

Australian Standard[®]

**Resistance welding equipment—
Single-phase a.c. transformer
type**

[Title allocated by Defence Cataloguing Authority:
RESISTANCE WELDING MACHINES, SINGLE PHASE—
TRANSFORMER TYPE (NSC 3432)]

This Australian Standard was prepared by Committee EL/19, Electrical Welding Plant. It was approved on behalf of the Council of Standards Australia on 7 May 1992 and published on 20 July 1992.

The following interests are represented on Committee EL/19:

- Confederation of Australian Industry
- Railways of Australia Committee
- Welding Technology Institute of Australia

Additional interests participating in preparation of Standard:

- Designers and manufacturers of resistance welding equipment
- Motor-car manufacturers

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This Standard was issued in draft form for comment as DR 91192.

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RECONFIRMATION
OF
AS 2799—1992
Resistance welding equipment—Single-phase a.c. transformer type

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Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 16 June 2016.

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NOTES

AS 2799—1992

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First published in part as AS C356.1—1964.
AS C356.2 first published 1966.
AS C356.1—1964 and AS C356.2—1966 revised,
amalgamated and redesignated AS 2799—1985.
Second edition 1992.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 7541 7

 **Documents**
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PREFACE

This Standard was prepared by the Standards Australia Committee on Electrical Welding Plant to supersede AS 2799—1985. It incorporates substantial material from International Standard ISO 669:1981, *Rating of resistance welding equipment*, and includes a practical method of determining the rating of resistance welding equipment.

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STANDARDS AUSTRALIA

Australian Standard

Resistance welding equipment—Single-phase a.c. transformer type

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard defines and specifies the characteristics of single-phase resistance welding equipment. It includes the information required on the equipment nameplate and specifies the test methods to be used to verify the compliance of the equipment with the requirements of this Standard.

NOTE: Appendix A gives information on thermal time constants.

It is applicable to single-phase resistance welding equipment, including all types of complete portable equipment, for use under the following conditions:

- (a) *Altitude* The altitude shall not exceed 1000 m.
- (b) *Cooling medium temperature* For water-cooled equipment, the temperature of the cooling water shall not exceed 30°C at the inlet of the equipment and, in the case of air-cooled equipment, none of the following limits shall be exceeded:
 - (i) Maximum ambient air temperature: 40°C.
 - (ii) Daily average ambient air temperature: 30°C.
 - (iii) Yearly average ambient air temperature: 20°C.
- (c) *Cooling water pressure* The pressure of the cooling water shall not be less than that which is necessary to supply the rated flow of cooling water.

This Standard does not apply to transformers sold separately or to capacitor discharge or rectifier equipment.

For a given voltage and frequency the characteristics of the equipment are calculated, constructed and tested, as a function of the following operational modes:

- (i) Intermittent operation at a duty cycle (see Clause 1.3.4) of 50%, the values of current and power being termed nominal or rated.
- (ii) Continuous operation, the values of current and power being termed continuous.

All voltages and currents shall be expressed as r.m.s. values.

1.2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:
Standards

- AS 2812 Welding, brazing and cutting of metals—Glossary of terms
- 3000 SAA Wiring Rules

Approval and test specifications

- AS 3100 General requirements for electrical equipment
- IEC Publication 85 Thermal evaluation and classification of electrical insulation

1.3 DEFINITIONS For the purpose of this Standard, the definitions given in AS 2812 and those below apply.

1.3.1 Continuous output current (I_{scn})—the output current corresponding to 100% duty cycle, the relationship with the nominal output current at 50% duty cycle being given by the equation:

$$I_{\text{scn}} = \frac{I_{\text{rn}}}{\sqrt{2}}$$

1.3.2 Continuous power (P_{con})—the power corresponding to 100% duty cycle, the relationship with the nominal power at 50% duty cycle being given by the equation:

$$P_{\text{con}} = \frac{P_{\text{rn}}}{\sqrt{2}}$$

1.3.3 Duty—a schedule of the loads on an apparatus or equipment, taking into account their respective duration and sequence.

1.3.4 Duty cycle—the ratio of the duration of work under load to the duration of the welding cycle time, this ratio lying between 0 and 1, and usually expressed as a percentage.

