

Brussels, 25 January 2013

**Version 1**  
Approved by the IMDS Steering Committee

*Guidance on the use of*  
**VULCANIZED-RUBBER PSEUDO SUBSTANCES**  
*in IMDS declarations of tyres*

**For further information contact ETRMA:**

- Mr. Lorenzo Zullo, Coordinator. Email: [technical@etrma.org](mailto:technical@etrma.org)

## Introduction

The IMDS (International Material Data System) is the automobile industry's material data system for collecting, maintaining, analysing and archiving information on materials used for automobile manufacturing, in order to meet the obligations placed on automobile manufacturers, and thus on their suppliers, by national and international standards, laws and regulations such as ELV directives, REACH SVHC, RRR and similar regulations.

With the objective to improve, in line with customers and regulatory requirements, how the tyre chemical composition is reported via the IMDS system, on April 2012 the IMDS steering committee accepted ETRMA request to introduce in the IMDS list of declarable substances the pseudo-substance "NR/SBR/BR/IIR based vulcanized rubber for tyres".

The aim of this guidance document is to clarify how the pseudo-substance should be used in the IMDS system to describe the chemical composition of tyres.

The approach outlined in this guidance is only valid for IMDS declarations of tyres. Other rubber articles, GRG – General Rubber Goods, used in the automotive industry and subject to the same reporting obligation, can not use the above pseudo-substance. A similar approach will be developed for these types of article by taking into account the wider range of polymers used in the GRG applications.

This guidance has been developed jointly with and endorsed by the IMDS SC.

## Scope

Tyres intended to be fit on the following vehicles: truck and bus, passenger car, motorcycle, commercial van.

## References

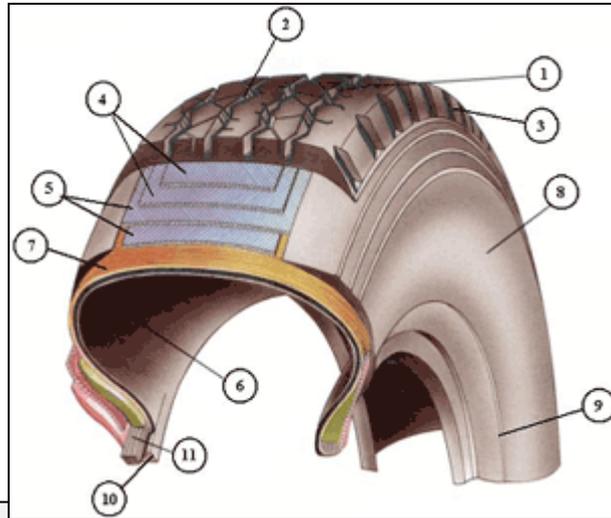
The present document has been drafted by considering the latest versions of the IMDS recommendations:

Number	Title	Version
IMDS 001	General Structure	02/08/2012
IMDS 001a	General Structure Annex I	05/04/2012
IMDS 002	"Flat Bill of Material" (FBOM)	15/02/2007
IMDS 004	Textiles	07/06/2005
IMDS 007	Steel Flat Products (strips and sheets), Metallic Coated (hot-dipped or electrolytically)	24/03/2004

## General notions on tyre composition

### Structure of a tyre

Tyres are made up of various components, which include several parts, types of steel and rubber compounds. After the curing, the initially different rubber layers are part of single homogeneous compound. The main components in a tyre structure are shown in Figure 1 below:



**Figure 1:** Components of a green tyre

“**Tread**” (1) the part of a pneumatic-tyre that is designed to come into contact with the ground.

“**Tread groove**” (2) the space between the adjacent ribs or blocks in the tread pattern.

“**Sidewall**” (3) the part of a pneumatic-tyre between the tread and the area designed to be covered by the rim flange.

“**Ply**” (4, 5) a layer of "rubber" coated parallel cords. In the radial tyre, it has the purpose of stabilizing the tyre.

“**Cord**” (6) the strands forming the fabric of the plies in the pneumatic-tyre.

“**Casing**” (7) that structural part of a pneumatic-tyre other than the tread and outermost "rubber" of the sidewalls which, when inflated, supports the load.

“**Section width**” (8) the linear distance between the outside of the sidewalls of an inflated pneumatic-tyre, when fitted to the specified measuring rim, but excluding elevations due to labelling (marking), decoration or protective bands or ribs.

“**Belt**” (9) applies to a radial ply or bias belted tyre and is a layer or layers of material or materials underneath the tread, laid substantially in the direction of the centre line of the tread to restrict the casing in a circumferential direction.

“**Bead**” (10) the part of a pneumatic tyre that is of such shape and structure as to fit the rim and hold the tyre onto it.

“**Chafer**” (11) material in the bead area to protect the casing against chafing or abrasion by the wheel rim.

