



# SLOVENSKI STANDARD

## SIST EN 536:2000

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### Road construction machines - Asphalt mixing plants - Safety requirements

Road construction machines - Asphalt mixing plants - Safety requirements

Straßenbaumaschinen - Asphaltmischanlagen - Sicherheitsanforderungen

Machines pour la construction des routes - Centrales de production de mélanges bitumineux - Exigences de sécurité

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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**EN 536**

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## Road construction machines - Asphalt mixing plants - Safety requirements

Machines pour la construction des routes - Centrales de production de mélanges bitumineux - Exigences de sécurité

Straßenbaumaschinen - Asphaltmischanlagen - Sicherheitsanforderungen

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

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 151 "Construction equipment and building material machines - 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of an identical text or by endorsement, at the latest by October 1999, and conflicting national standards shall be withdrawn at the latest by October 1999.

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 Directive(s), see informative Annex ZA, which is an integral part of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom  
The annex A is normative and contains „Skip system for loading of storage hoppers“,  
the annex B is normative and contains „Access openings“,  
the annex C is normative and contains „Access“,  
the annex D is informative and contains „Examples for asphalt mixing plants and terminology“,  
the annex E is informative and contains „Bibliography“.

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## 0 Introduction

This European Standard is a type-C standard as stated in EN 292-1:1991.

The machinery concerned and the extent to which hazards are covered are indicated in the scope of this standard.

It is intended to revise EN 536:199X at an early date to take account of subsequent standards and legislation.

## 1 Scope

**1.1** This European Standard specifies the safety requirements applicable to stationary and transportable plant for the production of asphalt mixing materials used for the construction and maintenance of traffic routes (roads, highways, airfields, etc.) water retaining works, dam walls, culverts, etc.

- Stationary plant is in a fixed position when in production.
- Transportable plant is capable of being transported generally by road from one production site to another but likewise being fixed in position when in production.

This safety standard applies to the following plant:

- a) Asphalt mixing plant;
- b) Mixing plant for cold materials;
- c) Processing plant for bituminous recycling materials;
- d) Plant for processing of natural asphalt;
- e) Manufacturing plant for mastic asphalt;
- f) Plant for storage of bituminous binders.

**1.2** This European Standard deals with all significant hazards pertinent to asphalt mixing plants, when they are used as intended and under the conditions foreseen by the manufacturer (see clause 4). This European Standard specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards.

**1.3** This European Standard does not apply to machines for the production of concrete.

**1.4** This European Standard does not deal with hazards caused by flammable gases. As soon as information is available it will be included.

**1.5** This European Standard does not deal with hazards caused by mechanical and pneumatic handling equipment, such as belt feeders, screw feeders, apron feeders, rotary valves, belt conveyors, screw conveyors, pneumatic conveyors, compressors and pumps.

NOTE: As soon as applicable European Standards are available, it will be checked if reference could be made to them.

**1.6** This European Standard does not apply to machines which move during the production process.

**1.7** This European Standard applies primarily to machines which are manufactured after the date of approval of the standard by CEN.

## 2 Normative references

This European Standard incorporates by dated or undated references provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- |                       |  |
|-----------------------|--|
| EN 292-1:1991         | Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology   |
| EN 292-2:1991         | Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications  |
| EN 292-2:1991/A1:1995 | Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications  |
| EN 294:1992           | Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs  |
| EN 418:1992           | Safety of machinery - Emergency stop equipment, functional aspects - Principles for design   |
| EN 547-1:1996         | Safety of machinery - Human body measurements - Part 1: Principles for determining the dimensions required for openings for whole body access into machinery |
| EN 547-2:1996         | Safety of machinery - Human body measurements - Part 2: Principles for determining the dimensions required for access openings                               |
| EN 563:1994           | Safety of machinery - Temperatures of touchable surfaces - Ergonomics data to establish temperature limit values for hot surfaces                            |
| EN 746-1:1997         | Industrial thermoprocessing equipment - Part 1: Common safety requirements for industrial thermoprocessing equipment   |
| EN 1037:1995          | Safety of machinery - Prevention of unexpected start-up  |
| EN 1070:1998          | Safety of machinery - Terminology  |
| EN 1088:1995          | Safety of machinery - Interlocking devices associated with guards - Principles for design and selection  |
| EN 60204-1:1997       | Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:1997)   |
| EN 60529:1991         | Degrees of protection provided by enclosures (IP-Code) (IEC 60529:1989)  |

## 3 Definitions - Terminology - Symbols and abbreviations

For the purposes of this European Standard the definitions stated in EN 1070:1998 apply. Additional definitions specially needed for this European Standard are added below:



### 3.1 Batch and continuous production

- Batch production is characterized by the fact that the mixing is carried out by successive batches in a mixer;
- Continuous production is characterised by the fact that the mixing is carried out either in a continuous mixer or in a drum-mixing machine, without interrupting the flow of materials.

