44.6 A sample of the room air-conditioner is to be tested for leakage current starting with the as-received condition – as-received being without prior energization except as may occur as part of the production line testing. The room air conditioner is to be prepared and conditioned for leakage current measurement as follows. The sample shall not be energized during the conditioning:

a) The grounding conductor is to be open at the attachment plug and the test unit is to be isolated from ground.

b) The sample is to be conditioned in an ambient temperature of $70 - 80^{\circ}F$ (21.1 - 26.7°C) and 50 percent ±5 percent relative humidity for not less than 8 hours.

c) The test is to be conducted at the ambient temperature conditions specified by (b).

d) The supply voltage is to be adjusted to the voltage indicated in Table 43.1.

e) Water-cooled units are to be tested with water flowing through the condenser at a rate required for operation of the system.

44.7 With reference to the measuring circuit in Figure 44.1, the leakage current test sequence shall be as described in (a) – (d) below. If the compressor stalls during sequence B or C due to changing the position of switch S2, the sequence is to be conducted in its entirety in one position of switch S2 and then repeated in the second position of switch S2.

a) With switch S1 open, the unit is to be connected to the measuring circuit. The leakage current is to be measured using both positions of switch S2 and with manually-operated unit switching devices successively placed in each mode (fan only, cooling, heating, and the like).

b) With unit controls set for maximum cooling and maximum fan speed, switch S1 is to be closed to energize the unit. Within 5 seconds, leakage current is to be measured using both positions of switch S2. Following this and using both positions of switch S2, manual switching devices are to be operated as quickly as possible through all cooling modes, but not in the "off" position, to determine the maximum leakage current condition.

c) With switching devices set at the position which causes the highest leakage current, the unit is to be operated continuously until the measured leakage current stabilizes or decreases. Both positions of switch S2 are to be used.

d) Following (c), switch S1 is to be opened to de-energize the unit. Measurement of leakage current is to continue, using both positions of switch S2, until values stabilize or begin to decrease.

44.8 A room air conditioner with provision for reverse cycle heating, resistance heating, or both shall be tested in all modes of heating operation. The test sequence shall be in accordance with (b) - (d) of 44.7 except that unit switching devices shall be set for the heating mode. It may be necessary to shunt some unit controls in order to energize all heating loads.

45 Rain Test

45.1 The section of a room air conditioner exposed to weather shall be subjected to rain exposure without creating the risk of electric shock.

45.2 The room air conditioner is to be conditioned in an ambient temperature of $70 - 80^{\circ}F$ ($21.1 - 26.7^{\circ}C$) and 20 - 50 percent relative humidity for not less than 8 hours. The insulation resistance of the unit is then to be measured by the series-voltmeter method, or equivalent means, using a nominal 500-volt dc circuit. The insulation resistance shall not be less than 2 megohms. Air heating elements, if any, which comply with the requirement of 65.1.1 are to be disconnected. The unit is to be installed in accordance with the manufacturer's instructions.

45.3 The rain test apparatus is to consist of three spray heads mounted in a water supply pipe rack as shown in Figure 45.2. Spray heads are to be constructed in accordance with the details shown in Figure 45.1. The water pressure is to be maintained at 5 psi (34 kPa) at each spray head. The distance between the center nozzle and the test unit is to be approximately 5 feet (1.5 m). The unit is to be brought into the focal area of the three spray heads in such a position and under such conditions that the greatest quantity of water will enter the unit. The spray is to be directed at an angle of 45 degrees to the vertical toward openings closest to current-carrying parts. The unit is to be operated so that electrical components located in the outdoor section are energized. It may be necessary to operate the unit under various modes of operation or de-energize the unit if more adverse conditions could result. In any case, each exposure is to be for 1 hour and if more than one exposure is required, the unit is to be reconditioned as indicated in 45.2 before repeating the test.

45.4 After each exposure, the unit shall have an insulation resistance between live parts and dead metal parts of not less than 0.5 megohms. The insulation resistance is measured 1 minute after application of the voltage obtained by using the series-voltmeter method, or equivalent means, and a nominal 500-volt dc circuit. Air heating elements, if any, which comply with the requirements of 65.1.1 are to be disconnected. After measurement of the insulation resistance, the complete unit, including air heating elements, shall comply with the requirements of the Dielectric Voltage-Withstand Test, Section 50.