The above structure generically refers to passenger car tyres. Tyres intended for other vehicles (Truck and Bus, Motorcycle, Commercial van) may present differences in terms of reinforcing materials used in the carcass and/or compound composition.

## Tyre typical composition

Main materials used in the formulation and production of tyres are:

Material	Application
<b>Natural Rubber</b>	Generally Natural rubber currently accounts for about 30% to 40% of the total elastomeric part in a car tyre and 60% to 80% of a truck tyre.
<b>Synthetic Rubber</b>	Generally synthetic rubber accounts for about 60% to 70% of the total elastomeric part in a car tyre and about 20% to 40% of a truck tyre.
<b>Steel cord and bead wire including the coating materials and activators, brass/tin/zinc.</b>	Steel is used to provide rigidity and strength to the tyres.
<b>Reinforcing fabrics:</b> polyester, rayon or nylon	Used for structural strength and of the carcasses of car tyres.
<b>Carbon black, amorphous silica</b>	Carbon black and amorphous silica provide durability and resistance against wear and tear.
<b>Zinc oxide</b>	Zinc oxide is added essentially as vulcanization activator. After vulcanization it is present as bound zinc in tyres.
<b>Sulphur (including compounds)</b>	Main actor of vulcanization.
<b>Oils:</b> MES (special purified, aromatic oil), naphthenic oil, TDAE (special purified aromatic oil), paraffinic oils	Oils are added to the rubber compound in the factory during the manufacturing process or added to purchased rubbers to improve the processability of the compounds. Additionally, the tread rubber compound achieves improved performance characteristics, mainly wet grip but also other characteristics like wear and endurance
<b>Other additives and solvents:</b> age resistors, processing aids, accelerators, vulcanizing agents, softeners and fillers	The other additives are used in the various rubber compounds to modify handling manufacturing and end-product properties.

**Table 1 - Main components of tyres**

Source: Adapted from "A National Approach to Waste Tyres", 2001 and ETRMA, 2001 and State of knowledge report for tyre materials and tyre wear particles, ChemRisk Inc, July 30, 2008.

Passenger car tyres and truck tyres represent the overwhelming majority of tyres sold on the EU market. Both kinds of tyre can be generally described in terms of their difference in compound ingredients (pre-vulcanization).

**Table 2 - Main components of passenger car and truck tyres (in %)**

Material	Car	Trucks	Reacting during vulcanization ?
<b>Rubber/Elastomers</b>	43%	42%	YES
<b>Carbon black &amp; silica</b>	28%	24%	YES
<b>Metal</b>	13%	25%	NO
<b>Textile</b>	5%	-	NO
<b>Zinc oxide</b>	2%	2%	YES
<b>Sulphur</b>	1%	1%	YES
<b>Accelerators/antidegradants</b>	2.5%	n.a.	YES/NO
<b>Stearic acid</b>	1%	n.a.	YES
<b>Oils</b>	7%	n.a.	NO

As reported in the above table, a substantial fraction of rubber chemicals do react during the vulcanization process, creating a three-dimensional network chemically indescribable with specific mechanical and chemical characteristics.

### Description of tyres into the IMDS

All the above considering, the new approach used for describing materials composition of tyres into the IMDS system, starts from the understanding and application of the most recent versions of the IMDS recommendations, which are dictating the rules and guidelines for describing and reporting declarations to the OEMs.

Ranges:

*Rule 4.3.2.A The portion type “range” must be used solely to reflect real variations of a material or semi-component amount in a semi-component description. Ranges must not be used as a means to avoid declaring the full composition.*

From the above table 2, it is clear that ranges for semi components and materials must be used to actually describe the small variations in the composition of different type of tyres (PSR from TBR or MC). These ranges will allow using a fair small number of different templates for a wide range of tyre types.

Declarable substances:

*Rule 4.4.1.B A material must be described in its end state. Only basic substances contained in the final material are to be reported (example: cured adhesives or paint coatings are entered without the evaporating solvents).*

*Rule 4.4.1.C Process chemicals used in the production of a material/part that are not contained in the end material/part must not be reported.*

The template shall not report any process material not finally ending up into the final product, i.e. solvent used in cement application or paints/adhesives. Substances not present as such in the final product shall not be reported.

