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Working document with regard to ecodesign requirements for machine tools and welding equipment, by means of a Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council

Preamble

- (1) Directive 2009/125/EC requires the Commission to set ecodesign requirements for energy-related products that represent significant volumes of sales and trade, that have a significant environmental impact and that present significant potential for improvement in terms of their environmental impact without entailing excessive costs.
- (2) Under Directive 2009/125/EC energy-related products representing significant volumes of sales and trade, having significant environmental impact within the Union and presenting significant potential for improvement in terms of their environmental impact, without entailing excessive costs, are to be covered by an implementing measure or a self-regulation measure regarding ecodesign requirements.
- (3) Following the intentions outlined in the Ecodesign Working Plan 2009-2011¹, as reinforced by the current Ecodesign Working Plan 2016-2019², the Commission carried out a preparatory study to analyse the technical, environmental and economic aspects of welding equipment and machine tool products typically used for industrial purposes. 'Welding equipment' refers to arc welding and allied processes designed for industrial and professional use³. 'Machine tools' refers to computer numerically-controlled machine tools including laser machine tools, comprising one or more main functions, including multi-functional machining centres. Computer numerically-controlled machine tools offer the largest possibilities for potential energy and resource savings. The preparatory study was carried out with stakeholders and interested parties from the Union and third countries, and the results have been made publicly available.
- (4) In addition, an external Impact Assessment study has been carried out, with wide consultation of stakeholders. Its preliminary conclusions were discussed at a Consultation Forum on 6th May 2014, the documents for which are publicly available.

¹ COM/2008/0660 final

² COM(2016)773 final, 30.11.2016

³ As defined in IEC 60974-1: Arc welding equipment – Part 1: Welding power sources. Specifically excluded from the scope of the regulation are arc welding and cutting equipment designed for limited duty operation by laymen, designed in accordance with IEC 60974-6: Arc welding equipment – Part 6: Limited duty equipment.

The 2014 Consultation Forum endorsed, subsequent to recommended refinements to the proposal, the proposed Self-Regulatory Instrument (Voluntary Agreement) proposed by the European machine tool industry's European trade association. However, the European machine tool industry subsequently declined to further pursue this Self-Regulatory Instrument. The 2014 Consultation Forum also recommended the further exploration of the concept of a "points system" approach to setting Ecodesign requirements, which would form part of the future review of the Regulation.

- (5) The environmental aspects of welding equipment products that have been identified as significant for the purposes of the Regulation are energy consumption in the use phase, including when the products are in 'idle' mode, and resource efficiency issues concerning the equipment per se, and the consumables utilised during welding processes. The environmental aspects of machine tool products that have been identified as significant for the purposes of the Regulation are energy consumption in the use phase, including in the various 'off', 'idle', 'standby' and 'activated' states as well as during machining, and resource issues concerning the use of machine tool equipment and peripheral devices forming part of the product, such as cooling, lubrication and ventilation equipment.
- (6) The annual final energy consumption related to welding equipment directly is expected to be in excess of 5 TWh p.a. in 2030, excluding the energy which is used in making the consumables which are used (shielding gases, welding wire, etc). The annual final energy consumption of machine tool products is expected to be c. 65 TWh in 2030. The preparatory study shows that use-phase and various states of idle or standby energy consumption by welding equipment and machine tool products can be significantly reduced.
- (7) The effect of the ecodesign requirements set out in the Regulation is estimated to result by 2030 in annual energy savings of for welding equipment products of 0.65 TWh p.a., corresponding to annual total savings of c 0.25 Mt CO₂ eq. p.a.. The effect of the ecodesign requirements for machine tool products set out in the Regulation may result in 2030 in annual final energy savings of approximately 1.0 TWh p.a. (c. 0.4 Mt CO₂ eq. p.a.), if it initiates the adoption of better practices with regard to the management of the various states of idle or standby energy consumption. By 2040, such savings may increase, depending on the review of the regulation. Resource efficiency savings will be promoted via the material efficiency requirements regarding disassembly, reparability and software compatibility and deletion measures. In addition, regarding resource efficiency, information requirements for welding equipment products (regarding the use of shielding gases during welding, and the quantities of welding wire or filler material used) and machine tool products (via the promotion of more efficient machining methods, and hence less metal wastage). Such resource savings cannot presently be estimated from information currently available, or estimations with any accuracy regarding potential market developments.
- (8) The EU action plan for the Circular Economy⁴ calls for cost-effective improvements on resource efficiency, which has been reinforced by reports addressing the potential for ensuring a longer lifetime for products⁵ and on the Ecodesign Working Plan 2016-

⁴ COM(2015) 614 final

⁵ Durand report (IMCO Committee, European Parliament), 2016/2272(INI), final version A8-0214/2017, PE595.614v02_00, 09.06.2017

2019⁶. Therefore, the Regulation lays down requirements on non-energy related aspects, including disassembly, reparability and extraction of key components, and of critical raw materials, availability of built-in software based data deletion tools and of the latest software version.

