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**Date**  
May 23th, 2007

**Report**

**Project number** : T07 15655

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T07.15655  
**Subject:** Shoes

**Received** : Various brands of shoes, namely:  
1) - Crocs Silvercloud (beige)  
2) - Crocs Cayman (black)  
3) - Dansco  
4) - Quiva  
5) - Kswiss Tennis shoe

**Encl.**  
0

**Customer's tel.:**  
040-2125901

**Assignment:** To determine, by means of walking tests, the electrostatic behaviour of the shoes supplied. Shoes described in standards EN 1815 and ISO 6356 were chosen as reference. The shoes have soles of Neolite, rubber and PVC. The extent of the charge was determined using two types of floor covering known to have different characteristics as far as electrostatic charging is concerned, namely:  
- high charging characteristic  
- low charging characteristic

**Customer's ref.**  
E-mail dated 3 May 2007

Op opdrachten aan TNO zijn van toepassing de Algemene Voorwaarden voor onderzoeksopdrachten aan TNO, zoals gedeponeerd bij de Arrondissementsrechtbank te Den Haag en de Kamer van Koophandel Haaglanden.

**Results:** see page 2

**Details:** see page 3

TNO TQS

Author : J. Brinks

Seen by : V. Kruys



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## RESULTS

### Antistatic (charge transmitted to person)

Research method ISO 6356 and EN 1815

Conditions : 23°C and 25% relative humidity  
Duration of conditioning : 4x24h  
Values : kV

	Floor covering with low charging characteristics							
	Neolite		Rubber		PVC		Shoes supplied	
	Maximum charge	Two feet median	Maximum charge	Two feet median	Maximum charge	Two feet median	Maximum charge	Two feet median
Reference shoes	-2.3	-1.1	-1.1	-0.3	-1.6	-0.7	-	-
Crocs Silvercloud	-	-	-	-	-	-	-2.5	-0.6
Crocs Cayman	-	-	-	-	-	-	-2.8	-0.5
Dansco	-	-	-	-	-	-	-2.5	-1.4
Quiva	-	-	-	-	-	-	-1.2	-0.4
Kswiss Tennis shoe	-	-	-	-	-	-	-4.0	-3.7

	Floor covering with high charging characteristics							
	Neolite		Rubber		PVC		Shoes supplied	
	Maximum charge	Two feet median	Maximum charge	Two feet median	Maximum charge	Two feet median	Maximum charge	Two feet median
Reference shoes	-6.2	-4.2	-4.2	-3.3	-5.2	-3.8	-	-
Crocs Silvercloud	-	-	-	-	-	-	-2.5	-1.2
Crocs Cayman	-	-	-	-	-	-	-2.7	-1.2
Dansco	-	-	-	-	-	-	-5.2	-3.2
Quiva	-	-	-	-	-	-	-2.9	-1.6
Kswiss Tennis shoe	-	-	-	-	-	-	-4.5	-3.9



## Details:

The maximum charge is measured when a test person is standing with one foot on the floor covering. The two-feet median is determined if the two feet are making contact with the floor covering. In order to avoid problems in the form of unpleasant shocks, a maximum value of 2kV is maintained. This is seen as antistatic and applies to the value determined at the two feet median. A higher charge can lead to complaints. The strength of the charge depends on the following factors: relative humidity, persons and the combination of floor covering and sole materials.

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## Evaluation:

### Low-charge floor covering

Only the Kswiss tennis shoe showed a considerable charge and is therefore not antistatic. The remaining shoes submitted more than met the 2kV requirement.

### High-charge floor covering

The Crocs Silvercloud (beige), Crocs Cayman (black) and Quiva showed a limited charge, but the risk that the wearer will receive unpleasant shocks is small.

The remaining shoes submitted and the reference shoes showed a charge that was clearly higher. There is a very real risk of unpleasant shocks.