

Standard Category

1

S1133 A10 **Premises - Stairways and ramps**

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1 Purpose

The purpose of this standard is to define the requirements for determining performance for stairways, steps, fixed ladders, ramps and handrails in all operational London Underground (LU) premises and property.

2 Scope

This standard applies to new and altered stairways, which include public stairways, temporary stairways, fire escape stairways, non-public stairways, fire fighting stairways, steps, fixed ladders, public ramps, non-public ramps, fire escape ramps and temporary ramps.

- Note: For stairways and ramps loading requirements, refer to [S1053](#) 'Civil Engineering – Building and Station Structures'.
- Note: For embankment/cutting step design, refer to [S1054](#) 'Civil Engineering – Earth structures'.
- Note: For ramps to platform humps and platform end ramps, refer also to [S1131](#) Premises – station platforms.
- Note: This standard is supported by [G0133](#) 'Guidance on Stairways and Ramps'.

3 Requirements

3.1 General requirements

- 3.1.1 Stairways, steps, fixed ladders, ramps and handrails shall comply with the Building Regulations and relevant British Standards. Where any conflicts arise between the Building Regulations and this standard, compliance with this standard shall take precedence except where a breach in the law would arise.
- 3.1.2 Guarding to stairways and ramps shall comply with Approved Document Part K of the current Building Regulations. Refer also to [S1132](#) 'Premises - Barriers and Fencing (Non-Lineside)'.
- 3.1.3 Stairways and ramps shall be designed for the location in which they are to be installed. Generally within LU premises this will mean one of four categories or types of requirements:
- a) Public – All locations where the customers have regular access and where the minimum standard is defined in BS 5395-1 and BS 8300. Spatial requirements for public stairways and ramps are defined in LU standard [S1371](#) 'Station planning'.

Note: [S1371](#) 'Station planning' requirements for minimum stair widths and minimum distance between handrails vary from BS 5395-1 and BS 8300. Refer to the notes in S1371 for further clarification.

- a) Staff – Back of house locations where the minimum standard is defined in the current Building Regulations.
- b) Escape – A stair designed solely as a means of escape where the minimum standard is defined in Approved Document Part B of the current Building Regulations.
- c) Maintenance – A stair / ladder / ramp designed solely for access to assets for maintenance purposes where the minimum standard is defined in BS EN ISO 14122.

Note: BS EN ISO 14122 Safety of machinery. Permanent means of access to machinery applies not only to machinery access but dedicated maintenance access to and within buildings.

- 3.1.4 Colours and visual contrast to public stairways and ramps shall be in accordance with the LU Station Design Idiom flashcards and BS 8300. Refer also to [S1351](#) 'Station design' for further requirements on stair and ramp design.
- 3.1.5 The components covered by this standard shall be replaceable as defined in BS ISO 15686-1 & BS ISO 15686-2. The design life for major replaceable components in public areas shall be a minimum of 40 years.

Note: Effective maintenance of stairs should be undertaken to ensure their continued safety.

Stair accidents may result in serious injury and effective maintenance reduces the risk of accidents. In order of frequency, accidents are most likely to be caused by degraded and non-compliant:

nosings, especially the groove, see Figure 1,

finishes,

handrails – position, size and condition,

inconsistent riser heights.

Poor lighting is also a factor in accident risk. Refer to [S1066](#) 'Lighting of London Underground Assets'.

Note: For stair and stair nosing inspection requirements, refer to [PR0012](#) 'Inspection of Buildings'.

Note: For existing public stairways, refer to CIRIA C722 Safer stairs in public places – assessment of existing stairs.

- 3.1.6 The designer shall demonstrate that sustainability has been considered in the selection and specification of materials and finishes to stairways and ramps, in accordance with TfL's Building Research Establishment Environmental Assessment Method (BREEAM) targets.

Note: This will be supported by TfL's Responsible procurement policy, currently in development.

3.2 Public stairs

- 3.2.1 New curved or spiral stairs shall not be used except where replacing a pre-existing asset.
- 3.2.2 Applied stair nosings shall be installed to provide visual contrast to the step and protection of the tread material from wear and damage. Cast metal nosings have a proven track record of performance (refer to Figures 1 and 2), however alternative overlays or nosings may be used provided the performance of the cast stair nosings can be achieved. Whole life costings may be part of this consideration.

