

ICS 35.240.99; 61.060

## **Digitalisierung des Schuhproduktionsprozesses –Fuß-, Leisten- und Schuhcharakteristiken; Text Englisch**

Digitalisation of the shoe production process –  
Foot, last and shoe characteristics; Text in English

La numérisation du processus de production des chaussures –  
Caractéristiques du pied, de la forme et de la chaussure; Texte en anglais

Gesamtumfang 31 Seiten

Dieses Dokument wurde durch die im Vorwort genannten Verfasser erarbeitet und verabschiedet.

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## **Foreword**

This DIN SPEC has been developed according to the PAS procedure. The development of a DIN SPEC according to the PAS procedure is carried out in DIN SPEC-consortiums and does not require the participation of all stakeholders.

This document has been developed and adopted by the initiator(s) and authors named below:

- OneFID GmbH  
Dr. Timo Marks, Joshua Meskemper
- BNS International GmbH  
Sarah Ljubicic
- DESMA Schuhmaschinen GmbH  
Christian Decker, Klaus Freese
- Fraunhofer-Institut für Integrierte Schaltungen IIS — Entwicklungszentrum Röntgentechnik EZRT  
Dr. Steven Oeckl
- HDS/L — Bundesverband der Schuh- und Lederwarenindustrie e. V.  
Torben Schütz
- Prüf- und Forschungsinstitut Pirmasens e. V. (PFI)  
Dr. Monika Richter

At present, there are no standards covering this topic in the body of German Standards.

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## Introduction

The shoe industry has not yet been able to fully exploit the possibilities of digitalisation, as in many cases the individual process steps are not linked to each other. The lack of standards and technical rules leads to incompatible, competitive approaches.

Furthermore, e-commerce, trade and production require data for digital services. These technological innovations additionally increase the possibilities of use as well as the interest in use by all parties involved. Many industry players are aware of the emerging changes and are looking for standardized solutions in the areas of digitalisation, product and technology development and new business strategies.

Current developments indicate a high demand for international standards that describe trustworthy and validated processes in this environment. The aim is to build a bridge between the end customer and producers. The possibilities offered by digitisation and the "Shoe 4.0 idea" are to be applied. A standard is to be created for all digital process steps. Especially for individualization solutions, the focus is on the conversion of anatomical foot data into production-ready data and thus the standardization of the digital shoe production process. So far, there are only insufficient technical rules in the digital shoe industry.

This document serves as the basis for all digital steps in the supply chain of the shoe production process, from the foot scan and digital generation of data to the connection of production and manufacturing processes. This requires manufacturers to provide underlying information about the products.

This document enables the customer to use his own data for a simplified purchasing process. Within this framework, a transparent discussion of products is guaranteed. Furthermore, the information provided by the customer serves as a basis for size and product advice. The more information about the customer is known, the more extensive the customer can be supported in the sales process. A high level of transparency creates trust for the customer in the digital processes as well as in the product.

## 1 Scope

This document defines requirements for the digitization of a sub-sector of the shoe production process. The data processing of already recorded foot, last and shoe characteristics is defined and the preparation for further processing is described. Therefore static and dynamic data is considered.

For this purpose, a description of digital data is defined, which is arranged within a uniform orientation system. Comparable measurements are taken from these data. This enables a uniform typing. The document contains specifications on data type, data format, data acquisition process, definition of data accuracy and data quality.

The accuracy of the applied data can be identified by a value system described in this document and classified in different complexity types (up to dynamic measurement).

This document is applicable to both serial and individual shoe production.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/TS 19408, *Footwear — Sizing — Vocabulary and terminology*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

DIN and DKE maintain terminological databases for use in standardization at the following addresses:

- DIN-TERMinologieportal: available at <https://www.din.de/go/din-term>
- DKE-IEV: available at <http://www.dke.de/DKE-IEV>

### 3.1 foot length

*l*

maximum horizontal distance from the centre of the back of the heel (maximum point of heel curve) to the end of the most prominent toe, with the subject standing with the weight of the body equally distributed on both feet, barefoot or wearing thin hose that does not significantly affect the dimensions of the foot

[SOURCE: ISO/TS 19408:2015, 2.1.4, modified — Notes have been deleted]

### 3.2 effective shoe length effective last length

*s*

foot length (*l*) plus a toe allowance (*f*)

**3.3****absolute shoe length***a*

sum of effective shoe length and design allowance

**3.4****toe allowance***f*

addition to the foot length which is necessary to accommodate the dynamic functioning of the foot

[SOURCE: ISO/TS 19408:2015, 2.2.16, modified — “the” has been removed from definition, Note has been deleted]

**3.5****design allowance***g*

additional aesthetic allowance to the effective shoe length added to the forefoot area of the last

[SOURCE: ISO/TS 19408:2015, 2.1.2, modified — “aesthetic” has been added]

**3.6****feather line***n*

perimeter (edge) of the bottom pattern of the last

[SOURCE: ISO/TS 19408:2015, 2.2.4]

**3.7****stick width of the foot***c*

perpendicular distance between the first metatarsal head and the fifth metatarsal head

[SOURCE: ISO/TS 19408:2015, 2.1.13, modified — “(or linear width)” has been removed from the term, Notes have been deleted]

**3.8****anatomic ball width***a<sub>bw</sub>*

maximum orthogonal distance between the outside swell of the medial ball and outside swell of the lateral ball of the last/shoe

**3.9****anatomic ball girth***a<sub>bg</sub>*

circumference of the last in a vertical plane around the outside swell of the medial ball and outside swell of the lateral ball of the last/shoe

**3.10****technical ball girth***t<sub>bg</sub>*

girth of the last crossing 3 measuring points

Note 1 to entry: Two points at the inside and outside of the last are following the golden section. The third point, located at the last top by 22,5° to the vertical plane right through the other two points, leaned to the last top.

