**Translation from Finnish**
**Legally binding only in Finnish and Swedish**
**Ministry for Foreign Affairs, Finland**

# Act on the Export Control of Dual-Use Items

(500/2024)

By decision of Parliament, the following is enacted:

## Chapter 1
## General provisions

### Section 1
### Scope of application

This Act lays down provisions on the obligations, powers and procedures that supplement Regulation (EU) 2021/821 of the European Parliament and of the Council setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items, hereinafter referred to as *the Dual-Use Regulation*.

### Section 2
### Definitions

In applying this Act, the definitions laid down in Article 2 of the Dual-Use Regulation shall apply.

Furthermore, in this Act:

1) *Union control list* means the list set out in Annex I to the Dual-Use Regulation;

2) *transit operator* means a natural or legal person on whom an authorisation requirement for a transit referred to in Article 7(2) of the Dual-Use Regulation may be imposed;

3) *operator* means an exporter, broker, provider of technical assistance, transit operator and any natural or legal person who transfers dual-use items within the European Union.

**Section 3**
**Relationship to other legislation**

If another act contains provisions on the export control of dual-use items that derogate from the provisions of this Act, the provisions of the other act shall apply instead of this Act.

Provisions on the supervision of and control procedure for the export, transfer, brokering and transit of defence materiel are laid down in the Act on the Export of Defence Materiel (282/2012).

Provisions on the control of firearms, firearm components, cartridges and particularly dangerous projectiles are laid down in the Firearms Act (1/1998).

Provisions on the control of and licensing procedure for the export, transfer, brokering and transit of nuclear products are laid down in the Nuclear Energy Act (990/1987).

**Section 4**
**Authorities**

The Ministry for Foreign Affairs is the competent authority referred to in the Dual-Use Regulation and the competent authority under this Act.

Finnish Customs enforces the provisions on the export, transit and transfer of dual-use items and the provision of brokering services and technical assistance related to dual-use items.

**Chapter 2**
**Authorisations and operators' obligations**

**Section 5**
**National notification obligations**

In addition to what is provided in Article 4(2) of the Dual-Use Regulation, an exporter shall notify the Ministry for Foreign Affairs if it has reason to suspect that the dual-use items that are not listed in the Union control list and that are to be exported are or may be intended, in their entirety or in part, for any of the uses referred to in paragraph 1 of the said Article.

In addition to what is provided in Article 6(2) of the Dual-Use Regulation, a broker shall notify the Ministry for Foreign Affairs if it has reason to suspect that the dual-use items that are the subject of brokering services are or may be intended for any of the uses referred to in Article 4(1).

**Section 6**
**National authorisation requirements and prohibition of transit**

In addition to what is provided in Article 6(1) of the Dual-Use Regulation, an authorisation is required for the provision of brokering services of dual-use items not listed in the Union control list if the broker has been informed by the Ministry for Foreign Affairs that the items in question are or may be intended, in their entirety or in part, for any of the uses referred to in Article 4(1) of the said Regulation.

In addition to what is provided in Article 7(1) and (2) of the Dual-Use Regulation, the Ministry for Foreign Affairs prohibits the transit of dual-use items not listed in the Union control list if the items are located in Finland and are or may be intended, in their entirety or in part, for any of the uses referred to in Article 4(1) of the said Regulation. Provisions on the procedures related to the prohibition of transit and the authorisation requirement are laid down in chapter 4 of this Act.

In addition to what is provided in Article 11(1) of the Dual-Use Regulation, the Ministry for Foreign Affairs makes the transfer of dual-use items from Finland to another Member State of the European Union subject to authorisation if the conditions laid down in Article 11(2) are met.

The Ministry for Foreign Affairs makes the export of dual-use items not listed in the Union control list subject to authorisation if the items in question are or may be intended, in their entirety or in part, for a use that significantly endangers public security or Finland's national security.

**Section 7**
**National control list**

In addition to what is provided in Article 3 of the Dual-Use Regulation, an export authorisation is required for the export of dual-use items referred to in the Annex to this Act from Finland to a destination outside the customs territory of the European Union. By derogation from Article 12(2) of the Dual-Use Regulation, the Ministry for Foreign Affairs is the issuing authority. The provisions

of this Act and the Dual-Use Regulation, with the exception of Article 12(2)(1) and (2), Article 14 and Article 21(4), apply to the issuing of an authorisation.

