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QUALITATIVE EVALUATION OF THE AIRDROP IMPACT CAPABILITY OF THE STERILIZER, AUTOCLAVE FOR SPECIAL FORCES

U.S. ARMY NATICK LABORATORIES
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AIR DELIVERY EQUIPMENT DIVISION

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TECHNICAL MEMORANDUM
AEO-16

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ABSTRACT

The Air Delivery Equipment Division has evaluated the airdrop impact capability of the "Sterilizer, Dressing, Pressure, Fuel Heated, Autoclave for Special Forces." Static drops and airdrops were conducted with and without energy dissipating material.

After each drop the sterilizer was inspected and functionally checked under standard operating conditions. No operational deficiencies were encountered, although some permanent deformation of the supporting structure did occur during the most severe impacts.

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SECTION I

INTRODUCTION

The "Sterilizer, Dressing, Pressure, Fuel Heated, Autoclave for Special Forces" has been developed by the Medical Equipment Development Laboratory, Fort Totten, Flushing, L.I., New York. Technical assistance was requested by the development agency to determine the airdrop impact capability of the Autoclave.

SECTION II

PROCEDURE

A. Static Drops

The sterilizer was visually evaluated for structural integrity prior to conducting any static drop tests. Examination of the unit indicated that it was structurally capable of withstanding moderately high impact forces. However, as a precautionary measure the initial drop was made from a height of 10 feet in order to limit the ground impact velocity to approximately 25 feet/sec.

All static drop tests were conducted from a forty-ton capacity track laying crane with a fifty foot boom. For drop tests 1 through 4, the sterilizer was mounted on a platform consisting of a single sheet of 3/4-inch plywood with one intervening layer of 80-0-1/2 energy dissipating paper honeycomb 24 inches square by 3 inches thick (Figure 1). Tests 6 and 7 were made without the use of plywood platform or paper honeycomb. All six static drops were made on a hard packed gravel surface. Drops 1 and 6 were made from a drop height of 10 feet, corresponding to an impact velocity of 25 feet/sec.; drops 2 and 7 were made from a drop height of 14 feet (impact velocity of 30 feet/sec.) and drops 3 and 4 were made from a drop height of 30 feet (impact velocity of 44 ft./sec.). After each drop, the sterilizer was examined for structural deformation and then subjected to a functional check for a period of one hour under standard operating conditions.

B. Live Jump

The sterilizer was airdropped once (Drop 5 - Figures5a through 5e) by a parachutist into an open field. The sterilizer was suspended from the parachutist by means of a weapons and individual equipment harness. The aircraft employed for the airborne test was a U. S. Army L-20. Figure 5a shows how the sterilizer was suspended from the parachutist with the container and individual equipment harness. Figure 5b shows the parachutist descending over the drop zone with the sterilizer suspended from his shoulder harness. At approximately 200 feet from ground, the parachutist released the sterilizer permitting it to fall the length of the drop line as shown in Figure 5c. Figure 5d shows the parachutist after landing.

After the live jump, the sterilizer was subjected to visual examination for any structural deformation and functionally checked for a period of one hour under standard operating conditions.

SECTION III

RESULTS

A. Static Drops

In drops 1 through 4, no evidence of any structural deformation or functional defects were noted. Figures 2, 3 and 4 show the impact effect on the paper honeycomb from 10, 14 and 30 foot drop heights respectively for drops 1, 2 and 3.

In drops 6 and 7, the sterilizer was subjected to much higher stress values, since it was permitted to impact without energy dissipater material. Figure 6 shows the unrigged sterilizer ready for static drop and figures 7 and 8 show areas of permanent deformation to base and supporting structure resulting from impact with hard packed gravel surface.

B. Live Jump

No evidence of any permanent deformation or effect on functional condition of the sterilizer was noted as a result of the live jump. Figure 5e is a close up view of the sterilizer after ground impact.

SECTION IV

CONCLUSIONS

It is concluded that the design of the sterilizer is adequate for airdrop both by parachutist's weapons and individual equipment harness without the use of energy dissipater, and by standard airdrop techniques when using paper honeycomb as an energy dissipater.

