

CALLEBAUT

Useful information

Everything you need to know about storing,
tempering and cooling chocolate



Useful information

In this brochure, we should like to provide answers to the following questions:

- How to store chocolate and why.
- How to melt chocolate.
- How to temper chocolate. What is tempering for?
- What is the ideal temperature for workshops, moulds and fillings?
- How to cool chocolate.
- How to store finished products.

HOW TO STORE CHOCOLATE AND WHY.

Chocolate is sensitive to humidity, odours and, if in contact with air and light, oxidation. Chocolate should be protected against light and air and stored in a cool dry place, at a constant tempe-

perature between 12 and 20°C. Always ensure that the packaging used to store chocolate is properly closed.

HOW TO MELT CHOCOLATE.

Chocolate should preferably be melted at a temperature between 40 and 45°C. Chocolate should never be placed in direct contact with the heat source. Chocolate should preferably be melted in an oven or double boiler adjusted so that the chocolate reaches a uniform temperature between 40 and 45°C. This is the ideal temperature for tempering (pre-crystallisation) to begin.



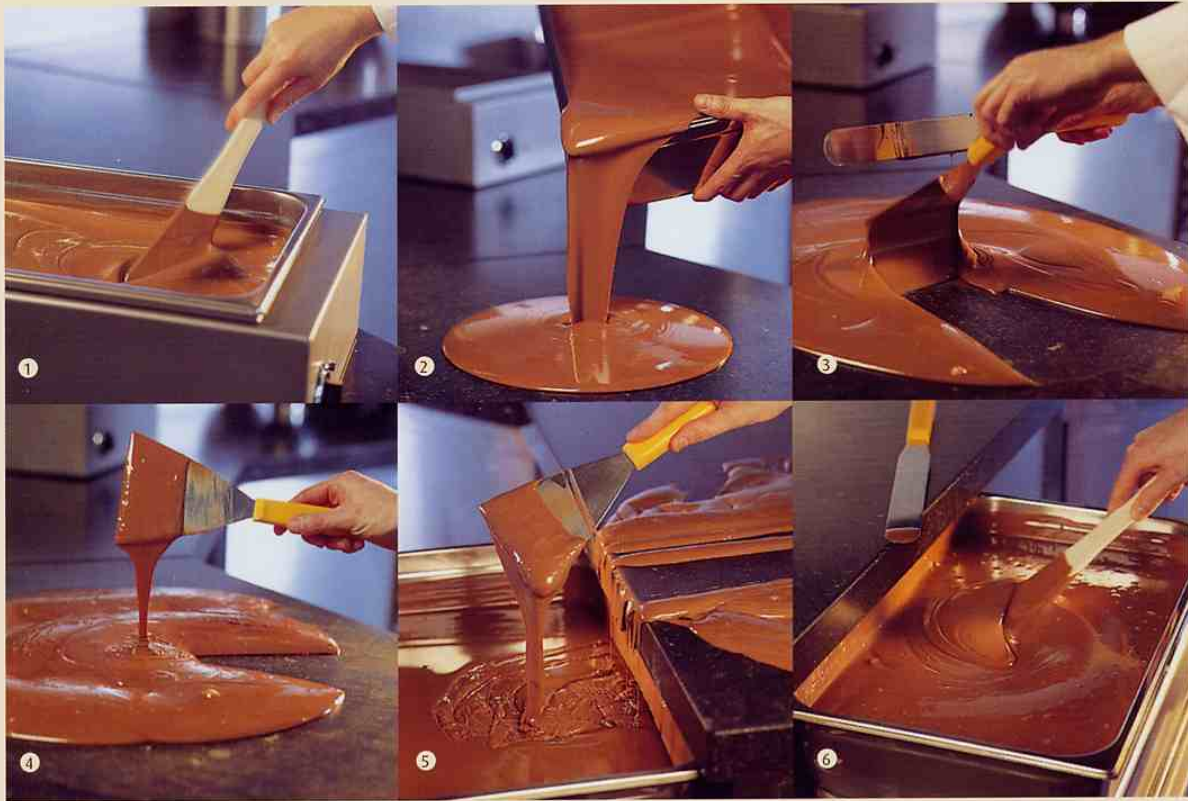
HOW TO TEMPER CHOCOLATE. WHAT IS TEMPERING FOR?

