



# SLOVENSKI STANDARD

## oSIST prEN 17059:2016

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### 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

Ta slovenski standard je istoveten z: prEN 17059

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#### **ICS:**

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## Plating and anodizing lines - Safety requirements

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

Galvanik- und Anodisieranlagen -  
Sicherheitsanforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 271.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (prEN 17059:2016) has been prepared by Technical Committee CEN/TC 271 “Surface treatment equipment - safety”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

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.

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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 European Standard 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 to be specified.

For reference to plating lines and anodizing lines the term machinery is used in this standard.

This standard applies to the design and construction of plating lines and anodizing lines including its transport 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);

including rinsing tanks and the corresponding transporter equipment (hoists), where the products are lifted in and out of tanks.

This standard distinguishes between the following types of plating lines:

Type 1: manual plating lines

Type 2: semi-automatic lines

Type 3: fully automatic lines

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

This standard does not deal with hazards resulting from machinery parts above category 1 of PED.

This standard is not applicable to:

- transport systems of carrousel lines;
- equipment for the preparation and treatment of water and wastewater;
- 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.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 349, *Safety of machinery – Minimum gaps to avoid crushing of parts of the human body*

EN 981, *Safety of machinery – System of auditory and visual danger and information signals*

EN 1037, *Safety of machinery – Prevention of unexpected start-up*

EN 1088, *Safety of machinery – Interlocking devices associated with guards - Principles for design and selection*

EN 1677-1, *Components for slings - Safety - Part 1: Forged steel components, Grade 8*

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

EN 1677-3, *Components for slings - Safety - Part 3: Forged steel self-locking hooks - Grade 8*

EN 1677-4, *Components for slings - Safety - Part 4: Links, Grade 8*

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

EN 12921-2, *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, *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, *Machines for surface cleaning and pretreatment of industrial items using liquids and vapours - Part 4: Safety of machines using halogenated solvents*

EN 13237:2003, *Potentially explosive atmospheres - Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres*

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

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

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

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

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

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

EN 13463-1:2001, *Non-electrical equipment for use in potentially explosive atmospheres - Part 1: Basic method and requirements*

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

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

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

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

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

EN 13856-1, *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)*

EN 13856-2, *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)*

EN 13856-3, *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)*

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

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

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

EN 60204-1, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

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

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

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

EN 61496-1, *Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### **3 Terms and definitions**

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

#### **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

#### **3.2**

##### **additives**

admixtures added to the coating chemistry at a specified volume ratio. Additives influence the deposition and the coating characteristics of the deposited layers

### 3.3

#### **anodes**

metals in the form of plates, rods, balls (spheres), section, pellets, billets dipping into the treatment tank and which are suspended at an anode rod or which are filled in baskets attached to an anode hook and suspended, hung or immersed in the tank. The anodes are connected to the positive pole (electroplated coating) of the rectifiers. Anodes used in electrolytic cleaning or process tanks for anodic oxidation (ELOXAL-procedure) are connected to the negative pole of the rectifiers

Note 1 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). They do not have the task of emitting metallic atoms to the treatment tank.

### 3.4

#### **types**

with respect to possibly different constructions of plating lines, this standard distinguishes between the following types:

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:

#### **3.5.1**

##### **operating mode 1 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

#### **3.5.2**

##### **operating mode 2 setting mode**

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

Note 1 to entry: Operating mode 2 or the setting mode is also referred to as TIP mode.

#### **3.5.3**

##### **operating mode 3 service mode**

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

Note 1 to entry: Operating mode 3 or service mode is also referred to a MANUAL mode.

Note 2 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 (ISO/IEC Guide 52) during combustion of all flammable substances associated with machinery and their production including raw and auxiliary materials

**prEN 17059:2016 (E)****3.7****flammable substance**

gas, vapour, liquid, solid, or mixtures of these 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

**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

[SOURCE: EN 13237:2003, definition 3.37 and 3.38]

**3.11****plating line**

is the totality of machinery, i.e. complex installations, which together form the coating or treatment equipment. Metal deposition or surface treatment from inorganic and/or organic liquid electrolytes on the work piece is performed here

Note 1 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 transport hoist;
- flight bar including barrel, rack, jig, basket for product reception;
- control system with electrical control panels and switching devices;
- process tanks;
- rinsing bath;
- drying position;
- positions for storage of product carriers, unprocessed work-pieces and finished products;
- forced ventilation (inlet and exhaust air system);
- auxiliary equipment such as e.g.: rectifier, filters, pumps and agitators, product motions, heaters, dosing systems, recycling plants, automation systems including switching system

Note 2 to entry: Plating lines can be installed with or without enclosure.

Note 3 to entry: Machinery for surface cleaning and surface per-treatment (EN 12921 series) with its process tanks could be part of a plating line. These process tanks should be distinguished from process tanks from the other plating processes.