**Section 8**
**National general export authorisation**

The Ministry for Foreign Affairs issues the national general export authorisations referred to in Article 12 of the Dual-Use Regulation.

A national general export authorisation is served by issuing a public notice. Provisions on a public notice are laid down in the Administrative Procedure Act (434/2003).

**Section 9**
**Reporting, registers and records and the internal compliance programme**

An exporter who has been issued with a global export authorisation shall report on the use of the global export authorisation to the Ministry for Foreign Affairs annually.

Further provisions on the contents of the report referred to in subsection 1, the contents of the internal compliance programme referred to in Article 2(21) of the Dual-Use Regulation, the contents of the register or record referred to in Article 27 of the Regulation, and the contents of the notifications and reports related to the use of the Union general export authorisations referred to in Annex II to the Regulation may be issued by decree of the Ministry for Foreign Affairs.

**Section 10**
**Consideration of authorisations**

In addition to what is provided in Article 15 of the Dual-Use Regulation, the Ministry for Foreign Affairs shall take the following considerations into account when deciding whether to issue an authorisation:

1) ensuring the unobstructed availability of items of foreign origin that are subject to strategic export control, or compliance with the conditions set for the availability of such items;

2) restrictions or prohibitions on the re-export of goods or services.

When issuing an authorisation, the Ministry for Foreign Affairs may impose conditions on the use of the authorisation in order to prevent an item subject to authorisation from ending up in any other use other than that referred to in the authorisation.

**Section 11**
**Preliminary opinion concerning dual-use items**

Upon application, the Ministry for Foreign Affairs issues an operator with a decision containing a preliminary opinion on whether an export, provision of brokering services, provision of technical assistance, transit or intra-Union transfer meets the conditions for issuing an authorisation referred to in the Dual-Use Regulation and in this Act.

A favourable preliminary opinion is binding on the Ministry for Foreign Affairs and it is valid for a fixed period of a maximum of one year. The Ministry for Foreign Affairs is not bound by a favourable preliminary opinion if, after issuing the opinion, there occurs a significant change in circumstances that affects the foreign and security policy assessment of the situation or if the applicant has provided the Ministry for Foreign Affairs with untruthful, materially deficient or misleading information.

**Section 12**
**Classification request**

Upon application, the Ministry for Foreign Affairs issues an operator with a decision on whether an item specified in the application is a dual-use item in accordance with the Union control list or the national control list.

**Chapter 3**
**Powers when considering authorisations and enforcement powers**

**Section 13**
**Disclosure of information between authorities**

Notwithstanding non-disclosure provisions, the Ministry for Foreign Affairs and Finnish Customs have the right to disclose to each other information that is essential for the performance of a duty laid down in this Act or in the Dual-Use Regulation and that concerns:

1) operators;

2) exports and other transactions subject to control;

3) applications and decisions related to export control;

4) items;

5) consignees, end-use and end-users of dual-use items;

6) other matters related to export control of dual-use items than those referred to in paragraphs 1–5.

Notwithstanding non-disclosure provisions, the Tax Administration, the Ministry of Defence, the Finnish Defence Forces, the National Police Board of Finland, the Finnish Security and Intelligence Service, the National Bureau of Investigation, the Finnish Immigration Service, the Finnish Border Guard, the Ministry of Economic Affairs and Employment, and the Radiation and Nuclear Safety Authority have the right to disclose to the Ministry for Foreign Affairs and Finnish Customs information referred to in subsection 1 that is essential for the performance of a duty laid down in this Act or in the Dual-Use Regulation.

Notwithstanding non-disclosure provisions, the Ministry for Foreign Affairs and Finnish Customs have the right to disclose to the authorities referred to in subsection 2 information the disclosure of which is essential for the performance of a duty related to the export control of dual-use items.

**Section 14**
**Disclosure of non-disclosable information to an authority of a foreign state or to an international body**

In addition to what is provided in the Dual-Use Regulation and the Act on the Openness of Government Activities (621/1999), the Ministry for Foreign Affairs may, notwithstanding non-disclosure provisions, disclose to an authority of a foreign state or international body information referred to in section 13, subsection 1, paragraphs 1–5 of this Act, other than personal data, if this

is essential for the implementation of international export control cooperation and the disclosure of the information is not contrary to national interests.