1.3.5 kVA rating—a term used in the electrical industry to indicate the apparent power rating of an a.c. appliance, expressed in kilovolt amperes, e.g. the kVA rating of the transformer is 6 kVA.

1.3.6 Maximum and minimum electrode force for spot, projection and seam welding equipment

1.3.6.1 Maximum electrode force ($F_{\max}$)—the maximum force, applied to the parts to be assembled during welding, which can be withstood by the welding equipment without damaging deformation of its mechanical parts.

1.3.6.2 Minimum electrode force ($F_{\min}$)—the minimum force which can be used for proper functioning of the equipment.

1.3.7 Maximum short-circuit current (I_{psc} primary and I_{sc} secondary)—the current at the rated supply voltage and at the highest regulator (tap) setting, the electrodes being short-circuited according to conditions laid down in the test method (see Appendix C) and the equipment being arranged so as to have minimum impedance (minimum throat depth and gap).

1.3.8 Maximum short-circuit power—the maximum apparent power at the input terminals of the equipment, expressed in kilovolt amperes, measured at the highest regulator (tap) setting, the electrodes being short-circuited according to conditions laid down in the test method (see Appendix C) and the equipment being arranged in such a manner as to have the minimum secondary impedance compatible with this method of short-circuit.

1.3.9 Maximum welding power—the power equal to 80% of the maximum short-circuit power.

1.3.10 No-load current—the current flowing through a line terminal of the primary winding when the rated voltage is applied at the rated frequency, the secondary windings being open-circuited.

1.3.11 Nominal output current at 50% duty cycle (I_{sn})—the highest current that can be drawn from the transformer, at any regulator (tap) setting, during actual or simulated operation at the nominal welding cycle, without exceeding the specified temperature rise.

1.3.12 Nominal power at 50% duty cycle (P_n)—the maximum electrical input (apparent power), expressed in kilovolt amperes, during the nominal welding cycle time without exceeding the specified temperature rise, when measured by the appropriate test method (see Appendix B).

1.3.13 Nominal welding cycle time—a cycle having a total duration of 60 s and a duty cycle of 50%.

1.3.14 Operating conditions—all quantities defining the performance of the equipment.

1.3.15 Periodic duty—a duty which is repeated periodically, the sum of one load time and one no-load time being termed the weld cycle time.

NOTE: The periodic duty referred to in this Standard comprises, for each cycle, a given working time under load, followed by a given no-load time. The load is constant, i.e. without any preheating or postheating period.

1.3.16 Pressure of the energizing medium—the pressure of the medium in the driving cylinder or cylinders, at established conditions, required to produce the maximum force.

1.3.17 Rated—a qualifying term applied to a value used in the designation of resistance welding equipment.

1.3.18 Rated primary current—that current calculated by multiplying the standard kVA rating by 1000 and dividing by the rated supply voltage.

1.3.19 Rated supply voltage—the supply voltage for which the equipment is constructed.

1.3.20 Required rate of flow of cooling agent—the total flow of circulating cooling agent, in litres per minute, which is required in the cooling circuit in order to ensure that the permitted maximum temperature rise (see Clause 2.2.2.1) is not exceeded when the equipment is operated at nominal power.

1.3.21 Secondary open-circuit voltage—the r.m.s. voltage between the electrodes when the rated supply voltage is applied to the terminals of the equipment at its various settings with the secondary circuit open.

1.3.22 Stroke of the electrode

- Where the electrode or the moving jaw is attached to the driving cylinder, the maximum stroke of the electrode, by convention, equals the total stroke of the driving cylinder.
- Where the moving electrode is attached to a hinged lever moved by a driving cylinder, the maximum stroke of the electrode, by convention, equals the length of the chord of the arc generated by a point on the axis of the moving electrode for a full stroke of the cylinder.

NOTE: On certain equipment, the stroke of the electrode may be composed of a 'retract' with wide amplitude and without any contact, facilitating the introduction of the parts to be welded between the arms of the equipment, and a 'working stroke', in general, with less amplitude.

