



SCIENTIFIC SUB-COMMITTEE

NS0047E1
(+ Annex)

-
17th Session
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O. Eng.

Brussels, 21 November 2001.

POSSIBLE AMENDMENT OF THE HS NOMENCLATURE AND
EXPLANATORY NOTES REGARDING SILICONES
(PROPOSAL BY THE US ADMINISTRATION)
(Item II.10 on Agenda)

Reference documents :

NR0192E1 (RSC/24)
NR0250E2, Annex D/7 (RSC/26 - Report)

I. BACKGROUND

1. On 9 July 2001, the Secretariat received a proposal from the US Administration to update the HS Nomenclature and Explanatory Notes regarding silicones. This proposal is based on comments submitted to the US Administration by the "Silicone Environmental Health and Safety Council (SEHSC) of North America".
2. The Review Sub-Committee examined this proposal at its 24th Session (September 2001). Given the technical nature of the proposal, the Sub-Committee unanimously decided to refer this question to the Scientific Sub-Committee asking it to examine and comment on whether the proposed modifications are technically correct and whether these modifications would clarify the classification of silicones.

II. COMMENTS FROM THE US ADMINISTRATION

3. "According to the SEHSC, "the chemical structure of a silicone chemical or polymer can be linear, cyclic or branched and it may be capable of being polymerized and/or cross-linked. Depending on the chemical structure of the final product, silicones can take a variety of physical forms, ranging from volatile, low-viscosity fluids to rubbery solids to hard resins. The choice of substituent groups on the [silicon] atom determines the physico-chemical properties and performance of the resulting material, as well as its final form. This chemistry has a large influence on how silicone products are classified...".

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4. Given the global growth and technical advancement of the silicone industry over the past two decades, the development of new products and applications has resulted in a reported world market of approximately US\$7 billion. Applications are found in the aerospace, automotive, chemical, construction, electrical, electronics, food-processing, household care, industrial maintenance, leather-processing, health-care, paints/coatings, paper, personal-care, petrochemical, pharmaceutical, plastics and textile/nonwoven industries.
5. In this connection, the US Administration proposes an amendment to the HS Nomenclature and several modifications to the Explanatory Notes covering silicon compounds and silicone polymers, as set out in the Annex hereto. In general, these proposals are intended only to make clear the classification of these goods in various Chapters of the Harmonized System."

III. SECRETARIAT COMMENTS

6. It should be noted that the intention of the US proposal is to clarify the classification of silicone products in various Chapters of the Harmonized System and not to change the scope of relevant headings. The proposed amendments to the Nomenclature and several modifications to the Explanatory Notes are reproduced in the Annex to this document.
7. The Secretariat could generally accept the amendments proposed by the US Administration. However, in respect of certain amendments, the Secretariat wishes to make comments and to propose certain modifications for consideration by the Sub-Committee. For ease of reference, the alternative texts proposed by the Secretariat have also been incorporated in the Annex hereto and have been placed in square brackets. It should be further noted that the page numbers with regard to the Explanatory Notes are based on the 1996 edition; those based on the 2002 edition have been placed in square brackets.

Amendments to the Nomenclature

8. With regard to the proposed new subparagraphs (ij) and (l) to Note 2 to Chapter 39, the Secretariat suggests the following alternative texts in order to be consistent with the relevant legal texts.
 - “(ij) Products suitable for use as glues or adhesives, put up for retail sale as glues or adhesives, not exceeding a net weight of 1 kg (heading 35.06);
 - (l) Prepared additives for mineral oils (including gasoline) or for other liquids used for the same purposes as mineral oils (heading 38.11)”.
9. With regard to the proposed new subparagraph (a), the Secretariat wonders whether this would mislead users to classify in heading 39.10 silicone products not containing petroleum oil based components which should be classified in heading 34.03.

Amendments to the Explanatory Notes

Page 249 [271]. Heading 28.04. Part (C). Item (5). First paragraph. First line.

