



## Technical Characteristics

Test load, type	TIE 42-5W	TIE 42-1W	TIE 42-3W	TIE 42-5W / 16 / 3G	TIE 47-5W	TIE 47-1W	TIE 47-3W	TIE 47-5W / 16 / 3G	TIE 420-5W	TIE 420-1W	TIE 420-3W	TIE 420-5W / 16 / 3G
1. Design	unbalanced with water heat-exchanger	balanced	balanced	with air heat-exchanger	unbalanced with water heat-exchanger	balanced	balanced	with air heat-exchanger	unbalanced with water heat-exchanger	balanced	balanced	with air heat-exchanger
2. Resistance	50 Ω	120 Ω	300 Ω	50 Ω	50 Ω	120 Ω	300 Ω	50 Ω	50 Ω	120 Ω	300 Ω	50 Ω
3. Medium power ratings	200 kW	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	750 kW	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	2 000 kW	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz
4. Frequency range	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz	from 30 Hz up to 30 MHz
5. Standing wave ratio SWR	1.1	1.2	1.2	1.1	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.1
Maximum ratio	1.1	1.2	1.2	1.1	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.1
• up to 10 MHz	1.1	1.2	1.2	1.1	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.1
• up to 26 MHz	1.1	1.35	1.8	1.1	1.1	1.35	1.8	1.1	1.1	1.1	1.1	1.1
• up to 30 MHz	1.1	1.35	1.8	1.1	1.1	1.35	1.8	1.1	1.1	1.1	1.1	1.1
• up to 100 MHz	1.5	1.5	1.8	1.5	1.5	1.5	1.8	1.5	1.5	1.5	1.5	1.5
• up to 250 MHz	1.5	1.5	1.8	1.5	1.5	1.5	1.8	1.5	1.5	1.5	1.5	1.5
6. Method of measurement	calorimetric	calorimetric	calorimetric	calorimetric	calorimetric	calorimetric	calorimetric	calorimetric	calorimetric	calorimetric	calorimetric	calorimetric
7. HF connection	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial
• HF connection	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial	coaxial
• HF connection	6 1/8" EIA	215 x 215	380 x 380	6 1/8" EIA	215 x 215	600 x 600	6 1/8" EIA	215 x 215	6 1/8" EIA	430 x 430	860 x 860	9" EIA
8. Standard power supply (other voltages available on request)	2 kW, 3 x 400 V, 50 Hz	approx. 10 kW	approx. 10 kW	approx. 10 kW	6 kW, 3 x 400 V, 50 Hz	approx. 20 kW	approx. 20 kW	approx. 20 kW	11 kW, 3 x 400 V, 50 Hz	approx. 38 kW	approx. 38 kW	approx. 38 kW
9. Primary circuit	medium	medium	medium	medium	medium	medium	medium	medium	medium	medium	medium	medium
• medium	medium	medium	medium	medium	medium	medium	medium	medium	medium	medium	medium	medium
• flowmeter scale	1 000 - 10 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h	2 500 - 25 000 l/h
• required soda-water flow for max. power	8 600 l/h (at Δt = 20 °C)	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled	approx. 70 °C automatically controlled
• mean temperature	above +1 °C	above +1 °C	above +1 °C	above +1 °C	above +1 °C	above +1 °C	above +1 °C	above +1 °C	above +1 °C	above +1 °C	above +1 °C	above +1 °C
• ambient air temperature	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW	1.5 kW
• soda-water pump rating	200 kW	200 kW	200 kW	200 kW	200 kW	200 kW	200 kW	200 kW	200 kW	200 kW	200 kW	200 kW
