



Technical Specifications for **REEFER VEHICLES**



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ABOUT US

COLD CHAIN LOGISTICS RESOURCE CENTER

Cold Chain Logistics Resource Center (CCLRC) has been set up as an industry-led Center towards supporting and catalyzing the development of integrated cold chain networks across the country. The Centre is aligned with the overall objectives of reducing food loss, maximizing energy efficiency, and optimizing time and cost in the cold chain networks. The CCLRC vision is also dovetailed with the National Logistics Policy with key objective of integrated development of the logistics sector, leveraging multimodal transport, digital transformation, sector modernization, logistics excellence and democratization.

The key focus of the Center is aligned towards bringing in investment into the sector, supporting harmonization & convergence of Government's financial outlay for the sector, promoting Environmentally Sustainable Technology Solutions and Innovative Cross-functional Shared Infrastructure and enabling capacity building.



On behalf of:



Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

of the Federal Republic of Germany

ABOUT US

DEUTSCHE GESELLSCHAFT FÜR INTERNATIONALE ZUSAMMENARBEIT (GIZ) GMBH

As a service provider in the field of international cooperation for sustainable development and international education work, we are dedicated to shaping a future worth living around the world. The 2030 Agenda is the overarching framework that guides our work. For over 60 years, GIZ has been working jointly with partners in India for sustainable economic, ecological, and social development. The Federal Ministry for Economic Cooperation and Development (BMZ), the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU) as well as the Federal Ministry for Economic Affairs and Energy (BMWi) are the main commissioning parties of GIZ in India.

The Government of India has launched numerous important initiatives to address the country's economic, environmental, and social challenges, and GIZ is contributing to some of the most significant ones. For example, it supports key initiatives such as Smart Cities, Clean India and Skill India. GIZ, in close cooperation with Indian partners, devises tailor-made, jointly developed solutions to meet local needs and achieve sustainable and inclusive development.



Confederation of Indian Industry

ABOUT US

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government, and civil society through working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for Industry.

For more than 125 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. The premier business association has over 9000 members, from the private as well as public sectors, and an indirect membership of over 300,000 enterprises from around 294 national and regional sectoral industry bodies.

With 62 offices, including 10 Centres of Excellence in India, and 8 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with 394 counterpart organizations in 133 countries, CII serves as a reference point for Indian Industry and the international business community.

Confederation of Indian Industry

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ACKNOWLEDGMENT

The Cold Chain Logistics Resource Centre (CCLRC) works with a vision to support and catalyze the development of integrated cold chain networks across the country. Towards the same, a series of technical reference manuals have been developed for most used cold chain infrastructure— including cold stores, ripening chambers and reefer vehicles, which are available as open source (at WWW.CCLRC.in) to be utilized by new entrants of the industry.

We would like to thank and acknowledge the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH for their support towards developing this document series.

We would also like to acknowledge our international technical experts from United Nations Environment Programme (UNEP) and Alliance for Energy Efficiency (AEEE); and industry experts from Blue Star, Carrier Transicold and Desai AgriFoods, without whose support, efforts and invaluable inputs, this document would not have been possible.

OBJECTIVE:

The document is provided only as a guide to select the appropriate Light Commercial Vehicle (LCV) / Truck reefer solutions based on industry application.

Purpose of vehicles used for carrying perishable goods:

The refrigerated truck is an insulated vehicle with a cooling system which makes it possible to maintain the temperature of the pre-cooled product. Truck refrigeration units are not designed to reduce or increase the temperature of the product.

INFORMATIONS REQUIRED TO MAKE THE RIGHT REEFER SOLUTION SELECTION

Selecting a refrigeration unit depends on many factors (see below). All these informations should be considered before selecting the unit:

1) BOX CHARACTERISTICS:

- Length, width & height of the insulated box (Interior & Exterior)
- K factor of the box
- Insulation Type
- Configuration of the box, Partition (mobile or fixed), Evaporator position
- No. of Doors

2) APPLICATION TYPE:

- Nature and type of products to be transported
- Temperature required inside Compartments Chilled (0 to 10 Deg C), Frozen (0 to -25 Deg C)
- Distribution (City Distribution/Long Distance /Short Distance)
- Frequency and duration of distribution

3) OTHERS:

- Vehicle characteristics (LCV/TRUCK/TRAILER)
- Power mode (Vehicle engine powered / Self powered)
- Road Operation / Standby Operation of truck refrigeration unit
- Ambient Temperature
- Other useful information

For vehicle engine driven units, it is also necessary to consider the following information to select appropriate accessories to drive the units:

- Vehicle battery voltage (12V or 24V),
- Air Conditioning (AC) or not,
- Alternator amperage,
- Type of engine,
- Engine displacement,
- Other useful information.

