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Impact of using a metal sheet as an "alternative substrate for ISO 12863" on SE performance

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Objective of the study

To demonstrate the impact of using a thin metal steel sheet instead of 10 Layers of filter papers for testing the SE performance according ISO 12863.

Statement given by NIST:

“NIST has shown that a substrate consisting of a thin metal sheet with a single layer of filter paper produces ignition propensity data very similar to the prescribed substrate consisting of 10 layers of Whatman No.2 filter paper.”

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Outcome of Study conducted by NIST, engineering laboratory

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- Different “thermally” thick and thin materials have been tested.
- Metal specimens from 3 manufacturers gave similar results in physical testing.
- Metal specimens recommendation: 0,2mm – 302 stainless steel
- These metal and one layer of paper results were not very sensitive to the filter paper from different manufacturers
- *The 0,2mm – 302 stainless steel sheet with one layer of filter paper gave test results close to the original Whatman No.2*

from Dr. Richard. Gann, Ph.D.

Proposal for an ILS given by NIST

- The Inter-laboratory Study was defined in 3 different rounds:

Round 1:

5 sets of 40 determinations using SRM 1082 with Whatman No.2 filter papers

Round 2:

5 sets of 40 determinations using a set of “additional cigarette designs” with results between 10% and 50% Full Length Burn and an assigned brand of filter paper.

Round 3:

5 sets of 20 determinations using SRM (Reference Cig.NIST) and additional cigarettes. 2 brands of filter paper.

- Expected timeline: January 2013 – May 2013

Internal Study performed by delfortgroup/Wattenspapier

- Due to the limited information of the provided study report by NIST we performed an internal study with a similar proposal as given by Dr.Gann
- Study design:

1. Materials used:
    a. Filter paper
    b. Metal specimens
    c. Cigarette samples
2. Test setup
3. Results

- Conclusions

Materials used – Filter paper

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- SE performance has been evaluated in accordance to ISO 12863
- ISO 12863 allows to use an alternative substrate to determine the SE performance of a cigarette

- Whatman No.2
- LIPCan (Tesorb 97g/m²)

Materials used – Metal specimens

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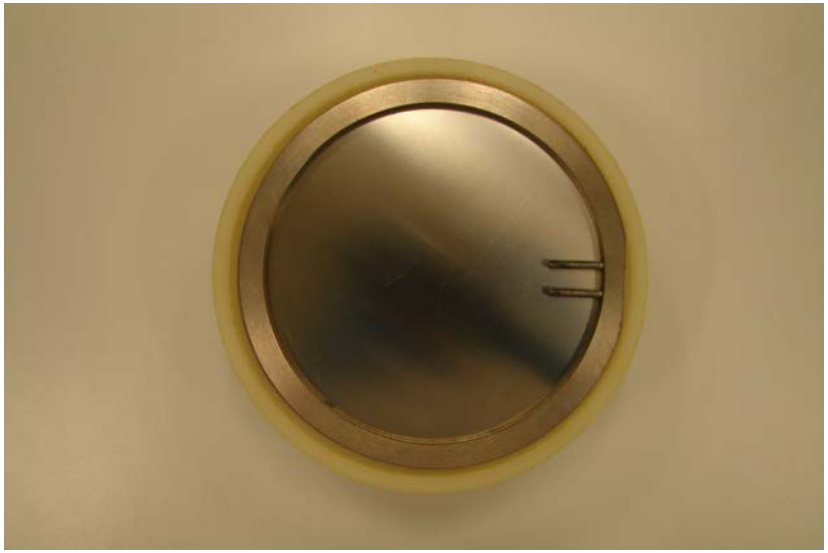
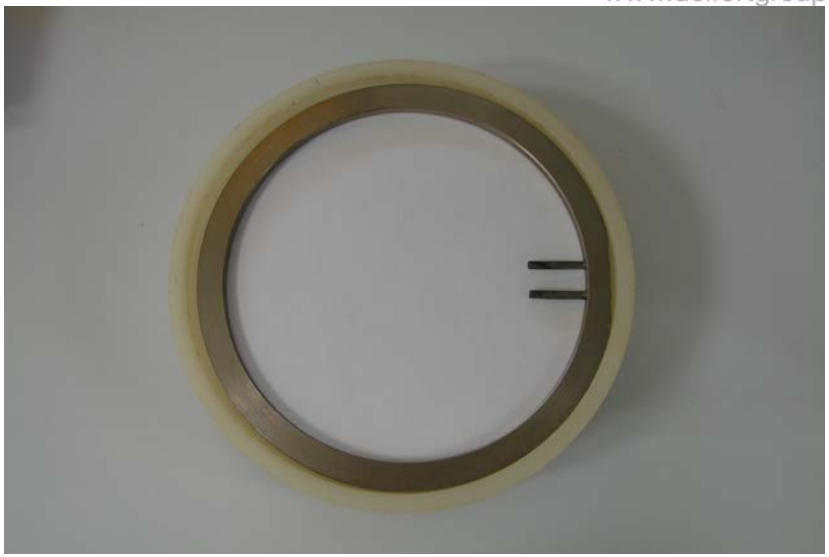
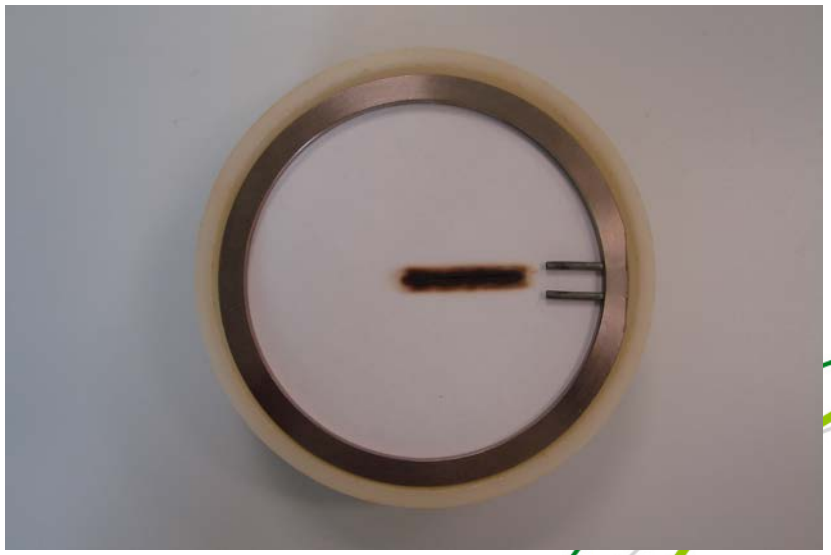
- Nominated prime candidate by NIST: 0,2mm – 302 stainless steel metal sheet
- Limited availability of 302 stainless steel in Europe
- Good Interchangeability between 302 and 304 stainless steel material
- Stainless steel 304, like 302 has good mechanical properties and corrosion resistance. No significant difference in heat conductivity. (<1%).
- 0,2mm – 304 stainless steel metal sheet was used in this study

