

RETMA RS-181

RETMA STANDARD

*Iron Core
Charging Inductors*

RS-181
(Revision of TR-127)



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Engineering Department
RADIO-ELECTRONICS-TELEVISION MANUFACTURERS ASSOCIATION

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IRON CORE CHARGING INDUCTORS

(From Standard TR-127 and Standards Proposal No. 514 formulated under the cognizance of RETMA Engineering Committee SQ-4 on Transformers and Inductors)

1. SCOPE

This standard covers iron core charging reactors for use in radar transmitters and similar equipment where long life, reliability and continuity of operation is essential.

2. DEFINITIONS

Definitions of electrical terms used in this standard shall be in accordance with those given in "American Standard Definitions of Electrical Terms"—ASA Standard C42-1941. Definitions of electrical terms used in this standard, but not covered by ASA Standard C42-1941, are given below:

2.1 Charging Inductor

A charging inductor is an inductor placed in the charging circuit of a pulse forming network. Because of the oscillatory nature of the charging, network capacitance is charged to almost double the power supply voltage, at which time the switch shunting the network conducts, discharges the network and develops a pulse across the load of the modulator.

2.2 Pulse Repetition Frequency (PRF)

Pulse repetition frequency (PRF) is the number of times per second the pulse is transmitted.

2.3 Resonant Frequency of Charging (f_R)

Resonant frequency of charging reactor inductance and network capacity as determined by

$$f_R = \frac{1}{2\pi\sqrt{LC}}$$

2.4 Resonant Charging

Resonant charging occurs when the switch starts to conduct at the peak of the sine wave of voltage across the network. f_R should approximately equal $\frac{PRF}{2}$ for this condition.

2.5 Linear Charging

In linear charging, the switch starts to conduct while the voltage across the network condenser is still rising. f_R should be less than $\frac{PRF}{2}$ for this condition.

2.6 Resonant Charging with a Charging Diode

A diode is placed in series with the charging inductor with its plate connected to the high voltage side of the inductor and its cathode connected to the common junction of the switch and the pulse forming network. The network charges to full voltage, remains there until the switch conducts, and permits operation at PRF's less than $2f_R$.

2.7 Graded Insulation

Graded insulation is a method of construction wherein the insulation to ground is reduced more or less uniformly from the high potential end to the low potential end. It is applicable to charging inductors where one end is permanently connected to a fixed potential while the other end may swing to essentially double this fixed potential.

2.8 RMS Working Voltage

The "RMS working voltage" between the winding and ground shall be defined as 0.707 times the sum of the maximum d-c voltage and the peak a-c voltage which may appear between the winding and ground under normal conditions of continuous operation.

2.9 Average Current (I_{dc})

This is the current drawn from the power supply over one or more complete cycles.