### 3.2 Asphalt mixing plant (see D.1, D.2, D.3)

Asphalt mixing plant performs the following functions:

- storage and charging of aggregates;
- measuring out of aggregates;
- drying and heating of aggregates;
- removal of dust from the gases emitted from the dryer;
- reintroduction of reclaimed fines;
- measuring out of hot hydrocarbon binders;
- measuring out of the hot aggregates;
- mixing of the constituents to obtain a homogeneous material;
- storage and charging of materials;
- storage and distribution of hydrocarbon binders;
- storage and use of fuels.

### 3.3 Cold mixing plant (see D.4)

Cold mixing plant performs the following functions:

- measuring out of aggregates;
- measuring out of hydraulic or hydrocarbon binders;
- mixing of the constituents to obtain a homogeneous material;
- storage and distribution of materials;
- storage and distribution of binders.

### 3.4 Recycling units

Recycling units reprocess materials which are taken from the layers removed from the bituminous roadway. These are supplementary machines installed at asphalt mixing plant and ensure:

- the drying and heating of reclaimed bituminous aggregates;
- the measuring out of constituents.

### 3.5 Mastic asphalt plant

Group of machines similar to the mixing plant for hot mix asphalt in which the materials are processed at higher temperatures - up to 250°C - incorporating extra filler and with increased bitumen contents. This plant can be equipped with reheaters for the filler and also storage silos equipped with reheaters and mixers (e.g. stirrers).

### 3.6 Storage tanks

Storage tanks for the hot hydrocarbon binders are positioned adjacent to the plant and perform the following functions:

- maintaining hydrocarbon binders at working temperature;
- storage supply and distribution to the mixers and drum mixers.

### 3.7 Control stations

Control stations include panels and consoles; control panels and consoles contain the apparatus for starting and protecting the motors together with automatic and servo-control devices.

## 4 List of significant hazards

This clause contains all hazards and hazardous situations, as far as they are dealt with in this European Standard, identified by risk assessments significant for this type of machinery and which require action to eliminate or reduce risk.

The hazards and the numbering of them listed below follow annex A of EN 414:1992.

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**4.1 Mechanical hazards**

( <sup>1</sup> )	Burying	- in bins for delivery or storage by treated or untreated materials
1.1	Crushing	- when erecting machines - in the operating area of skips
1.3	Cutting or severing	- with moving elements of the machines, e.g. . screw conveyors . with the hopper discharge doors
1.5	Drawing-in or trapping	- in the support rollers of rotating drums - on belt conveyors - on ventilator fans - on bucket elevators and slat conveyors - with the moving parts of mixers
1.9	High pressure fluid injection	- flexible piping under hydraulic pressure; hot and flammable fluids in the circuits of thermal oil systems and bitumen distribution systems
1.10	Ejection of parts	- on the material sampling systems
1.11	Loss of stability	- insufficient supporting capability of the foundations - erection of transportable machines
1.12	Falling  Slipping	- into the feed hoppers, the hot stone bins, silos storing the mineral filler or into the binder storage tanks - from walkways - on walkways or access platforms

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**4.2 Electrical hazards**

2.1	Electrical contact (direct or indirect)	- power circuit
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<sup>(1)</sup> Not dealt with in EN 414:1992

**4.3 Thermal hazards**

3.1	Burns from contact or radiation	<ul style="list-style-type: none"> <li>- the heating equipment of dryers, drum mixers and recycling drums and the equipment for heating binders</li> <li>- screens, storage hoppers</li> <li>- piping - especially flexible connections - and, in particular, those carrying hot and flammable products (thermal oil, hydrocarbon binders)</li> <li>- overflow from bitumen tanks</li> </ul>
3.2	Harmful effects by hot environment	<ul style="list-style-type: none"> <li>- maintenance of the drum dryers and mixing drums</li> <li>- changing the screen meshes</li> <li>- maintenance on bag filters</li> <li>- inside the mixing towers</li> </ul>

**4.7 Hazards generated by materials and products (maintenance)**

7.1	Contact with or inhalation of harmful dusts	<p>Maintenance work:</p> <ul style="list-style-type: none"> <li>- in housings for screens and bag filters (5.9)</li> <li>- during the manufacture of special products incorporating harmful additives (5.13)</li> </ul>
7.2	Fire or explosion	<ul style="list-style-type: none"> <li>- in drums as well as in dust filters</li> <li>- in the storage tanks for fluid bitumens and in thermal oil heaters</li> </ul>

**iTeh STANDARD PREVIEW****4.8 Hazards generated by neglecting ergonomic principles**

8.1	Defective posture	<p>SIST EN 536:2000</p> <ul style="list-style-type: none"> <li>- in control cabins (position of the consoles, poor viewing position of the terminals)</li> </ul>
8.4	Inadequate lighting at the control station	<ul style="list-style-type: none"> <li>- poor layout of the control cabin in relation to natural and artificial lighting</li> </ul>