Ansell

PARAMETERS INFLUENCING PPE FOR PROTECTION AGAINST HAZARDOUS SUBSTANCES

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INTRODUCTION

Hazardous substances interact with chemical PPE in 3 key ways: Penetration, Degradation and Permeation. Each of these 3 aspects can individually, or as part of a combination, effect the efficacy of protection and must be taken into account when asking questions such as “How long can I wear this piece of PPE?“ or “Can I reuse the PPE after it has been exposed to a chemical?“

Getting answers to these questions can often be daunting given the level of data required and the implications of specifying incorrect PPE. The aspects discussed within this guide aim to shed light on each of these processes and how the data Ansell would provide aid in the specification of correct PPE.

> **“A CHEMICAL PPE‘S ABILITY TO PROTECT IS DEPENDENT ON A NUMBER OF VARIABLES, OF WHICH TIME CONSTRAINTS ARE ONLY ONE OF THEM.”**

PROPERTIES OF CHEMICALS

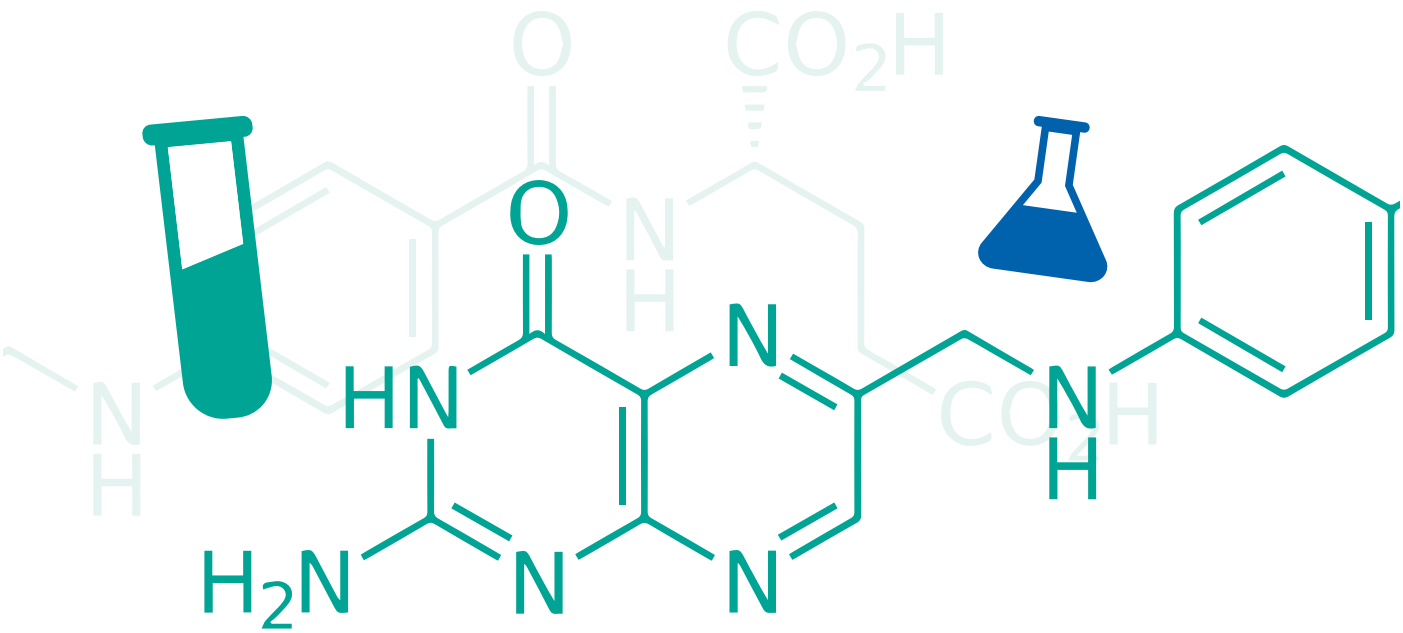
> **"CHEMICAL PPE WILL BEHAVE DIFFERENTLY DEPENDING ON THE NATURE AND MAKEUP OF THE CHEMICAL"**

The performance level of a piece of chemical PPE will depend on:

THE RUBBER POLYMER OR PLASTIC LAMINATE MAKEUP OF THE PRODUCT AND THE NATURE OF THE CHEMICALS USED

Chemicals have inherent properties which result in different interactions with different chemical PPE types.

Each piece of PPE will behave differently depending on the chemical in use. A piece of PPE which has poor performance against one chemical could have excellent performance against another.



