
**Varnost strojev - Varnostne zahteve za fluidne sisteme in njihove
komponente - Hidravlika (prevzet standard EN 982:1996 z metodo platnice)**

Safety of machinery - Safety requirements for fluid power systems and their
components - Hydraulics

Sécurité des machines - Prescriptions de sécurité relative aux systèmes et leur
composants de transmissions hydrauliques et pneumatiques - Hydraulique

Sicherheit von Maschinen - Sicherheitstechnische Anforderungen an
fluidtechnische Anlagen und deren Bauteile - Hydraulik

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Deskriptorji: hidravlični sistemi, hidravlični prenos, hidravlična oprema, krmilne cevi, fluidni tokokrogi, komponente, varnost, zaščita pred poškodbami, nevarnosti, načrtovanje, specifikacije opreme, zaščita, preverjanje, označevanje

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Referenčna številka
SIST EN 982:1998 ((sl), en)

Nadaljevanje na straneh od II do III in od 1 do 23

UVOD

Standard SIST EN 982, Varnost strojev - Varnostne zahteve za fluidne sisteme in njihove komponente - Hidravlika, prva izdaja, 1998, ima status slovenskega standarda in je z metodo platnice prevzet evropski standard EN 982, Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics, 1996.

NACIONALNI PREDGOVOR

Evropski standard EN 982:1996 je pripravil tehnični odbor Evropske organizacije za standardizacijo CEN/TC 114 Safety of machinery. Nacionalni dodatek je pripravil tehnični odbor USM/TC VSN Varnost strojev in naprav.

Ta slovenski standard je dne 1998-11-16 odobril direktor USM.

ZVEZE S STANDARDI

S prevzemom tega evropskega standarda veljajo naslednje zveze:

SIST EN 292-1	Varnost strojev - Osnovni pojmi, splošna načela načrtovanja - 1. del: Osnovna terminologija, metodologija
SIST EN 292 -2	Varnost strojev - Osnovni pojmi, splošna načela načrtovanja - 2. del: Tehnična načela in specifikacije
SIST EN 418	Varnost strojev - Oprema za izklop v sili - Ffunkcionalni vidiki, načela načrtovanja
SIST EN 954-1	Varnost strojev - Krmilni sistemi v zvezi z varnostjo - 1. del: Osnovna načela načrtovanja
SIST EN 1050	Varnost strojev - Načela za oceno tveganja
SIST EN 1070	Varnost strojev - Terminologija

OSNOVA ZA IZDAJO STANDARDARDA

- Slovenski standard SIST EN 982 je z metodo platnice prevzet evropski standard EN 982:1996, kot nacionalni dodatek pa je dodan slovenski prevod 3. poglavja - Definicije

OPOMBE

- Povsod, kjer se v besedilu standarda uporablja izraz "evropski standard", v SIST EN 982:1998 to pomeni "slovenski standard".
- Uvod in nacionalni predgovor nista sestavni del standarda.

Nacionalni dodatek (informativni)

Prevod 3. poglavja: Definicije

Pri uporabi tega standarda se uporabljajo spodaj navedene definicije pojmov in tiste, ki so navedene v EN 1070. Druge definicije, ki se nanašajo na predmet standarda in niso tukaj navedene, so v ISO 5598.

3.1 Fluidna tehnika: Področje tehnike, ki obravnava načine prenosa, pretvarjanja, krmiljenja toka energije in informacije s fluidom pod tlakom.

3.2 Sistem: Skupek med seboj povezanih enot in sklopov za prenos, pretvarjanje in krmiljenje toka energije (moči).

3.3 Sklop: Osnovna enota fluidnotehničnega sistema, ki je sestavljena iz več med seboj povezanih delov in opravlja eno od osnovnih funkcij prenosa, pretvarjanja ali krmiljenja toka energije ali informacije oziroma delovnega medija (na primer valj, motor, ventil, filter).

3.4 Pnevmatika: Tehniška veda, ki obravnava značilne lastnosti in uporabo stisnjenega zraka ali nevtralnih plinov, kot delovni medij za pogon in krmiljenje strojev.

3.5 Najvišji delovni tlak: Najvišji tlak, pri katerem sistem ali njegov del lahko delujeta pri ustaljenem stanju.

3.6 Nazivni tlak: Najvišji tlak (zaokrožen na standardno vrednost), pri katerem sklop lahko deluje ob zahtevani zmogljivosti in trajnosti.

3.7 Ukazni mehanizem: Naprava, ki zagotavlja vhodni signal krmilne enote (na primer odmičnik, tipka, stikalo, prekrmilni tlak).

