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HARMONIZED SYSTEM COMMITTEE

-
29th Session
-

NC0575E1
(+ Annex)

O. Eng.

Brussels, 16 April 2002.

CLASSIFICATION OF AN ELECTROSTATIC CHUCK AND DISTINCTION BETWEEN CHUCKS OF HEADINGS 84.66 AND 85.05

(Item IX.14 on Agenda)

Reference documents :

NC0472E1 (HSC/28)
NC0510E2, Annex H/10 (HSC/28 – Report)

I. BACKGROUND

1. At its 28th Session, the Harmonized System Committee examined the classification of parts of machines for sawing monocrystal semiconductor boules into slices, or wafers into chips. This was one of a number of commodities forwarded to the WCO by the World Trade Organization (WTO). In this connection, the information provided by the US Administration referred to the "Rainbow™ 4500/4520 Oxide Etch System Electrostatic Chuck (ESC)".

2. For ease of reference, the Secretariat would draw the Committee's attention to the Annex to this document for the relevant parts of the description of the product, as well as the Secretariat 's comments, as found in Doc. NC0472E1. With respect to the possible classification of the commodities described in the working document, the Committee agreed not to take up this issue, given the clarification of WTO that the question related to the distinction between parts and accessories in the Harmonized System in general and not to a specific product.

3. Subsequently, on 23 November 2001, the Republic of Korea wrote to the Secretariat requesting assistance with the HS classification of an "electrostatic chuck". In responding, the Secretariat noted that while it did not have an actual product before it for classification,

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File No. 2925

there did not appear to be a clear dividing line between the work holders of heading 84.66 and those of heading 85.05.

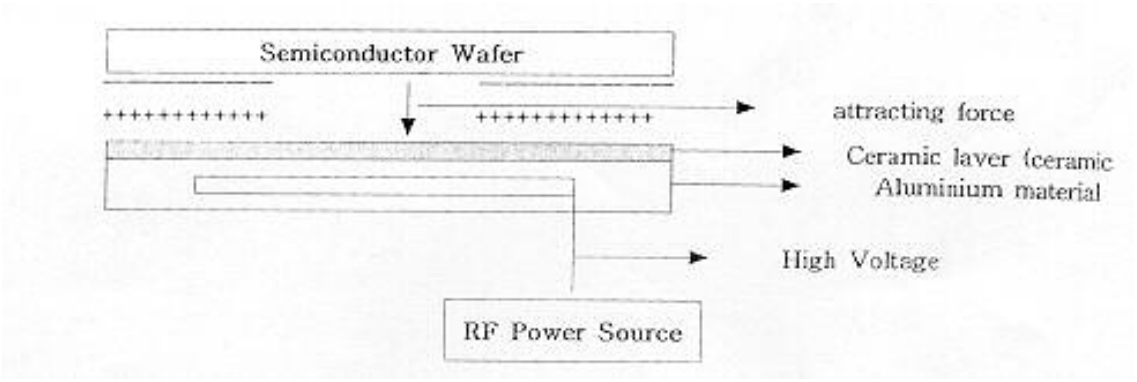
4. For that reason, the Secretariat suggested that if the Republic of Korea agreed, the Secretariat would submit the question to the 29th Session of the Harmonized System Committee to rule on the classification of a specific product, as well as to consider the differences between the work holders of heading 84.66 and those of heading 85.05.

5. On 4 March 2002, the Secretariat received the following note from the Republic of Korea.

II. NOTE FROM THE REPUBLIC OF KOREA

"Product Description

6. The apparatus at issue is the "Precision 5000 Mark II Electrostatic Chuck". It is installed in a plasma dry-etching chamber for semiconductor wafers. It chucks the wafer in ultra-high-vacuum by electrostatic power. The surface is coated with aluminium and ceramic plates and a cooling apparatus is embedded inside. When a high voltage current is sent to the inside of the chuck, the surface insulated by ceramic is charged with positive or negative charge and then the surface of the wafer becomes charged with the opposite electric charge. The electromotive force generated between the two surfaces "chucks" the wafer.



Classification

7. The classification of the product at issue under the HS is in accordance with the General Rules of Interpretation (GIRs).