Materials used – Metal specimens







Materials used – Cigarette samples

- 2 different cigarette samples
- To have a more detailed focus on the impact of a metal sheet, compared to the filter papers we have also included the CORESTA Monitor TP No.7 in this study.
- The CORESTA Monitor TP No.7 is a non LIP “Cigarette” sample.
- The cigarette paper applied for this monitor doesn’t have bands or any other technology which refers to a comparable LIP product
- This monitor is produced with a regular base sheet paper
- The LIP brand chosen is one main brand from the market (75CU - 6/18mm - 0,05cm/s)

Test setup

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Sample	Product	Replicates	N-LIP/LIP	Filter paper	Layers	Steel substrate
1A	CM7-TP	2	N-LIP	Whatman No.2	10	X
1B	CM7-TP	2	N-LIP	LIPCan	10	X
1C	LIP Brand	2	LIP	Whatman No.2	10	X
1D	LIP Brand	2	LIP	LIPCan	10	X
2A	CM7-TP	3	N-LIP	Whatman No.2	1	304 metal sheet
2B	CM7-TP	3	N-LIP	LIPCan	1	304 metal sheet
2C	LIP Brand	3	LIP	Whatman No.2	1	304 metal sheet
2D	LIP Brand	3	LIP	LIPCan	1	304 metal sheet