**Section 15**
**Right to obtain information from an operator**

The Ministry for Foreign Affairs and Finnish Customs have the right to obtain information that is essential for the performance of a duty laid down in this Act or in the Dual-Use Regulation from an operator and any other natural or legal person related to activities subject to control.

An operator and any other natural or legal person related to activities subject to control are obliged to provide the information referred to in subsection 1.

**Section 16**
**Powers of Finnish Customs**

Provisions on the powers of Finnish Customs are laid down in the Customs Act (304/2016). In the enforcement referred to in section 4, subsection 2 of this Act, dual-use items specified in the Dual-Use Regulation and this Act are also considered goods referred to in the Customs Act.

**Chapter 4**
**Transit**

**Section 17**
**Taking possession of goods in transit and decision-making on transit**

Finnish Customs shall take possession of dual-use items in transit if it has reasonable grounds to suspect that the dual-use items in transit are or may be intended, in their entirety or in part, for any of the uses referred to in Article 4(1) of the Dual-Use Regulation.

Finnish Customs shall notify the transit operator that it has taken the items into possession and refer the matter concerning transit to the Ministry for Foreign Affairs for consideration and decision. The Ministry for Foreign Affairs decides whether the transit shall be prohibited under Article 7(1) of the Dual-Use Regulation or under section 6, subsection 2 of this Act, or whether an authorisation requirement shall be imposed for the transit under Article 7(2) of the Dual-Use

Regulation. If an authorisation requirement is imposed for the transit, the Ministry for Foreign Affairs shall notify the transit operator of this, after which the transit operator has 90 days to apply for an authorisation from the Ministry for Foreign Affairs.

If the Ministry for Foreign Affairs decides that an authorisation for the transit is not issued, the transit is considered prohibited in accordance with Article 7(1) of the Dual-Use Regulation.

**Section 18**
**Return or destruction of goods in transit**

If the Ministry for Foreign Affairs decides that a transit is not prohibited or issues an authorisation for a transit, Finnish Customs shall return the goods it has taken into possession to the transit operator.

If the Ministry for Foreign Affairs prohibits a transit or decides not to issue an authorisation for a transit, the Ministry for Foreign Affairs shall order that the goods be returned to their country of origin. However, if there are reasonable grounds to suspect that the goods would be used in the country of origin for any of the uses referred to in Article 4(1) of the Dual-Use Regulation, the Ministry for Foreign Affairs shall order that the goods be destroyed by Finnish Customs.

**Section 19**
**Liability for costs**

The transit operator is liable for the costs incurred from the storage of goods in transit during the authorisation and review procedures and for the costs incurred from the return of the goods to their country of origin or from the destruction of the goods. However, the transit operator is not liable for the said costs of destruction if the goods were destroyed before the decision on the destruction became final and the court has, due to a request for a review, decided that there were no grounds for the destruction and the decision is final.

## Chapter 5
## Miscellaneous provisions

### Section 20
### Advisory Board on Export Controls

The Advisory Board on Export Controls appointed by the Government operates in connection with the Ministry for Foreign Affairs. The objective of the Advisory Board on Export Controls is to promote inter-authority cooperation related to export controls and contacts with business and industry.

Further provisions on the tasks, composition and appointment of the Advisory Board on Export Controls are issued by government decree.

### Section 21
### Conditional fine

The Ministry for Foreign Affairs or Finnish Customs may impose a conditional fine to enforce compliance with an order concerning the obligation to provide information referred to in section 15, subsection 2.

The Ministry for Foreign Affairs may impose a conditional fine to enforce compliance with an order concerning the reporting obligation referred to in section 9, subsection 1.

Provisions on the imposition and ordering of payment of a conditional fine are laid down in the Act on Conditional Fines (1113/1990).

### Section 22
### Request for review

Provisions on requesting a judicial review by an administrative court are laid down in the Administrative Judicial Procedure Act (808/2019).