8. The General Rules of Interpretation (GIRs) govern the classification of goods. GIR 1 states, in pertinent part :

"… classification shall be determined according to the terms of the headings and any relative Section or Chapter Notes…"

9. Legal Note 2 to Section XVI, states that :

"Subject to Note 1 to this Section, Note 1 to Chapter 84 and Note 1 to Chapter 85, parts of machines (not being parts of the articles of heading 84.84, 85.44, 85.45, 85.46 or 85.47) are to be classified according to the following rules :

(a) Parts which are goods included in any of the headings of Chapter 84 or 85 (other than headings 84.09, 84.31, 84.48, 84.66, 84.73, 84.85, 85.03, 85.22, 85.29, 85.38 and 85.48) are in all cases to be classified in their respective headings;

(b) Other parts, if suitable for use solely or principally with a particular type of machine, or with a number of machines of the same heading (including a machine of heading 84.79 or 85.43) are to be classified with the machines of that kind or in heading 84.09, 84.31, 84.48, 84.66, 84.73, 85.03, 85.22, 85.29 or 85.38 as appropriate. However, parts which are equally suitable for use principally with the goods of headings 85.17 and 85.25 to 85.28 are to be classified in heading 85.17;

(c) All other parts are to be classified in heading 84.09, 84.31, 84.48, 84.66, 84.73, 85.03, 85.22, 85.29 or 85.38 as appropriate or, failing that, in heading 84.85 or 85.48."

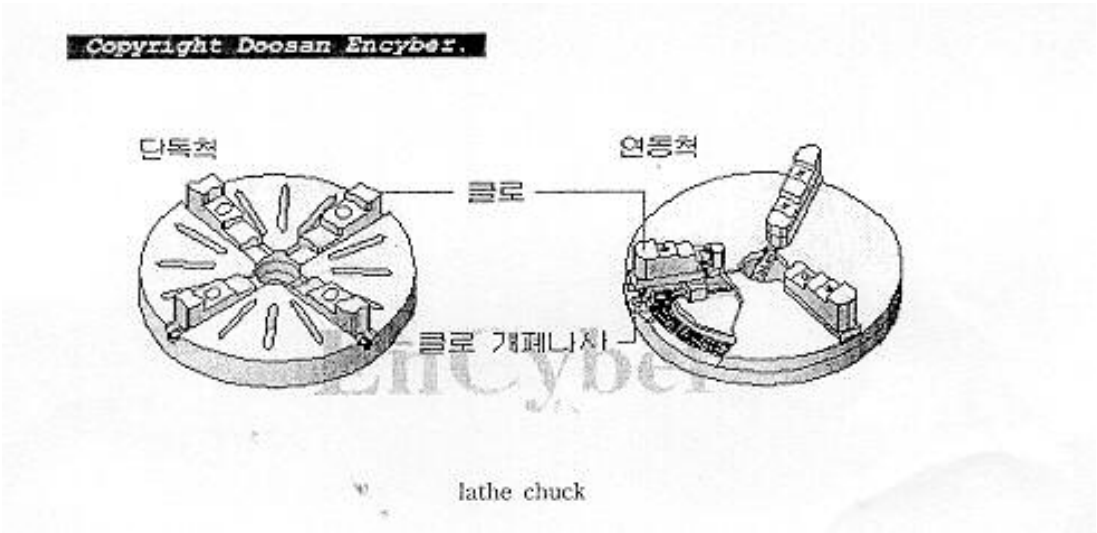
10. Heading 84.66 reads :

> "Parts and accessories suitable for use solely or principally with the machines of headings 84.56 to 84.65, including work or tool holders, self-opening dieheads, dividing heads and other special attachments for machine-tools; tool holders for any type of tool for working in the hand."

11. Heading 85.05 reads :

> "Electro-magnets; permanent magnets and articles intended to become permanent magnets after magnetisation; electro-magnetic or permanent magnet chucks, clamps and similar holding devices; electro-magnetic couplings, clutches and brakes; electro-magnetic lifting heads."

12. The HS Explanatory Note (EN) to heading 84.66 says that the heading covers "**mechanical or pneumatic** (bold and underline added) lathe chucks of all kinds …".



lathe chuck

13. On the other hand, the EN to heading **84.66 excludes** (bold added) :

"(e) **Electric** (bold and underline added) (including **electronic**) (bold and underline added) parts and accessories (e.g., magnetic chucks and numerical control panels) (**Chapter 85**)."

