

FRONT LOADED REFUSE COLLECTION VEHICLE

APPLICATION OBJECTIVE

- to pick up in an optimised manner various kinds of household and commercial waste set out in large sized mobile waste containers (see also fact sheet "[Mobile waste container](#)") at accessible locations under a pick-up arrangement

OUTLINE ON APPLICATION FRAMEWORK

PARTICULARLY APPLICABLE FOR WASTE TYPES

Glass	X	Light-weight packaging	X	Biowaste	X
Paper / paperboard	X	Mixed household waste	X	Bulky waste	
Lamps		Textiles		Electrical and electronic waste	
Scrap metal		Waste wood		C&D waste	
Waste oil		Old paint & lacquer		Waste tyres	
Hazardous waste					
Branch specific waste					
Other waste material	X	all kinds of solid waste that arise continuously within a larger area and require a frequent pickup			

SPECIAL CHARACTERISTICS AND REQUIREMENTS OF THE APPLICATION

Pre-treatment of the input material: not necessary

Options for the utilisation of the generated output:

The compaction of the waste in the truck body results in a mixture and caking of the waste. This makes a separation afterwards difficult.

Other aspects:

Collection vehicles can be additionally equipped with on-board computers to keep record on the emptying and other relevant data (e.g. weight of the bin) for purposes of service monitoring, tour planning and billing. Meanwhile the combination with bin identification technology is a common solution (see also fact sheet "[Waste bin identification](#)").

RESTRICTIONS OR INFLUENCE OF EXTERNALITIES ON THE APPLICATION

Infrastructural conditions:

To allow an efficient waste collection with this type of vehicle, waste collection containers must be set out at points where they are easily accessible for the vehicle and placed in a way that the lifter mechanism can reach them without that any additional physical manipulation or intervention is needed. It is for this reason that this pickup technology is especially suited to areas with a detached building structure (most particularly rural type areas with sufficient space along roads and between houses and at the city outskirts). In the inner city environment with a high traffic density and limited space availability at the kerbside, the effective application of this technology may face rather high limitations.

Climatic conditions:

No limitations except of the fact that the vehicle itself must be fit for the road conditions in the collection area.

TECHNICAL DETAILS

GENERAL OVERVIEW

ABSTRACT

The front loaded refuse collection vehicle plays a growing although not yet so prominent role for the pickup of various waste types. The vehicle is characterised by the front lifting mechanism which empties waste containers overhead (above the drivers cabin) into the storage body. Compared to the rear - end loaded collection vehicle (See also fact sheet "[Rear-end loaded collection vehicle](#)") this allows storage bodies of higher capacities and has the advantage that driving and loading can be done by a crew of only one person and thus in a more economical way.

	<p>Front loaded refuse collection vehicles are usually employed according to a special logistic concept (principle of logistic nodes) in collection areas with a lower density of pick-up points and a higher proportion of large sized waste containers particularly supplied for wastes generated by commercial sources. That is why front loaded refuse collection vehicles are usually tailored for the emptying of mobile 4-wheel waste containers up to a capacity of 5 m³, although 2-wheel containers can be emptied as well.</p>
<p>BASIC REQUIREMENTS</p>	<ul style="list-style-type: none"> - for their pickup, waste containers must be accessibly located so to allow the collection vehicle and lifter mechanism to reach them without manual intervention - waste containers must be compatible to vehicle's lifting device
<p>SPECIFIC ADVANTAGES</p>	<ul style="list-style-type: none"> - needs a crew of one person only - emptying process can be well controlled from the cabin - high loading capacity thru on-board compaction of the waste - can be used for both pickup and short-distance transport at the same time
<p>SPECIFIC DISADVANTAGES</p>	<ul style="list-style-type: none"> - relatively high-priced vehicle - not all types of waste emerging in households can be picked up effectively - operation inefficient in areas with a high building density and problems of narrow streets, traffic and car parking
<p>APPLICATION DETAILS</p>	
<p>TECHNICAL SCHEME</p>	<p>The basic parts of this vehicle type are the chassis, the body with a compaction mechanism, the hopper and the front lifting device.</p> <p>The lifting device is situated behind the driver's cabin and consists of a two-shanked telescope arm either with forks, a comb- or a pocket-system at its end to fix the bin at the lifter. A front-/side loading type with shanks that can be swivelled from the front to the side of this vehicle exists as a special version. The compaction is normally done by two hydraulic and counter-driven screws. During operation the waste container is being emptied into the hopper by means of the lifting device which moves the container ahead of the driver cabin. Operation of the lifting device can be done in an automatic mode or manually controlled with a joystick outside the cabin.</p> <p>The compaction mechanism compresses the waste and forwards it from the hopper into the storage body of the vehicle. Once the body is completely filled, the vehicle goes to the disposal facility where it opens its rear to discharge the waste. Some versions of the front loaded refuse collection vehicles are equipped with a chassis for container types used in an exchange system (see also fact sheet "Swap body container")</p> <p>Figure 1: Front loaded refuse collection vehicle with fixed body construction (left, right) (picture sources left & right: Intecus GmbH)</p> <div style="display: flex; justify-content: space-around;">   </div>
<p>QUANTITY ASPECTS</p>	<p>The carrying capacity is limited by the allowed total load of the vehicle and the body type (permitted load).</p>
<p>SCALE OF APPLICATION</p>	<p>The loading volume and loading mass of the different vehicles can go up to 34 m³ or 12 Mg.</p>