A decision referred to in Article 16(1) of the Dual-Use Regulation and a decision concerning an operator and referred to in Article 4(1), Article 5(1), Article 6(1), Article 7(1) or (2), Article 8(1) or

Article 10(1) of the said Regulation or in section 6 of this Act shall be complied with regardless of any request for a review, unless otherwise ordered by the reviewing authority.

If the goods in transit referred to in section 18, subsection 2 have dangerous characteristics, the Ministry for Foreign Affairs may, in its decision on their destruction, order that the destruction be carried out immediately.

**Section 23**
**Reference to the Criminal Code**

Provisions on the punishment for a regulation offence are laid down in chapter 46, sections 1–3 of the Criminal Code (39/1889) and provisions on the punishment for failure to file an export control notification of dual-use items are laid down in chapter 46, section 12 of the Criminal Code.

**Section 24**
**Entry into force**

This Act enters into force on 15 September 2024.

This Act repeals the Act on the Control of Exports of Dual-Use Goods (562/1996).

A reference elsewhere in the law to the repealed Act shall mean a reference to this Act after the entry into force of this Act.

Matters instituted before this Act's entry into force are considered in accordance with the provisions in force at the time of the entry into force of this Act. However, this Act applies to matters concerning the Advisory Board on Export Controls that have been instituted before the entry into force of this Act.

Authorisations issued under the Act in force at the time of this Act's entry into force shall remain in force and the provisions in force at the time of this Act's entry into force apply to them.

The Advisory Board on Export Controls that was serving at the time of the entry into force of this Act shall continue its work as the advisory board under this Act until the end of its term.

*Annex*

**National control list**

General Notes, Acronyms and Abbreviations, and Definitions in Annex I to Regulation (EU) 2021/821 apply to this Annex.

Categorization and numbering of control entries in this Annex follows the form of Annex I to Regulation (EU) 2021/821.

*Point 1*
**Category 0: Nuclear materials, facilities and equipment**
None.

*Point 2*
**Category 1: Special materials and related equipment**
None.

*Point 3*
**Category 2: Materials processing**

**2A Systems, equipment and components**
None.

**2B Test, inspection and production equipment**

2B901 Additive manufacturing equipment, designed to produce metal or metal alloy components, having all of the following, and specially designed components therefor:

a. Having at least one of the following consolidation sources:
    1. ”Laser”;
    2. Electron beam; or
    3. Electric arc; and

b. Having a controlled process atmosphere of any of the following:
    1. Inert gas; or
    2. Vacuum (equal to or less than 100 Pa); and

c. Having any of the following ‘in-process monitoring’ equipment in a ‘co-axial configuration’ or ‘paraxial configuration’:
    1. Imaging camera with a peak response in the wavelength range exceeding 380 nm but not exceeding 14,000 nm;
    2. Pyrometer designed to measure temperatures greater than 1,273.15K (1,000°C); or
    3. Radiometer or spectrometer with a peak response in the wavelength range exceeding 380 nm but not exceeding 3,000 nm; and

d. A closed loop control system designed to modify the consolidation source parameters, build path, or equipment settings during the build cycle in response to feedback from ‘in-process monitoring’ equipment specified in 2B901.c.

*Technical Note: For the purposes of 2B901:*
1. *‘In-process monitoring’, also known as in-situ process monitoring, pertains to the observation and measurement of the additive manufacturing process including electromagnetic, or thermal emissions from the melt pool.*
2. *‘Co-axial configuration’, also known as on-axis or inline configuration, pertains to one or more sensors that are mounted in an optical path shared by the ”laser” consolidation source.*
3. *‘Paraxial configuration’ pertains to one or more sensors that are physically mounted onto or integrated into the “laser”, electron beam, or electric arc consolidation source component.*

4. *For both 'co-axial configuration' and 'paraxial configuration', the field of view of the sensor(s) is fixed to the moving reference frame of the consolidation source and moves in the same scan trajectories of the consolidation source throughout the build process.*

**2C Materials**
None.

**2D Software**
None.

**2E Technology**

2E901 "Technology" according to the General Technology Note for the "development" of equipment or "software" specified in 2B.

2E902 "Technology" according to the General Technology Note for the "production" of equipment specified in 2B.

