

ACOTA

- Solvent Cleaning History –
  - Recent and upcoming changes to Solvent Legislation
- Introduction to 3M Novec Engineered Fluids
  - Safety & the Environment
  - Performance
- Case Study
  - Daresbury Laboratory

# Available Solvent Cleaning Solutions

- Trichloroethylene (Trike), Methylene Chloride, Perchloroethylene
- HFC based Solvents (Vertrel, Lenium F-series, Solvokane)
- nPB (Lenium, Ensolv, Lexsol etc.)
- Aqueous
- Flammable Solvents (Isoparaffins etc.)
- HFE / HFO based Solvents

# What to consider when assessing available solutions?

- Environmental impact
- Legislative restrictions
- Operator H&S
- Ease of use
- Performance
- Cost

# Solvent Cleaning – Current Regulations & Legislations

- Solvents Emission Directive
- Chlorinated Solvents Charter
- F-gas Regulation
- REACH Regulations
  - Trichloroethylene Sunset Date
- ACGIH – nPB TLV

# Solvents Emissions Directive

The European Union Solvents Emission Directive (SED) places restrictions on the “loss of solvent to atmosphere”, especially solvents that are classified as having ‘CMR’ potential. CMR stands for ‘carcinogenic, mutagenic or toxic to reproduction’.

Solvents classed as CMRs include trichloroethylene (more commonly known as Trike) and n-Propyl Bromide (nPB), both of which have traditionally been used in cleaning applications.

## **What's the timeframe?**

The SED became mandatory on 31st October 2007.

# Solvents Emissions Directive

## **What's the impact?**

In the UK, the SED is administrated by the Health & Safety Executive, which has not placed an outright ban on CMR-classed solvents, but instead, uses the 'Risk Phrases' defined in the directive as its guide.

If less than one tonne of CMR solvents are used by a company per annum, then that solvent is exempt from SED regulation.

Many companies will exceed that amount and it can be hard to predict volume of use in advance, so solvent purchasers need to look at alternatives.

Substitution of CMRs in the shortest possible time is a requirement of the SED.

Usage must comply with the emission limit of 20mg/m<sup>3</sup>

# Chlorinated Solvents Charter



The target group for the 'Declaration of Conformity' is customers with a solvent consumption of less than 1 mt/year

## What's the timeframe?

- From 31 December 2010 onwards

## What's the impact?

- Distributors will only supply Trichloroethylene for metal cleaning to users that have signed a 'Declaration of Conformity', confirming that the product will only be used in approved closed systems.



# F-gas Regulation

The aim of these regulations is to reduce the emission of fluorinated greenhouse gases.

HFC-based cleaning solvents are affected by these regulations. In addition, the F-Gas Regulations stipulate that solvents affected by the F-Gas Regulations are re-captured (in other words, not allowed to evaporate into the atmosphere) for recycling reclamation or destruction.

- HFC, PFC and SF6 are in scope with use restrictions, and a few bans.

## **What's the timeframe?**

17 May 2006: the European commission published the **Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases.**

Revised F-gas Regulation - Official journal published on 20th May 2014 :  
**REGULATION (EU) No 517/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006 .**

# F-gas Regulation

## What's the impact?

From 4th July 2008, companies needed to start putting in place strategies to ensure that they comply with the F-Gas Regulations.

This included having qualified staff who are allowed to handle greenhouse gases identified by these regulations in place by July 4th 2009.

Chemicals affected with which users will be most familiar are HFC-4310mee and HFC-365mfc, both of which are listed in Annex 1 of the regulations.

## New points in the updated F-Gas regulation:

- HFC-23 will be prohibited from being placed on the market after January 1, 2015.
- Phase down scenario for all other HFCs (cut the use of hydrofluorocarbons (HFCs) 79% below average 2009-2012 levels by 2030.

Table 3. Reduction Schedule

Years	Maximum Quantity of HFCs (based on tonnes of CO <sub>2</sub> equivalent) That Can be Placed in the Market
2015	100% (of 2008-2011 average)
2016-2017	93%
2018-2020	63%
2021-2023	45%
2024-2026	31%
2027-2029	24%
2030	21%

# REACH Regulations

The REACH Regulations replace a number of directives with a single system EU regulation concerning the registration, evaluation, authorisation and restriction of chemicals:

Provide a high level of protection of human health and the environment from the use of chemicals.

Make the people who place chemicals on the market responsible for understanding and managing the risks associated with their use.