The purpose of tempering chocolate is to pre-crystallise the cocoa butter in the chocolate, which is related to the working temperature of the chocolate. During tempering, the cocoa butter in the chocolate changes into a stable crystalline form. It ensures the hardness, shrinking force and gloss of the finished product after it has cooled. If the chocolate is melted in the normal way (between 40 and 45°C) then left to cool to working temperature, the finished product will not be glossy. How

the above temperature is reached is important. The 3 factors which are important during tempering are time, temperature and movement. Note that the working temperature of dark chocolate is approximately 32°C, whereas it is approximately 30°C for white chocolate and milk chocolate.

So how can you ensure perfect results? By tempering the chocolate by one of the three following methods:

ON A COOL (MARBLE) WORK SURFACE



ON A COOL (MARBLE) WORK SURFACE

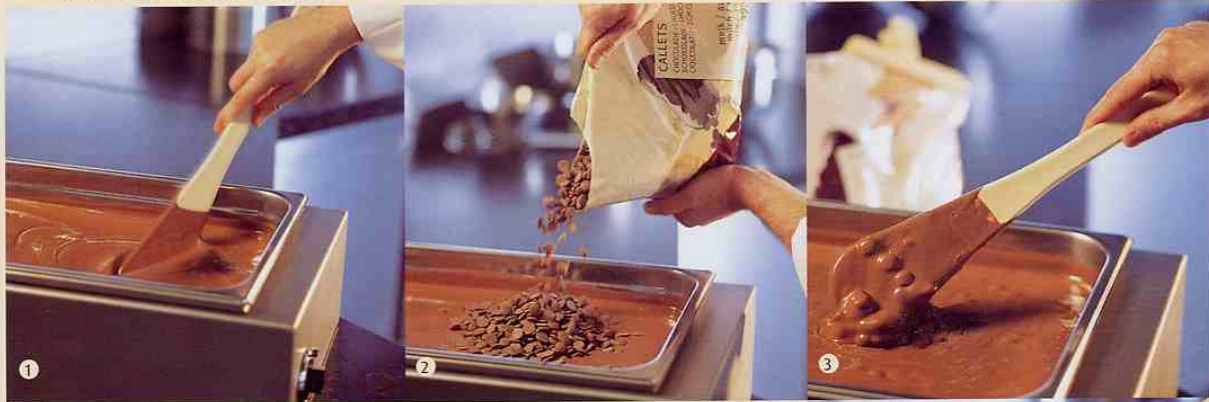
1. Melt the chocolate at a temperature between 40 and 45°C in a double boiler or melting pan.
2. Pour 2/3 of the melted chocolate onto the cool marble surface.
3. Keep the chocolate moving by stirring continually with a spatula and a scraper.
4. Continue to do so until the chocolate starts to thicken (when its temperature is 4 to 5 degrees lower than its working temperature): crystallisation takes place. You will see that 'peaks' are formed when the chocolate is allowed to fall from the spatula (*).
5. Pour the pre-crystallised chocolate into the rest of the melted chocolate and stir until it forms an even mixture.
6. The chocolate is now ready to work with. However, if the chocolate is too thick, reheat it until it becomes liquid again, but is still pre-crystallised. Take a sample: dip the tip of a knife into the chocolate. If the chocolate is correctly tempered, it will harden evenly within 3 minutes at an ambient temperature of $\pm 20^{\circ}\text{C}$.

(*) If the whole of the chocolate is poured onto the marble surface, it only needs to thicken slightly until its temperature is 1 to 2 degrees lower than its working temperature.