Item	inch	(mm)	Item	inch	(mm)	
А	1-7/32	(31.0)	N	1/32	(0.80)	
В	7/16	(11.0)	Р	.575	(14.61)	
С	9/16	(14.0)		.576	(14.63)	
D	.578	(14.68)	Q	.453	(11.51)	
	.580	(14.73)		.454	(11.53)	
E	1/64	(0.40)	R	1/4	(6.35)	
F	с	С	S	1/32	(0.80)	
G	.06	(1.52)	Т	(No. 35) ^b	(2.80)	
н	(No. 9) ^b	(5.0)	U	(No. 40) ^b	(2.50)	
J	23/32	(18.3)	V	5/8	(16.0)	
К	5/32	(3.97)	W	0.06	(1.52)	
L	1/4	(6.35)				
М	3/32	(2.38)				
^a Nylon Rain – Test Spray Heads are available from Underwriters Laboratories Inc.						

^b Drill size per ASME B 94.11, Twist Drills

^c Optional – To serve as wrench grip.

^d ASME B1.20.1, Pipe Threads, General Purpose (Inch)



RT101B

Item	inch	(mm)
A	28	(710)
В	55	(1400)
С	2-1/4	(55)
D	9	(230)
E	3	(75)

46 Test Conditions for Input Test and Temperature-Pressure Test

46.1 The room air conditioner is to be prepared for test by attachment of pressure gauges to the highand low-pressure sides of the refrigeration system. Thermocouples are to be secured to components, such as the motor-compressor enclosure, fan motor windings, conductor insulation, enclosure surfaces, and the like, as indicated in Table 48.1. The temperature of motor windings or of coils may be measured by the change-in-resistance method, but the primary method of temperature measurement is to be the thermocouple method.

46.2 The unit is to be installed in the test room(s) in accordance with the manufacturer's instructions. Dampers, louvers, and switches are to be set in accordance with the manufacturer's instructions to produce maximum cooling (or heating). An accessory for use with the room air conditioner is to be installed and tested with the unit if use of the accessory will affect input current, temperatures, or pressures.

46.3 If the controls of a room air conditioner are designed to permit operation of an electric heater during the cooling cycle (see 24.16), the unit is also to be tested under this condition. If the control function is dependent on temperature, the test ambient temperature is to be adjusted to the maximum condition under which this operation may occur.

46.4 If a unit is intended for use with air delivery and return collars, sleeves, or the like, the unit is to be tested as a free air delivery unit under cooling conditions, with the appropriate air discharge louver or diffuser and air return grille attached directly to the unit. When tested under heating conditions, the unit is to be tested for either free air delivery or with collars, sleeves, and the like, installed in accordance with the manufacturer's instructions, whichever results in the highest currents, temperatures, and pressures. See 3.8, 91.3, and 91.4.

46.5 The test room(s) is to be maintained at conditions which will provide inlet air to the unit at temperatures specified in Table 46.1. Air temperatures are to be the average of three measurements at points selected to give representative inlet air conditions. Water and steam temperature measurements are to be made as nearly adjacent to the inlet and outlet connections as is practicable.

		Temperature ^a			
		Input test,	Input test, Degrees		pressure test, ees
		F	(C)	F	(C)
1.	Cooling				
	Air cooled unit				
	Indoor air, DB/WB ^c	80/67	(26.7/19.4)	104/80	(40/26.7)
	Outdoor air, DB/WB	95/75	(35/23.9)	104/80	(40/26.7)
	Water cooled unit				
	Indoor air, DB/WB	80/67	(26.7/19.4)	104/80	(40/26.7)
	Condensed water, In/Out	75/95	(23.9/35)	80/100	(26.7/37.8)
2.	Reverse cycle heating				
	Air cooled unit				
	Indoor air, DB/WB	-	-	70/58.5	(21.1/14.7)
	Outdoor air, DB/WB	-	-	70/58.5	(21.1/14.7)
	Water cooled unit				

