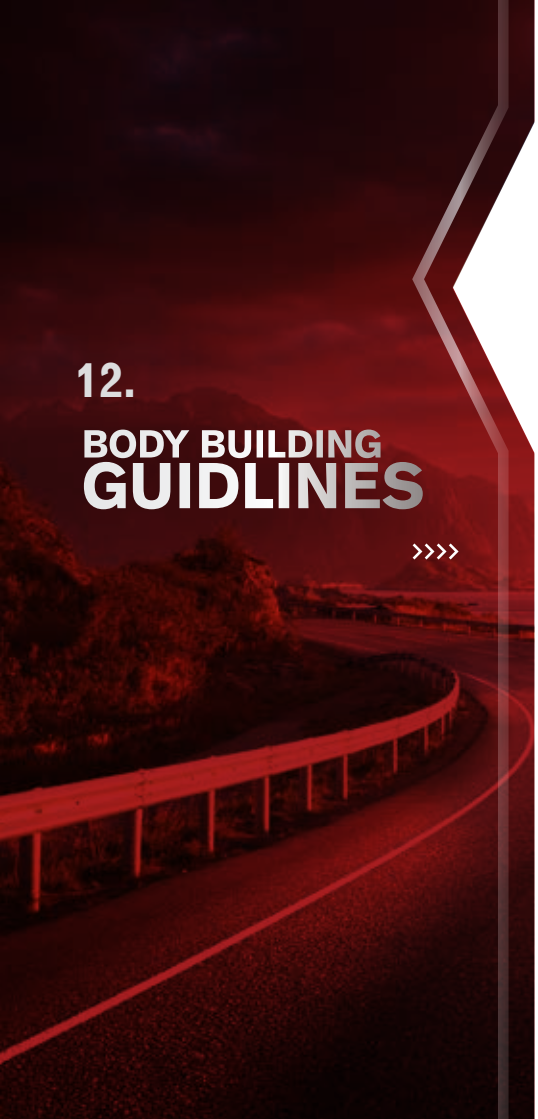
GUIDE TO WORLD-CLASS BODY BUILDING



https://truckmanualshub.com/



12.
BODY BUILDING GUIDLINES

Guidelines and Precautions

Daimler India Commercial Vehicles Pvt. Ltd., as the manufacturer of BharatBenz vehicles, publishes this body/equipment mounting directive to provide body manufacturers with important technical information about the basic vehicle. This information must be observed by the body manufacturer in the production of bodies and equipment, fittings and modifications for BharatBenz vehicles.

Due to the large number of body manufacturers and body types, Daimler India Commercial Vehicles Pvt. Ltd., cannot take into account all the possible modifications to the vehicle, e.g. performance, stability, load distribution, center of gravity and handling characteristics, that may result from the design of attachments, bodies, equipment or modifications. For this reason, Daimler India Commercial Vehicles Pvt. Ltd., can accept no body manufacturer liability for accidents or injuries sustained as a result of such modifications to the vehicles if such modifications have a negative impact on the overall vehicle.

Accordingly, Daimler India Commercial Vehicles Pvt. Ltd., will only assume liability as vehicle manufacturer within the scope of the design, production and instruction services which it has performed itself.

The body manufacturer is bound to ensure that its bodies and equipment, fittings and modifications are themselves not defective, nor capable of causing defects or hazards to the overall vehicle. If this obligation is violated in any way, the body manufacturer shall assume full product liability.

Daimler India Commercial Vehicles Pvt. Ltd., does not issue body/equipment approval certificates for bodies not manufactured by BharatBenz. These directives only supply important information and technical specifications to body manufacturers explaining how to handle the product.

These body/equipment mounting directives are primarily intended for the professional manufacturers of bodies, equipment, fittings and modifications for our vehicles. As a result, these body/equipment mounting directives assume that the body manufacturer has suitable background knowledge. If you intend to mount attachments, bodies and equipment on or carry out modifications to our vehicles, please be aware that certain type of work (e.g. welding work on loadbearing components) may only be carried out by qualified personnel.

This will avoid the risk of injury while also ensuring that the degree of quality required for the attachments, bodies, equipment and modifications is given.

https://truckmanualshub.com/

THE AIM OF DIRECTIVES

These directives serve as instructions for the manufacture of attachments, bodies, equipment and modification to other make bodies and major assemblies. The following graphics show the distinction between the basic vehicle and the body.

Illustrations and schematic drawings are examples only and serve to explain the texts and tables. References to regulations, standards, directives etc. are given in keywords and serve for information only.

Additional information is available from any of the Daimler India Commercial Vehicles Pvt Ltd authorised Dealers or Service Centres.

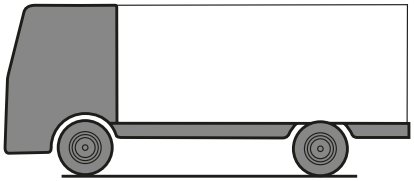


Fig: Basic Vehicle DICV-HDT-1945

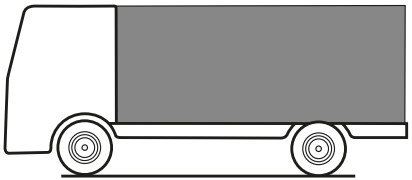


Fig: Body DICV-HDT-1946

Property Damage

General recommendations are being highlighted below in Operators Manual. For detailed body building guidelines please contact BharatBenz dealer for expert advice.

Warning

Before installing any attachments, special-purpose bodies, equipment or carrying out any modifications to the basic vehicle and/or its assemblies, you must read the relevant sections of this Operator's Manual, as well as the operating and assembly instructions issued by the manufacturer of the accessories and items of optional equipment. You could otherwise fail to recognise dangers, which could result in injury to yourself or others.

The instructions listed herein must be observed in full to maintain the operational reliability and road safety of the chassis and for observance of material defect claims.

Additional Information

BharatBenz body building guidelines for trucks is also hosted in BharatBenz official website and it can accessed by any customer / bodybuilder / end user.

https://truckmanualshub.com/

Additional Information

Step-by-step navigation :
https://www.bharatbenz.com/
▸ Homepage ▸ Trucks ▸ Medium duty trucks/HDT Rigid/Tippers/ Tractors ▸ Select Model ▸ Download Bodybuilding Guidelines

Conventions / Interpretation

The following conventions are used in these directives:

Warning

A warning note draws your attention to possible risks of accident and injury to yourself and others.

Environmental Note

An environmental note gives you tips on the protection of the environment.

Property Damage

This note draws your attention to possible damage to your vehicle.

▸ Reference TOC

This symbol indicates the reference TOC on which you will find further information on the subject.

Additional Information

This note points any advice or further information you may find useful.

Vehicle Safety

Warning

The use of parts, assemblies or conversion parts and accessories which have not been approved may put the safety of the vehicle at risk. Before installing any attachments, special-purpose bodies, equipment or carrying out any modifications to the basic vehicle and/or its assemblies, you must read the relevant sections of the this Operator's Manual, as well as the operating and assembly instructions issued by the manufacturer of the accessories and items of optional equipment. You could otherwise fail to recognise dangers, which could result in injury to yourself or others. Official acceptance by public testing bodies or official approval does not rule out safety hazards.

https://truckmanualshub.com/

Notes on vehicle safety

Daimler India Commercial Vehicles Pvt. Ltd recommends

using appropriate parts only for each particular vehicle model. In many countries, parts that make extensive changes to the vehicle can invalidate the general operating permit. Specifically, this concerns parts which:

- change the vehicle type approved in the general
- operating permit
- could endanger road users
- could adversely affect exhaust emissions or noise levels

Additional Information

Make absolutely sure that you comply with national registration regulations as attachments, bodies, equipment on or modifications to the vehicle will change the vehicle type approved and may invalidate the general operating permit.

Operational Reliability

Warning

Before installing any attachments, special-purpose bodies, equipment or carrying out any modifications to the basic vehicle and/or its assemblies, you must read the relevant sections of this Operator's Manual, as well as the operating and assembly instructions issued by the manufacturer of the accessories and items of optional equipment. You could otherwise fail to recognise dangers, which could result in injury to yourself or others. Work incorrectly carried out on electronic components and their software could prevent this equipment from working correctly. Since the electronic systems are networked, this might also affect systems that have not been modified.

Warning

Malfunctions in the electronic system could seriously jeopardise the operating safety of the vehicle.

Accident Prevention

The body, the attached or installed equipment and any modifications must comply with the applicable laws and ordinances as well as work safety or accident prevention regulations, safety rules and accident insurer leaflets. All technical means shall be used to avoid operating conditions that may be unsafe or liable to cause an accident. All national laws, directives and registration requirements must be complied.

The manufacturer of the attachment, body, equipment or conversion or the device manufacturer is responsible for compliance with these laws and regulations.

https://truckmanualshub.com/

Vehicle and Model Designations

This body/equipment mounting directive applies for the following vehicle model designations:

Vehicle	Model	Model designation	Wheelbase (in mm)
28t Rigid	2823R	20x	5175, 5775, 6375
35t Rigid	3523R	21x	5775, 6375
42t Rigid	4228R	22x	6575
19t Const	1923C	29x	3600
28t Const	2823C	23x	4275
28t Const	2828C	24x	4275, 4875
28t Mining	2828CH	24x	4275
35t Const	3528C	25x	5175
35t Mining	3528CM	25x	5175

Identification of Model Designation

The model designation can be identified from the model plate attached to the cab. Please refer digits 4, 5 & 6 in the VIN to get the model designation. Digit 4 & 5 indicate the model designation and Digit 6 indicate the variant in the specific model.

Additional Information

Further information about VIN location can be found on “Vehicle Identification” ▸ **PRODUCT INFORMATION**

VIN example for Model Description:

For VIN No. 0000503AJBP000005, the digits 4, 5 & 6 are 0, 5 and 0. Therefore the model designation is 050.

Additional Information

Information on latest vehicle models and its range can be known from BharatBenz Authorised dealerships.

https://truckmanualshub.com/

Contact Details for Technical Support

The staff members of the Body Builder Management department, the team responsible for conversion/ body manufacturers and the body/equipment mounting directive for the overall vehicle development of BharatBenz trucks, answer technical and design-engineering questions. The relevant members of staff can be contacted at:

Contacts	
24x7 Road Side Assistance and Service Enquiries	1800 120 380380 7338844441 9360800020
Sales Enquiries	1800 121 380380 7338844441 9360800020
Dial for Part / ProServ App Support	1800 120 381381 7338844441 9360800020
Factory Address	Daimler India Commercial Vehicles Pvt. Ltd. SIPCOT Industrial Estate, Mattur P.O, Oragadam Village, Sriperumbudur Taluk, Kancheepuram District, Tamilnadu, India – 602105.

Product Safety

Both the vehicle manufacturer and the body manufacturer must always ensure that they introduce their scopes into the market in a safe condition and that third parties are not at risk of any safety hazard. If this is not adhered they may be subject to civil, criminal and public law consequences. Every manufacturer is liable for the products it manufactures.

From this, it follows that the body/ conversion manufacturer therefore also bears responsibility for the following:

- the operating and road safety of the body, parts and modifications.
- testing and maintaining the operating and handling safety of the vehicle after the body/ equipment is mounted (the body and/or equipment must not have a negative effect on the driving, braking or steering characteristics of the vehicle).
- influences of parts on or modifications to the chassis.

https://truckmanualshub.com/

- consequential damage resulting from the body, attachment, equipment, retrofitted electrical and electronic systems or modification.
- maintaining the operational reliability and freedom of movement of all moving parts of the chassis after the body/ equipment is mounted (e.g. axles, springs, propeller shafts, steering, gearbox linkage, etc.) even in the case of diagonal torsion between the chassis and the bodies.

Work or modifications performed to the chassis or body must be entered in the "Service Records"

▸ MAINTENANCE AND LUBRICATION

Guarantee of Traceability

Hazards in your equipment/body which become known after delivery may necessitate supplementary measures in the market (customer notification, warnings, recalls). In order to make these measures as efficient as possible, your product must be traceable after delivery.

For this purpose and to enable the Road Transport Inspector or comparable registers abroad to be used for determining which owners are affected, we advise you to promptly file the serial number/ identification number of your equipment/ add-on part linked to the vehicle identification number for the truck in your databases. Similarly, it is also advisable to store the addresses of your customers for this purpose and to grant subsequent purchasers the opportunity to register.

Body builder identification plate as per the local laws to be incorporated in the body/ equipment, meeting the regulations.

After Sales Central (ASCENT)

An additional source of information available to you is the ASCENT which provides information on basic data (dimensions, tightening torques), function descriptions, circuit diagrams, repair instructions and maintenance sheets. Information about ASCENT can be obtained from any Bharat-Benz dealership
(Refer ▸ **BODY BUILDING GUIDELINES** to the contact details for technical support)..

BharatBenz Logo and Emblem

The BharatBenz logo and emblem are registered trademarks of Daimler AG. They must not be removed or affixed in another position without approval.

BharatBenz logo and emblem shall not be affixed/painted at a place other than that is provided by Daimler India Commercial Vehicles Pvt. Ltd.

Overall appearance of the overall vehicle

If the vehicle fails to comply with the appearance and quality standards as required by Daimler India Commercial Vehicles Pvt Ltd, the trademarks such as the BharatBenz logo and emblem must be removed.

Third-party trademarks,

• may not be affixed next to BharatBenz trademarks.

• may not be affixed at any other points on the basic vehicle without necessary approval of the department responsible.

(Refer ▸ **BODY BUILDING GUIDELINES** to the aim of directives for basic vehicle)

https://truckmanualshub.com/

RECYCLING OF COMPONENTS

Environmental Note

All attachments, bodies, equipment and modifications shall be done with environmentally compatible design and material selection shall be done taking environment protection into account.

Materials with risk potential, such as halogen additives, heavy metals, asbestos, CFCs and CHCs, are to be avoided.

- It is preferable to use materials which permit recycling and closed material cycles.
- Plastics are to be used only where they provide advantages in terms of cost, function or weight.
- Materials and production processes are to be selected such that only low quantities of waste are generated during production and that this waste can be easily recycled.
- In the case of plastics, and composite materials in particular, only compatible substances within one material family are to be used.
- For components which are relevant to recycling, the number of different types of plastics used must be kept to a minimum.
- It must be assessed whether a component can be made from recycled material or with recycled elements.
- Wherever possible, components should not be painted or coated; coloured plastic parts are to be used instead.
- Components in areas at risk from accidents must be designed in such a way that they are damage tolerant, repairable and easy to replace.

Quality System

World-wide competition, increased quality standards demanded by the customer from the product as a whole, national and international product liability laws, new organisational forms and rising cost pressures make efficient quality assurance systems a necessity in all sectors of the automotive industry.

For the reasons quoted above, Daimler India Commercial Vehicles Pvt. Ltd., advises body manufacturers to set up a quality management system with the following minimum requirements:

- The quality management system should clearly define responsibility and authority.
- There should be a description of processes/workflow.
- The body build orders / contracts has to be checked for its feasibility with respect to its application / usage.
- Product checks on the basis of specified instructions to be carried out.

https://truckmanualshub.com/

- Provisions are made for the handling of faulty products.
- The inspection results must be documented and archived.
- All employees concerned should have valid proof of qualification required to perform their task.
- The test equipment must be monitored and calibrated regularly.
- There should be a system for labelling materials/parts.
- Quality assurance measures should be carried out at suppliers end.

Planning of Bodies Selecting the Chassis

Property Damage

When planning attachments, bodies, equipment or modification work, the selected vehicle must be checked to verify whether it fulfils the necessary requirements.

In order to ensure safe operation of the vehicle, it is essential to choose the chassis and equipment carefully in accordance with the intended use.

Along with the selection of the correct vehicle version, the required series and special equipment such as

- Wheelbase
- Engine/Gearbox
- Power take-off
- Axle ratio
- Position of the centre of gravity
- Legal registration requirements (eg. underride guard)
- Permissible and technical gross vehicle weight

should be taken into consideration and be appropriate for the intended use.

Property Damage

Observe the weight code. The axle designation or the load capacity of the tyres has only limited relevance to the gross weight of the vehicle.

Additional Information

The non-availability of a vehicle version may be an indication that the vehicle is not suitable for the intended application. For clarification contact BharatBenz authorised dealership.

Vehicle Modifications

Warning

Do not carry out any modifications to major assemblies (steering, brake system etc.). Any modifications to the steering and the brake system may result in these systems malfunctioning and ultimately failing. The driver could lose control of the vehicle and cause an accident.

https://truckmanualshub.com/

Warning

Alterations to the basic vehicle are permitted only within the framework of the procedures described in this body/equipment mounting directive.

Standard vehicles ex-factory comply with Central Motor Vehicle Rules (vehicles produced for countries outside of India may be exceptions). The vehicles must still comply with CMVR after modifications have been carried out.

The body manufacturer must inform the officials of recognised approval authority or inspector about any modifications done to the chassis when the vehicle is inspected.

Following all work on the brake system, i.e. even if merely disassembling parts, a complete check (operation, effectiveness and visibility) of the entire brake system must be performed.

Dimensions, Weights, Overall Vehicle Height

Warning

The vehicle tyre load capacity may not be exceeded by overloading the vehicle beyond its specified gross vehicle weight. The tyres could overheat and suffer damage.

This could cause you to lose control of the vehicle and cause an accident with possible injury to yourself and others.

Information on the permissible axle loads can be found on the vehicle model plate. All legal

provisions governing the permissible vehicle height must be taken into account when planning bodies.

Standard vehicles ex-factory comply with Central Motor Vehicle Rules (vehicles produced for countries outside of India may be exceptions).

The vehicles must still comply with CMVR after modifications have been carried out.

The body manufacturer must inform the officials of recognised approval authority or inspector about any modifications done to the chassis when the vehicle is inspected.

Following all work on the brake system, i.e. even if merely disassembling parts, a complete check (operation, effectiveness and visibility) of the entire brake system must be performed.

Additional Information

The non-availability of a vehicle version may be an indication that the vehicle is not suitable for the intended application. For clarification contact BharatBenz authorised dealership.

https://truckmanualshub.com/

Additional Information

Should comply as per the AIS 093 (Rev.1):2015 standard.

Tyres

The body manufacturer must ensure that:

- The largest permissible tyres can be fitted.
- The distance between the tyre and the mudguard or wheel housing is sufficient even with the suspension fully compressed (including any twist) (adherence to valid regulations).
- The relevant information in the drawings to be observed.

Bolted and Welded Connections

Warning

Do not modify any bolted connections that are relevant to safety, e.g. that are required for wheel alignment, steering or braking functions.

When unfastening bolted connections make sure that, when work is complete, the connection again corresponds with the original condition. Welding work on the chassis/body may only be carried out by trained personnel. The body, the attached or installed equipment and any modifications must comply with the applicable laws and ordinances as well as work safety or accident prevention regulations, safety rules and accident insurer leaflets.

Bolted Connections

If it is necessary to replace standard bolts with longer bolts, use only bolts:

- of the same diameter
- of the same strength grade
- of the same type
- with the same thread pitch

Also note:

It is strictly prohibited to shorten the length of the free clamping bolt, change to a stretch-shank bolt or use bolts with a shorter thread.

- No design modification is possible if bolts are tightened to the required torque and angle by Daimler India Commercial Vehicles Pvt Ltd.
- The settling behaviour of bolted connections must be observed.

Additional tensioned parts must be of equal or greater strength than the preceding tensioned assembly.

The use of Daimler India Commercial Vehicles Pvt Ltd tightening torques assumes coefficients of friction for the bolts in the tolerance range of 0.08 -0.14.

Daimler India Commercial Vehicles Pvt Ltd recommends the use of Daimler India Commercial Vehicles Pvt Ltd standard parts.

https://truckmanualshub.com/

Flange head bolts

Thanks to the use of flange head bolts, all bolted connections on the chassis of BharatBenz commercial vehicles are maintenance free, i.e. retightening of the bolts in the context of regular service intervals is no longer necessary. We expect all bolted connections used for work on BharatBenz vehicles to satisfy the same requirements.

Causes for the loosening of bolted connections

Bolted connections work loose when a permanent change in length occurs in the axial direction of the bolt. This leads to a reduction in the preload force and thus a reduced clamping force under operating loads.

A permanent change in length can be caused by:

Settling

The surfaces of parts that make contact with other parts (e.g. nuts, washers) are coated with corrosion protection and settle under the pressure of the clamping force. This means that more the connecting points are bolted together, greater the length change due to settling.

Creepage

The pressure per unit area of the bolt and nut on the contact surfaces exceeds the specific pressure strength of the material of the clamped parts.

Description of flange head bolts

The main feature of this type of bolt is a press-fitted flange which increases the contact area of the bolt head.

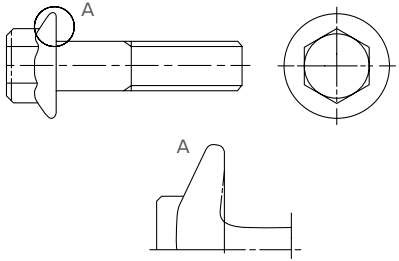


Fig: Flanged bolt DICV-HDT-1947

Properties

Flange head bolts and nuts that comply with MBN standards 10105 and 13023 reduce the danger of loss of pre-load by setting on the bearing surface. The pressure intensity that is created during the process of tightening is low in contrast to other types of screw heads, because it is spread over the increased bearing surface.

Advantages of flange head bolts and nuts to MBN 10105 and 13023

- Reduced risk of creep due to an enlarged contact area and thus a lower pressure per unit area than other types of bolt heads.
- Reduced settling effect due to a lower number of parts to be connected compared with bolted connections with washers.
- The pressure concave contact disc increases the elasticity of the connection so that any settling or creep behaviour that still occurs can be compensated, largely preventing any decrease in the clamping force.
- The elasticity of the bolted connection can be increased further by selecting a high clamping length ratio l/d (l = shank length, d = shank diameter).
- The use of flange head bolts and nuts guarantees a secure and maintenance-free bolted connection.

(For attached components, e.g. fifth wheel couplings, the maintenance guidelines of the component manufacturer should be followed.)

Conformity of lengths and reach in blind holes must be ensured.

https://truckmanualshub.com/

As the nuts conforming with MBN 13023 feature clamp locking, they must not be used more than once.

When flange head bolts and nuts are used, the tightening torques in the following tables must be complied.

Extract from MBN 10130 Part 3 Class II

Torque variation in tightening process: ± 3% to ± 8%

Bolt driver with shutoff clutch; torque wrench: -5%

Thread	Tightening Torque (Nm)	Pre-load Force Fvmin. (kN)
M8 x 1.25	29.5±2.3	16.3
M10 x 1.5	58±4.5	25.9
M12 x 1.5	106±8	39.7
M14 x 1.5	172±13	56.0
M16 x 1.5	260±20	74.4
M18 x 1.5	380±30	96.9
M20 x 1.5	520±40	120

Extract from MBN 10130 Part 3 Class III

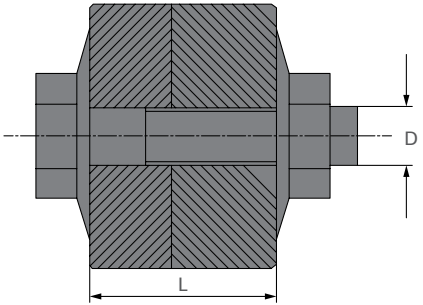
Torque variation in tightening process: ± 3% to ± 20%

Impulse wrench;
“good impact wrench”: –20%

Thread	Tightening Torque (Nm)	Pre-load Force Fvmin. (kN)
M8 x 1.25	26±5	12.9
M10 x 1.5	51±10	20.5
M12 x 1.5	92±18	31.0
M14 x 1.5	150±30	43.9
M16 x 1.5	225±45	57.9
M18 x 1.5	330±60	75.8
M20 x 1.5	460±90	95.6

Tightening torque for BharatBenz original flange-bolts and flange-nuts

- For torque and turn-angle tightening a minimum clamp-length (L) of 1.5 x D must be guaranteed
- Bolt spec -MBN 10105; .
  Nut spec -MBN 13023



DICV-HDT-2056

https://truckmanualshub.com/

Flange - bolts & nuts	M12 x1.5 10.9	M14 x1.5 10.9	M16 x1.5 10.9	M18 x1.5 10.9	M20 x1.5 10.9
Torque tightening	92 Nm	150 Nm	225 Nm	330 Nm	460 Nm
Torque and turn-angle tightening. Only for nuts MBN 13023	92 Nm + 90°	150 Nm + 90°	225 Nm + 90°	330 Nm + 90°	460 Nm + 90°

Use of bolted connections

All bolts and nuts used to connect implements or equipment to the BharatBenz chassis (e.g. fuel tank, exhaust system, implement carrier, end cross member) must always be selected according to the criteria described in section “Flange head bolts” (according to MBN 10105 and 13023).

The exception to this rule is body mounting. For this it is possible to use bolts conforming to standards ISO 4162 and ISO 1665 (both of the normal shank design) and nuts according to ISO 7044 of property class 10.9.

Welded Connections

Welding work on the chassis/body may only be carried out by trained personnel.

Property Damage

Parts which must not be welded:

- Assemblies such as the engine, gearbox, axles, etc.
- The chassis frame.

Pass-By Noise

No modification (from the original spec) is permitted on the parts that change the pass-by noise quality, e.g.

- Engine
- Exhaust system
- Air intake system
- Tyres, etc.,

Noise-insulating parts fitted as standard must not be removed or modified.

Exhaust System

Property Damage

The original exhaust system mounting, by this we mean the bracket components including frame mounted castings, may not be modified. Modifications can lead to damage to the exhaust system.

Maintenance and Repairs

Warning

Do not modify any bolted connections that are relevant to safety, e.g. that are required for wheel alignment, steering or braking functions.

https://truckmanualshub.com/

Warning

When unfastening bolted connections make sure that, when work is complete, the connection again corresponds with the original condition. Welding work on the chassis/body may only be carried out by trained personnel. The body, the attached or installed equipment and any modifications must comply with the applicable laws and ordinances as well as work safety or accident prevention regulations, safety rules and accident insurer leaflets.

Maintenance and repair of the vehicle should not be made difficult by the body.

Maintenance points and major assemblies must be easily accessible.

- This Operator's Manual must be complied with and supplemented as necessary.
- Stowage boxes must be fitted with maintenance flaps or removable rear panels.
- The battery compartment must be sufficiently ventilated, with provision for air to enter and exit.
- Check the condition and capacity of batteries and service them in accordance with the manufacturer's specifications.

Any additional expenses arising from the body in connection with warranty, maintenance or repair will not be borne by Daimler India Commercial Vehicles Pvt. Ltd.

Maintenance Instructions

The following must be observed by the body manufacturer before delivery of the vehicle:

- Due date of inspection
- Check the condition and capacity of batteries and service them in accordance with the manufacturer's specifications.
- Check the head lamp setting or have this checked at a qualified specialist workshop.
- Retighten the wheel nuts to the specified torque.
- This Operator's Manual and directives for maintenance of attachments, bodies, installations or conversions, which have been installed by the body manufacturer, must be provided with the vehicle in the language of the country of use.
- Daimler India Commercial Vehicles Pvt Ltd recommends adapting to each individual body the scope of maintenance work which has to be carried out on the body, coordinating it by means of the valid BharatBenz service systems. This applies both to the scope and type of service work, and for determining the service due dates for servicing intervals based on time elapsed and distance covered.

Preparation for Storing the Vehicle

Storage in an enclosed space:

- Clean the overall vehicle.
- Check the oil and coolant levels.
- Inflate the tyres to 0.5 bar above the specified tyre pressures.
- Release the handbrake and chock the wheels.
- Disconnect the battery and grease battery lugs and terminals.

https://truckmanualshub.com/

Storing the vehicle in the open (< 1 month):

- Carry out the same procedure as for storing in an enclosed space.
- Close all air inlets and set the heating system to “OFF”.

Storing the vehicle in the open (> 1 month):

- Carry out the same procedure as for storing in an enclosed space.
- Fold the windscreen wipers away from the windscreen.
- Close all air inlets and set the heating system to “OFF”.
- Remove the battery and store it in accordance with the manufacturer’s specifications.

Maintenance work on stored vehicles (in storage for > 1 month):

- Check the oil level once a month.
- Check the coolant once a month.
- Check the tyre pressures once a month.
- Remove the battery.

Removing the vehicle from storage:

- Check the fluid levels in the vehicle.
- Correct the tyre pressures to the manufacturer’s specifications.
- Check the battery charge and install the battery.
- Clean the overall vehicle.

Battery Maintenance and Storage

- To avoid damage to the battery, disconnect the battery if the vehicle is to be immobilised for a period of more than 1 week.
- If the vehicle is immobilised for a period of more than 1 month, remove the battery and store it in a dry place at temperatures of between 0 °C to 30°C.
- Store the battery in an upright position.
- The battery charge must be kept above 12.55 V at all times.

Property Damage

If the battery voltage drops below 12.1 V, the battery is damaged and it will have to be replaced. Leaving the vehicle parked up for a long period of time can lead to battery damage. This can be avoided by disconnecting the battery and storing it appropriately.

Work before handing over the body built vehicle

The body manufacturer must confirm the work and modification carried out by making an entry in the “Service Records”

▸ **MAINTENANCE AND LUBRICATION.**

Body manufacturer should strictly advise the customer to carry out a detailed check on the vehicle after the body is mounted, at BharatBenz authorised dealership.

Checking the overall vehicle

- Check the vehicle for its perfect condition. All damages must be repaired.
- If it is not known how long a vehicle equipped with a hydraulic clutch

https://truckmanualshub.com/

operating system has been in storage, the brake fluid must be replaced by BharatBenz authorised dealership.

Checking the batteries

- Test the battery charge before handing over the vehicle.

Checking the tyres

- Before handing over the vehicle, check that the tyres are inflated to the specified pressure and check the tyres for damage. Damaged tyres must be replaced.

Checking wheel alignment

When equipment, attachments and bodies have been mounted, it is recommended to have the toe setting checked by a Daimler India Commercial Vehicles Pvt Ltd authorised Dealer or Service Centre.

Daimler India Commercial Vehicles Pvt Ltd recommends authorised Dealer or Service Centre for this work.

It is absolutely essential that all safety-relevant work and all work on safety-relevant systems is performed by Daimler India Commercial Vehicles Pvt Ltd authorised Dealer or Service Centre.

Pneumatic Auxiliary Consumers

If pneumatic accessories are installed, the following must be observed:

- In the System protection valve of Pneumatic brake circuit the outlet port number 24 is provided for any auxiliary usage. If necessary T-Junction should be installed to this air line.
- To protect the other (on-board) auxiliary usages, the connection may only be made using an additional overflow valve without return flow.
- Do not use auxiliary outlet port that consume compressed air continuously.

Maximum Permissible Air Consumption

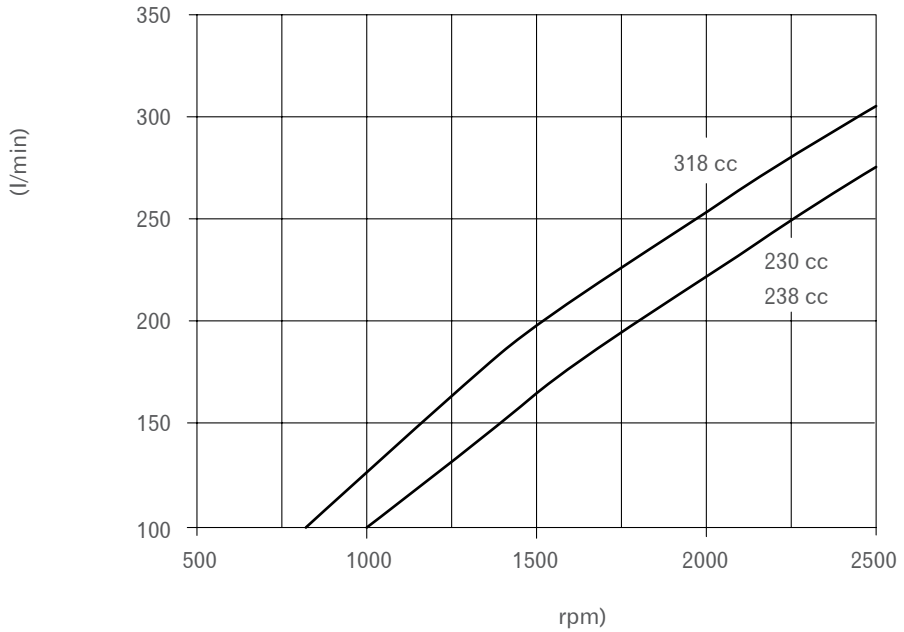
The air requirement must be checked in the case of arduous vehicle operation, e.g. stop/start traffic and/or when pneumatic auxiliary usages with high air consumption are installed.

