

## UL Certification of Relays; commonly used loads for electrical life testing

### General information about life testing of relays

Each test consists of two parts.

- Overload Testing
- Endurance Testing

The same relay has to pass both parts of the test successively.

### Resistive Load

Ohmic load: The applicant specifies rated voltage and current of the load.

Overload Test: Test at 1.5 times rated current,  $\cos \phi = 1.0$ ; number of cycles: 50

Endurance Test: Test at rated current,  $\cos \phi = 1.0$ ; number of cycles: 6,000  
(6,000 cycles is the standard value; the applicant may specify a higher number of cycles)

### General Use

Inductive load: The applicant specifies rated voltage and current of the load.

Overload Test: Test at 1.5 times rated current,  $\cos \phi = 0.75 \dots 0.80$ ; number of cycles: 50

Endurance Test: Test at rated current,  $\cos \phi = 0.75 \dots 0.80$ ; number of cycles: 6,000  
(6,000 cycles is the standard value; the applicant may specify a higher number of cycles)

### HP Load (Horsepower Motor load)

Motor load, rated voltage and motor power (in HP) are specified.

The following table shows the relevant rated current:

HP		1/10	1/8	1/6	1/4	1/3	1/2	3/4	1	1,5	2
Rated Current (A)	at 125 VAC	3.0	3.8	4.4	5.8	7.2	9.8	13.8	16.0	20.0	24.0
	at 250 VAC	1.5	1.9	2.2	2.9	3.6	4.9	6.9	8.0	10.0	12.0

Overload Test: Test at 6 times rated current,  $\cos \phi = 0.40 \dots 0.50$ , number of cycles: 50

Endurance Test: Test at 2 times rated current,  $\cos \phi = 0.40 \dots 0.50$ , number of cycles: 1,000 (1,000 cycles is the standard value; the applicant may specify a higher number of cycles; often 100,000 cycles are tested); afterwards 5,000 operations without contact load are conducted

Example for load definition: ½ HP at 250 VAC

### Definite Purpose Controllers (FLA / LRA specifications)

Motor load: The applicant specifies voltage of the load and arbitrary current values for FLA (Full Load Amps: The amount of current the motor draws at full speed, under full mechanical load, at rated voltage) and LRA (Locked Rotor Amps: The maximum current the motor will draw at locked rotor).

Overload Test: Test at LRA - current value,  $\cos \phi = 0.40 \dots 0.50$ ; number of cycles : 50

Endurance Test: Test at FLA - current value,  $\cos \phi = 0.75 \dots 0.80$ ; number of cycles: 30,000 or 100,000

Example for load definition: 20/60 (FLA/LRA) at 277 VAC, 30k cycles.

This means: Test at 60 A with 50 (!!!) cycles and at 20 A with 30 000 cycles.

### TV-Load (e.g. TV-5)

The inrush behavior of a television set is simulated by incandescent tungsten lamps (thus this kind of load is called TV-Load); the test is made at 120 VAC. The related number indicates the rated current of the incandescent lamps.

Overload Test: Test at 1.5 times rated current, lamp load; number of cycles: 50

Endurance Test: Test at rated current, number of cycles: 25,000. After a short ON period the lamps are OFF for 55 seconds. The standard specifies the minimum inrush currents (peak value), they are about 15 times the rated current.

Example for load definition: TV-5; this means: test at lamp load, rated current 5 A, min. inrush current 78 A (peak value).

### Pilot Duty (e.g. Q300, B300)

Strongly inductive load, all loads of the specified category will be tested.

Direct Voltage, 'DC-Controls'					
Category	Voltage	Current	Power	$\tau$ (=L/R)	Continuous Thermal Current
	VDC	A	W	ms	A
Q300	125	0.55	69	100	2.5
	250	0.27	69	100	
R300	125	0.22	28	56	1.0
	250	0.11	28	56	

Alternating Voltage, 'AC-Controls'					
Category	Voltage	Inrush Current	Breaking Current	cos phi	Continuous Thermal Current
	VAC	A	A		A
A300	120	60	6.0	0.35	10
	240	30	3.0		
B300	120	30	3.0	0.35	5
	240	15	1.5		
C300	120	15	1.5	0.35	2.5
	240	7.5	0.75		

Overload Test: Test at 1.1 times voltage and 1.1 times current, number of cycles: 50

Endurance Test: Test at values as in table above, number of cycles: 6,000