Standards such as EN ISO 374 and ASTM F739 have been put in place to assess the relative performance of different materials against interactions such as permeation and degradation. A common way to compare protective properties of materials is through the use of a breakthrough time. This refers to the time taken for the chemical to permeate the material at the rate defined within the standard. Performance against degradation is determined against how the physical properties of a PPE, which has been exposed to chemicals, differs from an unexposed sample. The performance against these interactions affects the in-application use time.

> **"THE PERFORMANCE AGAINST STANDARDISED TESTING CAN AID RISK ASSESSMENTS IN HELPING TO DEFINE THE CORRECT LEVEL OF PROTECTION."**

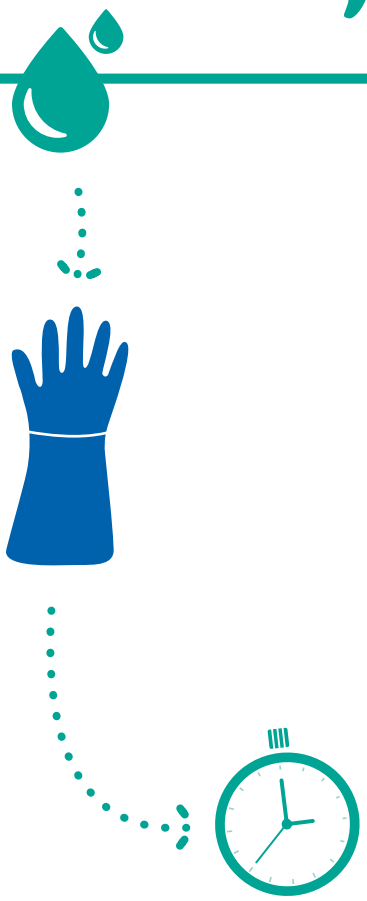
Ansell**GUARDIAN™**

AnsellGUARDIAN™ Chemical was created to house all of the chemical permeation and degradation data for Ansell's chemical PPE range. The system currently contains data for over 31,000 chemicals with many of these being chemical mixtures. AnsellGUARDIAN™ Chemical allows for comparison between materials to facilitate glove and suit selection.

> **"BY PROVIDING DATA FOR ANSELL'S CHEMICAL PROTECTIVE HAND AND BODY PROTECTION RANGE, AnsellGUARDIAN® CHEMICAL IS AN IDEAL TOOL TO AID IN THE SELECTION OF THE APPROPRIATE PPE."**

ON-SITE USE OF PROTECTIVE GLOVES AND SUITS

> **BREAKTHROUGH TIMES REFERENCE THE TIME IT TAKES FOR A CHEMICAL TO REACH THE RATE SET BY THE STANDARD AS TESTED UNDER LABORATORY CONDITIONS.**



Breakthrough time is the time taken for a chemical to permeate the material at a set rate defined by the standard under laboratory conditions. Because of this, personalised in-application conditions, which can affect the performance of the material, are not taken into account. There are various other factors such as chemical toxicity, hand and environmental temperature as well as secondary mechanical hazards which can impact the duration which a PPE can be worn for.

This understanding of additional factors which can impact performance reinforces that breakthrough time does not correspond to a “safe use“ time. Only when taking these other factors into account alongside considerations for your individual application can a wear time be determined. Wear times even for the same material will be unique and should be reviewed on a case-by-case basis.

> **AN EVALUATION OF THE WEARING TIME OF A CHEMICAL PROTECTIVE GLOVE OR SUIT SHOULD BE PERFORMED CASE-BY-CASE AND CORRESPOND TO REAL ON-SITE CONDITIONS.**

CAN I REUSE MY CHEMICAL PPE?

THE CONDITIONS OF USE

The decision to reuse chemical PPE can often be difficult due to a number of factors. Since the PPE has already been put in contact with a chemical, it is possible that it can no longer provide the same protection compared to its first-time use. After its first usage, even after washing, there is a possibility that some of the chemicals remain on the PPE and can continue to permeate through the material. This means that the chemicals can be present inside the PPE when you reuse it for a second time. This is extremely important to take into account if the chemical is toxic/ harmful in very low quantities.

