INTERNATIONAL STANDARD

ISO 13988

First edition
2008-08-01

Passenger vehicle wheels — Clip balance weight and rim flange nomenclature, test procedures and performance requirements

Roues pour véhicules particuliers — Nomenclature des masselottes d'équilibrage clippées et des rebords de jantes, méthodes d'essai et exigences de performance

Reference number
ISO 13988:2008(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13988 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 19, *Wheels*.

Introduction

This International Standard addresses clip balance weights used on passenger car wheels. It provides general features and configurations of the clip balance weights and rim dimensions and defines terms used to describe these features.

This International Standard provides test procedures to evaluate weight retention on the wheel.

Passenger vehicle wheels — Clip balance weight and rim flange nomenclature, test procedures and performance requirements

1 Scope

This International Standard specifies procedures and minimum performance requirements for testing without tyres the retention of clip balance weights for use on wheels for passenger vehicles. It also specifies general features for configurations of clip balance weights and rim flanges for light alloy and steel wheels intended for use on passenger cars. Alternative materials and geometries can be considered in the future.

2 Normative reference

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

ISO 3911, *Wheels and rims for pneumatic tyres — Vocabulary, designation and marking*

ISO 4000-1, *Passenger car tyres and rims — Part 1: Tyres (metric series)*

ISO 4000-2, *Passenger car tyres and rims — Part 2: Rims*

ISO 4223-1, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres*

3 Terms and definitions

For the purposes of this document, the definitions given in ISO 4223-1, ISO 4000-1, ISO 4000-2, ISO 3911 and the following apply.

3.1
balance weight assembly
assembly of the weight and the clip, which is intended for mounting on the rim flange to balance the tyre/wheel assembly about its axis of rotation and thus minimize vibrations due to the rotation of the tyre/wheel assembly

NOTE Figure 1 gives the terminology and nomenclature of balance weight assembly.

3.1.1
weight
material of a specified mass with contours to conform to the surface of the rim flange

3.1.2
clip
specially formed metal affixed to the weight to mount the balance weight on the rim flange

3.1.3
spur
optional part of a clip that protrudes from its surface interfacing with the rim flange

3.1.4
balance weight coating
non-corrosive material coating to avoid corrosion

EXAMPLE Polyester, nylon.

3.1.5
balance weight key dimensions
dimensions that are essential for fitting the balance weight on the rim flange

3.1.6
balance weight size
size determined by the magnitude of the balance weight mass, expressed in grams

3.1.7
balance weight retention force
static force required to remove the balance weight from the rim flange, expressed in newtons

3.1.8
balance weight retention
ability of the balance weight to maintain its secure position on the rim flange in various service conditions

3.1.9
interference
measure of balance weight press fit computed as the difference between the flange thickness and the weight gap

3.2
rim flange
part of the rim where the balance weight is mounted

NOTE 1 Figure 2 gives the terminology and nomenclature of rim flange features for light alloy wheels.

NOTE 2 Figure 3 gives the terminology and nomenclature of rim flange features for wheels with roll formed rim.

NOTE 3 Figure 4 gives the terminology and nomenclature of rim flange features for fullface wheels.

NOTE 4 Figure 5 gives the terminology and nomenclature of rim flange features for clad wheels.

3.2.1
rim flange key dimensions
dimensions that are essential for fitting the balance weight on the rim flange