PRE-CRYSTALLISATION WITH CALLETS

Pre-crystallisation is very easy if you add chocolate which has already been tempered to the melted chocolate. Callebaut Callets are useful for this. Callets have of course already been tempered. In other words, they are already in the required crystalline form, and can be added to the melted chocolate. The required quantity of Callets depends upon the temperature of the melted chocolate and the Callets. When the melted chocolate reaches a temperature of approximately 40°C, you can add 15 to 20% Callets at ambient temperature (between 15 and 20°C).

PRE-CRYSTALLISATION WITH CALLETS



1. Melt the chocolate in a melting pan (set the thermostat to 45°C).
2. Lower the thermostat ($\pm 32^{\circ}\text{C}$ for dark chocolate, $\pm 30^{\circ}\text{C}$ for white chocolate and milk chocolate) and immediately add 15 to 20% Callets at ambient temperature.
3. Stir the chocolate well to ensure the dispersion of the stable crystals of the Callets. Are the Callets melting too quickly? That is because the chocolate is still too hot. Add more Callets and continue stirring.
4. In this way, you will obtain a slightly thickened chocolate, which is ready to work with.



WHEEL-TYPE TEMPERING MACHINE



WHEEL-TYPE TEMPERING MACHINE

- 1 and 2. Melt the chocolate in the tempering machine (setting the thermostat to 45°C) then lower the thermostat ($\pm 32^{\circ}\text{C}$ for dark chocolate, $\pm 30^{\circ}\text{C}$ for white and milk chocolate) and immediately add 15 to 20% Callets at ambient temperature.
3. The machine mixes the Callets into the melted chocolate, dispersing the stable crystals throughout the already melted chocolate. Are the Callets melting too quickly? That is because the chocolate is still too hot. Add more Callets and continue stirring.
4. That's it! The chocolate has thickened, but has remained even. For tempering systems other than wheel-type machines, we recommend you contact your supplier.



PRE-CRYSTALLISATION IN THE MICROWAVE



PRE-CRYSTALLISATION IN THE MICROWAVE

It is also possible to temper chocolate blocks. Callebaut Callets are perfect for this.

1. Pour some Callets into a plastic or glass bowl.
2. Put the bowl into the microwave and melt the Callets at 800-1000 W.
3. Take the Callets out of the microwave every 15 to 20 seconds and stir well to ensure that the temperature of the Callets is evenly distributed and that they do not scorch.

4+5. Repeat this procedure until the chocolate has almost all melted. Some small pieces of Callet should still be visible in the bowl.

6. Remove from the heat and stir the chocolate well, until all the pieces of Callets have disappeared and a slightly thickened even liquid chocolate has been obtained. This method is very quick and it is ideal when only a small amount of chocolate is required.

AND FINALLY, HERE ARE SOME MORE TIPS:

TIP 1: How to check pre-crystallisation.

To check pre-crystallisation, spread a tiny amount of chocolate on the tip of a knife or on a piece of paper. If the chocolate is properly tempered, it should harden evenly within 3 minutes at an ambient temperature between 18 and 20°C, and it should have a good shine. If it does not, continue tempering.

TIP 2: What to do if the chocolate becomes too thick?

After a certain amount of time, the tempered chocolate may start to thicken rapidly. This is called over-crystallisation and is caused by the sudden, rapid swelling of the cocoa butter crystals. Over-crystallised chocolate imparts less shine to the finished product and its shrinkage force is too weak. It also becomes more difficult to remove air bubbles. What can be done about this?

It is simple: raise the temperature of the melted chocolate by adding more melted chocolate or reheat the chocolate slightly in the microwave. Reheat the chocolate in small stages, not abruptly, so that it becomes as liquid as before, whilst the cocoa butter crystals remain. It is also wise to stir the chocolate regularly because crystallisation mostly takes place on the surface forming a skin.

WHAT IS THE IDEAL TEMPERATURE FOR WORKSHOPS, MOULDS AND FILLINGS?