14. The problem is how to draw a dividing line and establish criteria for distinguishing between the work holders of heading 84.66 and similar work holders of heading 85.05.

15. Webster's Third International Dictionary defines "magnet", "electronic", "electron" and "electrostatic" as follows :

1. The term "**magnet**" is described as :

"1) a : variety or a piece of magnetite or magnetic iron ore having naturally the property of attracting iron.

B : a body having the property of attracting iron and producing a magnetic field external to itself.

2) something that attracts."

2. The term "**electronic**" is described as :

"1) : of or belonging to an electron

2) : of or relating to electronics; esp : utilizing devices constructed or working by the methods or principles or electronics."

3. The term "**electron**" is described as :

"One of the constituent elementary principles of an atom being a charge of negative electricity equal to about 1.602×10^{-19} coulomb, having a mass when at rest of about 9.109×10^{-28} gram or 1/1837 that of a proton, being the least massive known charged particle, and having a magnetic moment of about 1 Bohr magneton associated with its one half quantum unit of spin."

4. The term "**electrostatic**" is described as :

"1) : of or relating to static electricity or electrostatics."

16. In view of the above, "electronic" means moving electrons by energy of electricity, heat, etc.

17. Therefore, the electrostatic chuck at issue works on the principle of "moving electrons". When a high voltage current is sent to the inside of the chuck, the surface insulated by the ceramic is charged with a positive or negative charge and then the surface of the wafer becomes charged with the opposite electric charge.

18. The work holders of heading 84.66 are mechanical or pneumatic type work holders.

19. On the contrary, holding devices of heading 85.05 are electrical or electronic type work holders.

20. Therefore, work holders of heading 84.66 are not electric or electronic work holders but mechanical or pneumatic work holders.

21. Finally, on the basis of Section XVI, Note 2(a), the terms of the headings, the Explanatory Note to heading 84.66 (2), exclusion (e) to heading 84.66, Note 2 to Section XVI, General Section to Chapter 84, Part (C) **Parts**[1] on page 1394 and the General Section to Chapter 85, Part (A), Item (3)[2], page 1618, we believe that the electrostatic chuck at issue is classifiable in subheading 8505.90."

III. SECRETARIAT COMMENTS

22. The Secretariat would add the following description taken from the Applied Materials' Precision 5000 Mark II electrostatic chuck manual :

> The electrostatic chuck (ESC) is an aluminium pedestal with a thin copper film between layers of polyimide. The polyimide coating protects the copper from the plasma and from arcing. The pedestal bolts to the surface of the simplified cathode. The ESC pedestal is either notched or flatted, depending on the type of wafer being used.
>
> Helium channels cut into the top and bottom of the ESC distribute helium across the back of the wafer. The helium flow increases heat transfer from the wafer to the ESC pedestal. This helps prevent photoresist reticulation on the wafer. The helium is routed up through the cathode to the back of the wafer.
>
> When a plasma ignites the chamber, it creates a charge at the backside of the wafer. A positive DC voltage is then applied to the copper film of the ESC. This results in a charge opposite in polarity to the charge at the backside of the wafer. The opposite charges attract, forming an electrostatic bond between the wafer and the ESC. This "chucks" the wafer, keeping the wafer in place when the backside helium pressure is enabled. After processing, the backside helium pressure is reduced and the voltage is lowered, allowing the plasma to dissipate the excess static charge. This "dechucks" the wafer. After dechucking, the wafer is ready to be transferred out of the chamber.

23. The Secretariat, through the International Chamber of Commerce (ICC), received the following pertinent information from the manufacturer's representative. The word "chuck" is used in the sense of "an attachment for holding a work-piece or tool in a machine". When a semi-conductor wafer is chucked, it is held in place by the chuck throughout the etching process. Application of current by itself will not hold a wafer in these types of chucks. The wafer must also be grounded in some way; the plasma accomplishes this by providing a path

[1] "Separately presented electrical parts generally fall in one or other of the headings of Chapter 85, … (85.05)…"

[2] "This Chapter covers (3) certain machines and appliances which depend for their operation on the properties or effects of electricity, such as its electro-magnetic effects, heating properties, etc., (headings 85.05, 85.11 to 85.18, 85.25 to 85.31 and 85.43)."

to the ground. Thus, current must be applied and plasma must be ignited before the backside helium pressure is enabled. As these chucks can maintain chucking force for some time after the current is turned off, the plasma must be maintained for a period with the current reduced to drain the charge before the wafer can be reliably removed.

