



PROJECT MIDWOR-LIFE Deliverable A1.1.

Report on the study of textile materials, DWOR finishing and alternatives



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¹ **Nature of Deliverable:** P= Prototype, R= Report, S= Specification, T= Tool, O= Other.

² **Dissemination level:** PU = Public, RE = Restricted to a group of the specified Consortium, PP = Restricted to other program participants (including Commission Services), CO= Confidential, only for members of the Consortium (including the Commission Services)



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0. Introduction

This document contains the results of **Action A.1 Selection of most representative textile materials and finishing technologies** which objective was to identify and select the different textile materials and finishing technologies and products which will be employed in the project. This action is divided into three tasks which are the textile materials selection, the finishing technologies selection and a survey on textile companies (results and results' analysis on the survey are presented at deliverable **A1.2 Report on the results of the survey**).

As results of **Action A.1**, 2 conventional long chain fluorocarbon based DWOR have been selected; 7 alternative DWOR products have been identified and selected and 5 textile fabrics of different composition, structure and weight have been selected.

Action A.1 has been developed from September'15 to March'16, coordinated by AEI TÈXTIL and with the collaboration of LEITAT, CLUTEX and CS-POINTEX.



1. Selection of DWORs

Conventional DWORs

The most used products based on C-8 fluorocarbons have been studied, and finally two different products have been selected. They are the most used by the companies surveyed and their chemistry can be described as perfluorinated acrylate copolymers.

Alternative DWORs

Regarding DWOR finishing, the tendency is to replace the C8 fluorocarbon chemistry by C6 or C4 fluorocarbon products or even fluorine-free water repellents. In fact, currently, new commercial DWOR finishes are coming onto the market based on short chain fluorocarbons, hybrid systems or they are fluorine free.

Research on different conventional DWORs alternatives has been done, and as a result the following technologies have been identified and selected:

- **Short-chain fluorinated DWORs (C-6):** This technology is the most widely used in industry. The survey results show that two products (C6_B a C6_C) are the most used, and they were selected. By the experience of Leitat and contact with finishers, it was observed that other typical finishes on short-chain fluorocarbons are the products C6_A and C6_D. It is interesting to clarify, that other solutions with C4 chemistries have not been selected because of its lower repellency.

Other alternatives have been selected due to the interest from companies to be studied in the project and due the state of the art done. Three products have been selected, one per each alternative technology that seems to be an alternative on the future.

- **Perfluorosilicones:** the product PFSi has been selected. It combines two technologies, fluorocarbon (C-6) and silicone, and it delivers to the fabrics the advantages of the two chemistries.
- **Sol-gel:** Leitat has experience in sol-gel technology and suggested to work with the selected product (Sol-gel) because it is one of the most used at commercial level, with good performance. It is completely fluorine-free.
- **Silicone:** a silicone based product (Si) has been selected. It is completely fluorine-free, and it seems one of the most innovative solutions of the FC-free alternatives. Although it is not a real alternative to fluorocarbon based products, in terms of performance, it was selected due to the innovations and interest showed by the company.



In the following table, the selection of conventional and alternative DWORs is presented:

Table 1. Products selection summary

Reference	Category	Chemistry	Comments
C8_A	CONVENTIONAL	Long-chain fluorocarbon (C-8)	-
C8_B	CONVENTIONAL	Long-chain fluorocarbon (C-8)	-
C6_A	ALTERNATIVE	Short-chain fluorocarbon (C-6)	PFOA-free
C6_B	ALTERNATIVE	Short-chain fluorocarbon (C-6)	PFOA-free. Nano-dispersion of fluoropolymer
C6_C	ALTERNATIVE	Short-chain fluorocarbon (C-6)	PFOA-free dendrimer and 3D hyperbranched polymer
C6_D	ALTERNATIVE	Short-chain fluorocarbon (C-6)	PFOA-free
Sol-gel	ALTERNATIVE	Sol-gel	Sol-gel without fluorine. PFOA-Free
PFSi	ALTERNATIVE	Perfluorosilicone	Structured coating: C6 + silicone
Si	ALTERNATIVE	Silicone	Completely Fluor-free

2. Selection of fabrics

A list of different fabric references has been revised in order to select the most representatives according to the different sectors that are interested in water and oil repellence such as automotive, sport, fashion, work wear and home textiles.

The final selection of 5 representative fabrics is the following (in colour). Note that there are 9 different fabrics pre-selected in order to avoid possible difficulties in acquiring:

Table 2. Fabrics selection summary

Reference	Weight	Composition	Sector
1	230 g/m ²	100% PES	Automotive
2	220 g/m ²	90% PA / 10% EI	Sport (cycling)
3	195 g/m ²	100% PES	Sport (mountain)
4	180g/m ²	100% WO	Fashion (suit)
5	175g/m ²	100% CO	Fashion (shirt)
6	170g/ m ²	65% PES / 35% CO	Fashion (trouser)
7	250 g/m ²	49% PP / 47% PES / 4%CO	Home (sofa)
8	175g/m ²	100% PES	Workwear (polo)
9	250 g/m ²	80% CO / 18% PES / 2% antistatic	Workwear (trouser)

Each fabric is a representative one of the sector studied, according to the most common characteristics used to develop them.