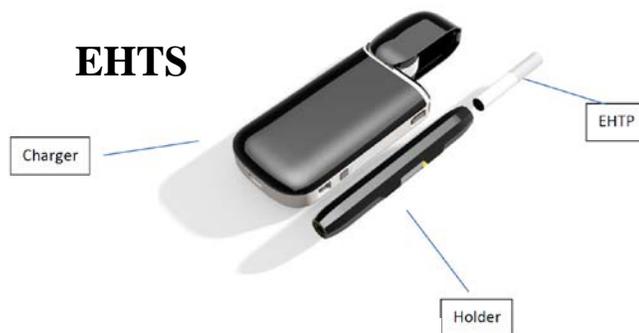


Philip Morris International (PMI) has developed a patented Electrically Heated Tobacco System (EHTS) that heats a specifically designed tobacco product (Electrically Heated Tobacco Product or EHTP). The EHTP contains tobacco¹ material in the form of a plug that undergoes a controlled heating process to produce a vapor (aerosol). The tobacco is only heated and is not burnt as happens in a lit cigarette.



Professor Pawel Gierycz is Professor of Chemical and Process Engineering at the Warsaw University of Technology, Poland. He is an expert in the thermal analysis and characterization of materials. PMI retained Professor Gierycz to review and analyze scientific data concerning combustion and smoke generating processes.

Professor Gierycz issued an expert opinion that includes:

1. Scientific definitions of combustion and smoke.
2. Analyses as to whether (a) any combustion processes occur when the Holder heats the tobacco material in the EHTP, and (b) if the EHTS operation produces smoke when the Holder heats the tobacco material in the EHTP.

Professor Gierycz performed a literature search of Polish and International scientific definitions for combustion and smoke. He then reviewed the operation of the EHTS and analyzed experimental data on the EHTS provided by PMI (that includes data generated by an independent analytical laboratory) to assess whether any combustion processes occur.

¹ The EHTP does not contain tobacco cut-filler (tobacco leaf cut in small pieces found in cigarettes) or pipe tobacco. All of the tobacco in the EHTP is reconstituted (cast-leaf) tobacco made from tobacco powder, water, glycerin, guar gum and cellulose fibers.

From his review of the scientific literature, Professor Gierycz concludes that the most adequate definition for combustion is:

The combustion process is exothermic (heat release) chemical reaction occurring between combustible substance (fuel) and oxygen (including air oxygen), resulting in release of heat, as well as light, and production of ash and smoke.

From his review of the scientific literature, Professor Gierycz concludes that the most precise and clear definition among the definitions reviewed for smoke is:

Smoke is an emitted aerosol whose main source are combustion processes. Smokes – aerosols containing solid or liquid particles, a result of processes of substance combustion. Often this process is accompanied by chemical reactions such as oxidation.

The expert opinion of Professor Gierycz concludes that no combustion of the tobacco occurs during the heating of the EHTP in the Holder and that the aerosol produced is fundamentally different from cigarette smoke.

Professor Gierycz's expert opinion is based on the following findings from his assessment:

- Due to the special design of the EHTP and appropriately selected and electronically controlled range of operation temperature, there is no combustion of tobacco during the heating of tobacco in the new EHTS device. The maximum temperature obtained in the device is so low that the process of burning of tobacco cannot be initiated.
- The products of the heating of the EHTP in the Holder is an aerosol and a solid residue structurally similar to the original EHTP. These products are fundamentally different from products of "classical" burning of tobacco in cigarettes, i.e. smoke and ash.
- During the heating of the tobacco inside the EHTP, the main process occurring is the distillation of constituents. More than 98% of the constituents in the EHTP aerosol come from the distillation of constituents in the EHTP and only approx. 1.7% of substances might be as a result of chemical processes occurring during the heating process.
- The obtained aerosol does not contain products of tobacco combustion and the levels of harmful and potential harmful constituents are present in significantly smaller quantities than in the case of smoke generated from the burning of tobacco.