The total air consumption must not exceed the limit curve indicated in the diagram. Ensure that all available pneumatic utilities are considered, e.g. brakes, air suspension, trailer, etc.

Additional Information

The non-availability of a vehicle version may be an indication that the vehicle is not suitable for the intended application. . For clarification contact BharatBenz authorised dealership.

Below illustration represents the maximum permissible air consumption.



Max . permissible air consumption

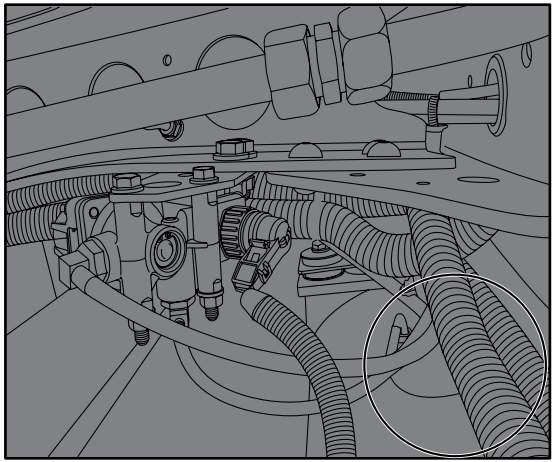
rpm = average engine speed

l/min = permissible air consumption (litres/min) free air

https://truckmanualshub.com/

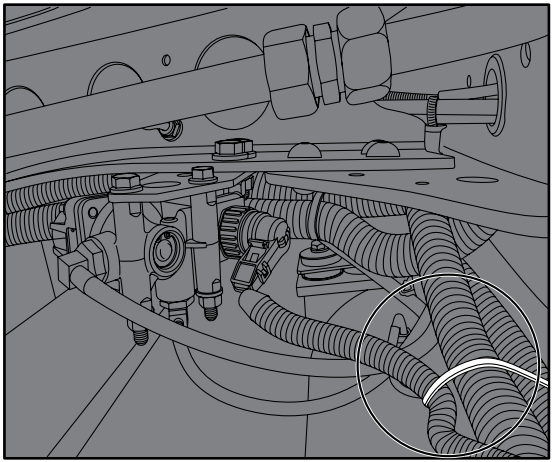
Pneumatic line routing examples

✗ Incorrect



Brake lines are routed poorly without cable ties.

✓ Correct



Brake lines should be secured against chafing with cable ties.

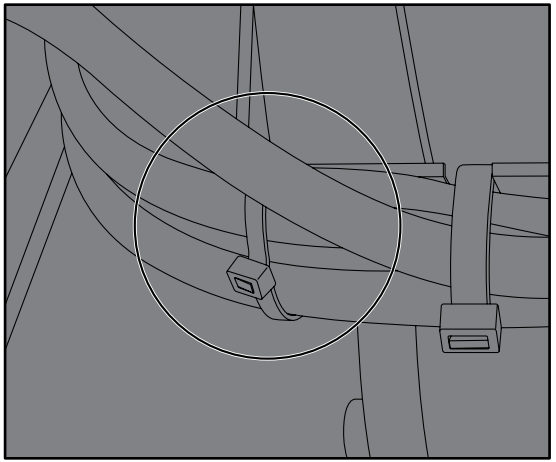
DICV-HDT-2070

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

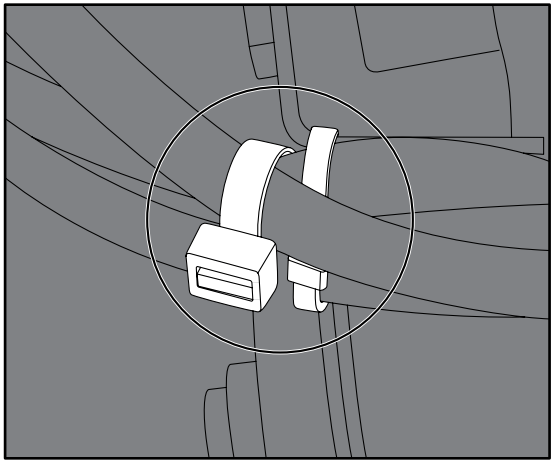
Pneumatic line routing examples

✗ Incorrect



Intersecting point is not properly secured, risk of chafing.

✓ Correct



Intersecting point is secured with cable tie.

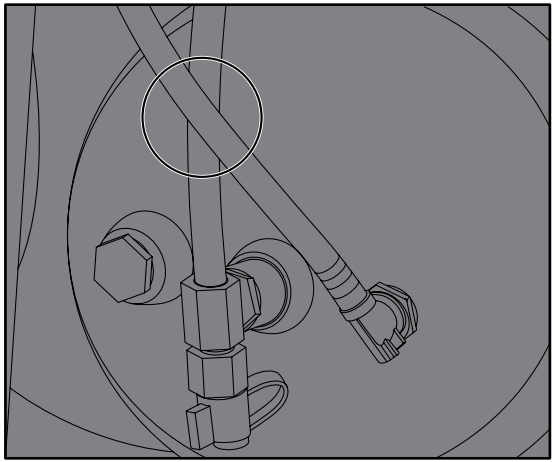
DICV-HDT-2071

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

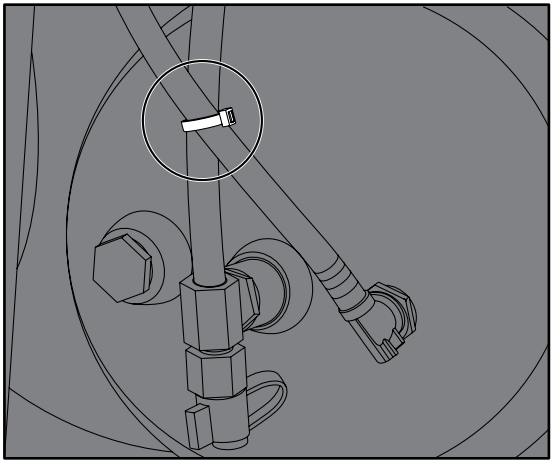
Pneumatic line routing examples

✕ Incorrect



Intersecting point is not properly secured, risk of chafing

✔ Correct



Intersecting point is secured with cable tie.

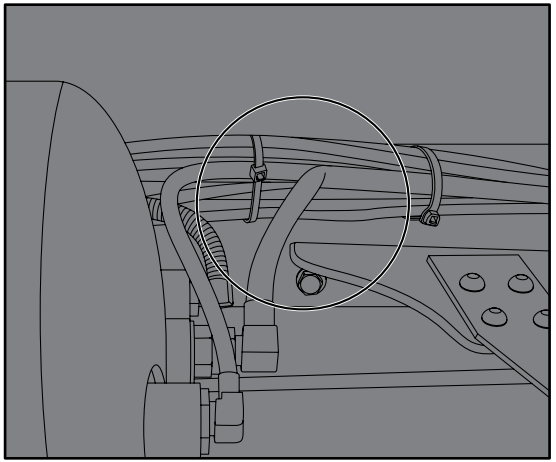
DICV-HDT-2072

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

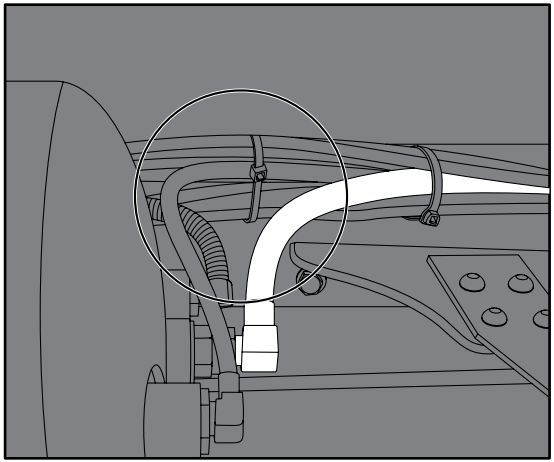
Pneumatic line routing examples

✕ Incorrect



Pneumatic line is kinked, bending radius is not provided to avoid kinks.

✓ Correct



Bending radius and adequate length should be provided for pneumatic lines to avoid kinks.

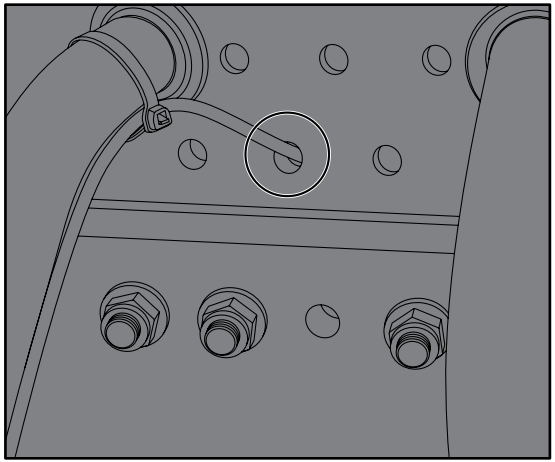
DICV-HDT-2073

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

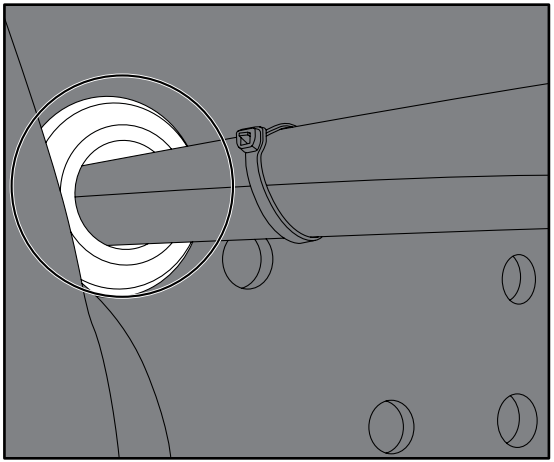
Pneumatic line routing examples

✕ Incorrect



Chafe protection is not provided on the frame holes, risk of line chafe.

✔ Correct



Chafe protection should be provided with rubber grommet in the frame through holes to avoid damages to the pneumatic holes.

DICV-HDT-2074

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

AdBlue System

- DICV does not recommend to relocate the AdBlue tank as the AdBlue line re-routing may have an impact on dosing, if not done properly.
- AdBlue & Pneumatic lines are not to be disturbed as it may impact AdBlue dosing.
- Bodybuilder to ensure sufficient space is provided for filling of AdBlue tank upon building the load body.
- As the AdBlue tank is made of polymer, care to be exercised while welding so that no weld sparks fall on the tank. Protective shield may be used in such cases.
- The electrical connection should not be removed unless vehicle ignition is OFF. If not, there will be fault codes which would be registered.

Additional Information

Further information about “AdBlue System” ▸ **AFTER TREATMENT SYSTEM**

Technical Threshold Val.ues for Planning

Vehicle Overhang

Warning

The body must be designed in such a way that placing of excessive load weight at the rear is prevented. It is important, otherwise the necessary steering and braking forces for safe vehicle operation cannot be transferred to the road.

- It is strongly recommended not to alter the vehicle overhang the specification offered by BharatBenz.

Weight Distribution, CoG Height, Anti-Roll Bars

Warning

The body must be designed in such a way that placing of excessive load weight at the rear is prevented. It is important to comply with the points listed below, otherwise the necessary steering and braking forces for safe vehicle operation cannot be transferred to the road.

https://truckmanualshub.com/

Vehicle	Permissible axle load (kg)	Permissible axle load distribution	
		Front Axle (kg)	Rear Axle (kg)
19T (C)	18,500	7,000	11,500
28T (R) /28T(C)	28,000	7,000	21,000
28T (R)	27,960	6,960	21,000
28T (C)	27,600	6,600	21,000

Property Damage

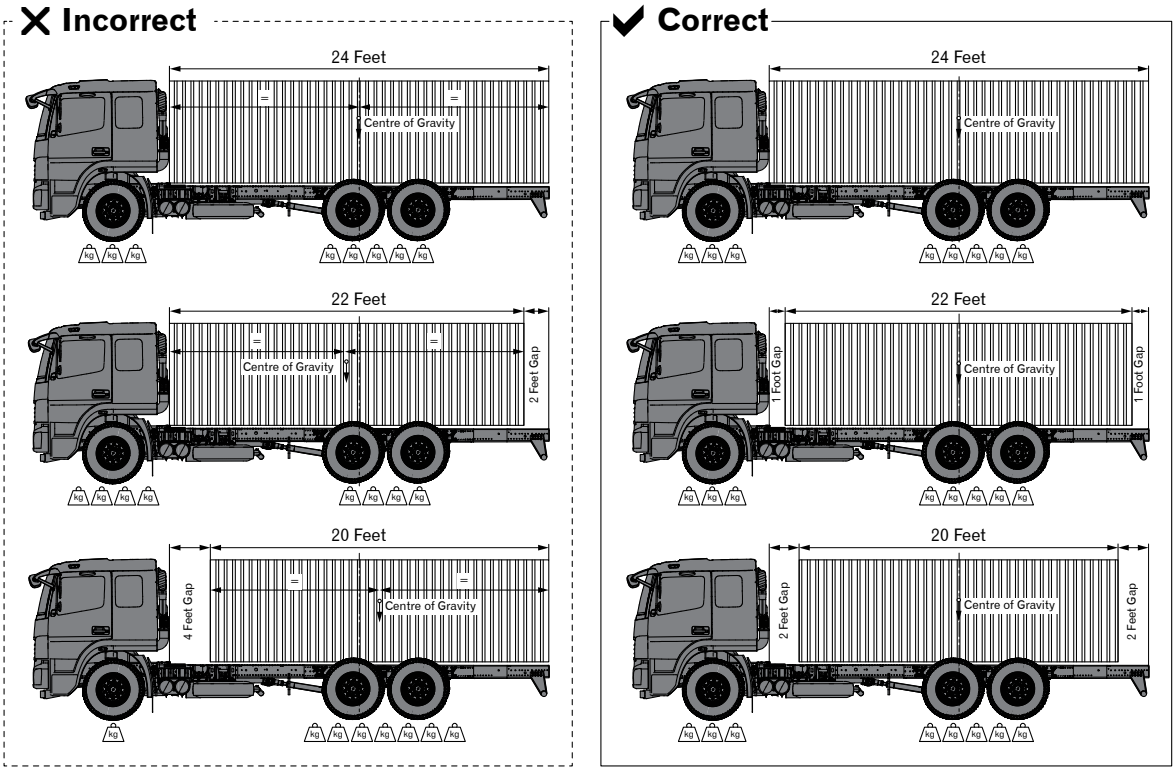
At any point of time the sum of wheel load distribution shall not exceed legally permitted axle loads as per the national regulations.

CoG Height

BharatBenz cannot vouch for the handling, braking and steering characteristics of vehicles with attachments, installations or modifications for payloads with unfavourable centres of gravity (e.g. rear-mounted, over height and side mounted loads). The vehicle body/

equipment manufacturer/converter is responsible for the safety of the vehicle in the case of these bodies.

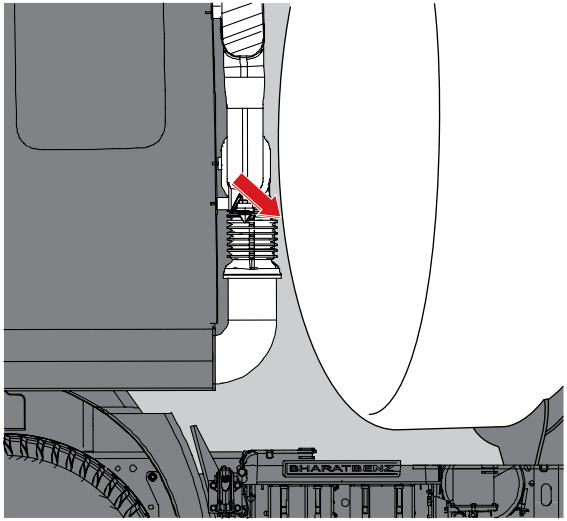
https://truckmanualshub.com/



https://truckmanualshub.com/

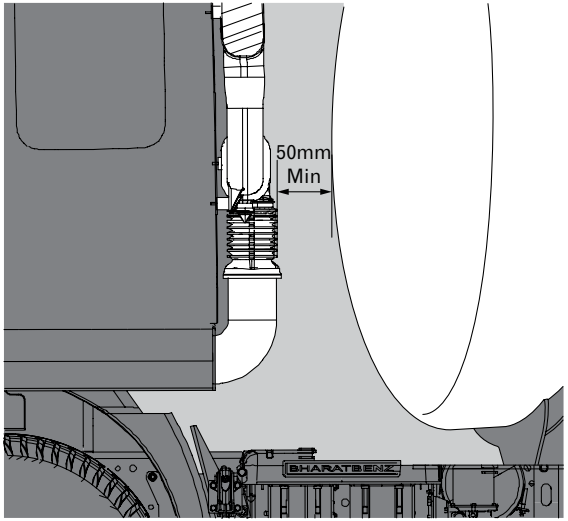
Ensure proper gap between cab & body

Incorrect



Clash between air intake & load body is not ok

Correct



Minimum clearance of 50mm should be maintained between cab and load body / bunker.

DICV-HDT-2043

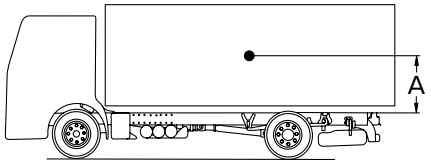
Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Stabilisers

Make sure that the vehicle you are building is correctly equipped. BharatBenz provides stabilisers for different model series. It is recommended to use additional stabiliser (in addition to standard fitment) for vehicles with high loads in accordance with the table below. Stabilising equipment is required if the vehicle is used for extremely high loads. If no stabilising equipment is available for a model series, or if this equipment is unsuitable due to operating conditions (such as a need for OFFroad capability), the mounting frame must be designed in a manner that stabilises the overall vehicle in consultation with the department responsible (Refer ▸ **BODY BUILDING GUIDELINES** to the contact details for technical support).

Centre of gravity height (A) above top edge of chassis frame		
Up to	550 mm	Normal load
	550–1250 mm	High load
Over	1250 mm	Extremely high load



DICV-HDT-1949

Fig: Centre of gravity height above top edge of chassis frame

Warning

The body must be designed in such a way that placing of excessive load weight at the rear is prevented.
It is important to comply with the points listed below, otherwise the necessary steering and braking forces for safe vehicle operation cannot be transferred to the road.

To ensure sufficient vehicle steerability, the minimum front axle load must be maintained under all load conditions. Consult the department responsible in the event of any deviations.

Property Damage

At any point of time the sum of wheel load distribution shall not exceed legally permitted axle loads as per the national regulations.

https://truckmanualshub.com/

Clearance for Assemblies and Cab

Certain clearances must be maintained in order to ensure the function and operational safety of assemblies. Dimensional data in the quotation drawings must be observed.

Gearshift Linkage

- Sufficient distance from the body, including when the cab is tilted.
- Observe the vertical slewing range of the semitrailer.

Spring-loaded brake cylinder

- For vehicles with drum brakes, check that the spring-loaded brake emergency release screw moves freely and is accessible.

Engine and gearbox

- Minimum distance from body 30 mm.

Attachment above Cab

- Observe the permissible centre of gravity location and the front axle load.
- Make sure that there is sufficient space for tilting.

Cab

- The distance between the cab and the body or vertical exhaust must be at least 50 mm (AIS 093 (Rev:1): 2015).

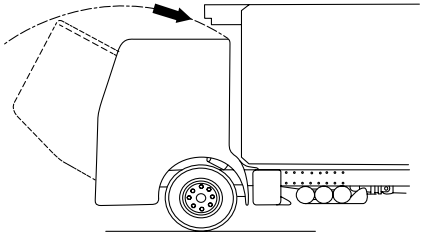


Fig: Cab tilting range clearance DICV-HDT-1950

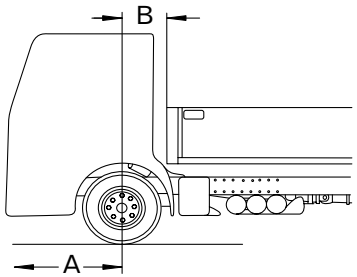


Fig: Cab tilting range clearance DICV-HDT-1951

Vehicle	Cab	A	B
		mm	mm
HDT Model Designation (2xx)	Short Cab	7,000	825
	Short Cab + Vertical Exhaust	1460	1125
	Long Cab	1460	1100

https://truckmanualshub.com/

Damage Prevention Electrical System

Warning

Work carried out incorrectly on the electrical system may impair its function. This may lead to the failure of components or parts relevant to safety.

All accident prevention regulations must be complied with when working on the vehicle.

Comply with all national regulations and laws. . Work on live electrical lines carries a risk of short circuit. Before starting work on the electrical system, disconnect the on-board electrical system from the power source, e.g. battery.

General Instructions:

- This vehicle is having advanced E&E system, Vehicle ECU, Engine ECU, ABS ECU & Cluster is connected by CAN.
- Don't tamper (cutting and joining of the existing wiring harness) for taking output for Lamps, Horn, Fan, Audio System, VTS etc.
- Don't tamper earth points and power net connections like Ignition Switch, Starter motor, Battery & Alternator etc.
- Use BharatBenz approved accessories to avoid tampering.
- After making changes in Electrical connections, check for fault codes and malfunction indicator lamp in the cluster.

Batteries

- Never place any metal objects or tools on the batteries.
- There is a risk of short circuit if the positive terminal clamp on the connected battery comes into contact with vehicle parts. This could cause the highly explosive gas mixture to ignite. You and others could be seriously injured as a result.
- When disconnecting the batteries, always disconnect the negative terminal clamp first and then the positive terminal.
- When connecting the batteries, always connect the positive terminal clamp first and then the negative terminal.
- Incorrect polarity of the supply voltage can cause irreparable damage to the control units.
- Never start the engine without a connected battery (battery terminals tightened).
- Do not disconnect or remove the battery terminals while the engine is running.
- If the batteries are flat, the engine can be jump-started using jump leads connected to the batteries of another vehicle. Observe the Instruction Manual. Do not use a quick charger for jump-starting.
- Only tow-start the vehicle with the batteries connected.
- Quick-charge the batteries only after disconnecting them from the vehicle's electrical system. Both the positive and negative terminals must be disconnected.

Lines, plug connections and control units

- A plug connection must not be unplugged from or plugged into the control units while the ignition is on.
- Lines must be protected from heat by means of insulation.

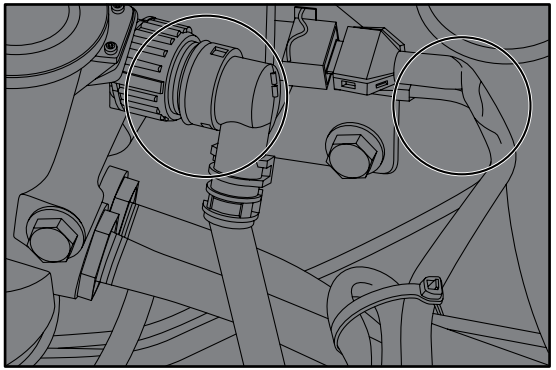
https://truckmanualshub.com/

- Route cables in such a way that chafing cannot occur, particularly at crossover points and sharp edges. If necessary, use cable ducts or guide pipes.
- Do not carry out tests at connector terminals using unsuitable tools (test probes, wire ends, etc.). This may lead to contact damage and subsequent problems. Use suitable test leads.
- The department responsible must be consulted if a battery isolating switch is to be retrofitted.

https://truckmanualshub.com/

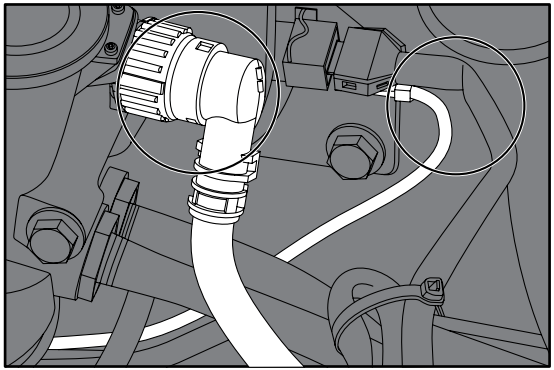
Electrical line routing examples

✕ Incorrect



Electrical lines are poorly routed with tension.

✓ Correct



Electricals cables and connectors should be routed properly without tension.

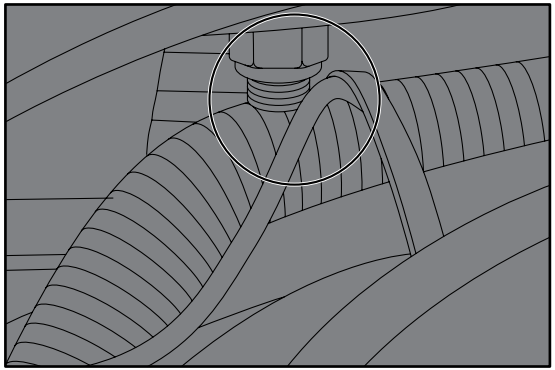
DICV-HDT-2075

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

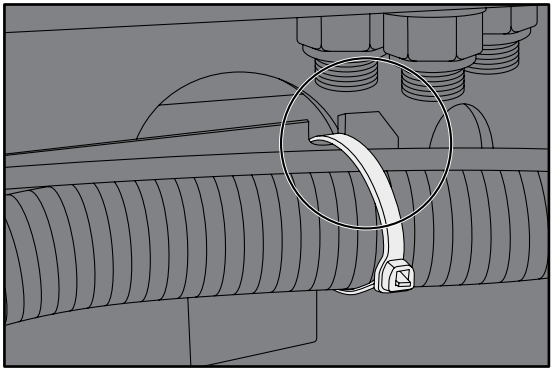
Electrical line routing examples

✕ Incorrect



Line chafes against / lies on thread of a bolt.

✓ Correct



Electrical line should be routed with sufficient clearance to avoid contact with other components.

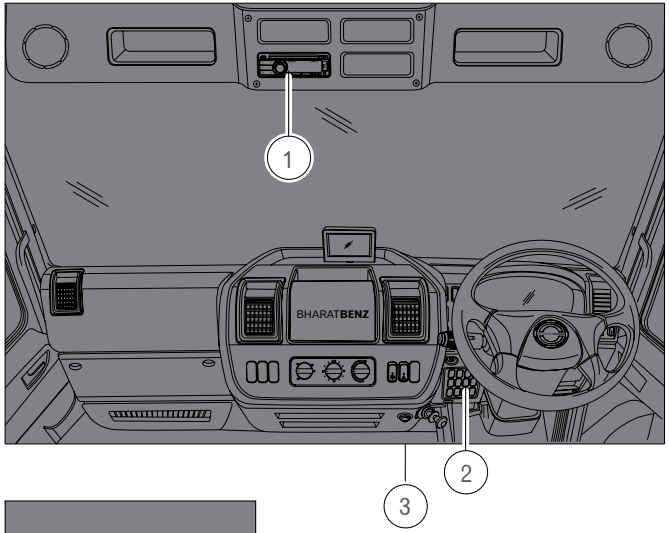
DICV-HDT-2076

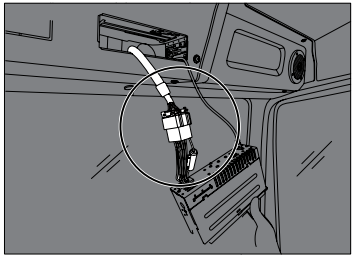
Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Electrical terminal for accessories (Inside cab)

Below illustration represents the location and wiring harness for the electrical accessories inside the cab.

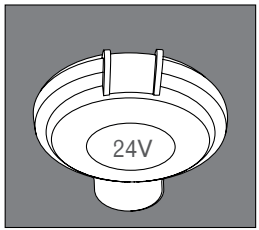




1. 24V Connector (1no) - for radio
Location: Overhead tray
Harness: Roof wiring harness



2. 24V Connector (2 nos) - For Electrical accessories
Location: Left side of the steering column
Harness: Dashboard wiring harness

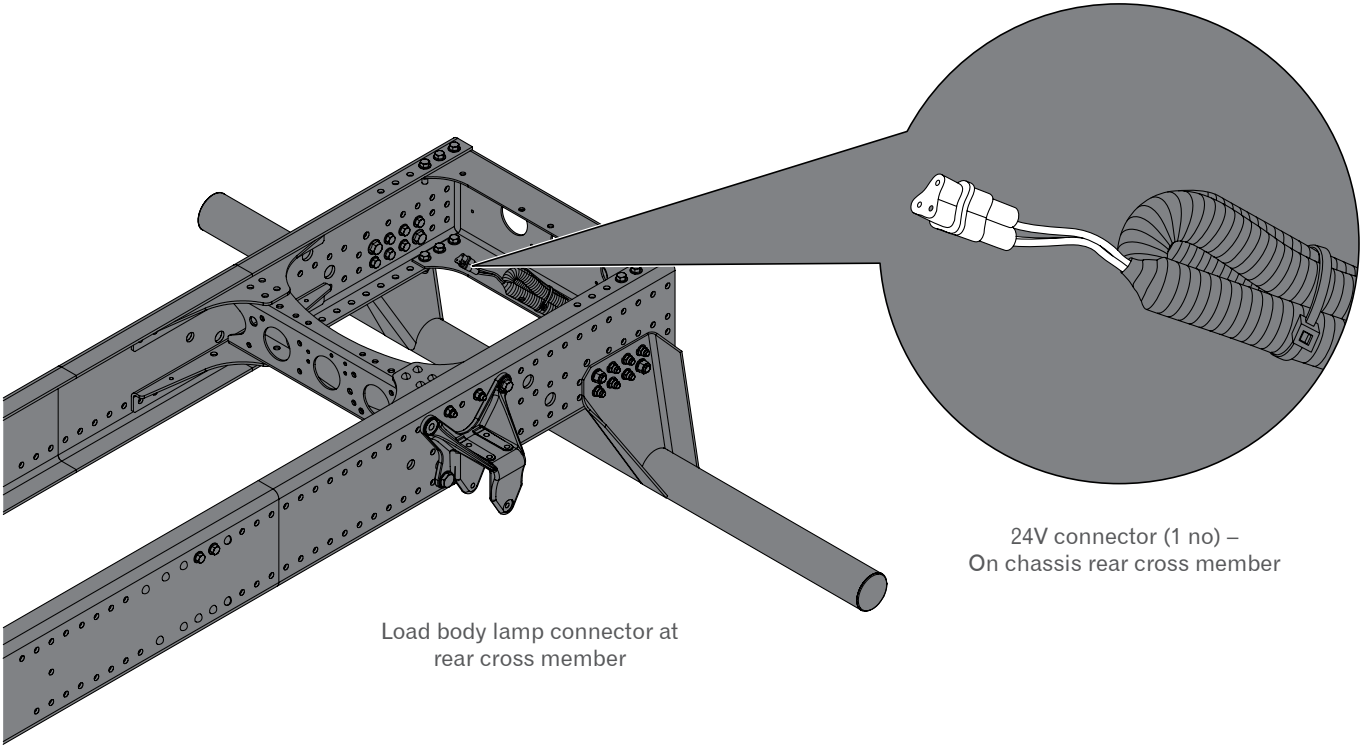


3. 24V Socket - For 24V output
Location: At the bottom of the center console.
Harness: Dashboard wiring harness

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Electrical terminal for accessories (On chassis)



24V connector (1 no) –
On chassis rear cross member

Load body lamp connector at
rear cross member

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Brake Hoses/Cables and Lines

Warning

Work carried out incorrectly on the brake hoses, cables and lines may impair their function. This may lead to the failure of components or parts relevant to safety.

- Compressed-air, fuel and gas lines, hydraulic lines and brake hoses must be covered or removed if necessary before carrying out any welding, drilling and grinding work and before working with cutting discs.
- After installing compressed-air, fuel and gas lines, hydraulic lines and brake hoses, the system must be tested for pressure loss and leaks.
- No other lines may be attached to brake hoses.
- Lines must be protected from heat by means of appropriate insulation.
- Line routing must be designed to prevent any increase in pressure loss.
- Comply with all national regulations and laws.

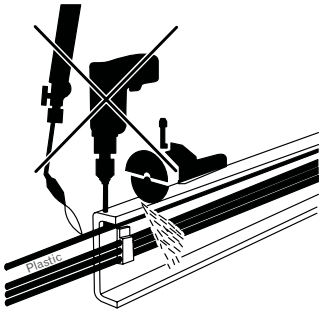


Fig: Safety for plastic lines DICV-HDT-1956

Mobile Communications Systems

If mobile communication systems (e.g. telephone, CB radio) are retrofitted, the following requirements must be fulfilled in order to avoid malfunctions developing on the vehicle at a later stage.

