PROCESS SENSORS CORPORATION

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113 Cedar St., Milford, MA 01757 • Tel: 508-473-9901 • Fax: 508-473-0715 • info@processsensors.com







Applications Notes

Fat and Moisture measurements in the Chocolate making Process

Flow properties and particle size are important parameters in the processing of chocolate which are influenced to a large extent by the fat content. Too high a fat content will, in addition to wasting high value cacao butter, have a detrimental effect on flavour, texture, melting properties and the rate at which it sets. Too low a fat content will create similar problems, and could result in violation of the minimum fat levels legislated for chocolate and cocoa powder. Moisture levels generally have to be minimized as high levels will increase the viscosity and affect the flow and usage of the product in addition to reducing it's shelf life.

Chocolate manufacturing processes

Cocoa beans are roasted at 210 °F for variable time intervals, dependent on the quality of the beans and the desired flavour and aroma. Milling, sifting and winnowing operations separate the shells from the nibs. The latter is ground and heated to produce liquor which is either used directly in dark or milk chocolate production, or is pressed resulting in cocoa butter and press cake. Press cake is dried and milled to produce cocoa powder. Dark and milk chocolate recipes are similar in that they both utilize liquor and cocoa butter but further processing and additives differ. For dark chocolate, sugar is added to the liquor, then further grinding reduces the particle size from 100 to 18 microns. The resultant powder is stirred at 180 °F to remove residual moisture and to improve the "smooth" taste in a process termed Conching. The cocoa butter is added at this stage. Tempering, the art of transforming the liquid into a solid involves controlled heating and cooling steps. Milk chocolate is formed by adding condensed milk or milk powder to the liquor to produce kneader paste, this is dried, crumbed, and with the addition of molten cocoa butter converted into refiner paste which is rolled into refiner flake before undergoing conching.

Gauge Location

When measuring on powder or granular material the gauge is located 150-200cm above the product on a transfer belt, conveyor, or on a roller. At line measurements can be made with a MCT 600.

Measurements

Product	Constituent	Range	Accuracy
Cocoa beans (whole)	Moisture Fat	4-7% 45-55%	+/- 0.8% +/- 0.6%
Milled Crumb	Moisture Fat	0.5-3% 12-23%	+/- 0.25% +/- 0.35%
Cocoa Powder	Moisture Fat	2-4% 19-24%	+/- 0.2% +/- 0.4%
Drinking Choc. powder	Moisture Fat	2-4% 3-8%	+/- 0.2% +/- 0.3%

ima UK Distribution by: IMA Ltd, Parkwell House, Otley Road, Guiseley, West Yorkshire, LS20 8BH, England
Tel: +44(0)1943 878877 Email: info@ima.co.uk Website: www.ima.co.uk