

Definition of White Spirits Under RAC Evaluation Based on New Identification Developed for REACH

1. Introduction – Document Purpose

- 1.1 To facilitate substances identification and registration within REACH, the hydrocarbon solvents producers have developed a new identity for their products.
- 2.2 The purpose of this document is to link the old White Spirit definitions (type 0, 1, 2 and 3) and covered by the CAS numbers 64742-82-1, 64742-88-7, 8052-41-3, 64742-48-9, and 64741-92-0 to the corresponding substances that are registered by HSPA.

2. New REACH Identifier for Hydrocarbon Solvents

- 2.1 Historically hydrocarbon solvent substances have been identified with the same EINECS/CAS numbers as the petroleum raw materials from which they are manufactured. This creates confusion in the market because hydrocarbon solvents are more highly processed with narrower boiling ranges, narrow carbon number distributions, and, often, lower concentrations of hazardous constituents leading to different classifications. A more focused and narrow set of definitions for hydrocarbon solvents has been defined for REACH registration to facilitate hydrocarbon solvent identification and to definitively separate them from the broader and different petroleum products.
- 2.2 It should also be noted that the CAS/EC numbers used (see item 3.0 below) are in no way unique to “white spirit” type materials and can be used to describe other hydrocarbon based materials which may be similar to but not the same as white spirit. It is important to note that such materials could have entirely different toxicology profiles and hence be considered as requiring entirely different classification proposals.
- 2.3 Manufacturers and producers of hydrocarbon solvents have taken the opportunity, offered through the REACH process, to clarify both the make-up of hydrocarbon solvents (including white spirits) and the classification. This has allowed the manufacturers to be as specific as it is possible to be with the identification of the hydrocarbon species in each substance. The percentage of each hydrocarbon species will vary within certain boundaries due to the natural variation in feedstocks. These boundaries are clearly defined using the naming convention and the process described within the REACH guidance.

- 2.4 This new identification is based on the REACH substance identification guidance, and differentiates the substances by their carbon range, composition and C&L. It should be noted that the materials identified below using the naming convention are 100% hydrocarbon distillates.
- 2.5 It is important to remark that, even though according to the REACH guidance Hydrocarbon solvents are considered to be UVCB substances (Unknown or Variable composition, Complex reaction products, Biological materials), the types of constituents are known and well controlled by rigorous specifications, so the substances are very similar. However, the amounts of specific constituents may vary due to the used feedstock or production process, in other words, the compositions are variable but the types of constituents are known. The overall compositions of hydrocarbon solvents can be generically defined and can be determined using different analytical methods as gas chromatography, UV absorbance measurement or HPLC analysis
- 2.6 The convention agreed method to describe the hydrocarbon solvents is the following:
- a) **"Hydrocarbons" will be the first part of the name** to indicate their specific chemical character.
 - b) **The carbon number range** (which must at least encompass 80% of the components of the substance) determined by Gas Chromatography (GC) or an equivalent test method.
 - c) **The description of the hydrocarbon structures** present or the PINA structure: the split into n-Paraffins (or n-alkanes), Isoparaffins (or isoalkanes), saturated cyclics (or Naphthenes) and Aromatics. The first three are mentioned when present in the substance at a level between 10 and 80%. Aromatics will be indicated as per HPV category. The PINA structure can be determined by GC/MS and/or 2D GC or any equivalent test method.
 - d) **Components with specific toxicology or classification** will be mentioned, using the classification cut-off as an indication level (according to EU DSD (Dangerous Substances Directive) and Regulation No 1272/2008 on classification, labeling and packaging of substances guidance).
- 2.7 This convention was presented and approved by ECHA, used for pre-registration and registration.
- 2.8 To know more about the details of the new naming, consult the HSPA document sent together with this one or go to the ESIG webpage http://www.esig.org/uploads/documents/104-584-hspa_naming_convention.pdf.