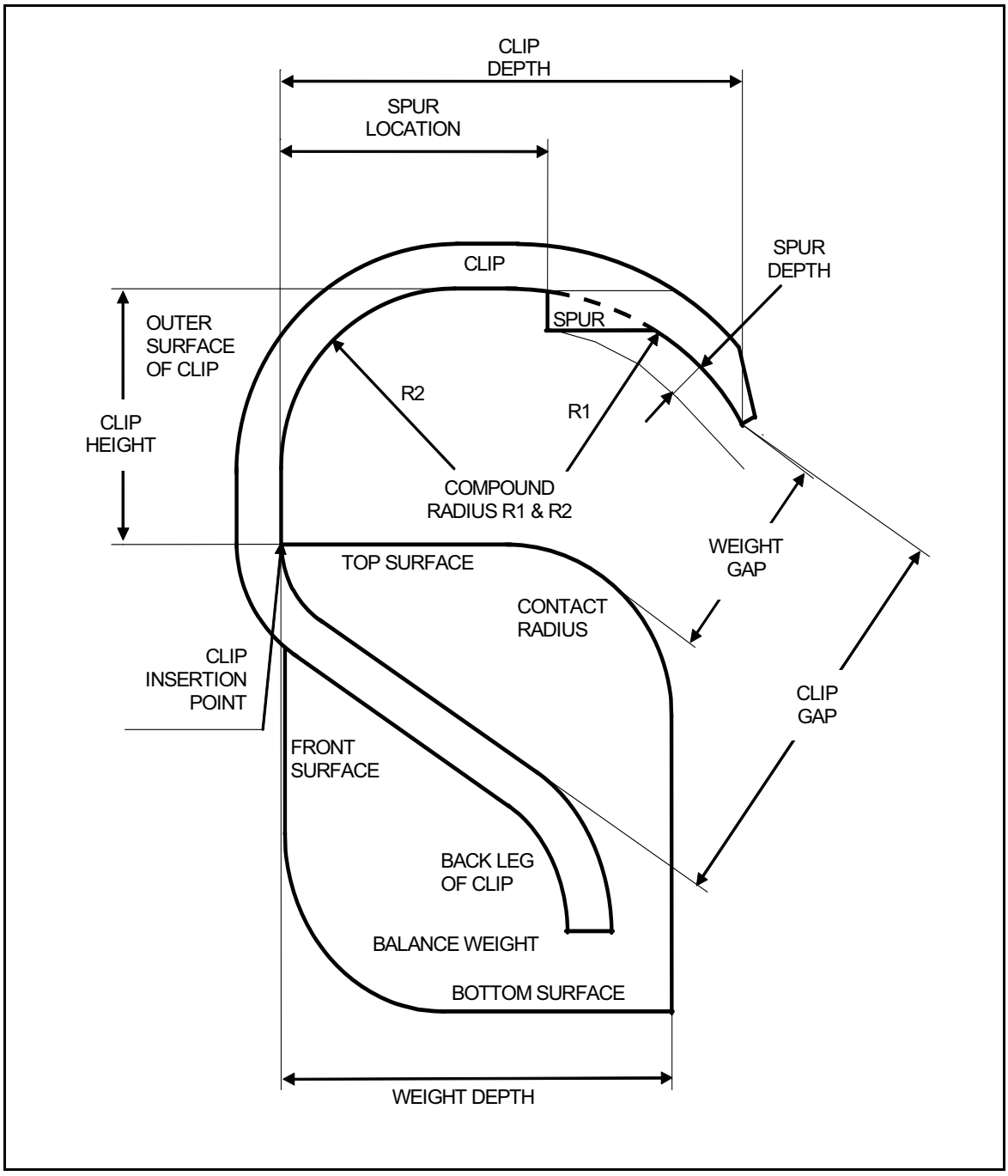

Figure 1 — Balance weight assembly terminology

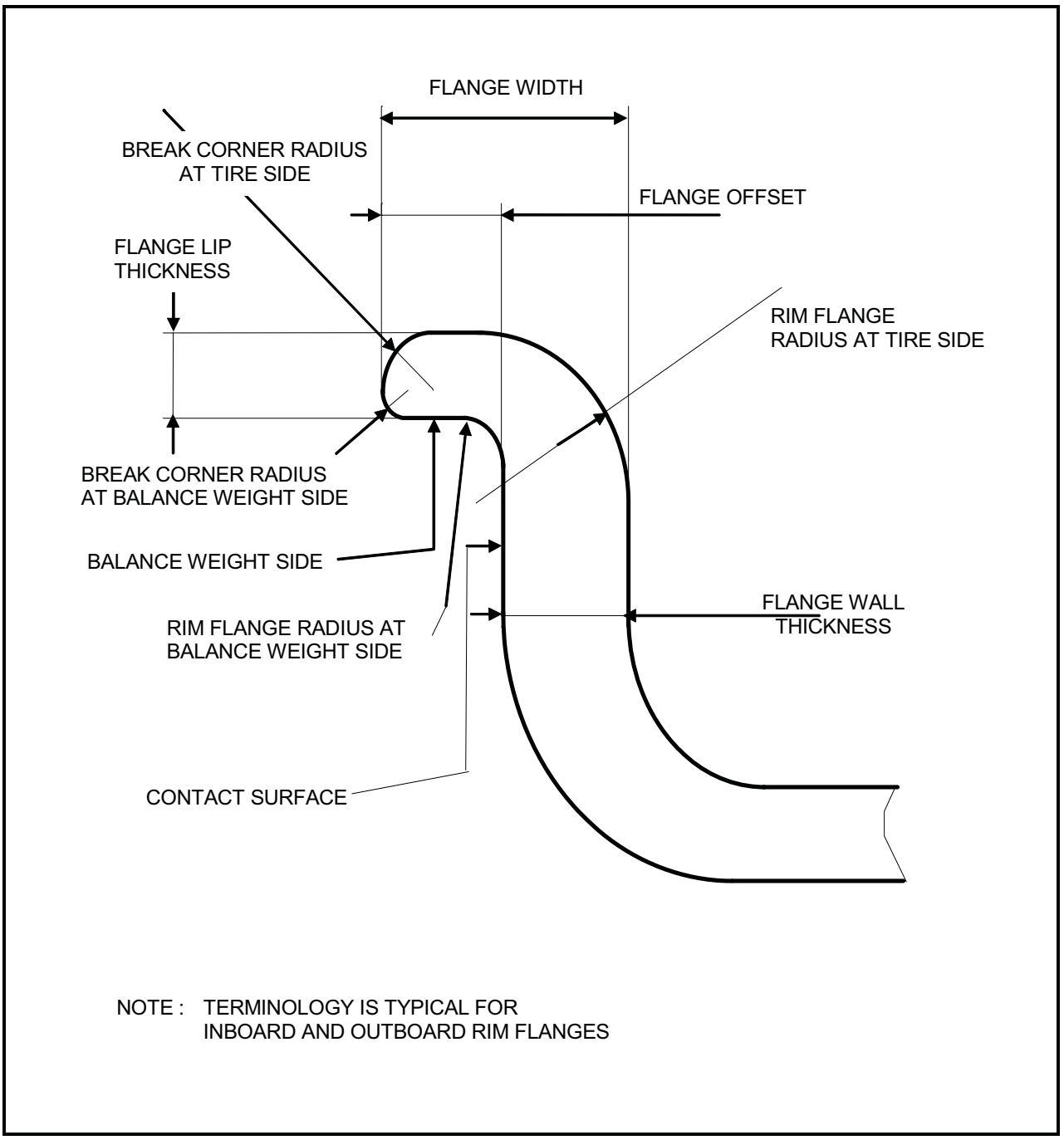

Figure 2 — Light alloy rim flange terminology

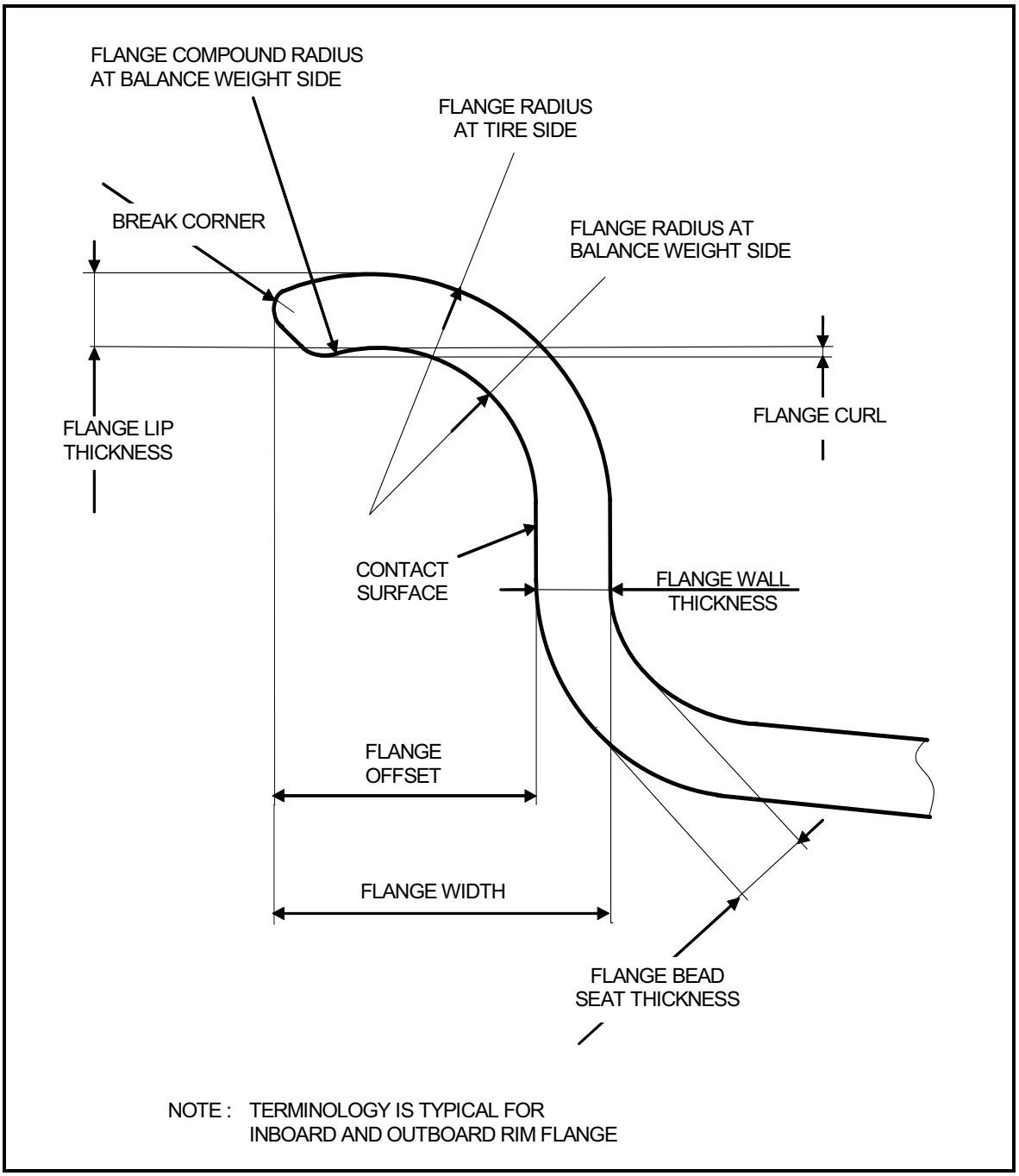

Figure 3 — Rolled formed rim flange terminology

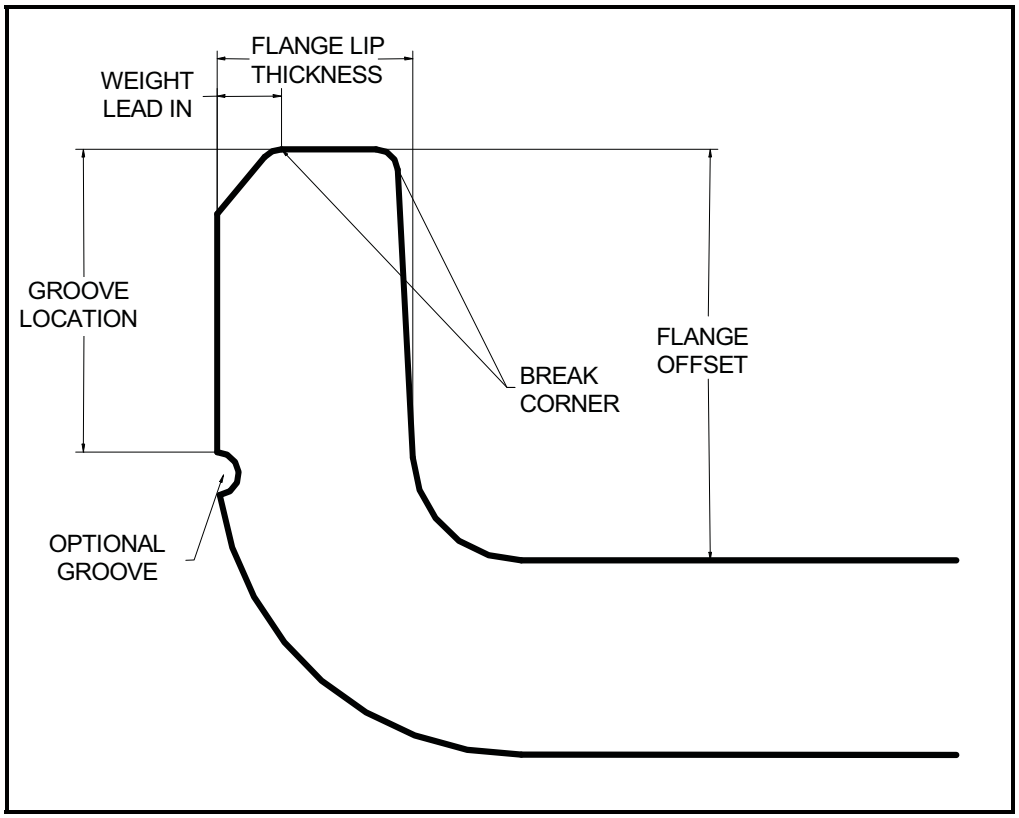

Figure 4 — Fullface rim flange terminology

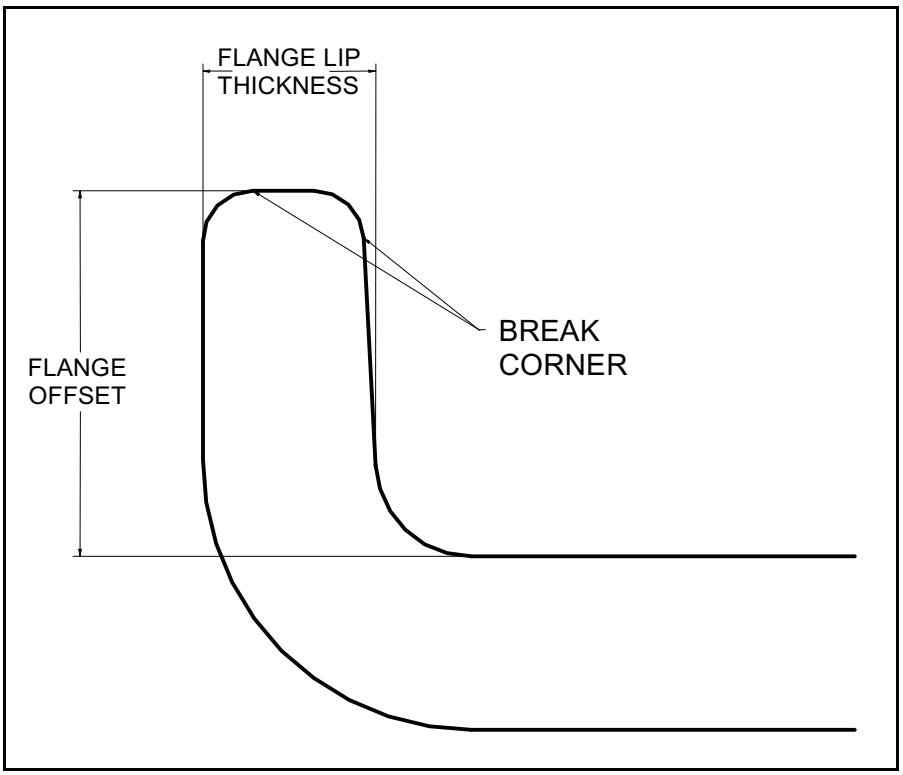

Figure 5 — Cladded rim flange terminology

4 Rim flange types

Rim flange types are identified by letter codes. Rim flange types covered by this International Standard are J and B. Configurations of these rim flanges are included in ISO 4000-2.

Dimensions shown in ISO 4000-2 are limited to those pertaining to the rim flange contour on the tyre side and do not include dimensions on the balance weight side.

5 Test procedure

