ANEC R&T 2009 DOMAP 008 Surface Temperatures

EXECUTIVE SUMMARY

During 2009 ANEC commissioned Intertek to undertake a short study with the aim of providing ANEC with a solid, reliable and up-to-date technical background into Guide 29 temperature limits and to relate these to the levels of temperatures on handheld products such as irons and hairdryers and table-top cooking appliances.

Method
Six products were selected, one steam iron, one steam station, two hairdryers, a health grill with griddle and a Panini maker/health grill. They were all made by well-known brands in the EU. A thermal imaging camera was used to identify the hottest parts of the products. Measurements of the surface temperatures of handles, knobs, grips, etc. were made in accordance with EN 60335-1 and EN 60335-2 using bare-ended thermocouples. A small user trial was undertaken establish the areas of the products that were touched in normal use, including the handles, knobs, grips, etc. The participants were asked to use the appliances and report on experiences regarding the surface temperatures, for example if the handle felt cold, warm, or hot. The participants included 10 adults and 6 children selected from the Intertek User Panel. The adult participants all had one or more physical impairment in their hands, such as arthritis that mildly affected their ability to use domestic products. The children assessed only the hairdryers and the health grills; they did not assess the iron and steam station.

From the user trial results and the surface temperature measurements the maximum surface temperatures of handles, knobs, grips, etc the areas likely to be touched under conditions of normal use were mapped on each sample. The results were compared to surface temperature values in EN 60335-1 and other relevant values such as those in CENELEC Guide 29.

Results

Iron
All of the areas likely to be touched in normal use had measured temperatures that were below the CENELEC Guide 29 burn thresholds for 10 second contact duration burn threshold (70 to 75°C). They were also below 50°C, which is the proposed ANEC modification to Table 3 of EN60335 Part 1 for surfaces of handles, knobs, grips and similar parts held for 10 minutes or more. None of the areas likely to be touched in normal use were rated as hot by the testers.

One side of the body, immediately above the soleplate, was found to have a temperature of 110.9°C. This is above the CENELEC Guide 29 burn threshold for 0.5 second contact (90.5 to 99°C). The other side measured 59.6°C, but was measured in a slightly higher position. During the user trial no testers were observed touching the side of the body above the soleplate, although, the testers rated this area as ‘Very Hot’ or ‘Hot’. The nose area at the front of the iron was not touched during normal use, however, when asked to rate it, one tester did not wish to touch it and one tester rated it as ‘Very Hot’.

Steam station
All but one of areas likely to be touched in normal use had measured temperatures that were below the CENELEC Guide 29 burn thresholds for 10 seconds contact duration burn threshold (70 to 75°C). They were also below 50°C, which is the proposed ANEC modification to Table 3 of EN60335 Part 1 for surfaces of handles, knobs, grips and similar parts held for 10 minutes or more. The temperature/steam lever slide control reached 56.9°C but it is likely to be touched for less than four seconds. This temperature is below 75°C which is the temperature suggested by ANEC in their modifications to

Table 3 of Part 1 of EN 60335 for 4 seconds contact on moulded material. It is also below the temperature threshold for 4 seconds contact time for children and elderly people identified in CENELEC Guide 29 (76 to 82°C). The user trial rating for the slide control was 'Acceptable/warm to Cool'.

The sides of the body above the soleplate recorded high temperatures likely to cause a burn. However, during the user trial, no testers were observed touching these areas, and those that assessed the surface temperature rated them as 'Very hot' or 'Hot'.

The steam hose reached a temperature of 83.1°C. It was covered with a plaited thread fabric. There are no burn threshold temperatures in CENELEC Guide 29 for fabrics. In the user trial, one tester rested her arm against the steam hose intermittently and she rated the temperature of the hose as 'Hot/warm'.

Seven surfaces had one or more testers who gave a rating of 'Hot' or 'Very Hot' when asked to touch them. Only one of these, the sides of the handle, was typically touched during normal use and one rating of 'Hot' was given, although the measured temperature on the sides of the handle was 28.4°C.

Hairdryer 1

None of the areas likely to be touched in normal use recorded temperatures that gave cause for concern. The sides of the body were not typically held during use, although one tester preferred to hold the body rather than the handle. This tester rated the sides of the body as 'Hot', although the measured temperature was 29.8°C. Two children also rated the sides of the body as 'Hot', but they normally held the handle.

The temperature measured at the vent, 133.5°C, exceeded the Guide 29 burn threshold for 0.5 second contact on plastic (90.5 to 99°C) and the ANEC proposed revisions to EN 60335 Parts 2 temperature limits for surfaces likely to be touched (87°C). However, this area was not observed being touched during testing. None of the other measured temperatures reached the CENELEC Guide 29 burn threshold for 10 seconds contact duration (70 to 75.5°C).

