

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 669

RATING OF RESISTANCE WELDING EQUIPMENT

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BRIEF HISTORY

The ISO Recommendation R 669, *Rating of resistance welding equipment*, was drawn up by Technical Committee ISO/TC 44, *Welding*, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question by the Technical Committee began in 1957 and led, in 1963, to the adoption of a Draft ISO Recommendation.

In May 1966, this Draft ISO Recommendation (No. 974) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Ireland	Sweden
Belgium	Israel	Switzerland
Brazil	Japan	Turkey
Chile	Korea, Rep. of	U.A.R.
Czechoslovakia	Norway	United Kingdom
Denmark	Poland	Yugoslavia
Finland	Romania	
France	South Africa,	
Germany	Rep. of	
Hungary	Spain	

Six Member Bodies opposed the approval of the Draft :

Canada
India
Netherlands
Portugal
U.S.A.
U.S.S.R.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in February 1968, to accept it as an ISO RECOMMENDATION.

RATING OF RESISTANCE WELDING EQUIPMENT

PART I

GENERAL

1. SCOPE

This ISO Recommendation applies to single-phase resistance welding machines, including complete mobile equipment, but not to transformers supplied separately. Provisionally, it covers equipment whose maximum conventional power (see clause 2.8) does not exceed 400 kVA.

It applies to equipment for use under the following conditions :

- (a) *Altitude.* In the absence of any information concerning height above sea level at which the machine is intended to work in ordinary service, the altitude is assumed not to exceed 1000 m (3300 ft).
- (b) *Temperature of the cooling medium.* In the absence of any information to the contrary, it is assumed that, for water-cooled machines, the temperature of the cooling water does not exceed 25 °C at the inlet of the machine and, in the case of air-cooled machines, that none of the following limits is exceeded :
 - maximum ambient air temperature 40 °C
 - daily average ambient air temperature 30 °C
 - yearly average ambient air temperature 20 °C
- (c) *Pressure of cooling water.* In the absence of any information to the contrary, it is assumed that the pressure of the cooling water is not less than that for which the machine is designed.

2. DEFINITIONS

- 2.1 *Operating conditions.* All quantities defining the performance of a machine.
- 2.2 *Rated.* Qualifying term applied to a quantity which is used in the specification of resistance welding equipment.
- 2.3 *Duty.* A schedule of the loads on an apparatus or machine taking account of their respective duration and sequence.
- 2.4 *Periodic duty.* A duty which is repeated periodically.
- 2.5 *Duty cycle* (see Note 1). The ratio of the duration of the electrical load (see Note 2) to the duration of the complete cycle. This ratio, lying between 0 and 1, may be expressed as a percentage.

NOTES

- 1. In English, the term "duty factor", as used in the ISO and IEC definitions, and the term "duty cycle" are synonymous.
- 2. In this ISO Recommendation, the word "load" should be considered in a restricted manner. It refers to a constant load which excludes all periods of pre-heat, post-heat and slope control.

- 2.6 *Maximum short-circuit power (P_m)*. The maximum apparent power at the terminals of the machine, expressed in kilovolt-amperes, absorbed at the highest regulator setting, the electrodes being short-circuited according to conditions laid down in the methods of test (see Part II, section 1) and the machine arranged in such a manner as to have the minimum secondary impedance compatible with this method of short-circuit.
- 2.7 *Maximum welding power.** The power equal to 0.8 of the value of maximum short-circuit power.
- 2.8 *Maximum conventional power at 50 % duty cycle (P_c).** The maximum apparent power, expressed in kilovolt-amperes, corresponding to an actual or assumed continuous service at a duty cycle of 50 % with the regulator at its highest setting without exceeding the temperature rises specified in section 4, when tested in accordance with the following recommendations.

3. CONDITIONS UNDER WHICH TEMPERATURE MEASUREMENTS SHOULD BE TAKEN

3.1 Air-cooled transformers

The test should be made at an ambient air temperature of at least $+10\text{ }^{\circ}\text{C}$. It is assumed that the rise in temperature is the same for ambient temperatures between $+10\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$. The ambient temperature should be taken as the average registered during the last quarter of the test.

The rises in temperature should be measured by either the resistance or thermometer method in the case of primary windings, and by either thermometer or embedded detectors in the case of secondary windings, provided that, when using the thermometer method, the measurement is taken at the hottest accessible point.

The temperature rise should be measured immediately after the end of the last period under load.

The highest temperatures registered should be the reported values.

3.2 Water-cooled transformers

In determining the temperature rises, account should be taken of the actual water inlet temperature at the time of the test.

The water inlet temperature should be taken as the average registered during the last quarter of the test.

The temperature rise should be measured by either the resistance or embedded detector method in the case of primary windings, and by either the thermometer or embedded detector method in the case of secondary windings.

When using the resistance method the temperature should be measured with the cooling water shut off and the load removed. The readings should be taken not less than 15 seconds and not more than 60 seconds after shutdown.

When using the embedded detector method for measuring the temperature of either the primary or the secondary windings, and the thermometer method for measuring that of the secondary windings, the temperature should be measured with the cooling water flowing and the load applied.

The highest temperatures attained should be the reported values.

* See Part III. The maximum welding power is symbolized by $S_{\max}$. The maximum conventional power at 50 % duty cycle is symbolized by S_{conv} .