2E903 "Technology", not specified elsewhere, for the "development" or "production" of 'coating systems' having all of the following:

a. Designed to protect ceramic "matrix" "composite" materials specified by 1C007 in Annex I of Regulation (EU) 2021/821 from corrosion; and
b. Designed to operate at temperatures exceeding 1,373.15 K (1,100°C).

*Technical Note. For the purposes of 2E903, 'coating systems' consist of one or more layers (e.g., bond, interlayer, top coat) of material deposited on the substrate.*

*Point 4*
**Category 3: Electronics**

**3A Systems, equipment and components**

3A901 Electronic items as follows:

*Note: Integrated circuits include the following types:*
- *"Monolithic integrated circuits";*
- *"Hybrid integrated circuits";*
- *"Multichip integrated circuits";*
- *"Film type integrated circuits", including silicon-on-sapphire integrated circuits;*
- *"Optical integrated circuits";*
- *"Three dimensional integrated circuits";*
- *"Monolithic Microwave Integrated Circuits" ("MMICs").*

a. Complementary Metal Oxide Semiconductor (CMOS) integrated circuits, not specified in 3A001.a.2 in Annex I of Regulation (EU) 2021/821, designed to operate at an ambient temperature of 4.5K or below.

*Technical Note: For the purposes of 3A901.a, CMOS integrated circuits are also referred to as cryogenic CMOS or cryoCMOS.*

b. Parametric signal amplifiers having all of the following:

1. Designed for operation at an ambient temperature below 1 K (-272.15°C)
2. Designed for operation at any frequency from 2 GHz up to and including 15 GHz; and
3. A noise figure less (better) than 0.015 dB at any frequency from 2 GHz up to and including 15 GHz at 1 K (-272.15C).

*Note. Parametric signal amplifiers include Travelling Wave Parametric Amplifiers (TWPAs).*

*Technical Note. Parametric signal amplifiers may also be referred to as quantum-limited amplifiers (QLAs).*

c. Integrated circuits having an aggregate bidirectional transfer rate of 600 Gbyte/s or more over all inputs and outputs and to or from other integrated circuits not including volatile memories, and having or being programmable to have any of the following:

1. One or more digital processor units executing machine instructions having a 'total processing performance' of 6000 or more;
2. One or more digital 'primitive computational units,' excluding those units contributing to the execution of machine instructions specified in 3.A.1.a.15.a., having a 'total processing performance' of 6000 or more;
3. One or more analog 'primitive computational units' having a 'total processing performance' of 6000 or more; or
4. Any combination of digital processor units and 'primitive computational units' on an integrated circuit whose 'total processing performance' across 3A901.c.1, 3A901.c.2 and 3A901.c.3 sum to 6000 or more.

*Note. Integrated circuits specified by 3A901.c include graphical processor units (GPUs), tensor processing units (TPUs), neural processors, in-memory processors, vision processors, text processors, co-processors/accelerators, adaptive processors, field-programmable logic devices (FPLDs), and application-specific integrated circuits (ASICs).*

*Nota Bene. For "digital computers" and "electronic assemblies" containing integrated circuits specified by 3A901.c, see 4A902.*

*Technical Note. For the purposes of 3A901.c:*

1. *'Total processing performance'('TPP') is the bit length per operation multiplied by the processing performance measured in Tera ($10^{12}$) Operations Per Second (TOPS) over all processor units on the integrated circuit. For example, the 'TPP' for an integrated circuit having two digital processor units that are each capable of 200 TOPS at 16 bits is 6400 (2 processors x 200 TOPS x 16 bits = 6400). In 3A901.c.3, the 'TPP' of each analog 'primitive computational unit' is the processing performance expressed in TOPS multiplied by 8.*
2. *A 'primitive computational unit' is defined as containing zero or more modifiable weights, receiving one or more inputs, and producing one or more outputs. A computational unit is said to perform 2N-1 operations whenever an output is updated based on N inputs, where each modifiable weight contained in the processing element counts as an input. Each input, weight, and output might be an analog signal level or a scalar digital value represented using one or more bits. Such units include:*

