

SINGAPORE STANDARD

Specification for personal fall-arrest systems

– Part 2 : Lanyards and energy absorbers

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– Part 2 : Lanyards and energy absorbers

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Institution of Engineers Singapore
Jubilant International Pte Ltd
Ministry of Manpower
PDS International Pte Ltd
QMT Industrial and Safety Pte Ltd
QSS Safety Products (S) Pte Ltd
Singapore Contractors Association Limited
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National Foreword

This Singapore Standard was prepared by the Technical Committee on Personal Safety and Ergonomics under the purview of the General Engineering and Safety Standards Committee.

This standard, which comes in six parts, supersedes the requirements for safety harnesses described in SS 402 : Part 1 : 1997 – ‘Industrial safety belts and harnesses – Part 1 : General requirements’ and SS 402 : Part 2 : 1997 – ‘Industrial safety belts and harnesses – Part 2 : Permanent anchors’. The requirements for safety belts are currently being revised.

The six parts of SS 528, to be read in conjunction, are as follows:

- Part 1 : Full-body harnesses
- Part 2 : Lanyards and energy absorbers
- Part 3 : Self-retracting lifelines
- Part 4 : Vertical rails and vertical lifelines incorporating a sliding-type fall arrester
- Part 5 : Connectors with self-closing and self-locking gates
- Part 6 : System performance tests

This part of SS 528 is identical with ISO 10333-2 : 2000 – ‘Personal fall-arrest systems – Part 2 : Lanyards and energy absorbers’, published by the International Organization for Standardization.

Attention is also drawn to the following:

1. Where the words ‘International Standard’ appear, they should be interpreted as ‘Singapore Standard’.
2. The comma has been used throughout as a decimal marker in ISO 10333-2, whereas in Singapore Standards it is a practice to use a full-point on the baseline as the decimal marker.
3. The reference to International Standards shall be replaced by the following Singapore Standards:

International Standard	Corresponding Singapore Standard
ISO 10333-1 : 2000	SS 528 : Part 1 : 2006 – Specification for personal fall-arrest systems – Full-body harnesses
ISO 10333-2 : 2000	SS 528 : Part 2 : 2006 – Specification for personal fall-arrest systems – Lanyards and energy absorbers
ISO 10333-3 : 2000	SS 528 : Part 3 : 2006 – Specification for personal fall-arrest systems – Self-retracting lifelines
ISO 10333-4 : 2002	SS 528 : Part 4 : 2006 – Specification for personal fall-arrest systems – Vertical rails and vertical lifelines incorporating a sliding-type fall arrester
ISO 10333-5 : 2001	SS 528 : Part 5 : 2006 – Specification for personal fall-arrest systems – Connectors with self-closing and self-locking gates
Future part 6 to ISO 10333	SS 528 : Part 6 : 2006 – Specification for personal fall-arrest systems – System performance tests

NOTE – At the time of publication of this standard, the ‘future part 6 to ISO 10333’ has already been published as ISO 10333-6 : 2004.

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

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR.*
3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 10333 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10333-2 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 4, *Personal equipment for protection against falls*.

ISO 10333 consists of the following parts, under the general title *Personal fall-arrest systems*:

- *Part 1: Full-body harnesses*
- *Part 2: Lanyards and energy absorbers*
- *Part 3: Self-retracting lifelines*
- *Part 4: Vertical rails and vertical lifelines which incorporate a sliding-type fall arrester*
- *Part 5: Connectors*

The systems performance tests will be the subject of a future part 6 to ISO 10333.

Introduction

In cases where the hazard of falling from a height exists and where, for technical reasons or for work of very short duration, safe access cannot be otherwise provided, it is necessary to consider the use of personal fall-arrest systems (PFAS). Such use should never be improvised and its adoption should be specifically provided for in the appropriate formal provisions for safety in the work place.

PFAS complying with this part of ISO 10333 should satisfy ergonomic requirements and should only be used if the work allows means of connection to a suitable anchor device of demonstrated strength and if it can be implemented without compromising the safety of the user. Personnel should be trained and instructed in the safe use of the equipment and be observant of such training and instruction.