## **What's the timeframe?**

REACH came into force on 1st June 2007 and replaced a number of European directives and regulations with a single system.

Subsequent inclusions impact solvents traditionally used in cleaning applications

# ACGIH – nPB TLV

The American Conference of Governmental Industrial Hygienists (ACGIH) is a member-based organization that advances occupational and environmental health. A new threshold limit value - time weighted average (TLV - TWA) exposure guidelines for nPB was recently published.

## **What's the impact?**

ACGIH regulations are not enforceable in the UK however more information from the European regulators ECHA is expected soon

# ACGIH – nPB TLV

## **What's the detail of the new ACGIH TLV?**

The threshold for n-propyl bromide (nPB), has been significantly reduced from 10 parts per million (ppm) to 0.1 ppm.

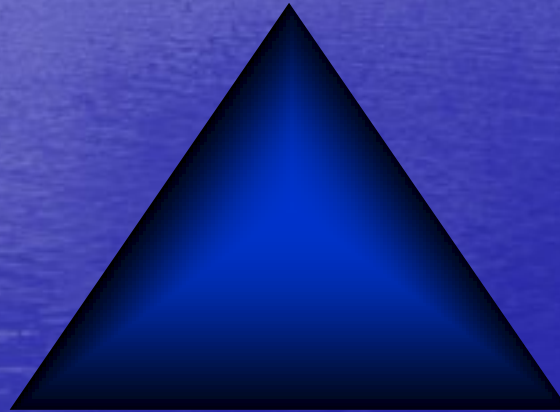
As part of this action, ACGIH also reclassified nPB as category A3, or a “Confirmed Animal Carcinogen with Unknown Relevance to Humans.”

Due to worker exposures potentially exceeding this new threshold, nPB may no longer be a viable solution for use in some industry applications, including vapour degreasing.

# 3M™ Novec™ Engineered Fluids

## Safety

Non flammability  
Low toxicity  
Stability



## Performance

Solvency  
Compatibility  
Low viscosity  
Wide liquid range

## Environmental

Zero ozone depletion  
Short atmospheric lifetime  
Low global warming impact  
Low water solubility  
Non hazardous air pollutant

# 3M™ Novec Engineered Fluids enable you to achieve ....

- Increased operator safety
- Continued use of 'Open-Top' degreasers
- Low energy consumption and short cleaning cycle times
- SED Compliance
- REACH compliance
- Not subject to use restrictions by the F-gas Regulation\*
- Not affected by Chlorinated Solvent Charter

\*Novec™ 7100 & 7200 Engineered Fluids are listed in the recently published Regulation (EU) 517/2014 of 16 April 2014 in Annex II. **However they are not subjected to any use restrictions as specified in Annex III and mandatory for those substance listed in Annex I<sup>1</sup> of this regulation**

# Compatibility with most typical materials of construction

## 3M™ Novec™ Engineered Fluid Compatibility Test Results – Table 2

Test Description	ASTM#	Novec 7100	Novec 71DE	Novec 7200	Novec 72DE
Sandwich Corrosion Test	F1110	Conforms	Conforms	Conforms	Conforms
Acrylic Stress Cracking	F484	Conforms	Doesn't conform*	Conforms	Doesn't conform*
Paint Softening Test	F502	Conforms	Conforms	Conforms	Conforms
Hydrogen Embrittlement	F519-77	Conforms	Conforms	Conforms	Conforms
Hydrogen Embrittlement	F519,1C	Conforms	Conforms	Conforms	Conforms
Residue Test	F485	Conforms	Conforms	Conforms	Conforms
Immersion Corrosion Test	F483	Conforms	Conforms	Conforms	Conforms
Cadmium Removal Test	F483	Conforms	Conforms	Conforms	Conforms
Low Embrittling Cadmium Plate	F111	Conforms	Conforms	Conforms	Conforms
Flash Point	D56	Conforms	Conforms	Conforms	Conforms

\* Novec 71DE and 72DE fluids caused visible stress cracking of the acrylic plastics.  
Testing performed by Scientific Materials, Inc.

3M™ Novec™ Engineered Fluids have been approved in a number of high-value applications within the government and military markets. Please contact your 3M representative for more information.



# *Daresbury Laboratory*



Some Aqueous Cleaners Clean as well as solvents when considering room temperature outgassing

Tested all the Solvents available

ESD Data – Solvent Much Better

HFE – 3M Novec 72DE – Preferred TCE replacement

Currently Installed 2 Degreasers to Replace TCE