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Electrically Heated Tobacco System (EHTS) and Electrically Heated Tobacco Product (EHTP)

Description of the product

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

Figure 1 The three components of the EHTS

1 Electrically Heated Tobacco Product

The EHTP is a novel patented tobacco product containing specially processed tobacco and two filter sections. The EHTP has been designed specifically and exclusively for use with the Holder (heating device). The EHTP comprises a number of elements that are different as compared to cigarettes:

- A tobacco plug (with the tobacco mixture) which is manufactured using a unique “crimped” cast-leaf tobacco material which provides taste and flavor compounds. Subject to market requirements, it may also contain a co-laminated aluminum tobacco plug wrap preventing the self-sustaining combustion of the tobacco plug should any one try to light the EHTP as a cigarette
- A hollow acetate tube which acts as a mechanical spacer between the tobacco plug and the first filter
- A polymer-film filter which may contain menthol for some EHTP variants
- A low-density cellulose acetate mouthpiece filter (different construction depending on EHTP variants)
- Outer and mouth-end papers

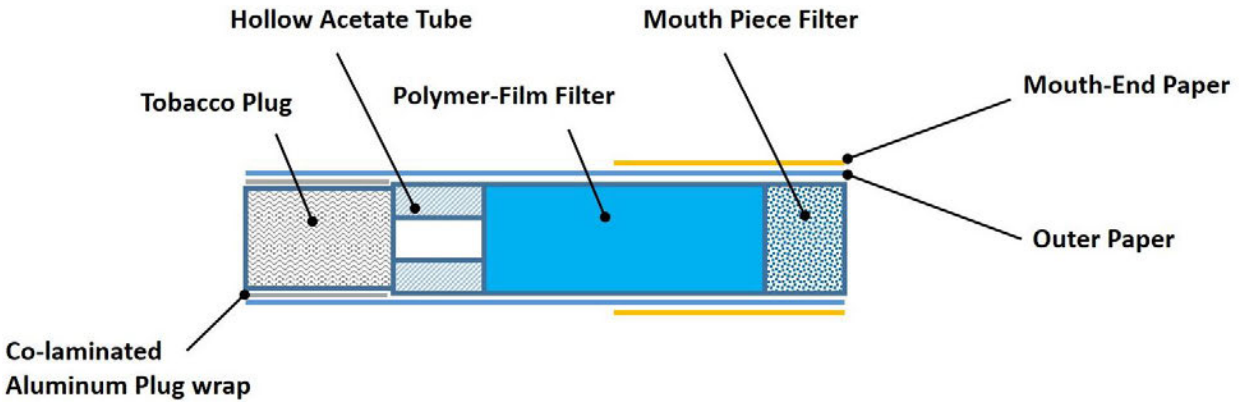


Figure 2 Illustration of cross-sectional diagram of the EHTP showing major components

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 the cast-leaf tobacco material. This special material is made from various tobacco types which are ground and formed into a reconstituted sheet together with binders and humectants: water, guar and natural cellulose fibers as well as glycerin. The tobacco plug is specifically formulated for heating and is not designed for smoking. When heated, water and glycerin evaporate and re-condense into small droplets to generate a visible nicotine containing aerosol (vapor). The tobacco plug is the source of tobacco taste and flavors.

The reconstitution of tobacco is performed by grinding selected tobacco grades into fine powder. The powder is mixed with water, binders and humectants into a homogeneous slurry. The slurry is then cast

and dried into thin sheets. The reconstituted tobacco sheet (with a specified thickness and weight) is then cut into bands of a defined width. By crimping the reconstituted tobacco bands, tobacco plugs of a specified weight are obtained. The casting and drying process for the reconstitution of tobacco is known as the cast leaf process and is widely used by the tobacco industry.

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

The **polymer-film filter** is made from polymer-film wrapped in a non-porous paper over-wrap which is made of wood cellulose fibers. In this section of the EHTP, 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 EHTP components together.