When declaring substances into the IMDS, a clear understanding of what has reacted during the vulcanization process and thus is not present anymore in its initial form, is absolutely necessary. From

the above table 2 it is evident that polymers, sulfur, zinc oxide, silica, and other chemicals (curing activators, promoters or inhibitors, accelerators, etc) do react during the curing phase and create a three-dimensional network not chemically describable. In this case all these materials shall be considered as part of the newly created pseudo-substance “**NR/SBR/BR/IIR based vulcanized rubber for tyres**”

## MDS and Module Search

→ Search

### Basic substance data:

CAS No.: -  
EU-Index: -  
EINECS/ELINCS No.: -

### GADSL category:

duty-to-declare  
 prohibited  
State: active

### REACH-SVHC:

Yes

### German

Name: NR/SBR/BR/IIR basierter vulkanisierter Gummi für Reifen  
Synonym 1:  
Synonym 2:  
Synonym 3:

### English

Name: NR/SBR/BR/IIR based vulcanized rubber for tyres  
Synonym 1:  
Synonym 2:  
Synonym 3:

### Basic substance groups:

Chk: Classification 1-6  
Chk: Named \*poly\*  
Chk: Named \*poly\* + elastomer w/o polym./durom.  
Chk: Named \*poly\* w/o duromers  
Chk: Named \*poly\* w/o polymers  
Chk: Named \*poly\*, duromers and shellac

### Replacement suggestions:

*Rule 4.5.1.D Declarable and prohibited substances and their concentration/application must be declared in a manner that compliance to legal requirements can be evaluated.*

Any substance remaining in the final product which is listed in the GADSL or Renault list, is present in the latest edition of the SVHC list published on the ECHA website or is known to present equivalent concerns, has to be disclosed and reported in the declaration together with its concentration or concentration range. In no cases, these substances of concern can be included in the confidentiality claim or tagged as highly confidential and hidden into jokers.

Substances that are not declarable or prohibited according to GADSL, not an SVHC, do not appear on a Renault list, or do not require an application code, may be marked *confidential*. This attains to substances like antioxidants, antioxidants, plasticizer, etc, that are intended to not react during the curing phase.

**Rule 4.5.2.A** *Substances may only be marked as confidential if they are not declarable or prohibited according to GADSL (suppliers to Renault: BGO list), are not an SVHC, and do not require an application code.*

**Rule 4.5.2.C** *The sum of confidential substances, including wildcards for highly confidential substances (see section 4.5.3) must not exceed 10 % of a material. [..]*

There are nine different wildcards available (see Figure 5) in order to characterize the type(s) of highly confidential substance(s).

Search Criteria: CAS No.=system

9 items found. Ordered ascending by "Name"

No.	Name	CAS No.	EU-Index	Einecs-No.	Synonym	GAD...
1	Flame Retardant, not to de...	system	system	system	-	-
2	Further Additives, not to de...	system	system	system	Additives, not...	-
3	Impact modifier, not to decl...	system	system	system	-	-
4	Inorganic Ingredient, not to...	system	system	system	Mineral Mater...	-
5	Misc., not to declare	system	system	system	Miscellaneous	-
6	not yet specified, not to dec...	system	system	system	-	-
7	Organic Ingredient, not to d...	system	system	system	Natural Ingre...	-
8	Pigment portion, not to decl...	system	system	system	colorant, not t...	-
9	Plasticizer, not to declare	system	system	system	-	-

Apply View Clipboard New Search Cancel

On the basis of compound recipe, IMDS user can refer to any of the above jokers for highly confidential substances not subject to any declaration duty.

It has to be remarked the following obligation when compiling the IMDS declaration and using jokers:

**Rule 4.5.3.A** *If wildcards are used to hide a substance, the owner of the data is obliged to archive the related data (for a minimum of 30 years) which must instantly be available in case of legal enquiries.*

The disclosure of confidential and highly confidential substances can only be requested in special cases justified by reason of public health or environmental concern:

**Rule 4.5.3.C** *In special justified cases (health care, environmental protection) the data about the actual substance must be made accessible to the customer on their request.*

The ranges for the declaration of substances within a homogeneous material have to follow the rules specified in the IMDS recommendation:

**Rule 4.5.4.B** *If the portion type "range" is selected, the following maximum portion ranges apply:*

Portion: from X % to Y %

$0 \leq X \leq 7.5$

$7.5 < X \leq 20$

Maximum  $M = Y \% - X \%$

$M \leq 3$

$M \leq 5$

$$20 < X \leq 100$$

$$M \leq 10$$

If ranges are used (example: 2 % – 8 %), the smaller number defines the row and M value in the table to be used. Consequently, the range 2 % – 8 % is not allowed because for the lower limit 2 %, the maximum Y value is 5 (2 + 3 = 5).

## Glossary

- **BR:** Polybutadiene
- **ECHA:** European Chemicals Agency
- **ELV:** End of Life Vehicles
- **GADSL:** Global Automotive Declarable Substance List
- **GRG:** General Rubber Goods
- **IIR:** Isobutylene Isoprene Butyl
- **IMDS:** International Material Data System
- **IMDS SC:** International Material Data System Steering Committee
- **OEM:** Original Equipment Manufacturer
- **MC:** Agricultural tyres
- **NR:** Natural rubber
- **PSR:** passenger car radial tyres
- **REACH:** Regulation (EC) No 1907/2006
- **RRR:** Reduced Regulatory Requirement
- **SBR:** styrene-butadiene rubber
- **SVHC:** Substances of Very High Concern
- **TBR:** Truck and bus radial tyres

