

# ISO 13473-1:2019 The MPD standard:

## Notes about issues that may have uncertain interpretations

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### Background

When Mr Peter Andrén wrote the software code for this standard, he noticed some details which may be interpreted in more than one way or which were not absolutely clear. These are listed below with the purpose to clarify them when the next revision takes place.

### Important issues

**Segment length:** In the definition, segment length is stated as 100 mm. In most places in the standard it is indeed given as 100 mm (without any tolerance). But in 7.7 and in Figure A.4 it is given as 100 mm  $\pm$  10 mm. This is inconsistent. Mr Andrén's calculations have indicated that a profile with MPD of around 2.5 mm, may be calculated as 2.4 mm for 90 mm segment length and as 2.6 mm at 110 mm segment length. This variation is not acceptable.

This was probably decided to be able to test circular laboratory samples with a diameter of 100 mm.

However, we think that in most, if not all, applications by users, segment length will be set as 100 mm; thus, the uncertainty due to this will in practice be negligible.

Proposal: Consistently write that segment length shall be 100 mm.

**Minimum number of MSD:s in an MPD measurement:** It is never specified how many mean segments depth values (MSD) that must be included in an MPD calculation to be considered acceptable. If one measures (say) 100 m, it could in principle happen that only one MSD value (out of 1000) is considered acceptable (given the requirements for drop outs and spikes, for example on a glossy new porous asphalt surface) and this may be accepted as the MPD value of these 100 m. This would apply to Clause 7.10.

Proposal: At least 50 % of the MSD values are acceptable in order to consider the MPD as acceptable.

### Less important issues

**Spike removal # 1:** In E.1 it reads "The criterion (E.1) is checked for all the data points  $i$  of the profiles. After this, the procedure shall be repeated but done in the reverse direction."

Problem: When shall the spike be replaced with its "proxy" value; in the forward direction and then in the reverse direction, or shall it be made after both directions have been checked? Results may differ according to this.

Proposal: First identify the spikes in forward and reverse direction and then remove them.

**Spike removal # 2:** In Fig. E.3, the last point (X = 10) is somewhat higher than the second last point.

**Problem:** It should be the same Y value for the last as for the second last points. This is probably something that was incorrectly drawn by the ISO illustrations officer. The problem is not important but may be confusing to somebody.

**Proposal:** Redraw the figure.

**Filtering:** In 7.6 it reads "The filtering shall neglect the first and the last segments of the profile curve. As an alternative, one can extend the profile curve by mirroring the first and the last segments."

**Proposal:** Use the second option as default.

**Drop-out #1:** In 7.3 it reads "When the invalid sample(s) constitute(s) the beginning or the end of a sampled profile, the invalid samples shall be replaced by the value of the nearest valid sample. This method of extrapolation shall be limited to a maximum length at either side of the sampled profile data series equal to 5 mm."

**Problem:** It does not say what one shall do if there is 5 mm or more of drop-out at the ends.

**Proposal:** Write that such segments shall be disregarded.

**Drop-out #2:** At the end of 7.3 it reads "Profiles with loss of data due to drop-out greater than 10 % (of the total number of readings) shall be discarded."

**Problem:** It is not totally clear what "Profiles" mean here, although the most natural interpretation would be that it is the total profile that is used for MPD calculation.

**Proposal:** Replace "Profiles" with "Segments". Replace "readings" with "samples".

**Test report:** In Clause 10 it reads that one shall report the following:

- "type of interpolation", but only linear interpolation is allowed.
- "whether or not spike removal procedure was applied", but in the text it reads "Spike removal shall be performed"
- "type and order of filters used", but in the text it reads "Therefore, no filter other than the one required here shall be used"

**Proposal:** Delete these phrases.

**Misprint in Annex D:** There is an error in D3.7. The last term (link to a previous Clause) should read 7.9, not 7.10.