Results

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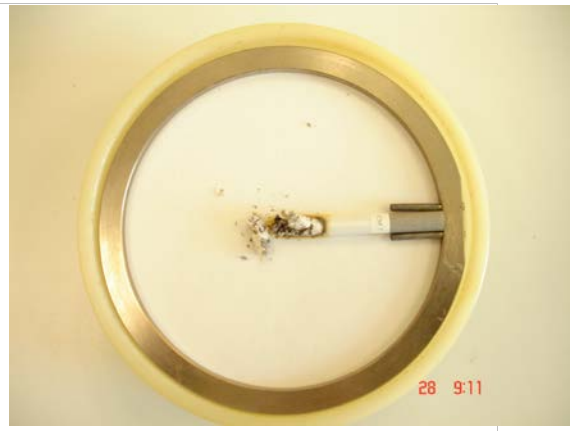
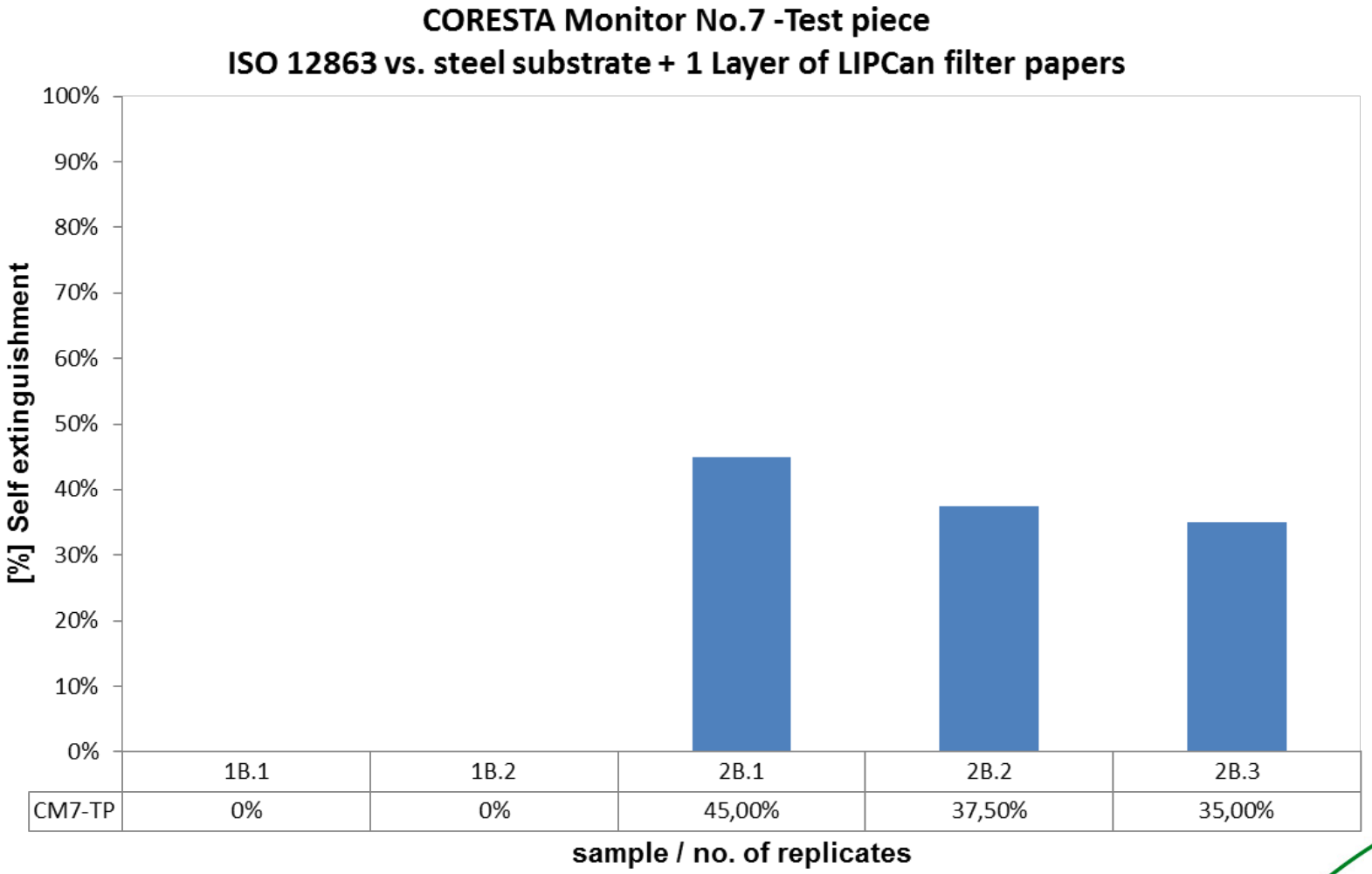
CORESTA Monitor No.7 -Test piece
ISO 12863 vs. steel substrate + 1 Layer of Whatman No.2 filter papers



Results



Results

Conclusions

- A non-LIP cigarette sample, old design, will also pass the test with the metal plate.
- Contradiction with the aims of the regulators, who consider the old design dangerous in relation to fire caused by these cigarettes.
- This effect is not comparable to the actual oxygen transfer through the filter paper, as any cigarette would self extinguish on a metal sheet.

➔ The best option would be to stay with the existing test method, using 10 layers of substrate.

➔ ISO method dedicates testing on 10, 5 & 3 layers of filter paper. Test becomes progressively more difficult to “pass” as number of layers are reduced.

➔ A metal sheet with using 1 layer of filter paper allows for NON-LIP cigarettes to pass the test too!

Questions?