# International Standard 5179

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# Investigation of brazeability using a varying gap test piece

*Étude de l'aptitude au brasage au moyen d'une éprouvette à jeu variable*

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## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5179 was developed by Technical Committee ISO/TC 44, *Welding and allied processes*, and was circulated to the member bodies in March 1982.

It has been approved by the member bodies of the following countries :

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| Australia | Finland | Norway |
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United Kingdom
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## 0 Introduction

When designing and making a brazed joint, quite apart from the physical properties of the brazing alloy and the mechanical properties which may be expected from the joint, it is important to know the brazeability as a function of the operating conditions adopted. The determination of wettability has already been the subject of numerous investigations and proposals regarding testing methods.

In carrying out these investigations, the most frequently used methods are based on the spreading of a drop, or on the measurement of surface tension, but they in fact only take into account one element of the problem. It is important to know not only the way in which the liquid filler metal wets the surface of the parent metal but also how this same liquid filler metal behaves in a given gap between the joint components when diffusion takes place.

The test piece described in this International Standard gives guidance about the effects of brazing variables on filler metal flow when capillary gaps of different dimensions are used.

## 1 Scope and field of application

This International Standard specifies a varying gap test piece and a testing method for assessing the influence of the various parameters which can influence brazing during manufacture as a function of clearances.

## 2 Description of the varying gap test piece

The design of the varying gap test piece is shown in figure 1. By using this configuration, it is possible to investigate flow characteristics in the same specimen with capillary gaps varying from 0 to 0,5 mm.

The test piece consists of :

a) an outer tube A :

exterior diameter, 19 ± 0,1 mm
interior diameter, 14 ± 0,02 mm
height, 80 ± 0,05 mm;

The inner end of tube A is bevelled to 45°, while keeping a root face with a width of 0,5 ± 0,05 mm.

b) an inner tube B :

exterior diameter, 13,5 ± 0,02 mm
interior diameter, 9,5 ± 0,1 mm
height, 80 ± 0,05 mm;

c) a cup C used as a bottom for the test piece;

NOTE — It is necessary that there is a gap between the base of the inner tube B and the cup C to allow the filler metal to flow into the capillary gap between tubes A and B.

d) two adjustment screws press the inner cylinder B against the inner wall of the outer cylinder A in such a way that, on looking at a cross-section of the assembly, the gap varies from 0 to 0,5 mm over one half of the circumference.

The filler metal(cut in pieces of 15 mm to 20 mm) is introduced into the bore of the inner tube B. If it requires fluxing at the temperature of the test, then the flux is also introduced into the bore. The method of mixing filler metal and flux will depend upon their characteristics. It is suggested that about 1 400 $mm^3$ of filler metal and the appropriate quantity of flux be used.

## 3 Purpose of the test

The variables that can be investigated by this test include :

a) parent material : light alloys, copper and its alloys, non-allied steels and steels with low levels of addition elements and stainless steels, etc.;

b) surface condition : various machine finishes, surface roughness effects, chemical and other cleaning, plating, etc.;

c) filler metals : silver based, copper based, nickel based, noble metal based, etc.;

d) flux : various types of flux;

e) atmosphere : air, hydrogen, vacuum, cracked ammonia;

f) method of heating : torch, furnace, induction, infra-red, etc.;

g) heating cycle : degree of superheat, time at temperature, time to reach temperature, cooling rate.