- (9) The energy and resource consumption of welding equipment and machine tools products could be reduced by applying existing non-proprietary technologies without an increase in the combined costs of purchasing and operating these products.
- (10) Ecodesign requirements should harmonise energy consumption and resource efficiency requirements for welding equipment and machine tools products throughout the Union, for the internal market to operate better and in order to improve the environmental performance of those products. These requirements need to be revised not later than 2024, in the light of technological evolution, in order to take into account further possibilities for improving these products' performance, and for optimising the operation of the internal market.
- (11) The ecodesign requirements should not affect the functionality or affordability of welding equipment and machine tools products from the end-user's perspective and should not negatively affect health, safety or the environment.
- (12) The introduction of ecodesign requirements should give manufacturers sufficient time to redesign their products subject to the Regulation. The timing should take into account the impact on manufacturers' costs, in particular for small and medium-sized enterprises, while ensuring timely achievement of the objectives of the Regulation.
- (13) Current European Union product-related legislation related to energy, environmental, health and safety and Ecodesign regulations covering the components used in the products within the scope of the Regulation must be complied with, and the scope of the Regulation is intended to prevent any overlap in requirements. However, ambiguities and loopholes between product definitions must be aligned when taking into account the above directives and similar products in the scope of the Regulation, to ensure clarity for manufacturers, importers and end-users.
- (14) Product parameters should be measured and calculated using reliable, accurate and reproducible methods which take into account recognised state-of-the-art measurement and calculation methods, including, where available, harmonised standards adopted by the European standardisation organisations following a request by the Commission, in accordance with the procedures laid down in Regulation (EU) 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation⁷.
- (15) In accordance with Article 8 of Directive 2009/125/EC, the Regulation specifies which conformity assessment procedures apply.
- (16) In order to facilitate compliance checks, manufacturers should provide the information contained in the technical documentation referred to in Annexes IV and V to Directive

⁶ EESC report (Rapporteur Lohan) on the Ecodesign WP 2016-2019, publication of final report and reference pending: see status at: <http://www.eesc.europa.eu/?i=portal.en.nat-opinions.41386> .

⁷ OJ L 316, 14.11.2012, p. 12.

2009/125/EC insofar as that information relates to the requirements laid down in the Regulation.

- (17) In addition to the legally binding requirements laid down in the Regulation, indicative benchmarks for best available technologies should be determined to ensure that information on the life-cycle environmental performance of welding equipment and machine tools products is widely available and easily accessible.
- (18) The measures provided for in the Regulation are in accordance with the opinion of the Committee established under Article 19(1) of Directive 2009/125/EC,

Section 1: Subject matter and scope

1. The Regulation establishes ecodesign requirements for the placing on the market and putting into service of welding equipment.

The Regulation shall apply to electric mains-operated welding equipment and battery-operated welding equipment, including battery-operated welding equipment when operated indirectly from the mains supply via a battery and accumulator.

The Regulation shall also apply to electric welding equipment which is powered by a generator set, in turn powered by liquid or gaseous fuel, without prejudice to the requirements of Regulation (EU) 2016/1628, and Delegated Regulations (EU) 2017/654, (EU) 2017/655 and (EU) 2017/656.

The Regulation shall apply to the following categories of welding equipment and technologies:

- (a) Manual metal arc welding;
- (b) Shielded metal arc welding;
- (c) Cored wire welding;
- (d) Flux cored arc welding;
- (e) Metal active gas/ metal inert gas welding;
- (f) Tungsten inert gas welding;
- (g) Plasma arc cutting;
- (h) Laser welding;
- (i) Laser-arc hybrid welding;
- (j) Multi-functional equipment capable of performing two or more of the above technologies.

However, it shall not apply to the following products:

- (k) Submerged arc welding equipment (arc exceeding 600 A);
 - (l) Limited duty arc welding equipment;
 - (m) Resistance welding equipment;
 - (n) Stud welding equipment.
2. The Regulation also establishes ecodesign requirements for the placing on the market of computer numerically-controlled machine tools including laser machine tools, and non-computer numerically-controlled laser machine tools, which are powered by the electric mains, by off-mains electric supplies or batteries, by a generator set, by hydraulic systems, by pneumatic systems, or combinations of any of these means of power.

Section 2: Definitions

In addition to the definitions set out in Article 2 of Directive 2009/125/EC, the following definitions shall apply for the purposes of the Regulation:

1. 'Welding equipment' means a product that provides all or any of manual, automated or semi-automated welding, brazing, soldering or cutting, via arc welding and allied processes. Welding equipment is stationary or transportable, and consists of linked parts or components, at least one of which moves, and which are joined together to produce coalescence of arbitrary materials by heating them to the welding temperature, with or without the application of pressure or by the application of pressure alone, and with or without the use of filler metal, and with or without the use of shielding gas or gases, using appropriate tools and technologies, resulting in a product of defined geometry.
- (a) Manual metal arc welding means an arc-welding process welding with a coated electrode where the operator's hand controls the travel speed of the welding operation and the rate at which the electrode is fed into the electric arc.
 - (b) Shielded metal arc welding means an arc-welding process whereby coalescence is produced by heating with an electric arc between a covered metal electrode and the workpiece and work area. Shielding is obtained from decomposition of the electrode covering. Pressure is not used and filler metal is obtained from the electrode.
 - (c) Self-shielded flux-cored welding is a wire welding process in which a continuous hollow wire electrode is fed through the welding gun into the weld joint without the need for the use of an external shielding gas to protect the weld pool from contamination. Instead of an external shielding gas, a flux compound contained within the hollow wire reacts with the welding arc to form a gas that protects the weld pool.

