

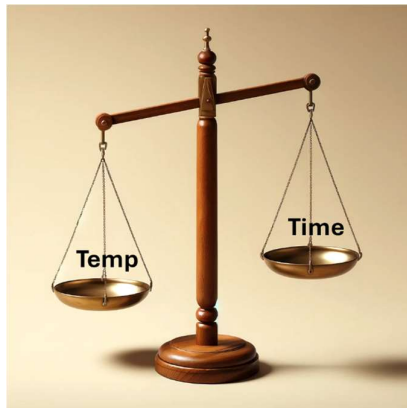
## Glasma 700 Studio - Melting and Annealing Guide

(Rev 2025-01-08)

The following melting guideline should be considered as a general recommendation. A complete melting and refining cycle is around 15 hours.

Every furnace and pot are unique with different capacities, characteristics and ways of measuring temperature.

Melting and refining are always a balance between temperature and time. Lower temperature will give longer time before the glass is ready and vice versa. It's all about finding the perfect balance between temp and time in your unique process. Please remember, low temperature saves energy and your equipment, but if it's too low the glass will not be ready.

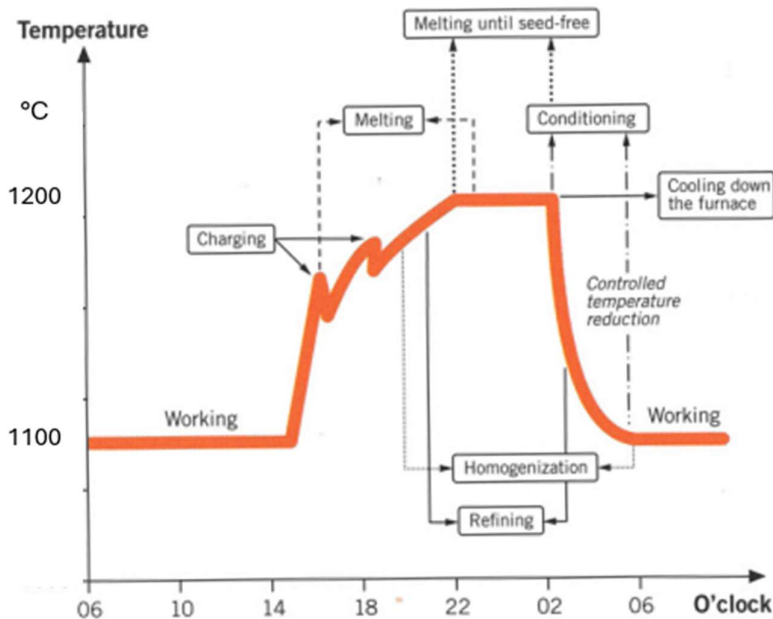


Several trials have to be made before an optimized process and a perfect result are obtained. It's recommended to only change one parameter at a time and document everything to be able to trace back. Glasma 700 Studio can be melted as low as 1200°C but we recommend using a furnace that is capable of at least 1250°C, please follow recommendations from the pot and furnace manufacturer.

Before switching over to another glass composition, it's recommended to empty the pot or replace with a new pot. Normally it will take a couple of melts for the new glass to stabilize and the new pot to acclimatize. A new pot can emit some impurities and cords before it acclimatizes.

Cullets are with great benefit used together with Glasma pellets. The pellets will actively reduce seeds and bubbles in the cullets. Add cullets on top of each charge. Please make sure the cullets are of similar formula as the pellets and free from impurities. Smallest impurity can discolor the glass or cause other problems.

