APPENDIX A3.2.1-20

DEVELOPMENT REPORT

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DEVELOPMENT REPORT

P1
THS 2.2

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1. Product Description

The Tobacco Heating System (THS) 2.2 is a new type of product. It has three distinct components that perform different functions: (i) a Tobacco Stick - a novel patented tobacco product with unique processed tobacco made from tobacco powder, (ii) a Holder into which the Tobacco Stick is inserted and which heats the tobacco material by means of an electronically controlled heater, and (iii) a Charger that is used to recharge the Holder after each use.



Figure 1 THS 2.2 Components

2. Product Functional Components

2.1. Tobacco Stick

The Tobacco Stick is a novel patented tobacco product containing tobacco material in a non-conventional form and two filter sections. The Tobacco Stick has been designed specifically and exclusively for use with the Holder (Heating Device). The Tobacco Stick comprises a number of elements that are not found in cigarettes:

- A tobacco plug, which is manufactured from a unique "crimped" cast-leaf tobacco material. It provides taste and flavor compounds. It contains an aluminum co-laminated tobacco plug wrapper preventing the self-sustaining combustion of the tobacco plug should any one try to light the Tobacco Stick with a cigarette lighter.
- A hollow acetate tube which acts as a mechanical spacer between the tobacco plug and the first filter

- A polymer-film filter (Polylactic Acid or PLA) which contributes to the removal of some aerosol constituents (primarily phenol), this filter may contain menthol for some Tobacco Stick variants
- A low-density cellulose acetate mouthpiece filter (MPF)
- Outer paper and mouth-end (Tipping) paper

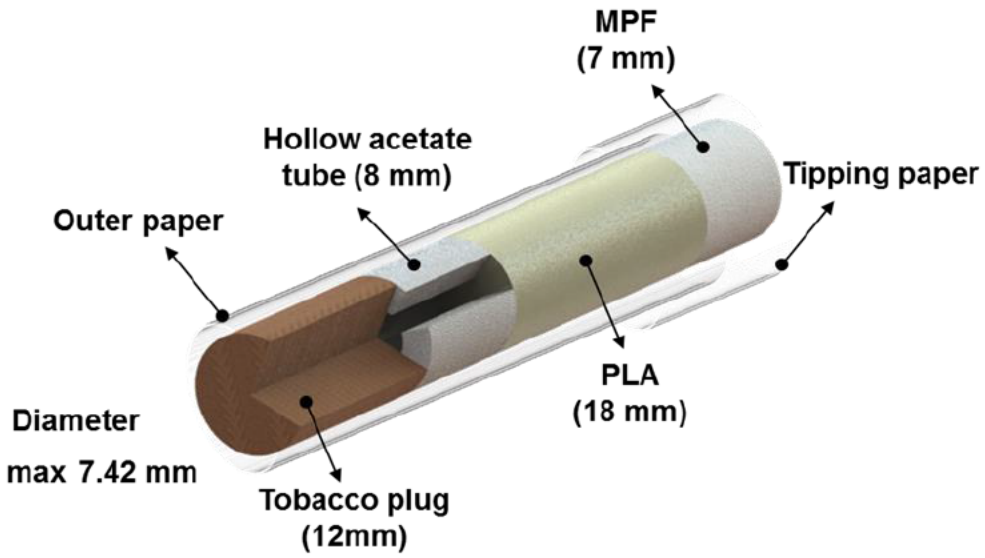


Figure 2 Cross-Sectional Diagram of the Tobacco Stick Showing Major Components

Of the various components, the tobacco plug and polymer-film filter were developed and produced by PMI. The other materials (hollow tube, mouth piece filter, outer paper and mouth-end paper) are commercially available products.

The **tobacco plug** is made of 100% cast-leaf tobacco material. This special cast-leaf material is made of processed/reconstituted tobacco powder containing various tobacco types as well as binders and humectants: water, guar gum and natural cellulose fibers as well as glycerin to facilitate the production of an aerosol. When heated, the glycerin evaporates and re-condenses into small droplets to generate a visible aerosol.