3.8 Krmilni mehanizem: Naprava, ki zagotavlja vhodni signal sklopa (na primer vzvod, elektromagnet, krmilni ventil).

3.9 Pogonski del: Sklop, ki energijo fluida pretvarja v mehansko delo (na primer motor, valj).

3.10 Cevovod: Sestav togih in/ali gibkih cevi, cevnih priključkov, cevnih spojk in druge cevne armature, ki omogoča povezavo med sklopi.

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EUROPEAN STANDARD

EN 982

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 1996

ICS 23.100.00

Descriptors: hydraulic fluid power, hydraulic transmission, hydraulic equipment, directional control valves, fluid circuits, components, safety, accident prevention, hazards, design, equipment specifications, protection, verification, marking

English version

Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics

Sécurité des machines - Prescriptions de
sécurité relative aux systèmes et leur
composants de transmissions hydrauliques et
pneumatiques - Hydraulique

Sicherheit von Maschinen -
Sicherheitstechnische Anforderungen an
fluidtechnische Anlagen und deren Bauteile -
Hydraulik

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

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 114 "Safety of machinery", 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 1996, and conflicting standards shall be withdrawn at the latest by October 1996.

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).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

It was developed to contribute towards unification of safety regulations and procedures in the various member countries for each aspect dealt within the field of hydraulics for fluid power systems and their components. This Standard utilizes the most recently validated technical information from established technical sources (e.g. CEN, ISO, national standards and European documents).

0 Introduction

This standard is a type B2 standard (according to EN 292-1) and contains the general requirements for hydraulic systems and their components on machinery. For type C standard makers, it is a basis for the development of specific requirements on dedicated machines. If no type C standards are available, it is a basis for the manufacturers when constructing machines that include hydraulic systems and their components.

In developing this standard, safety related requirements out of ISO 4413 were selected as well as additional safety related requirements.

Equivalent safety requirements for pneumatic systems are defined in EN 983 "Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics".

1 Scope

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This standard applies to hydraulic systems and their components on machinery. It identifies hazards and factors which affect the safety of systems and their components when they are put to their intended use.

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The principles specified apply to the design, construction and modification of new systems and their components and aspects of use including:

- assembly
- installation
- adjustment
- operation
- cleaning
- maintenance.

Components are covered in the standard but only to the extent that safety requirements are given to allow the components to be safely integrated into a system's design.

The standard applies to systems and their components on machinery that are manufactured after the date of the adoption of this standard.

2 Normative references

This European Standard incorporates by dated or undated reference, 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 418	Safety of machinery - Emergency stop equipment, functional aspects - Principles for design
EN 563	Safety of machinery - Temperature of touchable surfaces - Ergonomic data to establish temperature limit values for hot surfaces
prEN 954-1 : 1992	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design
prEN 1050 : 1992	Safety of machinery - Risk assessment
ENV 1070	Safety of machinery - Terminology
prEN 1127-1 : 1993	Safety of machinery - Fire and explosions - Part 1: Explosion prevention and protection
EN 50081-2	Electromagnetic compatibility - Generic emission standard - Part 2: Industrial environment
prEN 50082-2 : 1994	Electromagnetic compatibility - Generic immunity standard - Part 2: Industrial environment
EN 60204-1 : 1992	Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 204-1: 1992, modified)
EN 60529	Degrees of protection provided by enclosures (IP code) (IEC 529: 1989)
ISO 1219-1	Fluid power systems and components - Graphic symbols and circuit diagrams - Part 1: Graphic symbols
ISO/DIS 1219-2 : 1993	Fluid power systems and components - Graphic symbols and circuit diagrams - Part 2: Circuit diagrams
ISO 4021	Hydraulic fluid power - Particulate contamination analysis - Extraction of fluid samples from lines of an operating system
ISO 5598	Fluid power systems and components - Vocabulary

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

3 Definitions

For the purpose of this standard, the definitions of ENV 1070 and the following apply. Other definitions not included are given in ISO 5598.

- 3.1 fluid power:** The means whereby signals and energy can be transmitted, controlled and distributed using a pressurized fluid as the medium.
- 3.2 system:** Arrangement of interconnected components which transmits and controls fluid power energy.
- 3.3 component:** An individual unit (e.g. cylinder, motor, valve, filter) comprising one or more parts designed to be a functional part of a fluid power system.
- 3.4 hydraulics:** Science and technology which deals with the use of a liquid as the fluid power medium.
- 3.5 maximum working pressure:** The highest pressure at which the system or part of the system is intended to operate in steady-state conditions.
- 3.6 rated pressure:** The highest pressure at which the component is intended to operate for a number of repetitions sufficient to assure adequate service life.
- 3.7 operating device:** Device that provides an input signal to a control mechanism (e.g. cam, switch).
- 3.8 control mechanism:** A device that provides an input signal to a component (e.g. lever, solenoid).
- 3.9 actuator:** Component that transforms fluid energy into mechanical energy (e.g. motor, cylinder).
- 3.10 piping:** Any combination of fittings, couplings or connectors with pipes, hoses or tubes which allows fluid flow between components.