- Workshop: ideal temperature: $\pm 20^{\circ}\text{C}$.
- Fillings: the temperature of the filling must be as near as possible to the temperature of the chocolate (where the type of filling permits). If the difference between the temperature of the filling and the temperature of the chocolate is too great, it will have a negative effect on the crystallisation of the cocoa butter and the finished product will have less gloss and will be less heat-resistant. The best result will be achieved with a filling of which the temperature is about 5°C lower than the temperature of the chocolate.
- The temperature of the mould must be as near as possible to the ambient temperature of the workshop ($\pm 20^{\circ}\text{C}$). Slight pre-heating of the mould is recommended. Ensure above all that the temperature of the mould does not exceed the temperature of the tempered chocolate. These precautions will help to give the finished product a perfect glossy appearance.
- Important remark: The chocolate may continue to thicken whilst it is being worked with. This is caused by rapid multiplication of the cocoa butter crystals. It is possible to solve this problem by adding a little heated chocolate or by slightly increasing the temperature of the chocolate.



HOW TO COOL CHOCOLATE.

The ideal temperature for cooling chocolate used for moulding work is between 10 and 12°C . Chocolate for coating work should preferably be cooled between 15 and 18°C . Temperature variations of more than 10°C should be avoided at all costs. Please also note that during the cooling of moulding work, there should be plenty of cold air circulating, as a large quan-

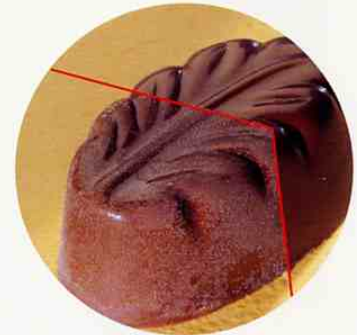
tity of heat will need to be evacuated during the process of solidification of the chocolate. Coating work should preferably be cooled without ventilation. When the moulds are ready to be cooled, they are placed in a room which is colder than the workshop. As a result, the solidification of the chocolate takes place. Then the moulds are placed in a refrigerator.

HOW TO STORE FINISHED PRODUCTS.

Like chocolate that is used as a raw material, finished chocolate products are sensitive to temperature, unpleasant odours and tastes, light and air, humidity and storage time. Typical problems which may occur during storage are as follows:

FAT BLOOM

This problem is caused by a thin layer of fat crystals on the surface of the chocolate. The chocolate loses its gloss and a soft white layer appears. This layer gives the chocolate an unpleasant appearance. This problem should not be mistaken for the formation of mould. The cause of fat bloom is the re-crystallisation of fat and/or the migration of fatty fillings into the layer of chocolate. Storage at constant temperature delays the appearance of fat bloom.



FAT BLOOM

SUGAR BLOOM

By comparison with fat bloom, sugar bloom consists of a rough and irregular layer on the surface of the chocolate. Sugar bloom is caused by condensation, e.g. when chocolate is taken out of the refrigerator and moisture forms upon it. The water from this condensation dissolves the sugar in the chocolate. Then when the water evaporates, the sugar remains on the surface of the chocolate in the form of large, irregular crystals. This gives the chocolate an unpleasant appearance. Sugar bloom can be prevented, if temperature variations when moving the chocolate from a cold place into a warm place are avoided (thus preventing condensation). Chocolate products leaving a cold room should be stored in a warmer room for a certain amount of time before opening the packaging. In this way, direct condensation can be avoided. It is therefore vitally important for chocolate products to be stored under ideal conditions so that they remain in their original condition for as long as possible, without developing any defects or decay.



SUGAR BLOOM

The following factors should of course be considered:

STORAGE TIME

The following rule applies to chocolate products: short storage times ensure better quality products. Normal storage times for chocolate:

- White chocolate: 12 months
- Milk chocolate: 18 months
- Dark chocolate: 24 months

The FIFO (first in/first out) system of stock control is recommended. With this system, the products which have been in storage the longest are delivered first. In this way, no product remains in storage for too long, and optimum freshness is guaranteed.