24. In practice only silicon wafers are held by these chucks but, generally speaking, any conductive material (magnetic or not) could be held. An insulating material by itself could not be held, but a conductive material with an insulating coating could be.

25. The Secretariat would draw the attention of the Committee to the fact that a search of the Secretariat's records did not uncover any discussions on the differences between the chucks of heading 84.66 and those of heading 85.05 when these texts were first included in the Nomenclature.

26. The Shorter Oxford English Dictionary, Volume I, A – M, defines electromagnetic and electrostatic as follows :

Electromagnetic : "The production of a state of magnetic polarity in a body near or round which an electric or galvanic current passes, or the generation of an electric current by the action of a magnet."

Electrostatic : "The production of an electrical charge upon a body by the influence of a neighbouring body charged with statical electricity, as exemplified in Volta's electrophorus."

27. The Secretariat understands that an electro-magnetic chuck of heading 85.05 uses electro-magnetic forces to operate. Its power is controlled by the volume of electric current; that is to say, an electro-magnetic chuck uses a relatively high current, which would be needed for as long as the chuck was in use. An electro-magnetic chuck uses the attraction induced by electricity and chucks only magnetic materials. It holds work pieces on the basis of the repulsive and attractive forces of static electricity.

28. An electrostatic chuck uses a relatively high voltage and a small charging current in the initial transient stage, followed by a very small current that would replace charge lost by leakage. An electrostatic chuck is made of a nonconducting substance and is used either solely or principally for plasma dry-etching apparatus.

29. The Secretariat would draw the Committee's attention to the Secretariat's comments in Doc. NC0472E1 (see the Annex to this document, paragraph 6), wherein, the Secretariat concluded that the machine or system to which the chuck(s) will be mounted is not a sawing machine but a system which removes material by the use of plasma, which is classifiable in heading 84.56. Parts (and accessories) of these machines are classifiable in heading 84.66, which reads : "Parts and accessories suitable for use solely or principally with the machines of headings 84.56 to 84.65, including work or tool holders, self-opening dieheads, dividing heads and other special attachments for machine-tools (. . .)".

30. In looking at the product description in paragraph 6 above, it is clear that the product at issue is made from non-conducting materials and, furthermore, does not operate by the principles described in paragraph 27 above. It is the application of a voltage to the chuck that activates the electrostatic, not magnetic, attraction. Consequently, the Secretariat would be inclined to classify the "Precision 5000 Mark II Electrostatic Chuck" in heading 84.66 and,

more specifically, subheading 8466.20, by application of General Interpretative Rules 1 (Note 2 (b) to Section XVI) and 6. In arriving at this classification, the Secretariat considers that the electrostatic chuck (i.e., work holder) is not covered by another heading of Chapters 84 and 85. Furthermore, within heading 84.66, subheading 8466.20 would apply, since it refers expressly to "work holders" (application of General Interpretative Rules 1 and 6).

31. The Secretariat would offer the information in paragraphs 26 to 28 as a starting point for the Committee's discussion concerning the differences between chucks of headings 84.66 and 85.05. In this connection, the Committee may wish to consider seeking the advice of the Scientific Sub-Committee in determining those differences and, in addition, the wording of possible Explanatory Note amendments.

IV. CONCLUSION

32. The Committee is invited to express its views on the classification of the "Precision 5000 Mark II Electrostatic Chuck", as well as to indicate what other action should be taken, if any, concerning the differences between work holders of headings 84.66 and 85.05.

* * *

Extract from Doc. NC0472E1

3. The information provided by the US referred to the "Rainbow™ 4500/4520 Oxide Etch System Electrostatic Chuck (ESC)".

4. Since the documentation received from the WTO did not include a full description of the commodity at issue, the Secretariat contacted the International Chamber of Commerce (ICC) with a view to obtaining more information vis-à-vis the product. On 22 August the Secretariat received further information from the ICC, indicating that "Lam's Rainbow Series Dry Etch processing systems remove materials from the surface of a silicon wafer or from films deposited on the wafer through exposure to plasma, a highly reactive chemical species created in an etch reactor. These systems are not machines for sawing monocrystal semiconductor boules into slices or wafers into chips.".

