

# Mechanical resistance study of internal surfaces of silencers in a ventilation system

## Introduction

The purpose of this project was to test the brush cleaning durability of two different noise dampening insulation materials:

- Airfelt polyester
- Isover glass wool ISOTEC Climlinder SLAB CLEANTEC with glass fibre fabric.

For this purpose, the test materials were exposed to a rotating wire-nylon brush of type commonly used for cleaning ventilation pipes. The effects that brush abrasion had upon the test samples was assessed by analyzing photographs, performing visual inspections, and using a scanning electron microscope.

The external housings of the silencers tested are manufactured from hot-zinc steel, with rubber gasketed inlet and outlet flanges.



Photo 1. Tested products NTF 160-1000, NTFA 160-1000, NTP 160-1000, NTPA 160-1000 and NKE 160-1000

## Testing

For testing, a rotating wire-nylon brush (Photo 2) and power drill were used at maximum rpm. The wear resistance of the test materials was assessed after 1, 5 and 10 cycles of back-and-forth brushing. The rotation of the brush was reversed when it reached the internal end of the silencer.



Photo 2. Wire-nylon (Ø160 mm) rotating cleaning brush used in the test

## Test Results

### Silencer based on Airfelt polyester

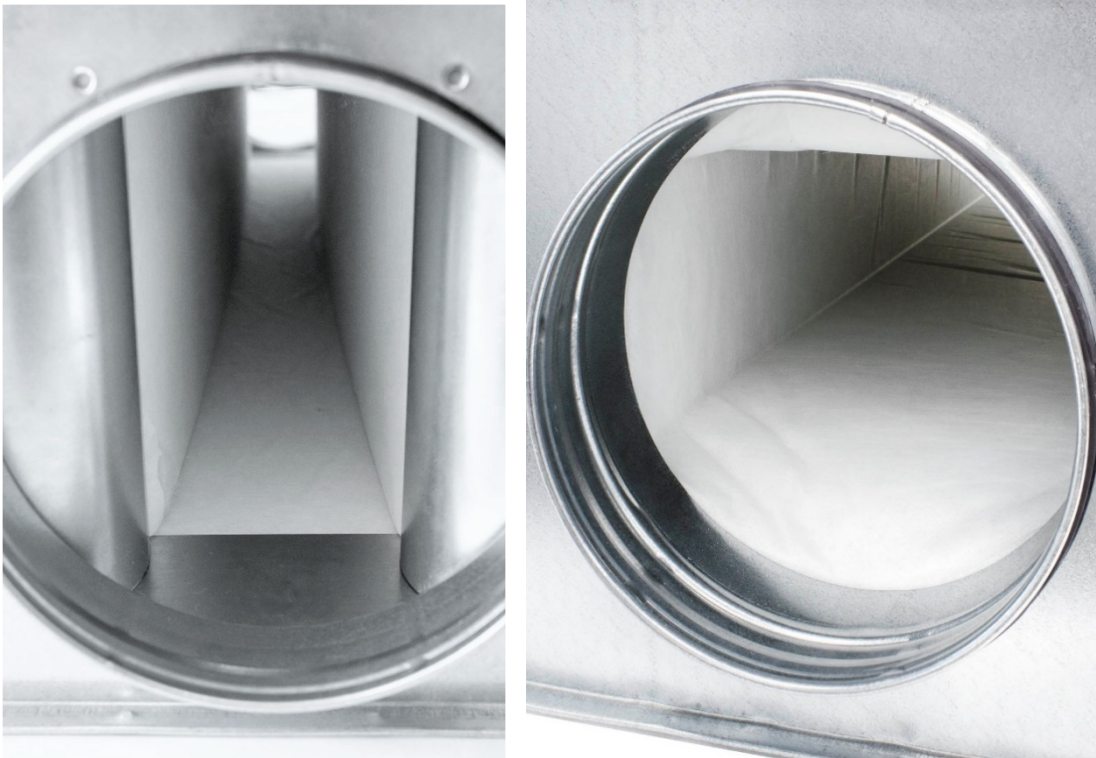


Photo 3. Tested products NTP 160-1000, NTPA 160-1000 and NKE 160-1000 silencers with Airfelt polyester surface finishing

Photographic review of the polyester-based silencer revealed surface wear resistance to a minimum of ten brushing cycles (Photo 4).

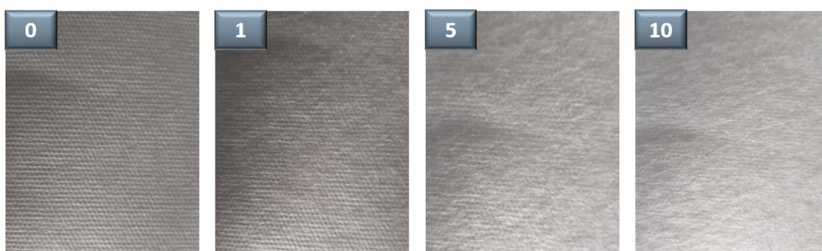


Photo 4. Photos of the Airfelt polyester. The figure in the upper corner indicates the number of treatments cycles performed.

By inspecting the polyester-based silencer insulation surface material with the scanning electron microscope prior to testing, it was noted that the polyester felt surface material was attached to its base layer with a thermal treatment, wherein pressure and heat had been applied, resulting in smooth areas between the fibres. After each brushing cycle it can be seen by visual inspection and photographs that the fabric structure integrity was maintained even after 50 brushing cycles, indicating very good durability of the material.

## A silencer based on Isover glass wool



Photo 5. Tested products NTF 160-1000 and NTFA 160-1000 silencers with Isover CLEANTEC surface finishing

Photographic review of the ISOVER Climlinder SLAB CLEANTEC glass fibre based silencer revealed surface wear resistance up to a maximum of ten brushing cycles. Namely there are no major changes in the fabric structure of the material.

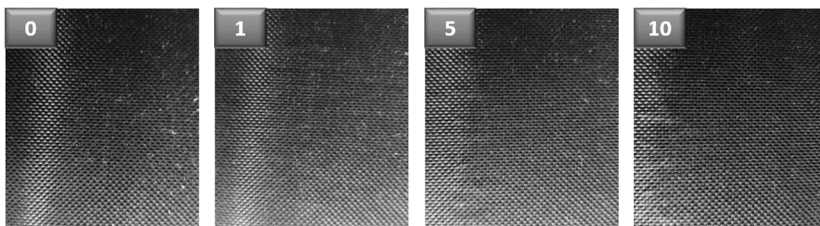


Photo 6. Photos of the rock wool. The figure in the upper corner indicates the number of treatments cycles performed.

By inspecting the ISOVER Climlinder SLAB CLEANTEC glass fibre based silencer surface material with the scanning electron microscope prior to testing, it was noted that the material was a tightly woven glass fibre fabric. After each brushing cycle, it can be seen by visual inspection and photographs that the fabric structure integrity was also maintained after brushing 10 times, indicating very good durability of the material.



## Summary

The durability of silencer noise dampening insulation materials was examined in the scope of this project. No visual surface damage was observed with either of the materials tested after the tenth brushing procedure.

It can therefore be concluded that the life of the silencer is at least 50 years, provided the pipe cleaning cycle is 5 years.

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Urmas Hiie

Member of the Management Board