5.1 Preparation of balance weights for test

5.1.1 Selection of balance weights

For each test, use a set of new balance weights of different sizes representative of the wheel for which they are intended. The balance weights of each size shall be equally divided into two groups, each containing the same number. For testing purposes, one group shall be mounted on the outboard flange and the other group on the inboard flange.

5.1.2 Measurement of key dimensions of balance weights

For balance weights intended for light alloy wheels, measure weight gap and, when applicable, spur depth. For balance weights intended for steel wheels, measure weight gap only. For fullface wheels, measure weight gap and clip depth (see Figure 1).

The measured values shall be within design specifications.

5.1.3 Marking of balance weights

Individual balance weights of different sizes shall be picked at random from the selected group and marked by using sequential numbers. One half of the group is to be tested on the outboard rim flange and the other half on the inboard rim flange.

5.2 Preparation of the wheel

5.2.1 Cleaning

Clean the surface of the outboard and the inboard rim flanges to remove any dirt or grease by using a suitable product which leaves no residue.

5.2.2 Marking

Make equally spaced marks around the circumference of the outboard and inboard flanges to indicate mounting points for each of the balance weights. The flange surface at each mounting point shall be free of scratches, gouges and welds.

5.2.3 Measurement of rim flange dimensions

Measure and record the following dimensions on the outboard and inboard rim flanges (see Figures 2 to 5):

— for all wheel types: flange lip thickness, flange curl, flange offset and flange width;

— for fullface and clad wheels: weight lead in and optional groove location.

All measured dimensions shall be within design specifications.

5.3 Installation of balance weight

Improper striking may cause drop-out of the balance weight. Follow the proper procedure as described below.

The operator shall do the striking work right in front of the striking position.

Strike the balance weight in such a manner that the striking force is applied parallel with the wheel rim configuration and a maximum of three strikes properly seats it on the rim flange. Care shall be taken that a gap of about 1 mm is left between the balance weight and the wheel for secure bite of the balance weight (see Figure 6).

