SLOVENSKI STANDARD
SIST EN 17059:2018

01-oktober-2018

Galvanizacijske in anodizirne linije - Varnostne zahteve

Plating and anodizing lines - Safety requirements

Galvanik- und Anodisieranlagen - Sicherheitsanforderungen

Equipement de traitement de finition chimique et électrolytique - Exigences de sécurité

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ICS:

25.220.01	Površinska obdelava in prevleke na splošno	Surface treatment and coating in general

SIST EN 17059:2018 **en,fr,de**

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EUROPEAN STANDARD
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EN 17059

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English Version

Plating and anodizing lines - Safety requirements

Lignes de traitement de surface et d'anodisation - Prescriptions de sécurité

Galvanik- und Anodisieranlagen - Sicherheitsanforderungen

This European Standard was approved by CEN on 18 January 2018.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European foreword

This document (EN 17059:2018) has been prepared by Technical Committee CEN/TC 271 “Surface treatment equipment - Safety”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2018, and conflicting national standards shall be withdrawn at the latest by December 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directives, see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

This European Standard is a type C-standard as stated in EN ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

If provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards.

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1 Scope

This document describes all significant hazards, hazardous situations and events relating to plating and anodizing lines, when used as intended and in compliance with the foreseeable conditions of the manufacturer. In addition, procedures for testing and measuring safety requirements, marking of equipment and minimum operation requirements are specified.

For reference to plating lines and anodizing lines the term plating line is used in this document.

This document applies to the design and construction of plating lines and anodizing lines including their transporter systems for surface treatment of industrial products by means of inorganic or organic electrolytes or by means of other process chemistries.

Plating lines and anodizing lines in terms of this standard are arrangements of process tanks for:

— electrolytic treatment of work pieces (e.g. electrocleaning, passivation, electroetching, burnishing, electrolytic polishing and brightening, drying);

— wet chemical treatment of work pieces (e.g. degreasing, passivation, chemical polishing, etching, pickling, blackening);

— electrolytic and electro-less metal deposition, even on non-metallic work pieces made electrically conductive by corresponding treatment;

— changing of substance composition on the surface of metallic work pieces e.g. burnishing, blackening, phosphatizing, chromating and;

— anodizing (anodic oxidation);

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including rinsing tanks and the corresponding transporter equipment (e.g. transporter systems, handling gantry, bean, etc.), where the products are lifted in and out of tanks.

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This document distinguishes between the following types of plating lines:

— Type 1: manual lines;

— Type 2: semi-automatic lines;

— Type 3: fully automatic lines.

Furthermore, it specifies equipment marking and requirements on user information.

This document does not deal with hazards resulting from plating linesparts above category 1 of PED (Pressure Equipment Directive).

This document is not applicable to:

— transporter systems of carrousel lines (see EN 618 and EN 15095);

— equipment for the preparation and treatment of water and waste water;

— machinery for dip coating and electro-deposition of organic liquid coating material (EN 12581);

— horizontal plating lines (e.g. printed circuit board, etching, reel to reel, continuous plating lines);

— machinery for surface cleaning and surface pre-treatment of industrial items using liquids or vapours (EN 12921-1, EN 12921-2, EN 12921-3, EN 12921-4).

NOTE Machinery for surface cleaning and surface pre-treatment (EN 12921 series) could be part of a plating line.

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2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 179:2008, *Building hardware — Emergency exit devices operated by a lever handle or push pad, for use on escape routes — Requirements and test methods*

EN 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 981:1996+A1:2008, *Safety of machinery — System of auditory and visual danger and information signals*

EN 1037:1995+A1:2008, *Safety of machinery — Prevention of unexpected start-up*

EN 1125:2008, *Building hardware — Panic exit devices operated by a horizontal bar, for use on escape routes — Requirements and test methods*

EN 1127-1:2011, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

EN 1677-1:2000+A1:2008, *Components for slings — Safety — Part 1: Forged steel components, Grade 8*