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4 List of hazards

The possible hazards associated with the use of hydraulic power in a machine are given in table 1:

Table 1: List of hazards

Hazard type	Relevant clauses			Relevant type B standard or clause in this standard
	EN 292-1: 1991	EN 292-2: 1991	Annex A of EN 292-2: 1991	
4.1 Mechanical hazards - shape - relative location - mass and stability (potential energy of elements) - mass and velocity (kinetic energy of elements) - inadequacy of the mechanical strength - accumulation of potential energy by: - elastic elements (springs), or - liquids or gases under pressure, or - vacuum - leakage	4.2		1.3, 1.4, 1.3.7	5.1.1, 5.1.2, 5.1.3, 5.1.5, 5.1.7, 5.2.1, 5.2.2, 5.2.3, 5.3.1, 5.3.2, 5.3.3, 5.3.4.2, 5.3.4.3, 5.3.4.4, 5.3.4.5, 7.2, 7.3.1
4.2 Electrical hazards				5.1.6, 5.2.1, 5.3.3.3.2 a, EN 60204-1
4.3 Thermal hazards resulting in burns and scalds, by a possible contact of persons, by flames or explosions and also by the radiation of heat sources				5.1.9, 5.1.10, 5.2.1, 5.3.4.6,
4.4 Hazards generated by noise				5.1.8, 5.2.1
4.5 Hazards, especially unintended move-ments, caused by electromagnetic fields		3.7.11	1.5.10, 1.5.11	EN 50081-2, prEN 50082-2
4.6 Hazards generated by materials and sub-stances processed, used and exhausted by machinery			1.5.13	
4.6.1 Hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts				5.3.2.6, 7.1, 7.2
4.6.2 Fire or explosion hazards				5.2.1, 5.3.4.1

Table 1 (concluded)

Hazard type	Relevant clauses			Relevant type B standard or clause in this standard
	EN 292-1: 1991	EN 292-2: 1991	Annex A of EN 292-2: 1991	
4.7 Hazards caused by failure of energy supply, breaking down of machinery parts and other functional disorders	5.2.2	3	1.2	
4.7.1 Failure of energy supply (of energy and/or control circuits) - variation of energy - unexpected start - prevention from stopping if the command has already been given - falling or ejecting of moving parts or pieces held by the machinery - impeded automatic or manual stopping - protection device remains not fully effective	3.16	3.7	1.2.6	5.1.4, 5.1.6, 5.2.1, 5.3.3.2 c, 5.3.3.2 d
4.7.2 Unexpected ejection of machine parts or fluids	4.2.1	3.8, 4	1.3.2, 1.3.3	5.2.1, 5.3.4.3.2
4.7.3 Failure, malfunction of control system (unexpected start up, unexpected overrun)	3.15, 3.16, 3.17	3.7	1.2.7, 1.6.3	prEN 954-1, 5.1.4, 5.1.6, 5.3.3.2, 5.3.5, 5.3.6, 5.3.7
4.7.4 Errors of fitting			1.5.4	5.2.1, 5.2.2, 5.2.3, 5.3.3.1, 5.3.4.2, 5.3.4.3, 5.3.4.5.3, 7.3
4.8 Hazards caused by temporarily missing and/or incorrectly positioned safety related measures/means, for example		4		
4.8.1 Starting and stopping devices		3.7	1.2.3, 1.2.4	5.1.4
4.8.2 Safety signs and signals		3.6.7, 5.2, 5.3, 5.4	1.7.2, 1.7.3	5.3.4.5.1, 7.2
4.8.3 All kinds of information or warning devices		5.4	1.7.0, 1.7.1	5.3.4.1.3, 5.3.4.4.2, 5.3.5.7, 7.3
4.8.4 Energy supply disconnecting devices		6.2.2	1.6.3	5.1.6, 5.3.4.5.2, 7.2
4.8.5 Emergency devices		6.1	1.2.4	EN 418
4.8.6 Essential equipment and accessories for safe adjusting and/or maintaining	3.3, 3.11	3.12, 6.2.1, 6.2.3, 6.2.6	1.1.2 f, 1.1.5	5.1.5, 5.3.2.3, 5.3.4.1.3, 5.3.5.1, 5.3.5.2