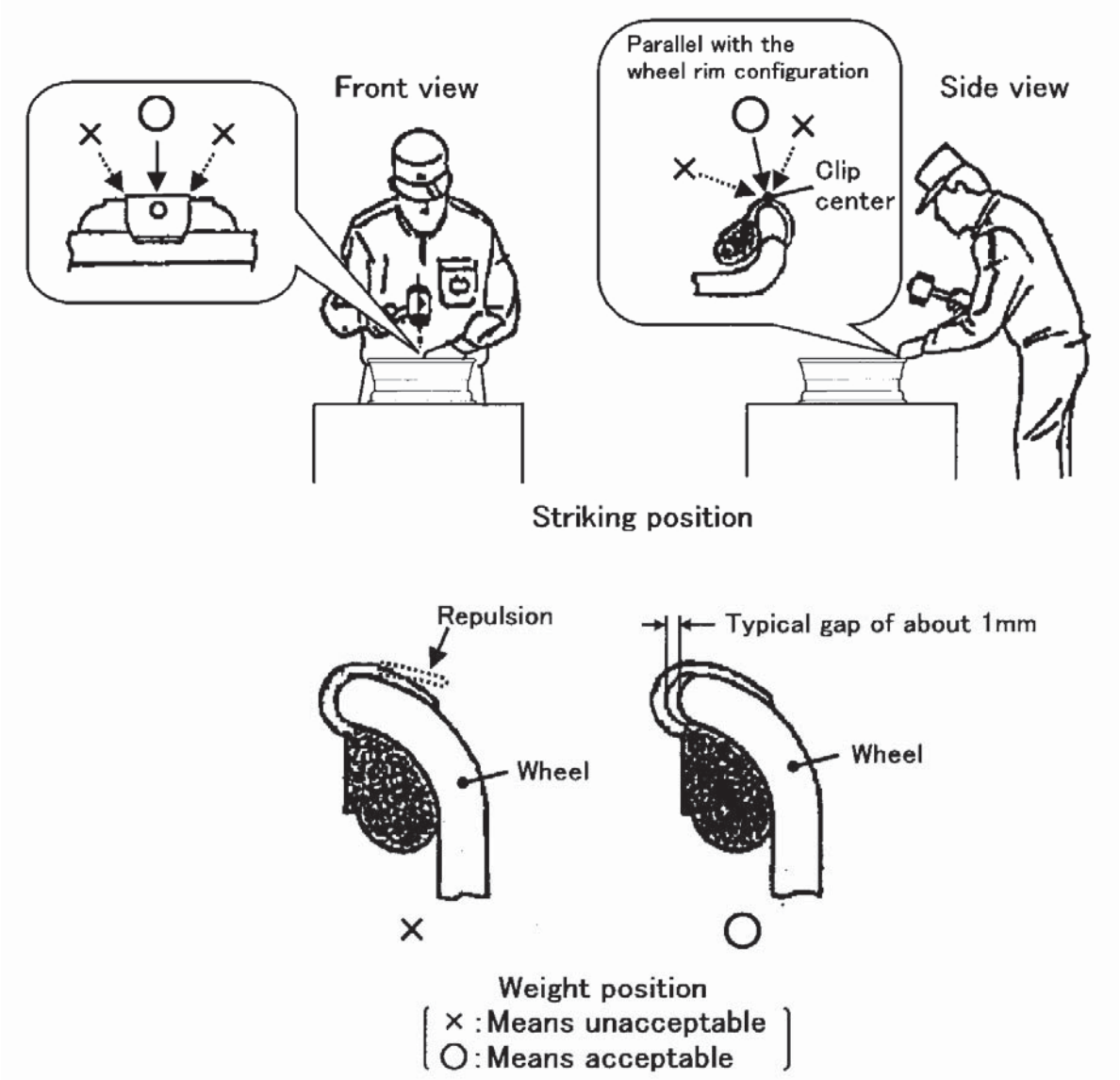

Figure 6 — Balance weight installation

5.4 Tangential test

5.4.1 General

The test shall consist of measuring the minimum tangential force required to initiate the movement (see Figure 7).

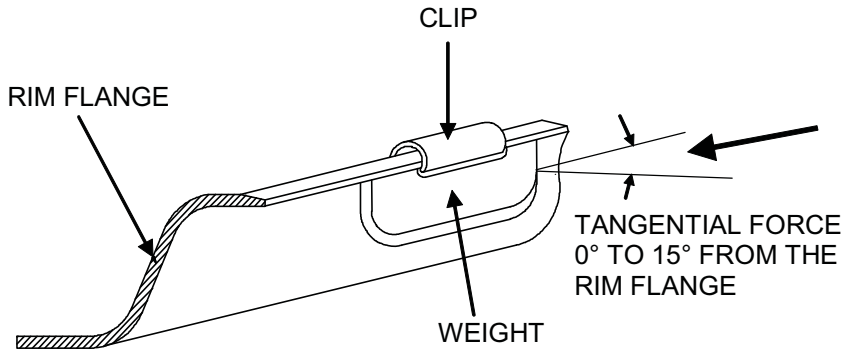

Figure 7 — Tangential force test

5.4.2 Test equipment

The test equipment shall be capable of removing the balance weight from the rim flange, as well as measuring and reading the minimum tangential force required (0° to 15° angle from the rim flange) to initiate the movement. Calibrate the load cell using increments of 25 N up to 200 N.

5.4.3 Test sequence

5.4.3.1 Install the balance weight on the inboard and outboard rim flange by using a non-metallic hammer, as described in 5.3.