SUMMARY OF DROP TEST DATA

Drop No.	Drop Method	Energy Dissipater	Drop Height Ft.	Velocity at Impact Ft/Sec	Kinetic Energy at Impact Ft./Lbs.	Deformation & Structural Damage	Operational Status after Impact
1	Static	Paper Honeycomb	10.0	25.4	490	None	Operable
2	Static	Paper Honeycomb	14.0	30.0	680	None	Operable
3	Static	Paper Honeycomb	30.0	44.0	1470	None	Operable
4	Static	Paper Honeycomb	30.0	44.0	1470	None	Operable
5	Live Jump	None	N.A.	Approx. 20.0	300	None	Operable
6	Static	None	10.0	25.4	490	Yes	Operable
7	Static	None	14.0	30.0	680	Yes	Operable

NOTE: Impact Surface

a. All static drops conducted on hard packed gravel surface

b. Live jump impact on sod

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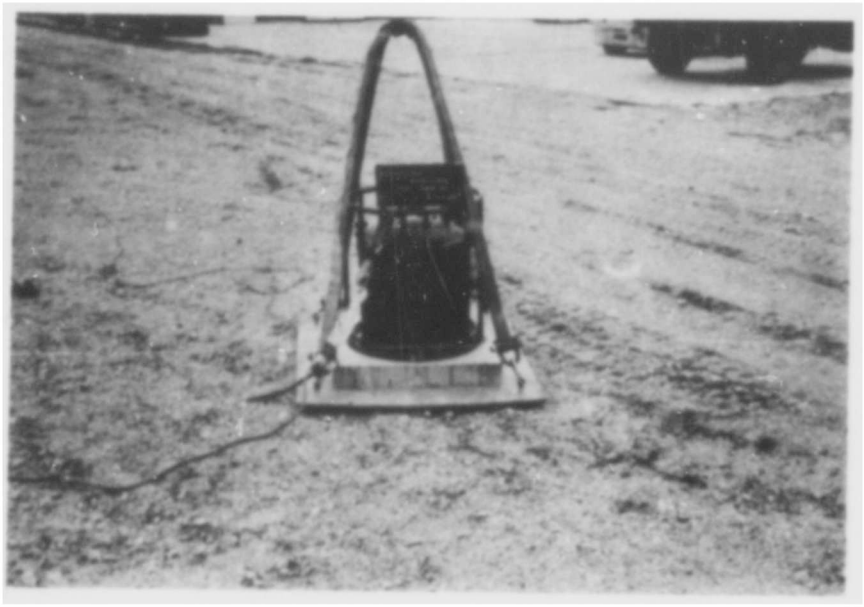

Figure 1 - Sterilizer Rigged to Platform Prior to Static Drop

Figure 2 - Impact Effect on Paper Honeycomb after 10 foot Drop (Impact Velocity - 25 feet/ sec.)

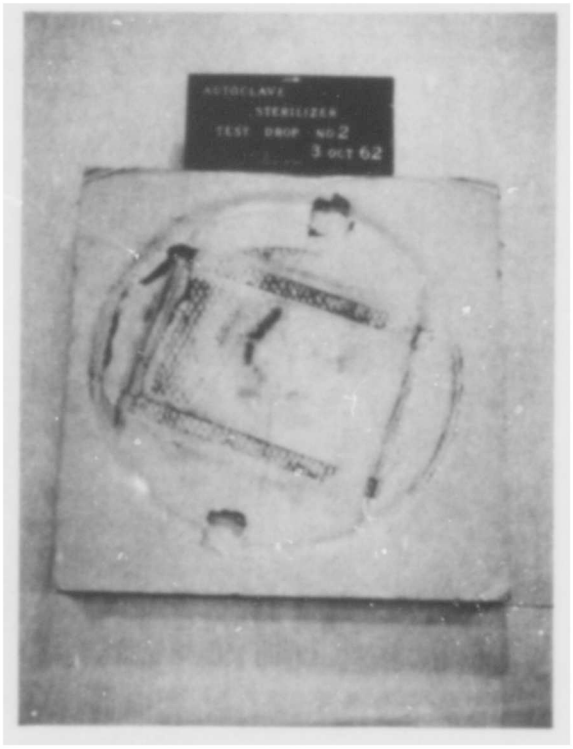

Figure 3 - Impact Effect on Paper Honeycomb after 14 foot Drop (Impact Velocity - 30 feet/sec.)

