

Australian Standard™

Locksets

Part 4: Padlocks



Documents

Document Sharing Hub

This Australian Standard was prepared by Committee CS-082, Locksets. It was approved on behalf of the Council of Standards Australia on 18 January 2002 and published on 24 April 2002.

The following interests are represented on Committee CS-082:

Architectural Hardware Industry Association
Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Window Association
Housing Industry Association
Locksmiths Guild of Australia
Master Locksmiths Association of Australasia
NSW Police Service
Security Construction and Equipment Committee
University of Western Sydney
Victoria Police

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Australia web site at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Australian Standard*, has a full listing of revisions and amendments published each month.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.com.au, or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 01115.

Australian Standard™

Locksets

Part 4: Padlocks

First published as AS 4145.4—2002.

COPYRIGHT

© Standards Australia International

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia
ISBN 0 7337 4280 7

 **Documents**
Document Sharing Hub

PREFACE

This Standard was prepared by the Standards Australia Committee CS-082, Locksets.

The objective of this Standard is to provide users with design criteria, performance requirements and procedures for testing key lockable and key unlockable padlocks, as well as combination padlocks in conjunction with padlock fittings such as hasps and staples.

Test methods are specified in detail to ensure reproducibility at any testing laboratory and acceptance criteria are defined objectively to ensure consistency of assessment.

This Standard forms Part 4 of the following AS 4145 Series on locksets:

AS

4145 Locksets

4145.1 Part 1: Glossary of terms

4145.2 Part 2: Mechanical locksets for doors in buildings

4145.3 Part 3: Mechanical locksets for windows in buildings

4145.4 Part 4: Padlocks

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	4
1.2 APPLICATION	4
1.3 REFERENCED DOCUMENTS.....	4
1.4 DEFINITIONS.....	5
1.5 SYMBOLS	6
1.6 CLASSIFICATION	6
SECTION 2 DESIGN REQUIREMENTS	
2.1 LOCKING FUNCTION.....	8
2.2 DIMENSIONS TERMINOLOGY	8
2.3 FINISH	8
2.4 KEY SECURITY	8
SECTION 3 PERFORMANCE REQUIREMENTS	
3.1 GENERAL.....	9
3.2 DURABILITY	14
3.3 EASE OF OPERATION—TORQUE TO RELEASE SHACKLE	17
3.4 PHYSICAL SECURITY (STRENGTH).....	17
3.5 KEYING SECURITY	18
3.6 COMBINATION SECURITY	18
SECTION 4 MARKING	19
APPENDICES	
A CLASSIFICATION	21
B TYPICAL TERMS FOR DIMENSIONS OF PADLOCKS.....	22
C SAMPLING AND TEST COMBINATION.....	23
D METHODS FOR THE CYCLIC TESTING OF PADLOCKS	24
E METHODS OF TEST FOR EASE OF OPERATION.....	27
F METHODS OF TESTING FOR THE PHYSICAL SECURITY OF PADLOCKS.....	30
G EXAMPLES OF SUITABLE FIXTURES, GAUGES AND TOOLS TO HOLD PADLOCKS	35

STANDARDS AUSTRALIA
Australian Standard
Locksets

Part 4: Padlocks

S E C T I O N 1 S C O P E A N D G E N E R A L

1.1 SCOPE

This Standard sets out general design criteria, performance requirements and procedures for testing padlocks for their resistance to physical attacks and corrosion under condition of low-frequency to high-frequency usage, interior or exterior.

This Standard also sets out performance requirements for key lockable, key unlockable and non-key lockable and non-key unlockable padlocks.

This Standard applies to padlocks used in conjunction with padlock fittings.

Requirements that relate to —

- (a) physical security are classified under 10 levels, based on performance tests that simulate attack;
- (b) corrosion resistance are classified under five levels, based on standard accelerated corrosion tests; and
- (c) durability are classified under three levels, based on operational tests under condition of low-frequency to high-frequency usage.

NOTE: Picking or impressioning are beyond the scope of this Standard.

1.2 APPLICATION

This Standard is intended for use when assessing the strength, security and durability of padlocks.

In some cases, padlocks may be subject to additional requirements to comply with regulations in the interest of personal safety.