- (c) Flux cored arc welding utilises composite tubular filler metal electrodes consisting of a metal sheath and a core of various powdered materials, producing an extensive slag cover on the face of a weld bead. The use of external shield gas(es) may or may not be required.
- (d) Metal inert gas (MIG)/ metal active gas (MAG) welding means types of gas metal arc welding whereby coalescence is produced by heating with an arc between a continuous filler metal (consumable) electrode and the workpiece area. Shielding is obtained entirely from an externally supplied gas, or gas mixture, which is inert (MIG) or active (MAG).
- (e) Tungsten inert gas welding means an arc welding process whereby coalescence is produced by heating with an arc between a single tungsten (non-consumable) electrode and the workpiece area. Shielding is obtained from a gas or gas mixture. Pressure may or may not be used and filler metal may or may not be used.
- (f) Plasma arc cutting means an arc cutting process that uses a constricted arc and removes the molten metal in a high velocity jet of ionized gas (plasma gas) issuing from the constricting orifice. Plasma arc cutting is a direct current electrode negative process.
- (g) Plasma gas means a gas directed into the torch to surround the electrode, which becomes ionized by the arc to form a plasma and issues from the torch nozzle as the plasma jet, and is also sometimes referred to as orifice gas or cutting gas.
- (h) Laser-arc welding means a welding process where welding is carried out by a pulsed laser or constant wave laser. The use of external shield gas(es) may or may not be required.
- (i) Laser-arc hybrid welding means a welding process where welding is carried out by a pulsed laser or constant wave laser together with the use of an electric arc. Coalescence between the workpiece area and the filler metal (consumable) electrode is produced by heat from both the arc and the laser energy sources. The use of external shield gas(es) may or may not be required.
- (j) Shielding gas (also referred to as secondary gas) means a gas that does not pass through the orifice of the nozzle, but instead passes around the nozzle and forms a shield around the electric arc.
- (k) Submerged arc welding equipment (arc exceeding 600 A) means an arc welding process that uses an arc or arcs between a bare metal electrode or electrodes and the weld pool. The arc and molten metal are shielded by a blanket of granular flux on the workpieces. The process is used without pressure and also utilises filler metal from the electrode and sometimes from a supplemental source such as a welding rod, flux, or metal granules.
- (l) Limited duty arc welding equipment means products for arc welding and allied processes that are not designed for industrial and professional use⁸.
- (m) Resistance welding equipment means a thermo-electric process in which heat is generated at the interface of the parts to be joined by passing an electrical

⁸ As defined in IEC 60974-6, Arc welding equipment – Part 6: Limited duty equipment

current through the parts for a precisely controlled time and under a controlled pressure. No consumables such as welding rods or shielding gases are required. ,

- (n) Stud welding equipment means a form of arc welding where capacitive discharge occurs across the consumable calibrated tip of a welding rod. When the negatively-charged tip of the welding rod is in contact with the positively-charged object, the tip explodes and the atmosphere between the rod and object ionizes, causing the material of the rod and object to melt.

- 2. 'Machine tool' means a mechanical device which is fixed and immobile, powered typically by mains electricity, compressed air pneumatic and hydraulic systems, and is used to produce workpieces by selective removal or addition of material, or by mechanical deformation of materials. The operation of a machine tool, such as those designed for processes such as, but not limited to, milling, drilling or perforating, grinding, cutting, turning, laser-operated operations, and multi-functional machining centres combining any or all of the above functions, may be controlled by mechanical or electronic sources.

The Regulation shall apply to computer numerically-controlled machine tools including laser machine tools, which are powered by the electric mains, by off-mains electric supplies or batteries, by hydraulic systems, by pneumatic systems, or combinations of any of these means of power, or by a generator set, in turn powered by liquid or gaseous fuel, without prejudice to the requirements of Regulation (EU) 2016/1628, and Delegated Regulations (EU) 2017/654, (EU) 2017/655 and (EU) 2017/656.

For the purposes of Annexes III to VII, additional definitions are set out in Annexes I and II.

Section 3: Ecodesign requirements and timetable

- 1. The ecodesign requirements for welding equipment and machine tool products are set out in Annexes I and II.
- 2. Ecodesign requirements shall apply in accordance with the following timetable:
 - (a) From 1 January 2021:

Welding equipment products shall comply with the requirements set out in points 2 and 3 of Annex III

Machine tools products shall comply with the requirements set out in points 1 and 2 of Annex IV
 - (b) From 1 January 2023:

Welding equipment products shall comply with the requirements set out in point 1.1. of Annex III
 - (c) From 1 January 2028 welding equipment products shall comply with the requirements set out in point 1.2 of Annex III.

