



LIQUID CONDITIONED SUIT

Designed in conjunction with the Royal Aircraft Establishment, Farnborough.

PURPOSE

Circulation of a heating or cooling fluid through the Liquid Conditioned Suit enables the wearer to work in reasonable comfort whilst in environments which would be intolerable or severely restrict his working capacity due to excessive heat or cold.

The suit is suitable for aircrew on standby and in flight under hot climatic conditions, and when wearing high altitude protective clothing and immersion suits.

The heat transfer efficiency of liquids is higher than that of air, so that much smaller pipe bores can be used, resulting in a garment of lower bulk. In addition, for both cooling and heating, the pumping power requirement is much smaller than for any existing type of air conditioned garment.

Portable conditioners are available for both cooling and heating the suit. The cooling conditioner is entirely independent, whilst the heating conditioner requires an electrical supply. For further information, see Leaflet IE9.

OPERATION

When worn under normal clothing, the Liquid Conditioned Suit adequately maintains thermal comfort at ambient temperatures of up to 70°C and down to -10°C. More extreme temperatures can be compensated for by wearing insulating clothing over the suit.

When worn under non-insulating clothing, the suit cools the wearer by extracting both metabolic and environmental heat.

Conversely, it provides a heating layer around the body and keeps the wearer warm by reducing body losses.

DESCRIPTION

The suit is a close fitting full length undergarment. It is made of knitted, crimped stretch nylon, which ensures that it stays in contact with the skin. The suit is closed by a lightweight nylon sliding fastener.

The main inlet tube is connected to four feed tubes which carry the liquid to the wrists and ankles. At these extremities, the feed tubes are connected by manifolds to 88 heat transfer tubes.

The heat transfer tubes are threaded through tunnels on the garment; they are routed in a pattern which ensures an even distribution over the body and connected to the outlet tube by a manifold. The supply tubes can be routed to suit the position of the liquid supply and apertures in over garments.

The main inlet and outlet tubes may be fitted with self-sealing quick release connectors if required, which effectively seal the fluid into the suit when it is necessary to disconnect from the supply unit.



TECHNICAL DATA

COOLING RATES

The following table gives various cooling rate requirements for various heat loads:

Heat Load at 60°C ambient	Cooling Rate CHU/Hour
Resting; lightly clothed	600
Steady work rate; aircrew clothing	850
Heavy work rate; aircrew clothing	1000

To fulfil the maximum cooling rate of 1000 CHU/hour, at the ideal suit inlet temperature of 15°C, a mass flow of 200lb/hour (90kg/hour) or 20 galls/hour (9 litres/hour) is required.

The suit back pressure at 200lb/hour mass flow is between 3.5 and 4.5 lbf/in² (5.5 and 7.1 kgf/cm²) depending upon the type of connector used.

WEIGHT

The size 9 suit weight 2 lb 6 oz (1.077 kg).

SIZES

The suit is available in nine sizes to fit wearers of the measurements listed below.

Size	Height	Chest
1	5 ft 5 in to 5 ft 8 in (165 cm to 173 cm)	33 in to 36 in (84 cm to 91 cm)
2	5 ft 5 in to 5 ft 8 in (165 cm to 173 cm)	36 in to 39 in (91 cm to 99 cm)
3	5 ft 5 in to 5 ft 8 in (165 cm to 173 cm)	39 in to 42 in (99 cm to 106 cm)
4	5 ft 8 in to 5 ft 11 in (173 cm to 180 cm)	33 in to 36 in (84 cm to 91 cm)
5	5 ft 8 in to 5 ft 11 in (173 cm to 180 cm)	36 in to 39 in (91 cm to 99 cm)
6	5 ft 8 in to 5 ft 11 in (173 cm to 180 cm)	39 in to 42 in (99 cm to 106 cm)
7	5 ft 11 in to 6 ft 2 in (180 cm to 188 cm)	36 in to 39 in (91 cm to 99 cm)
8	5 ft 11 in to 6 ft 2 in (180 cm to 188 cm)	39 in to 42 in (99 cm to 106 cm)
9	5 ft 11 in to 6 ft 2 in (180 cm to 188 cm)	42 in to 45 in (106 cm to 114 cm)