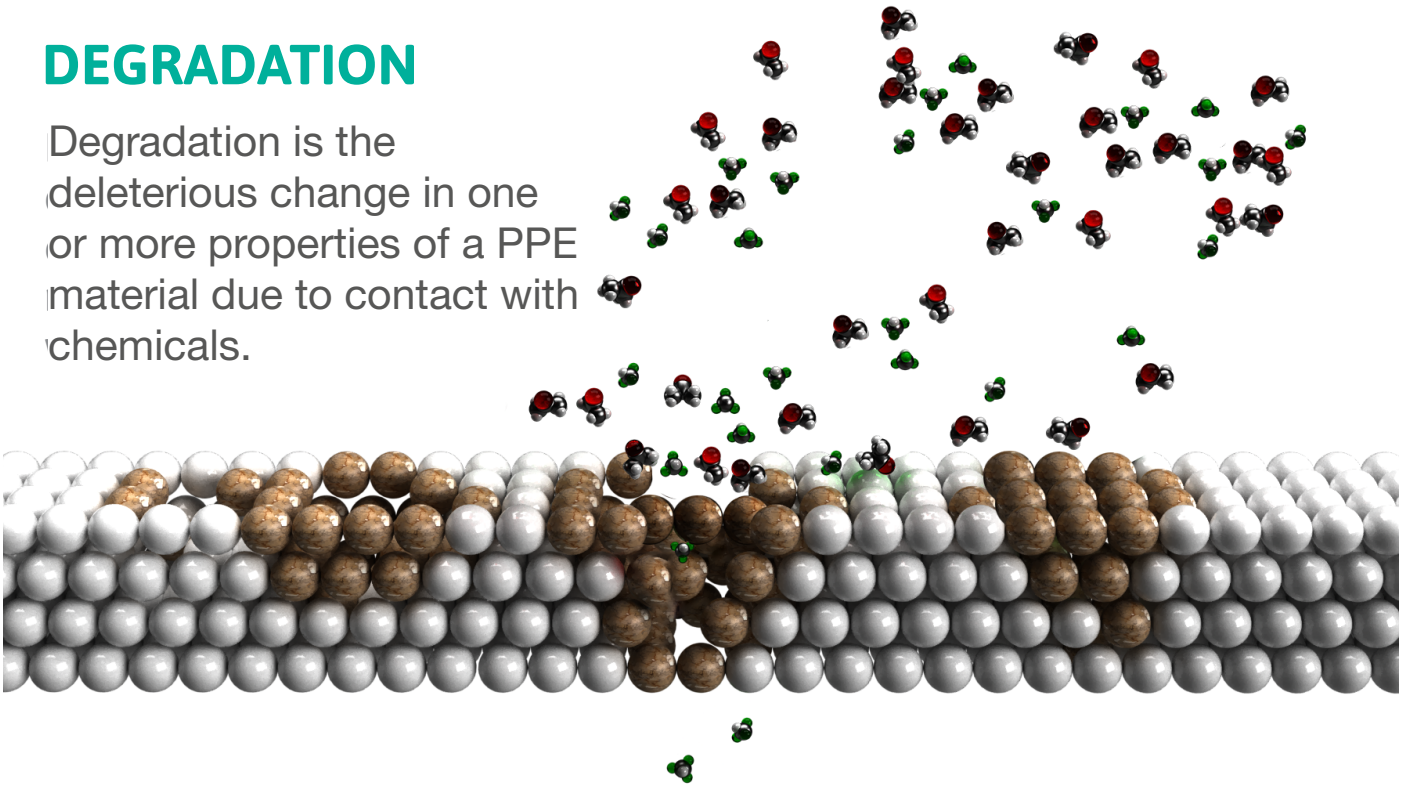
It is important to note that permeation can occur without any visual change to the PPE. Thus, visual inspection alone does not necessarily indicate the PPE is suitable for re-use.

DISCOLORATION ELONGATION BURNED HARDENED & CRACKED

Degradation is also a key factor which needs to be taken into account. Chemicals can degrade materials in many ways, all of which can potentially affect the protective properties of the PPE. Examples of degradation include discoloration, elongation, burning, hardening, and cracking. If any of these are present it is recommended that the PPE is replaced.

DEGRADATION

Degradation is the deleterious change in one or more properties of a PPE material due to contact with chemicals.

