

TECHNICAL REPORT

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General-purpose flat pallets for through transit of goods — Performance requirements

Palettes plates d'usage général pour le transport de marchandises — Exigences de performances

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Foreword

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ISO/TR 10233, which is a technical report of type 2, was prepared by Technical Committee ISO/TC 51, *Pallets for unit load method of materials handling*.

Annex A of this Technical Report is for information only.

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Introduction

In 1979, Technical Committee ISO/TC 51, *Pallets for unit load method of materials handling*, set up Working Group 2, with a brief to produce draft proposals for both methods of test and related performance requirements. Subsequently, in 1981, ISO/TC 51 decided to separate the work on methods from that on performance requirements, setting up Working Group 3 to deal with performance requirements.

Both Working Groups published drafts for consideration at the 9th meeting of ISO/TC 51 in 1983 and, while it was agreed that the document on methods of test should go forward as an International Standard (now published as ISO 8611 : 1988), it was decided that the draft on performance requirements should be prepared as an ISO Technical Report. The view was taken that the proposed performance levels should be further checked in practical use for a period after the publication of ISO 8611 before they were laid down in an International Standard.

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General-purpose flat pallets for through transit of goods — Performance requirements

1 Scope

This Technical Report specifies recommended levels of performance for pallets tested in accordance with ISO 8611. It applies to general-purpose flat pallets intended for through transit of goods.

The performance levels recommended relate to two grades of pallets:

- Grade N ("normal") is a minimum requirement suitable for a large number of pallets in through transit;
- Grade S ("special") is a minimum requirement suitable for a large number of pallets, for example two-way pallets, partial four-way pallets, in through transit.

Annex A gives a tabular summary of the recommended performance levels in relation to the methods of test specified in ISO 8611.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 445 : 1984, *Pallets for materials handling — Vocabulary*.

ISO 6780 : 1988, *General-purpose flat pallets for through transit of goods — Principal dimensions and tolerances*.

ISO 8611 : 1988, *General-purpose flat pallets for through transit of goods — Test methods*.

3 Definitions

For the purposes of this Technical Report, the definitions given in ISO 445 apply.

4 Number of pallets tested

ISO 8611 requires that, when evaluating a pallet in relation to its designed load capacity, a minimum of three replicates shall be tested and the complete sequence of seven tests shall be conducted consecutively in the order given.

The average of the three (or more) results shall be the criterion for assessment, not the individual results. For acceptance of a pallet design, the design shall meet the requirements of the seven tests of this Technical Report.

Complete or partial fracture of any pallet during performance testing to ISO 8611 shall be considered failure to meet the requirements of this Technical Report. This shall apply however large the sample undergoing test.

5 Performance requirements

The symbols x and y are used to identify displacement/deflection measurements in the horizontal and vertical planes respectively, but the actual detail and magnitude varies between tests. For the tests covered in 6.2.3 and 7.2.3, where a third translational plane is defined, z is also used for deflection, and α and β for angular displacement.

For timber pallets, all requirements for maximum/minimum deflections relate to a moisture content of 18 % by mass. Pallets may be tested at moisture contents greater than 18 %.

6 Normal grade pallets (grade N)

When pallets are tested in accordance with ISO 8611, the recommended performance levels for normal grade pallets are as given in 6.1 and 6.2.

6.1 Static tests (see ISO 8611 : 1988, clause 8)

6.1.1 Stacking test (see ISO 8611 : 1988, 8.1)

The change in deformation y shall not exceed 4 mm under full load measured in relation to the 0,25R datum load. During unloading, the change in y shall not exceed 1,5 mm under the 0,25R datum load and recovery shall be attained within 1 h.

6.1.2 Bending test (see ISO 8611 : 1988, 8.2)

The rate of deflection shall decrease during the test and, in addition, the deflection shall not exceed $0,025 l_1$ ($0,025 l_2$) under full load measured in relation to the 0,1R datum load. Recovery shall be attained within 1 h to a value not exceeding $0,01 l_1$ ($0,01 l_2$) measured under the 0,1R datum load.

The distance between the decks, h , shall be 92 mm min. under full test load (related to the requirements of ISO 6780 : 1988, 4.2).

NOTE — Certain pallets manufactured in North America have a minimum distance between the decks, h , of 86 mm under full test load. Such pallets may be used for international through transit of goods (see note to 4.2.1 of ISO 6780 : 1988).

6.1.3 Bottom deck test (see ISO 8611 : 1988, 8.3)

The rate of deflection shall decrease during the test and, in addition, the deflection shall not exceed $0,02 l_3$ ($0,02 l_4$, $0,02 l_5$) measured in relation to the $0,1 R$ datum load. Recovery shall be attained within 1 h to a value not exceeding $0,007 l_3$ ($0,007 l_4$, $0,007 l_5$) measured under the $0,1 R$ datum load.

6.2 Impact tests (see ISO 8611 : 1988, clause 9)

6.2.1 Inclined plane — Shear test (see ISO 8611 : 1988, 9.1.1)

After three impacts, the increase in x at any point on the leading edges shall be 6 mm max. The mean increase in y shall be 4 mm max.

6.2.2 Inclined plane — Top deck edge impact test (see ISO 8611 : 1988, 9.1.2)

After three impacts, the mean increase in x shall be 3 mm max. and in y , 3 mm max.

6.2.3 Inclined plane — Block impact test (see ISO 8611 : 1988, 9.1.3)

After three impacts, the mean of x (combined measurement of block displacement plus indentation depth) shall be 3 mm max., y shall be 3 mm max. and z shall be 3 mm max. At this point after three impacts the angles α and β shall be 5° max.

There is no displacement requirement for circular blocks in relation to x and α .