5.4.3.2 Set the force indicator (dynamometer) on the test equipment to zero.

5.4.3.3 Gradually increase the tangential force and record the maximum indicated force.

5.4.3.4 Discard the balance weight removed from the rim flange and do not use it in future testing.

5.4.3.5 Reset the wheel for the next position of balance weight removal.

5.4.3.6 Repeat steps 5.4.3.1 to 5.4.3.5 for each balance weight installed on the inboard and outboard rim flange, following the sequential order of balance weight numbers.

5.4.4 Performance requirements tangential force

The minimum value of balance weight retention force determined in accordance with the static test procedure described in 5.4 is shown in Table 1. The minimum values shown in Table 1 only apply to weight installed on wheels without a tyre mounted. Additional testing with a tyre mounted to the wheel may be desirable to evaluate vehicle performance.

NOTE The size and inflation pressure of the tyre can increase or decrease the final force.

Table 1 — Tangential test- force values

Mass, g	5	$\geqslant$ 10
Force, N	60	100

5.5 Axial removal test

5.5.1 Test equipment

The test equipment shall be capable of removing the balance weight from the rim flange, as well as measuring and reading the minimum force required to initiate movement. Calibrate the load cell using increments of 10 N up to 500 N.

5.5.2 Test sequence

5.5.2.1 There are two distinct methods for evaluating axial weight retention:

— option 1: push off test (see Figure 8, which illustrates a possible apparatus);

— option 2: pull off test (see Figure 9).