Manipulation tests for keying security shall be conducted in accordance with AS 4145.2.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- | | |
|----------|---|
| 2331 | Methods of test for metallic and related coatings |
| 2331.3.1 | Part 3.1: Neutral salt spray (NSS) test |
| 4145 | Locksets |
| 4145.1 | Part 1: Glossary of terms |
| 4145.2 | Part 2: Mechanical locksets for doors and buildings |

1.4 DEFINITIONS

For the purposes of this Standard, the definitions in AS 4145.1 and those below apply.

1.4.1 Cam

Part of the key mechanisms that operates the locking mechanism.

1.4.2 Combination manipulation

Operation of the coding mechanism to open the lock by trial and error without using force.

1.4.3 Effective differ

Difference between key mechanisms of similar design, achieved only by the movable detainers, which allows each key mechanism to be operated only by its own key. The number of effective differs is equal to the number of theoretical differs after deduction of the undesirables, suppressed by the manufacturer due to technical constraints.

1.4.4 Hasp

Part of the padlock fitting that goes over the staple.

1.4.5 Key lockable/unlockable

A padlock that is actioned by the use of a key.

1.4.6 Key mechanism

Part of the mechanism that recognizes a correct key.

1.4.7 Non-key lockable/unlockable

A padlock that is actioned by means other than a key, e.g. combination.

1.4.8 Padlock

Independent locking device usually comprising a body, a key mechanism, combination mechanism, a locking mechanism, and a shackle.

1.4.9 Padlock fitting

Device fitted to the object that is to be locked with a padlock.

1.4.10 Shackle

Part of the padlock that passes through the staple and secures the padlock fitting.

NOTE: The shackle may have several different appearances (loop, straight, curved, etc.).

1.4.11 Staple

Part of the fitting assembly through which the padlock shackle is passed.

NOTES:

- 1 The staple is an integral part of the overall security system and design, and should be of equivalent security with the chosen padlock.
- 2 If the staple and lock are supplied as a complete assembly, then the staple should be tested.

1.4.12 Wheels

Part of the combination mechanism that activates the locking or unlocking operation of the padlock.

1.5 SYMBOLS

For the purpose of this Standard the following symbols apply:

Symbol	Unit	Definition
d	mm	Diameter of shackle
F1	kN	Push/pull force on cylinder plug/locking mechanism
F2	kN	Pull force on shackle and staple
F3	kN	Cutting force on shackle and staple
M1	Nm	Torque on key to test for interpassing
M2	Nm	Torque on cylinder plug/locking mechanism
M3	Nm	Twisting torque on shackle and staple
n	—	Minimum number of effective key differs
t	—	Drilling/sawing resistance time
T	C	Temperature of product for impact testing
E	J	<i>Joules = weight x height x gravity (impact test)</i>
c	—	Number of cyclic operations
s	—	Second (time unit)

1.6 CLASSIFICATION

1.6.1 General

Padlocks are classified according to the security, corrosion resistance and durability they provide. Classification of padlocks shall be in accordance with the performance criteria given in Appendix A.

1.6.2 Physical security

Ten physical security grades are employed for padlocks. These grades are defined in part by the effective differs and key combinations as shown in Table 3.1.

1.6.3 Durability

Three durability grades are employed for padlocks. The 10 physical security grades are also defined in-part by durability performance as shown in Table 3.1.

1.6.4 Keying security

Keying security designations shall be as specified in AS 4145.2.

1.6.5 Corrosion resistance

Five corrosion grades are employed for padlocks (see Table 1.1). The 10 physical security grades are also defined in-part by resistance to corrosion as shown in Table 3.1.

Products intended for external use shall conform to the minimum requirements for corrosion resistance C4—high resistance.

TABLE 1.1
EXPOSURE ENVIRONMENT

Corrosion resistance category	Exposure environment
C1—very low	Not applicable
C2—low	Environments that are normally dry, including the majority of interiors
C3—moderate	Environments that are sometimes damp in the majority of normal rural and suburban localities, including interiors where condensation may occur
C4—high	Environments that are often wet and/or subject to slight pollution by sulphur dioxide, acid, alkali or salt, including some particularly damp interiors and the majority of exterior environments
C5—very high	Environments in very corrosive localities such as those subject to effect (or combination) of industrial and coastal conditions

NOTE: C5 is for special design applications only.

