55-60 (ford cup with hole 4mm)

<u>Recommendation</u>

About the mixing time is strongly recommended to mix the solution at least 30 minutes in order to be sure that all the glue parts are dissolved. Sometimes hided parts of gel can stay in the solution and during the time can change the viscosity of the solution.

COMPARISON BETWEEN SETGLUE and CMC

Introduction:

SETGLUE is an innovative plasticizer for ceramic glazes studied to substitute the common CMC glues. Using this product is possible to avoid many of the typical problems due to the full organic formulation of the CMC.

In fact the SETGLUE is a synthetic product with only a small presence of organic components and this allow a longer life of the glaze, slower degradation time of the gel and more constant rheological characteristics during the application.

All the instructions and properties of the SETGLUE are described in the *information sheet* ; in this pages we just want to show a comparison of the main characteristics of SETGLUE vs. CMC to demonstrate practically why the use of this product is strongly suggested.

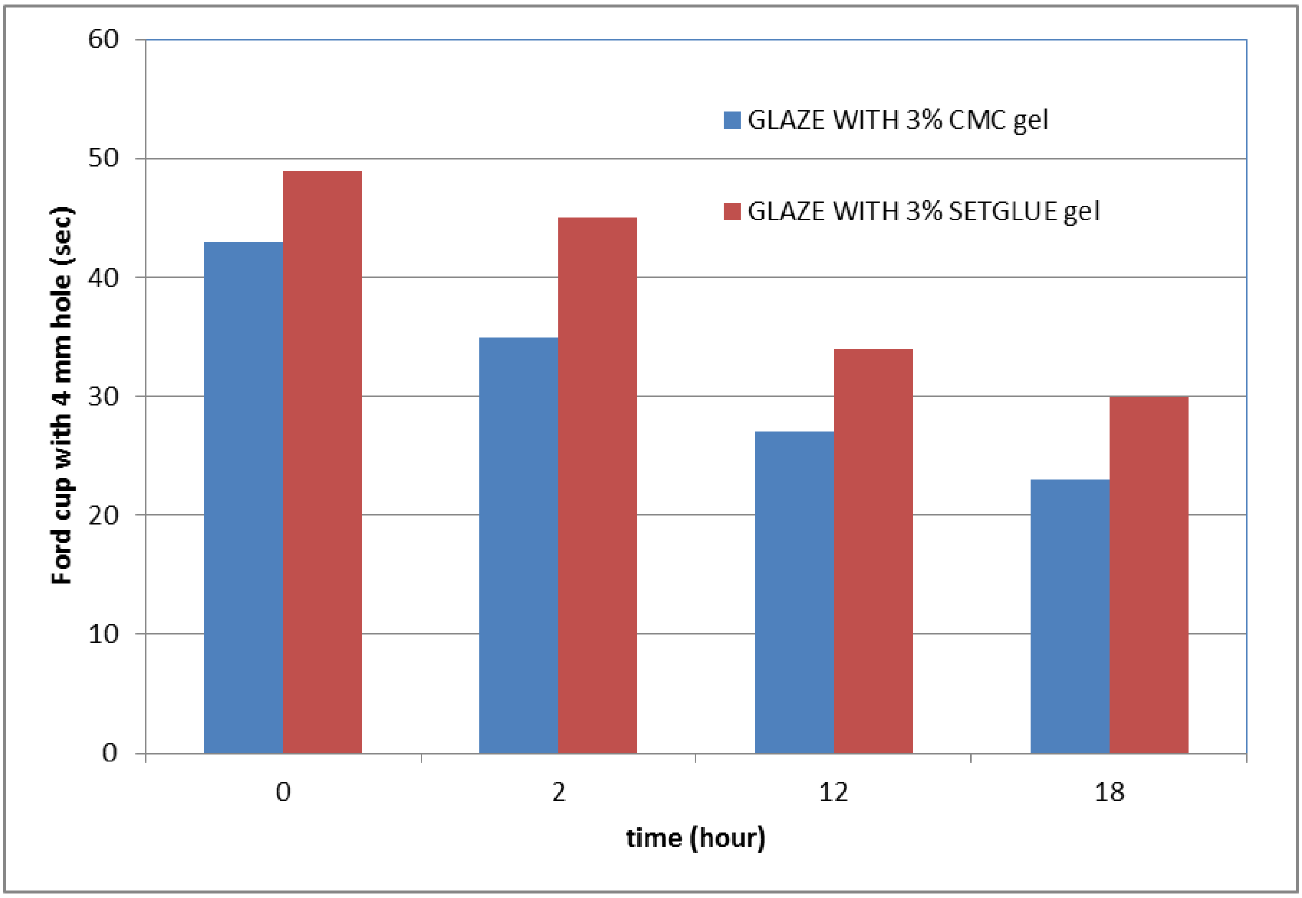
All the laboratory tests have been carried out using gels of SETGLUE at 7% of powder in water and the obtained gel has been mixed in ceramic glaze with a rate of 3%.
These numbers are standard percentages normally used in the main factories but to be considered only indicative. The test have been carried out at time 0 and with intervals of 2, 12, 18 hours to simulate the variation of rheological property of the glaze during a factory working day. The tests have been executed in our laboratory in Italy with a medium temperature around 16 °C so it has to be considered that in climates where the temperature and humidity level are higher than in Italy the bacterium attack to the glaze is much faster and the differences between CMC and SETGLUE would be even more evident.