Equipment

- Always use equipment approved by competent authorities as per the national regulations.
- The equipment must be permanently installed.
- Operation of portable or mobile equipment inside the cab is only permitted if this equipment is connected to a permanently installed external aerial.
- The transmitter must be installed separately from all other vehicle electronics.
- Protect equipment from moisture.
- Observe the permissible operating temperature.
- Protect the equipment against severe mechanical vibrations.

Aerial (for two-way radio sets)

- The aerial must be officially licensed.

Connection and wiring

- The connection should be made only from the additional 12-volt sockets inside the cabin for auxiliary consumers. It is recommended to take connection via an additional fuse.
- Disconnect the unit from the electrical system before jump-starting.
- Cables should be wired via the shortest possible route (not looped) and twisted.
- Ensure that the system has a good earth connection to the body (aerial and equipment).
- The aerial and connecting cables between the transmitter, receiver and

https://truckmanualshub.com/

control panel must be routed separately from the vehicle wiring harness in the vicinity of the body earth.

- Make sure that the aerial cable is not kinked or crushed..

Electromagnetic Compatibility (EMC)

The different electrical consumers on board the vehicle cause electrical interference in the vehicle's electrical circuit. At BharatBenz, electronic components installed at the factory are checked for their electromagnetic compatibility in the vehicle.

When retrofitting electric or electronic systems, they must be tested for electromagnetic compatibility and this must be documented.

The equipment must have been granted type approval in accordance with AIS 004 (for India) or any applicable regulation as per the national regulations.

Welding Work

All laws governing explosive substances must be complied with the following safety measures must be observed to prevent damage to components caused by overvoltage during welding work:

- Disconnect the positive and negative terminals from the battery and cover them.
- Connect the welding-unit earth terminal directly to the part to be welded.
- Do not touch electronic component housings (e.g. control modules) and electric lines with the welding electrode or the earth contact clamp of the welding unit.
- Before welding, cover springs and air bellows to protect them from welding spatter. Do not touch springs with welding electrodes or welding tongs.
- Cover the fuel tank, natural gas and fuel system (lines, etc.) before carrying out welding work.
- Avoid welding work on inaccessible cavities in the cab.

Property Damage

Do not connect the arc welder earth clamp to assemblies such as the engine, gearbox or axles.

Welding work is not permitted on assemblies such as the engine, gearbox, axles, etc.

Additional Information

All welding should comply as per the AIS 093 (Rev.1):2015 standard.

Corrosion Protection Measures

General

In order to preserve the durability and quality standard of the vehicle, measures must be taken to protect it against corrosion when the vehicle is modified and after installing bodies and fittings.

- When chassis paint is damaged during body installation, proper primer and top coat to be used for repair

Additional Information

Ensure proper cleaning of surface before primer coating.

https://truckmanualshub.com/

Information on the design, execution of work and the requirements of the materials and components to be used with regard to corrosion protection is listed below.

Information provided in this material may be used for body/equipment fabrication also. BharatBenz recommends to follow appropriate procedures to protect body/ equipment from corrosion and to ensure that the base vehicle is not affected due the corrosion of body/ equipment.

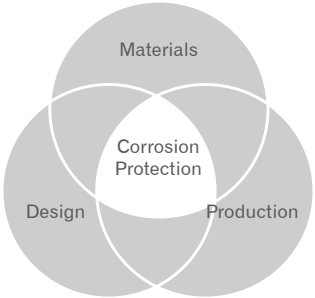


Fig: Corrosion protection DICV-HDT-1957

Damage to components

If components are damaged during disassembly (scratches, scuff marks), they must be professionally repaired. This applies especially for drilled holes and openings. Two-component epoxy primers are particularly suitable for repair work.

Cutting of components

When cutting and grinding work is carried out, the adjacent painted components must be protected against flying sparks and shavings. Grinding dust and shavings must be carefully removed because these contaminants can spread corrosion.

Corrosion protection on fittings

All fittings must receive adequate anti-corrosion priming prior to installation. In addition to galvanising, cataphoretic dip-priming and zinc-rich paint in sufficient coatings have proved satisfactory for this purpose.

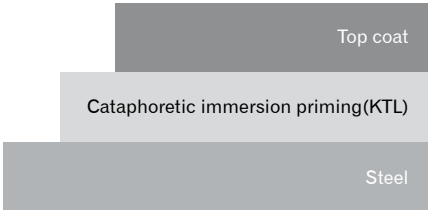


Fig: Body paint work DICV-HDT-1958

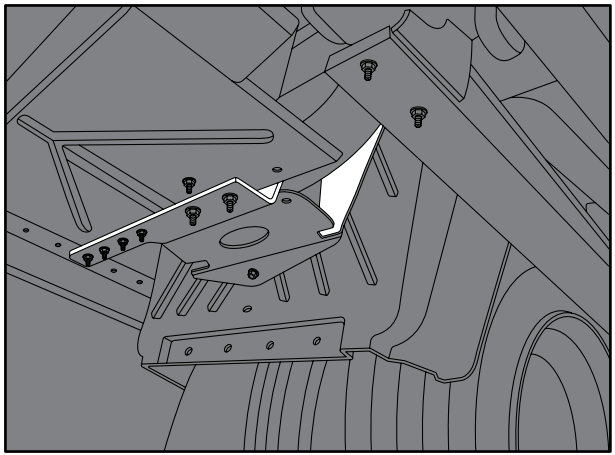
Additional Information

All paint coat corrosion protection should meet as per JIS DO202 standard & as per AIS 093 (Rev.1):2015 standard.

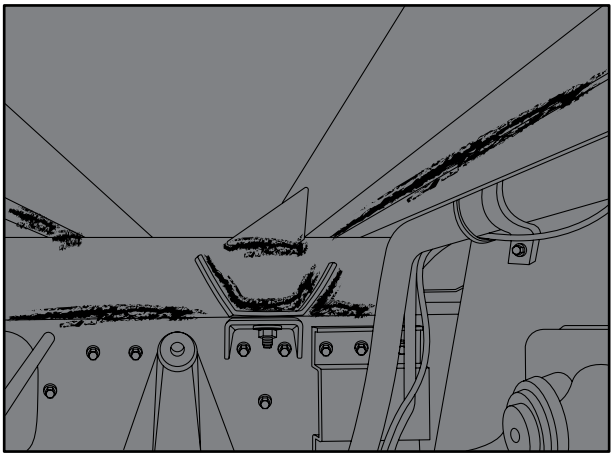
https://truckmanualshub.com/

Examples of inferior corrosion protection

✕ Incorrect



Top coat missing, parts are merely primed.



Corroded base metal used, top coat without surface preparation & primer application.

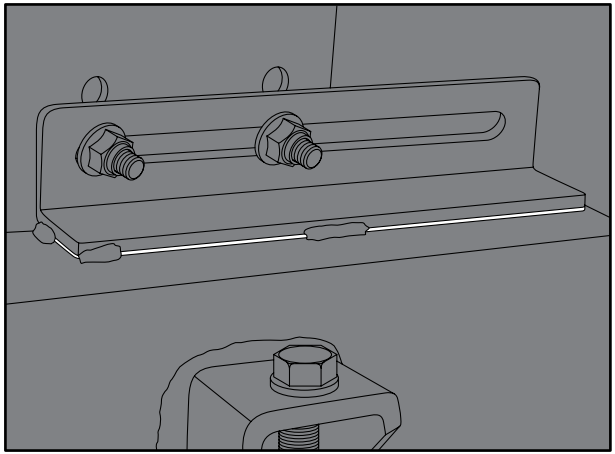
DICV-HDT-2068

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

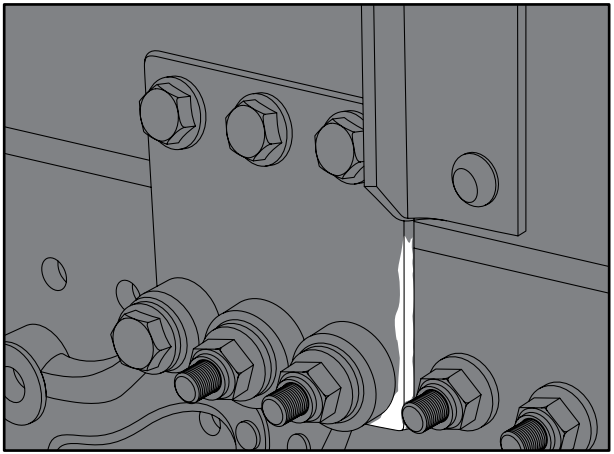
https://truckmanualshub.com/

Examples of inferior corrosion protection

✕ Incorrect



Gaps cannot be reached for surface coating.



Parts are merely coated with top coat, primer is missing.

DICV-HDT-2069

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Corrosion Prevention in Welding Work

In order to avoid crevice corrosion at weld seams, the welds should be made in accordance with the examples shown.

Preparation

The welding area must be free from corrosion, grease, dirt or similar contamination. If painted surfaces are to be welded, the paint coat must first be removed by grinding or chemical stripping. If this is not done, the paint will burn and the residues can impair corrosion resistance.

After welding work

- Remove drilling shavings.
- Deburr sharp edges.
- Remove any burned paint and thoroughly prepare surfaces for painting.
- Prime and paint all unprotected parts.
- Preserve cavities with wax preservative.
- Carry out corrosion protection measures on the underbody and frame parts.

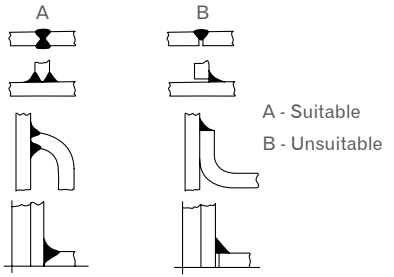


Fig: Suitable and unsuitable weld seams

Additional Information

Plug and slot welds, particularly on horizontal surfaces, should be avoided due to the risk of corrosion. If they are unavoidable, these welds must receive additional preservation. Furthermore, avoid designs which allow moisture to accumulate. These must be fitted with additional drainage holes or gaps in the weld seam.

Bolted Connections

Finish-painted components

If painted parts are to be bolted together, the coats of paint must not cause settling in the bolted connections. In such cases, hard, high-density coatings such as cataphoretic immersion primers or powder coatings should be used. The coat thicknesses should be kept as small as possible (cataphoretic immersion primer approx. 20μm, powder coatings approx. 100 μm).

- If using bolts with serrations under the head, an additional top coat must be applied to touch up any paint damage.
- The use of hexagon socket or Torx socket bolts in a horizontal position is to be avoided, as moisture can accumulate in the bolt head under certain conditions, leading to corrosion.

Fasteners

In areas susceptible to corrosion always use bolts, nuts, etc. with higher corrosion resistance regardless of the required strength class.

https://truckmanualshub.com/

Preventing contact corrosion

Direct contact between materials with different electrode potentials can lead to corrosion of the less noble material when exposed to moisture and salt ions.

When selecting materials, avoid the following combinations:

- Chrome/nickel-steel with aluminium
- Chrome/nickel-steel with zinc-coated steel

Insulation by coating

Contact corrosion can be prevented by using insulation such as washers, sleeves or bushings. Even in this case, however, the connecting points must not be persistently exposed to moisture.

Vehicle cleaning and care

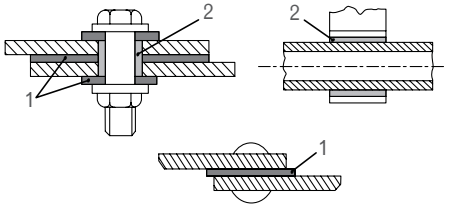
When the vehicle is handed over to the body manufacturer, it must immediately be cleaned of salt and dirt. If it is to be stored for some time, the vehicle must be preserved.

During modification it must be ensured that load bearing components are additionally protected against aggressive chemicals and environmental influences. If the vehicle comes into contact with chemicals or salts (e.g. snow-clearing operations), it must be cleaned thoroughly at regular intervals.

Property Damage

A conductive connection occurs if two different metals are brought into contact with each other through an electrolyte (e.g. air humidity). This causes electrochemical corrosion and the less base of the two metals is damaged. The further apart the two metals are in the electrochemical potential series, the more intense electrochemical corrosion becomes.

For this reason, electrochemical corrosion must be prevented by insulation or by treating the components accordingly, or it can be minimized by selecting suitable materials



1 - Insulating Washer
2 - Insulating Sleeve

DICV-HDT-1960

Painting Work

Environmental Note

Paints and lacquers are harmful to health and to the environment if they are not handled correctly. Dispose of paints and lacquers in an environmentally responsible manner.

Mask the following areas before painting:

- Sealing surfaces
- Windows
- Contact areas between the wheels and wheel hubs
- Contact areas for wheel nuts
- Breathers on gearboxes, axles, etc. Door locks

Property Damage

Do not exceed a temperature of 80°C for drying the paint.

https://truckmanualshub.com/

Engine

A warning buzzer is installed in the cab within the hearing range of the driver.

The buzzer serves as an acoustic warning when e.g.:

- The maximum permissible engine speed is exceeded.
- The maximum permissible coolant temperature is exceeded.
- The coolant level is too low.
- The oil level or oil pressure in the engine is too low.

Property Damage

When the warning buzzer sounds, the operating safety of the vehicle is in danger. Switch OFF the engine immediately (taking into account the traffic situation) and ascertain the cause.

If cranes are operated from outside the cab (e.g. loading crane), an additional visual warning system must be installed in the vicinity of the controls

Leaf Springs

Parabolic springs

- Damaged parabolic springs must be completely replaced.
- Individual spring leaves may not be renewed.
- Only use spring leaves which have been tested and approved for the vehicle model in question. Reinforcement by installing additional spring leaves is not permitted.
- Do not damage the surface or the corrosion protection of the spring leaves when carrying out installation work.
- Before carrying out welding work, cover the spring leaves to protect them against welding spatter. Do not touch springs with welding electrodes or welding tongs.

Tilting the Cab

Warning

Before tilting the cab, please make sure that you read the “Tilting the cab” section ▸ **DRIVING AND OPERATION**. You could otherwise fail to recognise dangers, which could result in injury to yourself or others.

Towing and Tow- Starting

Warning

Before towing or tow-starting, please make sure that you read the “Towing” section ▸ **DRIVING AND OPERATION**. You could otherwise fail to recognise dangers and cause of an accident, which could result in injury to yourself or others.

https://truckmanualshub.com/

Property Damage

Failure to observe the instructions in this Operator's Manual can result in damage to the vehicle.

Risk of Fire

Warning

Work on live electrical lines carries a risk of short circuit. Before starting work on the electri.cal system, disconnect the on-board electrical system from the power source, e.g. battery. With all bodies make sure that neither flammable objects nor flammable liquids can come into contact with hot assemblies (including through leakages in the hydraulic system) such as the engine, gearbox, exhaust system, turbocharger, etc.

Warning

Appropriate caps, seals and covers must be installed on the body in order to avoid the risk of fire

Storing and Handing Over the Vehicle

Storage

To prevent any damage while vehicles are in storage, BharatBenz recommends that they be serviced and stored in accordance with the manufacturer's specifications (Refer ▸ **BODY BUILDING GUIDELINES** to the maintenance and repairs)

Handover

To prevent damage to the vehicle or to repair any existing damage, BharatBenz recommends that the vehicle be subjected to a full function check and a complete visual inspection before it is handed over (Refer ▸ **BODY BUILDING GUIDELINES** to the maintenance and repairs)

Modification to the Basic Vehicle

Warning

Do not modify any bolted connections that are relevant to safety, e.g. that are required for wheel alignment, steering or braking functions. When unfastening bolted connections make sure that, when work is complete, the connection again corresponds with the original condition. Welding work on the chassis/body may only be carried out by trained personnel. The body, the attached or installed equipment and any modifications must comply with the applicable laws and directives as well as work safety or accident prevention regulations, safety rules and accident insurer leaflets.

https://truckmanualshub.com/

Additional Information

Further information on bolted and welded connections can be found in “Planning of bodies” and “Damage prevention” ▸ **BODY BUILDING GUIDELINES**

Chassis Frame Extension and Wheelbase Modification

Chassis frame extension and wheelbase modifications on BharatBenz chassis are not permitted. Incase of violation, Daimler India Commercial Vehicles Pvt. Ltd., provides no guarantee for any consequences.

Property Damage

Modification of wheelbase on frame overhang could lead to violation of national regulations.

Please ensure that no national regulations are violated at any case.

Drilling Work on the Vehicle Frame

Property Damage

Drilling work in the chassis frame is not permitted on BharatBenz chassis. Incase of violation, Daimler India Commercial Vehicles Pvt. Ltd., provides no guarantee for any consequences.

Welding Work on the Vehicle Frame

Property Damage

Welding work on the frame is not permitted.

Additional Information

All the modification should comply as per the AIS 093 (Rev.1):2015 standard.

Frame Modifications

Chassis frame extension and wheel.base modifications on BharatBenz chassis are not permitted. Incase of violation, Daimler India Commercial Vehicles Pvt. Ltd., provides no guarantee for any consequences.

Property Damage

Any frame modification, other than reduction of frame overhang, is not permitted. Reduction of frame overhang shall be done only after consulting responsible department (Refer ▸ **BODY BUILDING GUIDELINES** to the contact details for technical support)

https://truckmanualshub.com/

Additional Information

All the modification should comply as per the AIS 093 (Rev.1):2015 standard.

Mounting of Implements and Auxiliary Components

Warning

The use of parts, assemblies or conversion parts and accessories which have not been approved may jeopardise the safety of the vehicle. Before installing any attachments, special-purpose bodies, equipment or carrying out any modifications to the basic vehicle and/or its assemblies, you must read the relevant sections of the Vehicle Instruction Manual, as well as the operating and assembly instructions issued by the manufacturer of the accessories and items of optional equipment. You could otherwise fail to recognise dangers, which could result in injury to yourself or others. Official acceptance by public testing bodies or official approval does not rule out safety hazards.

Warning

All national laws, directives and registration requirements must be complied.

Attachment to the Chassis Frame

- BharatBenz recommends the use of flange head bolts and nuts complying with MBN standard (MBN) 10105 and 13023, strength class 10.9, pitch 1.5 mm, and self-locking nuts.
- (Refer .BODY BUILDING GUIDELINES to bolted connections)
- Use existing holes.
- Use the number of bolts appropriate to the load.

Mounting at side

- Install the bracket and assembly near a cross member. Fitting additional cross members is not permitted.
- Fit the reinforcement plate to the inside of the frame web.
- No load may be applied to the centre of the web of the longitudinal member (diaphragm effect). If this is unavoidable, make sure that there is a large area of support on both sides of the web.

Wheel Chocks

Mounting

- In a suitable bracket so that they cannot rattle.
- Secured to prevent loss.
- Ensure good accessibility.

Side Underride Guards

According to Central Motor Vehicle Rules, a side underride guard is stipulated for vehicles. Exceptions to this regulation are semitrailer tractor vehicles, machines and special-purpose vehicles whose purpose cannot be fulfilled if side underride guards are fitted.

- The function and accessibility of all equipment on the vehicle must not be impaired.
- The underride guards must extend continuously from the front to the rear wherever possible.
- All national regulations must be fulfilled.

https://truckmanualshub.com/

- Follow the installation dimensions provided .

▸ CMVRNORMS

Compressor Mounting

Arrange compressor brackets in such a way that the load application covers a large area on the chassis frame; use a pressure distribution plate if necessary.

- Do not attach the compressor brackets in the middle of the longitudinal body member web (diaphragm effect).
- The reinforcing bracket must have a minimum side measurement of 80 mm on the lower frame flange.

BharatBenz recommends the use of BSK 46 (min. St 52) material.

For compressors with a weight > 50 kg, reinforcement measures are required, depending on the installation position:

Variant 1

Compressor bracket lies near a vehicle cross member (i.e. the compressor bracket is bolted to the cross member gusset).

Additional Information

Adjust the material thickness of the semitrailer bracket.

Rigid Truck

No measures necessary

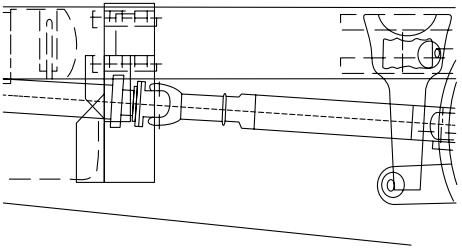


Fig: Compressor mounting on cross member DICV-HDT-1965

Variant2

Only part of the compressor bracket lies near a vehicle cross member (i.e. the compressor bracket can only be partly bolted to the cross member gusset).

Rigid truck:

Reinforcing brackets with a material thickness of at least 8 mm must be installed both above and below on the longitudinal frame member, and extending at least 300 mm beyond the compressor bracket.

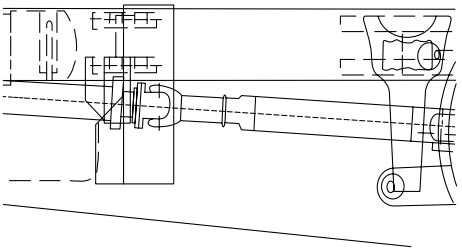


Fig: Compressor mounting near cross member DICV-HDT-1966

https://truckmanualshub.com/

Variant 3

Compressor bracket lies outside the gusset of the vehicle cross member.

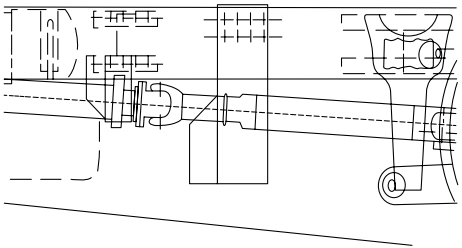


Fig: Compressor mounting away from cross member DICV-HDT-1967

Rigid truck

For torque support, install an additional standard cross member or as an alternative, 2 vertically upright panels, connected by an L bracket to the longitudinal body member.

Material thickness: at least 8 mm
Material: BSK 46

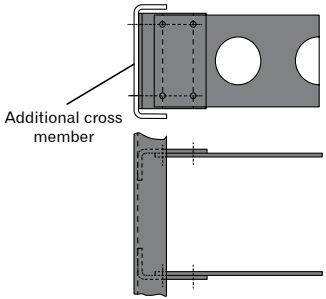
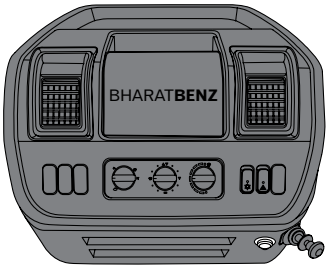


Fig: Additional cross member for compressor mounting DICV-HDT-1968

Power Supply for Auxiliary Consumers

- Sockets provided at appropriate positions for installing marker lamps on the body.
- 24Vsocketsprovidedinthe cabin shall be used for power supply for auxiliary consumers.
- For any additional requirements, contact responsible department.



DICV-HDT-19769

Property Damage

Ensure to properly re-fit all sealing plugs in the cabin whenever removed. This will help to avoid water ingress and short circuit.

https://truckmanualshub.com/

Power Take-Off

Power take-off versions available from the factory:

- Gearbox-driven power take-off
- Engine power take-off at the front

Consider the following when retrofitting power take-off:

- After installation, fill the gearbox with oil up to the lower edge of the filler opening.
- Allow the engine to run for approx. 2 minutes and engage the power take-off.
- Check the oil level again and correct if necessary.

Installation of a non BharatBenz power take-off must be approved by the department responsible (Refer ▸ **BODYBUILDING GUIDELINES** to the contact details for technical support). The operational reliability of the gearbox cannot be guaranteed if unsuitable power take.offs are used.

- The power take-off version and choice of ratio both depend on the power output and speed of the equipment to be driven.
- Gearbox-driven power take-off can only be engaged and disengaged with the vehicle stationary.
- Data on the maximum transferable torque (Nm) for the individual power take-off are guide values for operation without shock and vibration.
- The data was based on a highly durable gearing design and a calculated service life at maximum output. The additional mass forces of the driven PTO assemblies are not taken into account.
- Select the power take-off ratio such that a minimum engine speed of 650 to 800 rpm is maintained with the power take-off under load. The power output should be within the range of the maximum engine torque.
- Exposed propeller shafts or pulleys must be covered.
- Belts or chain drives must not be fitted to the drive shaft or flange of a power take-off. In special cases where absolutely necessary, submit drawings and required data for approval (Refer ▸ **BODY BUILDING GUIDELINES** to the contact details for technical support).

Property Damage

Failure to observe these instructions could result in damage to the gearbox.

Gearbox-Driven Power Take-Off

The power take-off is driven by the gearbox countershaft:

• Refer ▸ **INSTRUMENT AND CONTROLS** for notes on engaging and disengaging the power take-off.

- The power take-off is connected to the manual gearbox oil circuit.
- The maximum permissible weight moment must not be exceeded if a hydraulic pump is directly connected.

Power take-off without an oil cooler are only approved for brief operation at full power.

Brief operation:

- Maximum running time approx. 30 minutes
- Subsequent cooling OFF period at least 30 minutes

https://truckmanualshub.com/

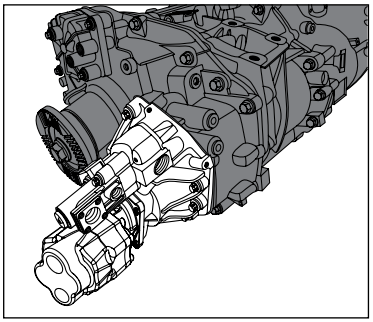


Fig: PTO on gearbox DICV-HDT-19701

Engine Power Take-Off at the Rear (Only for Model Designation (2xx)

An engine power take-off at the rear is available for vehicles with series 900 engines. The engine power take-off cannot be engaged or disengaged. Direction of rotation identical to that of the engine.

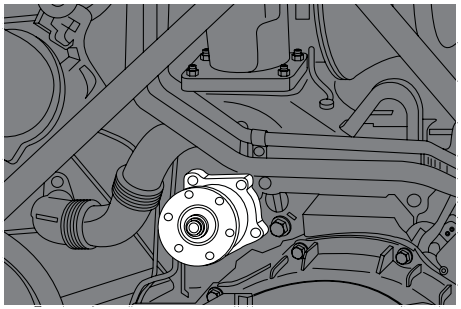
Gearbox ratio: 1.071 x engine speed

A certificate of non-objection is required from the department responsible when retrofitting assemblies (Refer ▸ **BODY BUILDING GUIDELINES** to the contact details for technical support).

Do not exceed the maximum permissible torque. Provide overload protection (e.g. pressure relief control for hydraulic pumps, and overload clutch, anti-lock protection or breakage protection for other assemblies).

Property Damage

Failure to observe these instructions could result in damage to the major assemblies.



DICV-HDT-1971

Fig: Engine power take-off at the rear

Detail	Value
Maximum transferable torque in Nm	600
Briefly permissible excess torque (e.g. when pulling away and changing gear)	20%
Maximum moment of inertia (resilient coupling) in kgm²	0.02

The below table represents the Engine PTO fitment details.

Sl. No	Product	Specification
1	PTO Fitment	Engine
2	PTO Type	Flange
3	Engine Variant	OM926 (DE180BS6) / OM926 (DE210BS6)
4	Engine Max Torque	850 Nm / 1110 Nm
5	Min Engine Speed @ PTO Engaged	900 rpm
6	Max Engine Speed @ PTO Engaged	2700 rpm
7	PTO Ratio	1.07143
8	Max. rated PTO Torque	<= 600 Nm
9	Min. Output Speed (PTO)	643 rpm
10	Max. Output Speed (PTO)	2893 rpm
11	Rotation from Rear of transmission	Counter - clockwise
12	PTO Mount Location (Engine/Transmission)	In engine flywheel housing
13	PTO Actuation Control	Constantly actuated PTO switch is only to raise the rpm from 600 to 900

https://truckmanualshub.com/

The below table represents the Transmission PTO fitment details.

Sl. No	Product	1923C	2823R	3523R	2823C	2828C	3528C	4228R
1	PTO fitment	Transmission						
2	PTO type	Spline	Flange/ Spline		Spline	Spline	Spline	Flange/ Spline
3	Transmission	G85			G131			
4	Engine variant	OM926 (DE180BS6)				OM926 (DE210BS6)		
5	Engine max torque	850Nm				1100Nm		
6	Max engine speed @ PTO engaged	1600rpm						
7	PTO ratio	1.607			1.357			
8	Max. Rated pto torque	1302Nm			1357Nm			
9	Rotation from rear of transmission	Clockwise						
10	PTO mount location	Rear mounted						
11	PTO action	Electropneumatic						

https://truckmanualshub.com/

Rigid Drive

- The moment of inertia of the driven rotary masses (including propeller shaft) must not exceed 0.01 kgm^2.

Resilient Drive

- The original resilient coupling (code N54) must be fitted if the moment of inertia is greater than 0.01 kgm^2.
- Always fit the resilient coupling on the assembly to be driven.
- Take the length of the resilient coupling into consideration when determining the length of the propeller shaft.
- The engine speed must not fall below 1,200 rpm when the power take-off is operating at full load. If operation at lower speeds is necessary, e.g. because of noise, a lower engine speed may be acceptable if the department responsible performs the necessary tests and is satisfied with the results.

Coupling dimensions (mm)							
a Ø	b Ø	c Ø	e	f Ø	Holes	OD	Width
102	“84± 0.1”	57h8	2	M8	6	212	83

Coupling flange dimensions

Coupling dimensions (mm)						
aØ	bØ	cØ	d	e	fØ	Holes
100	84± 0.1	57h8	7	2	8.1±0.1 5	6

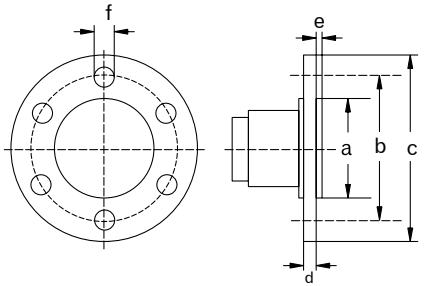


Fig: Companion flange DICV-HDT-1972

PTO Installation position

Engine	A (mm)	B (mm)
OM 926	362	128

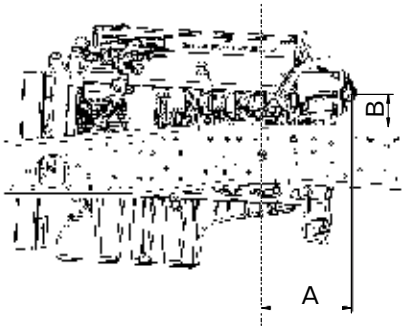


Fig: Engine power take-off output position DICV-HDT-1973

A -Centre of front axle to centre of coupling flange

B -Top edge of frame to centre of coupling flange

The centre of the engine power take-off is 162 mm from the centre of the crankshaft.

https://truckmanualshub.com/

Additional Information

All the modification should comply as per the AIS 093 (Rev.1):2015 standard.

Property Damage

Failure to observe these instructions could result in damage to the major assemblies.

Installation of Propeller Shafts

Observe the following when installing propeller shafts:

- Installation guidelines of the propeller shaft manufacturer.
- If necessary, fit several propeller shafts with intermediate bearings.
- The flanging surfaces must be completely flat.
- The angular offsets must be identical at both universal joints (ß1 = ß2). They must not be greater than 6° or less than 1°.
- Balancing plates must not be removed.
- Make sure that the marks are aligned on the propeller shafts during installation.
- Eliminate any vibrations, e.g. by optimising the propeller shaft angles.

Types of Angular Offset

Angle in one plane

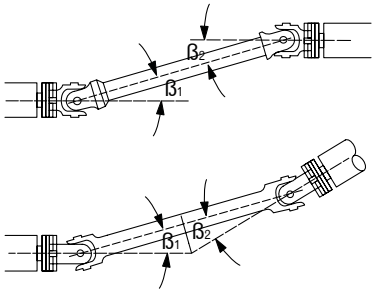


Fig: Angle in one plane DICV-HDT-1974

Fig: Angle in two plane

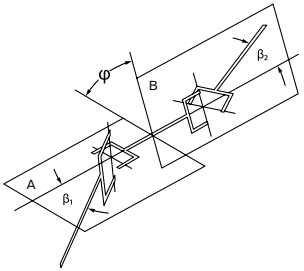


Fig: Angle in two plane DICV-HDT-1975

Cab Roof Load Carrier

BharatBenz cab is reinforced for adding a cab roof load carrier that could be used for certain specific purposes. Necessary mounting provisions are provided as standard fitment on all cabs.

