OPINION OF MR ADVOCATE GENERAL DARMON
delivered on 7 March 1990 *

Mr President,
Members of the Court,

1. The tribunal d'instance of Le Mans has referred to the Court a series of questions for a preliminary ruling on the tariff heading of silicon discs.

2. The Powerex company has, since 1967, been importing from America silicon discs which, after various processes to which I shall have reason later to return, become semiconductor devices. The essential property of such devices is that they let an electrical current pass in only one direction.

3. Until 1981, Powerex had declared those goods as parts under subheading 85.21 E of the Common Customs Tariff, under which they were subject to a customs duty of 5.8%. In 1981, the French customs authorities decided that the goods in question came under subheading 85.21 D II, that is to say, 'diodes, transistors and similar semiconductor devices', on which the rate of duty is 17%.

4. Three sets of legal proceedings illustrate the dispute between Powerex and the French customs. The first had its origin in the issue of an enforcement order on 28 March 1983 under which the customs claimed from the company the sum of FF 2 798 663 in respect of imports made since 8 December 1980. Powerex appealed against that order and brought the matter before the tribunal d'instance (District Court), Le Mans. The action was concluded on 23 November 1984 by a final judgment of that court in which it declared the enforcement order to be void and classified the goods at the centre of the dispute under subheading 85.21 E.

5. While those proceedings were in progress, Powerex had made declarations in accordance with the tariff position laid down by the customs authorities and consequently found, following the judgment on 23 November 1984, that it had paid too much. It therefore brought an action for recovery of overpayment before the same court on 11 July 1985 in which it sought to be refunded in the sum of FF 3 085 754. The customs authorities thereupon pointed to the existence of a draft Community regulation which classified silicon discs which had undergone selective diffusion under subheading 85.21 D II. The tribunal d'instance of Le Mans rejected that submission and, by judgment of 17 October 1986, ruled in favour of Powerex. The customs authorities appealed, but the judgment was substantially upheld on 9 November 1987 by the cour d'appel (Court of Appeal) at Angers. On 18 July 1989, the Cour de cassation (Court of Cassation) turned down the appeal brought against that judgment.

6. The third set of proceedings was commenced on 4 November 1987 by the customs authorities which sought payment of the sum of FF 1 750 287 and brought the matter before the tribunal d'instance of Le Mans. It based its submissions essentially on

* Original language: French.

the adoption of Commission Regulation (EEC) No 1203/86 of 23 April 1986 on the classification of goods falling within subheading 85.21 D II of the Common Customs Tariff.[1] Powerex pointed out before the court that the goods which it imported did not come within the scope of Regulation No 1203/86 and that that regulation was also invalid.

7. The tribunal d'instance of Le Mans therefore referred to the Court for a preliminary ruling a series of questions which seek essentially a ruling on the interpretation of Regulation No 1203/86 in order to determine whether that regulation applies to the items imported by Powerex and, in the event that it does so apply, a decision on the validity of that regulation and the temporal effects of a finding of invalidity.

8. In order to answer the first question, it will be useful to recall Powerex's production process for semiconductor devices as explained in the report drawn up by Mr Camus, the expert commissioned by the tribunal d'instance of Le Mans in its judgment of 7 September 1988.

9. The silicon atom has the particular feature of having four electrons on its outer layer. The build-up of several atoms makes it possible to obtain a pure crystal, with each atom then sharing eight electrons on its outer layer with four neighbouring atoms. All the electrons are at that point perfectly stable. Since an electrical current is a flux of electrons, it is necessary, in order to obtain an electrical current passing in only one direction, to inject into certain areas of the silicon minute quantities of phosphorous and arsenic atoms (which the expert report calls 'traces of impurities' or 'dopants'), which have five electrons on their outer layer, and to inject into other areas of the silicon atoms of boron, gallium or aluminium, which have three electrons on their outer layer. The first areas of silicon are referred to as N, that is to say, negative, since they contain a surplus of electrons, which are negative charges; the second areas are referred to as P, that is to say, positive, since they are lacking in electrons. On the same silicon disc it is possible to create zones of type N and zones of type P (both are termed 'discrete'). This involves a slight movement of electrons away from N towards P but the current can then only pass in one direction. Between the two zones N and P there is a neutral zone which, when it is subjected to bombardment by electrons, may move towards zone N, and this provides a greater degree of certainty that current will pass in one direction only.