TEMPERATURE

The ideal temperature for storing chocolate is between 12 and 20°C. At higher temperatures, the chocolate becomes softer and its gloss is diminished. Lower storage temperatures are less hazardous. When the products are brought back to ambient temperature, condensation must be avoided, because humidity causes sugar bloom. Temperature variations are also not recommended, because they may cause the appearance of fat bloom.

STORAGE AREA

Chocolate is very receptive to the absorption of unfamiliar odours. That is why chocolate must be stored in an area which does not smell musty or unusual. Good ventilation of the warehouse is indispensable. Chocolate should never be stored between or near strongly smelling products (e.g. cheese, fish, meat, lemons, etc.). The packaging of chocolate products must be neutral, which means that it must not give off unfamiliar odours. It goes without saying that smoking should not be allowed near chocolate products.

AIR AND LIGHT

Air and light cause the fat in chocolate to disintegrate. This leads to a significant change in taste and the appearance of an unpleasant smell. This is caused by oxidation. It is therefore very important to protect chocolate as much as possible against air and light (including artificial light). Chocolate should also be stored in closed packaging. Dark chocolate and milk chocolate naturally contain a number of anti-oxidants (substances which delay the oxidation process), but white chocolate does not contain such substances, and will therefore be more sensitive to oxidation. White chocolate therefore needs increased protection.

HUMIDITY

Chocolate must be protected against humidity. As a general principle, the maximum relative humidity in the warehouse should be 70%. Storage of chocolate products on floors or against walls should be strictly prohibited because this greatly increases the risk of absorption of humidity.

VERMIN

Unfortunately, chocolate is not only a stimulant for humans. The smell of chocolate can attract all sorts of vermin. It is therefore vitally important to protect chocolate products against vermin (e.g. by setting mousetraps, destroying insects, etc.).

POSSIBLE PROBLEMS:

PROBLEM	CAUSE	SOLUTION
Difficult to remove from mould	<ul style="list-style-type: none"> Poorly tempered couverture Cooling temperature too high Layer of couverture too thin, consistency too thin to remove from mould 	<ul style="list-style-type: none"> See tempering See cooling Use less liquid couverture
White or grey coloration of the chocolate	<ul style="list-style-type: none"> Cooling of couverture too slow Poorly tempered couverture "Over-crystallised" chocolate 	<ul style="list-style-type: none"> See cooling See tempering See tempering
Cracks in moulded product	<ul style="list-style-type: none"> Refrigerator too cold Layer too thin and cooling too fast 	<ul style="list-style-type: none"> See cooling See cooling
Dull stains on moulded product	<ul style="list-style-type: none"> "Over-crystallised" chocolate Refrigerator too cold Moulds too cold Moulds not cleaned sufficiently 	<ul style="list-style-type: none"> See thickening of the chocolate See temperature of refrigerator See temperature of moulds See cleaning of moulds
Thickening of couverture whilst working	<ul style="list-style-type: none"> Excessive crystallisation of couverture 	<ul style="list-style-type: none"> Increase the temperature Gradually add some couverture which is warmer. Do not add cocoa butter.
Couverture not glossy	<ul style="list-style-type: none"> Filling too cold Workshop or refrigerator too cold Couverture not at right temperature 	<ul style="list-style-type: none"> See temperature of filling See temperature of workshop See tempering
Fingerprints on finished product	<ul style="list-style-type: none"> Product touched with wet or warm fingers 	<ul style="list-style-type: none"> Do not touch the product with wet or warm fingers. If necessary, gloves should be worn.
Dirty moulds	<ul style="list-style-type: none"> Fingerprints inside the mould Moulds contaminated by fillings Dull stains in the mould Poorly tempered chocolate used Moulds not pre-heated 	<ul style="list-style-type: none"> How to clean moulds. With warm water and a very mild detergent. Use a very soft cloth, a sponge or brush in order to avoid scratching the inside of the moulds. Rinse with warm water and remove remaining water with a dry cloth. See tempering See temperature of moulds



CALLEBAUT
INSPIRED BY YOUR CRAFTSMANSHIP

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