

Resistance welding — Transformer-rectifier for welding guns with integrated transformers — Transformer-rectifier units operating at 1 000 Hz frequency

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National foreword

This British Standard is the UK implementation of EN ISO 22829:2008. It is identical with ISO 22829:2007. It supersedes BS ISO 22829:2007 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/29, Resistance welding.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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30 June 2008	This corrigendum renumbers BS ISO 22829:2007 as BS EN ISO 22829:2008

English Version

Resistance welding - Transformer-rectifier for welding guns with
integrated transformers - Transformer-rectifier units operating at
1000 Hz frequency (ISO 22829:2007)

Soudage par résistance - Transformateurs-redresseurs
pour pinces de soudage à transformateur incorporé -
Transformateurs-redresseurs alimentés sous une
fréquence de 1000 Hz (ISO 22829:2007)

Widerstandsschweißen - Transformatoren-Gleichrichter für
Schweißzangen mit integrierten Transformatoren -
Transformator-/Gleichrichtereinheiten mit einer
Arbeitsfrequenz von 1 000 Hz (ISO 22829:2007)

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Foreword

The text of ISO 22829:2007 has been prepared by Technical Committee ISO/TC 44 “Welding and allied processes” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 22829:2008 by Technical Committee CEN/TC 121 “Welding” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.

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Endorsement notice

The text of ISO 22829:2007 has been approved by CEN as a EN ISO 22829:2008 without any modification.

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1 Scope

This International Standard is applicable to transformer-rectifier units as used in electric resistance welding machines operating from a power supply with a frequency of 1 000 Hz, and of a rated value of the input voltage equal to or higher than 500 V. These transformer-rectifier units are primarily used in welding guns with an integrated transformer.

For these transformer units, this International Standard supplements the requirements given in ISO 5826 and ISO 10656, which remain applicable except where amended by this International Standard.

2 Normative references

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 5826:1999, *Resistance welding equipment — Transformers — General specifications applicable to all transformers*

ISO 17657-3, *Resistance welding — Welding current measurement for resistance welding — Part 3: Current sensing coil*

ISO 17657-4, *Resistance welding — Welding current measurement for resistance welding — Part 4: Calibration system*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

transformer-rectifier unit

transformer incorporating a full-wave rectifier in its secondary circuit

3.2

input voltage

U_1

Root-Mean-Square (RMS) value of the voltage applied to the primary terminals of the transformer-rectifier unit

3.3

rated supply voltage

U_{1N}

RMS value of the supply voltage (applied to the primary terminals) for which the transformer-rectifier unit is constructed

3.4
rectified voltage

U_{2d}
RMS value of the voltage at the output of the transformer-rectifier unit when a load resistance is connected across the output terminals

3.5
input current

I_1
RMS value of the current at the input terminals of the transformer-rectifier unit

3.6
open circuit input current

I_{10}
RMS value of the current at the input terminals of the transformer-rectifier unit with the output terminals open circuit

3.7
permanent input current

I_{1P}
maximum RMS value of the current at the input terminals of the transformer-rectifier unit with 100 % duty factor ($X = 100\%$), without exceeding the specified temperature limits

NOTE For calculation related to this International Standard, $I_{1P} = I_{2P} / (N1/N2)$, where $(N1/N2)$ is the transformer turns ratio.

3.8
output d.c.

I_{2d}
RMS value of the direct current at the output terminals of the transformer-rectifier unit

3.9
permanent output current

I_{2P}
maximum RMS value of the output current delivered by the transformer-rectifier unit at 100 % duty factor ($X = 100\%$), without exceeding the specified temperature limits

3.10
output current on load condition

I_{2R}
RMS value of the output current delivered by the transformer-rectifier unit with a load resistance R

3.11
apparent input power

S_1
power measured at the input terminals of the transformer-rectifier unit, or calculated by $U_1 \times I_1$

3.12
rated permanent input apparent power

S_{1P}
rated permanent apparent power calculated by $U_{1N} \times I_{1P}$

3.13 conduction interval

t_{st}

time span within one half-wave of a period of the alternating current of the inverter, in which a voltage has a measured value that is greater than or equal to $\frac{\hat{u}}{2}$, where $\hat{u}$ expresses the amplitude of voltage measured at the output of inverter

NOTE See Annex B.