   - *Artificial neurons*
   - *Multiply accumulate (MAC) units*
   - *Floating-point units (FPUs)*
   - *Analog multiplier units*
   - *Processing units using memristors, spintronics, or magnonics*
   - *Processing units using photonics or non-linear optics*
   - *Processing units using analog or multi-level nonvolatile weights*
   - *Processing units using multi-level memory or analog memory*
   - *Multi-value or multi-level units*
   - *Spiking units*

3. *Operations relevant to the calculation of TOPS include both scalar operations and the scalar constituents of composite operations such as vector operations, matrix operations, and tensor operations. Scalar operations include integer operations, floating-point operations (often measured by FLOPS), fixed-point operations, bit-manipulation operations, and/or bitwise operations.*
4. *The rate of TOPS is the maximum value theoretically possible when all processing units are operating simultaneously. The rate of TOPS and aggregate bidirectional*

*transfer rate is assumed to be the highest value the manufacturer claims in a manual or brochure for the chip.*

5. *The bit length of an operation is equal to the highest bit length of any input or output of that operation. Additionally, if the processor unit is designed for operations that achieve different bits x TOPS values, the highest bits x TOPS value should be used.*
6. *For processing units that provide processing of both sparse and dense matrices, the TOPS values are the values for processing of dense matrices (e.g., without sparsity).*

3A903 Cryogenic cooling systems and components, as follows:

a. Systems rated to provide a cooling power greater than or equal to 600 µW at or below a temperature of 0.1 K (-273.05°C) for a period of greater than 48 hours;
b. Two-stage pulse tube cryocoolers rated to maintain a temperature below 4 K (-269.15°C) and provide a cooling power greater than or equal to 1.5 W at or below a temperature of 4.2 K (-268.95°C).

## 3B Test, inspection and production equipment

3B901 Equipment for the manufacturing of semiconductor devices or materials, as follows and specially designed components and accessories therefor:

a. Equipment designed for dry etching having any of the following:

    1. Equipment designed or modified for isotropic dry etching, having a largest 'silicon germanium-to-silicon (SiGe:Si) etch selectivity' of greater than or equal to 100:1; or
    2. Equipment designed or modified for anisotropic dry etching, having all of the following;

        a. Radio Frequency (RF) power source(s) with at least one pulsed RF output;
        b. One or more fast gas switching valve(s) with switching time less than 300 milliseconds; and
        c. Electrostatic chuck with twenty or more individually controllable variable temperature elements.

    *Note 1: 3B901.a includes etching by 'radicals', ions, sequential reactions, or non-sequential reaction.*

    *Note 2: 3B901.a.2 includes etching using RF pulse excited plasma, pulsed duty cycle excited plasma, pulsed voltage on electrodes modified plasma, cyclic injection and purging of gases combined with a plasma, plasma atomic layer etching, or plasma quasi-atomic layer etching.*

    *Technical Note 1: For the purposes of 3B901.a, 'silicon germanium-to-silicon (SiGe:Si) etch selectivity' is measured for a Ge concentration of greater than or equal to 30 % ($Si_{0.70}Ge_{0.30}$).*

    *Technical Note 2: For the purposes of 3B901.a, 'radical' is defined as an atom, molecule, or ion that has an unpaired electron in an open electron shell configuration.*

b. 'Extreme Ultraviolet' 'EUV' masks and 'EUV' reticles, designed for integrated circuits, not specified by 3B001.g in Annex I of Regulation (EU) 2021/821, and having a mask "substrate blank" specified by 3B001.j in Annex I of Regulation (EU) 2021/821.

    *Technical Note 1: 'Extreme Ultraviolet' ('EUV') refers to electromagnetic spectrum wavelengths greater than 5 nm and less than 124 nm.*

    *Technical Note 2: For the purposes of 3B901.a, masks or reticles with a mounted pellicle are considered masks and reticles.*

3B902 Scanning Electron Microscope (SEM) equipment designed for imaging semiconductor devices or integrated circuits, having all of the following:

a. Stage placement accuracy less (better) than 30 nm;
b. Stage positioning measurement performed using laser interferometry;
c. Position calibration within a Field-Of-View (FOV) based on laser interferometer length-scale measurement;
d. Collection and storage of images having more than 2 x $10^8$ pixels;
e. FOV overlap of less than 5% in vertical and horizontal directions;
f. Stitching overlap of FOV less than 50 nm; and
g. Accelerating voltage more than 21 kV.