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EN 1677-2:2000+A1:2008, *Components for slings — Safety — Part 2: Forged steel lifting hooks with latch, Grade 8*

EN 1677-3:2001+A1:2008, *Components for slings — Safety — Part 3: Forged steel self-locking hooks. Grade 8*

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EN 1677-4:2000+A1:2008, *Components for slings — Safety — Part 4: Links, Grade 8*

EN 12921-1:2005+A1:2010, *Machines for surface cleaning and pre-treatment of industrial items using liquids or vapours — Part 1: Common safety requirements*

EN 12921-2:2005+A1:2008, *Machines for surface cleaning and pre-treatment of industrial items using liquids or vapours — Part 2: Safety of machines using water based cleaning liquids*

EN 12921-3:2005+A1:2008, *Machines for surface cleaning and pre-treatment of industrial items using liquids or vapours — Part 3: Safety of machines using flammable cleaning liquids*

EN 12921-4:2005+A1:2008, *Machines for surface cleaning and pretreatment of industrial items using liquids and vapours — Part 4: Safety of machines using halogenated solvents*

EN 13445-1:2014, *Unfired pressure vessels — Part 1: General*

EN 13445-2:2014, *Unfired pressure vessels — Part 2: Materials*

EN 13445-3:2014, *Unfired pressure vessels — Part 3: Design*

EN 13445-4:2014, *Unfired pressure vessels — Part 4: Fabrication*

EN 13445-5:2014, *Unfired pressure vessels — Part 5: Inspection and testing*

EN 13445-8:2014, *Unfired pressure vessels — Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys*

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EN 13480-1:2017, *Metallic industrial piping — Part 1: General*

EN 13480-2:2017, *Metallic industrial piping — Part 2: Materials*

EN 13480-3:2017, *Metallic industrial piping — Part 3: Design and calculation*

EN 13480-4:2017, *Metallic industrial piping — Part 4: Fabrication and installation*

EN 13480-5:2017, *Metallic industrial piping — Part 5: Inspection and testing*

EN 13861:2011, *Safety of machinery — Guidance for the application of ergonomics standards in the design of machinery*

EN 14462:2015, *Surface treatment equipment — Noise test code for surface treatment equipment including its ancillary handling equipment — Accuracy grades 2 and 3*

EN 14597:2012, *Temperature control devices and temperature limiters for heat generating systems*

EN 50110-1:2013, *Operation of electrical installations — Part 1: General requirements*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005)*

EN 61000-6-1:2017, *Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity for residential, commercial and light-industrial environments (IEC 61000-6-1:2016)*

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EN 61000-6-3:2007, *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:2006)*

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EN IEC 61000-6-4:2018, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4:2018)*

EN 61496-1:2013, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2012)*

EN 61496-2:2013, *Safety of machinery — Electro-sensitive protective equipment — Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs) (IEC 61496-2:2013)*

EN 82079-1:2012, *Preparation of instructions for use — Structuring, content and presentation — Part 1: General principles and detailed requirements (IEC 82079-1:2012)*

HD 60364-4-41:2007, *Low-voltage electrical installations — Part 4-41: Protection for safety — Protection against electric shock*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2015)*

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EN ISO 13849-2:2012, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2012)*

EN ISO 13850:2015, *Safety of machinery — Emergency stop function — Principles for design (ISO 13850:2015)*

EN ISO 13856-1:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 1: General principles for design and testing of pressure-sensitive mats and pressure-sensitive floors (ISO 13856-1:2013)*

EN ISO 13856-2:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 2: General principles for design and testing of pressure-sensitive edges and pressure-sensitive bars (ISO 13856-2*:2013*)*

EN ISO 13856-3:2013, *Safety of machinery — Pressure-sensitive protective devices — Part 3: General principles for design and testing of pressure-sensitive bumpers, plates, wires and similar devices (ISO 13856-3:2013)*

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

EN ISO 13943:2017, *Fire safety — Vocabulary (ISO 13943:2017)*

EN ISO 14119:2013, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection (ISO 14119:2013)*