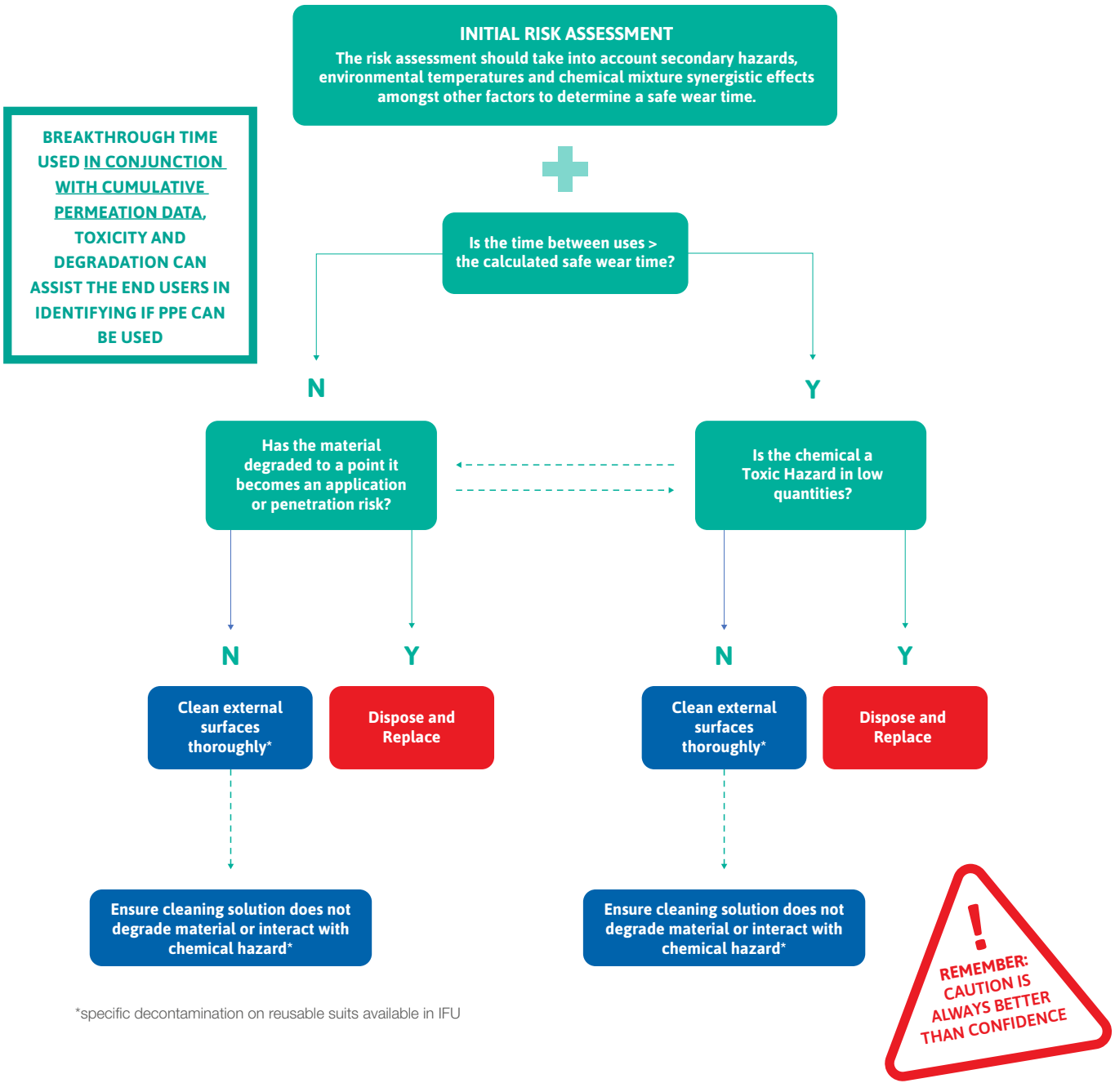


As with defining the initial protective solution, the decision to reuse is dependent on a case-bycase analysis of the application and the chemical involved.

The effects of chemical interactions should be used in conjunction with the end user's risk assessment as well as their cleaning regime.

None of these aspects should be taken in isolation and should all be considered when making the choice to reuse - even cleaning regimes use chemicals which could impact performance!

Below is a flow chart giving an overview of the considerations needed prior to deciding to reuse PPE.



*specific decontamination on reusable suits available in IFU

HOW LONG CAN I USE SINGLE USE / LIMITED USE PPE?

Single use gloves / limited use suits require all the considerations of industrial PPE as they are essentially the same product, only thinner. Thinner PPE offers greater dexterity and tactility. However, against certain chemicals, its advantages are offset by a reduction in performance against permeation and degradation.

The reduction in permeation and degradation performance, along with the toxicity of the chemicals are the key areas to focus on when determining wear times. When extended wear time is required, options such as double gloving or pairing single use gloves with support gloves such as the Ansell AlphaTec™ 02-100 Glove can be considered.

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BRIEFING