6.2.4 Corner drop test (see ISO 8611 : 1988, 9.2)

After three drops on the same corner of the same pallet, the change in diagonal y shall be $0,04 y$ max., measured as the mean change for three pallets.

7 Special grade pallets (grade S)

When pallets are tested in accordance with ISO 8611, the recommended performance levels for special grade pallets are as given in 7.1 and 7.2.

7.1 Static tests (see ISO 8611 : 1988, clause 8)

7.1.1 Stacking test (see ISO 8611 : 1988, 8.1)

The change in deformation y shall not exceed 1 mm under full load measured in relation to the $0,25 R$ datum load. During unloading, the change in y shall not exceed 0,5 mm under the $0,25 R$ datum load and recovery shall be attained within 1 h.

7.1.2 Bending test (see ISO 8611 : 1988, 8.2)

The rate of deflection shall decrease during the test and, in addition, the deflection shall not exceed $0,0125 l_1$ ($0,0125 l_2$) under full load measured in relation to the $0,1 R$ datum load. Recovery shall be attained within 1 h to a value not exceeding $0,005 l_1$ ($0,005 l_2$) measured under the $0,1 R$ datum load.

The distance between the decks, h , shall be 95 mm min. under full test load (related to the requirements of ISO 6780 : 1988, 4.2).

NOTE — Certain pallets manufactured in North America have a minimum distance between the decks, h , of 86 mm under full test load. Such pallets may be used for international transit of goods (see note to 4.2.1 of ISO 6780 : 1988).

7.1.3 Bottom deck test (see ISO 8611 : 1988, 8.3)

The rate of deflection shall decrease during the test and, in addition, the deflection shall not exceed $0,01 l_3$ ($0,01 l_4$, $0,01 l_5$) under full load measured in relation to the $0,1 R$ datum load. Recovery shall be attained within 1 h to a value not exceeding $0,004 l_3$ ($0,004 l_4$, $0,004 l_5$) measured under the $0,1 R$ datum load.

7.2 Impact tests (see ISO 8611 : 1988, clause 9)

7.2.1 Inclined plane — Shear test (see ISO 8611 : 1988, 9.1.1)

After three impacts the increase in x at any point on the leading edges shall be 4 mm max. The mean increase in y shall be 2 mm max.

7.2.2 Inclined plane — Top deck edge impact test (see ISO 8611 : 1988, 9.1.2)

After three impacts, the mean increase in x shall be 2 mm max. and in y , 2 mm max.

7.2.3 Inclined plane — Block impact test (see ISO 8611 : 1988, 9.1.3)

After three impacts, the mean of x (combined measurement of block or string displacement plus indentation depth) shall be 3 mm max., y shall be 3 mm max. and z shall be 3 mm max. At this point after three impacts the angles α and β shall be 5° max.

There is no displacement requirement for circular blocks in relation to x and α .

7.2.4 Corner drop test (see ISO 8611 : 1988, 9.2)

After three drops on the same corner of the same pallet, the change in diagonal y shall be $0,04 y$ max. measured as the mean change for three pallets.

Annex A (informative)

Recommended performance requirements

Table A.1 is a summary only; for more detailed information reference should be made to the body of the text.

Table A.1 — Summary of recommended performance requirements

Test	Maximum test load	Length of slide or drop height	Number of times	Maximum permitted deflection		Permitted damage
				N grade	S grade	
Static tests						
Stacking (see 6.1.1 and 7.1.1)	1,1 R	—	1	$y = 4 \text{ mm}$	$y = 1 \text{ mm}$	None
Bending ¹⁾ (see 6.1.2 and 7.1.2)	1,25 R	—	1	$0,025 l_1$ $0,025 l_2$	$0,012 5 l_1$ $0,012 5 l_2$	None
Bottom deck (see 6.1.3 and 7.1.3)	1,15 R	—	1	$0,02 l_1$ $0,02 l_2$	$0,01 l_1$ $0,01 l_2$	None
Impact test						
Inclined plane shear (see 6.2.1 and 7.2.1)	0,075 R	1 m	3	$x = 6 \text{ mm}$ $y = 4 \text{ mm}$	$x = 4 \text{ mm}$ $y = 2 \text{ mm}$	None
Inclined plane top deck (see 6.2.2 and 7.2.2)	0,075 R	1 m	3	$x = 3 \text{ mm}$ $y = 3 \text{ mm}$	$x = 2 \text{ mm}$ $y = 2 \text{ mm}$	None
Inclined plane block (see 6.2.3 and 7.2.3)	0,075 R	750 mm	3	$x = 3 \text{ mm}$ $y = 3 \text{ mm}$ $z = 3 \text{ mm}$	$x = 3 \text{ mm}$ $y = 3 \text{ mm}$ $z = 3 \text{ mm}$	Block indentation
Corner drop ²⁾ (see 6.2.4 and 7.2.4)	Own weight	1 m or 500 mm	1	$\alpha = 5^\circ, \beta = 5^\circ$ $0,04 y$	$\alpha = 5^\circ, \beta = 5^\circ$ $0,04 y$	Local compression

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1) The maximum deflection values given in 6.1.2 and 7.1.2 for the bending test are far in excess of those expected of identical pallets in service. The in-service maximum deflections would be expected to be 25 % to 50 % of those given here when a typical uniformly distributed load is applied to the pallet.

2) With nailed wooden pallets, the results of the corner drop test (see 6.2.4 and 7.2.4) are often sensitive to the tightness of the joints. When assessing corner drop test results, particular emphasis should be placed upon records of moisture content both on assembly and during test and upon ensuring that these are representative of normal manufacture and service. In this test, although damage that renders a pallet unsuitable for its purpose is not acceptable, minor compression damage within 50 mm of the impacted corner is acceptable.

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