LCV / TRUCK CONSTRUCTION

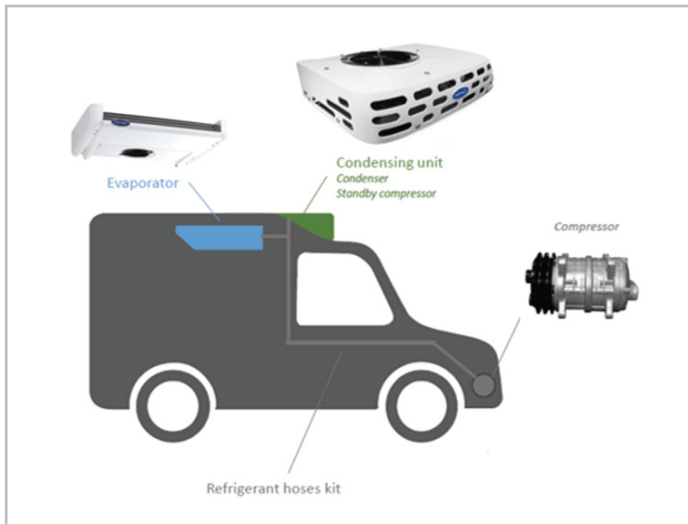


Fig 1: Direct Drive reefer van construction

LCV NON-AUTONOMOUS

Description:

Direct drive units have a compressor mounted to the vehicle's engine, like how an automotive air conditioning system is designed. While this eliminates the diesel engine in a standard truck refrigeration unit, it does require the vehicle engine to be running to provide refrigeration.

TRUCK AUTONOMOUS

Description:

Most truck refrigeration applications are more rigorous and require autonomy from the vehicle engine, necessitating a refrigeration unit with its own diesel engine. The Diesel Truck units are more popular in India since they are used on medium to large trucks and give flexibility to cover the entire spectrum of temperatures.

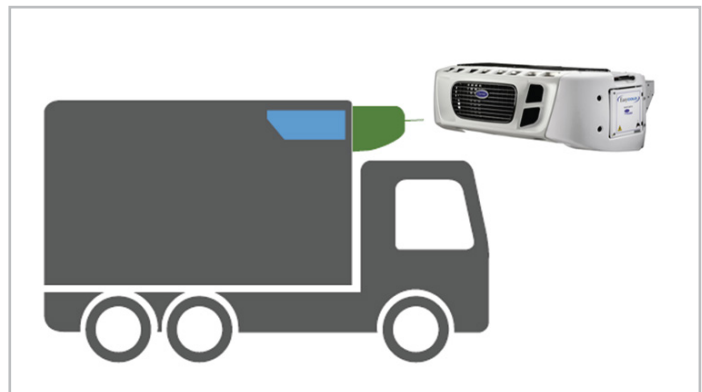


Fig 2: Diesel Truck reefer construction

LCV / TRUCK APPLICATION

2 M³ - 45 M³



DISTRIBUTION & INTERCITY

20 M³ - 80 M³



DISTRIBUTION / INTERCITY /
LONG HAUL

APPLICATION ARCHITECTURE

MONO TEMPERATURE

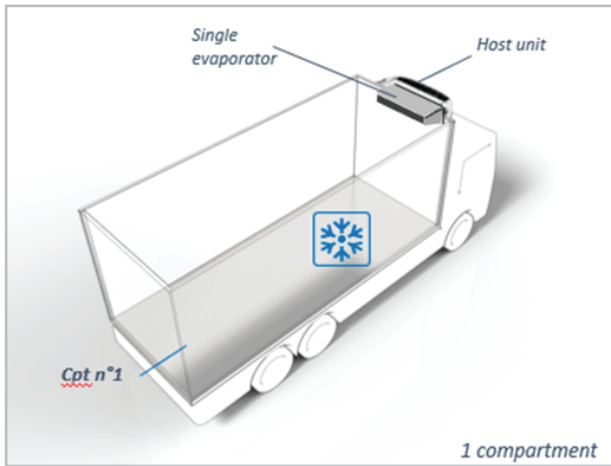


Fig 3: Mono Temperature reefer truck architecture

MULTI TEMPERATURE

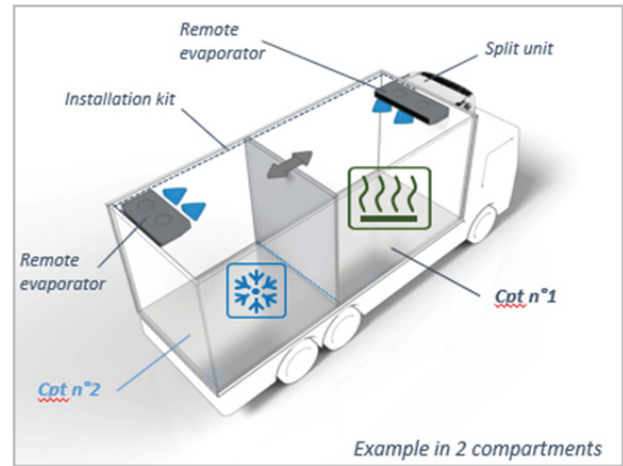


Fig 4: Multi Temperature reefer truck architecture

LONG HAUL & INTER CITY & DISTRIBUTION

INTER CITY & DISTRIBUTION

REFRIGERATED TRUCK ESTIMATED PRICE

S. No	Length (feet)	Tonnage (GVW)	Chilled reefer vehicle Ex Showroom Price* (lacs)	Frozen reefer vehicle Ex Showroom Price* (lacs)
1	8	1.5	11	13
2	10	2	14	20
3	14	4-5	22	26
4	20	12	28	32
5	24	16	37	38
6	32	19	45	45

* The prices are approximate prices of Fully Built Reefer Trucks subject to change based on selection of chassis, container, truck refrigeration unit model and other parameters.