3. Compliance with ecodesign requirements shall be assessed, measured and calculated in accordance with the methods set out in Annex VI.

Section 4: Conformity assessment

1. The conformity assessment procedure referred to in Article 8(2) of Directive 2009/125/EC shall be the internal design control set out in Annex IV to that Directive or the management system set out in Annex V to that Directive.
2. For the purposes of the conformity assessment pursuant to Article 8 of Directive 2009/125/EC, the technical documentation shall contain the information set out in point 3 of Annex III and point 2 of Annex IV to the Regulation.

Section 5: Verification procedure for market surveillance purposes

Member States shall apply the verification procedure set out in Annex IV to the Regulation when performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC to ensure compliance with the requirements set out in Annex II to the Regulation.

Section 6: Indicative benchmarks

The indicative benchmarks for best-performing welding equipment products available on the market at the time of entry into force of the Regulation are set out in Annex V.

Section 7: Review

The Commission shall review the Regulation in the light of technological and standardisation progress and present the result of that review to the Consultation Forum no later than 1 January 2024 (3 years after entry into force of the first requirements). In particular, the review shall assess whether it is appropriate to set specific ecodesign requirements:

- (a) For welding equipment, with regard to the amount of shielding gas used, and for upper limits for emissions to air associated with the use of welding equipment and consumption of welding wire or filler material; also with regard to changes in the limits to power source efficiency and idle state standby;
- (b) For machine tools, with regard to energy efficiency limits during use for various product types, and maximum energy consumption levels during the relevant various stages of off, idle and standby states; also, with regard to the allocation of points related to environmental performance, as a means of setting verifiable minimum requirements and minimum performance levels, and allowing potentially several means for manufacturers and importers to achieve and demonstrate compliance.

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ANNEX I

Definitions applicable to Annexes III, V, VI and VII for Welding Equipment Products

For the purposes of Annexes III, V, VI and VII the following definitions shall apply:

- (1) 'Power source efficiency' means the ratio, expressed in a percentage, of the welding output power at conventional welding conditions and conventional welding load voltages, to the highest power consumption of the supply source.
- (2) 'Idle state' means the operating state in which the power is switched on and the welding circuit is not energised..
- (3) 'Idle state power consumption' is the power demand, in Watts, in idle state.
- (4) 'Highest power consumption' means the maximum power consumption required by a welding process, excluding the power draw from external devices and any auxiliary power supplies.
- (5) 'Cold state' means the state of the power source after a necessary cool-down period, at which any fans or cooling pumps present have stopped, and after the power source has switched into a low energy idle state.
- (6) 'Power source' means a device that utilises alternating current (AC) to either power one or more AC power outputs, or which converts alternate current (AC) or direct current (DC) input power to one or more DC power outputs, for the purpose of powering a welding equipment product.
- (6) 'Component' means a part which normally cannot be taken apart without destruction or impairment of the use of the component in the overall product, unless readily and economically separable into principal sub-components which may be rapidly disassembled and replaced.

- (7) 'Control panel' means the overall operating interface containing the controls and indicators of electrical, electronic, materials use and measurable emissions parameters between the user of the product and the electronic and electro-mechanical components, inputs and outputs.
- (8) 'Equipment housing' means the protective casing of the product, often constructed from metal and plastics, giving robust protection to the product from the atmosphere, humidity and possible shock impacts, but which must also be able to readily disassembled in order to give access to the components.
- (9) 'Battery' means a device as defined in Article 3 of Directive 2006/66/EC, in the sense also of 'battery pack' or 'industrial battery or accumulator' in the same Article.
- (10) 'Welding torch' means the device which delivers the welding current to the electrode, which may include transferring the current to a consumable electrode, where used, and which also delivers the shielding gas, where used, to the electric arc area.
- (11) 'Gas supply hose' means a supply hose specifically designed for fuel supply of gases (for example, acetylene), compressed air and shielding gases used in welding, normally consisting of a tube and a protective cover, often specific to the gas type used, and sometimes to the operating conditions.
- (12) 'Gas supply regulator' means the device which reduces the higher pressure of the supplied compressed gases (normally provided in cylinders) to the lower pressure that can be safely used in the welding equipment, often equipped with a metering valve or flowmeter to measure and/ or control gas flow.
- (13) 'Welding wire or filler material drive' means a device to feed welding wire or filler material. For welding wire drives, these may be typically of three types: push, pull or a push-pull combination.
- (14) 'Fan' means a rotary bladed machine that is used to maintain a continuous flow of gas, typically air, passing through it and acts as the internal cooling system for the power source.
- (15) 'Electricity supply cable' means a welding supply cable meeting the requirements of recognised welding cable standards, including insulation performance, specific to the particular needs of the application, as needed (for example, special requirements related to plasma cutting, where applicable) and capable of providing electricity of sufficient performance and safety characteristics.

ANNEX II

Definitions applicable to Annexes IV to VII for Machine Tool Products

For the purposes of Annexes IV to VII the following definitions shall apply:

1.1.1.