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EN ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards (ISO 14120:2015)*

EN ISO 14122-1:2016, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means and general requirements of access (ISO 14122-1:2016)*

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EN ISO 14122-2:2016, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2016)*

EN ISO 14122-3:2016, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2016)*

EN ISO 14122-4:2016, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2016)*

EN ISO 80079-36:2016, *Explosive atmospheres — Part 36: Non-electrical equipment for explosive atmospheres — Basic method and requirements (ISO 80079-36:2016)*

3 Terms and definitions

For the purpose of this document the terms and definitions given in EN ISO 12100 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

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3.1
draining area
area (e.g. drip tray also as part of the transporter system) where runoff excess chemistry or rinsing liquids from the work piece are collected outside treatment tanks

3.2
additive
admixture added to the coating chemistry at a specified volume ratio

Note 1 to entry: Additives influence the deposition and the coating characteristics of the deposited layers.

3.3
anode
metal in the form of plates, rods, balls (spheres), sections, pellets, billets dipping into the treatment tank and which is suspended at an anode rod or which is filled in baskets attached to an anode hook and suspended, hung or immersed in the tank

Note 1 to entry: The anodes are connected to the positive pole (electroplated coating) of the rectifiers. Anodes used in electrolytic cleaning or process tanks for anodizing are connected to the negative pole of the rectifiers.

Note 2 to entry: Non-dissolvable anodes are metals such as stainless steel, steel, titanium, etc. in form of rods, plates, expanded metal plates serving as pure power-supplying electrodes (positive electrode) or are made of graphite. They do not have the task of emitting metallic atoms to the treatment tank.

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3.4
type of plating lines
are characterized by their different constructions and are distinguished by the following description:

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type 1: manual plating lines;

type 2: semi-automatic lines;

type 3: fully automatic lines

3.5
operating modes
intended operation of type 3 (fully automatic line) plating lines, and, if applicable, type 2 (semi-automatic line) can include the following operating modes:

— automatic mode

  automatic, programmed and continuous mode of the plating lines providing the possibility of manual and automatic loading by means of a transporter system until the program or the operator stops the machine;

— setting mode

  operating mode during which settings for the next working processes are performed;

  Note 1 to entry: The setting mode is also referred to as TIP mode.

— service mode

  operating mode for service and maintenance works; this is an optional operating mode for manual work under restricted operating conditions

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Note 2 to entry: The service mode is also referred to as MANUAL mode.

Note 3 to entry: Other operating modes are possible as long as they meet the safety objectives laid down in the European Directive 2006/42/EC (2006/42/EC, Annex I, chapter 1.2.5).

3.6
thermal load
sum of thermal energies capable of being released (EN ISO 13943) during combustion of all flammable substances associated with machinery and their production including raw and auxiliary materials

3.7
flammable substance
gas, vapour, liquid, solid, or mixtures thereof able to undergo an exothermic reaction with air when ignited

3.8
enclosure
equipment enclosed on all sides with the exception of closable access ports for loading and unloading of work pieces and having access doors and openings for fire protection reasons, e.g. roof openings

3.9
exposure limits
concentration limits of hazardous substances in air required by worker health legislation

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3.10
explosive atmosphere
mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture

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[SOURCE: EN 14034-1:2004+A1:2011, definition 3.4]

3.11
plating line
totality of machinery, i.e. complex installations, which together form the coating or treatment equipment

Note 1 to entry: Metal deposition or surface treatment from inorganic and/or organic liquid electrolytes on the work piece is performed here.

Note 2 to entry: Plating lines may consist of the following units:

— load and unload stations;

— transporter systems consisting of transport hoist with lifting and lowering devices;

— extraction hood at transporter system;

— flight bar including barrel, rack, jig, basket for product reception;

— control system with electrical control panels and switching devices;

— process tanks;

— rinsing baths;

— drying position;

— positions for storage of product carriers, unprocessed work-pieces and finished products;