 Table 46.1

 Temperature conditions for input test and temperature and pressure test

Table 46.1 Continued on Next Page

15 - UL 484

		Temperature ^a					
		Input test, De	Input test, Degrees		Degrees Temperature and pressure te Degrees		ressure test, s
		F	(C)	F	(C)		
	Indoor air, DB	70	(21.1)	70	(21.1)		
	Condensed water, In/Out	60/45	(15.6/7.2)	70/55	(21.1/12.8)		
3.	Resistance heat (only)	Approximately 77	(25)	Approximately 77	(25)		
4.	Combination reverse						
	cycle-resistance heat						
	Air cooled unit						
	Indoor air, DB/WB	70/58.5	(21.1/14.7)	70/58.5	(21.1/14.7)		
	Outdoor air, DB/WB	70/58.5	(21.1/14.7) ^b	70/58.5	(21.1/14.7) ^b		
5.	Steam or hot water						
	heat	_	-	Approximately 77	(25)		

Table 46.1 Continued

^a Temperature tolerance: $\pm 2^{\circ}F$ ($\pm 1^{\circ}C$) dry bulb; $\pm 1^{\circ}F$ ($\pm 0.5^{\circ}C$) wet bulb except for resistance heat or steam/hot water heat. ^b Or design temperature, for example, outdoor temperature at which all electric heaters which may operate concurrently with compressor are energized, see 47.5.2.

^c Special purpose spot coolers are input tested with condenser and evaporator air at an ambient of 80/67°F (26.7/19.4°C).

46.6 The test unit is to be operated continuously at the voltage(s) specified in Table 43.1.

47 Input Test

47.1 General

47.1.1 The room air conditioner is to be operated under the input test conditions specified in Section 46 for the various performance modes. The stabilized input current value is to be used in judging compliance with 47.2.1 - 47.5.2.

47.2 Cooling load

47.2.1 The measured ampere input to a cord-connected room air conditioner operating in the cooling mode, shall not exceed the total cooling-load amperes marked on the nameplate by more than 10 percent.

47.2.2 The measured ampere input to a permanently-connected room air conditioner operating in the cooling mode, shall not exceed the individual rating of each cooling load or group of cooling loads or the total rating marked on the nameplate by more than 10 percent.

47.2.3 The pressures developed in the room air conditioner shall be used in establishing the minimum high- and low-side design pressures appearing on the unit nameplate. See 88.7. Gaugeline valves are to be opened and pressures recorded after the input current has stabilized.

47.3 Heating load (reverse cycle heat only)

47.3.1 The measured ampere input to a water-cooled room air conditioner, operating in the reverse cycle heating mode, shall not exceed the individual rating of each load or group of loads or the total marked rating for reverse cycle heating by more than 10 percent.

47.4 Heating load (resistance heat only)

47.4.1 The measured ampere (or wattage) input to a cord-connected room air conditioner employing resistance heat and operating in that mode, shall not exceed the total heating ampere or wattage marked on the room air conditioner nameplate by more than 5 percent.

47.4.2 The measured input to a permanently-connected room air conditioner employing resistance heat and operating in that mode, shall not exceed the individual rating of each load or group of loads or the total marked rating for this function by more than 5 percent.

47.5 Heating load (combination reverse cycle and resistance heat)

47.5.1 The measured ampere input to a room air conditioner designed for combination reverse cycle and resistance heating shall not exceed the individual rating of each load or group of loads, or the total marked rating for this function by more than the following:

a) Ten percent when the compressor motor, fan motor(s), and all resistance heating loads operate concurrently; and

b) Five percent when the fan motor(s) and resistance heating loads do not operate concurrently with the compressor motor.

47.5.2 Compliance with 47.5.1 (a), is determined by using the indoor and outdoor ambient air temperatures of 70°F (21.1°C) dry bulb, 58.5°F (14.7°C) wet bulb as specified in Table 46.1. If all resistance heating loads which may operate concurrently with the compressor motor are not energized at these temperatures, the outdoor air temperature is to be decreased until such operation occurs. See footnote ^b in Table 46.1.

47.5.3 Compliance with 47.5.1 (b), is to be determined by energizing all loads which do not operate concurrently with the compressor as described under Heating Load (Resistance Heat Only), 47.4.1 and 47.4.2.

48 Temperature and Pressure Test

48.1 In addition to operating in the cooling mode, this test also applies to room air conditioners which incorporate reverse cycle heating or combination reverse cycle and resistance heating.