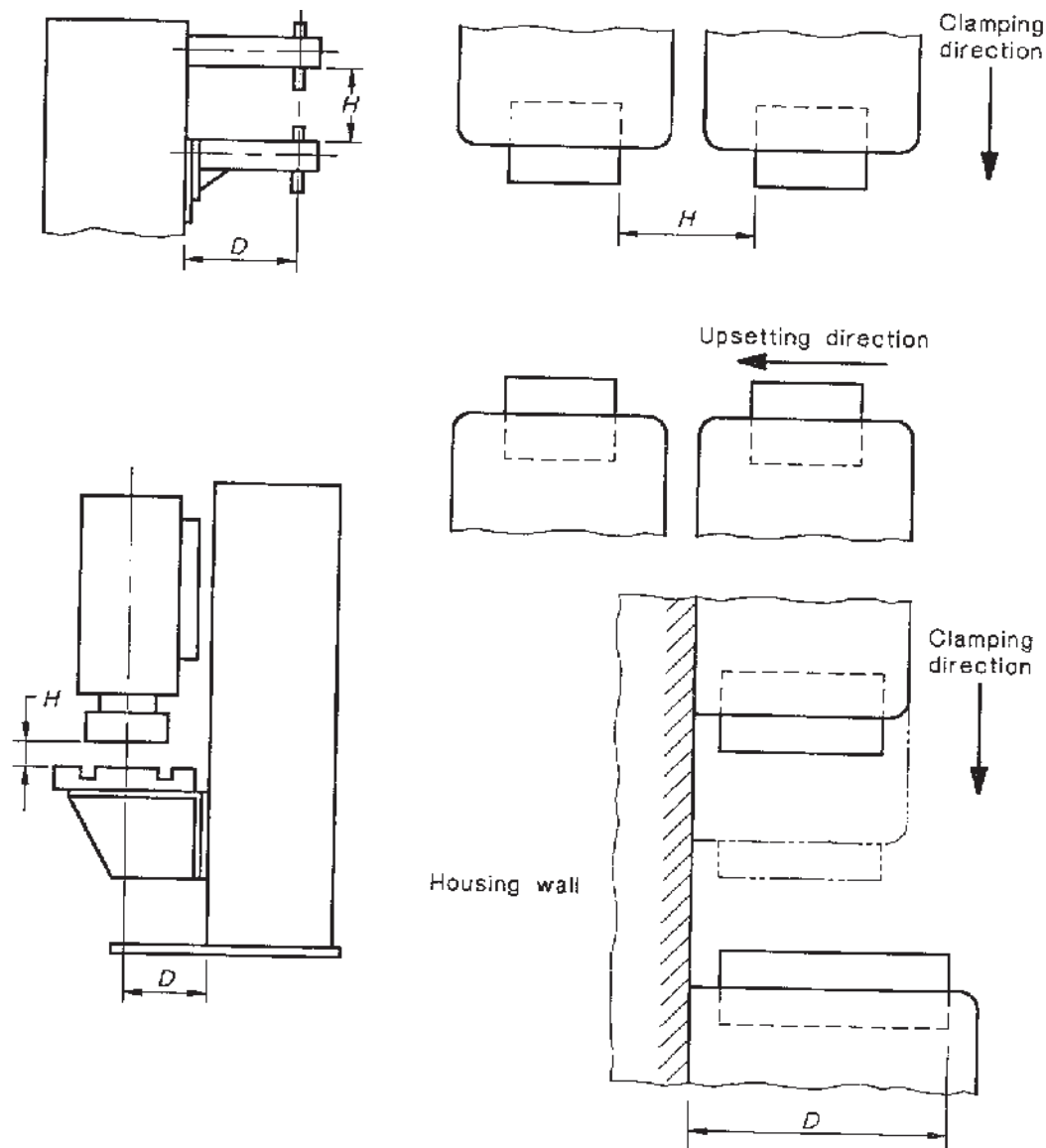


FIGURE 1.1 GEOMETRICAL CHARACTERISTICS OF RESISTANCE WELDING EQUIPMENT

1.3.23 Supply pressure (of the energizing medium)—the required supply pressure of the energizing medium measured at the supply to the equipment.

1.3.24 Throat depth (see Figure 1.1, symbol D).

- (a) *Spot, projection and seam welding equipment*—the usable distance between the axis of the electrodes, the platens or the centre of the contact line of the wheels and the nearest element of the equipment.

NOTE: This definition does not take into account any offset of the electrode tips.

- (b) *Butt welding equipment*—the distance perpendicular to the direction of the upsetting force between the housing wall of the equipment and the part of the clamping area located furthest from the equipment.