Moisture management in footwear

SATRA Advanced Moisture Management Test (SATRA TM376) measures the sweat management properties of all types of footwear – from everyday shoes to sports and high performance footwear.

The test uses a semi-rigid, moulded foot form, incorporating an electrical heating element and a system of pipes to deliver water to ‘skin’ at a controlled rate.

During the test, this “foot” is covered by a sock (hose) and placed inside the footwear to be tested. The device simulates real wear conditions by producing a warm, moist environment. The footwear sits in a wind tunnel circulating air at a standard temperature and humidity (23°C, 50 per cent RH).

Standard sweat rate conditions mimic the human foot at a moderately high stress level (34°C and 5g/hr). Higher stress levels can be tested – for example, to simulate sports applications (38°C, 13g/hr).

Moisture is drawn away from the foot, passing into the hose and footwear by wicking and absorption mechanisms. For optimum comfort, the skin and hose should remain dry and the moisture should evaporate.

The components (sock, insock and shoe) are weighed before and after the test to determine where the moisture is trapped. If the upper is permeable or ventilated, some moisture will work its way out and be lost to the atmosphere. If the upper is impermeable, the moisture will remain in the shoe and sock.

Overall footwear performance depends on elements such as footwear construction, upper design, lining types and outer materials.

The test is ideal for differentiating between products. We see, for example, that an impermeable upper can trap 95 per cent of the moisture within the shoe, compared to just 34 per cent for a permeable upper (66 per cent is evaporated externally). By using standardised footwear, socks (hose) can be similarly tested. Comparing natural and synthetic fibres in a reference shoe showed that synthetic fibres allowed 33 per cent more evaporation than the natural fibres, and the hose next to the foot was significantly drier.

Sample requirements and testing charges
We require left foot samples in one of the following sizes: UK 7 or 9; EUR 40½ or 43; US men’s 8 or 10; US women’s 9 or 11.

The charge for SATRA TM376 is GBP 479 per style.