Note: Selection of nosings should relate to the level of usage at any particular location. Refer to G0133 'Guidance on Stairways and Ramps' for options.

Note: BS 5395-1 and BS 8300 require a visual contrast to each tread of 50mm to 65mm and each riser of 30mm to 55mm for the full width of the stair.

Note: Heavy Duty London Transport (HDLT) pattern stair nosings as illustrated in G0133 'Guidance on Stairways and Ramps' do not comply with BS 5395-1 and BS 8300 and may only be used for the maintenance of existing stairs.

- 3.2.3 In stairways to sub-surface stations a Station Area Identification (SID) Code shall be fixed on the right hand side of the second riser from the bottom. Refer to [S1035](#) 'Location coding system'.

- 3.2.4 Public stairs shall be protected from the weather.

Note: Consideration should be given to protecting external public escape stairs from the weather.

- 3.2.5 The following parameters shall apply to stair construction:

	Unit	Min	Max
Rise	mm	150	180
Going	mm	300	450
Risers per flight	No	3	20

Table 1 - Parameters applicable to stair construction from BS5395-1

Note: 'The main observation from research and from experience is that the bigger the going is (up to 450mm), the safer the stair is.'

CIRIA C722 Safer stairs in public places – assessment of existing stairs

- 3.2.6 A corduroy hazard warning surface shall be installed in accordance with the Building Regulations Part M, BS 8300 and the Department for Transport Guidance on the use of tactile paving surfaces.

Note: For the purposes of compliance with Building Regulations, public stairs in the London Underground environment are considered to be external 'stepped access' and as such require a corduroy hazard warning surface at the top and bottom landing of a series of flights. Staff, escape and maintenance stairs do not require a warning surface.

3.3 Ramps

- 3.3.1 Ramps in public and staff areas are required to have the appropriate slip resistance, visual contrast with adjacent surfaces and handrails in accordance with this standard, [S1135](#) 'Premises – Finishes' and BS 8300. The exceptions are ramps at the ends of station platforms and ramps associated with platform humps, which do not require handrails.
- 3.3.2 Ramps are defined as any floor with a gradient equal to, or steeper than 1:20. Limits to rise and gradient are defined in BS 8300.
- 3.3.3 Ramps shall not have a gradient steeper than 1:12 except at the ends of station platforms in non-public areas. Such ramps shall have a gradient not steeper than 1:8.
- 3.3.4 No sloping floor in public areas shall have a gradient steeper than 1:40. The exception is where platform accessibility humps or raised platforms are installed. In such cases the gradient of cross-falls may be increased, in accordance with [S1131](#) 'Premises - Station Platforms'.

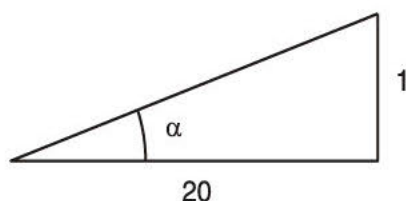
Note: Floors at a slope between 1:40 and 1:20 become increasingly hazardous and this range should be avoided unless there is benefit in having a gradient within this range to improve on low headrooms introduced as a result of raising platform levels.

3.4 Handrails

- 3.4.1 All handrails shall comply with the requirements of BS 5395-1 and BS 8300.
- 3.4.2 There shall be a minimum unobstructed vertical distance of 600mm above the top of the handrail.
- 3.4.3 The finish of the handrail used to achieve the required visual contrast shall be durable.

3.5 Slip resistance

- 3.5.1 The slip resistance for horizontal surfaces on stairs shall achieve a High Risk rating of Pendulum Test Value (PTV) 36 and above as described in S1135 Premises – Finishes, Attachment 2.
- 3.5.2 Pedestrian surfaces on slopes require to have a higher slip resistance than level surfaces. The required slip resistance can be calculated as follows:



Tan α 0.05
 α 2.81
 Extra CoF required 0.05
Extra PTV 5

Going of ramp	Maximum gradient	Maximum rise	Additional coefficient of friction requirement	Approximate PTV for ramp
	level	0mm	0	36
10 metres	1:20	500mm	0.05	41
5 metres	1:15	333mm	0.067	43
2 metres	1:12	167mm	0.083	45

Table 2: Going, gradient, rise and PTV of ramps - examples

Note: The PTV for ramped areas should be calculated using this methodology. For example, a 1:20 ramp needs an additional 0.05 Coefficient of Friction (CoF). To meet the LU standard take the PTV for level flooring and add the additional CoF x 100 to determine the requirement for the ramp. $36 + 5 = 41$ PTV for a ramp of 1:20 gradient.