- (1) 'Pump' means a device for moving and handling fluids in a machine tool product, including peripheral devices, and may be for moving coolant, lubricant, or metal/ fluid combinations.
- (2) 'Computer Numerically-Controlled (CNC)' means the execution of pre-programmed sequences of machine tool commands by computers, using logic to control the machine tool movements and to perform the required metalworking or woodworking operation, or operations.
- (3) 'Power source(s)' means a device that utilises alternating current (AC) to either power one or more AC power outputs, or which converts alternate current (AC) or direct current (DC) input power to one or more DC power outputs, for the purpose of powering a machine tool product, including peripheral devices.
- (4) 'Equipment housing' means the protective casing of the product, often constructed from metal and plastics, giving robust protection to the product from the atmosphere, humidity and possible shock impacts, but which must also be able to readily disassembled in order to give access to the components.
- (5) 'Motors' means devices both in the sense of Regulation 640/2009/EC and Regulation 4/2014/EU, and other motor devices which may be out of the scope of these regulations as used by machine tools, for example some servo-assisted motors, Variable Speed Drive and brake motors.
- (6) 'Fan' means a rotary bladed machine that is used to maintain a continuous flow of gas, typically air, passing through it and acts as the internal cooling system for the power source.
- (7) 'Complete assemblies providing multi-axes rotation' means the motor-driven shaft and related components that both position and transmits power to a machine tool or hold a workpiece during required multi-axis positioning, rotation and machining operations.
- (8) 'Spindles and associated assemblies for drilling, milling, turning, press, cutting, laser cutting and grinding' means the motor-driven shaft and related components that both position and transmit power to a machine tool or hold a workpiece during the required operations.
- (9) 'Battery' means a device as defined in Article 3 of Directive 2006/66/EC, in the sense also of 'battery pack' or 'industrial battery or accumulator' in the same Article.
- (10) 'Hydraulic pipes and hoses' means supply hoses and pipes specifically designed for the supply of hydraulic fluids used in machine tools.
- (11) 'Compressed air supply pipes and hoses' means supply hoses specifically designed for the supply of compressed air used in machine tools.

- (12) 'Compressed air supply regulator(s)' means the device which reduces the higher pressure of the supplied compressed air (normally provided in cylinders) to the lower pressure that can be safely used in the machine tool and/ or peripheral equipment, often equipped with a metering valve or flowmeter to measure and/ or control gas flow.
- (13) 'Ventilation, air and dust extraction equipment' means the devices used to extract air, dust, wood and metal fragments and particles both in the machine tool and immediate area and in peripheral equipment.
- (14) 'Lubrication equipment' means the devices used to provide lubrication via fluids to the machine tools and the peripheral equipment.
- (15) 'Liquid and air cooling equipment' means the devices used to provide direct and indirect cooling in machine tools and peripheral equipment via air and gaseous fluids, and via oil and other circulating fluids to provide cooling.
- (16) 'Electricity supply cable(s)' means a supply cable meeting the requirements of recognised machinery and machine tool standards, including insulation performance, specific to the particular needs of the application, and capable of providing electricity of sufficient performance and safety characteristics.
- (17) 'Off' state means that the following are turned off: electricity mains supply, machine control, peripheral units, machine processing unit and machine motion; the machine axes are not turning;
- (18) 'Standby with peripheral units off' state means that the following are turned off: peripheral units, machine processing unit and machine motion; the machine axes are not turning; the electricity mains supply and the machine control are turned on;
- (19) 'Standby with peripheral unit on' state means that the following are turned on: electricity mains supply, machine control, peripheral units; the machine processing unit and machine motion unit are turned off; the machine axes are not turning;
- (20) 'Ready for operation' state means that that the following are turned on: electricity mains supply, machine control, peripheral units; the machine processing unit and machine motion unit are on hold; the machine axes are not turning;
- (21) 'Warm up' state means that the following are turned on: electricity mains supply, machine control, peripheral units, machine motion unit; the machine processing unit is turned on, but no machining occurs; the machine axes are moving;
- (22) 'Chip removal circuit' means the system of fluid under pressure to satisfactorily remove from the immediate machining area and to direct the fragments of metal created during the required machining operations to a designated repository.
- (23) 'Processing' state means that the following are turned on: electricity mains supply, in tool change turned on, and is actively machining; the machine axes are moving;
- (24) 'Energy Efficiency Indicator (EEI)' means the following (in $\text{kW}^{-1} \cdot \text{m}^{-3} \cdot \text{h}^{-2}$):

(25)

$$EEI = \frac{n \bullet 4}{E_{vk} \bullet Q_v \bullet S}$$

Where the symbols used represent:

n: number of tool changes (*number.h⁻¹*)

E_{vk}: consumed electrical energy, where *v_k* represents several correction factors regarding tool change and manufacturing cycle, related to machine-specific characteristics (kWh)

Q_v: consumed compressed air (m³)

S: number of spindles (*number*)

And for which a 15-minute test cycle is run, comprising:

- (i) Tool change cycle (7.5 minutes)
- (ii) Simulated manufacturing cycle machining air (3.75 minutes)
- (iii) Stand-by cycle (3.75 minutes)

(25) 'Standard Workpiece Energy Consumption' means the energy consumption required to produce one, two or all three sizes of the standard dimension workpiece, for those machine tool products whose function includes the removal of material¹.