10. There are two methods for injecting 'traces of impurities' or 'dopants' into the silicon and that, as we shall find out later, is a matter of great importance. The first and older method is that of thermal diffusion, which requires a high temperature (between 1 100 and 1 200°C). Under the second method, which is more effective, the silicon is bombarded by electrons at very high speed (irradiation under an electron beam), which create 'gaps' in the silicon disc. The electrical effect of that process is equivalent to that of dopage with a small amount of impurities. However, this process makes it possible to control precisely the energy and the flux of the electrons and thereby to adjust exactly the dopage effect, a result which is not possible using thermal diffusion alone. Irradiation under an electron beam is carried out in France exclusively by the Oris Industrie company, a subsidiary of the Atomic Energy Commission, based at Saclay, as the method presupposes the availability of a particle accelerator.

1 — OJ L 108, p. 20.

11. The expert report drawn up for the French court distinguishes between two types of items imported by Powerex according to the degree of their manufacture. Items of type A are more basic than those of type B and for that reason have to be brought in as 'inputs' in the manufacturing process.

12. More precisely, items of types A and B have undergone thermal diffusion in the United States for the purpose of creating zones P and N. They have also been fitted with a molybdenum support to give the silicon disc greater stability and better electrical contact. Items of type B also have a bevel, which is a polishing of the surface of the silicon disc and its cover by an insulating varnish, a process which is also carried out exclusively in the United States. On the other hand, a number of processes still have to be carried out on items of type A following importation, in particular a chemical treatment to complete the bevel and the application of the protective varnish. Irrespective of whether the items are of type A or of type B, they must still be subjected, after importation into France, to irradiation under an electron beam for the purpose of adjusting the electrical properties of the silicon. That process is subcontracted to the Oris Industrie company. According to the expert commissioned by the court, that is an essential stage in the production process and requires highly specialized facilities.

13. It is then necessary to carry out a procedure of mounting or encapsulating the disc in such a way as to ensure complete safety, particularly for the fittings which will surround it, in view of the fact that the disc will be crossed by electrical currents of several thousand amperes. That process requires a special area called a 'white room' in order to eliminate dust, and a series of special processes which give the product a greatly enhanced value. That is carried out in the Powerex plant at Le Mans. It appears that that latter process is the one referred to in the third recital in the preamble to Regulation No 1203/86, adopted on the information provided by the French customs, when it refers to discs which have not yet been 'provided with terminals, leads or a housing'.

14. What do the provisions of the regulation have to say in that connection? The first article classifies under subheading 85.21 D II 'silicon discs, having undergone selective diffusion, whereby discrete zones are formed, mounted on a molybdenum support'. The third recital in the preamble states that these discs, 'although not provided with terminals, leads or a housing, already in their present form, constitute semiconductor devices . . . '.

15. It seems to me that there is a problem at the outset with the concept of 'selective diffusion'. We may interpret that concept either as relating solely to thermal diffusion to the exclusion of irradiation under an electron beam, in which case the items imported by Powerex have indeed undergone selective diffusion prior to importation and thereby come irrefutably within the scope of Regulation No 1203/86, or, on the contrary, we may interpret it as referring to any process which forms discrete zones, that is to say, to both thermal diffusion and irradiation under an electron beam. In the latter case, we may ask whether the items imported by Powerex really come within the scope of the regulation since irradiation is carried out on them after they have been imported.

16. In which sense, therefore, are we to understand the concept of selective diffusion? Obviously, if we refer to the documents appended to the expert report

drawn up on 12 February 1988 by Mr Gaussens at the request of Powerex, and in particular if we refer to Document No 1 in English,[2] it appears that the term 'diffusion' in scientific parlance relates solely to thermal diffusion.[3] However, on 3 February 1989, the Commission adopted Regulation (EEC) No 288/89 on determining the origin of integrated circuits,[4] the third recital in the preamble to which provides that 'diffusion in this context shall be defined as the process whereby integrated circuits are formed on a semiconductor substrate by the selective introduction of an appropriate dopant'. If we keep to that definition, irradiation under an electron beam also comes within the definition of diffusion, since its objective is 'the selective introduction of an appropriate dopant'. Regardless of the details of scientific parlance in that connection, it strikes me as unsuitable to produce two different definitions of diffusion in two areas which are extremely close, that of integrated circuits covered by Regulation No 288/89 and that of semiconductor devices covered by Regulation No 1203/86. Even though the definition of diffusion is given only in the recitals in the preamble to a regulation which is later in date than Regulation No 1203/86, it seems to me that we ought to use that definition to interpret the latter regulation.