(b) (4)

The **hollow acetate tube** (HAT) is made of cellulose acetate fibers with a plasticizer, wrapped in a non-porous paper over-wrap. The hollow acetate tube prevents the tobacco plug from being pushed into the Tobacco Stick when the tobacco plug is inserted in the heater.

The **polymer-film filter** is made of polylactic acid-film wrapped in a non-porous paper over-wrap which is made of wood cellulose fibers. In this section of the Tobacco Stick, vaporized compounds are cooled down to yield an acceptable aerosol temperature.

The **mouth piece filter** is made of cellulose acetate fibers with plasticizer, wrapped in a non-porous paper over-wrap. It is a low-efficiency filter which provides sufficient rigidity when the mouth piece filter is held between the lips of the consumer.

The **outer paper** holds the various Tobacco Stick components together.

The **mouth-end paper** is added on the mouth end to prevent the lips of a consumer from sticking to the Tobacco Stick mouth piece filter.

Tobacco Sticks are collated in a Pack. Number of units of Tobacco Sticks per pack depend on Pack format. Packs are then collated in a bundle.

Example of most common size:

- 20 units in a Pack
- 10 Packs or 200 units in a Carton/Bundle



Figure 3 Example of Pack of 20 Tobacco Sticks

2.2. Holder

The Holder comprises 4 major components:

- The casing;
- The heater, which is a glass-coated metallic resistive element through which electricity is passed to create the heating;
- The control electronics, which ensure the temperature control of the heater and provide protective monitoring so that overheating is prevented. It also supports the storage and communication of use information;
- The battery stores sufficient power for a single Tobacco Stick use.

The average temperature over the active surface of the heating element is ranging between 320°C and 350°C throughout the entire use.

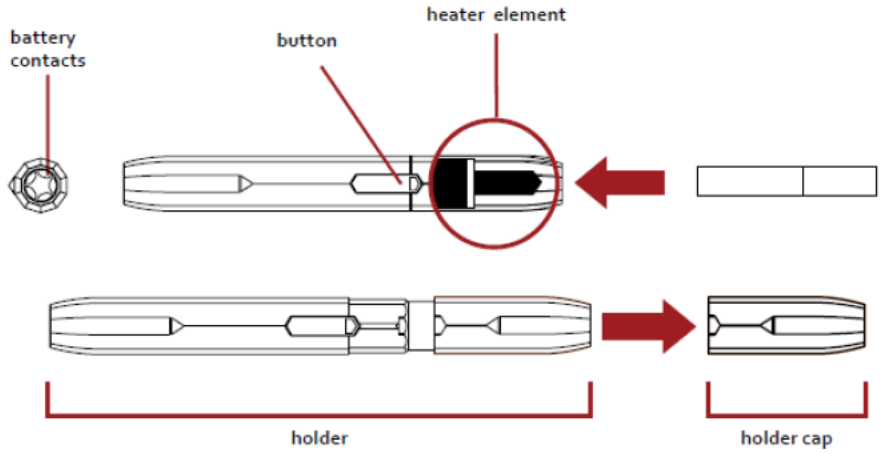


Figure 4 Holder Scheme

2.3. Charger

The Charger is designed to be portable and to recharge the Holder. The electronics regulate both the charging of the Holder battery from the Charger battery, and the charging of the Charger battery from an external power source.

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5. Revision history

Version N°	Date	Description of change (including reason for change)	Type of change
1.0	24 MAR 2016	New Template and wet signatures	2
1.0SV	22 JUL 2016	Issued for Submission	1

(1: Major change/new version; 2: Minor change; 3: Review without change)

6. Review and Approval

Name	Role	Signature	Date
Papenko, Andrei	Author / Manager System Integration		12-Aug-2016
Schneider, Jean-Claude	Approver / Director Product & Process Development Nicotine Containing Products		17-Aug-2016
Kapp, Florence	QA Reviewer / QA Officer		15 AUG 2016