SECTION 2 DESIGN REQUIREMENTS

2.1 LOCKING FUNCTION

Padlocks shall have the provision to be locked and unlocked by keys or other means.

Either deadlocking, or latching, or both deadlocking and latching shackle functions shall be available.

Where the unlocking operation is performed by key, the padlock may have the provision for the key not to be able to be removed until the shackle is in the closed and locked position.

The locking mechanism may be single- or multi-locking.

For Grades SP8 to SP10 it shall not be possible to remove the key until the shackle is deadlocked in the closed position.

2.2 DIMENSIONS TERMINOLOGY

NOTE: For common dimensions terminology of padlocks, see Appendix B.

2.3 FINISH

A suitable protective coating shall be applied to those internal and external components that are susceptible to corrosion when exposed to corroding agents.

2.4 KEY SECURITY

2.4.1 Identification marks

Any identification marks on the key or keys supplied with any lock or group of locks shall not directly disclose the combination of the key.

2.4.2 Effective key differs (key-operated padlocks)

To guard against the padlock being operated by other keys in the same series, the minimum number of effective key differs shall be as specified in Table 3.1 for the particular grade required.

The manufacturer shall demonstrate the calculations made to establish its key change claim. This supporting data shall include the measurements used to create a unit of difference and the range of key cuts or bittings used in production.

NOTE: Master key systems will reduce the effective number of differs and should not be taken into consideration when testing these.

2.4.3 Effective combinations

For digital or other combination padlocks, only the number of desirable effective combinations shall be quoted (see Table 3.1).

SECTION 3 PERFORMANCE REQUIREMENTS

3.1 GENERAL

3.1.1 Applicable requirements and test sequence

Padlocks shall comply with the performance requirements specified in Clauses 3.2 to 3.6.

The sequence of testing shall be in the order specified in Figure 3.1.

The flow charts shown in Figures 3.2, 3.3, 3.4 and 3.5 illustrate the method of sequence testing of ease for operation, cyclic corrosion and strength (see also Appendix E).

A lock shall be deemed to have passed a specific part of the test regime if it is not capable of being tested.

NOTE: A lock will have passed the test for a hardened steel body if it is not constructed of a hardened steel body. Likewise, if for cylinder protection, the test will not be necessary if it cannot be drilled.

The testing authority shall include in the test report the reason for not having conducted the test.

3.1.2 Performance test samples

Padlocks shall be supplied for testing from normal production stock. The locks shall be tested in 'as received' condition.

3.1.3 Lubrication

Additional lubrication to that applied during manufacture shall be necessary only when specifically provided for in the test method.

3.1.4 Corrosion resistance

After testing for corrosion, the padlock shall operate within the maximum forces plus 20% or, in the case of a combination lock, it shall operate by hand only, using the sequence of testing set out in Figure 3.2.

3.1.5 Tolerances

Unless otherwise stated, the following tolerances shall apply —:

- (a) Force $\pm 2\%$.
- (b) Torque $\pm 2\%$.
- (c) Mass/weight $\pm 2\%$.
- (d) Distance $\pm 2\%$.
- (e) Time $\pm 5s$.
- (f) Temperature $\pm 2^{\circ}C$.