INTEROPERABILITY	The lifter device is usually compatible to mobile waste containers with a fork-, comb- or pocket-adapted fringe. Other mobile container types and collection receptacles of low weight (see also fact sheet " <u>Non-standardized waste collection receptacles/waste sack</u> ") can only be emptied with special equipment.
OPERATIONAL BENCHMARKS: RESOURCE CONSUMPTION	
AIDS AND ADDITIVES NEEDED	none
HUMAN RESOURCES NEEDED	1 truck driver who also operates/controls the loading process
SPATIAL NEEDS	An adequate space for the collection truck to access the waste container from the front side is advisable considering that this vehicle type is mainly used for emptying large sized mobile waste containers up to a capacity of 5 m ³ which can hardly be moved manually by one person alone. Aside from that a parking space at the operating yard (car park) is needed
OPERATIONAL BENCHMARKS: COST DIMENSIONS	
INVESTMENT COSTS	The capital needs (investment) for front loaded refuse collection vehicles (3 axles, 10 Mg carrying capacity) are 140,000–190,000 EUR. Investment costs for an exchangeable body account to ca. 20,000 EUR.
OPERATING COSTS	running costs accrue for - repair and maintenance: ~11 % of the initial investment per annum
OTHER RELEVANT ASPECTS	
LABOUR PROTECTION	For the use of this technology tight labour protection regulations need to be observed in Europe. References for this in Germany are for example: - Technical rules for biological working materials – Waste collection, protective measures (TRBA 213), - GUV-Regulations: Safety and health protection during waste management activities, part I: Waste collection and transportation
MISCELLANEOUS	
MARKET INFORMATION	
REFERENCE FACILITIES	The front loaded refuse collection vehicle is a commonly used vehicle type for the pickup of different waste material collected in standardized containers.
RECOGNIZED PRODUCER AND PROVIDER FIRMS <i>(important note: the list of firms does not constitute a complete compilation of companies active in the specified fields)</i>	Producer and supplier firms for this technology and its components in Germany are i.e.: Chassis: - Daimler AG, Stuttgart, www.mercedes-benz.de - MAN Truck & Bus AG, München, www.truck.man.eu Body and lifting device: - HS Fahrzeugbau GmbH, Emstek www.hs-fahrzeugbau.com - FAUN Umwelttechnik GmbH & Co. KG, Osterholz-Scharmbeck www.faun.com - Schmidt Kommunalfahrzeuge GmbH, Brahmenau www.schmidt-kommunal.de
REMARKS AND REFERENCE DOCUMENTS	
<p><u>Further information on this vehicle technology and links to firms providing and using it can be obtained from:</u></p> <ul style="list-style-type: none"> - Verband der Arbeitsgeräte- und Kommunalfahrzeug- Industrie e.V., Berlin, www.vak-ev.de - Gemeinsame Arbeitsgruppe von VKU und BDE Fahrzeuge und Behälter - Technische Übersicht und Standards www.vku.de/abfallwirtschaft.html <p><u>Reference for applicable norms/standards in Germany:</u></p> <ul style="list-style-type: none"> - DIN EN 1501, Blätter 1, 4 und 5: Refuse collection vehicles and their associated lifting devices 	