This part of ISO 10333 is based on current knowledge and practice concerning the use of PFAS that incorporate a full body harness as specified in ISO 10333-1.

This part of ISO 10333 presumes that the manufacturer of the PFAS, subsystems or components will, for the sake of consistency and traceability, operate a quality management system which will comply with national and regional regulations in force at the time. Guidance on the form this quality management system may take can be found in ISO 9000 (all parts), *Quality management and quality assurance standards*.

Specification for personal fall-arrest systems – Part 2 : Lanyards and energy absorbers

1 Scope

This part of ISO 10333 specifies requirements, test methods, instructions for use and maintenance, marking, labelling and packaging, as appropriate, for lanyards and energy absorbers.

Lanyards and energy absorbers are used together as a connecting subsystem in personal fall-arrest systems (PFAS) which will be specified in a future International Standard (see ISO 10333-6 in the Bibliography).

Two classes of energy absorbers are specified for the purposes of this part of ISO 10333:

- a) Type 1: used in PFAS where, due to installation, the potential free-fall distance can be limited to a maximum of 1,8 m and, if a fall takes place, the arresting force is limited to a maximum of 4,0 kN;
- b) Type 2: used in PFAS where, due to installation, the potential free-fall distance can be limited to a maximum of 4,0 m and, if a fall takes place, the arresting force is limited to a maximum of 6,0 kN.

This part of ISO 10333 is applicable only to lanyards and energy absorbers limited to single-person use of a total mass not exceeding 100 kg.

NOTE Users of fall-protection equipment whose total mass (including tools and equipment) exceeds 100 kg are advised to seek advice from the equipment manufacturer regarding the suitability of this equipment, which may need additional testing.

For the purposes of this part of ISO 10333, energy absorbers may be supplied integral to a lanyard, integral to a full body harness (FBH), or may be supplied separately.

The scope of this part of ISO 10333 does not extend to:

- a) PFAS that incorporate lanyards without energy absorbers or without a means of energy dissipation;
- b) special lanyards and energy absorbers which are integral (i.e. can only be separated by mutilation or by special tool) to the PFAS components as specified in ISO 10333-4.

This part of ISO 10333 does not specify those additional requirements that would apply when lanyards and energy absorbers are subjected to special conditions of use (where, for example, there exist unusual limitations concerning access to the place of work and/or particular environmental factors). Thus treatments to ensure the durability of the materials of construction (such as heat treatment, anti-corrosion treatment, protection against physical and chemical hazards) are not specified in this part of ISO 10333, but should comply with appropriate International Standards or, failing that, with national standards and other specifications dealing with relevant physical characteristics and/or the safety of users. In particular, when it is considered necessary to test the corrosion resistance of metallic parts of the equipment, reference should be made to ISO 9227.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10333. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO

10333 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1140:1990, *Ropes — Polyamide — Specification.*

ISO 1141:1990, *Ropes — Polyester — Specification.*

ISO 1834:1999, *Short link chain for lifting purposes — General conditions of acceptance.*

ISO 1835:1980, *Short link chain for lifting purposes — Grade M (4), non-calibrated, for chain slings etc.*

ISO 2307:1990, *Ropes — Determination of certain physical and mechanical properties.*

ISO 3108:1974, *Steel wire ropes for general purposes — Determination of actual breaking load.*

ISO 4878:1981, *Textiles — Flat woven webbing slings made of man-made fibre.*

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests.*

ISO 10333-1:—¹⁾, *Personal fall-arrest systems — Part 1: Full body harnesses.*

ISO 10333-4, *Personal fall-arrest systems — Part 4: Vertical rails and vertical lifelines which incorporate a sliding-type fall arrester.*

ISO 10333-5, *Personal fall-arrest systems — Part 5: Connectors.*

ISO 14567, *Personal protective equipment for protection against falls from a height — Single-point anchor devices.*

EN 892:1996, *Mountaineering equipment — Dynamic mountaineering ropes — Safety requirements and test methods.*

EN 1891:1998, *Personal protective equipment for prevention of falls from a height — Low stretch kernmantel ropes.*

¹⁾ To be published.