

Milk and white chocolate contain milk. Dark or semi-sweet chocolate can also contain milk as part of its formula. Almost all chocolate contains soy lecithin (added as an emulsifier). Milk and soy are considered allergens. The chocolate manufacturer develops formulas and processing procedures if possible to segregate a dark chocolate without milk ingredients from a dark chocolate containing milk ingredients. This is not always possible in some factories and would require appropriate changeover procedures and labelling where necessary (see Chapter 25).

*Processing steps in chocolate making:*

- 1 Mixing;
- 2 Refining;
- 3 Conching;
- 4 Standardising;
- 5 Storage and shipment.

A chocolate manufacturer must develop a recipe based on meeting the Standards of Identity for Chocolate, which can be found in 21 CFR Part 163, in the Codex or in the specific country standard of identity. The raw materials chocolate liquor, cocoa butter and dairy ingredients may have been manufactured

**Table 23.3** Requirements for products labelled “chocolate” in the United States (21 CFR Part 163).

<b>Milk chocolate 21 CFR Part 163.130</b>	<b>Semi-sweet or sweet chocolate 21 CFR Part 163.123</b>	<b>White chocolate 21 CFR Part 163.124</b>
Nutritive carbohydrate sweetener	Nutritive carbohydrate sweetener	Nutritive carbohydrate sweetener
Chocolate liquor – at least 10%	Chocolate liquor – 15% for sweet chocolate and at least 35% for semi-sweet or bittersweet chocolate	Chocolate liquor is not added
Cocoa butter	Cocoa butter	Cocoa butter – 20% minimum
Dairy ingredients – at least 12%, no whey; 3.39% minimum milk fat	Dairy ingredients – less than 12%, no whey	Dairy ingredients – 14% minimum, 5% maximum Whey, 3.5% minimum milk fat
Soy lecithin – an emulsifier; less than 1% total emulsifiers	Soy lecithin – an emulsifier; less than 1% total emulsifiers	Soy lecithin – an emulsifier; less than 1.5% total emulsifiers
PGPR – polyglycerol polyricinoleate; an emulsifier or other approved emulsifiers	PGPR – polyglycerol polyricinoleate; an emulsifier or other approved emulsifiers	PGPR – polyglycerol polyricinoleate; an emulsifier or other approved emulsifiers
Vanilla; a natural flavouring	Vanilla; a natural flavouring	Vanilla; a natural flavouring
Vanillin; an artificial flavouring	Vanillin; an artificial flavouring	Vanillin; an artificial flavouring
Flavourings not imitating any ingredients singly or in combination	Flavourings not imitating any ingredients singly or in combination	Flavourings not imitating any ingredients singly or in combination

internally at a chocolate factory or purchased through a vendor assurance programme. Additional ingredients requiring purchase would be sugar, emulsifiers and flavourings. Typical dairy ingredients could be whole milk powder, milk crumb, non-fat dry milk, anhydrous milk fat, sweetened condensed milk and whey powder (see Chapter 5).

### **23.9.1 Mixing**

Mixing is the first step in making milk or dark chocolate. Sugar, chocolate liquor, dairy ingredients if desired and a portion of the cocoa butter are mixed together to form a paste. This process may be by batch or automatic. The consistency of the paste is very important in obtaining the correct setup for the next step in the process.

### **23.9.2 Refining**

Refining is where the mixture will be turned from a paste to a fine flake. This is typically a two-stage process going through a pre-refiner to condition the mass for the final finishing refiner. A refiner is a large machine with steel rolls mounted vertically with the bottom feed roll offset (see Chapter 9). The rolls are slightly crowned so when the machine is in operation, the pressure exerted will ensure a film of chocolate of even thickness spreading over the entire roll surface. The speed of the rolls increases from bottom to top and allows the chocolate film to be transferred from one roll to the next resulting in shearing action. The gap between the rolls will be adjusted to crush particles of sugar, cocoa and milk ingredients if present to the desired fineness. It is important to envelope the particles with fat. Refining will increase the number of particles, increase the surface area and thus turn this paste mixture into a light coloured, fine powdery mass. Fine chocolates will have an average particle size of 15–20µm and more coarse chocolates would be 30–35µm. The fineness required depends on what final product will be made using this product. Truffles would need very fine chocolate whereas a crisped rice product would not need quite as fine a chocolate. Operations must have trained operators to maintain the consistency of the mass and measure fineness and colour on-line to ensure the correct quality outcome. The proper particle size and distribution will impact the quality of the product texture, mouth feel and colour. It will also affect the amount of cocoa butter required to meet specific flow properties adjusting the cost of the final product.

### **23.9.3 Conching**

Conching is an essential process for the development of the final texture and flavour of a chocolate greatly determining the product final quality (see Chapter 10). After refining, the refiner flake travels to a conche. Conches are large machines designed to work the chocolate mass and can be manipulated by time, temperature and shear. This mixing–kneading operation incorporates