48.2 The unit is to be operated under the temperature and pressure test conditions specified in Section 46. Operation is to continue until input current, temperatures, and high- and low-side pressures have stabilized.

48.3 Temperature rises of electrical components, wiring, enclosure surfaces, and the like, shall not exceed those specified in Table 48.1.

		Degrees	
Device or material		С	(F)
A. Motors			
 Class A insulation systems on coil windings of alternating-c having a frame diameter of 7 inches (178 mm) or less (not inc motor-compressors)^{a,b} 	urrent motors cluding hermetic		
a. In open motors –			
Thermocouple or		75	(135)
resistance method			
b. In totally enclosed motors -			
Thermocouple or		80	(144)
resistance method			
 Class A insulation systems on coil windings of alternating-c having a frame diameter of more than 7 inches (178 mm) (not hermetic motor-compressors)^{a,b} 	urrent motors t including		
a. In open motors –			
Thermocouple method		65	(117)
Resistance method		75	(135)
b. In totally enclosed motors -			
Thermocouple method		70	(126)
Resistance method		80	(144)
 Class B insulation systems on coil windings of alternating-c having a frame diameter of 7 inches (178 mm) or less (not inc motor-compressors)^{a,b} 	urrent motors cluding hermetic		
a. In open motors –			
Thermocouple or		95	(171)
resistance method			
b. In totally enclosed motors-			
Thermocouple or		100	(180)
resistance method			
 Class B insulation systems on coil windings of alternating-c having a frame diameter of more than 7 inches (178 mm) (not hermetic motor-compressors)^{a,b} 	urrent motors t including		
a. In open motors –			
Thermocouple method		85	(153)
Resistance method		95	(171)
b. In totally enclosed motors –			
Thermocouple method		90	(162)

Table 48.1Maximum temperature rises

Table 48.1 Continued on Next Page

		Degrees	
Device or mate	erial	С	(F)
Resistance me	100	(180)	
B. Components		(100)	
1. Capacitors			
Electrolytic type ^c		40	(72)
Other types ^d		65	(117)
2. Field wiring ^e		35	(63)
3. Fuse bodies ^f		65	(117)
4. Hermetic motor-compressor enclosur	e ^g	150	(302)
5. Relay solenoid, and other coils with			, , ,
a. Class 105 insulated wind	ding-		
Thermocouple	method	65	(117)
Resistance me	ethod	85	(153)
b. Class 130 insulation –			, , ,
Thermocouple	method	85	(153)
Resistance me	ethod	105	(189)
6. Solid contacts		65	(117)
7. Transformer enclosures with			()
a. Class 2 transformers		60	(108)
b. Power transformers		65	(117)
8. Transformer windings:			()
a. Class 105 insulated wind	dina —		
	method	65	(117)
Besistance me	athod	85	(153)
h Class 130 insulation –			(100)
		85	(153)
Resistance method		105	(189)
c. Class 155 insulation:			(,
Class 2 transformers			
Th	ermocouple method	95	(171)
Be	esistance method	115	(207)
Power transfor	mers		()
Th	ermocouple method	110	(198)
Be	esistance method	115	(207)
d. Class 180 insulation:			()
Class 2 transfo	ormers		
Th	ermocouple method	115	(207)
Re	esistance method	135	(243)
Power transfor	mers		()
Th	ermocouple method	125	(225)
Re	esistance method	135	(243)
9 Wood or other compustible material		65	(117)
C. Insulated conductors	C. Insulated conductors		, , ,
1. Flexible cords and wires with rubber, thermoplastic, or neoprene insulation			
unless recognized as having a special heat-resistant properties as follows:			
Temperature rating –			
Degrees C De	egrees F		
60 14	0	35	(63)
75 16	7	50	(90)