3.6 Evidence of compliance

Compliance with the requirements of this standard shall be demonstrated to LU by each party contracted to LU. Additionally LU may audit compliance as part of its surveillance regime.

4 Responsibilities

The LU Principal Premises Engineer shall be responsible for creating and maintaining this standard thereby ensuring compliance, whilst identifying opportunities for improvement.

5 Supporting information

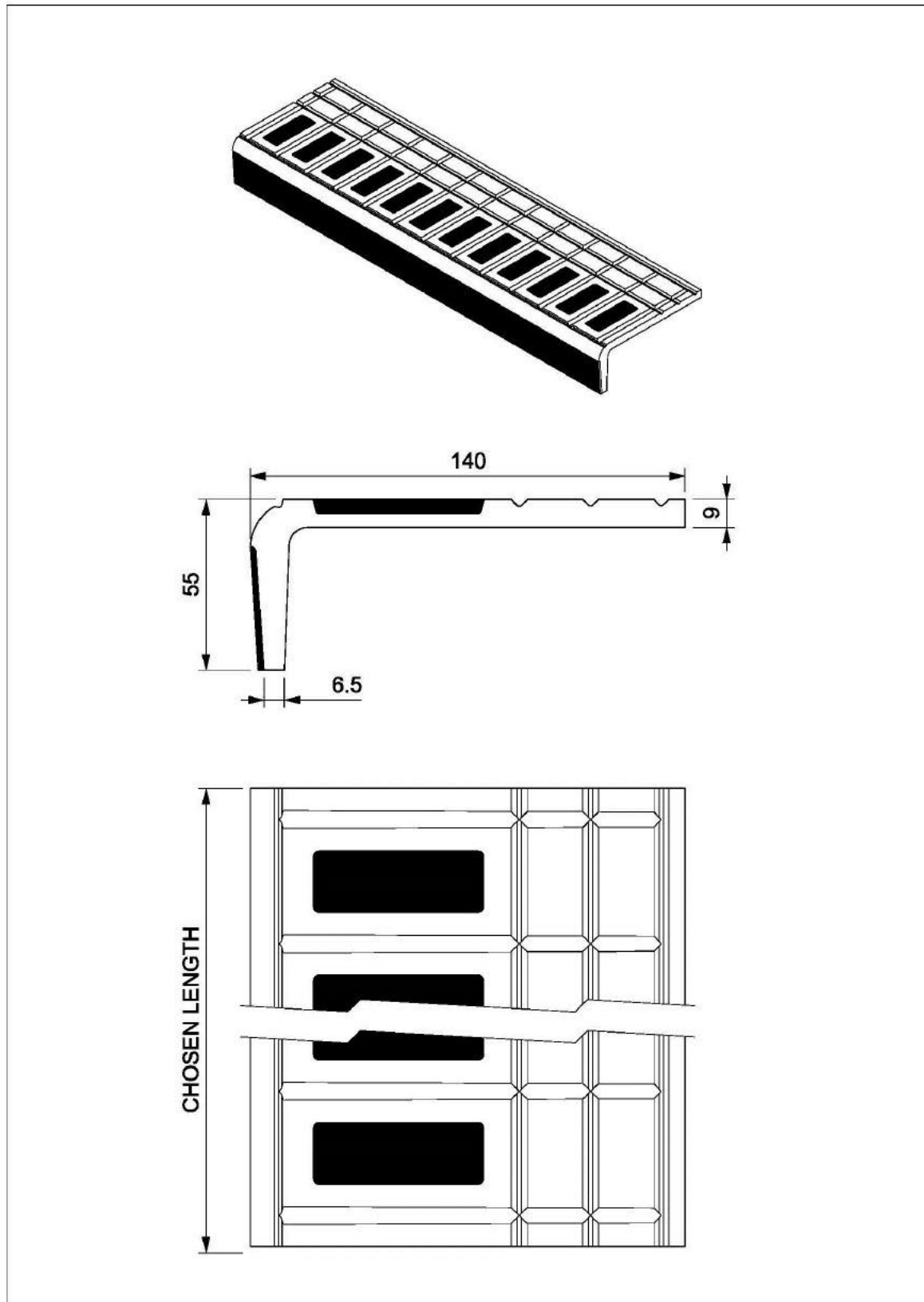


Figure 1 - 140mm cast metal stair nosing (all dimensions in millimetres)

