

Adjustments to workable time and hardening time for castable refractories

Workable time and hardening time for castable refractories

Note that the workable time and hardening time of castable refractories depend on the temperature of the castable mixed with water by a mixer. The temperature of the mixed castable is determined by air temperature, the temperature of the castable itself before mixing, and the temperature of the mixing water. Also, conventional castables and low cement castables show different behaviors in terms of workable time and hardening time.

This difference shall be taken into account at the time of the installation work.

- **Workable time:** Workable time means the duration that the mixed castable with water maintains good workability for casting. Our products allow no less than one (1) hour for workable time of the mixed castable with water at the temperature of 20°C.
- **Hardening time:** Hardening time means the duration from the mixing to the complete hardening. Our products allow no more than 24 hours for hardening at the temperature of 20°C.

Table 1: Relationship between workable time and hardening time

The Temperature of the Mixed Castable (°C)	Conventional Castable (CA-13S)		Low Cement Castable (GIBRAM-RE)	
	Workable Time (hr.)	Hardening Time (hr.)	Workable Time (hr.)	Hardening Time (hr.)
5	2	8	No less than 2	96
10	2	6	No less than 2	48
15	2	5	No less than 2	24
20	2	5	No less than 2	No more than 24
25	1.7	7	1.5	No more than 24
30	1	12	0.5	No more than 24
35	0.8	5	0.2	No more than 24

Fig. 1

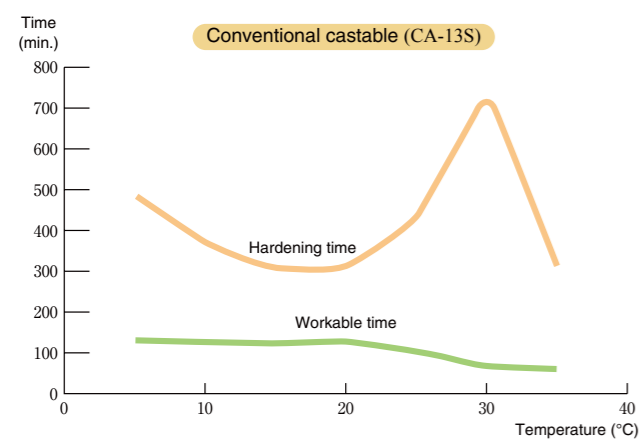
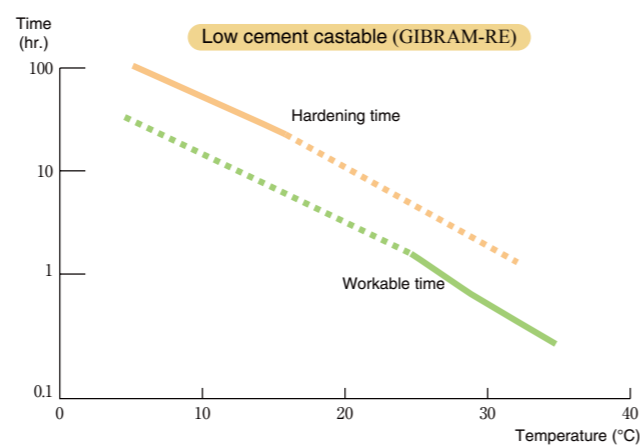


Fig. 2



Adjustments to workable time and hardening time for conventional castables

Hardening adjustment is basically unnecessary for conventional castables during all seasons or in tropical or subtropical countries.

However when the temperature of the castable itself before mixing is around 30°C or more, it is recommendable to use colder mixing water in order to maintain the workability of the mixed castable for more than one (1) hour. For example, when the temperature of the mixed castable is 25°C, the workable time becomes 1.7 hours in the case of CA-13S.

Table 2: The following table is the reference table for adjusting the mixed castable temperature to 25°C (in the case of CA-13S).

Temperature of the castable before mixing (°C)	Temperature of mixing water to be prepared (°C)
28	20
30	16
32	12
34	9

Adjustments to workable time and hardening time for low cement castables

- In comparison with conventional castables, low cement castables show a quite different behavior of workable time and hardening time. Under cold temperature, the workable time, and hardening time become longer. For example, the hardening time of low cement castable (GIBRAM-RE) is 96 hours when its temperature after mixing is 5°C as shown in Table 1 at P25. To appropriately adjust the workable time and the hardening time, please inform us of the temperature at the time of installation. A hardening accelerator and its instruction manual will be provided according to your information.
- On the other hand, under high temperatures the workable time and hardening time become quite shorter. For example, the workable time and hardening time of low cement castable (GIBRAM-RE) are respectively half an hour and a few hours when its temperature after mixing is 30°C as shown in Fig. 2 at P25. To appropriately adjust the workable time and the hardening time, please inform us of the temperature at the time of installation. A hardening retardant and its instruction manual will be provided according to your information.