¹ The precise methods for testing and the dimensions of three standard workpieces (to be used according to the relevant size of machine tool product being tested) are cited in Japanese draft standards via ISO/ TC 39/ SC 2 No. 1760: Part 1 (Machining centres), Part 2 (Turning machines and turning centres), Part 3 (Horizontal grinding wheel spindle and reciprocating table type surface grinding machines), Part 4 (Cylindrical grinding machines), Part 5 (Guidelines for integrating environmental aspects into design and development of machine tools).

ANNEX III

Specific ecodesign requirements and Information Provision for welding equipment products only

2. Specific Ecodesign requirements for welding products only on power source efficiency and power consumption in the idle state

- 1.1 From 1 January 2023, for welding equipment products, the power source efficiency at the highest power consumption shall be not less than the values reported in Table 1, and the idle state power consumption shall not exceed the values reported in Table 1.

Table 1 Minimum power source efficiency and maximum idle state power consumption from 1 January 2023

	Minimum power source efficiency at the highest power consumption	Maximum idle power consumption at cold state [W]
Three-phase power sources with direct current (DC) output	85%	50
Single-phase power sources with direct current (DC) output	80%	50
Single-phase and three-phase power sources with alternating current (AC) output	80 %	50

- 1.2 From 1 January 2028, for welding equipment products, the power source efficiency at the highest power consumption shall be not less than the values reported in Table

2, and the idle state power consumption shall not exceed the values reported in Table 2.

Table 2 Minimum power source efficiency and maximum idle state power consumption from 1 January 2028

	Minimum power source efficiency at the highest power consumption	Maximum idle power consumption at cold state [W]
Three-phase power sources with direct current (DC) output	87%	30
Single-phase power sources with direct current (DC) output	82%	30
Single-phase and three-phase power sources with alternating current (AC) output	80%	30

2. Material efficiency requirements for welding equipment products only

From 1 January 2021, manufacturers shall ensure that the following requirements are complied with:

2.1.1. 2.1 Manufacturers shall ensure that the following types of components, when present, can be accessed and removed, such that they may be fully inspected, cleaned, maintained, repaired or upgraded, as required, by third-party maintenance organisations or representatives of the manufacturer or importer, without prejudice to the requirements of Directive 2006/42/EC, as amended:

- (a) Control panel
- (b) Power source(s)
- (c) Equipment housing
- (d) Battery(ies)
- (e) Welding torch
- (f) Gas supply hose(s)

- (g) Gas supply regulator(s)
- (h) Welding wire or filler material drive
- (i) Fan(s)
- (j) Electricity supply cable.

2.1.2. 2.2 Manufacturers shall ensure that joining, fastening or sealing techniques do not prevent the disassembly of the above components. Accessing these components for disassembly shall be ensured by documenting the sequence of dismantling operations needed to access the targeted components, including for each of these operations: type of operation, type and number of fastening technique(s) to be unlocked, and the tool(s) required.

2.1.3. 2.3 Deletion of data stored on potentially reusable welding equipment (e.g. on any hard drives and solid state drives) shall be made possible by securing availability of built-in software based data deletion tool(s).

2.1.4. 2.4 The latest version of software and/ or firmware necessary for upgrading welding equipment shall be made available.

2.5 Manufacturers shall ensure that a clear display is provided on welding equipment products of shielding gas being utilised in litres/ minute, which shall be readily visible to the user of welding equipment during its operation; the display shall also indicate whether the shielding gas use is normal or excessive for the type of operation, with reference to the welding type, schedule and programme.

2.6 Manufacturers shall ensure that a clear display is provided on welding equipment products of welding wire or filler material being utilised in grammes/ minute or equivalently sensitive standardised unit of measurement, which shall be readily visible to the user of welding equipment during its operation; the display shall also indicate whether the welding wire or filler material use is normal or excessive for the type of operation, with reference to the welding type, schedule and programme.

3. Information to be provided by manufacturers and importers of welding equipment products

3.1. From 1 January 2021, the following product information on welding equipment products shall be provided in the instruction manuals for installers and end-users, and on the free-access websites of manufacturers, their authorised representatives and importers:

- (a) product type;
- (b) manufacturer's name, registered trade name and registered trade address at which they can be contacted;
- (c) product model number;
- (d) year of manufacture;

- (e) minimum power source efficiency at the stated highest power consumption point;
- (f) maximum idle power consumption at cold state [Watts];
- (g) information on the data deletion tool(s) referred to in point 2.3 of this Annex;
- (h) tabulated information on expected shielding gas utilisation of the product for representative welding schedules and programmes;
- (i) tabulated information on expected welding wire or filler material utilisation of the product for representative welding schedules and programmes.