DICV standardized design concept and fitment procedure is available with BharatBenz Authorised dealerships. It is strongly recommended to follow the standard design and procedure provided by DICV and use the BharatBenz standard accessory only. Incase of violation, Daimler India Commercial Vehicles Pvt. Ltd., provides no guarantee for any consequences.

Please ensure installation of roof load carrier complies with all local regulations as applicable.

https://truckmanualshub.com/

Additional Information

All the luggage carrier/storage space should comply as per AIS 093 (Rev.1):2015 standard.

Construction of Bodies

Warning

Do not modify any bolted connections that are relevant to safety, e.g. that are required for wheel alignment, steering or braking functions. Appropriate caps, seals and covers must be installed on the body in order to avoid the risk of fire.

Warning

When unfastening bolted connections make sure that, when work is complete, the connection again corresponds with the original condition. Welding work on the chassis/body may only be carried out by trained personnel. The body, attached or installed equipment and any modifications must comply with the applicable laws and directives as well as workplace safety or accident prevention regulations, safety rules and accident insurer leaflets. With all bodies make sure that neither flammable objects nor flammable liquids can come into contact with hot assemblies (including through leakages in the hydraulic system) such as the engine, gearbox, exhaust system, turbocharger, etc.

Property Damage

Bodies on which the gearbox can be expected to be exposed to high levels of water, e.g. cleaning water (flushing, overflowing or similar), require an effective cover over the gearbox (gearbox guard) which will prevent abrupt cooling as well as water ingestion via the gearbox breather.

Additional Information

Further information on bolted and welded connections can be found in “Planning of bodies” and “Damage prevention” ▸ **BODY BUILDING GUIDELINES**

https://truckmanualshub.com/

Body to be secured properly against all forces for safe vehicle handling and operation



DICV-HDT-2044

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Mounting Frame (Sub Frame)

All bodies require a mounting frame or a substructure that assumes the function of a mounting frame to ensure a reliable connection between the chassis and the body (except for self-supporting bodies and mounting frames acting as floor assemblies).

- The mounting frame longitudinal members must lie level on the upper flanges of the chassis frame and follow the course of the chassis frame.
- Position mounting frame cross members above the chassis frame cross member.
- For the longitudinal members, use flanged U-sections or commercially available U-sections for vehicle construction (not rolled steel sections).
- The dimensions of the longitudinal members are the function of the moment of resistance (Wx) required for the body and the chassis. (Refer ▸ **BODYBUILDING GUIDELINES** to the section dimensions).
- The specified moments of resistance and section dimensions refer to longitudinal frame members subjected to identical loads on both sides.
- Mounting frame long member should be flat and follow the chassis frame.
- Flexible parts like packing material not advisable between chassis frame and sub frame.

Property Damage

If more than one body is mounted on the same chassis (e.g. platform and loading tailgate), the larger of the specified moments of resistance must be taken to determine the mounting frame.

Mounting Frame Material

Material quality of specified mounting frame made of:

- Mounting frame with U-bolt or bracket mounting (non-positive) = St 52 or S 380 MC.
- Mounting frame with rigid mounting (positive locking) via shackles (butt strap) = BSK 46.
- If high-strength steels (e.g. N-A.XTRA) are used for the mounting frames, their strength must be at least equivalent to that of steel mounting frames. The mounting must be non-positive.

Material	Tensile Strength (N/mm2)	Yield Strength (N/mm2)
S 380 MC (St 52.3)	>450	380
BSK 46	>600	460

Property Damage

Wooden runner between longitudinal frame members and mounting frame are not permitted.

https://truckmanualshub.com/

Property Damage

Wooden runner between longitudinal frame members and mounting frame are not permitted.

In bodies made of hardwood, the mounting runner of the auxiliary frame may be used of the same quality wood. However must be strengthened properly, with steel reinforcements to ensure the necessary structural strength.

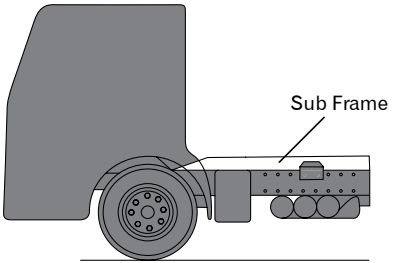
Aluminium platform bodies:

- Observe the instructions given by the aluminium manufacturer.
- The longitudinal members, plank floor, floor panels and cross members must form one self-supporting unit.

BharatBenz recommends that you use the materials described or superior ones.

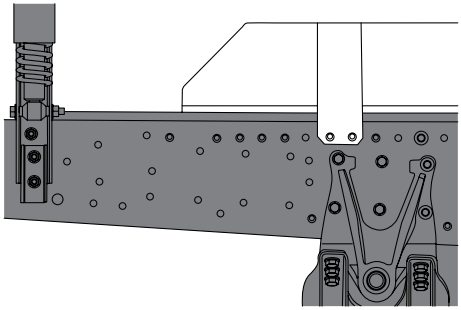
Additional Information

Further information on bolted and welded connections can be found in "Planning of bodies" and "Damage prevention" ▸ **BODY BUILDING GUIDELINES**



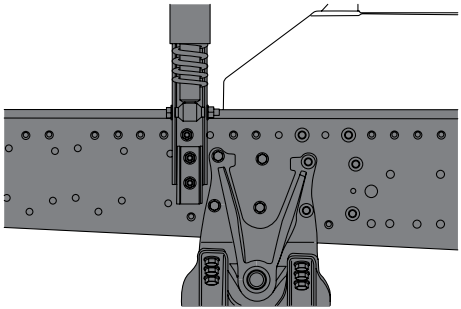
DICV-HDT-1976

Fig: Mounting frame - Begin forward (ahead of front spring rear mounting)



DICV-HDT-1977

Fig: Mounting frame starting position (HDT Day Cab)



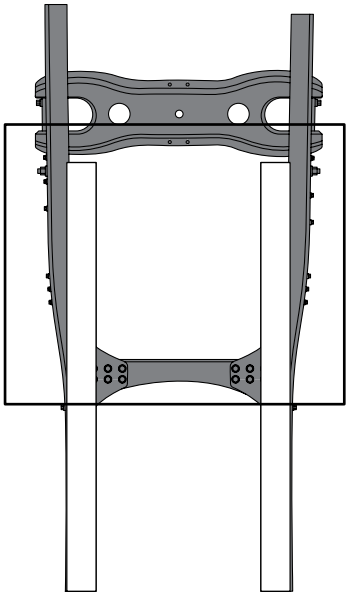
DICV-HDT-1978

Fig: Mounting frame starting position (HDT Sleeper Cab)

https://truckmanualshub.com/

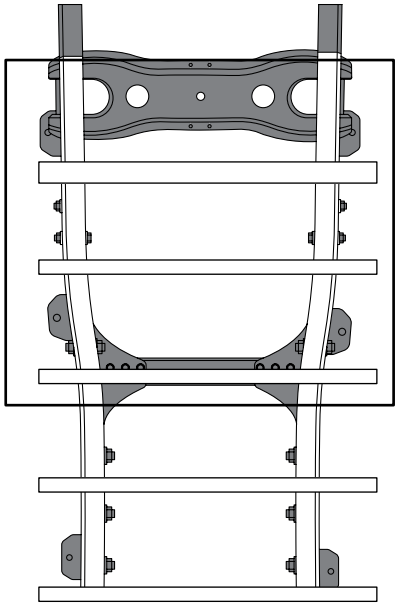
Mounting Frame - Follow the chassis frame profile and continuous

✕ Incorrect



Line chafes against / lies on thread of a bolt.

✓ Correct



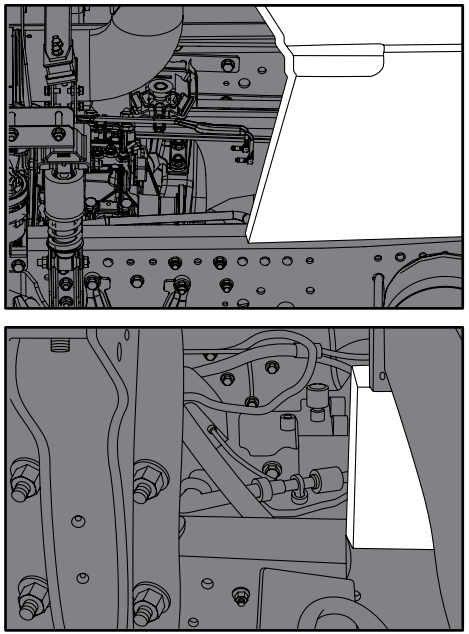
In a joggled frame, sub frame to follow the joggle profile exactly

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

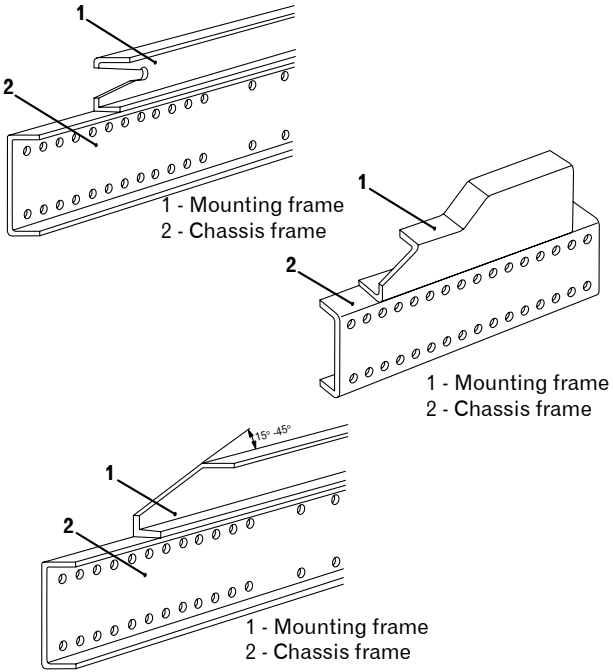
Mounting Frame - Follow the chassis frame profile and continuous

✕ Incorrect



Line chafes against / lies on thread of a bolt.

✔ Correct



Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

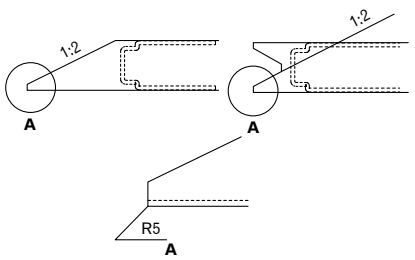
- Use flanged C-Sections or commercially available C-sections
- Ensure proper moment of resistance being offered by sub frame (for body & chassis)
- Sub frame should have same thickness and flange size as of chassis frame
- Material quality of sub frame:
- For non positive mounting (with brackets): St52
- For positive mounting (with butt straps): BSK 46

Continuous mounting frames are required for:

- Bodies with a high centre of gravity
- High point loading
- One-sided loading
- Superstructures extending over the cab

For example, for: tipper bodies, glass transport frame bodies, towing bodies, loading cranes, hinged booms, loading tailgates, etc. The longitudinal body members must extend as far forward as possible, but at the very least beyond the rear front spring brackets.

Radius of 5mm should be added on the sub frame bottom mounted over chassis frame (as mentioned below).

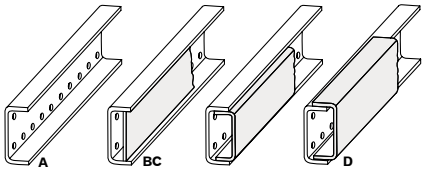


DICV-HDT-2040

If very high longitudinal members are required or if the height of the frame needs to be small, the U-section can be designed as follows if the connections are non positive:

- closed OFF like a box
- nested (inside overlapping U-section), or
- nested with an overlapping U-section

This increases the moment of resistance and also the torsional stability. Ensure a good transition from a closed longitudinal body member to an open U-section.



A- Open U-Section(Wx,see section dimension diagram)
B- Closed U-Section(Wx,see section dimension diagram x 1.75)
C- Inside overlapping section(Wx,see section dimension diagram x 1.75)
D- Overlapping U-section(Wx,see section dimension diagram x 1.9)

Fig: Mounting frame U-section closing examples DICV-HDT-1983

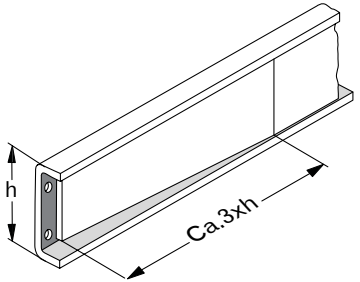
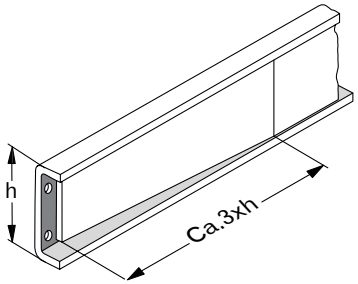
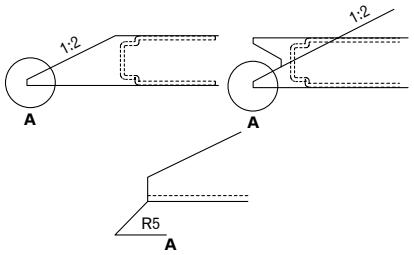


Fig: Mounting frame U-section closing examples DICV-HDT-1983

https://truckmanualshub.com/



DICV-HDT-1984



DICV-HDT-2040

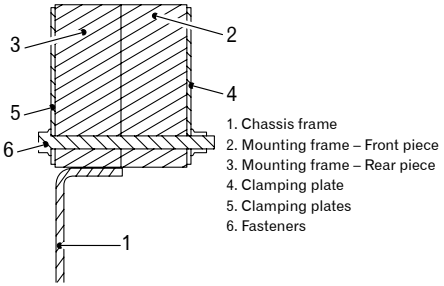


Fig: Wooden long member bolting example

DICV-HDT-1988

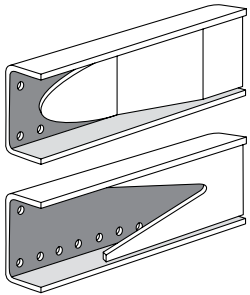


Fig: Examples of transition from closed to open U-section

DICV-HDT-1985

Radius of 5mm should be added on the sub frame bottom mounted over chassis frame (as mentioned below)

Wooden longitudinal body members

While using hard wood for longitudinal body members, ensure that the runner follows the chassis frame profile. Adopt suitable design for the runner at the joggle area (Only for Model Designation (2xx).

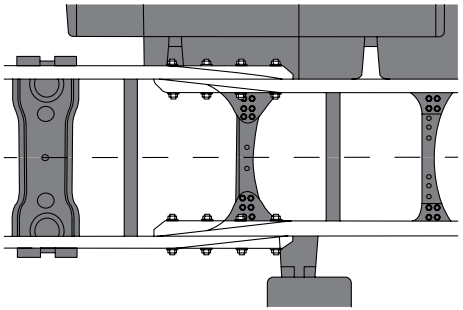
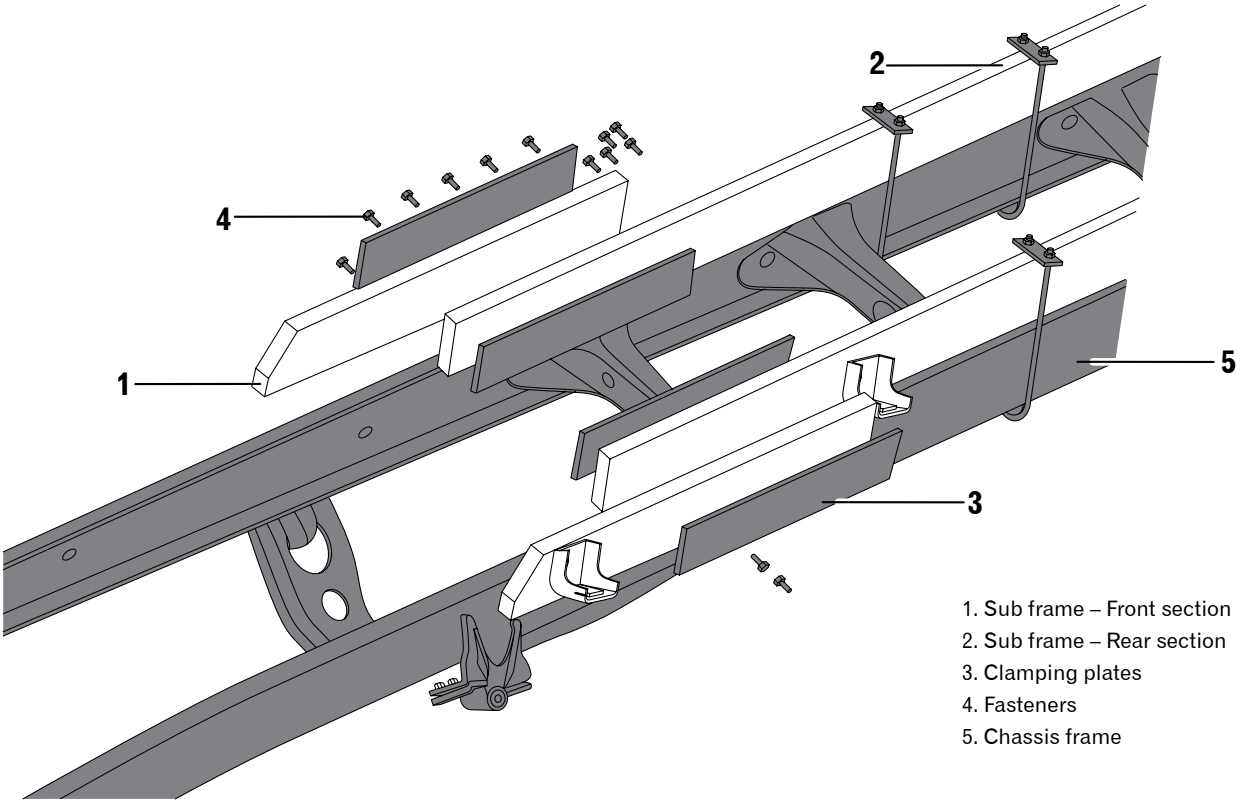


Fig: Example for wooden long member in mounting frame

DICV-HDT-1987

Below illustration represents the wooden long member connection.



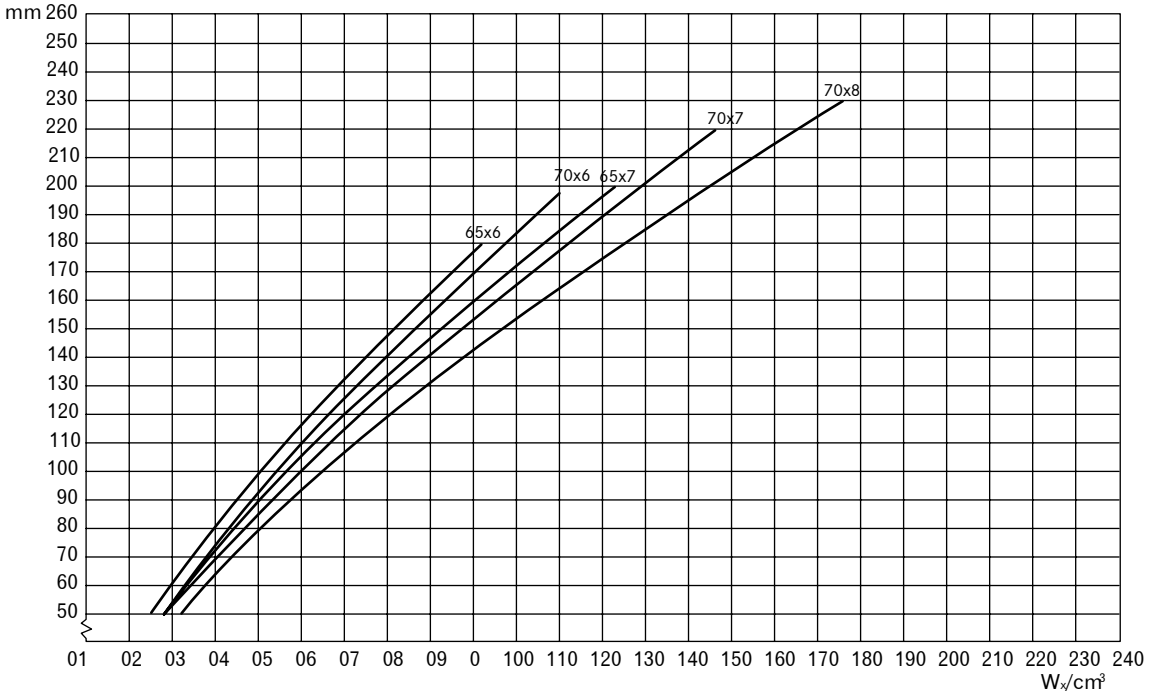
1. Sub frame – Front section
2. Sub frame – Rear section
3. Clamping plates
4. Fasteners
5. Chassis frame

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Section Dimensions

The mounting frame and the chassis frame should have the same material thickness and flange width. Below illustration represents the longitudinal member section dimensions graph.



https://truckmanualshub.com/

Additional Information

All change should comply as per the AIS 093 (Rev.1):2015 standard.

Mounting Frame Attachment

Mounting frame attachment to be designed as required depending on the chassis model and intended body as well as the conditions of use of the vehicle. Proper attachment is critical to the performance of the vehicle well as to the durability of the structure and chassis frame. Plan a sufficient number of mountings to absorb the braking and lateral forces. The concept shown in this directive are representative only. Detailed design based on the concept is to be carried out by body builder.

Correct mounting is decisive factor for:

- Vehicle handling and operational safety.
- The service life of chassis frame and body.

Friction Lock Connection

While using hard wood for longitudinal body members, ensure that the runner follows the chassis frame profile. Adopt suitable design for the runner at the joggle area (Only for Model Designation (2xx).

The longitudinal members must be fixed in both longitudinal and lateral directions for a friction locking connection.

Cross attachment:

- Use guide plates of sufficient size.
- There must be no gap between the guide plates and mounting frame.
- Install guide plates in the area of the first to third mounting brackets
- The guide plate is bolted to the vehicle frame or mounting frame on one side. When bolting to the mounting frame, a wear pad must be affixed to the opposite surface on the vehicle frame in order to prevent surface damage.

Friction lock connection (Non.positive connection bracket mounting):

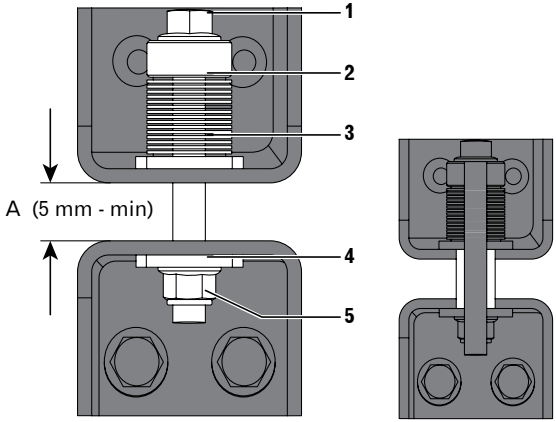
- It may be possible to move the mounting frame longitudinal member in relation to the chassis longitudinal member.
- A stress calculation must be carried out for each longitudinal member separately.
- A bending moment must be distributed according to the moments of inertia.
- The forward mounting points must not be rigidly connected.
- The mountings must be based on the recommended designs (illustrations) shown below.
- Do not twist mounting frame while tightening the bolts.
- At the rear end of the frame, the mounting frame must be positively locked (Refer positive connection for details).
- Limited movement between chassis frame and sub frame is possible.
- First load body mounting should be provided within 250mm of mounting frame start.

https://truckmanualshub.com/

Friction lock connection (Non-positive connection bracket mounting)

✕ Incorrect

Recommended mounting

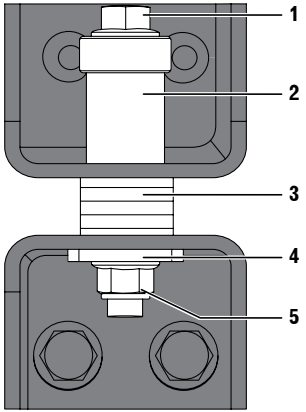


1. Flanged bolt – M14 x 1.5
2. Metal sleeve
3. Plate spring (Belleville)– 16 nos or elastic element
4. Spacer plate (5mm thick)
5. Flanged nut – M14 x 1.5

- Insert a spacer (A – 1 mm) in the gap
- Torque tighten to 150 ± 30 Nm
- Loosen 3 turns
- Remove spacer

✓ Correct

Alternative mounting



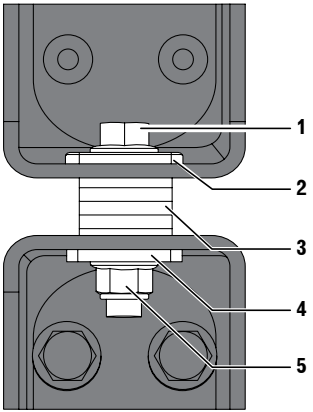
1. Flanged bolt – M14 x 1.5
2. Metal spacer tube
3. Washer (Plate)
4. Spacer plate (5mm thick)
5. Flanged nut – M14 x 1.5

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

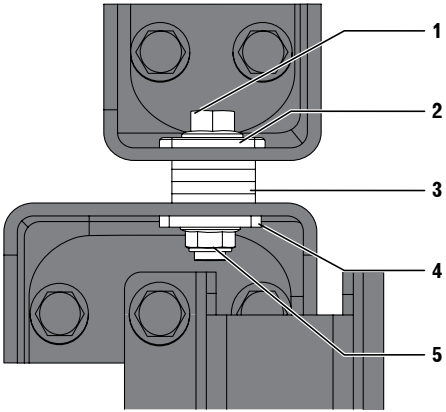
Friction lock connection (Non-positive connection bracket mounting)

✕ Incorrect



1. Flanged bolt – M14 x 1.5
2. Space plate (5mm thick)
3. Washer (Plate)
4. Spacer plate (5mm thick)
5. Flanged nut – M14 x 1.5

✓ Correct

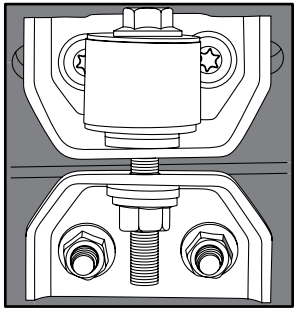


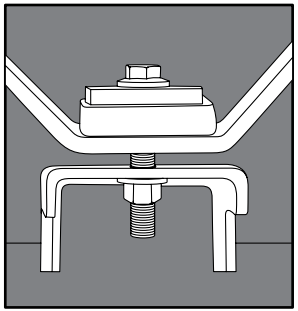
1. Flanged bolt – M14 x 1.5
2. Space plate (5mm thick)
3. Washer (Plate)
4. Spacer plate (5mm thick)
5. Flanged nut – M14 x 1.5

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

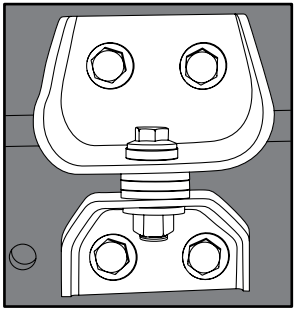
https://truckmanualshub.com/

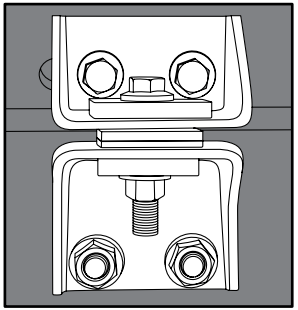
1st Mounting (Front end)

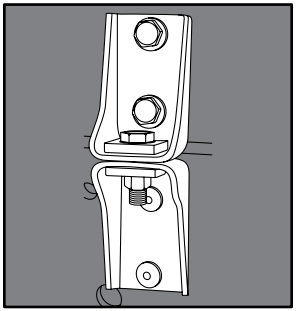


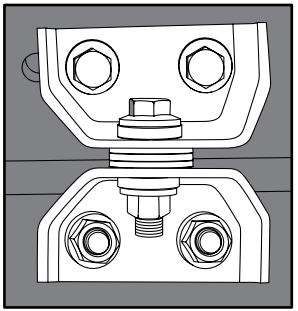


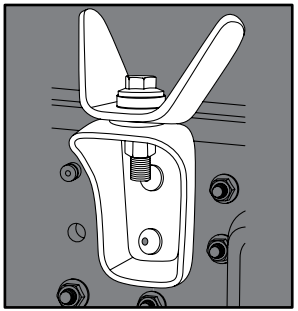
Remaining mounting points







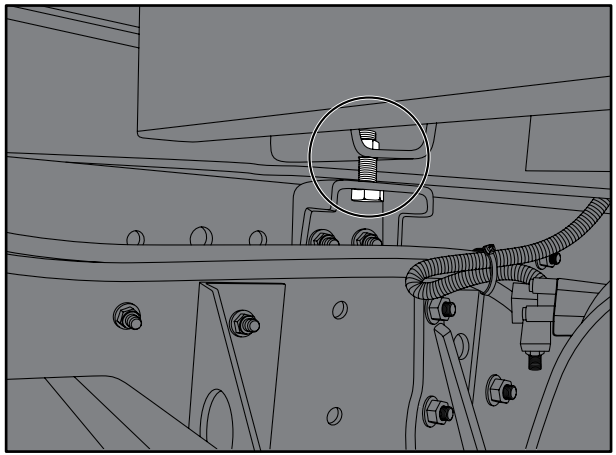


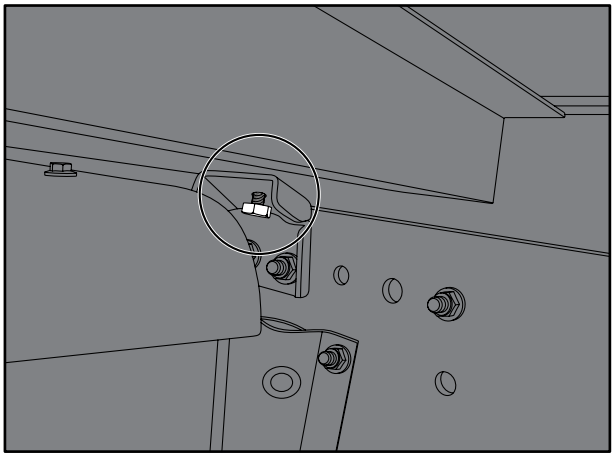


Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

✕ Incorrect





Screw without a sleeve
Bracket will be deformed / Overloaded

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

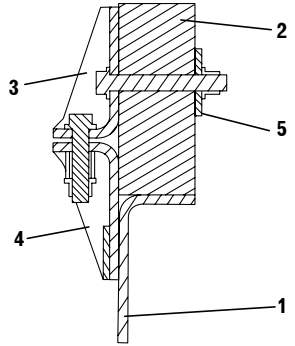
https://truckmanualshub.com/

Friction Lock Connection (Non - positive connection - U-Bolt Mounting)

This mounting system should be used preferably in the bodywork with wood and mounting frame with wood. Always use seasoned hardwood for making the mounting frame.