3. Identification of the Different White Spirit Types

- 3.1 The CLH Report “The proposal for harmonized classification and labeling of white spirit (V4, December 2009)” refers to materials with the following EC Numbers and CAS Numbers

Name	EC Number	CAS Number
Stoddard Solvent	232-489-3	8052-41-3
Naphtha (petroleum) hydrodesulphurised heavy	265-185-4	64742-82-1
Naphtha (petroleum) solvent refined heavy	265-095-5	64741-92-0
Naphtha (petroleum) hydrotreated heavy	265-150-3	64742-48-9
Solvent naphtha (petroleum), aliphatic medium	265-191-7	64742-88-7

The proposal quotes IPCS 1996 to offer more information on the composition of the substance by considering the materials alongside a broad description of the likely manufacturing processes and the physical-chemical properties using the categorization below

Name	Description
Stoddard solvent	A colourless, refined petroleum distillate that is free from rancid or objectionable odours and that boils between approximately 148.8 to 204.4°C
White Spirit Type 1	A complex combination of hydrocarbons obtained from a catalytic hydrodesulphurization process. It consists of hydrocarbons having carbon numbers predominantly in the range C7-C12 and boiling between approximately 90-230°C
White Spirit Type 2	A complex combination of hydrocarbons obtained as the raffinate from a solvent extraction process. It consists of hydrocarbons having carbon numbers predominantly in the range C7-C12 and boiling between approximately 90-230°C
White Spirit Type 3	A complex combination of hydrocarbons obtained by treating a petroleum fraction with hydrogen in the presence of a catalyst. It consists of hydrocarbons having carbon

	numbers predominantly in the range C6-C13 and boiling between approximately 65-230°C
White Spirit Type 0	A complex combination of hydrocarbons obtained from the distillation of crude oil or natural gasoline. It consists predominantly saturated hydrocarbons having carbon numbers predominantly in the range C9-C12 and boiling between approximately 140-220°C

3.2 General description of White Spirit

Traditionally White Spirit has been defined as a hydrocarbon solvent with a boiling range of approximately 150-200 C, and containing 80-85% aliphatic constituents and 15-20% aromatic constituents. This is the type of substance which was present in the market place in the period 1960-1980 and used in paint formulations. Construction painters working during that period would have been exposed to this type of solvent.

A wider description is given in document EHC 187, 1996 as follows:

a) The most common variety of white spirit is a mixture of saturated aliphatic and alicyclic C7-C12 hydrocarbons with a content of 15-20% (by weight) of aromatic C7-C12 hydrocarbons and a boiling range of 130-230°C. The C9-C11 hydrocarbons (aliphatics, alicyclics and aromatics) are most abundant, constituting > 80% (by weight) of the total.

b) White spirit is a mixture of saturated aliphatic and alicyclic C7-C12 hydrocarbons with a maximum content of 25% of C7-C12 alkyl aromatic hydrocarbons (Henriksen, 1980).

Note: The EINECS and corresponding CAS number definition of petroleum cuts includes a very wide range of carbon numbers and a wide boiling range, covering a very broad range of possible grades. Solvents are a subset of these petroleum cuts. The new solvent naming convention accommodates this differentiation, due to its much narrower definition in carbon number range and boiling range, defines much better and more precisely the hydrocarbon solvents than the EINECS numbers do.

3.3 **White Spirit Type 0**

EINECS number 265-191-7 (CAS number 64742-88-7): Solvent naphtha (petroleum), medium aliphatics

A complex combination of hydrocarbons obtained from the distillation of crude oil or natural gasoline. It consists predominantly of saturated hydrocarbons having carbon numbers predominantly in the range of C9 through C12 and boiling in the range of approximately 140°C to 220°C (284°F to 428°F).

This very EINECS/CAS number is also used for grades which are registered according the new naming convention by:

- Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)

Flash point minimum 30°C - boiling range 135 - 220°C

3.4 **White Spirit Type 1 and Stoddard Solvent "hydrodesulfurized".**

EINECS number 265-185-4 (CAS number 64742-82-1 and 8052-41-3): Naphtha (petroleum), hydrodesulfurized heavy

A complex combination of hydrocarbons obtained from a catalytic hydrodesulfurization process. It consists of hydrocarbons having carbon numbers predominantly in the 7-12 range and boiling in the range of approximately 90 to 230°C (194 to 446°F).

Maximum aromatic content: 25 wt%

The new naming convention for solvents of this type is:

- Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) (EC number: 919-446-0)

Flash point minimum 30°C - boiling range 135 - 220°C

3.4.1 White spirit type solvents which have been registered in accordance with the new naming convention are:

1) Low flash point = 21 - 30°C includes:

Now with new naming convention contains:

- Hydrocarbons, C8-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) (EC number: 928-136-4)

Flash point minimum 23°C - boiling range 132 - 176°C

- Hydrocarbons, C9-C10, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) (EC number: 927-344-2)

Flash point minimum 23°C - boiling range 110 - 180°C

- 2) Medium flash point = 31 - 54°C includes:
Now with new naming convention contains:
- Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) (EC number: 919-446-0)
Flash point minimum 30°C - boiling range 135 - 220°C
- 3) High flash point = > 55°C
Now with new naming convention:
No grades directly impacted, because not matching with the composition requirement,
- Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, aromatics (2-25%) (EC number: 919-164-8)
Physical properties correspond with a high flash point (>61°C) and a boiling range of 150-230°C.
But these products contain less than 80% C9-C11, which means that the products do not correspond to the regular white spirit definition as given in 3.1 a), because they are primarily comprised of higher molecular weight constituents.