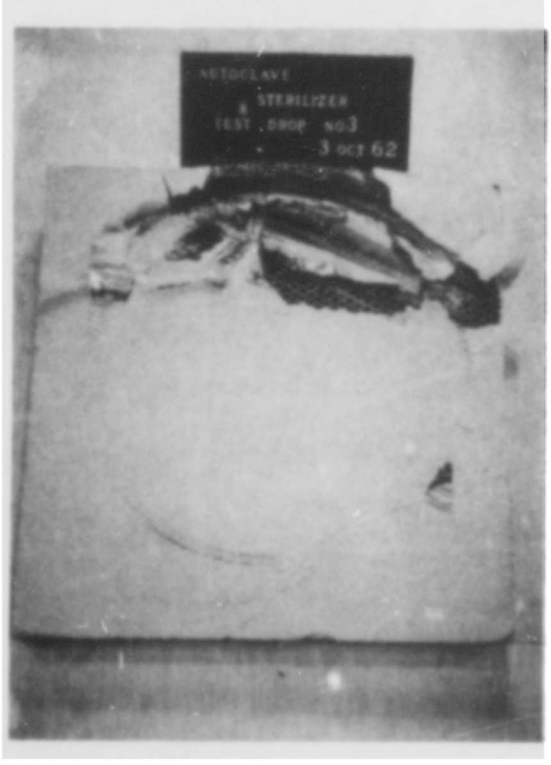

Figure 4 - Impact Effect on Paper Honeycomb after 30 foot Drop (Impact Velocity - 44 feet/sec.)