Specific Weight

	time 0	2h	12h	18h
Glaze with CMC	1725	1725	1724	1724
Glaze with SETGLUE	1729	1729	1726	1726

Ford Cup (4mm) test:

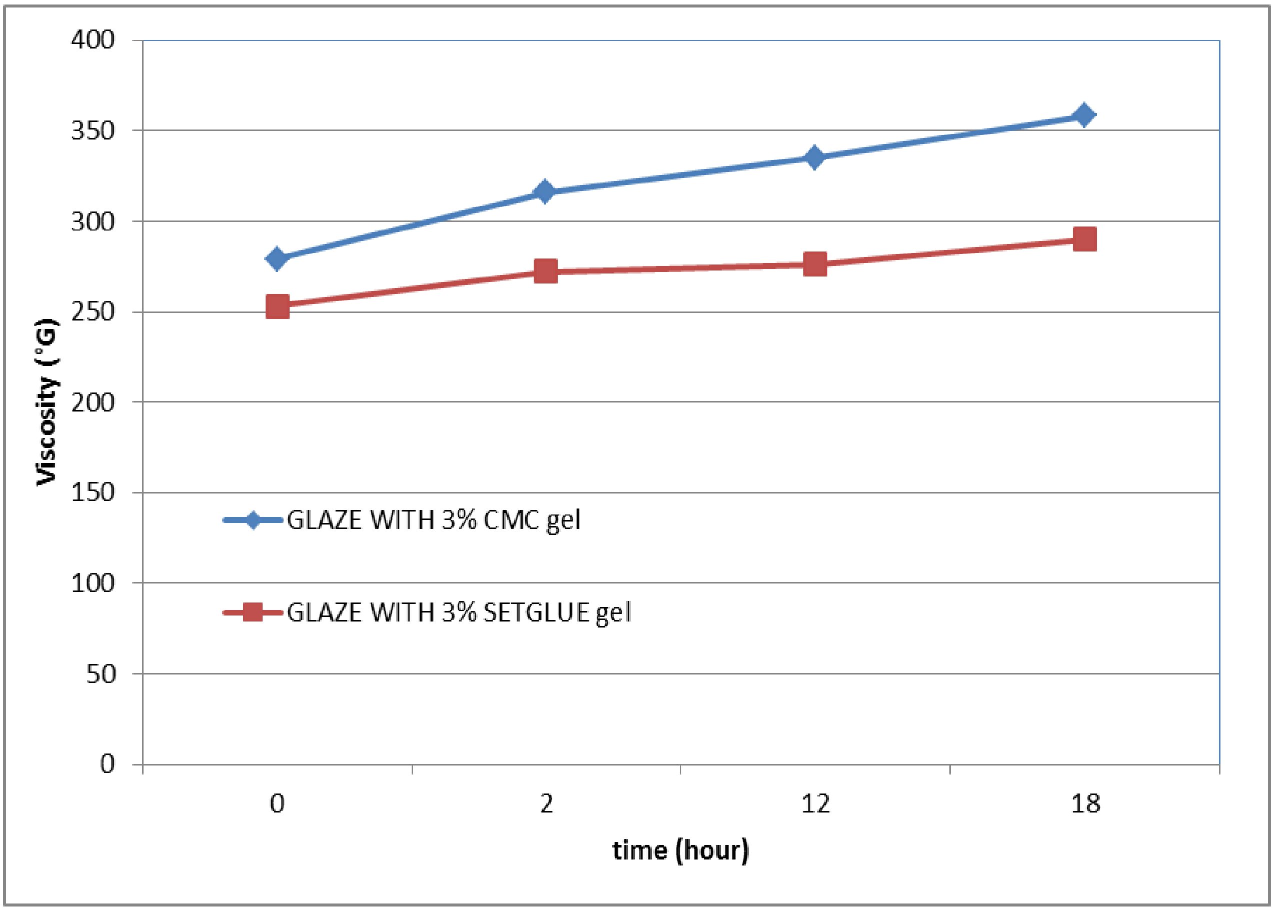
	time 0	2h	12h	18h
Glaze with CMC (time in sec.)	43	35	27	23
Glaze with SETGLUE (time in sec.)	49	45	34	30



This first test shows how the glaze treated with CMC get fluid much faster than the same glaze with SETGLUE. This raw experiment demonstrate that the glazes with SETGLUE have rheological properties about 20% more stable and constant during the application than glazes mixed with full organic CMC .
Advantages obtained with the use of SETGLUE are already evident.

