

# CONTROL LIST OF DUAL-USE CHEMICAL MANUFACTURING FACILITIES AND EQUIPMENT AND RELATED TECHNOLOGY AND SOFTWARE

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## I. MANUFACTURING FACILITIES AND EQUIPMENT

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**Note 1.** The objective of these controls should not be defeated by the transfer of any non-controlled item containing one or more controlled components where the controlled component or components are the principal element of the item and can feasibly be removed or used for other purposes.

**N.B.** In judging whether the controlled component or components are to be considered the principal element, governments should weigh the factors of quantity, value, and technological know-how involved and other special circumstances which might establish the controlled component or components as the principal element of the item being procured.

**Note 2.** The objective of these controls should not be defeated by the transfer of a whole plant, on any scale, which has been designed to produce any CW agent or AG-controlled precursor chemical.

**Note 3.** The materials used for gaskets, packing, seals, screws, washers or other materials performing a sealing function do not determine the status of control of the items listed below, provided that such components are designed to be interchangeable.

### 1. Reaction Vessels, Reactors or Agitators

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Reaction vessels or reactors, with or without agitators, with total internal (geometric) volume greater than 0.1 m<sup>3</sup> (100 l) and less than 20 m<sup>3</sup> (20000 l), where all surfaces that come in direct contact with the chemical(s) being processed or contained are made from the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight;
- c. fluoropolymers (polymeric or elastomeric materials with more than 35% fluorine by weight);
- d. glass or glass-lined (including vitrified or enamelled coating);
- e. tantalum or tantalum alloys;
- f. titanium or titanium alloys;
- g. zirconium or zirconium alloys; or
- h. niobium (columbium) or niobium alloys.

Agitators for use in the above-mentioned reaction vessels or reactors; and impellers, blades or shafts designed for such agitators, where all surfaces of the agitator or component that come in direct contact with the chemical(s) being processed or contained are made from the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight;

- c. fluoropolymers (polymeric or elastomeric materials with more than 35% fluorine by weight);
- d. glass or glass-lined (including vitrified or enamelled coating);
- e. tantalum or tantalum alloys;
- f. titanium or titanium alloys;
- g. zirconium or zirconium alloys; or
- h. niobium (columbium) or niobium alloys.

## 2. Storage Tanks, Containers or Receivers

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Storage tanks, containers or receivers with a total internal (geometric) volume greater than 0.1 m<sup>3</sup> (100 l) where all surfaces that come in direct contact with the chemical(s) being processed or contained are made from the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight;
- c. fluoropolymers (polymeric or elastomeric materials with more than 35% fluorine by weight);
- d. glass or glass-lined (including vitrified or enamelled coating);
- e. tantalum or tantalum alloys;
- f. titanium or titanium alloys;
- g. zirconium or zirconium alloys; or
- h. niobium (columbium) or niobium alloys.

## 3. Heat Exchangers or Condensers

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Heat exchangers or condensers with a heat transfer surface area of greater than 0.15 m<sup>2</sup>, and less than 20 m<sup>2</sup>; and tubes, plates, coils or blocks (cores) designed for such heat exchangers or condensers, where all surfaces that come in direct contact with the chemical(s) being processed are made from the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight;
- c. fluoropolymers (polymeric or elastomeric materials with more than 35% fluorine by weight);
- d. glass or glass-lined (including vitrified or enamelled coating);
- e. graphite or carbon-graphite;
- f. tantalum or tantalum alloys;
- g. titanium or titanium alloys;
- h. zirconium or zirconium alloys;
- i. silicon carbide;
- j. titanium carbide; or

k. niobium (columbium) or niobium alloys.

Technical note: carbon-graphite is a composition consisting of amorphous carbon and graphite, in which the graphite content is eight percent or more by weight.