Figure 5(a) - Method of Securing Sterilizer to Parachutist

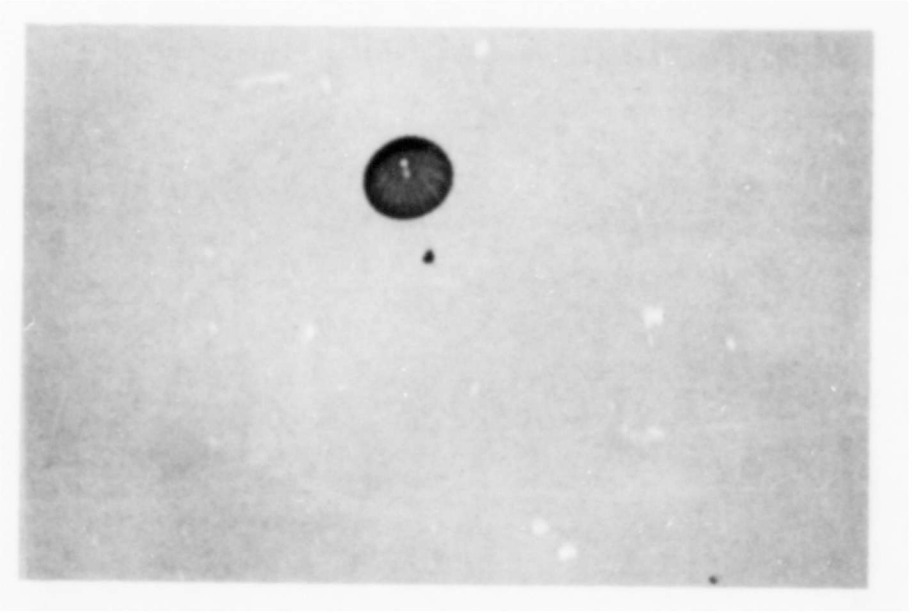

Figure 5(b) - Parachutist with Sterilizer Descending over Drop Zone

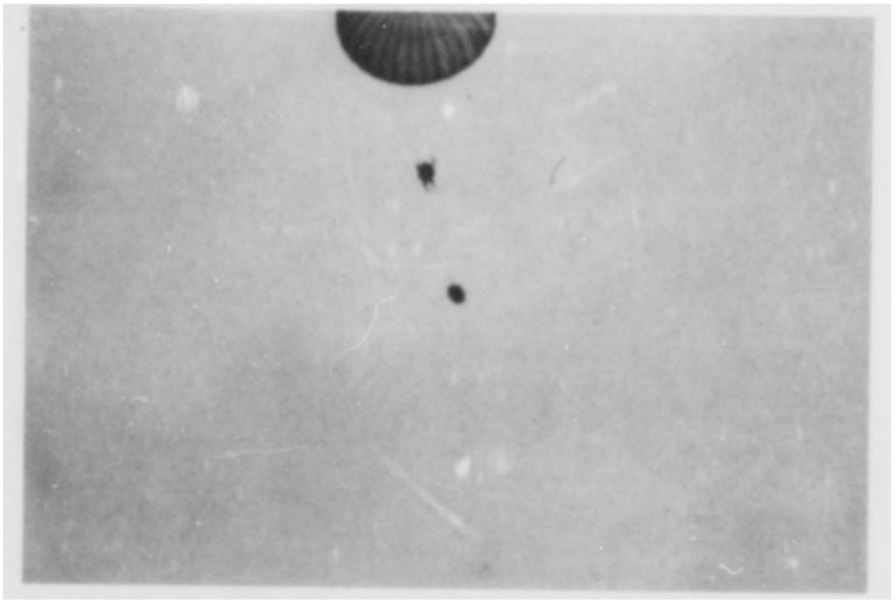

Figure 5(c) - Release of Sterilizer Prior to Ground Impact

Figure 5(d) - Parachutist and Sterilizer Immediately after Landing

Figure 5(e) - Sterilizer after Ground Impact

Figure 6 - Sterilizer Unrigged Ready for Static Drop

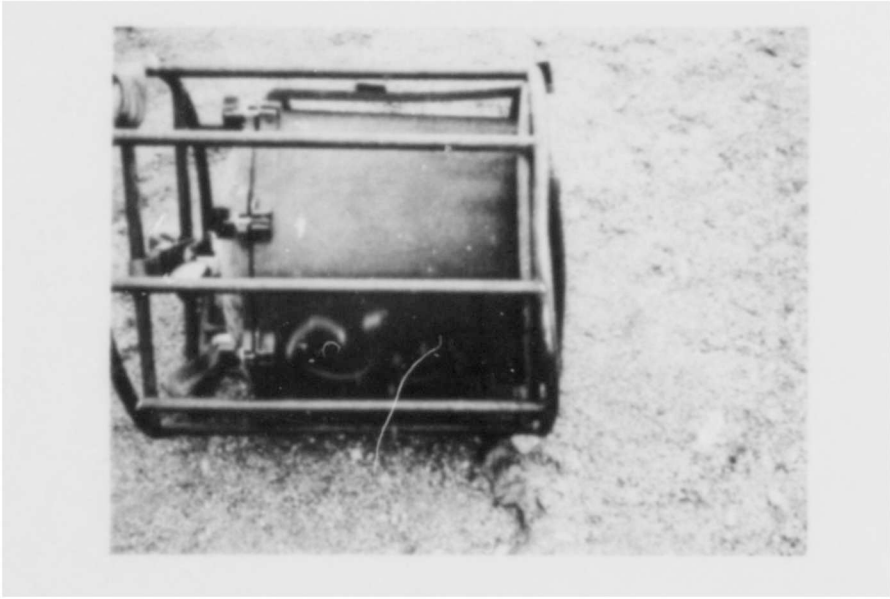

Figure 7 - Permanent Deformation of Base Structure after 10 foot Drop

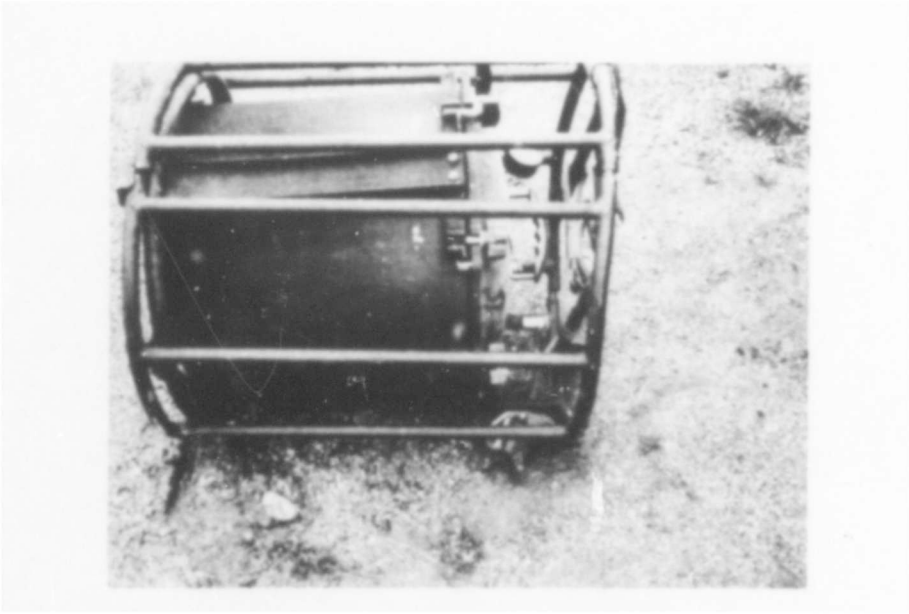

Figure 8 - Additional Deformation and Damage to Supporting Brace after 14 foot Drop