### 3.11 instep height

$Z_{1h}$

distance between the highest point by 50 % of foot length and the ground

Note 1 to entry: When measuring a last or shoe, the heel height is to be considered. When a last or shoe is compared to a foot, the heel height is also to be considered for the foot.

### 3.12 instep girth

$Z_1$

girth through the highest point by 50 % of foot length vertical to the ground

Note 1 to entry: When measuring a last or shoe, the heel height is to be considered. When a last or shoe is compared to a foot, the heel height is also to be considered for the foot.

### 3.13 toe height

$t_h$

largest height of toes on toe nail segment

### 3.14 last toe height

$p$

maximum distance between the last bottom and the upper surface of the last measured on a line perpendicular to the last bottom plane and at the effective last length

[SOURCE: ISO/TS 19408:2015, 2.2.12, modified — “the” has been removed from definition, Note has been deleted]

### 3.15 tread width of heel

$q$

distance,  $q$ , between the two points marked concerning heel width

[SOURCE: ISO/TS 19408:2015, 2.2.8.1, modified — Note has been deleted]

### 3.16 linear width of heel

$r$

distance,  $r$ , between the lateral and medial points following the contour of the surface of the bottom

Note 1 to entry: Measured by extending the line concerning up to the maximum swell of the heel part.

[SOURCE: ISO/TS 19408:2015, 2.2.8.2, modified — Note 2 has been deleted]

### 3.17 ankle girth

$i$

smallest horizontal girth,  $i$ , at the lower leg over the malleolus

[SOURCE: ISO/TS 19408:2015, 2.1.17, modified — “the” has been removed from definition, Note has been deleted]

**3.18****long heel girth of foot** $t_2$ 

circumference around the foot passing through the point at the back of the heel where the foot just touches the ground on which the foot stands and the instep point of foot

[SOURCE: ISO/TS 19408:2015, 2.1.16, modified — Note has been deleted]

**3.19****heel height of shoe** $h_h$ 

vertical height of the extreme rear end of the heel of the shoe down to the ground plane ( $h + s_{th}$ )

[SOURCE: ISO/TS 19408:2015, 2.1.5, modified — Formula has been added and notes have been deleted]

**3.20****heel height of last** $h$ 

vertical distance between the underside of the extreme end of the last and the ground plane with the last in its normal orientation

[SOURCE: ISO/TS 19408:2015, 2.2.6, modified — additional term “technical heel height” and Note has been deleted]

**3.21****max heel curve** $a$ 

distance of heel point to touching point defining the maximum heel curvature as the profile line of the heel part of the lasts

**3.22****last toe spring** $k$ 

distance between the front edge of the last and the floor when the last is at the correct heel height

**3.23****calf girth** $u$ 

maximum horizontal girth,  $u$ , in the calf area of lower leg

[SOURCE: ISO/TS 19408:2015, 2.1.18, modified — “the” has been removed from definition, Note has been deleted]

**3.24****under knee girth** $w$ 

smallest horizontal girth,  $w$ , below the knee and above calf

[SOURCE: ISO/TS 19408:2015, 2.1.19, modified — “the” has been removed from definition, Note has been deleted]

### 3.25

#### short heel girth of foot

$t_1$

shortest circumference, around the foot passing through the point at the back of the heel where the foot just touches surface on which the foot stands

[SOURCE: ISO/TS 19408:2015, 2.1.20, modified — Note has been deleted]

### 3.26

#### tread width of foot (ball area)

$b$

distance  $b$  between the maximum swell of the first metatarsal as a point of the foot line touching the ground and the maximum swell of the fifth metatarsal as a point of the foot line touching the ground

[SOURCE: ISO/TS 19408:2015, 2.1.15, modified — Term was slightly modified and note has been deleted, “the” has been removed from definition]

### 3.27

#### big toe angle

$b_{ta}$

angle between a tangent touching the big toe medial and the first metatarsal bone and a tangent touching the heel and the first metatarsal bone

### 3.28

#### upper height

$u_h$

vertical height between the cross section of the lowest point of the heel curve of the upper and the shoe feather line and the highest point of upper along the heel curve

### 3.29

#### last height

$l_h$

vertical height of the heel curve, profile line of the heel part of the lasts

### 3.30

#### sole thickness of ball area

$s_{tb}$

distance of the sole between the inside and outside in the ball area

### 3.31

#### sole thickness of heel area

$s_{th}$

distance of the sole between the inside and outside in the heel area

### 3.32

#### linear width of foot (of last/shoe)

$o$

maximum horizontal distance between the outside swell of the medial anatomical ball and outside swell of the lateral anatomical ball of the last/shoe

[SOURCE: ISO/TS 19408:2015, 2.1.10, modified — Content was adapted to the needs of this document]

### 3.33

#### arch height

$a_h$

maximum height of the arch on the inside of the foot at about 33 % foot length