Following diagram shows an example of a melting and refining schedule for a pot furnace (the figure is copied from the book "An Introduction to Glass" with modified temperature scale to fit with Glasma 700 Studio):



### Proposal to a Melting and Refining Cycle

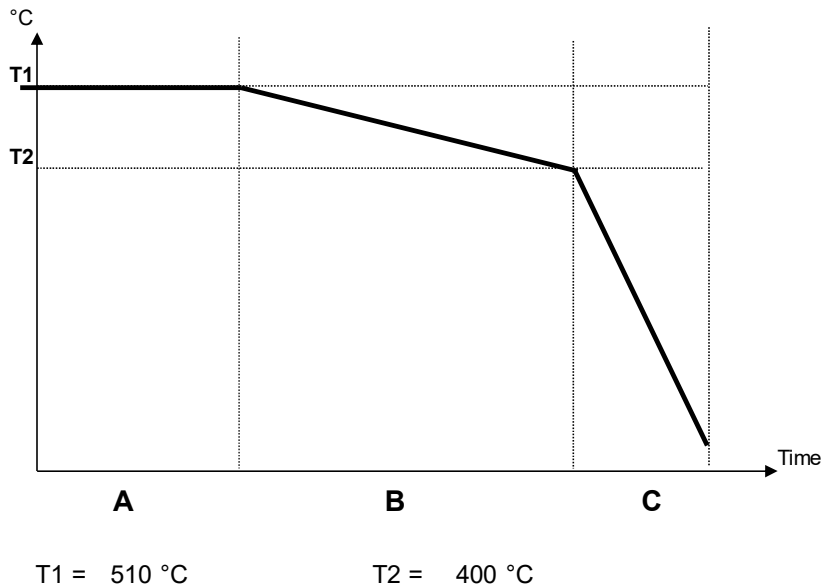
- 1) Make sure the temperature in the pot is appr. 1200°C. Please remember that temperature can be measured in many different ways and show a result that does not completely reflect the temperature in the melt.
- 2) First charge can start already at 1150 °C. Charging is made by topping up layer by layer to get a quick melting and to make sure to get an even melt. Let all pellets melt completely before charging a new layer. We recommend starting with thin layers and then top up more and more to find the best charging sequence in relation to your furnace capacity.
- 3) Make the second charge and let the pellets melt completely.
- 4) When needed, another charge, etc. The maximum melted glass level should be 3 to 5 cm from the pot edge.
- 5) When the pellets are melted the refining process starts. This is the process when the glass gets free from seeds and bubbles and finally gets homogenous and crystal clear. Temperature should be kept around same level as when melting. The refining process normally takes 4-6 hours, but it depends on your unique conditions. Lower temperature requires longer refining time and vice versa. To find the correct refining time an “iron bar test” could be useful. Only a few bubbles should be accepted before the temperature is decreased to working temperature.

- 6) Decrease the temperature to working temperature appr. 1100°C or what is suitable for your application.

### Optimizing of Temperature

A normal cycle lasts 15 hours +/- 2 and it starts in the afternoon with charging, and stops in the morning when the glass is ready for forming. We suggest start melting and refining at 1200°C. If the glass is not ready when needed (test for example with an iron bar), increase the temperature in the next-coming meltings in steps of 10°C until lowest possible melting temp is reached for your requested cycle time. Document temperature and time for future reference.

## Annealing Curve for Glasma 700 Studio (Celsius)



Rates and times for different glass thicknesses

Thickness cm	A		B				C				Total time	
	h	min	°C/min	°C/h	h	min	°C/min	°C/h	h	min	h	min
2	0	53	1,55	93,2	1	11	15,0	900	0	23	2	27
4	1	49	0,39	23,3	4	43	3,75	225	1	33	8	6
6	2	45	0,173	10,4	10	38	1,67	100	3	30	16	53
8	3	41	0,097	5,82	18	53	0,94	56,3	6	13	28	48
10	4	37	0,062	3,73	29	31	0,60	36,0	9	43	43	51
12	5	33	0,0431	2,59	42	30	0,42	25,0	14	0	62	3
15	6	57	0,0276	1,66	66	25	0,27	16,0	21	53	95	14
20	9	17	0,0155	0,93	118	4	0,15	9,0	38	53	166	14
25	11	37	0,0099	0,60	184	29	0,096	5,8	60	46	256	52
30	13	57	0,0069	0,41	265	39	0,067	4,0	87	30	367	6