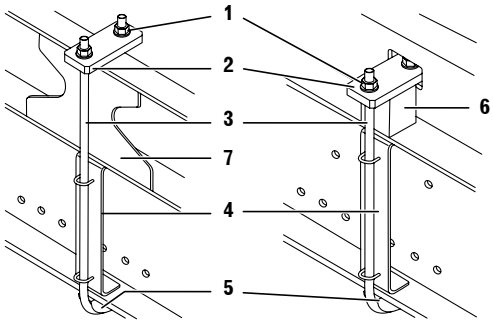
- The longitudinal members must be fixed in both longitudinal and lateral directions.
- Fixing for longitudinal direction may be done by using a bolted plate at the rear end.
- Fixing for lateral may be done with the help of guide plates in front end and area of rear axles / rear springs.
- Use U-bolts on other areas for connecting chassis frame and mounting frame.
- Use U-bolt guide made of aluminum or malleable cast iron for protection of chassis frame.
- Wherever U-bolts cannot be positioned, use bracket mounting with flexible connection.
- When bolts are used for connection with wood, use steel plates on both sides, so that fasteners do not come in direct contact with wood.
- Reinforce chassis long member with proper section to avoid local deformation of the flanges.
- The U-bolts shall not touch the chassis frame long member.
- Ensure that the U-bolts do not touch or damage any air / fuel pipes, electrical harness, leaf spring, etc.
- The U-bolts should not interfere with the brake pipe system and any other chassis components.
- Always ensure to provide internal chassis reinforcement at the location of the U bolt mounting.
- Install the first pair of U bolts at a distance of less than 250mm from the start of the subframe.
- The U bolt spacing is recommended to 600 – 800mm and in no case be more than 800mm.
- It is mandatory to use bottom guide at the location of the U bolt mounting.
- The width of the bottom guide must be longer than the flange width of the chassis long member.
- The internal chassis reinforcement must be secured so that it is not lost during day to day operations.
- Please ensure that the no part of the subframe/ U bolt/ any integration is welded to the chassis long member.
- All the components which rest on the chassis long member must be free of burrs & be rounded to a radius of atleast 2mm.

https://truckmanualshub.com/



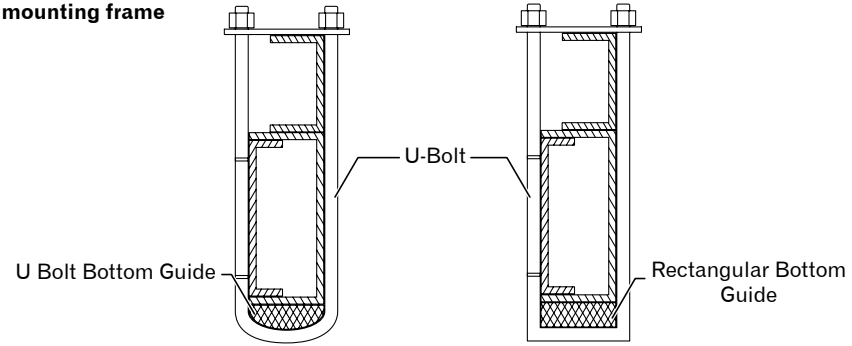
1. Chassis frame
2. Mounting frame
3. Bracket (Mounting frame)
4. Bracket (Chassis frame)
5. Back plate

Friction lock connection for wooden mounting frame



1. Flanged nut
2. Top plate
3. U-bolt
4. Frame reinforcement
5. Bottom guide
6. Seating block
7. Sub frame to be reinforced

U-bolt connection



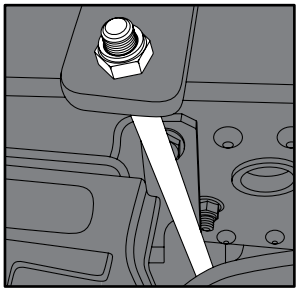
U-bolt with Bottom Guide

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

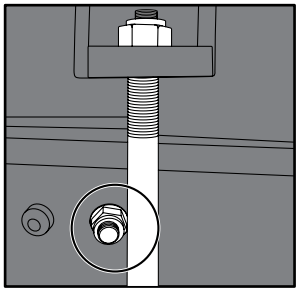
https://truckmanualshub.com/

✕ Incorrect

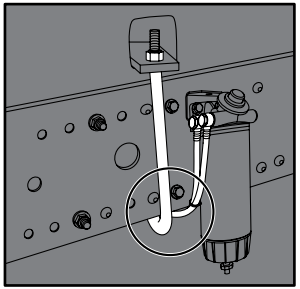
U-Bolt mounted at an angle



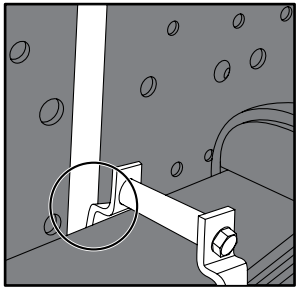
U-Bolt clash with chassis bolt



U-Bolt touching fuel line



Spring clamp rubbing against U-Bolt

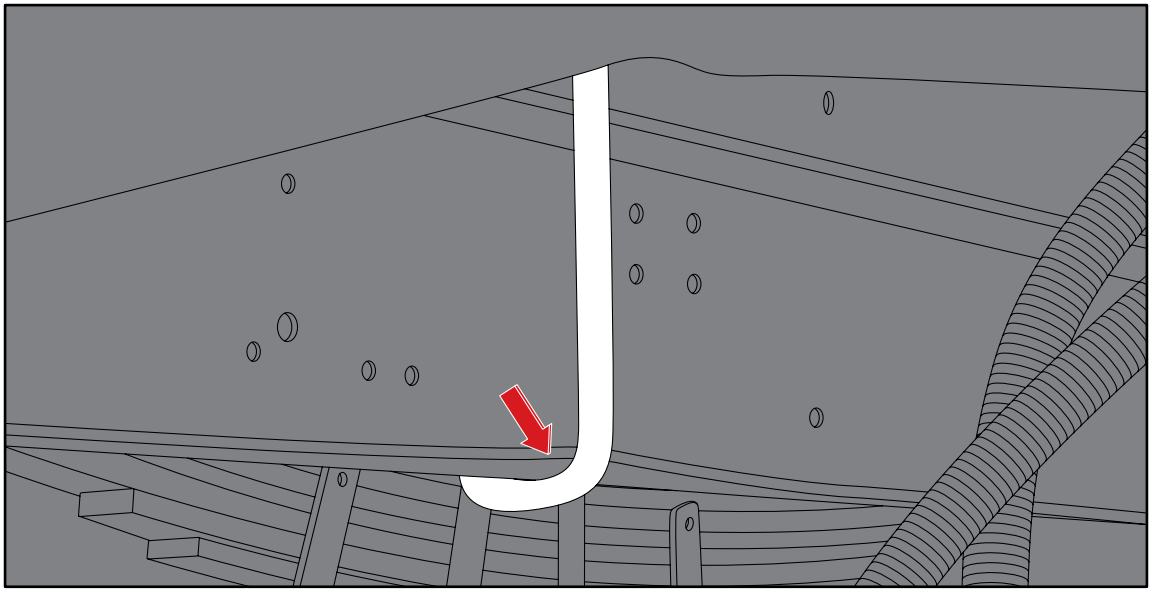


Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

✕ Incorrect

Avoiding bottom guide will damage chassis frame



Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

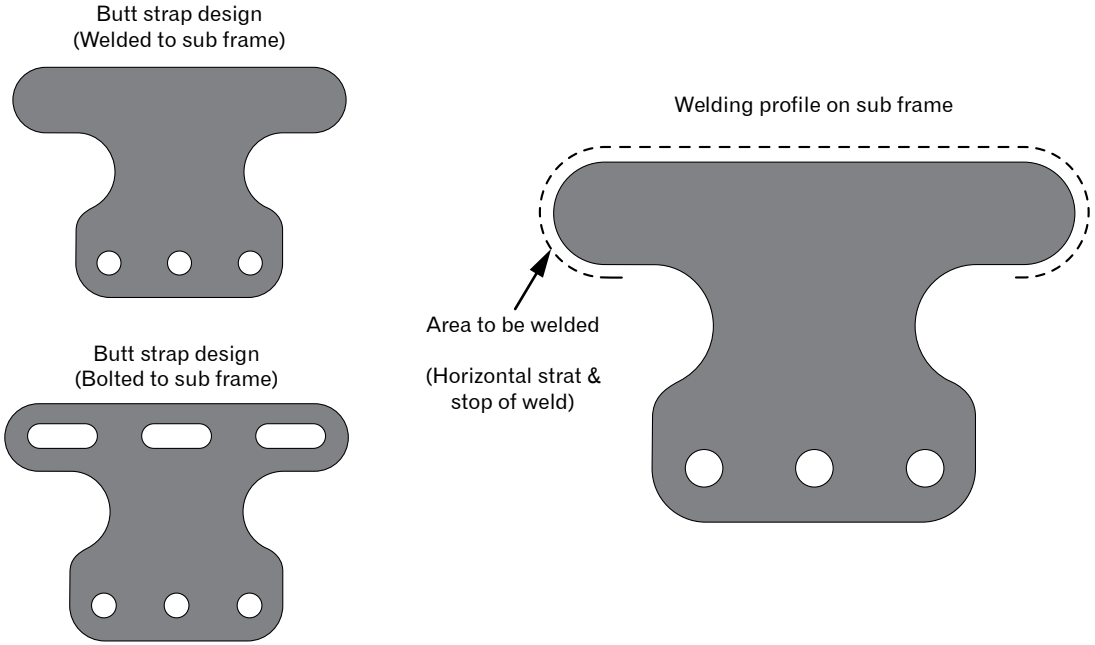
Form Lock Connection (Positive Connection):

- It is not possible to move the mounting frame longitudinal member in relation to the chassis longitudinal member.
- The longitudinal mounting frame member will move together with the chassis side member (bending, twisting).
- For the purposes of strength calculations, both longitudinal members are considered one component.
- On bodies for cement mixers, bodies with loading crane at the rear, rear dumpers and similar bodies, the mounting frame must be attached to the chassis frame by a rigid connection.
- The mounting frame in the rear area must be sealed OFF and reinforced by a diagonal cross.
- Mount torsionally rigid bodies (e.g. box-type bodies, tanks) on the mounting frame behind the cab in resilient mountings. Continuous elastic mounting is not permitted.
- Fasten the butt straps on the chassis frame with at least 3 flange head bolts next to one another, in accordance with MBN 10105, 10112 and 13023.
- Maximum distance between any two mountings must be between 500-700 mm.
- Match the material thickness of the butt straps to the strengths and weights of the body. The butt straps should be at least as thick as the chassis frame.
- Use bracket mountings at the front.

Additional Information

All the frame mounting should comply as per AIS 093 (Rev.1):2015 standard.

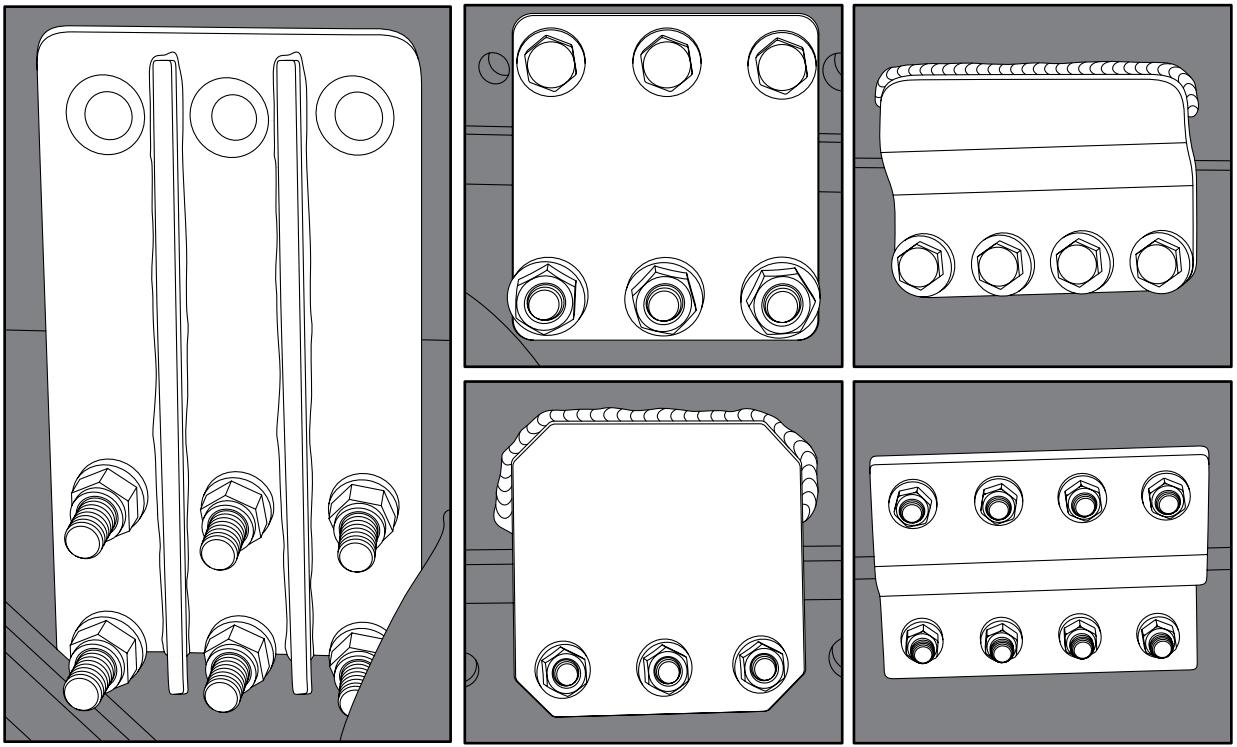
https://truckmanualshub.com/



Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

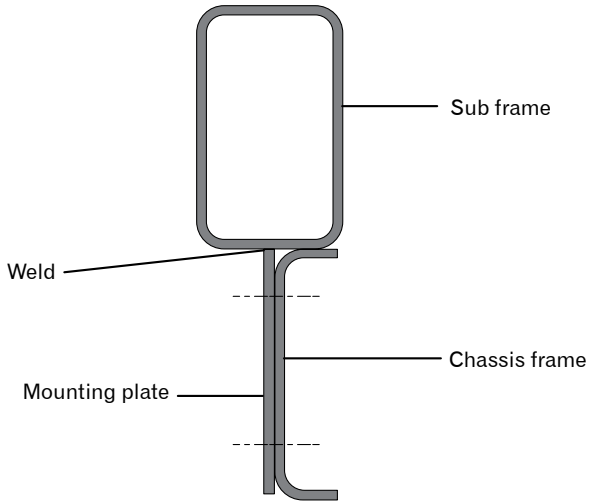
Other possible options for positive connection (Using butt straps)



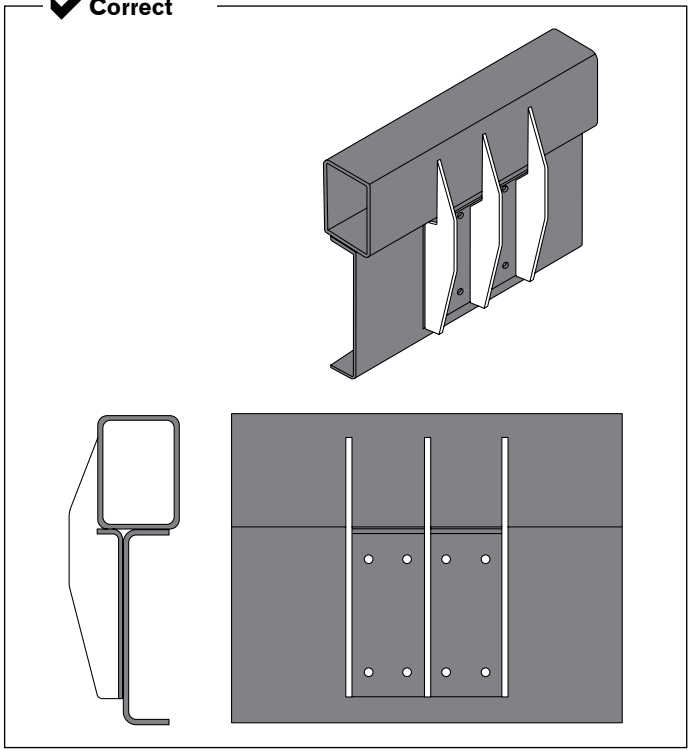
Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

Butt strap design for offset sub frame

Incorrect



Correct

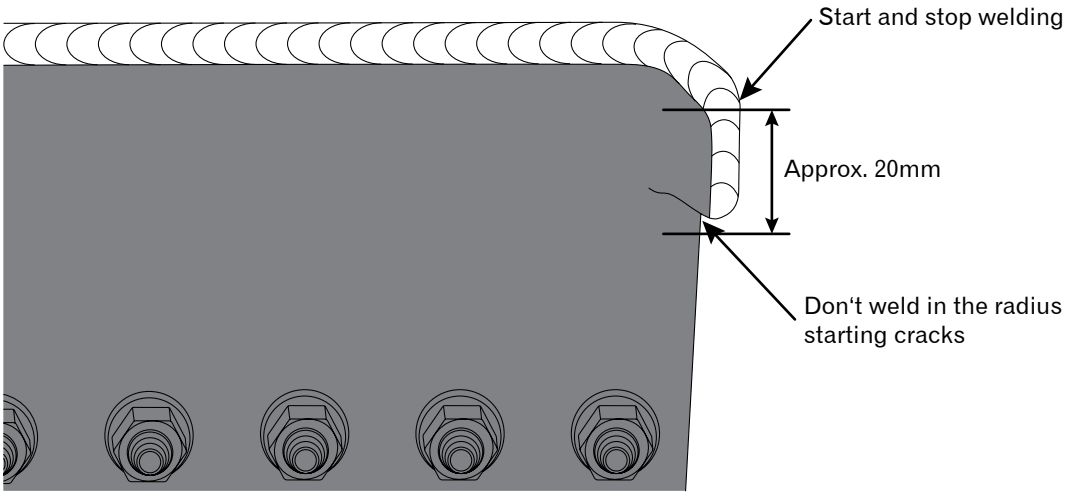


Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Welding of the butt straps

✕ Incorrect



Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Platform and Open Bodies

To ensure the uniform loading of the chassis frame, the body must be attached to the chassis frame by means of a mounting frame (U-section longitudinal members).

- The body must have a torsion-free attachment to the chassis frame longitudinal members.
- Place the vehicle on a flat, horizontal surface before mounting the body.
- If the standard platform is subjected to point loads (e.g. for the transportation of cable drums, coils, etc.), the substructure and the platform floor must be reinforced to support the load.
- Before mounting the body: weigh the chassis and define the body length.

Platform Body

Moment of resistance of mounting frame longitudinal member:

Vehicle	Moment of resistance for each longitudinal member (cm3)
HDT (Model Designation 2xx)	50

For section dimensions of longitudinal members, see diagram

(Refer ▸ **BODY BUILDING GUIDELINES** to the section dimensions).

Additional Information

All change should comply as per the AIS 093 (Rev.1):2015 standard.

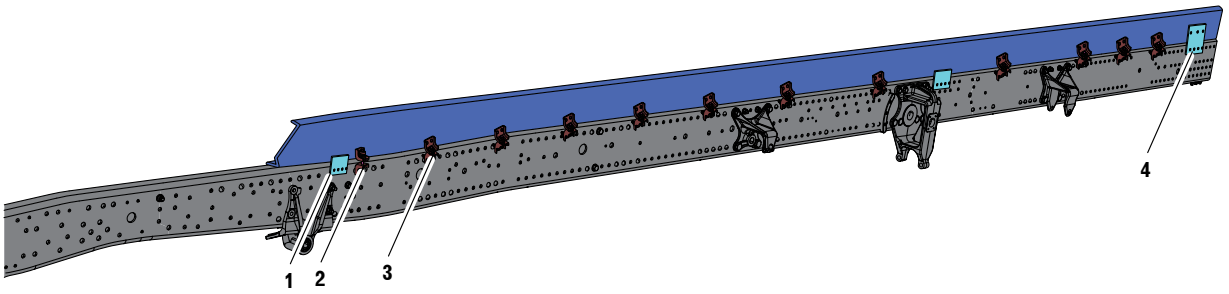
Property Damage

For cab chassis vehicle, customer should carry out vehicle inspection after body built, at BharatBenz authorised dealership.

https://truckmanualshub.com/

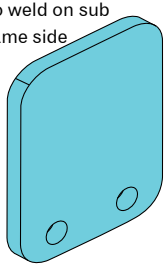
Steel sub frame body mounting

Correct

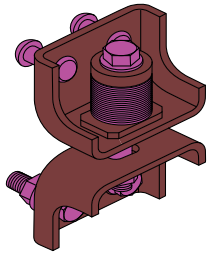


1 Guide plate front

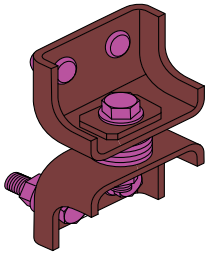
No weld on sub frame side



2 Friction lock 1st

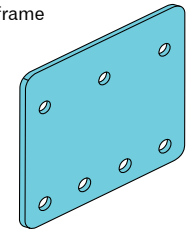


3 Friction lock for rest



4 Guide plate at rear

Weld or bolt to sub frame



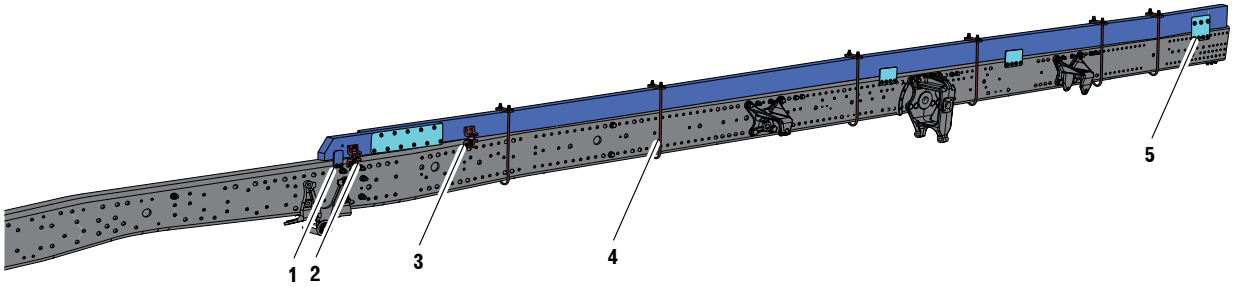
Frame **Sub frame** **Body mounts** **Guide plates** **Fasteners**

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

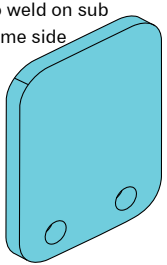
Wooden sub frame body mounting

Correct

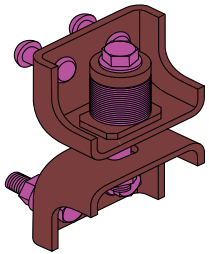


1 Guide plate front

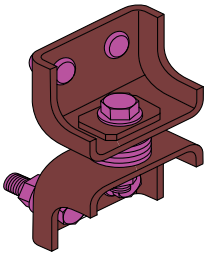
No weld on sub frame side



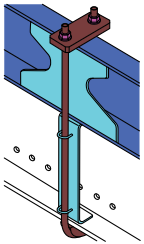
2 Friction lock 1st



3 Friction lock 2nd

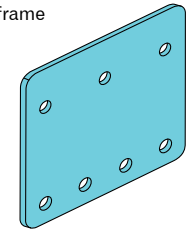


4 U-Bolt



5 Guide plate at rear

Weld or bolt to sub frame



Frame **Sub frame** **Body mounts** **Guide plates** **Fasteners**

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Tipper Bodies

- The mounting frame must be manufactured without joints and with adequately dimensioned steel cross members.
- The connection between the mounting frame and the chassis frame must be rigid.
- Position the rear pivot as close as possible to the rear axle.
- Close rear end to form a box and reinforce it with a diagonal cross.
- To reduce the risk of the vehicle tipping, the tilting angle of the body towards the rear must be limited to 45 deg. Therefore, only transport a load that can slide out easily. Equip the tipper body with a tilt stabilizer and mount it precisely above the rear axle or the centre of the double axle.
- Only operate the vehicle tipping on sealed roads, not on construction sites.

Fit reinforced rear springs and anti-roll bars if required and available.

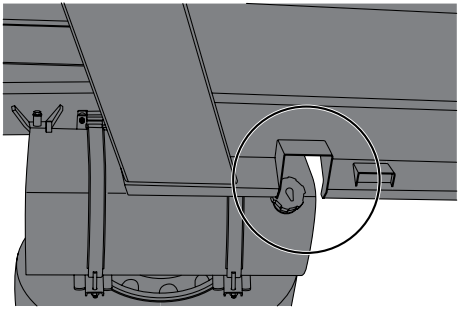
Warning

Ensure that the vehicle is stable when stationary, otherwise there is a danger of the vehicle toppling over. Observe the safety precautions and operating instructions of the tipper body manufacturer. All national laws, directives and regulations must be complied.

Additional Information

Due to the exceptional loads, three-way and rear end tipper bodies may only be fitted on the chassis intended for this purpose (Refer ▸ **BODY BUILDING GUIDELINES** to the contact details for technical support).

Cut out to be provided in Tipper load body for fuel filling in elevated fuel tank.



DICV-HDT-2372

Mounting Frame

Additional Information

Observe notes on mounting frame design (Refer ▸ **BODY BUILDING GUIDELINES** to the mounting frame).

Section dimensions and moments of resistance for mounting frames

The values given refer to normal operating conditions.

https://truckmanualshub.com/

Consult the department responsible in the event of difficult operating conditions (Refer ▸ **BODY BUILDING GUIDELINES** to the contact details for technical support).

Vehicle		Moment of resistance for each longitudinal member (cm^3)
HDT (Model)	6x4	90a)
Designation 2xx)	8x4	130a) b)

Additional Information

For section dimensions of longitudinal members, see diagram (Refer ▸ **BODY BUILDING GUIDELINES** to the section dimensions).

A) Mounting frame closed to form a box. Mounting frame rigidly secured to the chassis frame, reaching at least as far as the front of the tipper lift ram.

b) Rear-end tipper bodies only.

Pivots

- The rear pivot on three-way and rear-end tipper bodies must be positioned as close to the rear axle as possible.
- When the side gates or tailgate are folded down, they must not strike against the frame end, the light fittings or the trailer coupling.
- The front pivot must be provided with guide brackets so that the pivots can be guided when the tipper body is lowered.

Restraining Facilities

- The check straps should sag slightly in the end position.
- Fit a support (folding support) to prevent the tipper body from lowering.
- Safeguard controls against unintentional operation.
- Connect a “Tipper body” indicator lamp to provide a visual warning that the tipper body has not folded back completely (in driving position).

Hydraulic Ram

- If possible, position the mounting frame cross members directly above the chassis frame cross members.

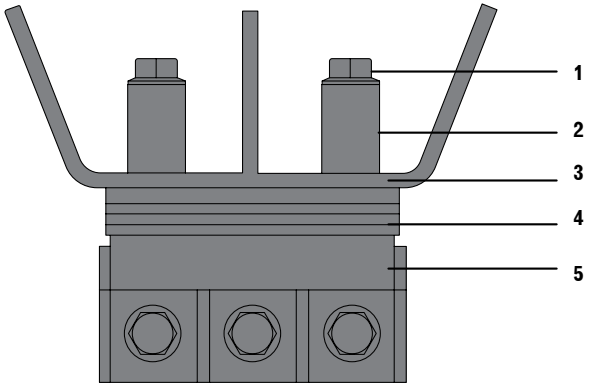
Three-way tipper bodies:

- The application point of the hydraulic ram must be in front of the centre of gravity of the body and the payload.

https://truckmanualshub.com/

Non-positive mounting proposal (Friction lock connection)

Correct



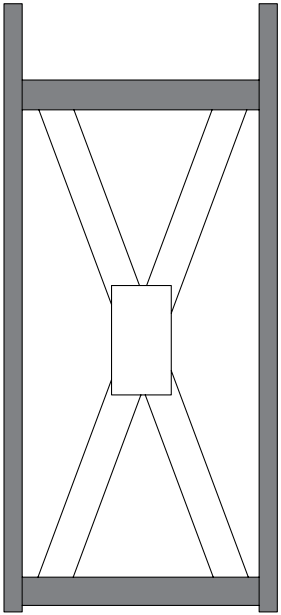
1. Flanged bold - M14 X 1.5
2. Metal sleeve
3. Bracket (welded to sub frame)
4. Spacer plates
5. Flanged nut - M14 x 1.5

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

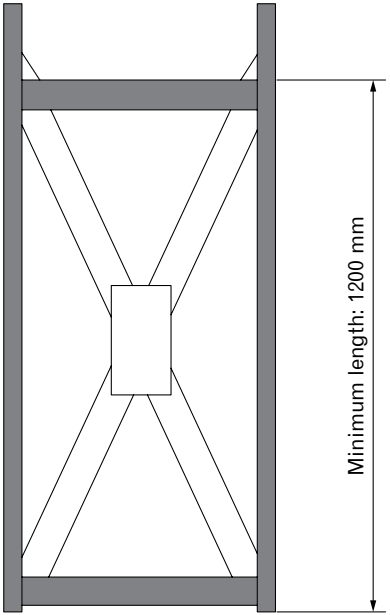
https://truckmanualshub.com/

Diagonal cross in sub frame rear end

Incorrect

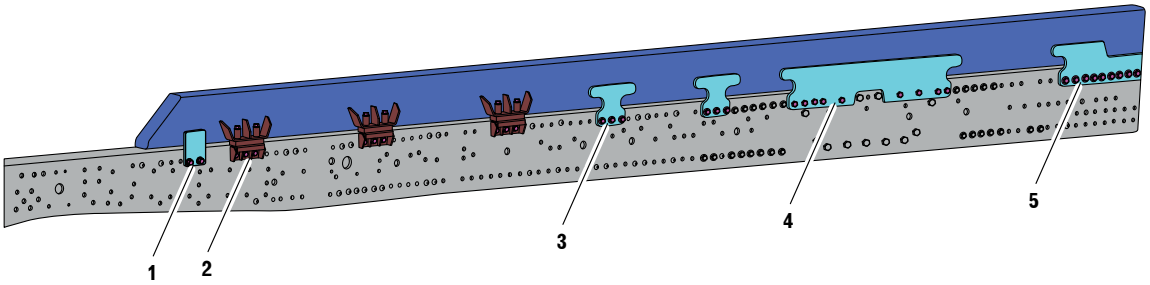


Correct



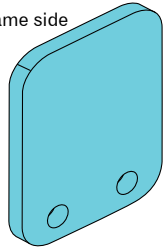
Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

Correct



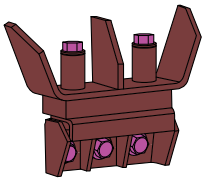
1 Guide plate front

No bolt or weld on sub frame side



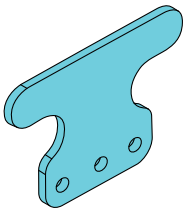
2 Friction lock tipper

Weld to sub frame



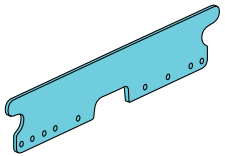
3 Butt strap general

Weld to sub frame



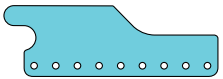
4 Butt strap bogie

Weld to sub frame



5 Butt strap rear

Weld to sub frame



Frame Sub frame Body mounts Guide plates Fasteners

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

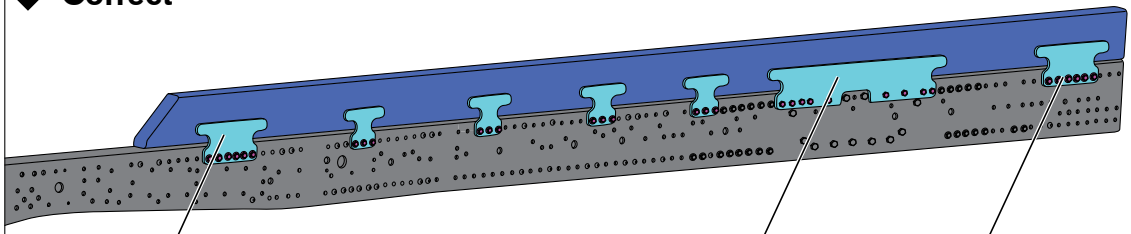
Cement Mixer Trucks

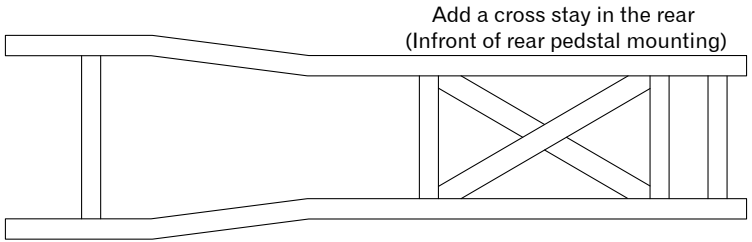
Cement mixers may only be mounted on chassis intended for this purpose (cement mixer chassis). The mounting frame should be of closed section type from the rear up to a position in front of the front mountings of the drum. The mounting frame should be rigidly onnected (form-locking) to the chassis by means of shackles. The material to be used is BSK 46.

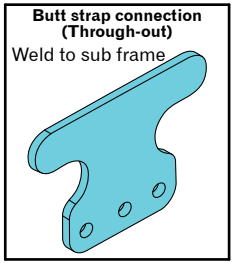
The container size must be suitable for the chassis load-bearing capacity. It is to be ensured that permissible axle loads are not exceeded.