17. It would appear to me therefore that the concept of selective diffusion must cover both thermal diffusion and irradiation under an electron beam. Is it possible then to conclude on that basis that the items imported by Powerex, which have not yet undergone that irradiation, do not come within the scope of Regulation No 1203/86? I do not believe so, because those items have undergone thermal diffusion in the United States and the parties do not dispute the fact that thermal diffusion is one method of selective diffusion. Consequently, the fact that they must still undergo another process of selective diffusion, this time by way of irradiation, in order fully to acquire the passing and blocking senses, does not warrant the assumption that they have not undergone any selective diffusion. Items of types A and B have indeed literally, prior to importation, undergone selective diffusion whereby discrete zones are formed. For that reason, they come within the scope of Regulation No 1203/86. It is along those lines that I would suggest the Court should answer the first question.

18. Next, it is necessary to address the issue of the validity of the regulation in dispute. Powerex objects to that regulation on two grounds: on the one hand, it claims that it was adopted on the basis of inaccurate data since it is not correct to state that silicon discs only require to be fitted with terminals, leads and housing in order to constitute semiconductor devices, without any further processing; secondly, Powerex alleges that the Commission exceeded its powers by classifying the silicon discs in question under a tariff heading which is not the permissible heading in the light of the Rules for the Interpretation of the Nomenclature.

19. It is quite correct to say, as we have seen when recalling the findings in the expert report of Mr Camus, that the silicon discs, after having undergone selective diffusion and acquired a molybdenum support, do not solely have to be provided with terminals, leads and a housing. They must also receive additional selective diffusion, this time by way of irradiation. If we cast our minds back, the third recital in the preamble to the disputed regulation

2 — Document entitled 'Annealing effects on electron irradiated and gold diffused thyristors for fast switch application', by C. K. Chu and J. F. Donlon.

3 — For example: 'Fast switch diodes and thyristors can be made by either electron irradiation or gold diffusion'.

4 — OJ L 33, p. 23.

states that 'the discs as described above, although not provided with terminals, leads or a housing, already in their present form, constitute semiconductor devices . . .'. It seems to me that that recital must be criticized on two grounds, first because it apparently assumes that only connection and assembly processes remain to be carried out, which is not correct, but secondly and particularly because it states that discs which have undergone selective diffusion 'already in their present form' constitute semiconductor devices. In fact, the Commission has applied here General Rule of Interpretation 2(a) of the Convention on Nomenclature for the Classification of Goods under the Common Customs Tariff which provides that 'any reference in a heading to an article shall be taken to include a reference to that article incomplete or unfinished, provided that, as imported, the incomplete or unfinished article has the essential character of the complete or finished article'. As a result, it was on the assumption that silicon discs, as soon as they undergo thermal diffusion, have the essential characteristics of a semiconductor device, that the regulation chose to classify such items under subheading 85.21 D II. I believe for that reason that the case turns primarily on the question of what the essential characteristic of a semiconductor device is and whether or not the discs imported by Powerex have such a characteristic.

20. What, then, is the essential characteristic of a semiconductor device? According to the expert report commissioned by the French court, 'items corresponding to type A . . . already have a thyristor structure (multilayer NPNP) and it is possible to make them function "on the spot" as a thyristor by applying the appropriate voltage to the anode, cathode and the gate'. Obviously, those items cannot yet be used in their state at that time. As Mr Gaussens pointed out at the hearing, without being contradicted, the use of such items in that state would result in short circuits. For that reason, must we consider the essential characteristic of a semiconductor device to be that it lets a current pass in only one direction, even if in an uncontrolled and unmanageable way, or must we rather, on the contrary, consider that characteristic to be that it lets the current pass in only one direction in a perfectly regulated manner, through the control of the electrical flux and its intensity? I should make clear immediately my view that the second interpretation is called for. I do not believe that the essential characteristic can be reduced to a simple 'tendency to'; it has to take account of the existence or absence of the principal functional capacities which are normally required. When General Rule of Interpretation 2(a) of the Convention on Nomenclature for the Classification of Goods under the Common Customs Tariff refers to incomplete or unfinished articles, it is referring to finishing and assembly processes, perhaps even some slightly more complex processes, but certainly not a highly sophisticated process which greatly increases the value of the product, such as irradiation under an electron beam by passing the item through a particle accelerator, which is the only process capable of preventing short circuits. That is a view which is corroborated by the third recital in the preamble to Regulation No 288/89, already cited, which states that it is by means of diffusion that the integrated circuit is given *all* its functional capabilities. If we apply that definition to the present case, we cannot but notice that the silicon discs after their importation are still not equipped with all their functional capabilities, since they are, in their form at that time, incapable of being used to allow the electrical current to pass in only one direction under something approaching 'laboratory' conditions.