Viscosity test:

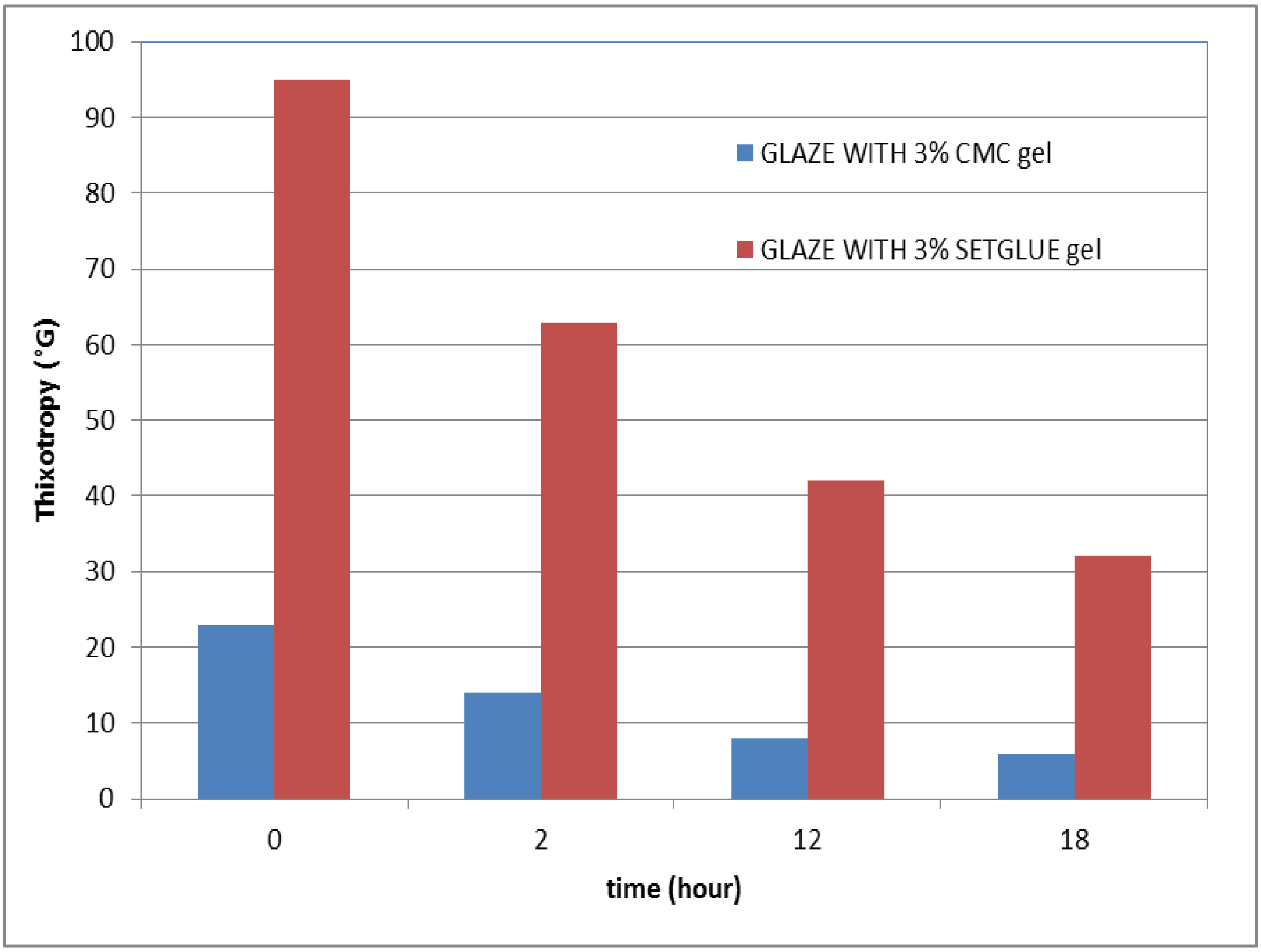
	time 0	2h	12h	18h
Glaze with CMC (in °G)	279	316	335	358
Glaze with SETGLUE (in °G)	253	272	276	290



This test executed with a professional viscometer shows that the glaze mixed with SETGLUE has an higher viscosity that the one with CMC already at time 0. The viscosity value of glaze with the SETGLUE is very constant with the passage of time, while the glaze with CMC start to degrade very quickly up lose almost completely its viscosity.
This fast degradation is the main cause of glaze leakage problems and even more evident if robotic glazing is used.

Thixotropy test:

	time 0	2h	12h	18h
Glaze with CMC (in Δ °G)	23	14	8	6
Glaze with SETGLUE (in Δ °G)	95	63	42	32



The thixotropy test shows the real efficacy of the SETGLUE vs. CMC glues and demonstrate that already in the starting time the SETGLUE makes the glaze 4 times more thixotropic than CMC. After 18 hours a glaze with SETGLUE is still 50% more efficient that a glaze just prepared with an organic CMC.