Vehicle		Moment of resistance for each longitudinal member (cm^3)
HDT (Model)	6x4	70
Designation 2xx)	8x4	130

✔ Correct







Sub frame material to be same as chassis material (BSK 46)

Frame **Sub frame** **Guide plates**

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Tank and Dry-Bulk Bodies

- Observe the permissible centre of gravity heights (Refer ▸ **BODYBUILDING GUIDELINES** to the sections CoG).
- Tank and dry-bulk bodies must be equipped with a continuous steel mounting frame.
- Make sure that the twisting ability of the chassis frame is not impaired by the connection between the body and the mounting frame or between the chassis frame and the mounting frame.
- Position the tank or dry-bulk body mounts as close to the spring brackets as possible.
- Position the rigid mounts at the rear to ensure good handling characteristics.
- Do not exceed the distance dimensions from the centre of the rear axle to the body mount specified in the below table. Position front body mounts as close as possible behind the cab.
- When goods with different specific weights are transported:

Mark filling levels on the tank so that the permissible filling capacity is visible. It is also possible to attach a load indicator to the rear axle which gives an audible or visual warning in the cab.

- On tank and dry-bulk bodies with separate compartments:
- The loading and unloading plans must be attached to the vehicle where they are clearly visible.
- BharatBenz recommends equipping the vehicle with high CG pack (with additional anti-roll bar).

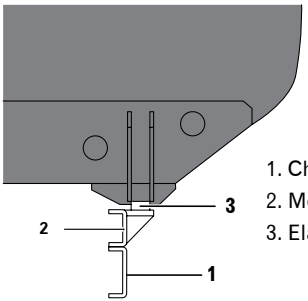


Fig: Example illustrations – Tank mounting at front DICV-HDT-2013

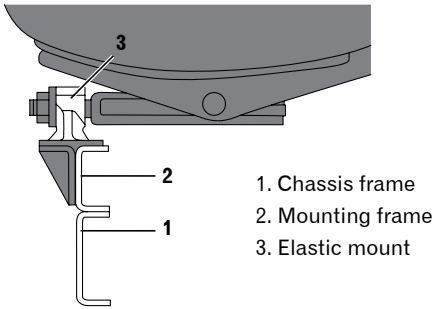


Fig: Example illustrations – Tank mounting at front DICV-HDT-2018

Vehicle		Max. distance from centre of rear axles to body mount behind rear axle	Moment of resist-ance for each longit-udinal member (cm^3)
HDT (Model)	6x2	1000	70
Designation 2xx)	8x2	1000	130

https://truckmanualshub.com/

Additional Information

For section dimensions of longitudinal members, see diagram (Refer ▸ **BODY BUILDING GUIDELINES** to the section dimensions).

Additional Information

It must be guaranteed that the permissible axle loads are not and the specified minimum front axle load is achieved under all loading conditions.

Tank & Dry-Bulk Bodies without Continuous Mounting Frames

- Provide a base of a minimum of 1,000 mm for the front mounting frame section.
- Both sections should be designed as an edge profile (minimum dimensions 100x70x6 mm) with a reinforcement plate and smooth transition.
- Attaching the tank directly without mounting frame sections is not permissible.
- The tank must be attached rigidly at the rear and elastically at the front.
- If there are vehicle vibrations after the body has been mounted, a mounting frame with the appropriate fastenings is required.

Additional Information

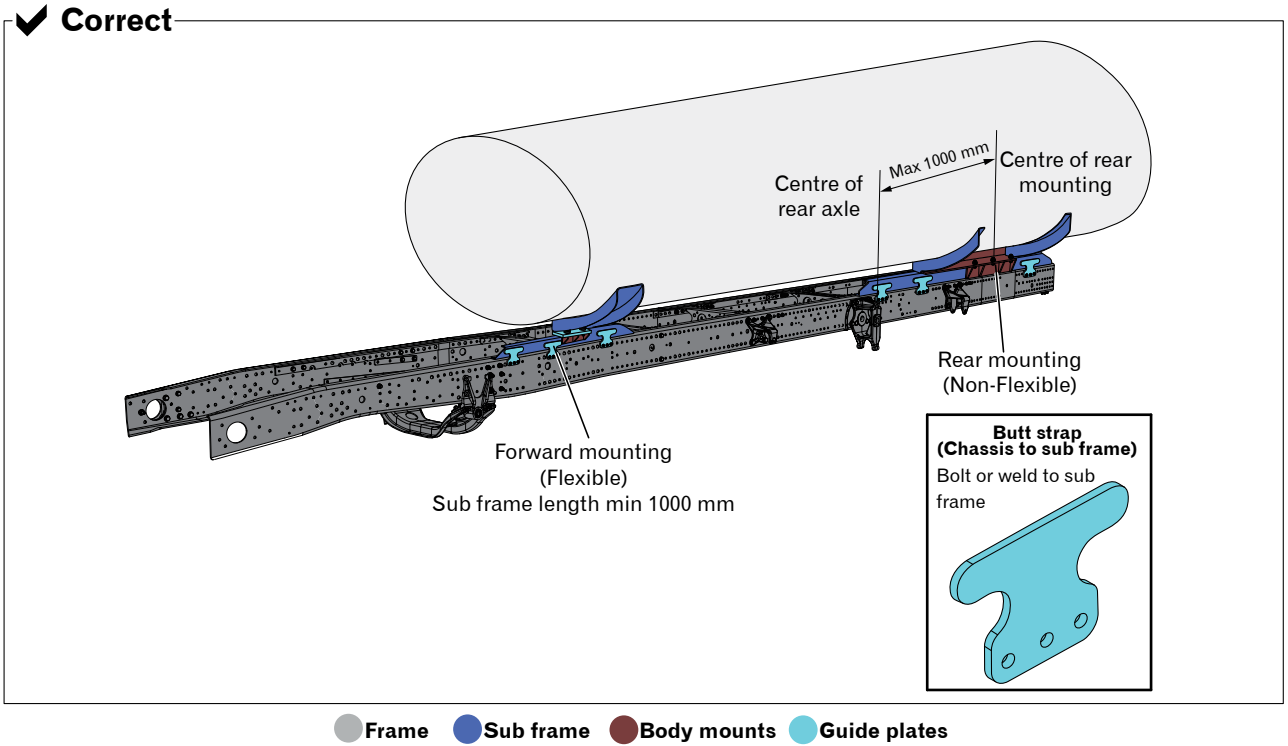
Observe the permissible centre of gravity heights. Consult the department responsible in the event of any modifications to the wheelbase (Refer ▸ **BODY BUILDING GUIDELINES** to the section dimensions).

Additional Information

Petroleum tanker capacities for 2823R -22kL; 3523R - 28kL and 4228R -34kL

https://truckmanualshub.com/

Mounting proposal - 1

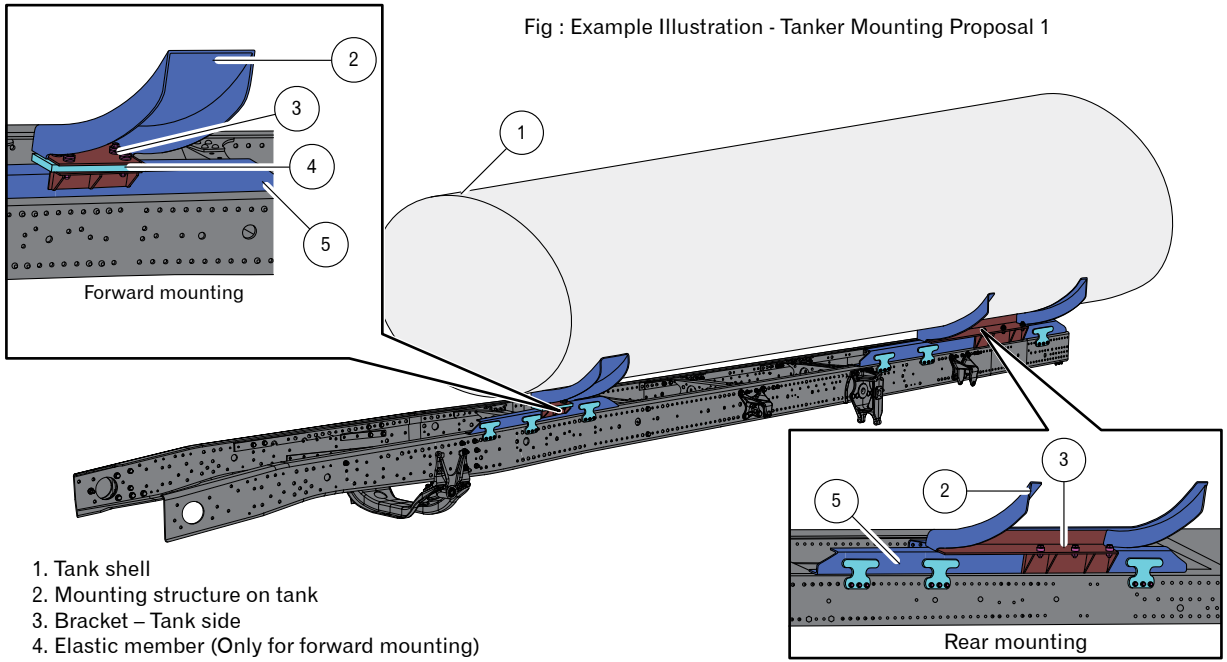


Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

Mounting proposal - 1

Correct

Fig : Example Illustration - Tanker Mounting Proposal 1



1. Tank shell
2. Mounting structure on tank
3. Bracket – Tank side
4. Elastic member (Only for forward mounting)
5. Sub frame & bracket – Chassis side

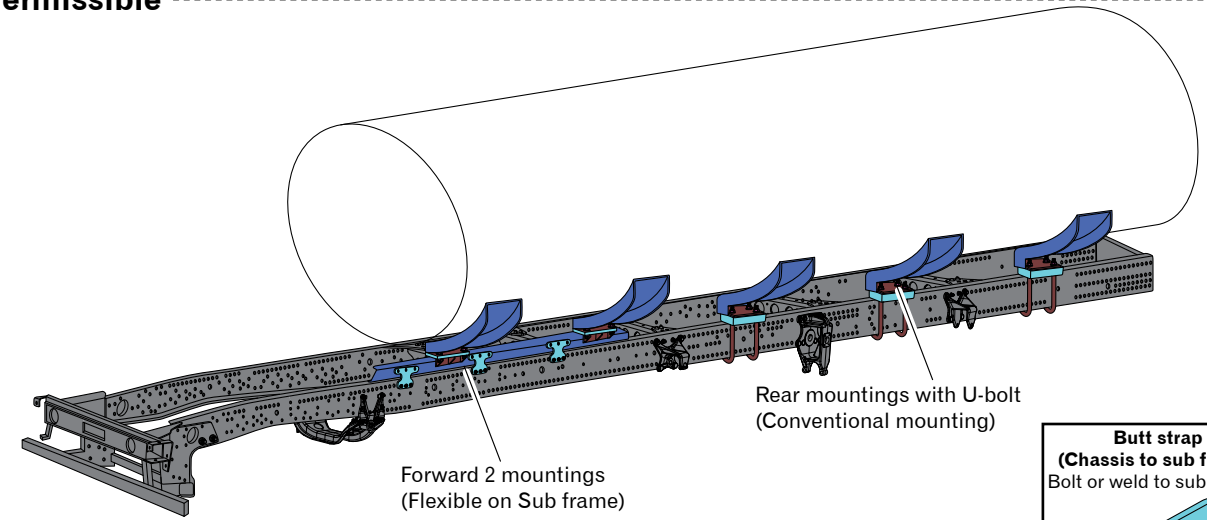
Frame **Sub frame** **Body mounts** **Guide plates** **Fasteners**

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Mounting proposal - 2

Permissible

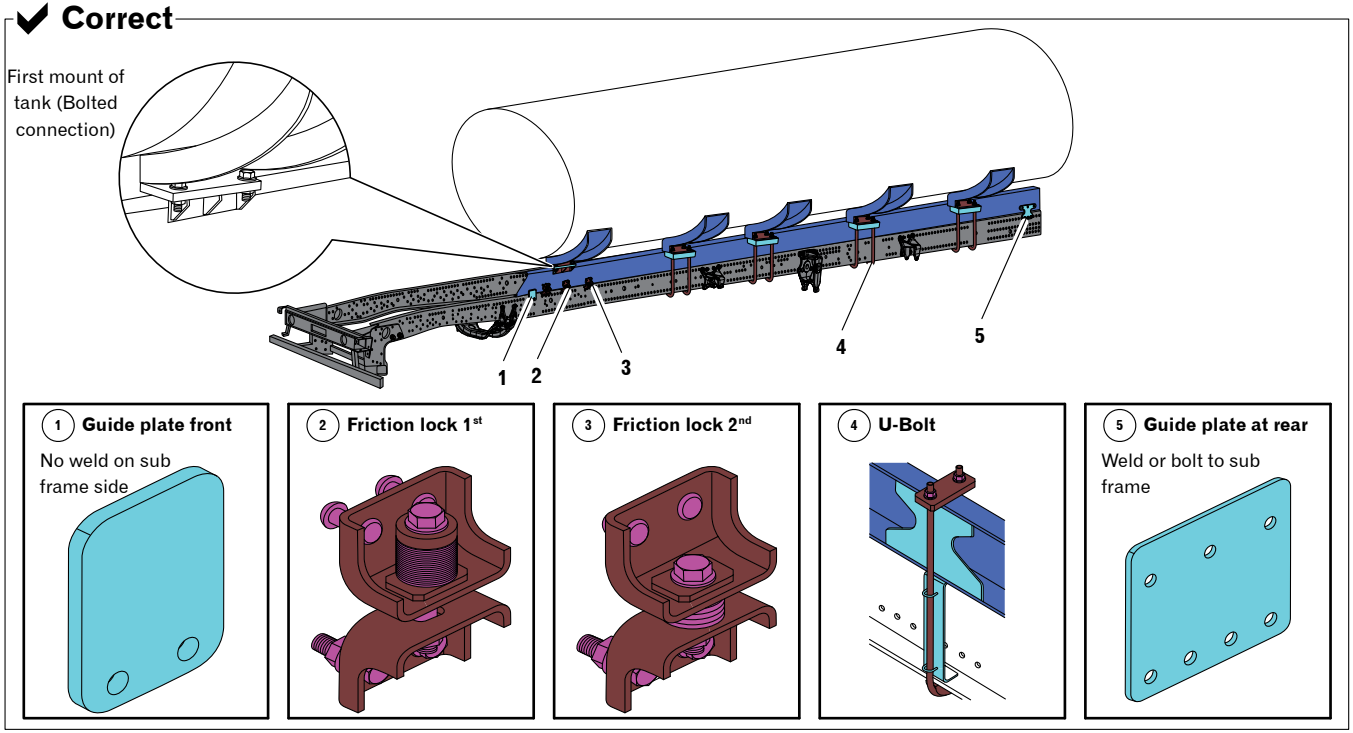


Frame **Sub frame** **Body mounts** **Guide plates**

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

Mounting proposal - 3

✔ Correct

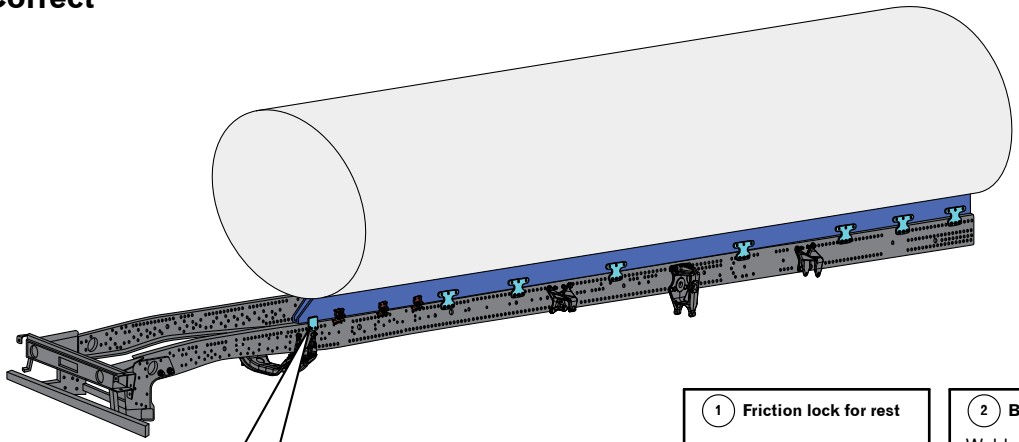


Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

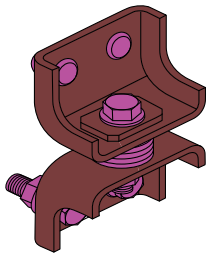
https://truckmanualshub.com/

Mounting proposal - 4

Correct

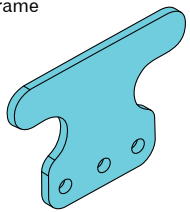


1 Friction lock for rest



2 Butt strap connection

Weld or bolt to sub frame



Frame **Sub frame** **Body mounts** **Guide plates** **Fasteners**

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Vehicles for the Transport of Hazardous Goods

Any vehicle plying in Hazardous material as prescribed under Petroleum explosives safety organization, shall require an approval to be obtained from Chief controller of Explosives (CCOE) in addition to the base vehicle type approval obtained by Daimler India Commercial Vehicles Pvt. Ltd.

Obtaining the required approval from CCOE/ PESO – governing body, is the responsibility of the bodybuilder and it is assumed the bodybuilder is familiar with these regulations.

Legal Regulations

For national approval in Republic of India:

- Any tank mounted on a truck for transport of hazardous material shall have a type approval for the fully completed vehicle (to be obtained from Chief Controller of Explosives) in addition to the base vehicle type approval obtained by Daimler India Commercial Vehicles Pvt. Ltd.
- It is assumed that the vehicle body/ conversion manufacturer is familiar with these regulations.
- Obtaining type approved from CCOE is responsibility of body conversion manufacturer.

Vehicles for the Transport of Aggressive Substances

On vehicles used to transport aggressive substances, all compressed-air lines, brake lines, brake hoses and electrical wiring must be protected against chemical reaction by the body manufacturer.

Additional Information

We recommend the use of exclusive tanker variant for Petroleum tanker application. Kindly obtain the details of the same from the nearest BharatBenz dealership.

Additional Information

Kindly ensure fitment of the thermal insulation on the exhaust system post bodybuilding – as mandated by CCOE/ PESO from nearest the BharatBenz dealership

Self-supporting bodies

Van and box-type bodies

A mounting frame with continuous longitudinal members is not required on self-supporting panel-van or box-type bodies if cross members are mounted that are less than 600 mm apart. In the rear axle fastening area, the maximum distance of 600 mm may be exceeded if this is necessary to realize tire clearances (jounce).

https://truckmanualshub.com/

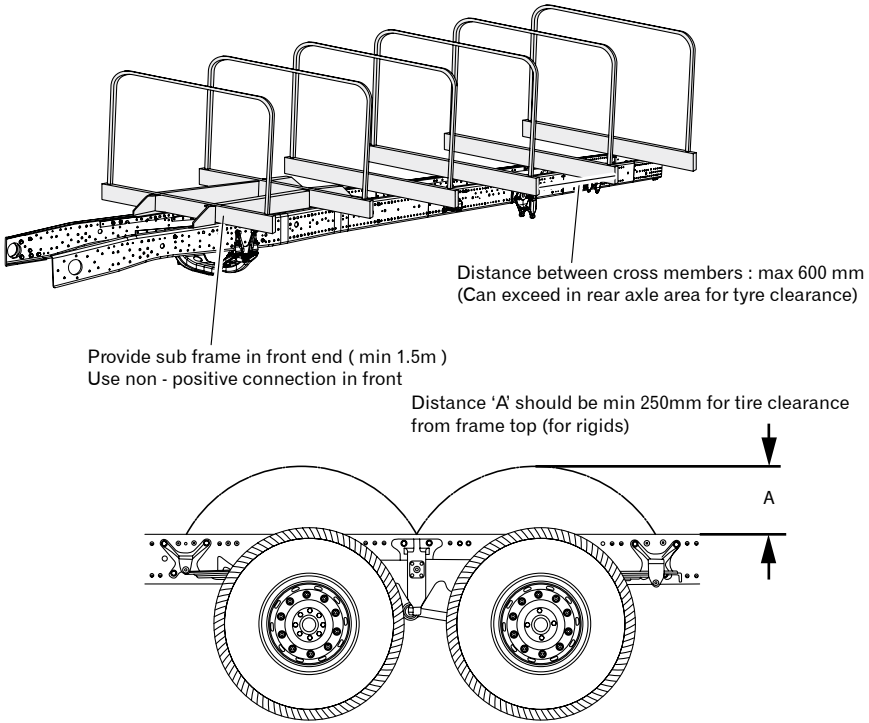


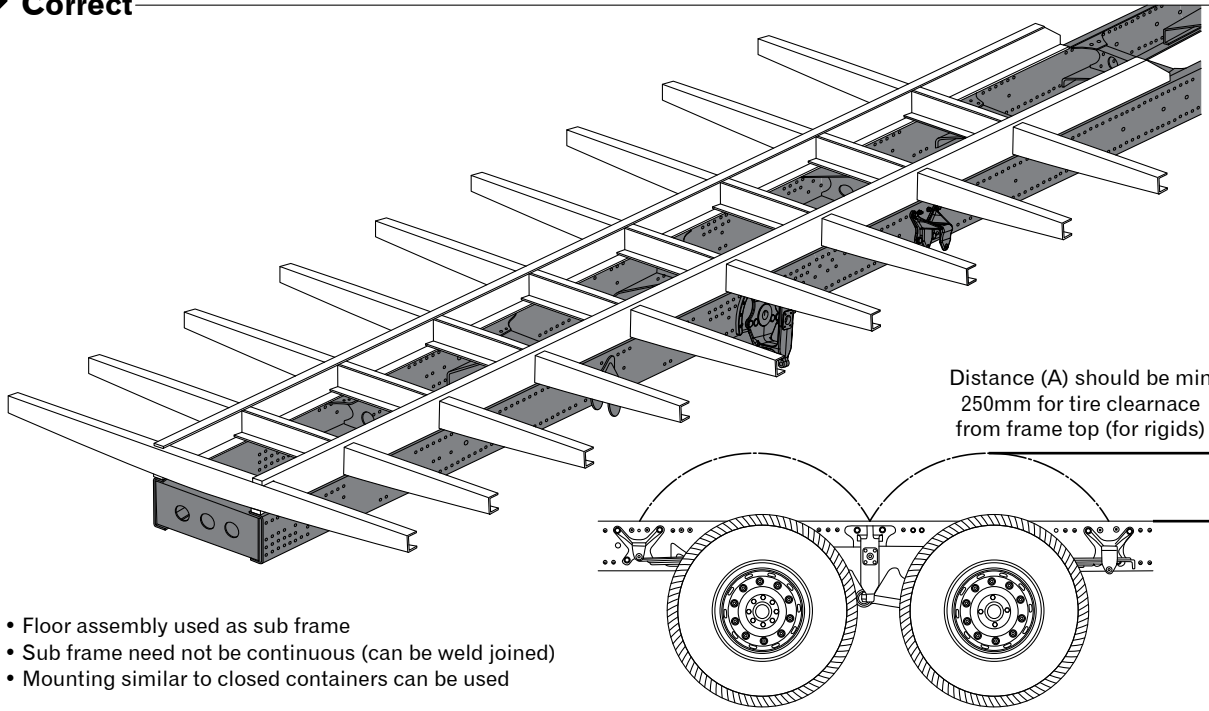
Fig : Example Illustration - Van and Box type body

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Bodies with sub frame as floor assembly

Correct



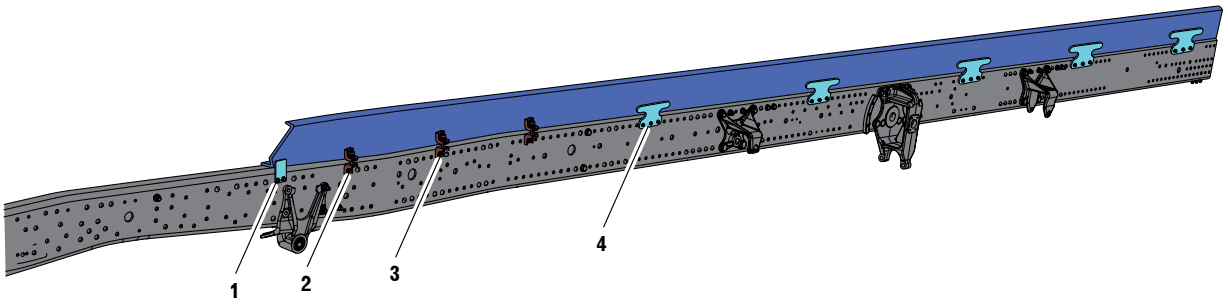
- Floor assembly used as sub frame
- Sub frame need not be continuous (can be weld joined)
- Mounting similar to closed containers can be used

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

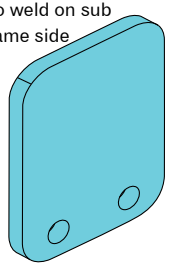
Closed Containers

Correct

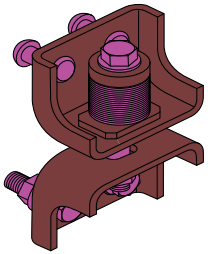


1 Guide plate front

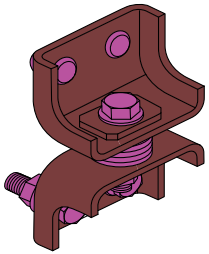
No weld on sub frame side



2 Friction lock 1st

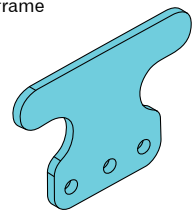


3 Friction lock for rest



4 Butt strap connection

Weld or bolt to sub frame

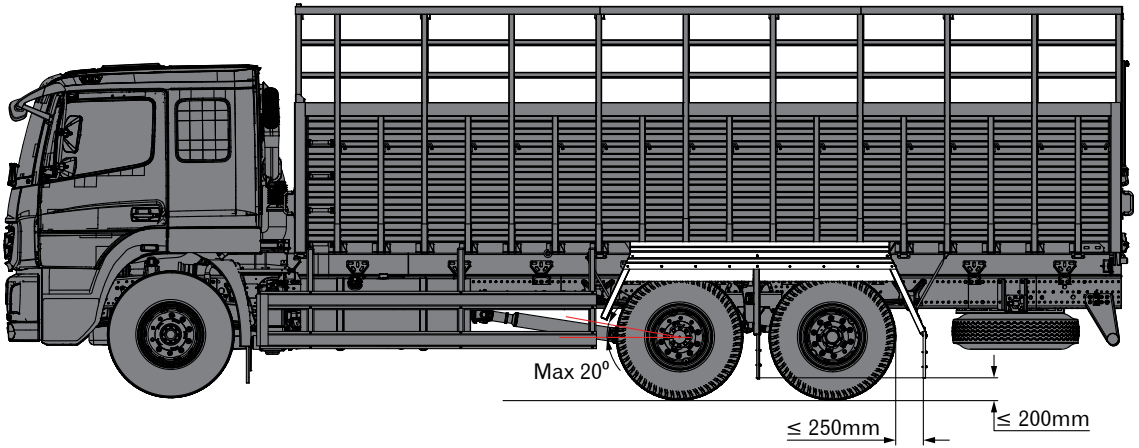


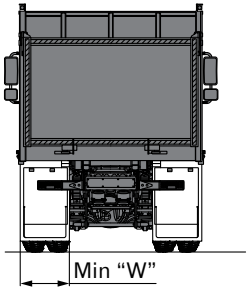
Frame **Sub frame** **Body mounts** **Guide plates** **Fasteners**

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Spray Suppression Installation (for body equipment)





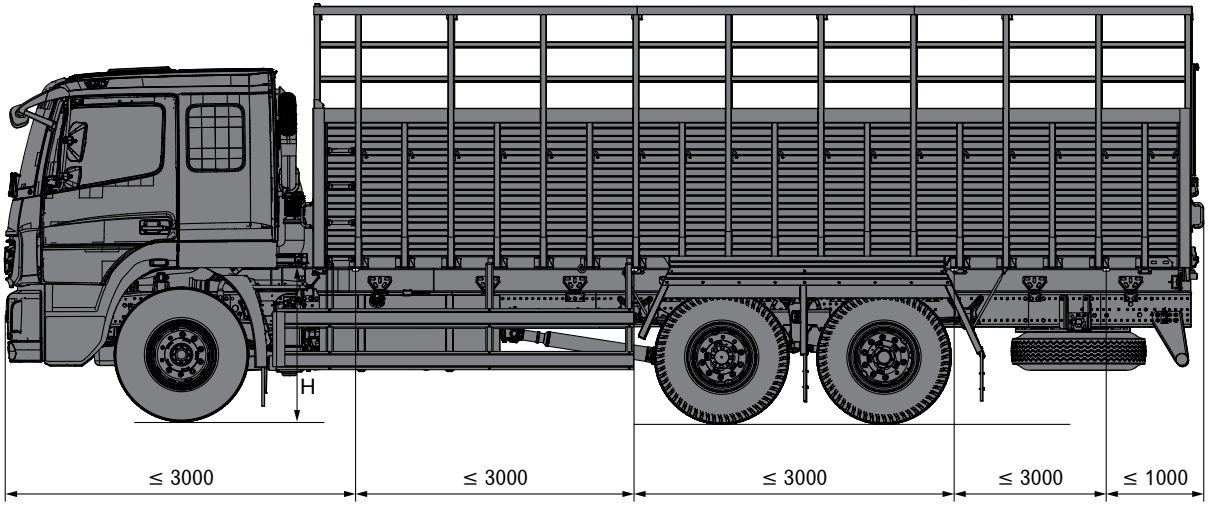
- Installation shall meet requirements as per AIS 013
- The instructions given here are for guideline only and not binding

Note:
All dimensions are in “mm”
W – Width of twin tires

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Side Marker Lamp Installation (for body equipment)



- Installation shall meet requirements as per AIS 008 Rev 01
- The instructions given here are for guideline only and not binding

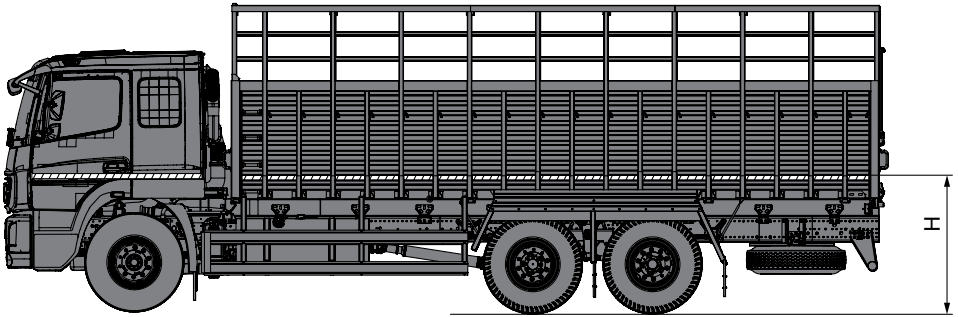
Dimension H: 250mm ≤ H ≤ 1500mm (in case of technical difficulty it can be up to 2100 mm)

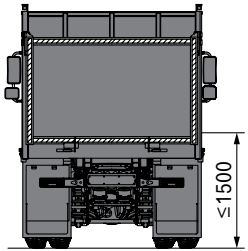
Note:
All dimensions are in “mm”

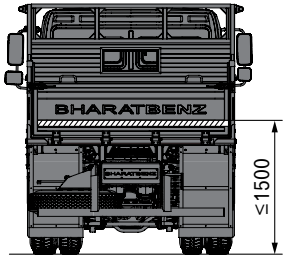
Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Retro-reflective Marking (for body equipment)







- Installation shall meet requirements as per AIS 090
- The instructions given here are for guideline only and not binding