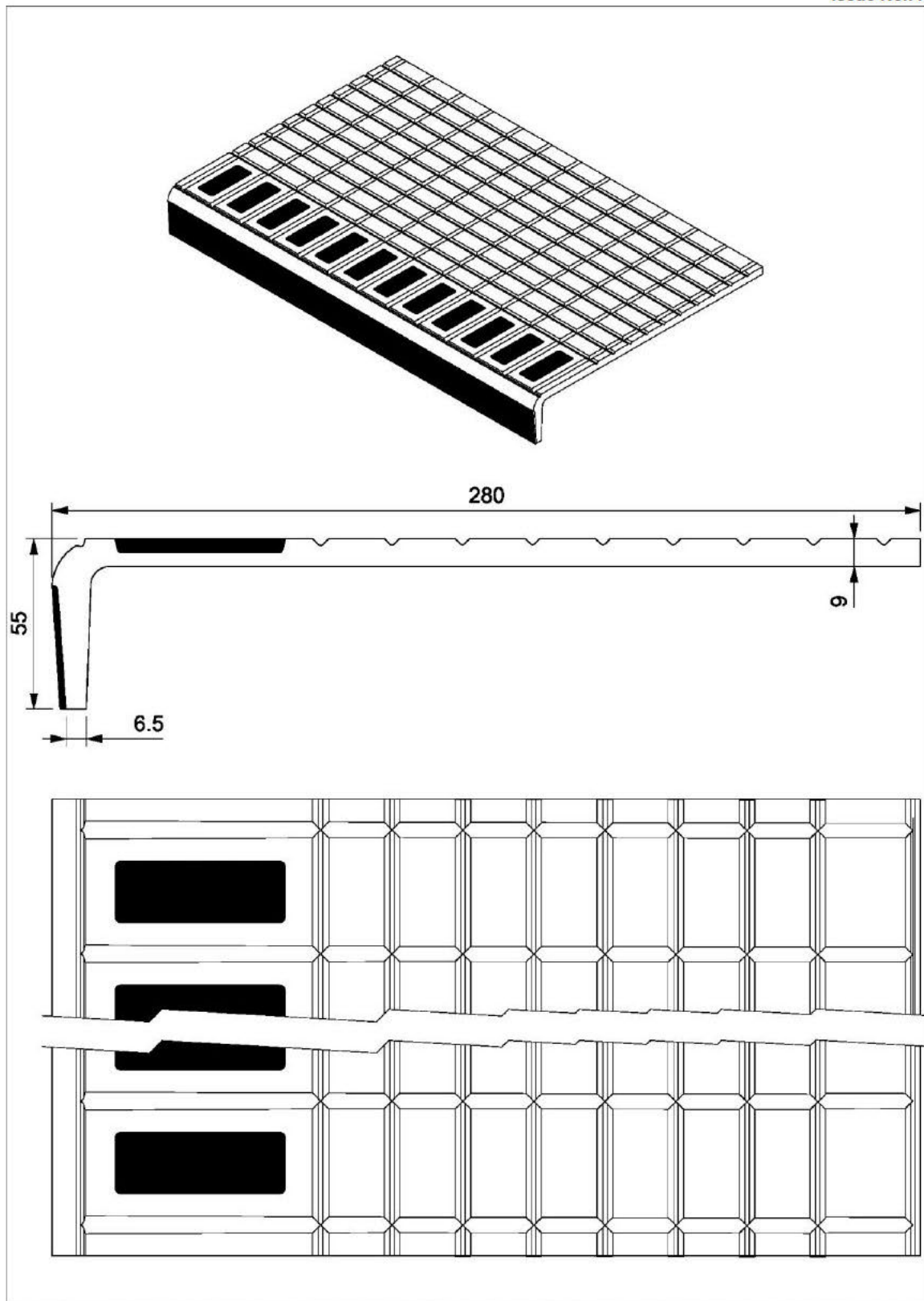


Figure 2 - 280mm cast metal stair nosing (all dimensions in millimetres)