3.2 From 1 January 2021, the following product information on welding equipment products shall be made available free of charge by manufacturers, their authorised representatives and importers to third parties dealing with maintenance, repair, reuse and upgrading of welding equipment products (including brokers, spare parts repairers, spare parts providers and third party maintenance) upon registration by the interested third party on a website provided:

- (a) product type;
- (b) manufacturer's name, registered trade name and registered trade address at which they can be contacted;
- (c) product model number;
- (d) year of manufacture;
- (e) information relevant to disassembly;
- (f) information relevant to recycling and disposal at end-of-life;
- (g) information on the data deletion tool(s) referred to in point 2.3 of this Annex;
- (h) information on the latest version of software and/ or firmware referred to in point 2.4 of this Annex;
- (i) total mass per product, expressed in grammes rounded to the nearest integer, of the three most commonly-found listed critical raw materials², if any, and a clear indication of the components in which those critical raw materials are present.

3.3. From 1 January 2021, product information listed in points 1, 2 and 3.1 of this Annex on welding equipment products shall be provided in the technical documentation for the purposes of conformity assessment pursuant to the requirements of Section 4.

² Listed at https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en

ANNEX IV

Specific Ecodesign Requirements and Information Provisions solely for Machine Tool Products

4. Material efficiency requirements for machine tools products only

From 1 January 2021, manufacturers shall ensure that the following requirements are complied with:

4.1.1. 1.1. Manufacturers shall ensure that the following types of components, when present, can be accessed and removed, such that they may be fully inspected, cleaned, maintained, repaired or upgraded, as required, by third-party maintenance organisations or representatives of the manufacturer or importer, without prejudice to the requirements of Directive 2006/42/EC, as amended:

- (a) Pump(s)
- (b) Computer Numerically-Controlled hardware and all electrical and electronic connections
- (c) Power source(s)
- (d) Equipment housing
- (e) Motors
- (f) Fans
- (g) Complete assemblies providing multi-axes rotation
- (h) Spindle and associated assemblies for drilling, milling, turning, press, cutting, laser cutting and grinding
- (i) Battery(ies)
- (j) Hydraulic pipes and hoses
- (k) Compressed air supply pipes and hoses
- (l) Compressed air supply regulator(s)
- (m) Machine-specific ventilation, air and dust extraction equipment
- (n) Machine-specific lubrication equipment
- (o) Machine-specific liquid and air cooling equipment
- (p) Electricity supply cable(s).

1.2 Manufacturers shall ensure that joining, fastening or sealing techniques do not prevent the disassembly of the above components. Accessing these components for

disassembly shall be ensured by documenting the sequence of dismantling operations needed to access the targeted components, including for each of these operations: type of operation, type and number of fastening technique(s) to be unlocked, and the tool(s) required.

- 1.3 Manufacturers shall install a leak detector and an on-demand monitoring system, clearly visible to the machine tool operator during use, for:
 - hydraulic systems, where present
 - pneumatic systems, where present.
- 1.4 Manufacturers shall ensure that minimum 400 Volts inverter systems are utilised in drive units; this must be clearly documented as required in point 2.1(i) of this Annex.
- 4.1.2. 1.5 Deletion of data stored on potentially reusable machine tools products (e.g. on any hard drives and solid state drives) shall be made possible by securing availability of built-in software based data deletion tool(s).
- 4.1.3. 1.6 The latest version shall be made available of software and/ or firmware, necessary for upgrading machine tools products and associated Computer Numerically-Controlled hardware, and to test the functionality and compatibility of different components in the machine tool products.

2. Information to be provided by manufacturers and importers of machine tool products

- 2.1. From 1 January 2021, the following product information on a machine tool product shall be provided in the instruction manuals for installers and end-users, and on the free-access websites of manufacturers, their authorised representatives and importers:
 - (a) product type;
 - (b) manufacturer's name, registered trade name and registered trade address at which they can be contacted;
 - (c) product model number;
 - (d) year of manufacture;
 - (e) total general machine-level power consumption (Watts) of the following operating states, where applicable reported at minimum levels for less precise operations, and maximum levels for high-precision operations:
 - off
 - standby with peripheral units off
 - standby with peripheral units on
 - ready for operation

- warm up;
- (f) Energy Efficiency Indicator;
- (g) IEC Class, where relevant, of each motor used in the machine tool product;
- (h) for each motor used, a declaration that it is equipped with a Variable Speed Drive and/ or regenerative braking; if these features are absent in any motor, an explanation must be provided why these features were not incorporated, with regard to functionality or safety;
- (i) documentation of electrical and electronic properties of all inverter and similar systems used in drive units;
- (j) information on the data deletion tool(s) referred to in point 1.5 of this Annex;
- (k) if a product model is part of a machine tool product family, a list of all model configurations that are represented by the model can be supplied.

If a product model is part of a machine tool product family, the product information required for items (e) to (j) under point 2.1 shall be reported either for the product model or, alternatively, for the low-performance and high-performance configurations of the machine tool product family.