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

EHTPs are collated in a Pack. Number of units of EHTPs 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 Illustration of pack of 20 EHTPs

EHTP Product Values:

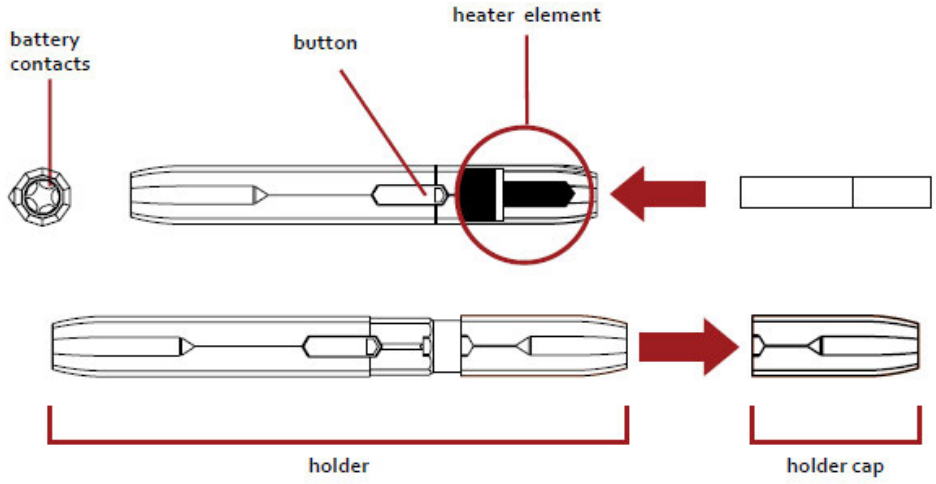
- EHTP Average Weight at equilibrium (at 50% RH, 22°C): 0.8 g indicative for the regular variant
- Tobacco mixture Average Weight (at 50% RH, 22°C): 305.7 mg indicative for the regular variant
- EHTP Average Length: 45 mm
- EHTP Average Diameter: 7.3 mm

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.
- The battery stores sufficient power for a single EHTP use

The EHTP is inserted into the holder and within which the tobacco mixture is heated only in temperatures ranges below 350[1] degrees Celsius through the electronically controlled heater. The average power consumption for one EHTP use is between 2 and 3 Watts.



[1] The temperature of the tobacco in contact with the header reached an average temperature of 280 degrees Celsius at a position of 0.2 mm from the heating elements surface.

Figure 4 Holder scheme

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.

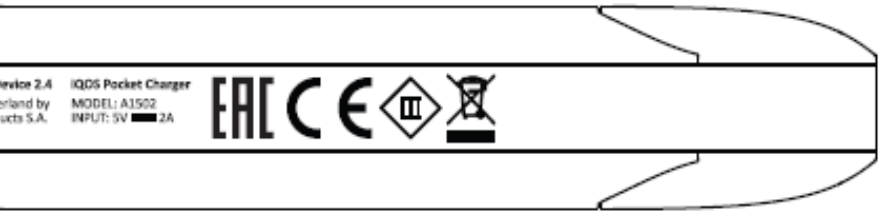


Figure 5 Illustration of an enlarged view of the Charger Label

The Charger and Holder are the key components of the EHTS which have been designed, manufactured and tested in accordance with the Electromagnetic Compatibility Directive 2004/108/EC and the Low Voltage Directive 2006/95/EC. A corresponding EC Declaration of Conformity has been issued.

The EHTS is packed in a user kit, which consists of:

- 1 Holder
- 1 Charger
- 1 Power Adaptor
- 1 USB Cable
- 1 Cleaning Tool
- 1 Full User Guide

Figure 6 Electrically Heated Tobacco System – Illustration of Device Kit

4 Product Use

To start using the EHTS, the tobacco end of the EHTP is inserted into the Holder until only the EHTP filter is visible and EHTS is initiated by pressing the button on the Holder. A LED indicates when the initial heating process is completed.

- Once initial heating is completed, the product can then be used by drawing air through the EHTP
- This initiates the in use heating cycle, which is a puff-by-puff heating profile that is designed to provide a consistent experience throughout use
- The Holder and EHTP can deliver puffs over a period of around 6 minutes
- Once this cycle is completed, the EHTP must be removed from the Holder, which is then placed in the Charger where it is recharged. A new EHTP must be used for the next cycle
- Since the EHTP Product does not burn down during consumption and produces no ash, an EHTP can be thrown away responsibly in any waste receptacle.