

Chapter E 630

ELECTRIC WELDERS

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A. GENERAL

E 630.01 Scope. This chapter covers electric arc welding, resistance welding apparatus, and other similar welding equipment that is connected to an electrical supply system.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 630.02 Other chapters. This chapter amplifies or modifies parts of chapters E 100 to E 400 inclusive of this code in order to properly cover the operating conditions to which electric welder installations are subjected. Accordingly the appropriate provisions of chapters E 100 to E 400 inclusive apply to the component parts of electric welder installations except as otherwise provided in this chapter.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

B. AC TRANSFORMER AND DC RECTIFIER ARC WELDERS

E 630.11 Capacity of supply conductors. The current-carrying capacity of conductors shall be as follows:

(1) **INDIVIDUAL WELDERS.** The rated current-carrying capacity of the supply conductors shall be not less than the current values determined by multiplying the rated primary current in amperes, given on the welder nameplate, and the following factor based upon the duty cycle or time rating of the welders:

Rated Percent Duty Cycle of Welders	Multiplying Factor
20 or less.....	0.45
30.....	0.55
40.....	0.63
50.....	0.71
60.....	0.78
70.....	0.84
80.....	0.89
90.....	0.95
100.....	1.00

For a welder having a time rating of one hour, the multiplying factor shall be 0.75.

(2) **GROUP OF WELDERS.** The rated current-carrying capacity of conductors which supply a group of welders may be less than the sum of the currents, as determined in accordance with subsection

E 630.11 (1) of the welders supplied. The conductor rating shall be determined in each case according to the welder loading based on the use to be made of each welder and the allowance permissible in the event that all the welders supplied by the conductors will not be in use at the same time. The load value used for each welder shall take into account both the magnitude and the duration of the load while the welder is in use.

Note: Conductor ratings based on 100% of the current, as determined in accordance with subsection E 630.11 (1), of the two largest welders, 85% for the third largest welder, 70% for the fourth largest welder, and 60% for all the remaining welders, should provide an ample margin of safety under high production conditions with respect to the maximum permissible temperature of the conductors. Percentage values lower than those given are permissible in cases where the work is such that a high operating duty cycle for individual welders is impossible.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 630.12 Overcurrent protection. Overcurrent protection shall be as provided in subsections E 630.12 (1) and (2). Where the nearest standard rating of the overcurrent device used is under the value specified in this rule, or where the rating or setting specified results in unnecessary opening of the overcurrent device, the next higher rating or setting may be used.

(1) **FOR WELDERS.** Each welder shall have overcurrent protection rated or set at not more than 200% of the rated primary current of the welder, except that an overcurrent device is not required for a welder having supply conductors protected by an overcurrent device rated or set at not more than 200% of the rated primary current of the welder.

(2) **FOR CONDUCTORS.** Conductors which supply one or more welders shall be protected by an overcurrent device rated or set at not more than 200% of the conductor rating.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 630.13 Disconnect means. (1) A disconnect means shall be provided in the supply connection of each welder which is not equipped with a disconnect mounted as an integral part of the welder.

(2) The disconnect means shall be a switch or circuit-breaker and its rating shall be not less than that necessary to accommodate overcurrent protection as specified under section E 630.12.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 630.14 Marking. A nameplate giving the following information shall be provided: name of manufacturer; frequency; primary voltage; rated primary current; maximum open-circuit secondary voltage; rated secondary current; basis of rating, i.e., the duty cycle, number of phases, 60-minute rating.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

C. MOTOR-GENERATOR ARC WELDERS

E 630.21 Other rules which apply. Motor-generator arc welder installations are covered by the appropriate rules of chapters E 100 to E 400 inclusive applicable to conductors, motors, generators and associated equipment. Referring specifically to the motor supply connections, the following rules apply in addition to such other provisions as may be applicable. Conductor rating, sections E 430.022 and E

430.026. Overcurrent protection for motors, section E 430.033; for conductors, section E 430.052. Controllers, sections E 430.007, E 430.008 and E 430.083. Disconnecting means, section E 430.111.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

D. RESISTANCE WELDERS

E 630.31 Capacity of supply conductors. The current-carrying capacity of the supply conductors necessary to limit the voltage drop to a value permissible for the satisfactory performance of the welder is usually greater than that required to prevent over-heating as prescribed in subsections E 630.31 (1) and (2).

(1) **INDIVIDUAL WELDERS.** The rated current-carrying capacity for conductors for individual welders shall conform to the following:

(a) *Varying operations.* The rated current-carrying capacity of the supply conductors for a welder which may be operated at different times at different values of primary current or duty cycle shall be not less than 70% of the rated primary current for seam and automatically fed welders, and 50% of the rated primary current for manually-operated non-automatic welders.

(b) *Specific operation.* The rated current-carrying capacity of the supply conductors for a welder wired for a specific operation for which the actual primary current and duty cycle are known and remain unchanged shall be not less than the product of the actual primary current and the multiplier given below for the duty cycle at which the welder will be operated.

Duty Cycle (per cent) -----	50	40	30	25	20	15	10	7.5	5.0	or less
Multiplier -----	.71	.63	.55	.50	.45	.39	.32	.27	.22	

(2) **GROUPS OF WELDERS.** The rated current-carrying capacity of conductors which supply 2 or more welders shall be not less than the sum of the value obtained as explained in subsection E 630.31 (1) for the largest welder supplied, and 60% of the values obtained as explained in subsection E 630.31 (1) for all the other welders supplied.

(3) **EXPLANATION OF TERMS.** (a) The rated primary current is the rated kva multiplied by 1,000 and divided by the rated primary voltage, using values given on the nameplate. (b) The actual primary current is the current drawn from the supply circuit during each welder operation at the particular heat tap and control setting used. (c) The duty cycle is the percentage of the time during which the welder is loaded. For instance, a spot welder supplied by a 60-cycle system (216,000 cycles per hour) making four hundred 15-cycle welds per hour would have a duty cycle of 2.8% (400 multiplied by 15, divided by 216,000, multiplied by 100). A seam welder operating 2 cycles "on" and 2 cycles "off" would have a duty cycle of 50%.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 630.32 Overcurrent protection. Overcurrent protection shall be as provided in subsections E 630.32 (1) and (2). Where the nearest standard rating of the overcurrent device used is under the value specified in this rule, or where the rating or setting specified results in unnecessary opening of the overcurrent device, the next higher rating or setting may be used.

(1) **FOR WELDERS.** Each welder shall have an overcurrent device rated or set at not more than 300% of the rated primary current of the welder, except that an overcurrent device is not required for a welder having a supply circuit protected by an overcurrent device rated or set at not more than 300% of the rated primary current of the welder.

(2) **FOR CONDUCTORS.** Conductors which supply one or more welders shall be protected by an overcurrent device rated or set at not more than 300% of the conductor rating.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 630.33 Disconnecting means. A switch or circuit-breaker shall be provided by which each welder and its control equipment can be isolated from the supply circuit. The current-carrying capacity of this disconnecting means shall be not less than the supply conductor rating determined as explained in this chapter. The supply circuit switch may be used as the welder disconnecting means where the circuit supplies only one welder.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 630.34 Marking. A nameplate giving the following information shall be provided: name of manufacturer, frequency, primary voltage, rated kva at 50% duty cycle, maximum and minimum open-circuit secondary voltage, short-circuit secondary current at maximum secondary voltage and specified throat and gap setting.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.