10. The US proposal to replace the expression “silicon carbide” by the word “carbon” is intended simply to correct an error existing in the current Explanatory Notes. On the other hand, in view of the global growth and technical advancement of the silicon industry, particularly in the area of modern electronics, the Secretariat feels that the explanation on silicon in the two paragraphs under Part (C) should also be reviewed.
11. Ullmann’s Encyclopedia of Industrial Chemistry, Sixth Edition, 2001 Electronic Release, under metallurgical silicon, indicates that silicon is produced almost exclusively by carbothermal reduction of silicon dioxide. A third way to produce silicon from silicon dioxide is aluminothermal reduction. Another method of producing silicon starts with silicon tetrafluoride, which is a byproduct of the production of superphosphate fertilizer from phosphate rock.
12. For application in electronics, photovoltaics, sensors, and micromechanics, metallurgical-grade silicon must be refined to a much higher purity. Purity requirements for the fabrication of high-efficiency solar cells, for example, are nearly as high as those for advanced semiconductor devices.
13. Ullmann's Encyclopedia also indicates that modern electronics is almost exclusively (>95%) based on silicon devices. Because of the eminent and ever increasing importance of electronics in technology and everyday life, silicon is one of the most important technical materials, although the quantity required for this application is relatively small. Of secondary importance are the uses of silicon for metallurgy and chemistry (silicon compounds), although they consume the major portion of the silicon produced. For chemical- or metallurgical-grade silicon, quartz lumps or pebbles (25-150mm) are reduced with coke in electric arc-furnaces.
14. Based on the above information, the Secretariat suggests deleting the two paragraphs under Part (C), Item 5, and to substitute :

“Silicon (chemical- or metallurgical-grade) is obtained almost exclusively by carbothermal reduction of silicon dioxide using electric arc-furnaces. For application in electronics, photovoltaics, sensors, and micromechanics, metallurgical-grade silicon must be refined to a much higher purity. Purity requirements for the fabrication of high-efficiency solar cells, for example, are nearly as high as those for advanced semiconductor devices.

Modern electronics is almost exclusively (>95%) based on silicon devices. Because of the eminent and ever increasing importance of electronics in technology and everyday life, silicon is one of the most important technical materials, although the quantity required for this application is relatively small. Of secondary importance are the uses of silicon for metallurgy and chemistry (silicon compounds), although they consume the major portion of the silicon produced.”

Page 502 [610]. Heading 32.14. Exclusions.

15. With regard to the proposed new exclusion (e) "Solutions described in Note 4 to this Chapter (**heading 32.08**)", the Secretariat is of the view that this needs clarification, since Note 4 to Chapter 32 refers to products specified in headings 39.01 to 39.13 and has no reference to products specified in heading 32.14.

Page 595 [716]. General. Scope of headings 39.01 to 39.11. Subparagraph (d).

16. According to Ullmann's Encyclopedia of Industrial Chemistry, the term "silicones" is used for compounds in which silicon atoms are linked via oxygen atoms, each silicon atom bearing one or several organic groups. In industrially important silicones, these groups are usually methyl or phenyl. The silicones are known as polyorganosiloxanes according to IUPAC rules.
17. Linear and cyclic polyorganosiloxanes are generally produced by reacting organodichlorosilanes with water. The mixture of oligomeric siloxanes arising from hydrolysis can be converted either entirely to cyclic siloxanes (e.g., octamethylcyclotetrasiloxane) or directly polymerized to linear polysiloxanes.
18. Based on the above information, the Secretariat proposes the following alternative explanation of silicones for the consideration by the Sub-Committee :
- “(d) Silicones are known as polyorganosiloxanes, in which silicon atoms are linked via oxygen atoms, each silicon atom bearing one or several organic groups (heading 39.10). Linear and cyclic polyorganosiloxanes are generally produced by reacting organodichlorosilanes with water. The mixture of oligomeric siloxanes arising from hydrolysis can be converted either entirely to cyclic siloxanes (e.g., octamethylcyclotetrasiloxane) or directly polymerized to linear polysiloxanes.”
19. The above text relates to the proposed amendment of the Explanatory Note to heading 39.10, page 610, as well. The Secretariat therefore proposes to insert the following first new paragraph, as an alternative :
- “Silicones are known as polyorganosiloxanes, in which silicon atoms are linked via oxygen atoms, each silicon atom bearing one or several organic groups (see General Explanatory Note, scope of headings 39.01 to 39.11).”
20. With regard to the proposed general structural formula for silicones, the Secretariat feels that this structure generally represents linear silicone fluids. It appears that linear polydimethylsiloxanes are the most important industrial polysiloxanes. It also appears that the nature of the end groups of the polymers determine the use. For example, trimethylsilyl-terminated polydimethylsiloxanes are typical silicone fluids. Hydroxy- and vinyl-terminated polymers find major application in silicone rubbers. On the other hand the proposed structure does not represent certain other important types of silicone fluids such as fluorosilicone fluids. In this context, the Secretariat feels that the necessity for the proposed general structural formula should be reviewed.

IV. CONCLUSION

21. The Sub-Committee is invited to examine the proposed amendments as reflected in the Annex hereto on the basis of the US and Secretariat comments in paragraphs 3 to 20 above and comment on whether the proposed modifications are technically correct and whether these modifications would clarify the classification of silicone products.

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