EURATEX
THE EUROPEAN APPAREL AND TEXTILE CONFEDERATION

EURATEX submission to ECHA consultation on the U-PFAS restriction

Input on PPE Directive Category III (l) bullet wounds or knife stabs

September 2023

Relating to restriction proposal's Annex E, table E. 13[1] and the conclusion that 'no PFAS required'.

		knife stabs		fabrics need to be used.
(National) ballistics standards/riot suits[24]	• National standards such as BS7971-10 & protection against Molotov cocktails[25] and other accidental risks.	III(l) *bullet wounds or knife stabs*	PFASs not required	If the bullet proof Kevlar (aramid) garment gets wet, it does not work. This means that an effective durable water repellent (DWR) treatment with non-PFAS should be sufficient.

The rationale is correct that only water repellent treatments of the para-aramid are necessary, and this for 2 reasons:
-moisture present in between the multilayer para-aramid textile layers can act as a lubricant for an impacting heated bullet
-para-aramids have very high mechanical (tensile) strength but are susceptible to hydrolysis (depolymerization) which causes a drastically drop in tensile strength, hence the protection level

There is a list of PFAS alternatives in E.2.2.2.1 and table E12 of Annex E. The composition of ballistic and/or stab resistant vests can be very complex. To date it has not been proven that these PFAS alternatives on itself cannot have a lubricating effect on penetrating heated bullets or knifes.

As per PPE Regulation EU 2016/425, the manufacturer of (soft) 'body armour' vests must sign a DOC (Declaration of Conformity) by which they take full responsibility that the produced and delivered PPE meets the identified requirements and is identical to the Module B certified product and technical file.

Typically for body armour, (public) procurers and end users ask for 10 – 15 years of warranty!

Another end use of para-aramids is in Firefighting PPE, where a mixture of 60% Para-aramid (for it high mechanical strength) and 40% PBI (for it is high LOI = Limited Oxigen Index; but lower mechanical strength). The study of Saiful Hoque et al (Univ. Of Alberta) has identified that PBI has a sulphur residue which in combination with moisture creates an acid, which attacks the para-aramid (hydrolysis) lowering it mechanical strength (even more important/critical for ballistic applications). To date it has not been proven that these PFAS alternatives cannot cause hydrolysis of para-aramids over time (taking into account 10 – 15 years of warranty).

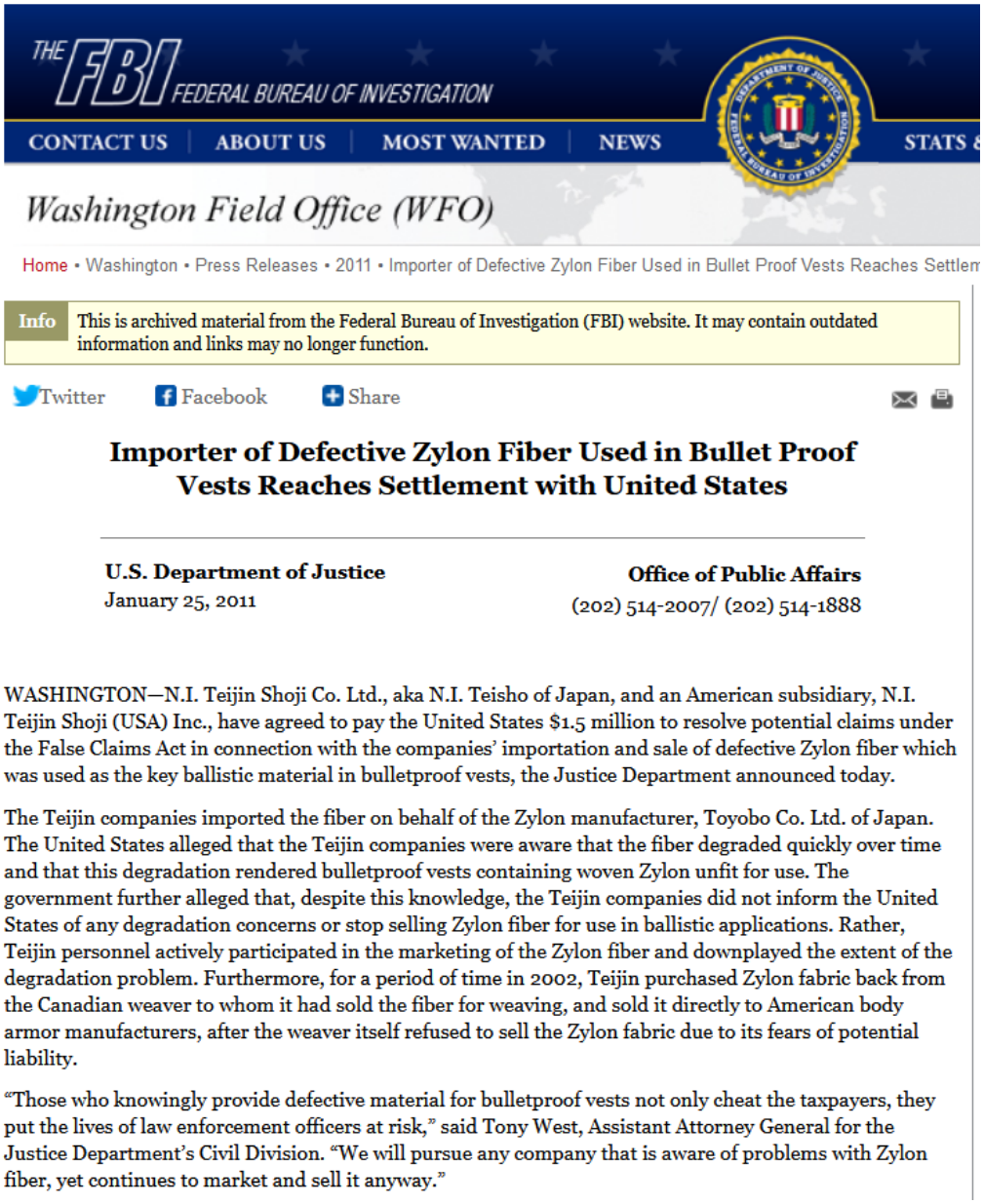
[1] U-PFAS restriction proposal, Annex E - https://echa.europa.eu/documents/10162/57812f19-8c98-ee67-b70f-6e8a51fe77e5, page 30