10. Secondary circuit	water-cooled	water-cooled	water-cooled	air-cooled	water-cooled	water-cooled	water-cooled	air-cooled	water-cooled	water-cooled	water-cooled	air-cooled
• design	water-cooled	water-cooled	water-cooled	air-cooled	water-cooled	water-cooled	water-cooled	air-cooled	water-cooled	water-cooled	water-cooled	air-cooled
• dissipation	200 kW	200 kW	200 kW	200 kW	750 kW	750 kW	750 kW	750 kW	2 000 kW	2 000 kW	2 000 kW	2 000 kW
• cooling medium	water	water	water	water or glycol-water	water	water	water	water or glycol-water	water	water	water	water or glycol-water
• flowrate of cooling medium	8 600 l/h	10 000 l/h glycol 8 600 l/h water	10 000 l/h glycol 8 600 l/h water	32 250 l/h	32 250 l/h	32 250 l/h	32 250 l/h	35 000 l/h glycol 32 350 l/h water	86 000 l/h	86 000 l/h	86 000 l/h	102 800 l/h glycol 86 000 l/h water
• maximum medium output temperature	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C	50 °C
• maximum medium input temperature	30 °C	to be designed	to be designed	30 °C	30 °C	30 °C	30 °C	to be designed	30 °C	30 °C	30 °C	to be designed
• temperature difference	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K	Δt = 20 K
• cooling air temperature	above +1 °C	-15 °C to +5 °C glycol +1 to +5 °C water	-15 °C to +5 °C glycol +1 to +5 °C water	above +1 °C	above +1 °C	above +1 °C	above +1 °C	-15 °C to +5 °C glycol +1 to +5 °C water	above +1 °C	above +1 °C	above +1 °C	-15 °C to +5 °C glycol +1 to +5 °C water
• pipe connection	DN 50, PN 16	DN 65, PN 16	DN 65, PN 16	DN 50, PN 10/16	DN 50, PN 10/16	DN 50, PN 10/16	DN 50, PN 10/16	DN 65, PN 16	DN 100, PN 16	DN 100, PN 16	DN 100, PN 16	DN 100, PN 16
• glycol-water pump rating	2.2 kW	2.2 kW	2.2 kW	4.5 kW	4.5 kW	4.5 kW	4.5 kW	4.5 kW	11 kW	11 kW	11 kW	11 kW
• glycol-water / air heat-exchanger rating	6 kW	6 kW	6 kW	8 kW	8 kW	8 kW	8 kW	8 kW	15 kW	15 kW	15 kW	26 kW
• soda-water / air heat-exchanger rating	4 kW	4 kW	4 kW	8 kW	8 kW	8 kW	8 kW	8 kW	18 kW	18 kW	18 kW	18 kW
11. Dimensions (approx.)	Heat-Exchanger	Heat-Exchanger	Heat-Exchanger	Heat-Exchanger	Heat-Exchanger	Heat-Exchanger	Heat-Exchanger	Heat-Exchanger	2 Heat-Exchangers	2 Heat-Exchangers	2 Heat-Exchangers	2 Heat-Exchangers
• height	2 070 mm	2 082 mm	2 100 mm	2 300 mm	2 300 mm	2 300 mm	2 300 mm	2 250 mm	2 420 mm	2 710 mm	2 710 mm	2 x 2 250 mm
• width	1 900 mm	1 900 mm	2 200 mm	1 970 mm	1 970 mm	1 970 mm	1 970 mm	4 000 mm	1 520 mm	2 650 mm	2 650 mm	2 x 6 000 mm
• depth	500 mm	500 mm	1 400 mm	580 mm	580 mm	580 mm	580 mm	2 400 mm	1 340 mm	1 340 mm	1 340 mm	2 x 2 400 mm
12. Weight (approx.)	500 kg	500 kg	850 kg	600 kg	600 kg	600 kg	600 kg	2 900 kg	2 900 kg	3 700 kg	3 700 kg	2 x 1 800 kg
• dummy load, without soda-water solution	500 kg	500 kg	850 kg	600 kg	600 kg	600 kg	600 kg	2 900 kg	2 900 kg	3 700 kg	3 700 kg	2 x 1 800 kg
• outdoor air heat-exchanger	500 kg	500 kg	850 kg	600 kg	600 kg	600 kg	600 kg	2 900 kg	2 900 kg	3 700 kg	3 700 kg	2 x 1 800 kg