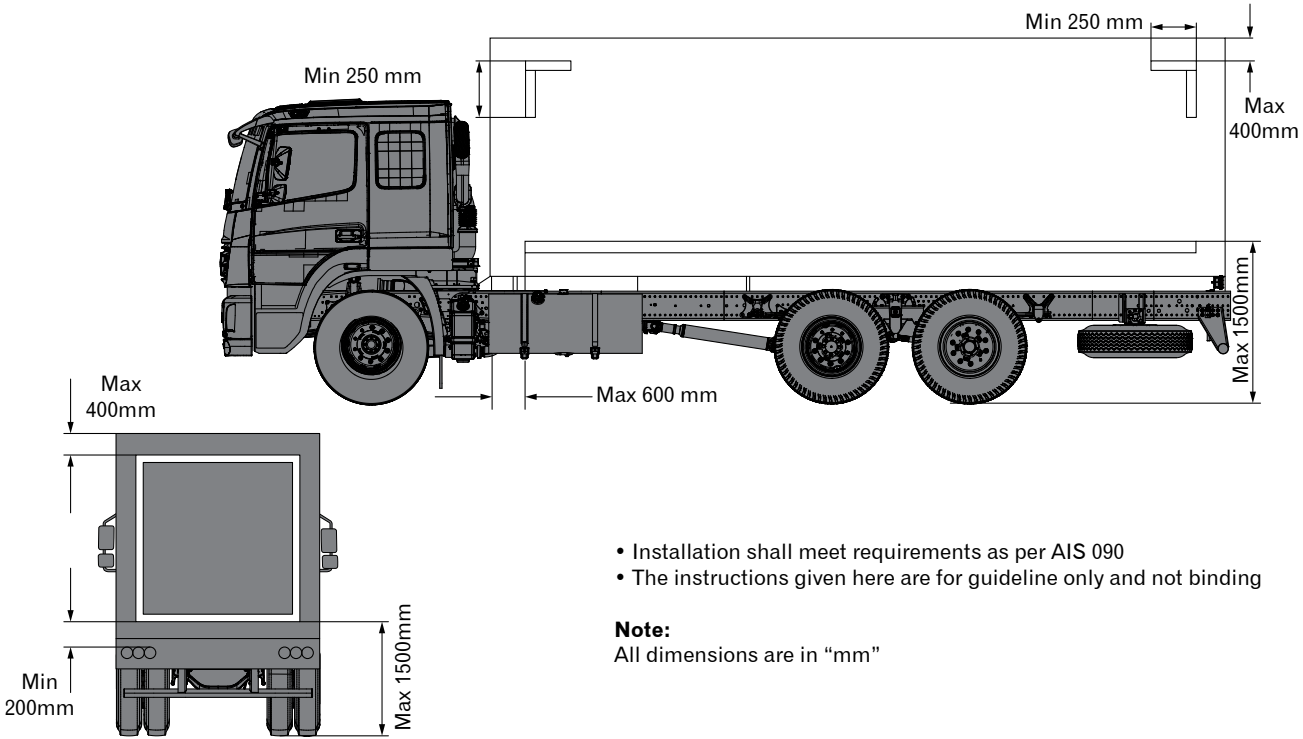
Dimension H: 250mm ≤ H ≤ 1500mm (in case of technical difficulty it can be up to 2100 mm)

Note:
All dimensions are in “mm”

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Retro-reflective Marking (for body equipment)



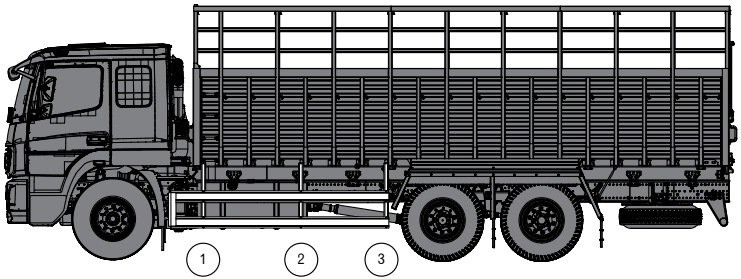
- Installation shall meet requirements as per AIS 090
- The instructions given here are for guideline only and not binding

Note:
All dimensions are in “mm”

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

SUPD Installation - 2823R



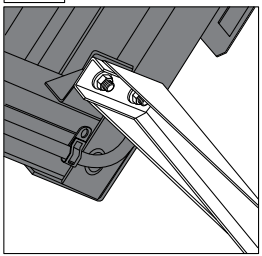
No of mountings in LH : 3

1 → 1st Floor cross member

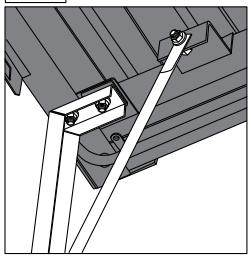
2 → 5th Floor cross member

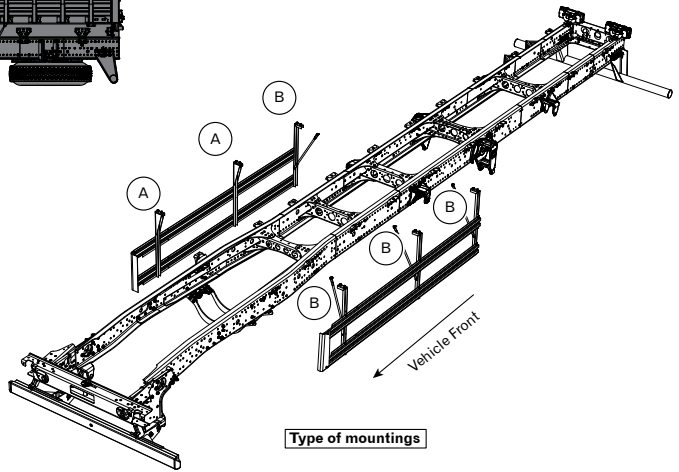
3 → 8th Floor cross member

A TYPE



B TYPE





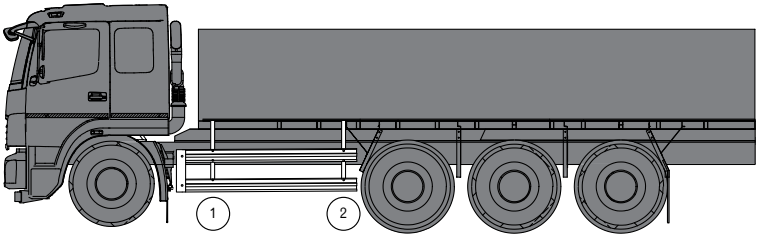
Type of mountings

Note: 1. LH mounting pitch is mirror of RH mounting
2. Pitch details refer the EB drawings

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

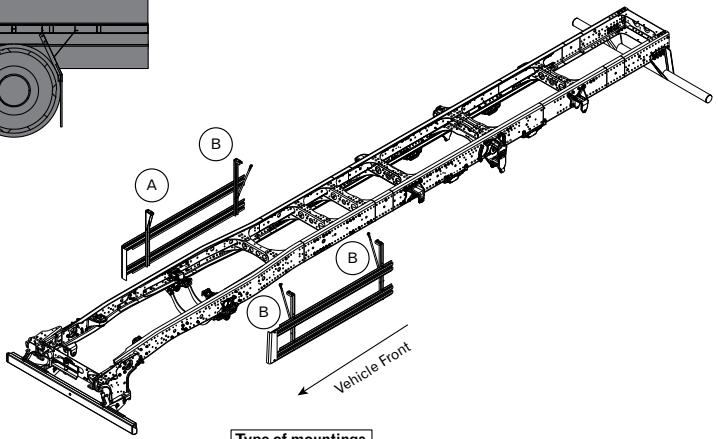
SUPD Installation - 3523R



No of mountings in LH : 2

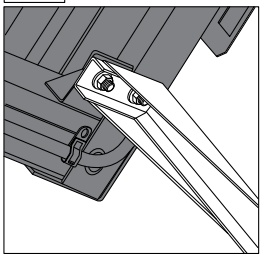
1 → 1st Floor cross member

2 → 5th Floor cross member

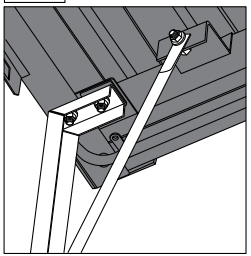


Type of mountings

A TYPE



B TYPE



Note: 1. RH mounting pitch is mirror of LH mounting
2. Pitch details refer the EB drawings

Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

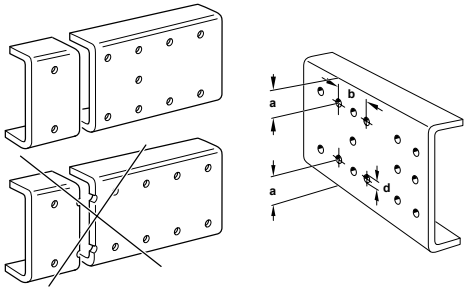
https://truckmanualshub.com/

Model	Variant	Wheel base	SUPD width	Load body minimum width requirement
2823R	24"	4500	2,524	Load body width should be same as SUPD width or more than that (< 2600 mm)
	CBC	5700	2,508	
	CBC	5100	2,524	
3523R	24"	4800 / 5100	2,524	
	CBC	5700	2,524	
4228R	CBC	5900	2540	
28t RMC	CBC	3600	2570	
35t RMC	CBC	4500	2570	

Applications requiring Loading span reduction

If you intend to reduce the frame overhang, the following guidelines must be complied with :

- During the frame long member overhang reduction, always ensure frame stability in the intended application.
- Do not cut the chassis long member in the vicinity of the cross member of the last axle or the first cross member of the overhang.
- During the sectional cutting of long member, ensure that position of cut does not pass through any existing holes in the longitudinal member
- Use only machine cut to reduce the overhang on the long member. Use of gas cutting is not recommended as the strength of the frame could deteriorate
- We recommend that the frame sectional cutting to be done centrally between two rows of holes (spacing 50mm apart) as shown in the below image
- New holes may be drilled in the web area of the long member for relocation of the end cross member, reverse buzzer & RUPD as given below:
- Distance (a) : Atleast 45mm from the inside edge of frame long member
- Distance (b) : Between holes must be atleast 50mm
- Maximum hole diameter must be 19mm
- Deburr and ream all holes after drilling
- Painting must be done at the area of long member cut and drilled areas with primer and top coat
- During retrofitment of the cross member and RUPD, please ensure recommend bolts and torque is only used to fasten these parts



Cutting points (examples)

Additional Information

For rigid tipper & any application wherein there is apprehension that the below mentioned cross member has to be used for better load bearing capabilities.

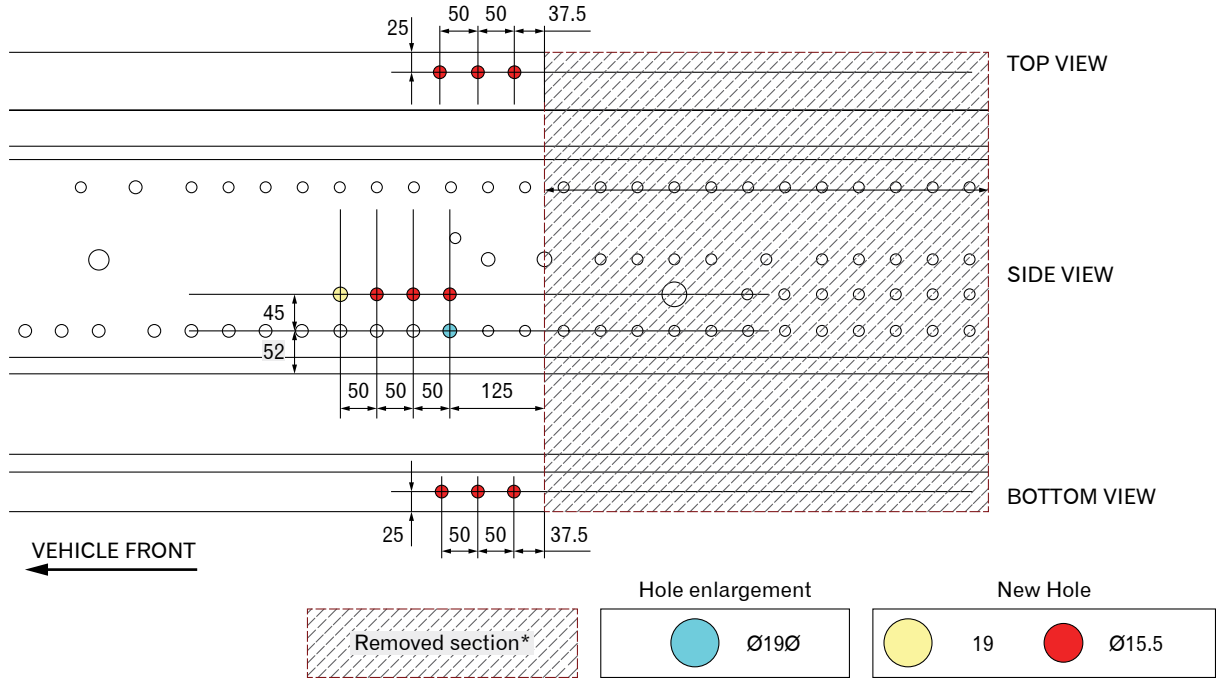
Existing end cross member is 5mm thick/BSK46

Width/Height cross member :170mm/270mm

https://truckmanualshub.com/

Additional frame length is removed by cutting and additional holes are drilled on the chassis long member

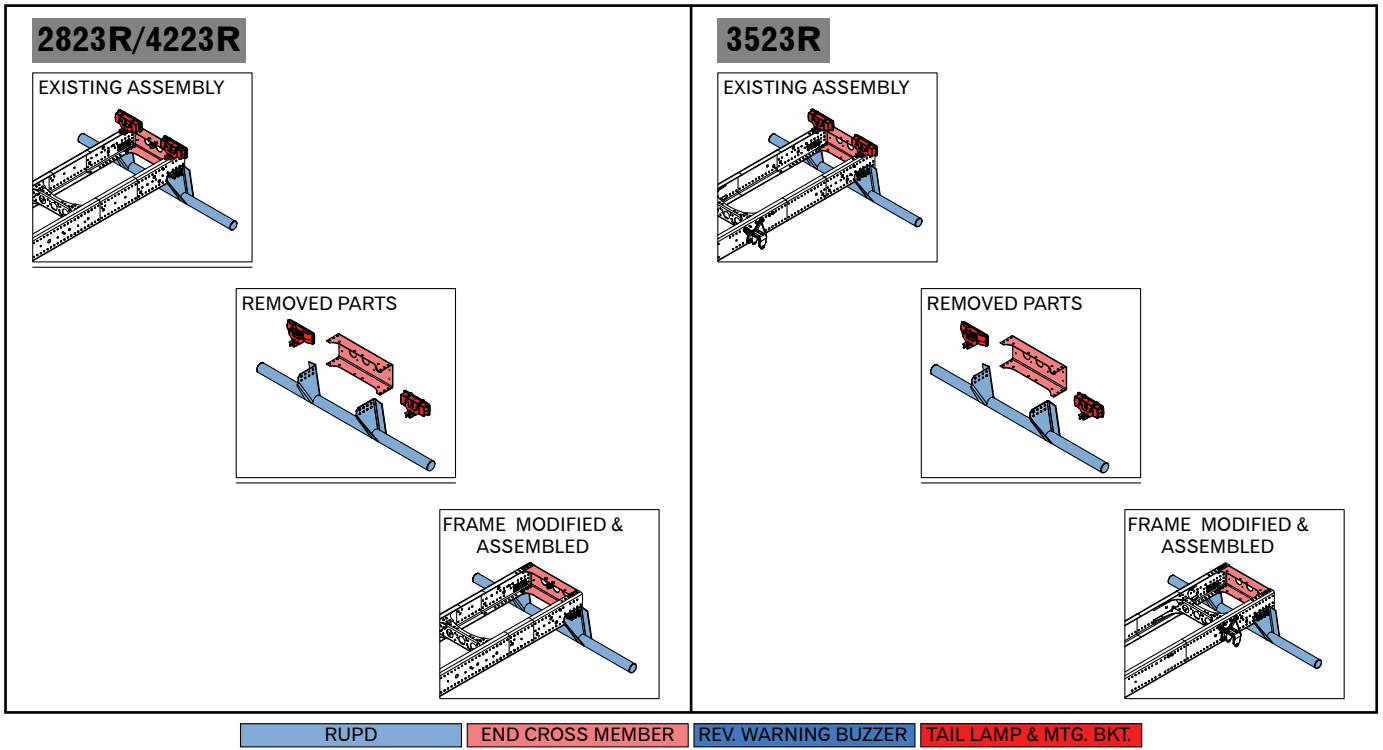
2823R, 3523R and 4223R



Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

End cross member, RUPD and reverse warning buzzer relocated to new mounting holes



Note: All the modification comply as per AIS 093 (Rev.1):2015 standard

https://truckmanualshub.com/

Parameterizable Special Module (PSM)

The interaction of the various control units is referred to collectively by the term Integrated electronics systems" (IES).

The connection between the individual components is no longer an analogue connection using wiring, but a digital connection using a high-speed data bus system and a high-speed controller area network (HS CAN bus).

All the integrated control units understand the messages transmitted on the CAN bus and are adapted to the CAN language, which is known as the protocol.

The parameterizable special module (PSM), was developed to provide body manufacturers with access to the individual CAN bus data. The CAN interface can also be supplied to comply with ISO 11898 (5-volt based CAN) via the supplemental code E3Z. This replaces the 24-volt based CAN complying with ISO 11992.

This module can read data from the HS CAN bus messages and translate this, e.g. into switching signals to the outputs provided ("high" or "low") or to PWM (Pulse Width Modulation) signals which can be used by the electronic circuits in the body.

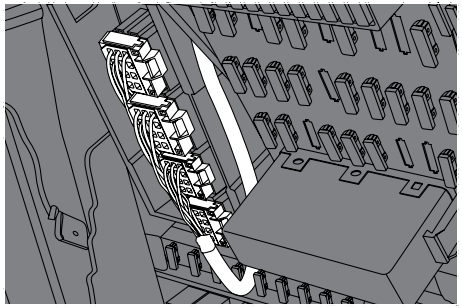
The PSM provides a clearly defined, diagnostics-compatible and EMC-tested interface between the vehicle and the body. The cabling on the vehicle must not be tampered with, as this would lead to fault messages from the other control units on the CAN bus.

Customer-specific requirements may be special inputs, such as an external engine start and stop, or special outputs, such as pulse-pause-modulated engine speeds or CAN-bus-compatible control units in bodies or trailers.

The PSM control unit is connected to the chassis CAN and therefore has access to all messages sent by the linked control units (e.g. idle throttle switch active, parking brake active, service brake active, vehicle speed C3, engine speed). By contrast, individual signals can be monitored or generated at analogue and digital inputs and outputs.

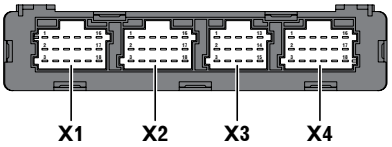
Example:

- The CPC sends the engine speed in a message, which can be read by the PSM control unit. The NM control unit converts the engine speed information into a PPM signal and makes this available at an output.
- In the opposite direction, PSM can convert the position of a hand throttle into an I-IS CAN message and thus request the desired engine speed.



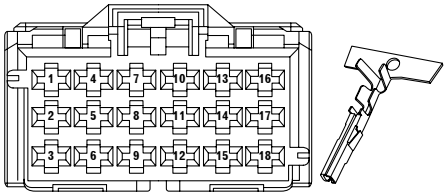
DICV-HDT-2362

Fig: Connectors in electrical compartment (example)



DICV-HDT-2364

Fig: Connector details



DICV-HDT-2363

Fig: Connector details

Connector:

Contact 1.01 mm^2 - 2.50 mm^2
Contact 0.50 mm^2 - 1.00 mm^2

Pin assignment of 18-pin PSM control unit connector (X1)	
X1 18/1	Construction CAN LOW Level
X1 18/2	Construction CAN ground shield
X1 18/3	Construction CAN High Level
X1 18/4	Engine speed
X1 18/5	Speed signal
X1 18/6	Engine torque signal
X1 18/7	Limit load control signal
X1 18/8	PWM II signal
X1 18/9	PWM III signal
X1 18/10	Hand-propelled +
X1 18/11	Hand-propelled encoder signal
X1 18/12	Hand-propelled -
X1 18/13	
X1 18/14	Engine fixed 2
X1 18/15	
X1 18/16	CoTel CAN Low level
X1 18/17	CoTel CAN Ground
X1 18/18	CoTel CAN High level

Pin assignment of 18-pin PSM control unit connector (X2)	
X2 18/1	Set speed 1
X2 18/2	Set speed 2
X2 18/3	Set speed 3
X2 18/4	Increase RPM
X2 18/5	Reducing speed
X2 18/6	Speed OFF
X2 18/7	Engine start (monitored)
X2 18/8	Engine stop (monitored)
X2 18/9	Starter lock-out (monitored)
X2 18/10	Pulsed switch supply 1
X2 18/11	Pulsed switch supply 2
X2 18/12	Pulsed switch supply 3
X2 18/13	Step plate switch (monitored)
X2 18/14	Engine start
X2 18/15	Engine stop
X2 18/16	Pulsed switch supply 4
X2 18/17	ADR enable
X2 18/18	Control console cutout

https://truckmanualshub.com/

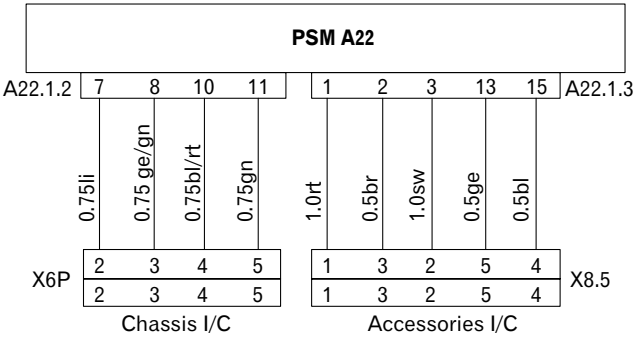
PSM control unit plug pin assignments, 15-terminal (X3)	
X3 15/1	Terminal 30
X3 15/2	Terminal 31
X3 15/3	Circuit 15
X3 15/4	Request PTO 1
X3 15/5	Request PTO 2
X3 15/6	Request PTO 3
X3 15/7	Power take-off 1 feedback
X3 15/8	Power take-off 2 feedback
X3 15/9	Power take-off 3 feedback
X3 15/10	Live power take-off 1
X3 15/11	Not assigned
X3 15/12	Not assigned
X3 15/13	Vehicle CAN low level
X3 15/14	Vehicle CAN, ground shield
X3 15/15	Vehicle CAN high level

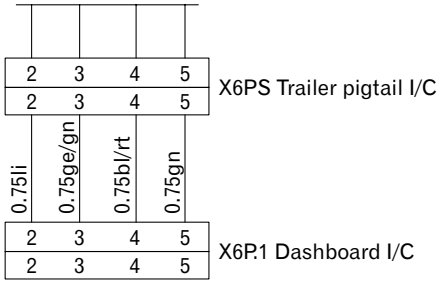
Pin assignment of 18-pin PSM control unit connector (X4)	
X4 18/1	Trailer CAN Low level
X4 18/2	Trailer CAN Ground shielding
X4 18/3	Trailer CAN High level
X4 18/4	Remote clutch control / ABS intervention I reverse gear / shift to neutral (monitored)
X4 18/5	Retarder status / parking brake lever (monitored)
X4 18/6	Terminal 31
X4 18/7	Pulsed switch supply 5
X4 18/8	Pulsed switch supply 6
X4 18/9	Engine running, generator OK I reverse gear information (0.7 A)
X4 18/10	Switch off retarder/1st gear information (1.6 A)
X4 18/11	Clutch actuation 1/kickdown (1.6 A)
X4 18/12	Clutch actuation 1/frequent-stop brake (1.6 A)
X4 18/13	Power take-off actuated/ABS fault (0.7 A)
X4 18/14	Power take-off reported back/ 2nd gear information (0.7 A)

Pin assignment of 18-pin PSM control unit connector (X4)	
X4 18/15	Neutral information (0,7 Al/ shifting to neutral
X4 18/16	PTO 1 actuation (1.6 A)
X4 18/17	PTO 2 actuation (1.6 A)
X4 18/18	PTO 3 actuation (1.6 A)

https://truckmanualshub.com/

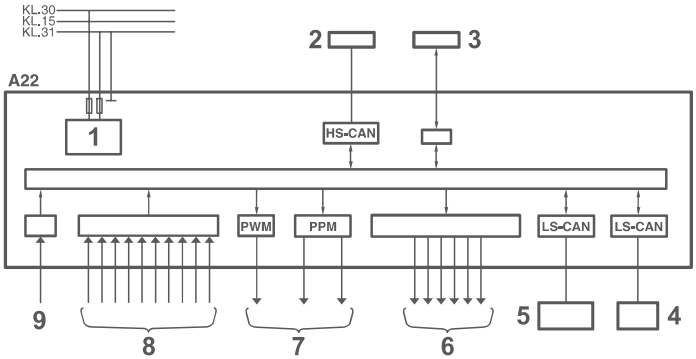
PSM Schematics





DICV-HDT-2366

PSM Interfaces



1. Power supply from on-board electrical system
2. High-speed CAN interface to vehicle star point
3. Power take-off switch
4. LS CAN interface to body electronics
5. LS CAN interface to trailer
6. Digital outputs (relay drivers) e.g. D+ switched
7. Pulse pause modulation (PPM) and pulse-width modulation (PWM) outputs, e.g. vehicle speed signal
8. Digital inputs, e.g. engine star
9. Analogue inputs, e.g. hand throttle

DICV-HDT-2365

https://truckmanualshub.com/

Some of the functions that can be realised:

- Engine start/engine stop
- Engine speed control (Power Take Off)

Certain basic functions are assigned to the inputs. These can be supplemented with additional functions or changed to other functions by means of parameterization. The PSM is parameterized using XENTRY.

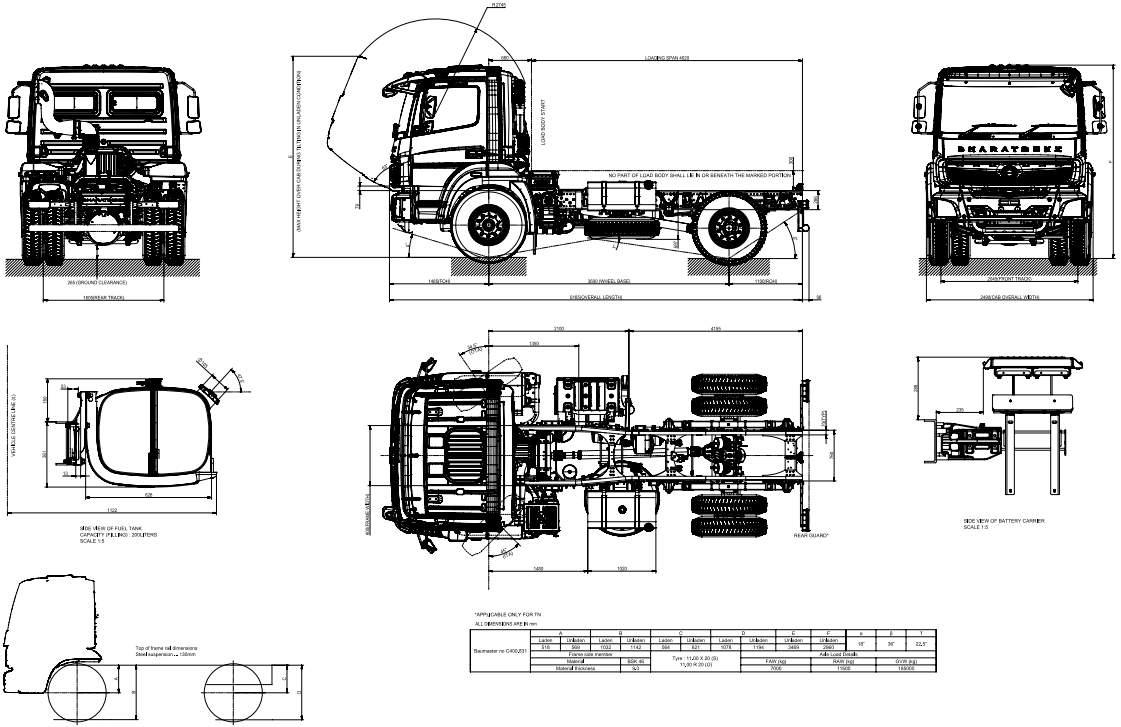
Additional Information

These Body/Equipment Mounting Directives cannot describe in full the wide variety of capabilities of the PSM.

For clarification contact BharatBenz authorised dealership.