RECOMENDATIONS

The following recommendations should be observed when using refrigeration units.

In a hot climate:

- The vehicle should always be parked in the shade.

When loading:

- Do not obstruct the evaporator with the loaded goods.
- Make sure that air circulation is not impeded (for example, when loading film-covered pallets, make sure that the air can flow back unobstructed under the pallets).



Fig 5: Uniform air circulation in a reefer truck

When transporting fresh products:

- Defrost manually 30 minutes after loading.

When transporting frozen products:

- If the hygrometry ratio is high, initiate a manual defrost 30 minutes after loading.
- Shut down the unit when you open the doors to avoid excessive frosting of the evaporator.

When transporting ice cream:

- Use protective curtains if the doors are to be opened frequently.
- Shut down the unit when you open the doors.

For urban deliveries:

- Use protective curtains.
- Shut down the unit when you open the doors.
- Before loading, pre-refrigerate the vehicle body to a temperature at least as low as that of the goods to be transported.

For long journeys:

- Check that the unit is operating correctly.
- In the event of a problem arising, contact the nearest cold chain equipment service center

Always take regular care of your unit as advised by the solution provider in order to avoid any unnecessary problems.

REEFER TRUCK PROPER LOADING PRACTICES

BEFORE LOADING

CLEAN THE EQUIPMENT

Especially the inner side: walls, roof and floor.

PRE-COOL THE BODY

Heat ingresses the container body through products, open doors and container floor, sides and roof. When not in use try to park in the shade.

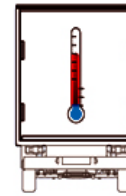
CHECK THE CONDITION OF STRIP CURTAINS

To limit the flow of cold air to the outside, they have to be:

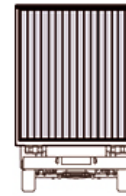
- in good condition
- with a proper length down to the floor.



Clean the body



Pre-cool the body



Check the condition of strip curtains

LOADING

RESPECT CORRECT TEMPERATURE

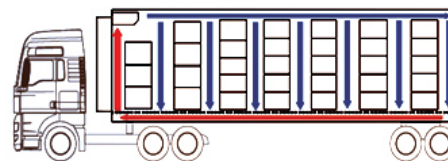
Product should always be loaded at the correct temperature and from a refrigerated loading bay.

RESPECT AIRFLOW

Do not obstruct the evaporator with the loaded goods. Make sure that air circulation is not impeded. Beware of orientation of pallets that should allow airflow to the rear of the body, through and under the load. Do not load up to the ceiling, as that will cause short cycling.

SEPERATE GOODS

Do not mix refrigerated and dry goods in the same compartment. It is not recommended to cool the second compartment by using a fan from the first compartment, mainly for hygiene reasons.

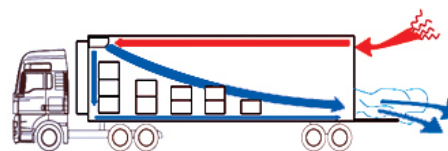


Respect airflow

AFTER LOADING

SHUT DOWN UNIT WHEN OPENING DOORS

Cold air is heavier than hot air. Opening doors with no curtains leads warmer air to replace cooler air. Operating unit when doors are opened may result in frost and increase energy consumption.



Shut down unit when opening doors

Fig 6: Reefer truck proper loading practices

TRANSPORT TEMPERATURE

During loading, check the internal temperature of the goods to be transported.

Frozen products

-25°C	Ice and ice cream
-18°C	Deep frozen foods
-18°C	Fishery products
-14°C	Butter and edible fats, including cream to be used for butter making
-10°C	Meat

Chilled products

+2°C	Fresh fish (in ice), shrimp etc.
+3°C	Cooked dishes, prepared foods, pastry creams, fresh pastries, sweet dishes, egg products
+3°C	Cooked meats pre-packaged for consumer use
+3°C	Poultry
+4°C	Non-sterilized, untreated, unpasteurized/fermented milk, fresh cream, cottage cheese, curd
+6°C	Milk for industrial processing
+6°C	Butter (Soft)
+4/6°C	Fresh fruit and vegetables
+4/6°C	Flowers
2-8°C	Chilled pharmaceutical products
15-25°C	Controlled ambient temperature pharmaceutical products

The above information is given for reference purposes only and may be overridden on the transporter or the consignee's advice.



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