## Test Loads

## Contact

Ampegon Power Electronics AG  
 Kreuzweg, 11 | CH-5400 Baden, Switzerland  
 Tel. +41 58 710 44 00  
 info@ampegon.com | ampegon.com





# Technical Summary Test Loads

Ampegon test loads are designed for the continuous dissipation of RF power in the long-, medium- and shortwave bands. By means of a special funnel adaptor, the frequency response is extended to well above 30 MHz.

Offering full radiation screening and robust design, this equipment is an indispensable tool for adjustment, testing and maintenance of transmitters and RF power amplifiers at fully modulated carrier power. Disturbance to other transmitters or the reception of nearby services is avoided.

The test loads are capable of dissipating the carrier power, modulated RF signals (for example 100 kW carrier + 100 % trapezoidal modulation in continuous operation) as well as any RF pulsed signal. Available with an appropriate secondary cooling circuit, the test loads are designed for three versions:

- soda-water / air heat-exchanger
- soda-water / glycol-water / air heat-exchanger
- soda-water / water heat-exchanger

## Test Load

Based on the principle of a closed loop circuit containing a soda-water solution, a test load consists of following main components: broadband resistor element (a soda solution), reservoir, pump, automatic temperature control system and measuring and safety elements. The resistor elements are available for an impedance of 50 or 120 ohms unbalanced or 300 ohms balanced, whereas in the latter case two 150 ohms series elements symmetrical to ground are used.

## Electronic Power Measuring Unit

In a primary circuit, the soda solution circulates at a constant preset flow. The resistance of this solution varies with the temperature, which is counteracted by thermostatic control. This process serves to keep the impedance at a constant value.

The dissipated power is measured across the soda-water resistor by means of the calorimetric power measuring unit. Parameters are the soda-water volume flow and the soda-water inlet and outlet temperatures. Readings on the calorimetric instrument include these temperatures as well as the temperature difference, the soda-water volume flow and the calculated dissipated RF power.

By means of a serial interface, these readings can be remotely indicated.

## Protective Equipment

The protective equipment in the circuit includes a flow indicator and a safety thermostat, which responds at 90 °C. These are connected to the interlock system of the equipment under test, so that it switches off in case of malfunction.

## Remote Control

The test load can be operated remotely by means of a potential free contact.

## Secondary Cooling Circuits

Depending on local conditions, different methods of absorbing the dissipated heat are available, whereby the indoor water-cooled version is recommended only in case sufficient cooling water is available on site (see technical data chart).

## Air-cooled (non-freezing conditions)

If ambient temperatures do not drop below +1 °C, the standard solution with an outdoor soda-water / air heat-exchanger is recommended.

## Air-cooled (freezing conditions)

If ambient temperatures drop below +1 °C, a glycol system is required, including: outdoor heat-exchanger, glycol-water pump, regulating device, expansion tank and soda-water / glycol-water heat-exchanger. The temperature range of the outdoor heat-exchanger is extended to meet local sub-zero ambient temperatures.

## Water-cooled (indoor installation)

The standard solution with a soda-water / water heat-exchanger is recommended for indoor installations where a sufficient local cooling water supply is available.

## Preheating device

Upon request, all test loads are available with an optional preheating device mounted into the soda-water reservoir. This device prevents antenna mismatching resulting from low water temperatures.

## Additional Information

Technical drawings and detailed product information relevant to the Ampegon test load family are available upon request.