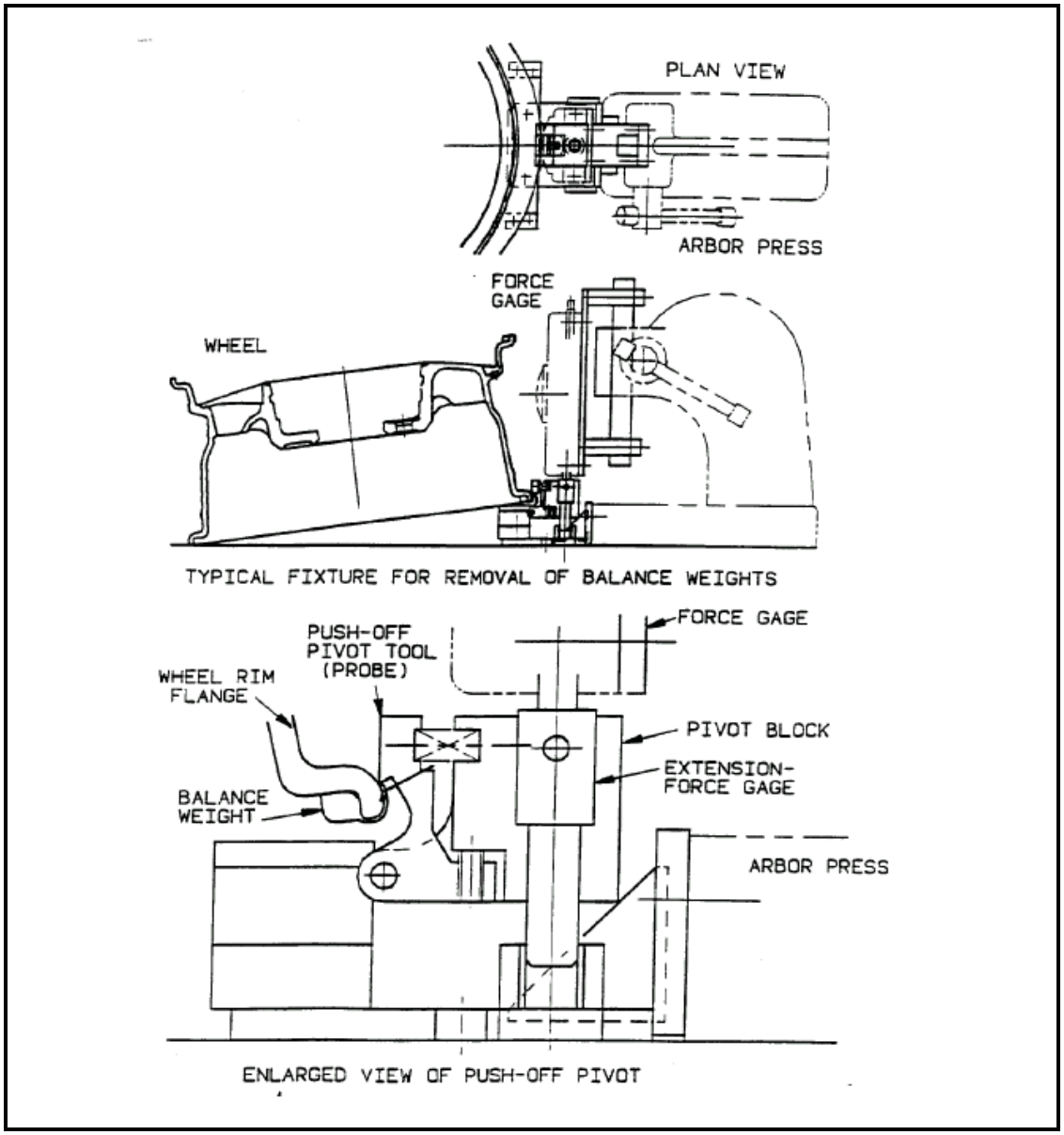

Figure 8 — Push off balance weight test

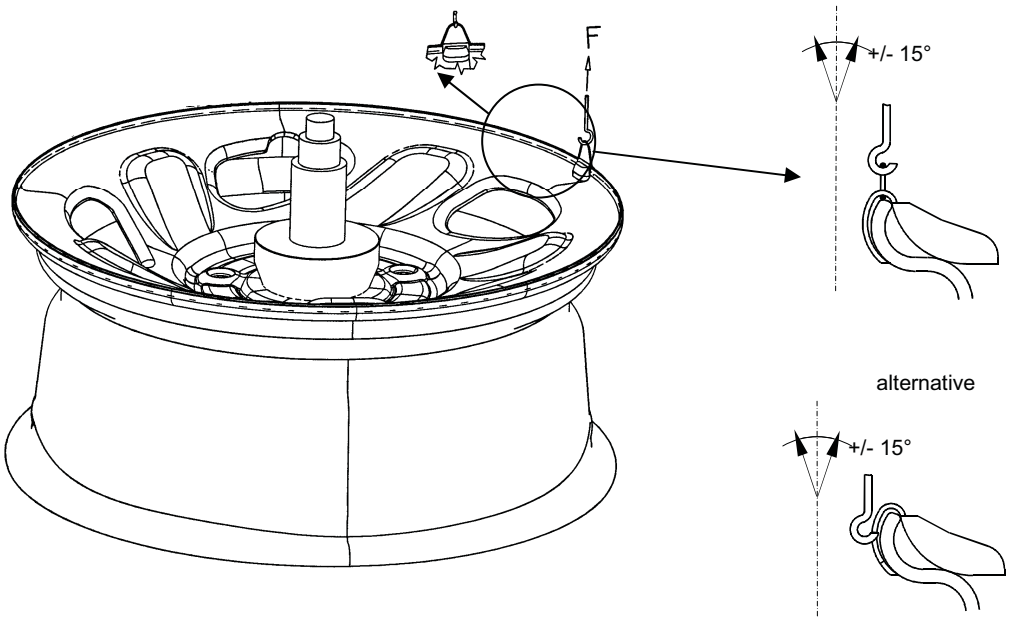

Figure 9 — Pull off balance weight test

5.5.2.2 The test shall be conducted in accordance with the sequence described in 5.5.2.3 to 5.5.2.11.

5.5.2.3 For option 1, install the probe for moving the balance weight on the rim flange in the centre hole of the fixture with the flat edge facing up.

5.5.2.4 Install the balance weight on the inboard and outboard rim flange by using a non-metallic hammer, as described in 5.3. For option 2, install weight with wire loop under the weight clip; alternatively, for balance weight with a hole in the clip, set the hook of the force indicator in the clip hole (see Figure 9).

5.5.2.5 Install the wheel in the test fixture and centre it in the base of the fixture.

5.5.2.6 For option 1, set the probe in the centre of the hole or notch located in the clip by adjusting its horizontal, vertical and angular positions, while avoiding contact with the rim flange during test sequence. For option 2, connect the wire loop (alternatively, the hook, avoiding contact with the rim flange) to the force indicator.

5.5.2.7 Set the force indicator on the test equipment to zero.

5.5.2.8 Gradually increase the force on the lever until the balance weight moves. Record the maximum indicated force.

5.5.2.9 Discard the balance weight removed from the rim flange and do not use it in future testing.

5.5.2.10 Reset the wheel for the next position of the balance weight removal.

5.5.2.11 Repeat steps 5.5.2.3 to 5.5.2.10 for each balance weight installed on the inboard and outboard rim flange, following the sequential order of balance weight numbers.

5.5.3 Performance requirement axial force

The minimum value of balance weight retention force determined in accordance with the static test procedure described in 5.5 is shown in Table 2. The minimum values shown in Table 2 only apply to weight installed on wheels without a tyre mounted. Additional testing with a tyre mounted to the wheel may be desirable to evaluate vehicle performance.

NOTE The size and inflation pressure of the tyre can increase or decrease the final force.

Table 2 — Axial removal test force values

Mass, g	5	10-15	20,25,30,35	40-80	$\geqslant$ 90
Force, N	50	100	150	200	300

ICS 43.040.50

Price based on 12 pages