#### 4. Distillation or Absorption Columns

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Distillation or absorption columns of internal diameter greater than 0.1 m; and liquid distributors, vapour distributors or liquid collectors designed for such distillation or absorption columns, where all surfaces that come in direct contact with the chemical(s) being processed are made from the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight;
- c. fluoropolymers (polymeric or elastomeric materials with more than 35% fluorine by weight);
- d. glass or glass-lined (including vitrified or enamelled coating);
- e. graphite or carbon-graphite;
- f. tantalum or tantalum alloys;
- g. titanium or titanium alloys;
- h. zirconium or zirconium alloys; or
- i. niobium (columbium) or niobium alloys.

Technical note: carbon-graphite is a composition consisting of amorphous carbon and graphite, in which the graphite content is eight percent or more by weight.

#### 5. Filling Equipment

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Remotely operated filling equipment in which all surfaces that come in direct contact with the chemical(s) being processed are made from the following materials:

- a. nickel or alloys with more than 40% nickel by weight; or
- b. alloys with more than 25% nickel and 20% chromium by weight.

#### 6. Valves

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Valves with nominal sizes greater than 1.0 cm (3/8") and casings (valve bodies) or preformed casing liners designed for such valves, in which all surfaces that come in direct contact with the chemical(s) being produced, processed, or contained are made from the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight;
- c. fluoropolymers (polymeric or elastomeric materials with more than 35% fluorine by weight);
- d. glass or glass-lined (including vitrified or enamelled coating);
- e. tantalum or tantalum alloys;

- f. titanium or titanium alloys;
- g. zirconium or zirconium alloys;
- h. niobium (columbium) or niobium alloys; or
- i. ceramic materials as follows:
  - 1. silicon carbide with a purity of 80% or more by weight;
  - 2. aluminum oxide (alumina) with a purity of 99.9% or more by weight;
  - 3. zirconium oxide (zirconia).

Technical note: The 'nominal size' is defined as the smaller of the inlet and outlet port diameters.

## 7. Multi-Walled Piping

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Multi-walled piping incorporating a leak detection port, in which all surfaces that come in direct contact with the chemical(s) being processed or contained are made from the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight;
- c. fluoropolymers (polymeric or elastomeric materials with more than 35% fluorine by weight);
- d. glass or glass-lined (including vitrified or enamelled coating);
- e. graphite or carbon-graphite;
- f. tantalum or tantalum alloys;
- g. titanium or titanium alloys;
- h. zirconium or zirconium alloys; or
- i. niobium (columbium) or niobium alloys.

Technical note: carbon-graphite is a composition consisting of amorphous carbon and graphite, in which the graphite-content is eight percent or more by weight.

## 8. Pumps

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Multiple-seal and seal-less pumps with manufacturer's specified maximum flow-rate greater than 0.6 m<sup>3</sup>/h, or vacuum pumps with manufacturer's specified maximum flow-rate greater than 5 m<sup>3</sup>/h (under standard temperature (273 K (0°C)) and pressure (101.3 kPa) conditions), and casings (pump bodies), preformed casing liners, impellers, rotors or jet pump nozzles designed for such pumps, in which all surfaces that come into direct contact with the chemical(s) being processed are made from any of the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight;
- c. fluoropolymers (polymeric or elastomeric materials with more than 35% fluorine by weight);
- d. glass or glass-lined (including vitrified or enamelled coating);

- e. graphite or carbon-graphite;
- f. tantalum or tantalum alloys;
- g. titanium or titanium alloys;
- h. zirconium or zirconium alloys;
- i. ceramics;
- j. ferrosilicon (high silicon iron alloys); or
- k. niobium (columbium) or niobium alloys.

Technical note: carbon-graphite is a composition consisting of amorphous carbon and graphite, in which the graphite content is eight percent or more by weight.

## 9. Incinerators

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Incinerators designed to destroy CW agents, AG-controlled precursors or chemical munitions, having specially designed waste supply systems, special handling facilities, and an average combustion chamber temperature greater than 1000o C, in which all surfaces in the waste supply system that come into direct contact with the waste products are made from or lined with the following materials:

- a. nickel or alloys with more than 40% nickel by weight;
- b. alloys with more than 25% nickel and 20% chromium by weight; or
- c. ceramics.