5 | CONCLUSION

This study investigates the effect of a generally unnoticed hazard, that is, hydrothermal conditions, on the mechanical performance and water repellency of eight fire-protective fabrics of different fiber contents. A larger loss in the Fabric strength was observed for the para-aramid/PBI-based fabrics studied compared to the meta-aramid-containing fabrics. It was attributed to the higher sensitivity of para-aramid fibers to hydrolysis compared to meta-aramid fibers. Furthermore, EDX analysis revealed a higher amount of sulfur in the para-aramid/PBI-based fabrics, which was mainly attributed to the PBI fibers. This larger amount of sulfur in the para-aramid/PBI fabrics, which is possibly a residue of the PBI fiber spinning process, is believed to be responsible for the larger loss in the mechanical performance observed in the para-aramid/PBI fabrics when exposed to hydrothermal aging, leading to an accelerated hydrolysis of the para-aramid fibers in acidic conditions.

On the other hand, no morphological changes were observed at the microscopic level, even for the fabrics exhibiting a large loss in mechanical performance after exposure to hydrothermal aging. For their part, the water contact angle and liquid absorbency capacity test results hint toward a degradation of the water-repellent finish for some fabrics as a result of hydrothermal aging. A

The sensitivity of this potential issue is illustrated by below case with another fibre PBO of Zylon.
https://archives.fbi.gov/archives/washingtondc/press-releases/2011/wfo012511.htm



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Importer of Defective Zylon Fiber Used in Bullet Proof Vests Reaches Settlement with United States

U.S. Department of Justice
January 25, 2011

Office of Public Affairs
(202) 514-2007/ (202) 514-1888

WASHINGTON—N.I. Teijin Shoji Co. Ltd., aka N.I. Teisho of Japan, and an American subsidiary, N.I. Teijin Shoji (USA) Inc., have agreed to pay the United States $1.5 million to resolve potential claims under the False Claims Act in connection with the companies' importation and sale of defective Zylon fiber which was used as the key ballistic material in bulletproof vests, the Justice Department announced today.

The Teijin companies imported the fiber on behalf of the Zylon manufacturer, Toyobo Co. Ltd. of Japan. The United States alleged that the Teijin companies were aware that the fiber degraded quickly over time and that this degradation rendered bulletproof vests containing woven Zylon unfit for use. The government further alleged that, despite this knowledge, the Teijin companies did not inform the United States of any degradation concerns or stop selling Zylon fiber for use in ballistic applications. Rather, Teijin personnel actively participated in the marketing of the Zylon fiber and downplayed the extent of the degradation problem. Furthermore, for a period of time in 2002, Teijin purchased Zylon fabric back from the Canadian weaver to whom it had sold the fiber for weaving, and sold it directly to American body armor manufacturers, after the weaver itself refused to sell the Zylon fabric due to its fears of potential liability.

"Those who knowingly provide defective material for bulletproof vests not only cheat the taxpayers, they put the lives of law enforcement officers at risk," said Tony West, Assistant Attorney General for the Justice Department's Civil Division. "We will pursue any company that is aware of problems with Zylon fiber, yet continues to market and sell it anyway."

For combined protection against bullets and knifes, a certain stiffness is incorporated into the multilayer protective pack; but at the same time it's important the layers can 'glide' freely over one another for the knife resistance. Cases are known where these layers start to stick to one another after 5, 6, 7 years… To date it has not been proven that these PFAS alternatives don't have a worse effect on this.

The guidelines of PPE EU Regulation 2016/425 says that manufacturers cannot be expected to use solutions which are still at the research stage or technical means that are not generally available on the market.

Preliminary Remark 3 – "state of the art"

The notion of "state of the art" is not defined as such in the PPE Regulation. However, it is clear from Preliminary Remark 3 that the notion of the "state of the art" includes both technical and economic aspects. In order to correspond to the "state of the art", the technical solutions adopted to fulfil the EHSRs must employ the most effective technical means that are available at the time for a cost which is reasonable taking account of the seriousness of the harm the risk reduction is required to address.

It may not always be possible to satisfy certain EHSRs fully, given the current "state of the art". In such cases, the PPE manufacturer must strive to fulfil the objectives set out in the EHSRs to the greatest extent possible.

Manufacturers of PPE cannot be expected to use solutions that are still at the research stage or technical means that are not generally available on the market. On the other hand, they must take account of technical progress and adopt the most effective technical solutions that are appropriate to the PPE concerned when they become available for a reasonable cost.

The "state of the art" is thus a dynamic concept: the "state of the art" evolves when more effective technical means become available or when their relative cost diminishes. Thus a technical solution that is considered to satisfy the EHSRs of the Regulation at a given time may be considered inadequate at a later time, if the state of the art has evolved. Usually, harmonised European standards are taken as a reference to define the "state of the art" at a done moment.

A PPE manufacturer can only take account of the "state of the art" at the time the PPE is