Table 48.1 Continued

Table 48.1 Continued on Next Page

Table 48.1 Continued

			Deg	rees
	Device or material			(F)
	90	194	65	(117)
	105	221	80	(144)
D. Electrica	l insulation – general			
	1. Fiber used as electrica	l insulation or cord bushings	65	(117)
	2. Phenolic composition used as electrical insulation or as parts where failure will result in a hazardous condition		125	(225)
	3. Thermoplastic material	Rise based on temperature limits of material		
E. Surfaces				
	1. Surfaces of room air co	onditioner at points of zero clearance to test enclosure	65	(117)
	2. Surfaces of test enclose specified	ure where clearance to combustible material is	65	(117)
	Surfaces of room air conditioner contacted by the persons operating it (control knobs, pushbuttons, levers, and the like)			
	I	Metal	35	(62)
	I	Nonmetallic	60	(108)
	4. Surfaces of room air co (enclosure, grille, and the	onditioner subjected to casual contact by persons like)		
	I	Metal ^h	45	(81)
	I	Nonmetallic	65	(117)
^a Thermoco	uple applied directly to the	integral insulation of the coil conductor.		

^b Thermocouple applied as in footnote^a or applied to conventional coil wrap.

^c For an electrolytic capacitor which is physically integral with or attached to a motor, the temperature rise on insulating material integral with the capacitor enclosure may be not more than $65^{\circ}C$ ($117^{\circ}F$).

^d A capacitor which operates at a temperature higher than a 65°C (117°F) rise may be judged on the basis of its marked temperature rating.

^e A temperature rise of no more than 50°C (90°F) is acceptable in the terminal box or wiring compartment of a unit that requires supply conductors with an ampacity of more than 100 amperes.

^f Includes both casing and ferrule. However, a temperature not more than 20°C (36°F) higher than the value indicated in the table is acceptable on the casing (not ferrule) of a Class CC, G, J, L, or T fuse.

^g Maximum - not rise.

^h 65°C (117°F) rise permitted on air discharge grilles used on units provided with means for heating.

48.4 The maximum pressures developed in the room air conditioner shall be used in applying strength test requirements, Section 70.

48.5 Motor-compressors shall be capable of operation continuously under the conditions of this test with any protective device in the circuit.

Exception: An automatic-reset protective device may cycle during the starting period. A manual-reset protective device shall not trip during the starting or operating period.

48.6 The room air conditioner shall comply with the requirements of the Dielectric Voltage Withstand Test, Section 50, following the above tests.

49 Starting Test

49.1 A room air conditioner shall start, run, and restart without opening the branch circuit fuses for which it is designed, marked, or both, to be used.

Exception: If a permanently-connected unit is intended to be connected to a branch circuit protected by an overcurrent device sized in accordance with 62.1.4, a starting test is not required.

49.2 For cord-connected units, the fuse rating mentioned in 10.2 is determined by the rating of the attachment plug. If a permanently-connected unit is intended to be connected to a circuit protected by an overcurrent device sized in accordance with 62.1.5, the fuse rating is to be as marked on the nameplate.

49.3 The unit and four fuses are to be connected in series. The unit is to be operated in a room maintained at $104^{\circ}F$ ($40^{\circ}C$) dry bulb and $80^{\circ}F$ ($26.7^{\circ}C$) wet bulb. The test voltage is to be maintained as indicated in Table 43.1. The unit is to be operated for 1/2 hour and then turned off. If a cord-connected unit has a permanent and legible marking near the control knob which specifies a minimum restart time, it is to be restarted by the control switch after the time lapse indicated but not more than 3 minutes. Otherwise, the unit is to be started immediately after the fans stop.

49.4 If no fuse opens, the fuse used is acceptable for starting the unit. If one fuse opens, the test is to be repeated using the three remaining fuses. If none of the three open, the results are acceptable. If one of the three opens, the results are not acceptable and the test is to be repeated using four time-delay fuses of the same rating as the original fuse.

49.5 If it is determined that time-delay fuses are required for starting, the unit shall be marked in accordance with 88.14.

49.6 If an automatic reset thermal protective device interrupts the current flow one or more times during the 1/2 hour operating period described in 49.3, the room air conditioner shall restart and run after each interruption and shall comply with the fusing requirements of 49.4 and 49.5.

50 Dielectric Voltage-Withstand Test

50.1 A room air conditioner shall withstand, without breakdown, a test potential as described in Table 50.1.

Exception No. 1: Deleted

Exception No. 2: If the steady-state voltage developed in a motor circuit through the use of capacitors exceeds 500 volts, as measured in the Temperature and Pressure Test, Section 48, the test potential for the parts affected shall be 1000 volts plus twice the developed capacitor voltage.