Technical note: For the listed materials in the above entries, the term 'alloy' when not accompanied by a specific elemental concentration is understood as identifying those alloys where the identified metal is present in a higher percentage by weight than any other element.

## Statement of Understanding

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These controls do not apply to equipment which is specially designed for use in civil applications (for example food processing, pulp and paper processing, or water purification, etc) and is, by the nature of its design, inappropriate for use in storing, processing, producing or conducting and controlling the flow of chemical warfare agents or any of the AG-controlled precursor chemicals.

## II. TOXIC GAS MONITORING SYSTEMS AND THEIR DEDICATED DETECTING COMPONENTS

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Toxic gas monitoring systems and their dedicated detecting components as follows: detectors; sensor devices; replaceable sensor cartridges; and dedicated software therefore

- a. designed for continuous operation and usable for the detection of chemical warfare agents or AG-controlled precursors at concentrations of less than 0.3 mg/m<sup>3</sup>; or
- b. designed for the detection of cholinesterase-inhibiting activity

### III. RELATED TECHNOLOGY

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'Technology', including licenses, directly associated with -

- CW agents;
- AG-controlled precursors; or
- AG-controlled dual-use equipment items,

to the extent permitted by national legislation.

This includes:

- transfer of technology (technical data) by any means, including electronic media, fax or telephone
- transfer of technology in the form of technical assistance.

Controls on 'technology' do not apply to information 'in the public domain' or to 'basic scientific research' or the minimum necessary information for patent application.

The approval for export of any AG-controlled item of dual-use equipment also authorises the export to the same end-user of the minimum 'technology' required for the installation, operation, maintenance or repair of that item.

### IV. SOFTWARE

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Controls on 'software' transfer only apply where specifically indicated in sections I and II above, and do not apply to 'software' which is either:

1. Generally available to the public by being:
  - a. Sold from stock at retail selling points without restriction, by means of:
    - i. Over-the-counter transactions;
    - ii. Mail order transactions;
    - iii. Electronic transactions; or
    - iv. Telephone call transactions; and
  - b. Designed for installation by the user without further substantial support by the supplier; or
2. 'In the public domain'.

### Definition of Terms

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#### 'Basic scientific research'

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Experimental or theoretical work undertaken principally to acquire new knowledge of the fundamental principles of phenomena or observable facts, not primarily directed towards a specific practical aim or objective.

#### 'Development'

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'Development' is related to all phases before 'production' such as:

- design
- design research
- design analysis
- design concepts
- assembly of prototypes
- pilot production schemes
- design data
- process or transforming design data into a product
- configuration design
- integration design
- layouts

#### 'Export'

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An actual shipment or transmission of AG-controlled items out of the country. This includes transmission of technology by electronic media, fax or telephone.

#### 'in the public domain'

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'In the public domain', as it applies herein, means technology that has been made available without restrictions upon its further dissemination. (Copyright restrictions do not remove technology from being in the public domain).

#### 'Microprogramme'

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A sequence of elementary instructions maintained in a special storage, the execution of which is initiated by the introduction of its reference instruction register.

#### 'Production'

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Production means all production phases such as:

- construction
- production engineering
- manufacture
- integration
- assembly (mounting)
- inspection
- testing
- quality assurance

#### 'Programme'

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A sequence of instructions to carry out a process in, or convertible into, a form executable by an electronic computer.

#### 'Software'

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A collection of one or more 'programmes' or 'microprogrammes' fixed in any tangible medium of expression.

#### 'Technology'

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Specific information necessary for the 'development', 'production' or 'use' of a product. The information takes the form of 'technical data' or 'technical assistance'.

### 'Technical assistance'

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May take forms, such as: instruction, skills, training, working knowledge, consulting services. Technical assistance includes oral forms of assistance. Technical assistance may involve transfer of 'technical data'.

### 'Technical data'

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May take forms such as blueprints, plans, diagrams, models, formulae, tables, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories.

### 'Use'

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Operation, installation (including on-site installation), maintenance (checking), repair, overhaul or refurbishing.