21. In addition, and if it is necessary, I must point out that Regulation No 1203/86, inasmuch as it apparently considers that silicon discs, after their importation, only

have to be provided with terminals, leads and housing, seems to be referring by that to assembly processes of a straightforward nature, within the capacity of any retail trader. However, the processes which the items imported by Powerex have to undergo are, as we know, exceptionally sophisticated, particularly as they must be carried out in a white room and as they confer a greatly increased value on the items.

22. The Court has not yet, to my knowledge, expressed an opinion on the exact nature of assembly in the context of the Common Customs Tariff,[5] but I may perhaps point out that the Court has, in the neighbouring area of the origin of goods, taken pains to state in a recent judgment that

'simple assembly processes are to be understood as covering processes which do not require personnel specially qualified to perform the operations in question, or specialist tools or factories specially equipped for the purposes of assembly. Processes of that kind cannot be considered likely to contribute towards conferring on the goods in question their essential characteristics or properties'.[6]

In the same decision, the Court allowed reference to be made to the subsidiary criterion of the value added by the assembly process. To the extent to which such a legal point may be applied to another case, it seems to me that the complexity of the assembly operations necessary in the present case[7] also argues in favour of the silicon discs being classified under the subheading which relates to parts and not under that which is applicable to semiconductor devices.

23. Thus, it seems, to bring this point to a close, that, subject to the complexity of the assembly operations, only silicon discs which have undergone selective diffusion, not only thermal but also by irradiation under electron beams, and which, consequently, are capable of letting a current pass in a fully controlled manner in only one direction, come within the subheading dealing with semiconductor devices. That is not the case with the discs imported by Powerex. Since the first article of the regulation in dispute refers to silicon discs having undergone selective diffusion, without further detail, and since the regulation consequently applies to discs which, in their state at that time, do not constitute semiconductor devices, it must be considered to be invalid. That is how I propose that the Court should answer the second question.

24. The third question posed by the court making the reference concerns the effect which such invalidity may have on imports carried out prior to the future date of this Court's decision. That presents a classic difficulty. In the Court's first judgment in *Roquette*,[8] it declared that the second paragraph of Article 174 of the EEC Treaty, under which the Court may, in proceedings for a declaration that a regulation is void, state 'which of the effects of the regulation which it has declared void shall be considered as definitive', was applicable by analogy to references for preliminary rulings. However, the limitation of the

5 — Except perhaps in the judgment of 29 May 1979 in Case 165/78 *IMCO* [1979] ECR 1837, which is, however, of no assistance in this case.

6 — Judgment of 13 December 1989 in Case C-26/88 *Brother International GmbH* [1989] ECR 4253, paragraph 17.

7 — See paragraph 12 above.

8 — Judgment of 15 October 1980 in Case 145/79 *Roquette* [1980] ECR 2917; see also judgments of 15 October 1980 in Case 109/79 *Société Maiseries de Beauce* [1980] ECR 2883, of 15 October 1980 in Case 4/79 *Société providence agricole* [1980] ECR 2823, of 15 January 1986 in Case 41/84 *Pinna* [1986] ECR 1, of 27 February 1985 in Case 112/83 *Société des produits de maïs* [1985] ECR 719 and of 22 May 1985 in Case 33/84 *Fragd* [1985] ECR 1605.

effects, particularly in respect of time, is only an exception to the rule which makes such effects go back in time to the date of the act in question which has been declared 'void'. As with every exception, it must be strictly interpreted and its scope must be limited to the requirements on which it is based, that is to say, under the established case-law of the Court, to the requirements of legal certainty. In so far as the contested regulation appears to apply only to imports made by Powerex, there is no obvious ground of legal certainty which would justify limiting the effects of the declaration of invalidity. I suggest that the Court should answer the third question to that effect.

25. I propose therefore that the Court should rule as follows:

'(1) Commission Regulation (EEC) No 1203/86 of 23 April 1986 on the classification of goods falling within subheading 85.21 D II of the Common Customs Tariff must be interpreted as meaning that it applies to silicon discs which have undergone selective diffusion by means of thermal diffusion and are mounted on a molybdenum support, even if after their importation into the Community they must still undergo, among other processes, selective diffusion by means of irradiation under electron beams.

(2) The abovementioned regulation, in so far as it classifies under subheading 85.21 D II of the Common Customs Tariff silicon discs which do not, in their imported state, present the essential characteristics of semiconductor devices, is invalid.

(3) There is no reason to limit the effects of that invalidity.'