

Product Contract
2.009 Team Orange

Product Description: Portable gas-powered vaccine "cold carrier"

Intended customers: Non-Governmental Organizations and their Governmental Counterparts

Market: Cold Chain equipment, portable vaccine storage

| Customer Needs | Design Attributes | Engineering Specs |
|--|--|--|
| Longer outreach sessions | Longer cold life | over 300 Wh of cooling per L fuel |
| Affordable by NGOs | Competitive/Pays for itself | \$700 price; At 15% "savable" wastage, \$.50/dose 4 2-day sessions/month, 100 doses/session: saves \$66.5/month (pays for itself in 10.5 months) |
| Comfortable to carry | One person can carry easily | Backpack form (hands-free), <35 lbs, detachable engine/alternator for separate carrying |
| Doesn't need power grid | Can maintain requisite cold life without presence of electricity | IC-engine powered (Honda 4-stroke GX25); supercedes WHO specs for 16 hrs cold life w/ no power, no openings |
| Flexible for different vaccines | Can accommodate different vial sizes | Can fit most common vial sizes (ref below 11-14), possible to carry all sizes |
| Doesn't freeze or heat up vaccines | Can keep vaccines in viable temp. range | Sophisticated thermostat circuitry; Stirling cooler accurate to 1 C; maintains at 5 C, between 2 and 8 C |
| Can treat many villages in a single trip | Can accommodate large number of doses | capacity 500-700 doses; min 216 in ³ vaccine volume |
| Works with current technologies in the cold chain | Can fit icepacks/PCM packs | Can fit two standard 9"x3.5"x1" PCM packs for thermal buffer |

| | | |
|-------------------------------|--|--|
| Way to ensure ease of use | Non-verbal directions | loading directions clearly marked using cartoons and diagrams on Vacc-Pack |
| Safe | Can be transported without danger to the operator or the environment | No refrigerant used (no flammable material other than fuel, which stays in IC engine); heat diffusion away from operator; no sharp corners |
| Efficient power consumption | Does not require a large amount of energy from fuel (volume) | COP of cooler 1.2, 100W engine will charge batteries in <1 hr and run Stirling cooler |
| Must use available resources | Has power requirements that can be met using a small IC engine | Runs on gasoline (can be brought in or found locally) for a short time, then runs off batteries while being carried |
| Must be durable and robust | Can withstand the rough handling that current vaccine coolers are projected to endure | Can withstand a drop and tumble from waist level (as per WHO specs) |
| Will ensure vaccine viability | Can monitor the temperature inside the refrigerator and notify operator when inside temperature is approaching a critical temp | Cooler can control temperature to +/-1 C; control box will auto-start cooling when temperature surpasses crit temp (7 C) |

| Vaccine vial dimensions | | | | |
|-------------------------|------------------------------|-------------------|-------------|-----------------------|
| Number | Name | Size (volume, ml) | Height (mm) | Diameter of base (mm) |
| 1 | Russian 100 ml | 100 | 110.00 | 55.00 |
| 2 | Phoenix Pharrmaceutical | 100 | 97.00 | 52.00 |
| 3 | Russian 50 ml | 50 | 93.00 | 42.00 |
| 4 | Elkins-Sinn 30 ml | 30 | 83.00 | 33.00 |
| 5 | American Regent Labs 30 ml | 30 | 80.00 | 30.00 |
| 6 | Agilent -long | 20 ? | 80.00 | 30.00 |
| 7 | Abbott Labs single dose | 20 | 63.00 | 31.00 |
| 8 | Unknown A (medium, unmarked) | 15 ? | 58.00 | 25.00 |
| 9 | Unknown B (medium unmarked) | 15 ? | 58.00 | 23.00 |
| 10 | Unknown C (medium, unmarked) | 15 ? | 54.00 | 24.00 |
| 11 | Agilent - short | 10 | 50.00 | 23.00 |
| 12 | Vitajet 10 ml | 10 | 51.00 | 23.00 |
| 13 | Unknown D (yellow DPT label) | 5 | 44.00 | 22.00 |
| 14 | Unknown E (small, unmarked) | 5 | 42.00 | 22.00 |
| 15 | Rimevax SK&F | 5 ? | 38.00 | 24.00 |
| 16 | Unknown F (mini, unmarked) | 2 ? | 38.00 | 16.00 |