Chassis Drawing

1923C BSVI - 3600WB

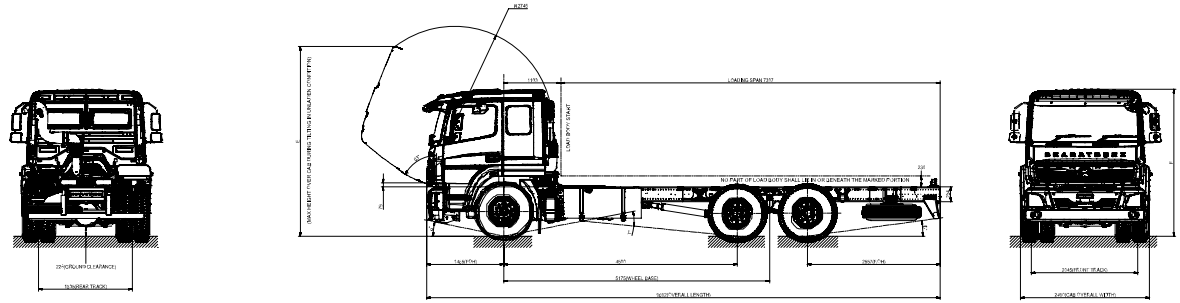


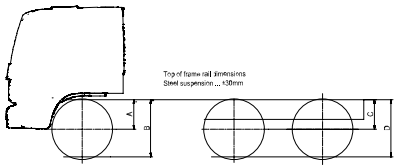
*APPLICABLE ONLY FOR TN
ALL DIMENSIONS ARE IN mm

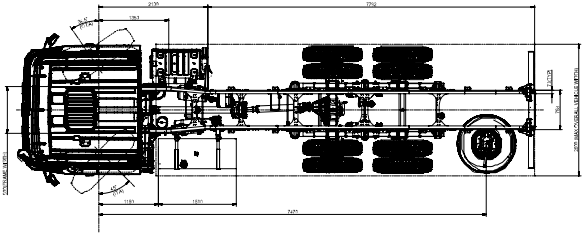
Rearmaster no C400L231	A		B		C		D		E	F	G	H	I
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen	15°	30°	22.5°
	918	569	1032	1142	564	421	1078	1194	2499	2340			
Frame side member					Tyre : 11.00 X 20 (G)			Axle Load Details					
Material			BSK 46		11.00 R 20 (G)			FAW (kg)		RAW (kg)		GVW (kg)	
Material thickness			7x7					7030		11500		18000	

DICV-HDT-2337

2823R BSVI - 5175WB

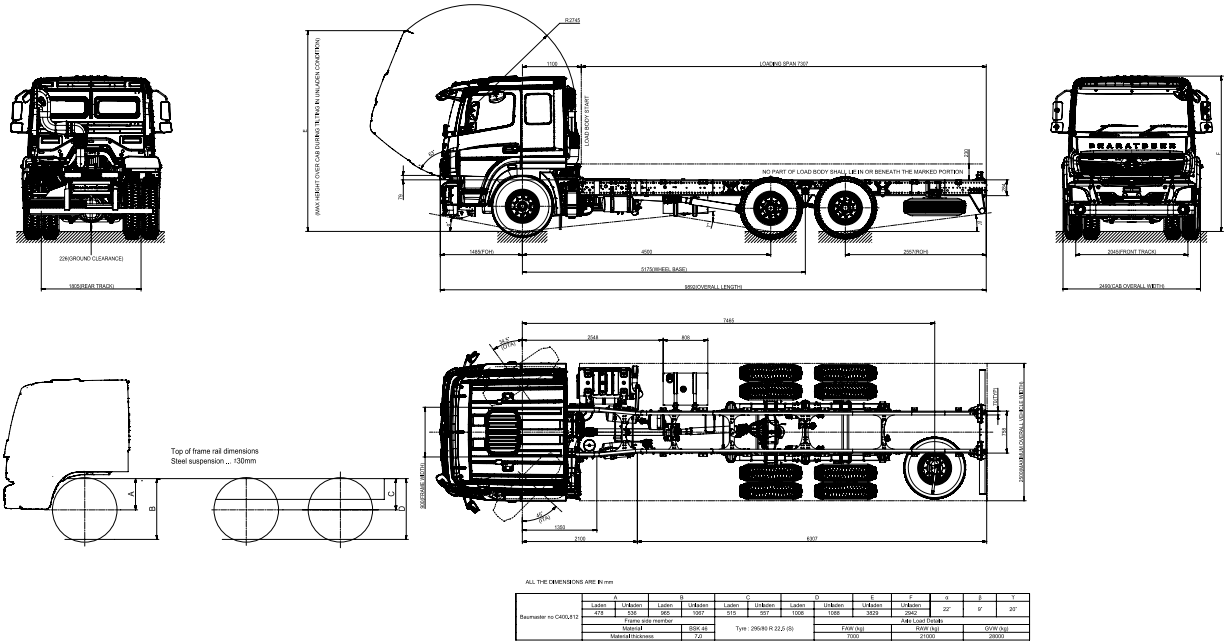






ALL THICKNESS ARE IN mm															
	A		B		C		D		E	F	x	X	Y
	Lxx(n)	U(xx(n)	Lxx(n)	U(xx(n)	Lxx(n)	U(xx(n)	Lxx(n)	U(xx(n)	U(xx(n)	U(xx(n)	22	11	28
Illustrative Only	470	500	995	1767	970	997	1796	1113	1067	1767			
	Frame section modulus									Axle Load Grade			
	Material		355MPa		Tyre - 11.2R 20 (S) 295/80 R 22.5 (P)			FAW (kg)		GVW (kg)			
	Material thickness		7.0					4995/7500		25000			

2823R BSVI - 5175WB (Tanker Variant)

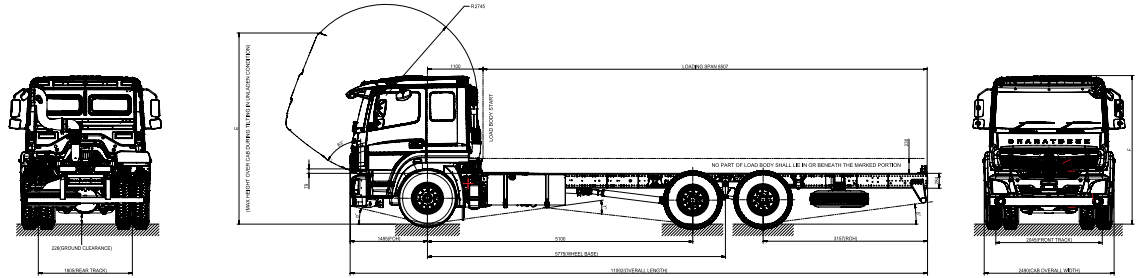


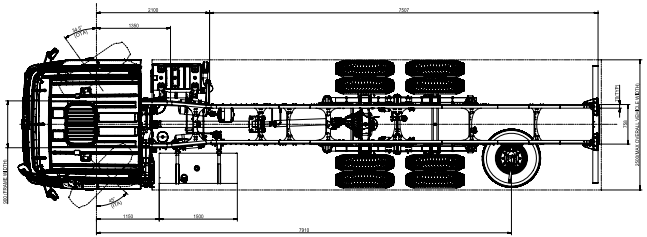
ALL THE DIMENSIONS ARE IN mm

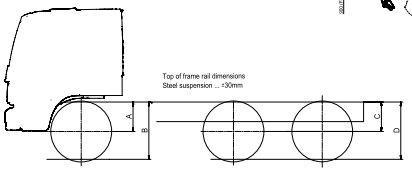
Baumaster no C400L612	A		B		C		D	E	F	α	β	γ
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	22°	5°	20°
	478	536	965	1067	515	557	1008	1008	3829	2942		
	Frame side member				Tyre : 295/80 R 22,5 (S)			Axle Load Details				
	Material			BSK 46				FAW (kg)		RAW (kg)		GVW (kg)
	Material thickness			7.0				7000		21000		28000

DICV-HDT-2341

2823R BSVI - 5775WB



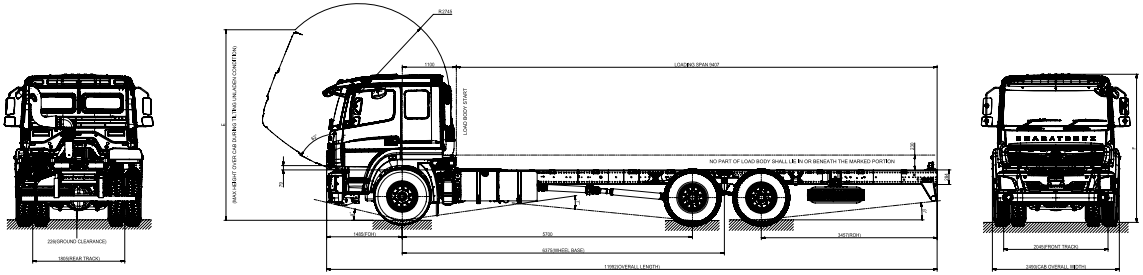


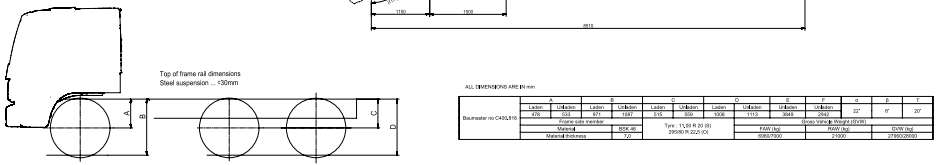


ALL DIMENSIONS ARE IN mm

	A		B		C		D	E	F	a	B	Y
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen		
Baumuster no C495,614	478	533	871	1097	515	550	1008	1113	3849	3842	22	4°	20°
Frame side member					Tyre : 11.00 R 20 (D)			Axle Load Details					
Material			BSR 46		295/80 R 22,5 (D)			FAW (kg)		RAW (kg)		GVW (kg)	
Material thickness			7.2					6995/7000		21150		27995/28000	

2823R BSVI - 6375WB

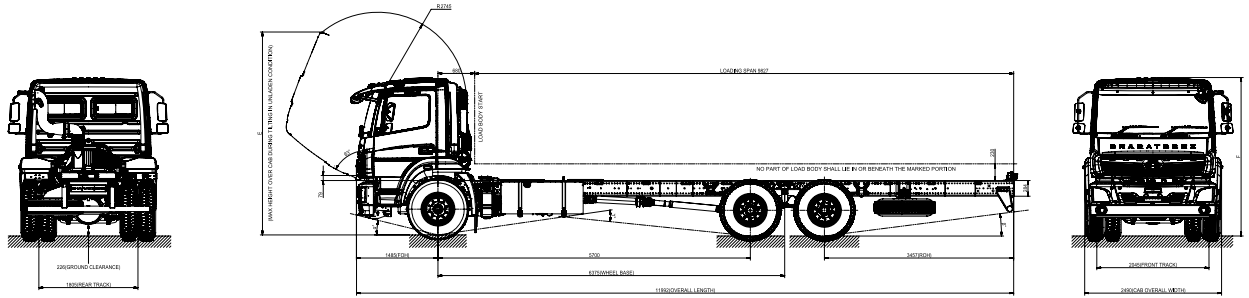


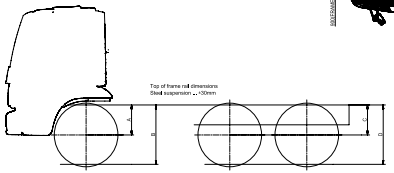


ALL DIMENSIONS ARE IN mm

	A		B		C		D		E	F	G	β	γ
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen	22°	6°	20°
Baumaster no C49L61C	878	933	971	1087	515	559	1006	1110	3648	2942			
Frame side member					Tyre : 11.00 R 20 (S)		Gross Vehicle Weight (GVW)						
Material			BSK 46		295/80 R 22.5 (O)		FAW (kg)		RAW (kg)		GVW (kg)		
Material thickness			7.0				6965/7000		21000		27965/28000		

2823R BSVI - 6375WB (with 32ft load span)



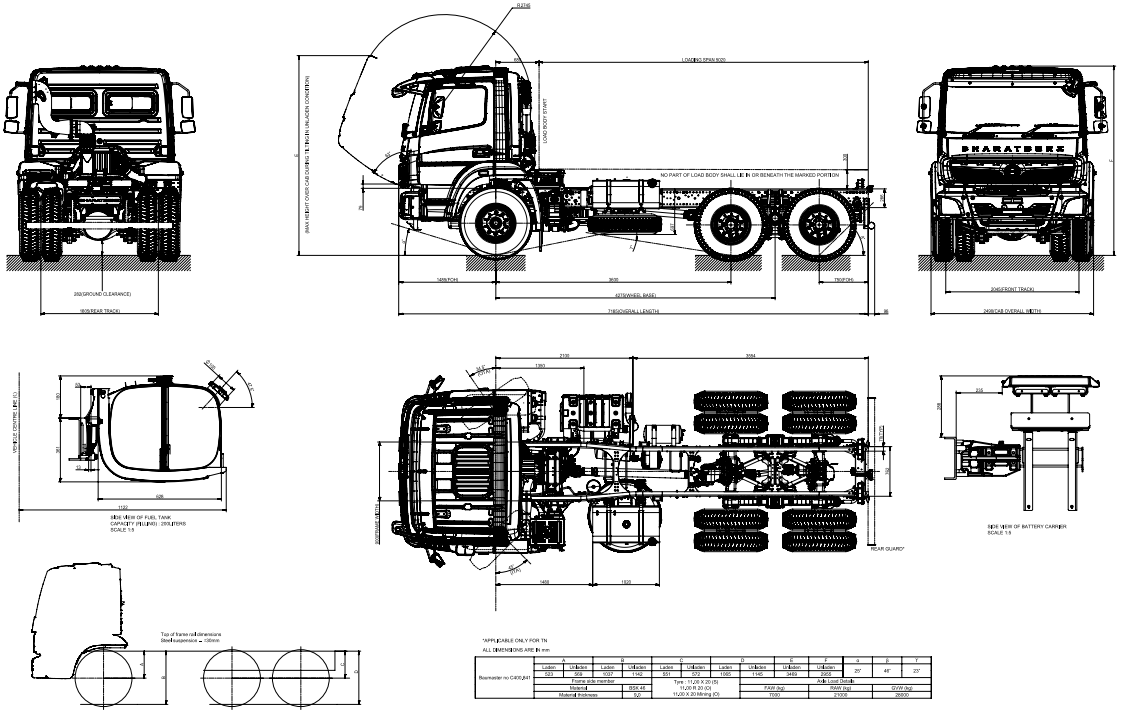


ALL DIMENSIONS ARE IN mm

Baumeister no C400J816	A		B		C		D	E	F	a	β	γ
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen			
	476	553	971	1097	515	539	1006	1113	3649	2912	22°	06°	20°
	Frame side member				Tyre : 11.(R 20 (D)		Axle Load Details						
	Material			BSK 46	295/80 R 22,5 (D)		RAW (kg)		RAW (kg)		GVW (kg)		
	Material Thickness			7.0			6960/7030		21000		27960/28000		

https://truckmanualshub.com/

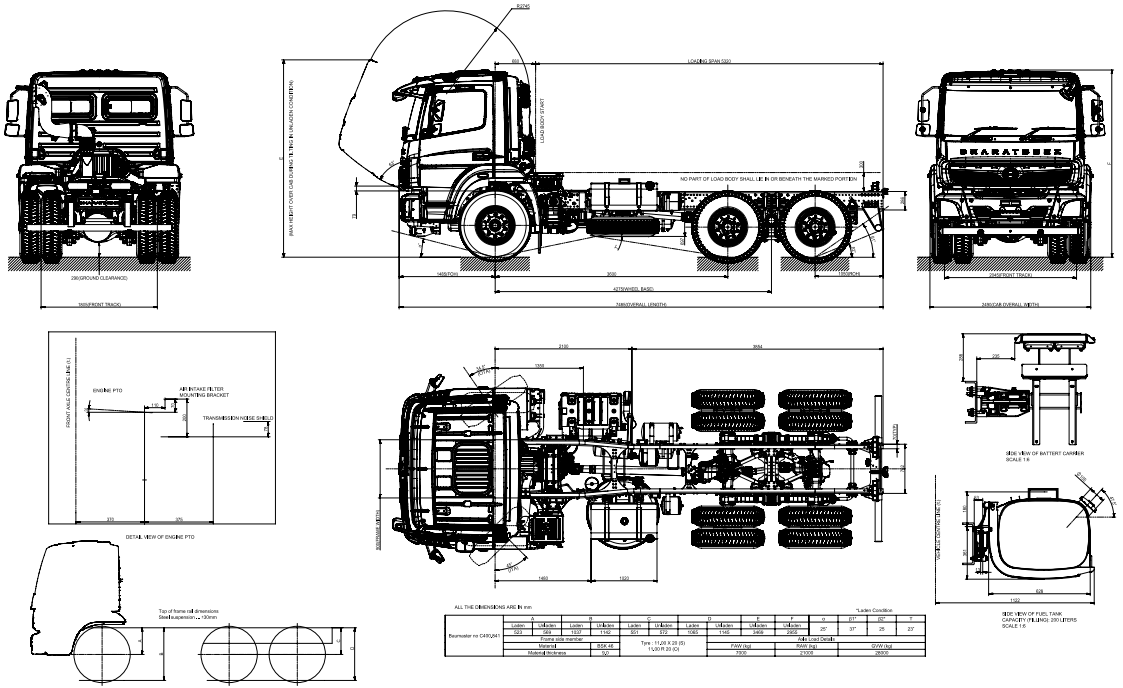
2823C/ 2828C BSVI - 4275WB



*APPLICABLE ONLY FOR TN
ALL DIMENSIONS ARE in mm

Beamaster no C4902J41	A		B		C	D	E		F		G	H	I
	Laden	UnladeN	Laden	UnladeN	Laden	UnladeN	Laden	UnladeN	Laden	UnladeN	UnladeN	20°	45°	22°
	523	568	1027	1142	551	572	1165	1145	3481	3481	2955			
Frame side member					Tyre - 11.2/R 20 (S)			Axle Load Details						
Material			BSK 46		11.2/R 20 (GO)			FAW (kg)			RAW (kg)		GVW (kg)	
Material thickness			10		11.2/R 20 Mining (O)			7500			31000		38500	

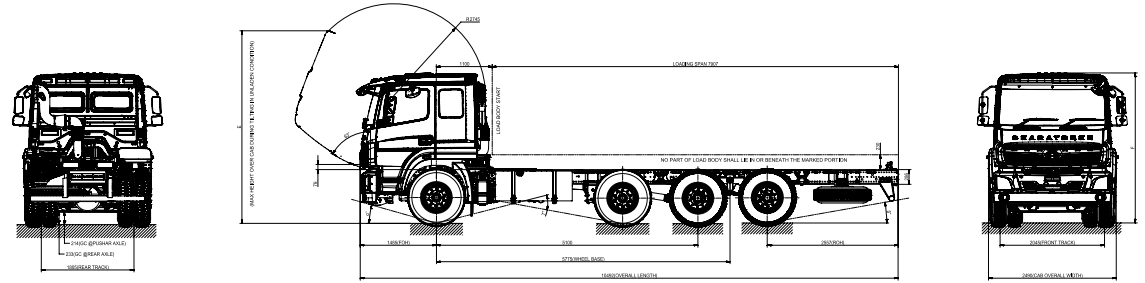
2823C/ 2828C RMC BSVI - 4275WB



Boumaster no CARYUNT	A		B		C		D		E		F	o			T
	Laden	UnLaden	Laden	UnLaden	Laden	UnLaden	Laden	UnLaden	UnLaden	UnLaden					
	923	1065	1337	1152	931	772	1065	1165	3469	3868	26°	37°	25	27°	
	Frame side member				Tyre : 11.26 X 20 (S) + 12.00 R 20 (C)			Axle Load Details							
	Material		BSK 46					FAW (kg)		RAW (kg)			GVW (kg)		
	Material thickness		5(t)					7300		21000			28300		

DICV-HDT-2339

3523R BSVI - 5775WB

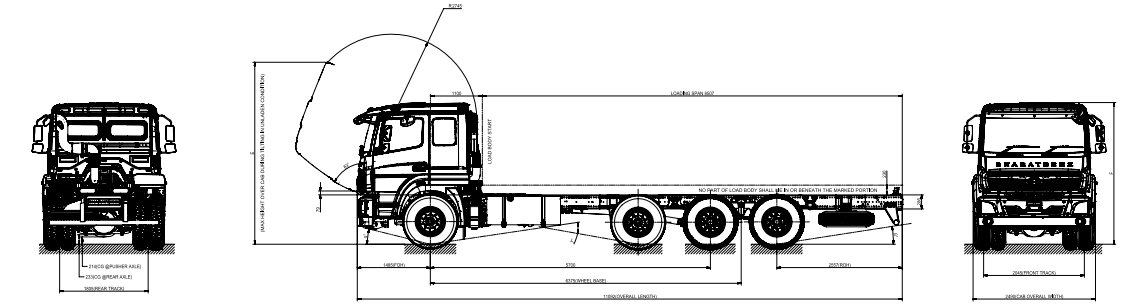


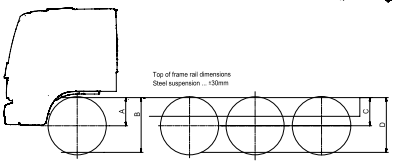
ALL DIMENSIONS ARE in mm

	A		B		C		D		E	F	a	β	γ
Baumuster no C40USX	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen	15±5°	10°	24.2°
	522	574	1035	1138	555	608	1348	1182	1850	2580			
	Frame rails member				Tyre : 11.00 R 20 (S) 295/80 R 22.5 (O)					Axle Load Details			
	Material		BSK 46					RAW (kg)	Prahrer Axle (kg)	RADR (Tandem) (kg)	GVW (kg)		
	Material thickness		8,5					6960/7000	6960/7000	21000	34980/35000		

DICV-HDT-2347

3523R BSVI - 6375WB

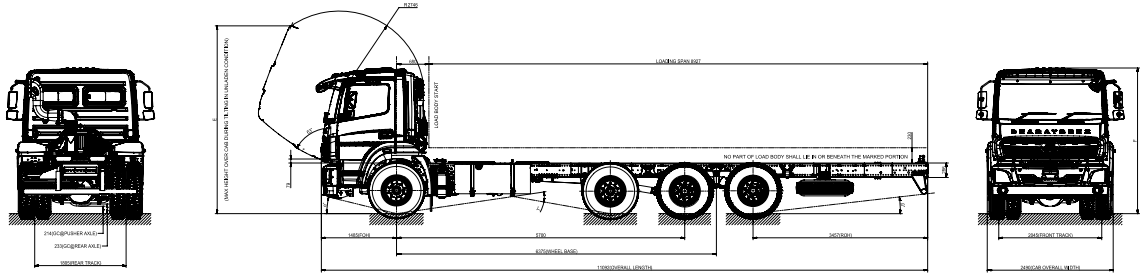


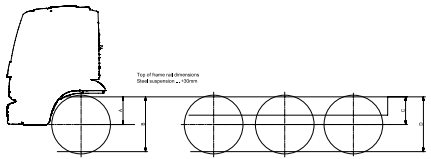


ALL DIMENSIONS ARE IN mm

Beamaster no C4KQJQ5	A		B		C		D		E		F	G	H	I
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen	Unladen	15.2°	15°	20.2°
	542	874	1535	1129	555	686	1048	1162	3890	2960				
Frame side member					Tyre : 11.00 R 20 (G) 295/80 R 22.5 (G)			Axle Load Details						
Material			BSK 46					FAW (kg)	Pusher Axle (kg)	RAW (Tandem) (kg)		GVW (kg)		
Material Thickness			5.0					6950/7300	6950/7500	21000		34950/35500		

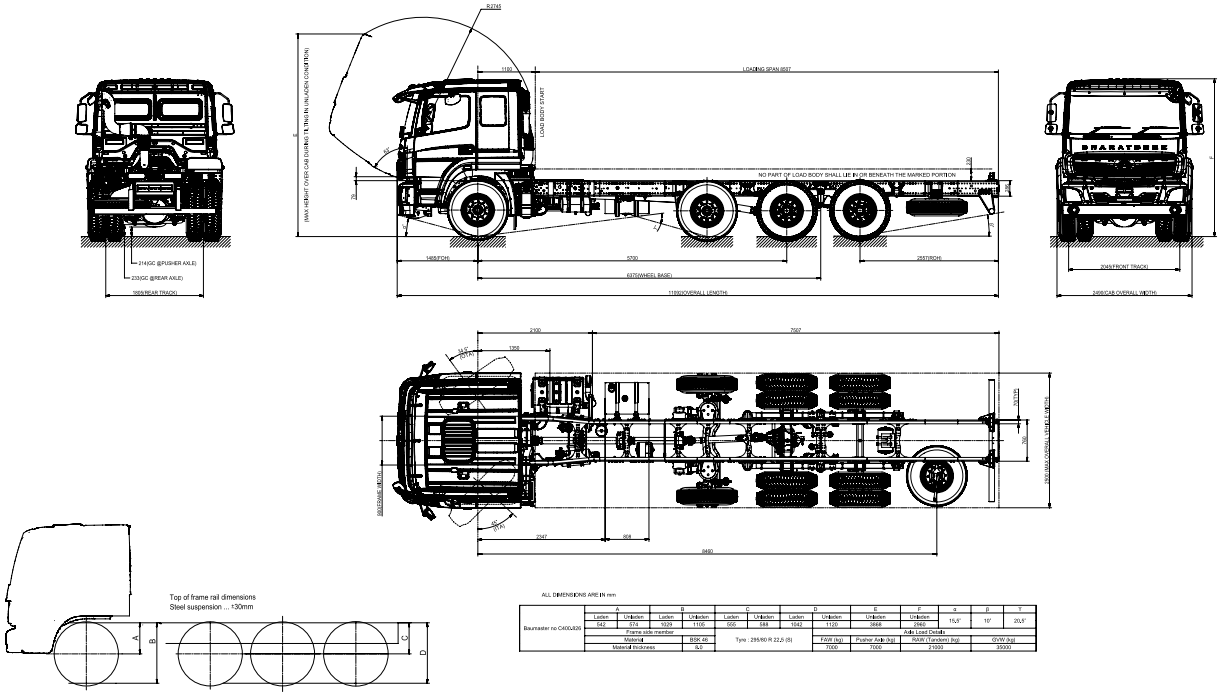
3523R BSVI - 6375WB (with 32ft load span)





ALL DIMENSIONS ARE IN mm															
Baumeister no C490J526	A		B		C		D		E	F	a	β	h
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen	15.5°	7.7°	20.2°
	942	974	1035	1139	885	988	1048	1142	3458	2960			
	Frame side member								Axle Load Details				
	Material		BSK 46		Tyre : 11.(R/X) R 22.5 (G) 20/650 R 22.5 (G)				FAW (kg)	Pusher Axle (kg)	RAW Tandem (kg)		GVW (kg)
	Material thickness		7						6950/7100	6950/7100	21000		34950/35000

3523R BSVI - 6375WB (Tanker variant)

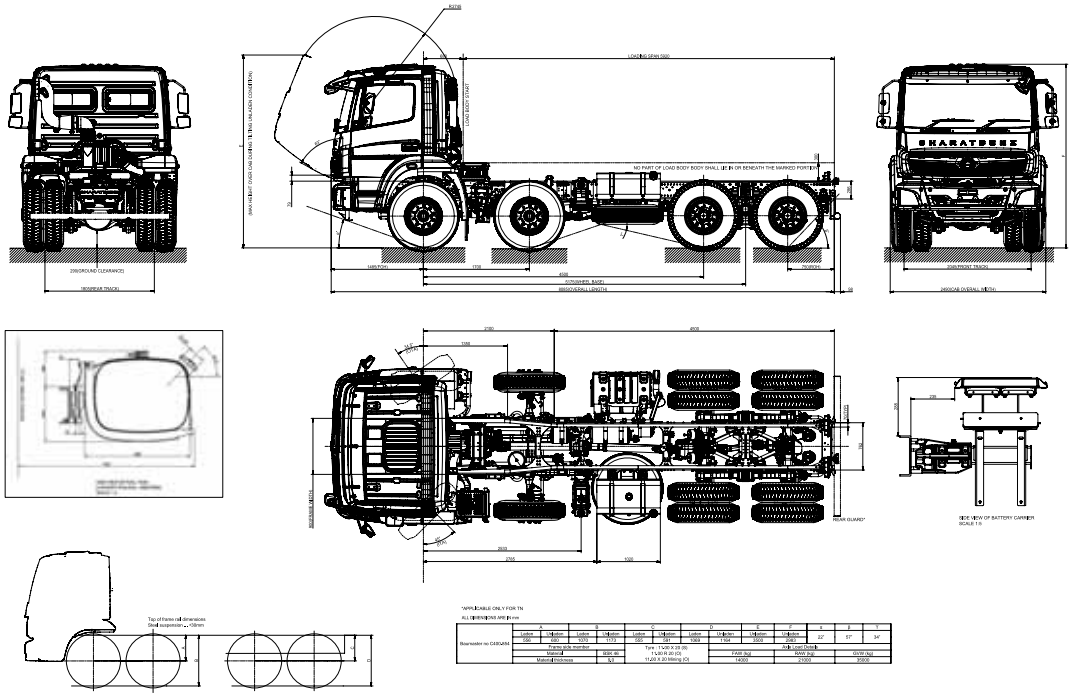


ALL DIMENSIONS ARE IN mm

Baumaster no C40XJ026	A		B		C		D		E	F	a	B	T
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen	15,5°	10°	20,5°
	642	574	1529	1155	550	588	1042	1120	2648	2965			
	Frame side member									Axle Load Details			
	Material		BSK 46		Tyre : 295/80 R 22,5 (S)			FAW (kg)	Pusher Axle (kg)	RAW (Tandem) (kg)		GVW (kg)	
	Material thickness		8,0					7500	7500	21000		35000	

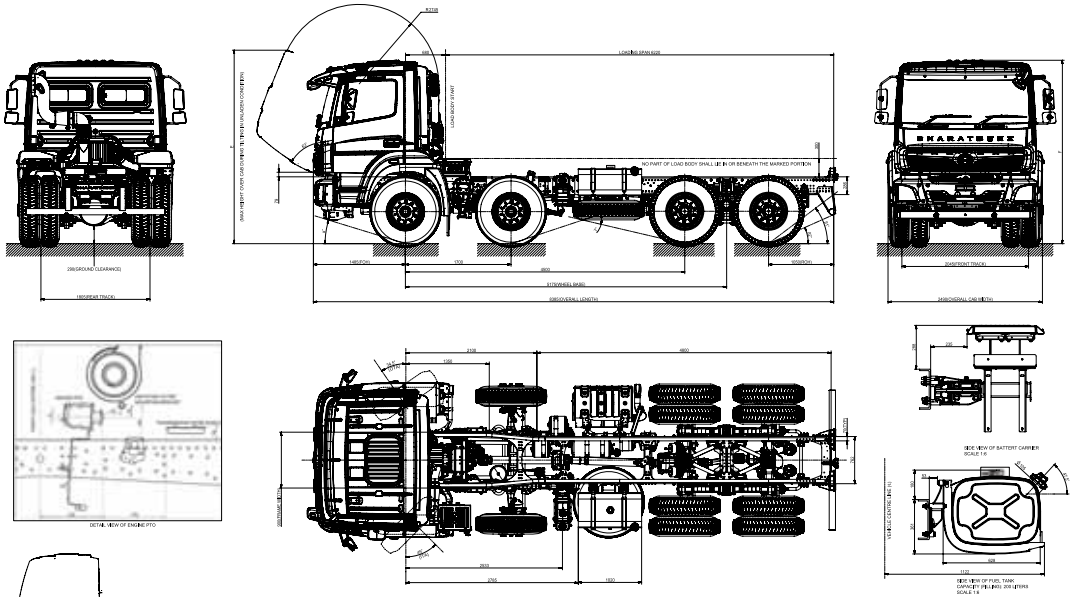
DICV-HDT-2354

3528C BSVI - 5175WB

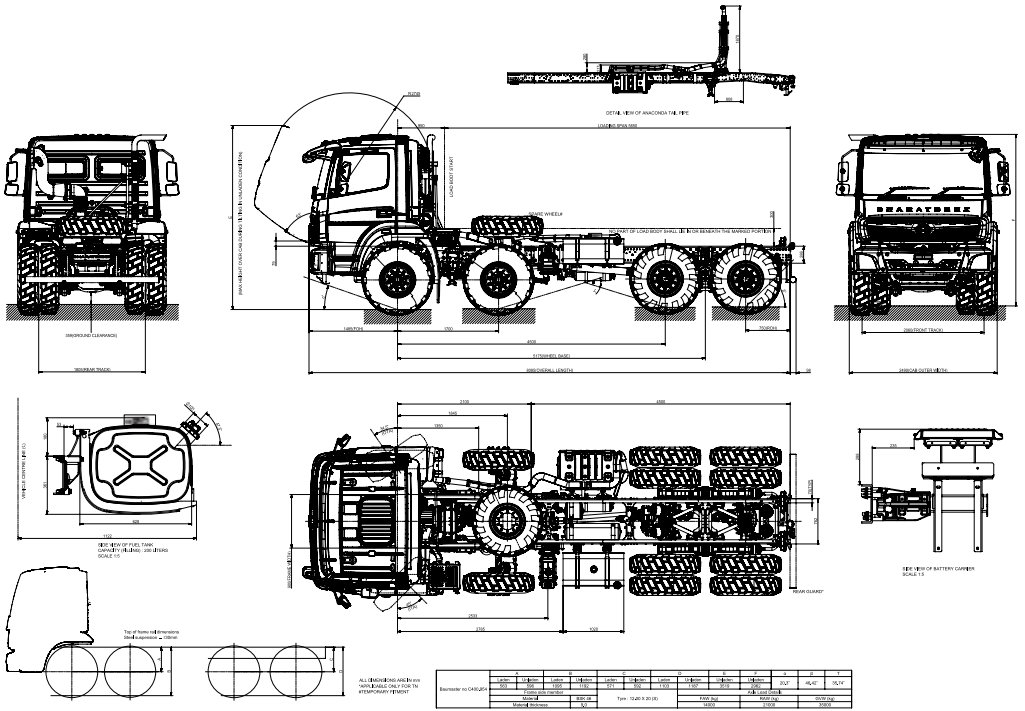


Wheelbase no CAB/AXLE	A		B		C		D		E		F	G	H	I
	Ladder	Midsection	Ladder	Midsection	Ladder	Midsection	Ladder	Midsection	Midsection	Midsection	Midsection	22°	57°	34°
	650	900	1070	1170	650	941	1060	1104	3500	3940	4340			
	Frame side member				Tank: 1 Left X 01 (R)				Side Load Outrig R					
	Material		BBK 46		1 LWX R 20 (O)				FAW (kg)		RAW (kg)		GVW (kg)	
	Material thickness		5.5		1 Left X 20 Mtring (O)				14000		21000		35000	

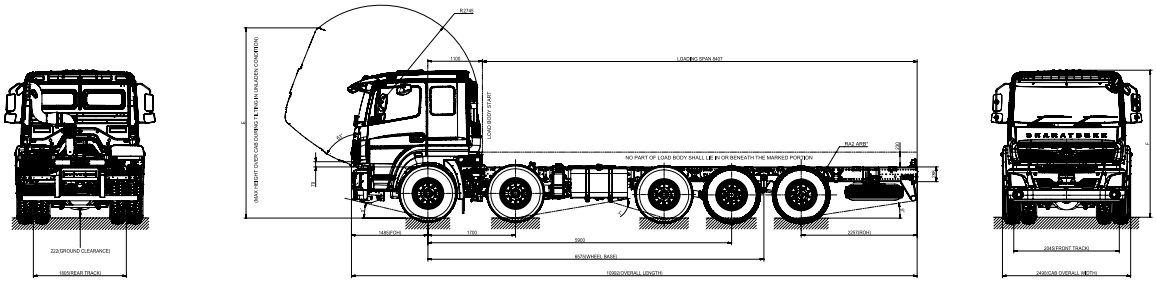
3528C RMC BSVI - 5175WB

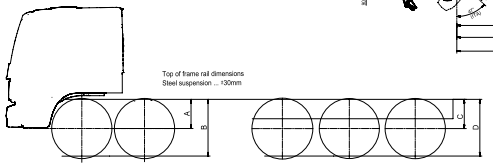


3528CM BSVI - 5175WB



4228R BSVI - 6575WB





ALL DIMENSIONS ARE IN mm
*APPLICABLE ONLY FOR HDG APPLICATION

Baumuster no C400JJ627	A		B		C		D		E	F	a	β	γ
	Laden	Unladen	Laden	Unladen	Laden	Unladen	Laden	Unladen	Unladen	Unladen			
	820	964	1015	1118	920	975	1020	1125	2008	2982	15°	10°	27.4°
Frame side member					Tyre : 11.00 R 20 (S) 20/600 R 22.5 (O)				Axle Load Details				
Material			650K 4D						FAWT (kg)	FAWT (Tag) (kg)	FAWT (Tandem) (kg)	GVW (kg)	
Material thickness			8(t)						6960/7000	6960/7000	21000	41880/45000	