*Note 1: 3B902 includes SEM equipment designed for chip design recovery.*
*Note 2: 3B902 does not apply to SEM equipment designed to accept a Semiconductor Equipment and Materials International (SEMI) standard wafer carrier, such as a 200 mm or larger Front Opening Unified Pod (FOUP).*

3B903 Cryogenic wafer probing equipment, having all of the following:

a. Designed to test devices at temperatures less than or equal to 4,5 K (-268,65 °C), and
b. Designed to accommodate wafer diameters of greater than or equal to 100 mm.

## 3C Materials

3C901 Epitaxial materials consisting of a "substrate" having at least one epitaxially grown layer of any of the following:

a. Silicon having an isotopic impurity less than 0.08 % of silicon isotopes other than silicon-28 or silicon-30; or
b. Germanium having an isotopic impurity less than 0.08 % of germanium isotopes other than germanium-70, germanium-72, germanium-74, or germanium-76.

3C902 Fluorides, hydrides, or chlorides, of silicon or germanium, containing any of the following:

a. Silicon having an isotopic impurity less than 0.08 % of silicon isotopes other than silicon-28 or silicon-30; or
b. Germanium having an isotopic impurity less than 0.08 % of germanium isotopes other than germanium-70, germanium-72, germanium-74, or germanium-76.

3C903 Silicon, silicon oxides, germanium or germanium oxides, containing any of the following:

a. Silicon having an isotopic impurity less than 0.08 % of silicon isotopes other than silicon-28 or silicon-30; or
b. Germanium having an isotopic impurity less than 0.08 % of germanium isotopes other than germanium-70, germanium-72, germanium-74, or germanium-76.

*Note. 3C903 includes "substrates", lumps, ingots, boules and preforms.*

## 3D Software

3D901 "Software" designed to extract "GDSII" or equivalent standard layout data and perform layer-to-layer alignment from Scanning Electron Microscope (SEM) images, and generate multi-layer "GDSII" data or the circuit netlist.

*Note. "GDSII" ("Graphic Design System II") is a database file format for data exchange of integrated circuit artwork or integrated circuit layout artwork.*

3D902 "Software" specially designed for the "use" of equipment specified by 3B901.a.

3D903 "Software" specially designed for the "development" or "production" of equipment specified in 3A901.b or 3B.

## 3E Technology

*Technical Note: a 'Process Design Kit' ('PDK') is a software tool provided by a semiconductor manufacturer to ensure that the required design practices and rules are taken into account in order to successfully produce a specific integrated circuit design in a specific semiconductor process, in accordance with technological and manufacturing constraints (each semiconductor manufacturing process has its particular 'PDK').*

3E901 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials specified in 3A, 3B or 3C.

*Note: 3E901 does not control 'Process Design Kits' ('PDKs') unless they include libraries implementing functions or technologies for items specified in 3A901.*

3E902 "Technology" according to the General Technology Note for the "development" or "production" of integrated circuits or devices, using "Gate all-around Field-Effect Transistor ("GAAFET") structures.

*Note 1: 3E902 includes 'process recipes'.*

*Note 2: 3E902 does not apply for tool qualification or maintenance.*

*Note 3: 3E902 does not control 'Process Design Kits' ('PDKs') unless they include libraries implementing functions or technologies for items specified in 3A001 in Annex I of Regulation (EU) 2021/821 or 3A901 in this Annex.*

*Technical Note: a 'process recipe' is a set of conditions and parameters for a particular process step.*

*Point 5*
**Category 4: Computers**

## 4A Systems, equipment and components

4A901 Quantum computers and related "electronic assemblies" and components therefor, as follows:

a. Quantum computers, as follows:

1. Quantum computers supporting 34 or more, but fewer than 100, 'fully controlled', 'connected' and 'working' 'physical qubits', and having a 'C-NOT error' of less than or equal to $10^{-4}$;
2. Quantum computers supporting 100 or more, but fewer than 200, 'fully controlled', 'connected' and 'working' 'physical qubits', and having a 'C-NOT error' of less than or equal to $10^{-3}$;
3. Quantum computers supporting 200 or more, but fewer than 350, 'fully controlled', 'connected' and 'working' 'physical qubits', and having a 'C-NOT error' of less than or equal to $2 \times 10^{-3}$;
4. Quantum computers supporting 350 or more, but fewer than 500, 'fully controlled', 'connected' and 'working' 'physical qubits', and having a 'C-NOT error' of less than or equal to $3 \times 10^{-3}$;
5. Quantum computers supporting 500 or more, but fewer than 700, 'fully controlled', 'connected' and 'working' 'physical qubits', and having a 'C-NOT error' of less than or equal to $4 \times 10^{-3}$;
6. Quantum computers supporting 700 or more, but fewer than 1,100, 'fully controlled', 'connected' and 'working' 'physical qubits', and having a 'C-NOT error' of less than or equal to $5 \times 10^{-3}$;
7. Quantum computers supporting 1 100 or more, but fewer than 2,000, 'fully controlled', 'connected' and 'working' 'physical qubits', and having a 'C-NOT error' of less than or equal to $6 \times 10^{-3}$;
8. Quantum computers supporting 2 000 or more 'fully controlled', 'connected' and 'working' 'physical qubits';

b. Qubit devices and qubit circuits, containing or supporting arrays of 'physical qubits', and specially designed for items specified by 4A901.a;
c. Quantum control components and quantum measurement devices, specially designed for items specified by 4A901.a.

*Note 1. 4A901 applies to circuit model (or gate-based) and one-way (or measurement-based) quantum computers. This entry does not apply to adiabatic (or annealing) quantum computers.*

*Note 2. Items specified by 4A901 may not necessarily physically contain any qubits. For example, quantum computers based on photonic schemes do not permanently contain a physical item that can be identified as a qubit. Instead, the photonic qubits are generated while the computer is operating and then later discarded.*

*Note 3. Items specified by 4A901.b. include semiconductor, superconducting, and photonic qubit chips and chip arrays; surface ion trap arrays; other qubit confinement technologies; and coherent interconnects between such items.*

*Note 4. 4A901.c. applies to items designed for calibrating, initializing, manipulating or measuring the resident qubits of a quantum computer.*

*Technical Notes. For the purposes of 4A901:*
*1) A 'physical qubit' is a two-level quantum system used to represent the elementary unit of quantum logic by means of manipulations and measurements that are not error corrected. 'Physical qubits' are distinguished from logical qubits, in that logical qubits are error-corrected qubits comprised of many 'physical qubits'.*
*2) 'Fully controlled' means the 'physical qubit' can be calibrated, initialised, gated, and read out, as necessary.*
*3) 'Connected' means that two-qubit gate operations can be performed between any arbitrary pair of the available 'working' 'physical qubits'. This does not necessarily entail all-to-all connectivity.*
*4) 'Working' means that the ‘physical qubit’ performs universal quantum computational work according to the system specifications for qubit operational fidelity.*
*5) Supporting 34 or more ‘fully controlled’, ‘connected’, ‘working’ ‘physical qubits' refers to the capability of a quantum computer to confine, control, measure and process the quantum information embodied in 34 or more 'physical qubits'.*
*6) ‘C-NOT error’ is the average physical gate error for the nearest-neighbour two-‘physical qubit’ Controlled-NOT (C-NOT) gates.*

4A902 Computers, “electronic assemblies” and components containing one or more integrated circuits described in 3A901.c.

*Technical Note. For the purposes of 4A902, computers include “digital computers,” hybrid computers, and analog computers.*

### 4B Test, inspection and production equipment

None.

### 4C Materials

None.

### 4D Software

4D901. "Software" specially designed or modified for the "development" or "production" of items specified by 4A901.b or 4A901.c.

### 4E Technology

4E901. "Technology" according to the General Technology Note for the "development" or "production" of items specified by 4A901.b, 4A901.c or 4D901.

4E902 "Technology" according to the General Technology Note, for the "development", "production" or "use" of equipment or "software" specified in 4A902.

*Point 6*
**Category 5: Telecommunications and "information security"**
None.

*Point 7*
**Category 6: Sensors and lasers**
None.

*Point 8*
**Category 7: Navigation and avionics**
None.

*Point 9*
**Category 8: Marine**
None.

*Point 10*
**Category 9: Aerospace and propulsion**
None.