
**Pallets for materials handling — Flat
pallets —**

**Part 4:
Procedure for predicting creep
responses in stiffness tests for plastic
pallets using regression analyses**

Palettes pour la manutention — Palettes plates —

*Partie 4: Mode opératoire pour prédire les réponses au fluage
lors des essais de rigidité des palettes en plastique en utilisant des
analyses de régression*

ISO/TS 8611-4:2013

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 51, *Pallets for unit load method of materials handling*.

ISO 8611 consists of the following parts, under the general title *Pallets for materials handling — Flat pallets*:

- *Part 1: Test methods*
- *Part 2: Performance requirements and selection of tests*
- *Part 3: Maximum working loads*
- *Part 4: Procedure for predicting creep responses in stiffness tests for plastic pallets using regression analyses* [Technical Specification]

Pallets for materials handling — Flat pallets —

Part 4:

Procedure for predicting creep responses in stiffness tests for plastic pallets using regression analyses

1 Scope

This part of ISO 8611 presents a procedure for predicting creep responses in stiffness tests for plastic pallets to shorten the test period. Based on regression analyses, deflections during full load and relaxation periods are predicted. This part of ISO 8611 is for use with the static stiffness tests such as tests 1b, 3b, 4b, 5b, and 7b referred to in ISO 8611-1:2011, and is for application at ambient temperature only. [Annex A](#) gives an informative example of this process.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 445, *Pallets for materials handling — Vocabulary*

ISO 8611-1:2011, *Pallets for materials handling — Flat pallets — Part 1: Test methods*

ISO 8611-2:2011, *Pallets for materials handling — Flat pallets — Part 2: Performance requirements and selection of tests*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 445 and the following apply.

3.1

regression analysis

statistical technique for modelling and analysing the relationship between several variables, where the focus is on the relationship between a dependent variable and one or more independent variables

3.2

least square method

statistical method of estimating the coefficients in the regression model such that the sum of squared residuals are minimized, where the residual is the difference between an observed value and the value provided by the model

3.3

test period

period required for the stiffness test of plastic pallets, which is divided into full test load period and relaxation period

3.4

full test load period

full period required for the stiffness test of plastic pallets under load, which lasts for 24 h or 48 h depending upon the type of tests

3.5 relaxation period

period required for the stiffness test of plastic pallets after releasing load, which lasts for 2 h from the outset of releasing

3.6 reduced test period

reduced period required for the stiffness test of plastic pallets under load, which lasts for 4 h

3.7 relaxation period of the full test

period required for the stiffness test of plastic pallets after releasing load, which lasts for 2 h from the end of the full test load period

3.8 relaxation period of the reduced test

period required for the reduced stiffness test of plastic pallets after releasing load, which lasts for 2 h from the end of reduced full load period

4 Symbols and abbreviated terms

- b_0, b_1 regression coefficients
- b_0^*, b_1^* estimated regression coefficients
- $Y(t)^*$ deflection predicted at time t (mm)
- $Y(t)$ deflection actually measured at time t (mm)
- $e(t)$ regression error at time t
- $\ln(t)$ natural logarithm of time t

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5 Procedure for predicting creep responses

5.1 Purpose

Stiffness tests for plastic pallets, including tests 1b, 3b, 4b, 5b, and 7b in ISO 8611-1:2011, require test durations of 24 h to 48 h, depending on the type of test measurement. These test durations are essential because plastic pallets and pallet decks creep while placed in storage racks or stack storage. However, it is of great benefit in saving time and cost if creep deflections can be predicted for the entire test period from the test data of the first 4 h. Using the method described in this part of ISO 8611, test duration can be reduced while keeping the same time of relaxation as in ISO 8611-1:2011, as recommended in Table 1. This part of ISO 8611 shows how to conduct the stiffness tests based on the predicted value of creep responses during the loading and relaxation periods.

Table 1 — Full load duration and reduced duration recommended for static stiffness tests

Pallet material and tests		Test period (h)	Reduced test period (h)	Relaxation time (h)
Where plastics or plastic parts dictate overall performance	tests 1b, 3b, 5b, and 7b	24	4	2
	test 4b	48	4	2