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THE COUNCIL FOR SOLID WASTE SOLUTIONS

On-board Plastics Compactor Technical Specifications

1. **STORAGE CAPACITY:** 300 pounds, 3/4 cubic yard volume

The compactor should be designed to hold 300 pounds of plastics. Assuming 400 households in a route, 30 #/HH/year and weekly pick up, the total plastic weight is 230 pounds per route.

The storage compartment dimensions will depend on the density of the compacted material.

The density for the plastics inside the compactor can be estimated at 18 pounds per cubic foot (or 486 pounds per cubic yard.) The density of uncompacted milk jugs is 20-25 pounds per cubic yard. The density of uncompacted 2-liter PET bottles is 34 pounds per cubic yard. An average density of 30 pounds per cubic yard is used in all the computations.

The density of the plastics inside the compactor indicates an internal compaction ratio of approximately 15 to 1.

For a 300-pound load, the required volume for the storage compartment is 0.62 cubic yards. A design volume of 3/4 cubic yards will give a 20% surplus margin.

For single resin programs, a 300-pound load represents 2,180 1-gallon milk jugs or 1,800 2-liter PET bottles.

2. **MAXIMUM OVERALL DIMENSIONS:** W= 26", L= 96", H= 60"

According to the Center for Plastics Recycling Research (CPRR), uncompacted plastics occupy approximately 30% of the volume in the recycling body when aluminum, glass, tin and newspaper are also collected.

The compactor should not use more than 10% of the available space in the truck. A 300-pound load occupies, uncompacted, 10 cubic yards. In a compactor with a total volume of 3 cubic yards (10% of the truck's volume) the effective volume reduction achieved by using the compactor is 3 to 1.

The ratio in this case between the total volume of the compactor and its storage capacity (3/4 cubic yard) is 4 to 1. Volume efficiency is 25%.

The length of the chassis in a typical low profile curbside truck varies from 195 to 283

inches (16 and 22 foot bodies respectively.) The compactor width should be accordingly 20 and 26 inches maximum.

The length of the compactor can be up to 96 inches (max). The height of the compactor can be up to 60 inches, which is typically the distance from the chassis to the top of the cab.

3. **CYCLE TIME:** 20 seconds

The compactor cycle time is defined as the time required to move the compacting ram in and return it to its initial position.

Considering that the desired maximum time for the recycling trucks at a stop is approximately 30 seconds, the compactor should be able to cycle in about 20 seconds.

The ideal compactor operation at the stop is as follows:

1. Truck stops.
2. Operator starts the compactor to retrieve the ram from the holding-in position. Time: 10 seconds.
3. Operator picks up materials and loads plastics into the receiving hopper.
4. Operator starts the compression stoke of the compactor, which will stop in the "in" position until the next truck stop. Time: 10 seconds.
5. Truck moves to next stop.

4. **MAXIMUM LOAD PER CYCLE:** 0.10 cubic yards

The average collection rate per household per year is 30 pounds of plastics containers. This represents a weekly average of 0.58 pounds. The density of uncompacted plastics is approximately 30 pounds per cubic yard. The average weekly collection occupies 0.0193 cubic yards (or 3.9 gallons).

Considering that most curbside programs use from 12-gallon to 20-gallon containers with newspapers bundled separately, a design volume for the receiving hopper in the compactor of 20 gallons (0.10 cubic yards) will allow collection from 4 to 5 houses before the compactor needs to be cycled.

The receiving hopper should have a loading opening sufficiently big to allow for the emptying of the curbside box in a single movement.

5. **DUAL SIDE LOADING:**

The compactor should be able to be loaded from both sides of the truck.

6. **HYDRAULIC PUMP:** 4-6 GPM, 1500-2500 psi

Compactors usually share the hydraulic pump provided with the truck for the hoist. Normally the pump provides from 4 to 6 gallons per minute (GPM) of oil at a pressure ranging from 1500 to 2500 psi.

This pump performance should be considered in the design of the compactor to complete a cycle in about 20 seconds.

If the truck is specially ordered with a compactor then a larger pump (10 to 12 GPM) can be specified to shorten the cycle time of the compactor.

7. **MINIMUM PLATEN PRESSURE:** 50 psi

The face pressure of the compacting ram should be at least 50 psi in order to achieve a density of 18 pounds per cubic foot.

8. **SPRINGBACK CONTROL:**

Plastics containers tend to partially regain their original shape when the pressure of the platen is removed. This springback effect of plastics usually causes the containers to move into the receiving hopper reducing its effective volume. The compactor should be designed to reduce this springback effect by means of fixed or spring-loaded retainer devices. When the compactor is full the usable volume of the receiving hopper should not fall below 2/3 of the initial value.

9. **DISCHARGE OPERATION: TIME, HEIGHT, CONTROLS**

The pressure inside the storage container that keeps the plastics containers in a reduced volume also keeps them from discharging easily. A positive discharge in which the main compacting ram or an additional mechanism pushes the load completely out in a single stroke is recommended.

The ability to discharge into a roll-off is a definite advantage since many programs with little or no processing on the premises unload the plastics directly into a 20- or 30- cubic yard roll-off container.

A reasonable unloading time is under three minutes. The controls of the unloading gate and hydraulic mechanism should remain within reach of the operator from the ground.

The unloading gate should have a mechanical or hydraulic latching mechanism to prevent unexpected opening during the route.

10. **LEAKAGE CONTAINMENT:**

The compactor should be designed to contain any liquid or content in the bottles that is squeezed out in the compacting process.

11. **LOADING HEIGHT:** 45-60"

An adequate loading height is between 45 and 65 inches from the ground.

12. **WEIGHT:** <2,500 pounds

The compactor weight should not exceed 2,500 pounds. Typically a recycling truck's (4700LP) GVW is 32,000 pounds with an empty weight of 10,000 pounds.