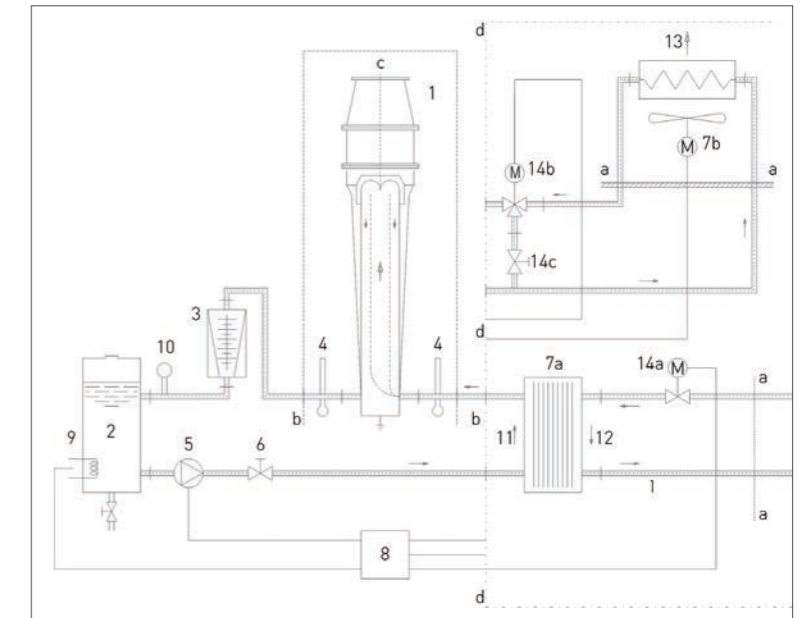


## Functional Diagrams

- 1 Soda solution broadband resistor element
- 2 Soda-water reservoir
- 3 Flowmeter
- 4 Temperature probe
- 5 Soda-water pump
- 6 Adjusting valve
- 7a Soda-water / water heat-exchanger\*
- 7b Soda-water / air heat-exchanger\*
- 8 Control and power supply box
- 9 Preheating element\*
- 10 Safety thermostat
- 11 Soda-water
- 12 Cooling water
- 13 Cooling air
- 14a Regulating valve
- 14b Three-way regulating valve
- 14c By-pass regulating valve

\* Optional items

- a-a Piping to the outdoor installation parts  
 b-b Piping connections for resistor element  
 c RF connection  
 d-d Piping to the secondary cooling circuit



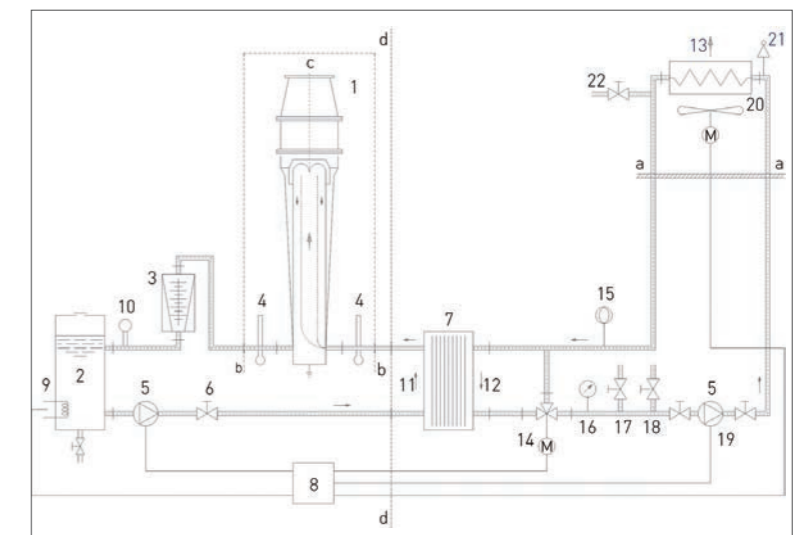
**Fig. 1: Simplified diagram of the Ampegon test load type TIE 42-5W / 1W / 3W**

- a) equipped with water cooled secondary cooling circuit (indoor installation)  
 b) equipped with air cooled-secondary cooling circuit (non freezing conditions)

- 1 Soda solution broadband resistor element
- 2 Soda-water reservoir
- 3 Flowmeter
- 4 Temperature probe
- 5 Soda-water pump
- 6 Adjusting valve
- 7 Soda-water / glycol-water heat-exchanger
- 8 Control and power supply box
- 9 Preheating element\*
- 10 Safety thermostat
- 11 Soda-water
- 12 Cooling glycol-water
- 13 Cooling air
- 14 Three-way regulating valve
- 15 Expansion tank
- 16 Manometer
- 17 Safety valve
- 18 Replenishing valve
- 19 Glycol-water pump
- 20 Glycol-water / air heat-exchanger
- 21 De-aerating valve
- 22 Depletion valve

\* Optional item

- a-a Piping to the outdoor installation parts  
 b-b Piping connections for resistor element  
 c RF connection  
 d-d Piping to the secondary cooling circuit



**Fig. 2: Simplified diagram of the Ampegon test load types TIE 42-5G/1G/3G, TIE 47-5G/1G/3G, TIE 420-5G/1G/3G**

equipped with an air-cooled secondary glycol-water cooling circuit (freezing conditions)