6 Person accountable for this document

Name	Job title
	Principal Premises Engineer

7 Abbreviations

Abbreviation	Meaning
BREEAM	Building Research Establishment Environmental Assessment Method
CoF	Coefficient of Friction
EC	European Commission
LU	London Underground
PTV	Pendulum Test Value
SID	Station Area Identification

8 References

References in the text are made to latest editions unless specific editions are cited.

Note: References to particular EC Directives and Regulations, Acts of Parliament, Statutory Instruments or Common Law are made only if the subject demands them. Users of engineering standards are bound by all the relevant requirements of the law, regardless of whether or not there is any reference to them in the standards.

8.1.1 British Standards

Document no.	Title or URL
BS EN ISO 14122	Safety of machinery. Permanent means of access to machinery
BS ISO 15686-1	Buildings and constructed assets - Service life planning: General Principles
BS ISO 15686-2	Buildings and constructed assets - Service life planning: Service Life prediction procedures
BS 5395-1	Stairs – Part 1: Code of practice for the design of stairs with straight flights and winders.
BS8300-1 and 2	Design of an accessible and inclusive built environment

8.1.2 Industry codes of practice

Document no.	Title or URL
CIRIA C722	Safer stairs in public places – assessment of existing stairs

8.1.3 Other

Document no.	Title or URL
Dept for Transport	Guidance on the use of tactile paving surfaces

8.1.4 TfL company documents

Document no.	Title or URL
S1135	Premises - Finishes
S1132	Premises – Barriers and Fencing (Non-Lineside)
S1371	Station planning
S1351	Station design
S1053	Civil Engineering – Building and Station Structures
S1054	Civil Engineering – Earth structures
S1066	Lighting of London Underground Assets
S1622	Glossary of Terms and Abbreviations
S1035	Location coding system
G0133	Guidance on Stairways and Ramps
PR0012	Inspection of Buildings
LU Customer Experience	LU Station Design Idiom

9 Document history

Issue no.	Date	Changes	Author
A1	October 2007	Standard 2-01107-005 A1 re formatted and re-numbered to 1-133, no technical changes have been made to the content other than changing references to other Standards where their numbers have changed. Authorised for use. Previous authorisation is valid.	
A2	March 2008	Changes after Director led review. Authorised for use.	
A3	November 2008	Clauses 3.3.8, 3.3.9 and 3.4.2 amended to clarify platform humps. Ref PSC M1-01186. Clause 3.5.3 amended. Ref PSC MR1-0123. Clause 3.2.8 and Figure 5 amended. Following TLL request for change and agreement by all parties at the special Engineering Partnership Meeting. Authorised for use.	
A4	January 2009	Clauses 3.2.13, 3.3.14 and 3.3.15 are deleted, ref PSC S1-01226. Headroom requirements for stairs, as well as ticket halls, horizontal circulation and platforms (i.e. Any area in which a public ramp may be located) are set out in Station planning 1-371 – see sections 3.5, 3.10.5, 3.11.7. Authorised for use.	

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A5	February 2009	Clauses 3.3.1 & 3.3.2 amended. Ref PSC S1-01236. Attachment 6.1, cl 3.6.1 Table Number amended. Authorised for use.	
A6	March 2009	Clause 3.3.2 changed to reflect LU and TLL agreed position post PSC comments as a result of Engineering Partnering meeting. Authorised for use.	
A7	May 2009	Updated to address comments from PSC S1-01246. Revised following joint meeting between LU and TLL. Authorised for use.	
A8	October 2010	Updated in accordance with DRACCT Log No 00067 following issuing of new BS 5395-1 Converted into new standards template.	John Caves
A9	March 2014	Standard 1-133 updated, re-formatted and re-numbered to S1133 A9 as per DRACCT No. 01956.	Cindy Marshall
A10	June 2018	Standard S1133 A9 updated as per change No. 05437.	Cindy Marshall