2.2 From 1 January 2021, the following product information on machine tool products shall be made available free of charge by manufacturers, their authorised representatives and importers to third parties dealing with maintenance, repair, reuse and upgrading of machine tool products (including brokers, spare parts repairers, spare parts providers and third party maintenance) upon registration by the interested third party on a website provided:

- (a) product type;
- (b) manufacturer's name, registered trade name and registered trade address at which they can be contacted;
- (c) product model number;
- (d) year of manufacture;
- (e) information relevant to disassembly;
- (f) information relevant to recycling and disposal at end-of-life;
- (g) information on the data deletion tool(s) referred to in point 1.5 of this Annex;
- (h) information on the latest version of software and/ or firmware referred to in point 1.6 of this Annex;

- (i) total mass per product, expressed in grammes rounded to the nearest integer, of the three most commonly-found listed critical raw materials³, if any, and a clear indication of the components in which those critical raw materials are present.
- (j) if a product model is part of a machine tool product family, a list of all model configurations that are represented by the model can be supplied.

If a product model is part of a machine tool product family, the product information required for items (e) to (i) under point 2.2 shall be reported either for the product model or, alternatively, for the low-performance and high-performance configurations of the machine tool product family.

2.3. From 1 January 2021, the following product information on a machine tool product may be provided in the instruction manuals for installers and end-users, and on the free-access websites of manufacturers, their authorised representatives and importers:

- (a) the Standard Workpiece Energy Consumption value, for all machine tool products whose functions are to remove material, such as grinding, cutting, milling operations;
- (b) a Workpiece Energy Consumption value selected by the manufacturer, where one or more non-standard workpieces are more appropriate for the function of the machine tool product, and its intended majority use, or client-specific use; this shall precisely document the workpiece dimensions and required finish levels, expressed in micrometres, and the associated Material Removal Rate expressed in grammes per minute.

2.4. From 1 January 2021, product information listed in points 2.1 and 2.2 on machine tool products shall be provided in the technical documentation for the purposes of conformity assessment pursuant to the requirements of Section 4.

³ Listed at https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en

ANNEX V
**Measurements and calculations for welding equipment and
machine tool products**

5. For the purposes of compliance and verification of compliance with the applicable requirements of the Regulation, measurements and calculations shall be made using harmonised standards, the reference numbers of which have been published in the Official Journal of the European Union, or using other reliable, accurate and reproducible methods which take into account the generally recognised state of the art, and produce results deemed to be of low uncertainty.

2. Welding equipment products and machine tool products shall be tested in their 'as-shipped' configuration, which includes

ANNEX VI

Verification procedure for market surveillance purposes for welding equipment and machine tool products

The verification tolerances defined in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the manufacturer or importer as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

When verifying the compliance of a product model with the requirements laid down in the Regulation pursuant to Article 3(2) of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the following procedure:

1. The Member State authorities shall verify one single unit of the model or model configuration.
2. The model or model configuration shall be considered to comply with the applicable requirements if:
 - (a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and
 - (b) the declared values meet any requirements laid down in the Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values; and
 - (c) when the Member State authorities test the unit of the model or model configuration, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as given in Table 1 of this Annex.
3. If the results referred to in points 2(a) or (b) are not achieved, the model and all model configurations that are covered by the same product information shall be considered not to comply with the Regulation.
4. If the result referred to in point 2(c) is not achieved, the Member State authorities shall select three additional units of the same model or model configuration for testing.
5. The model or model configuration shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values complies with the respective verification tolerances given in Table 1.

6. If the result referred to in point 4 is not achieved, the model and all model configurations that are covered by the same product information shall be considered not to comply with the Regulation.
7. The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision being taken on the non-compliance of the model according to points 3 and 6.

The Member State authorities shall use the measurement and calculation methods set out in Annex V.

The Member State authorities shall only apply the verification tolerances that are set out in Table 1 of this Annex and shall only use the procedure described in points 1 to 7 for the requirements referred to in this Annex. No other tolerances shall be applied.

Table 1— Verification tolerances

<i>Parameters</i>	<i>Verification tolerances</i>
Power source efficiency (%)	The average of the arithmetic averages of efficiency at load conditions as defined in Annex I does not fall below the applicable limit value for minimum power source efficiency by more than 2%
'Off', 'Standby with peripheral units off', 'Standby with peripheral unit on', 'Ready for operation', 'Warm up' and 'Processing' power states (W)	The arithmetic average of cited power states as defined in Annex II does not exceed 10%.

ANNEX VII

Indicative benchmarks for welding equipment products referred to in Section 6

The following indicative benchmarks are identified for the purpose of Part 3, point 2 of Annex I to Directive 2009/125/EC.

They refer to the best available technology at the time of drafting the Regulation.

The indicative benchmarks for the best available technology on the market for welding equipment products are as follows.

Table 2 Benchmark for idle state power, server efficiency and operating condition

Product type	Maximum idle state power consumption at cold state [W]	Power source efficiency (%)
Three-phase power sources with direct current (DC) output	10	92
Single-phase power sources with direct current (DC) output	10	90
Single-phase and three-phase power sources with alternating current (AC) output	10	83