3.5 **White Spirit type 2 "Solvent extracted"**

EINECS number 265-095-5 (CAS number 64741 92 0): Naphtha (petroleum), solvent-refined heavy

A complex combination of hydrocarbons obtained as the raffinate from a solvent extraction process. It consists predominantly of aliphatic hydrocarbons having carbon numbers predominantly in the 7-12 range and boiling in the range of approximately 90 to 230°C (194 to 446°F).
Maximum aromatic content : 5 wt%

Note: This manufacturing process is rarely used these days, and no substances consistent with this definition are being registered as hydrocarbon solvents by the Hydrocarbon Solvents Consortium.

3.5.1 White spirits according the new naming description affected:

- 1) Low flash point = 21 - 30°C
No product falls in this category?
- 2) Medium flash point = 31 - 54°C
No product falls in this category?
- 3) High flash point= > 55°C
No product falls in this category?

3.6 **White Spirit type 3 "Hydrogenated (hydrotreated)"**

EINECS number 265-150-3 (CAS number 64742-48-9) : Naphtha (petroleum), hydrotreated heavy

A complex combination of hydrocarbons obtained by treating a petroleum fraction with hydrogen in the presence of a catalyst. It consists of hydrocarbons having carbon numbers predominantly in the 6-13 range and boiling in the range of approximately 65 to 230°C (149 to 446°F).
Maximum aromatic content: 1 wt%

3.6.1 This group of solvents includes the de-aromatized grades and under the new naming convention are described as::

1) Low flash point = 21 - 30°C

Now with new naming convention contains:

- Hydrocarbons, C9-C10, n-alkanes, isoalkanes, cyclics, <2% aromatics (EC number: 927-241-2)

Flash point minimum 23°C - boiling range 110 - 190°C

2) Medium flash point = 31 - 54°C

Now with new naming convention contains:

- Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, <2% aromatics (EC number: 919-857-5)

Flash point minimum 36°C - boiling range 130 - 210°C

3) High flash point = > 55°C

Now with new naming convention:

No grades directly impacted, because not matching with the composition requirement

- Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, <2% aromatics (EC number: 918-481-9)

Physical properties correspond with a high flash point (>61°C) and a boiling range of 160-245°C.

But these products contain less than 80% C9-C11, which means that the products do not correspond to the regular white spirit definition as given in 3.1 a), because they are primarily comprised of higher molecular weight constituents.

4. **Conclusions**

4.1 According to the new White Spirit identification for REACH the substances following corresponding or partially corresponding substances were identified and compared to the old CAS/EINECS definition.

Aromatic containing White Spirits						
White Spirit type	New identification by			Old identification by		
	Solvent identified by new HSPA naming	new EC number	registration number	EINECS no	CAS no	
White Spirit type 0	Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	919-446-0	01-2119458049-33	265-191-7	64742-88-7	
White Spirit type 1	Low flash point	Hydrocarbons, C8-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	928-136-4	01-2119484809-19	265-185-4	64742-82-1
		Hydrocarbons, C9-C10, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	927-344-2	01-2119463586-28	265-185-4	64742-82-1
	Medium flash point	Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	919-446-0	01-2119458049-33	265-185-4	64742-82-1
					232 489 3	8052-41-3
High flash point	Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	919-164-8	01-2119473977-17	265-185-4	64742-82-1	
White Spirit type 2				232 489 3	8052-41-3	
	Low flash point	None		265-095-5	64741 92 0	
	Medium flash point	None		265-095-5	64741 92 0	
	High flash point	None		265-095-5	64741 92 0	

Dearomatised White Spirits					
White Spirit type	New identification by			Old identification by	
	Solvent identified by new HSPA naming	new EC number	registration number	EINECS no	CAS no
White Spirit type 3					
Low flash point	Hydrocarbons, C9-C10, n-alkanes, isoalkanes, cyclics, <2% aromatics	927-241-2	01-2119471843-32	265-150-3	64742-48-9
	Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, <2% aromatics	919-857-5	01-2119463258-33	265-150-3	64742-48-9
	High flash point	Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, <2% aromatics	918-481-9	01-2119457273-39	265-150-3

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