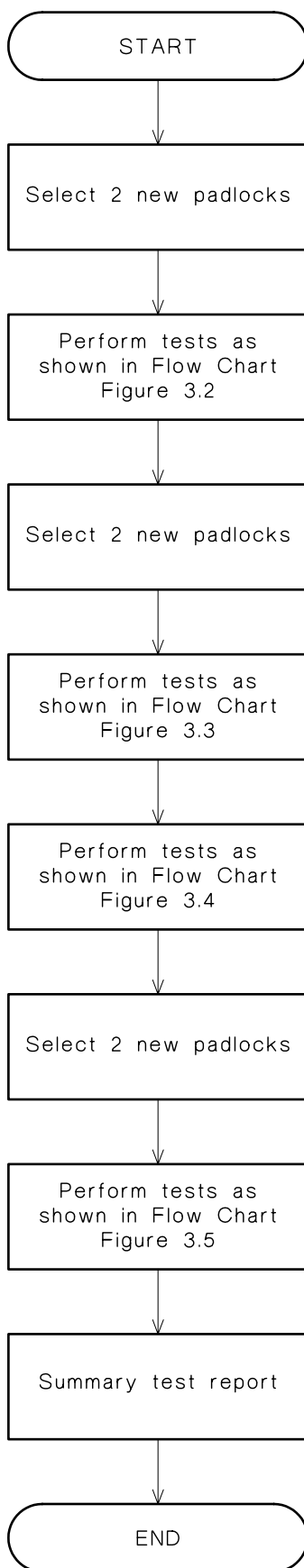


FIGURE 3.1 TEST SEQUENCE

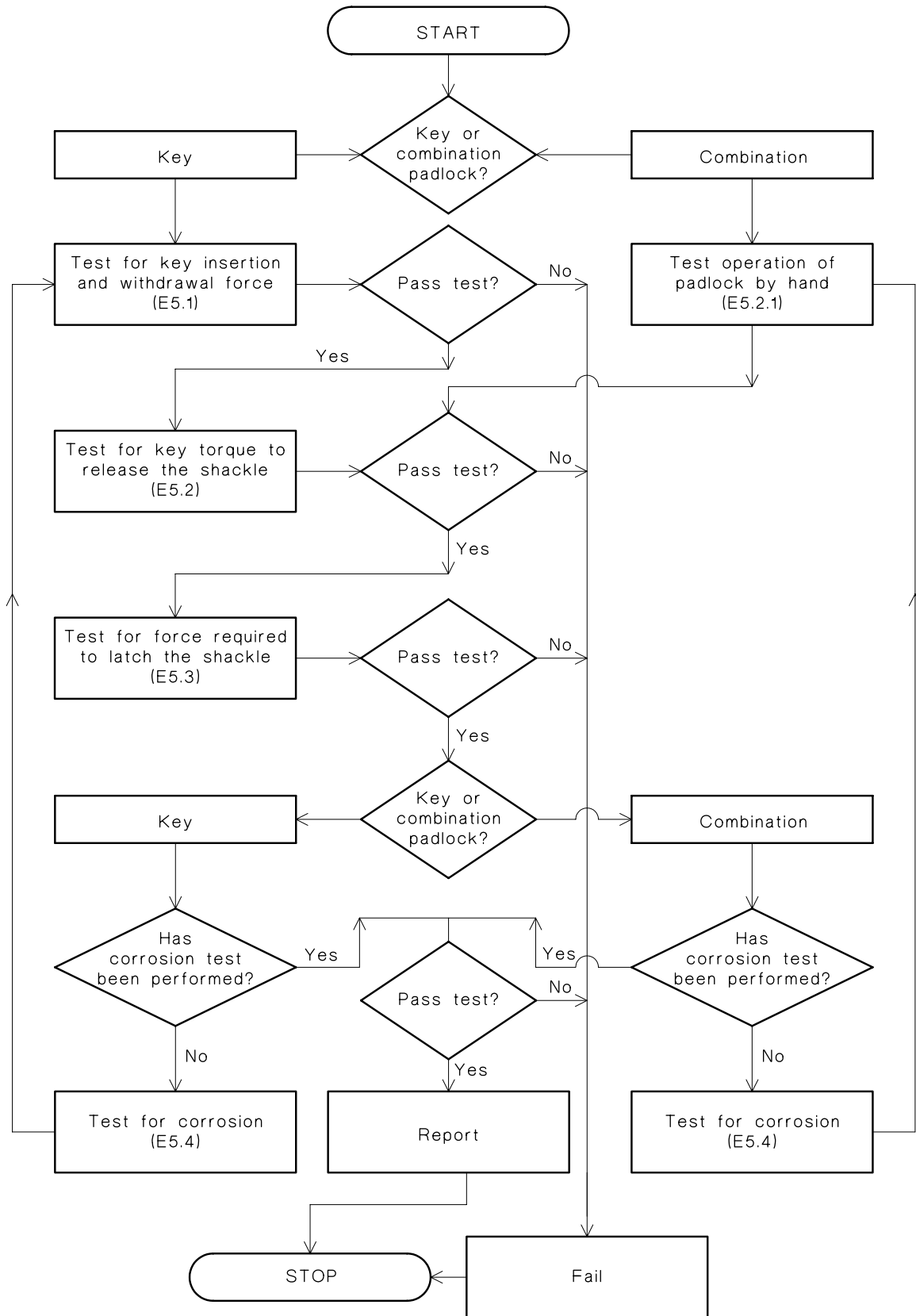