Hairdryer 2

Except for the nozzle, none of the areas likely to be touched during normal use recorded temperatures that gave cause for concern. The temperature found on the nozzle of the hairdryer, 77.9°C was above the CENELEC Guide 29 burn threshold temperatures for 10 seconds adult contact duration on plastic (70 to 75°C). It is within the CENELEC Guide 29 range for 4-seconds contact by children from 2 – 6 years, which can be applied to elderly users, (76 – 82ºC). The testers were not asked to assess this area for surface temperature as this was considered too high when referring to the thermal images taken before the trial. In normal use, it is likely that the nozzle will be twisted during hair styling to direct the airflow, but contact is unlikely to be for more than 4 seconds.

The side and top of the body were rated as 'Hot' by most of the testers. A temperature of 59.3°C was measured on the sides of the body. This is just below the threshold of 60°C suggested by ANEC as a modification to Table 3 of EN 60335 Part 1 for 1 minute contact with moulded material. During normal use, only one tester was observed holding the hairdryer around its body both to the rear and the front of the handle. The remaining testers held the hairdryer by its handle.

Other areas that were not likely to be touched had higher temperatures. The temperature measured at the vent, 100.1°C, exceeded the Guide 29 burn threshold for 0.5 second contact on plastic (90.5 to 99°C) and the ANEC proposed revisions to EN 60335 Parts 2 temperature limits for surfaces likely to be touched (87°C). However, this area was not observed being touched during testing. The edge of the body/vent reached 72.7°C was

within the CENELEC Guide 29 burn threshold temperatures for 0.5 second for adult contact duration on bare metal (67.5 to 73°C). In the user trial, nobody was observed touching this area during normal use, however, when rated for surface temperature, the 4 testers that assessed this all rated it as 'Hot' or 'Very Hot'.

Health grill with griddle

The grill plates and griddle are hot functional surfaces that are not intended to be touched, but inadvertent short periods of contact are likely to cause burns. Three other areas related to the edges of the grill plates also produced surface temperatures likely to cause a burn after a short contact period; however, these are unlikely to be touched during normal use.

The grill plate cover and the top of the appliance recorded high temperatures within or above burn thresholds, but these are not areas likely to be touched in normal use. The inner edge of the handle reached 52.2°C. This is below burn thresholds for bare metal for short periods of contact, but above the 50°C ANEC proposed modification to Table 3 of EN 60335 Part 1 for 10 minutes contact. Users were not likely to make contact with this area for that amount of time. However, the testers mostly rated it as 'Hot' or 'Very Hot'. Some testers rated the temperature controls and the area around them as being too hot. No other areas had measured temperatures that caused concerns for short periods of contact.

Panini maker/health grill

The grill plates, outer surfaces, lock mechanism and the area around the heating controls had measured temperatures likely to cause burns, depending on the duration of contact. These areas are not likely to be touched during normal use. The heating control was rated as 'Very hot' or 'Hot' by most of the testers, but did not have a measured temperature that was of concern. No other measured temperatures gave cause for concern.

The temperature of the metal part of the lock mechanism was 75.1°C. Two testers rated this as 'Hot'; however, it is an area that is not intended to be touched during use. This area was occasionally observed being touched during the user trial. This temperature is within the CENELEC Guide 29 burn thresholds for 4-seconds elderly person contact (73.5 to 78°C for metal coated with polyamide) but note the exact material of this part is unknown.

The area around the heating control measured 72.6°C. This falls within the CENELEC Guide 29 burn thresholds for 10 seconds adult contact (70 to 75.5°C). All of the testers rated this surface as 'Very Hot' or 'Hot', but none were observed touching it during normal use. The temperature control is large and this area is unlikely to be touched.

Conclusions

- The six products were all found to have areas with high surface temperatures likely to cause a burn which could be touched accidentally during normal use.
- A few of the areas that were likely, but not necessarily intended by the manufacturers, to be touched during use, eg the hairdryer nozzle were found under test conditions to have temperatures that could cause a burn during normal use if they were touched for long enough.
- The handles, knobs and switches were below Guide 29 burn threshold for 4 seconds contact, and were generally below the 50°C suggested by ANEC for 10 minutes or longer contact in their proposed modification for Table 3 of EN 60335 Part 1. The parts that were above 50°C were unlikely to be held for this length of time.
- The user trial showed that in some cases people with limited hand dexterity adapt their use of products to enable them to be used in the most comfortable way. The user can then come in contact with surfaces which are not those that the

manufacturer intends them to touch. The number of participants and the range of impairments included in this study were limited, so no firm conclusions should be drawn from this data about the likelihood and extent of this happening in the general population.

- The testers' ratings of 'Hot' or 'Very Hot' were sometimes applied to surfaces that were unlikely to burn them according to Guide 29, suggesting that this subjective feedback was an unreliable indicator of actual surface temperatures.