3.14 non-conduction interval

t_{pt}

time span within one half-wave of a period of the alternating current of the inverter, in which the voltage has a measured value that is less than $\frac{\hat{u}}{2}$

NOTE See Annex B.

3.15 on time

t_s

time during which the current is applied

3.16 off time

t_p

time during which the current is not applied

4 Power supply to the transformer-rectifier unit

The rated voltage supply shall be delivered by an inverter. This inverter shall deliver the rated voltage at a frequency of 1 000 Hz in a waveform to suit the transformer-rectifier unit characteristics.

5 Transformer types

The minimum principal electrical characteristics of a transformer-rectifier unit shall conform to Table 1.

Table 1 — Electrical characteristics

Type	Nominal value of the rectified voltage U_{2d} V	Minimum value of S_{1P} kVA	Minimum permanent output current I_{2P} kA	Minimum output current on load condition I_{2R}^a kA
H1	6,3	36,0	5,0	11
H2	8,4	45,0	5,0	14
J1	6,3	45,0	6,3	18
J2	10,0	68,0	6,3	28
J3	9,3	63,0	6,3	25
J4	12,5	83,0	6,3	32
N1	10,4	64,0	5,7	20
P1	12,2	75,0	5,7	27
S1	8,2	71,0	6,3	25
NOTE Indicated values are RMS values and are given for a cooling liquid flow rate of 6 l/min for types J1, J2, H, N and P, and of 8 l/min for types J3, J4 and S, with a maximum temperature of the cooling liquid at transformer input of 30 °C.				
^a $R = 200 \mu\Omega \pm 5\%$ = load resistance.				

The manufacturer of transformer-rectifier units shall provide a set of curves showing the maximum output current relative to duty factor and welding time at the rated supply voltage. An example of a set of curves is given in Annex A.

6 Dimensions

The dimensions of the transformer-rectifier unit shall be as given in Table 2 and as illustrated in Annex C.

NOTE According to ISO 10656, there are basically two transformer types:

- H (106 mm × 150 mm × variable length), and
- J (125 mm × 160 mm × variable length).

Table 2 — Dimensions

Dimensions in millimetres

Type	Maximum length L_1	Length between mounting holes L_2	Overall width	Overall height	Output terminals dimensions
H1	270	170	106	150	32 × 32
H2	270	170	106	150	32 × 32
J1	300	190	125	160	32 × 32
J2	300	190	125	160	32 × 32
J3	300	190	125	160	40 × 50
J4	360	250	125	160	40 × 50
N1	400	115	130	190	45 × 50
P1	400	128	125	200	50 × 50
S1	370	279	127	171	51 × 67

7 Construction and additional equipment

7.1 Grounding

The centre point of the secondary coil shall be earthed by a removable link.

7.2 Thermal protection

The transformer and the rectifier shall be equipped with thermostats that each have a normally closed contact. The insulation shall be suitable for the test conditions prescribed in this International Standard. The position of the wiring of these thermostats shall be in accordance with Figures C.1 to C.6. The wiring of primary thermostats shall be sky blue, the wiring of secondary thermostats shall be black and the wiring of rectifier thermostats shall be yellow.

7.3 Protection of the rectifier

The rectifier should be protected against the accumulation of welding spatter and other contamination.

7.4 Output current sensing coil

If the transformer-rectifier unit is equipped with an output current sensing coil, it shall comply with the conditions below.

- The degree of protection of an externally mounted coil shall be IP 55.
- The output shall be 150 mV/kA $\pm$ 1,5 % at a load resistor of 1 000 Ω $\pm$ 1 % under full sine wave with a 50 Hz frequency, up to 80 °C. The tolerance after mounting in the transformer-rectifier unit shall be $\pm$ 3 %.

The detector shall be a Rogowski type coil. The internal resistance of the detector shall be 10 Ω to 50 Ω . White and brown colour coding shall be used for the wiring.