FIGURE 3.2 TEST SEQUENCE FOR EASE OF OPERATION TESTS

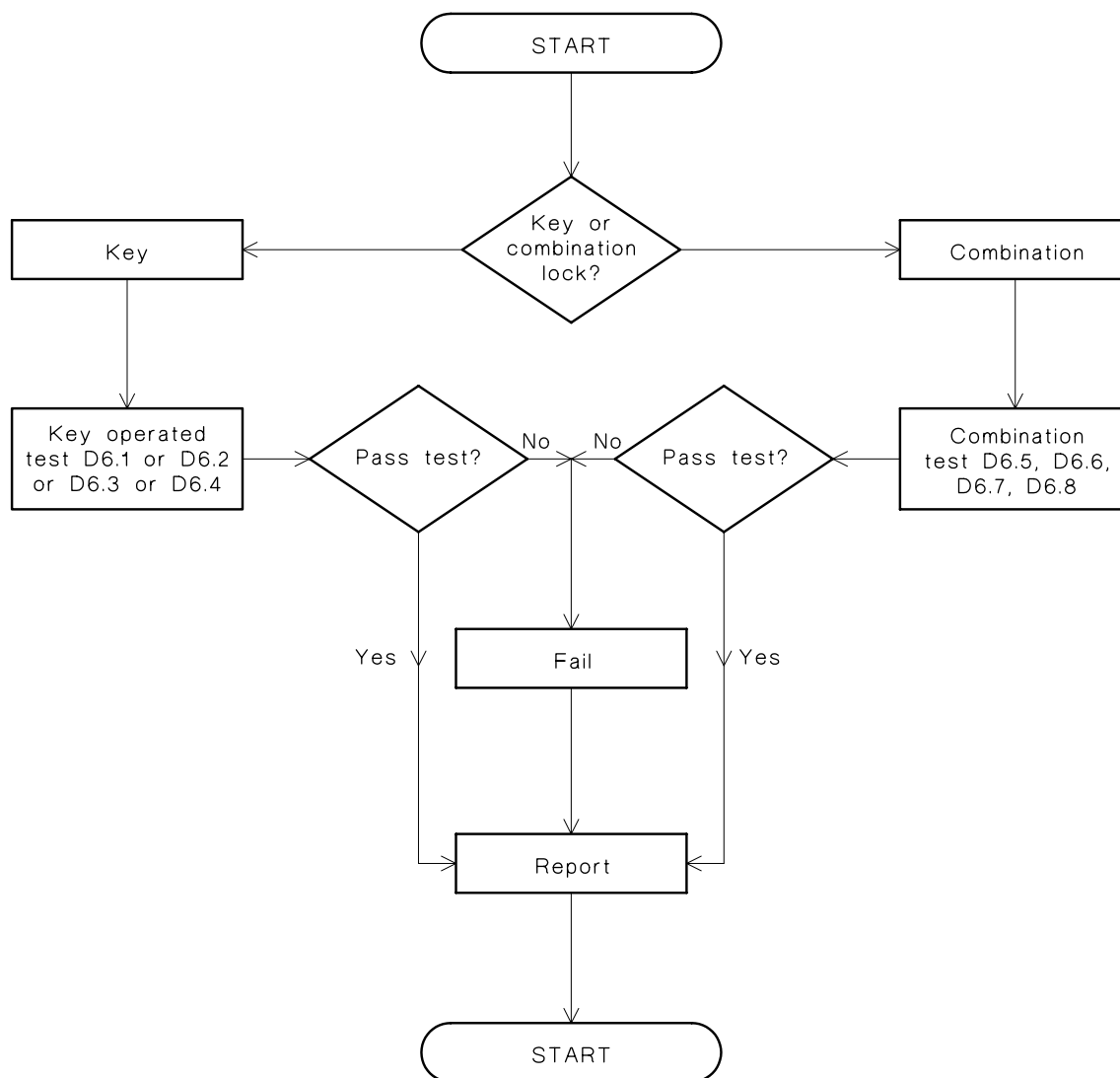


FIGURE 3.3 TEST SEQUENCE FOR DURABILITY CYCLE TESTS