5. It continues saying that "(. . .) [the] bipolar electrostatic chuck (ESC) uses electrostatic attraction to firmly hold the wafer on the electrode inside the main chamber of the system. Once the wafer is held in place by the ESC, the plasma etching can take place."

II. SECRETARIAT COMMENTS

6. As can be seen from the information received from the ICC, the machine or system to which the chuck(s) will be mounted is not a sawing machine but a system which removes material by the use of plasma, which is classifiable in heading 84.56. Parts (and accessories) of these machines are classifiable in heading 84.66, which reads : "Parts and accessories suitable for use solely or principally with the machines of headings 84.56 to 84.65, including work or tool holders, self-opening dieheads, dividing heads and other special attachments for machine-tools (. . .)".

7. The Secretariat presents the following description, which has been extracted or constructed from the information received from the ICC. Interested parties may wish to complete the description if deemed necessary.

Bipolar electrostatic chuck (work holder), used in the processing of wafers, using electrostatic attraction to firmly hold the wafer on the electrode, inside the main chamber of a plasma etching system. Applying a voltage to the chuck activates the electrostatic attraction. The wafer will be released when the voltage is removed.

8. With respect to the classification of parts of machines of Section XVI, attention should be given to the provisions laid down in Note 2 to that Section. In other words, it should be first determined whether the work holder at issue is classifiable as a commodity in any of the headings of Chapters 84 and 85 (other than headings 84.09, 84.31, 84.48, 84.66, 84.73, 84.85, 85.03, 85.22, 85.29, 85.38 and 85.48) (Note 2 (a) to Section XVI). If not, it is to be classified in heading 84.66 by virtue of subparagraph (b) of the same Note.

9. The Secretariat considers that the electrostatic work holder is not covered by another heading of Chapters 84 and 85. Consequently, classification in heading 84.66 seems appropriate (by application of General Interpretative Rule 1 – Note 2 (b) to Section XVI and the heading text).

10. Within heading 84.66 subheading 8466.20 would apply, since it refers, expressly, to "Work holders" (application of General Interpretative Rules 1 and 6).

11. Having said this, the Secretariat fails to see, within the context of HS classification, the discussion issue referred to in the WTO submission, i.e., whether a work holder should be considered as a "part" or as an "accessory" (see paragraph 2 above). Heading 84.66 refers in pertinent part to : (i) parts suitable for use solely or principally with the machines of headings 84.56 to 84.65, (ii) accessories suitable for use solely or principally with the machines of headings 84.56 to 84.65, and (iii) tool holders for any type of tool for working in the hand. The classification of parts of this heading is governed by Note 2 to Section XVI, whereas accessories are classified in heading 84.66 if they are (i) suitable for use solely or principally with the machines of headings 84.56 to 84.65, and (ii) not covered by a more specific heading of the Nomenclature. The Explanatory Note to heading 84.66, first paragraph, Item (B), on page 1392, gives guidance vis-à-vis the scope of the term "accessories" in this respect. So, at heading level, no distinction is made between the terms "parts" and "accessories".

12. At subheading level no reference is made to "parts" or "accessories". Subheadings 8466.10 to 8466.30 mention specific type of parts or accessories, whereas subheadings 8466.91 to 8466.94 refer to the headings covering the machines for which the parts and accessories are intended. In the case that parts or accessories can be equally used for machines referred to in two or more of the subheadings 8466.91 to 8466.94, the Secretariat would be inclined to classify them in accordance with General Interpretative Rule 3 (c).

13. The Secretariat also fails to see how work holders falling within the scope of heading 84.66, could be classified in subheading 8466.10, 8466.30 or 8466.91 (as noted by the WTO group – see paragraph 2 above), since work holders are classified in subheading 8466.20, regardless the machine they will be used on.

14. The Representatives of WTO and other interested parties may wish to clarify the above-referenced points, in particular those raised in paragraphs 11 to 13 above.

15. In conclusion, the Secretariat believes that the commodities described in paragraph 7 are to be classified in heading 84.66, subheading 8466.20, regardless of whether they should be considered as a "part" or as an "accessory" of the dry etch processing system.