

CHASSIS CITELIS EURO 4 - 5 / EEV RANGE

**12 m S 2-3 Doors Diesel/CNG – Transversal Motor
12 m Line 2-3 Doors Diesel – Longitudinal Motor
18 m L 3-4 Doors Diesel/CNG – Transversal Motor**

Vehicle equipment regulation

Strictly follow the instructions given for proper operation and reliability of vehicle parts.

Due to the natural and constant product development, certain parts contained in this document could not be updated.

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I. GENERAL INFORMATION

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I. GENERAL INFORMATION

The instructions given in this section aim at the following targets:

- Ensure, in all cases, the mechanical groups making up the chassis work properly.
- Act as compulsory regulation for both IRISBUS shops and external Body repairers, if manufacturing bodies on behalf of IRISBUS.
- Define the quality standard to be achieved for external Body repairers, self-equipping IRISBUS chassis.
- Set the standard relationship between IRISBUS-Body repairers and subcontractors as for production processing control and final product technical compliance regulation.
- Define the Body maker obligations as for works involving safety parts.
- Determine the Body maker liabilities before and after the IRISBUS authorization achievement.
- Define the IRISBUS-Body maker obligations as for the product direct liability
- Define the Body maker obligations as for the warehouse and modified vehicle quality management, as well as warranty procedures.

We remember that the Body maker cooperation with IRISBUS assumes he is a capable professional, always able to best exploit his technical and organization capacities. Therefore, IRISBUS takes for granted that his implementations shall always be carried out in compliance with professional rules. The following issues are not exhaustive and simply provide basic rules and provisions, which can be further developed.

Faults or defects due to total or partial failure to comply with the current regulation could not be covered by the chassis warranty, chassis mechanical groups included.

I.1 RULES AND INSTRUCTIONS

The Body maker shall be totally liable for the body project and implementation, in order for the vehicle to provide the necessary performances and reliability.

Therefore, he shall:

- Comply with the rules supplied by the current equipment instructions.
- Not modify the chassis without the IRISBUS written authorization.
- Build the body structure so to incorporate it within the IRISBUS chassis, by taking particular care as for frame seams.

I.1.1 Body spare parts

The Body maker agrees to ensure the supply of spare parts for a minimum period of 10 years, starting from the last ordered body, and for all the assembled parts and components.

I.2 TECHNICAL INFORMATION

I.2.1 IRISBUS supply to the Body maker

- Operation and Maintenance Manual, including chassis specifications.
- Chassis complete project, including dimensions essential to the Body maker.
- Equipment instructions, including information essential to the body manufacturing (heating intakes, leveling stands, etc.).
- Diagrams of the electric, pneumatic and hydraulic systems, including data necessary to the Body maker (authorized intakes, powers, etc.).

I.2.2 Body maker supply

For each equipped vehicle delivered, the Body maker will provide Operation and Maintenance instructions for the body and the related components, which will complete the manual supplied by IRISBUS along with the chassis.

The Body Shop will also supply a parts catalogue of the body and associated components and a warranty card.

I.3 WORK ORDER COMPONENT CONSISTENCY

All vehicles belonging to a same work order shall be equipped with components of a same brand, model and quality.

I.4 PROVISIONS

The body maker shall always consider and check the final product fully compliance with all applicable legal provisions for this type of vehicles, namely: local government/self-governing body/national regulations enforced in each Country where they are registered and/or used (Road Traffic Code, Official Rules, etc.), international rules (European Union Regulations, UNO/Geneva ECE Regulations, etc.), as well as all those instructions relevant to accident prevention, servicing instructions, environment, etc.

Note that the current equipment regulation only quotes recommendations concerning the applicable law, accident prevention provisions or other information which, in our opinion, can be considered as the most important ones. They are not meant to supersede or relieve the body maker commitment and liability to constantly update his sources of information.

For this reason, IRISBUS is not held liable for consequences due to mistakes resulting from poor knowledge or wrong construction of the currently enforced legal provisions.

I.5 REGISTRATION BOOK

Current national laws do not provide for registration books related to chassis meant for passenger vehicles. Therefore, the complete final product (equipped vehicle) contractor or purchaser shall have to require the registration book, provided no specific agreements have been made with IRISBUS.

IRISBUS will make all the necessary chassis documents available, so to obtain the equipped vehicle registration and the relevant registration book (in Spain, the class approval according to Royal Decree 2140/86 and the chassis manufacturing certificate).

I.6 AFTER SALES REGULATION FOR BODY REPAIRERS

This chapter defines liabilities for the works to be carried out onto IRISBUS passenger vehicle chassis, according to the following categories:

- IRISBUS direct sale
- Sale via Dealer
- Sale via Bodyshop

This in order to clearly define liabilities of whoever uses IRISBUS produced, controlled, supplied and delivered chassis (for passenger vehicles).

Obviously, if problems arise due to transportation, lack of materials and transit, IRISBUS will fully acknowledge and take its own liabilities, as provided for in the regulation.

The following paragraphs deal with various issues, namely:

- Chassis acceptance
- Checkout/overhaul
- Routine tuning up (RTU before delivery)
- Coupons
- Warehouse maintenance

I.7 CHASSIS ACCEPTANCE

The Body maker receiving a chassis from IRISBUS or a distributor shall perform a preliminary overhaul on the chassis acceptance, directly notifying missing parts or damages to the carrier.

This includes checking boxes of materials possibly supplied, compared to the enclosed sheet.

Any remark must be written on the sheet, listing damages and missing parts (See Annex A, Chapter 5), enclosed with the delivery note; then the sheet must be signed by the carrier for acceptance.

This delivery note, with the enclosed survey sheet, will be sent to IRISBUS, After Sales department, which will ask the relevant IRISBUS shop Quality manager to supply the missing material.

As for in transit damages or missing parts (not notified by IRISBUS), the receiver shall follow the instructions given in Chapter 5 "Procedures for damages and/or dents on vehicles forwarded to Body repairers".

IRISBUS shall not be held liable for missing parts and/or damages detected after the chassis acceptance; therefore, the Body maker shall borne all repair costs.

I.8 CHASSIS OVERHAUL FOR COMPLETED BUSES

During the delivery stage, the Body maker will perform, directly or by means of the IVECO/IRISBUS service network a functional checkout on the chassis, as specified in Annex B, Chapter 5. The relevant costs shall be fully borne by the Body maker.

This annex lists all checks to be performed on completed vehicles, in order to correct defects possibly arisen during processing and assess the equipped vehicle overall functionality.

Any defect or fault detected in the chassis mechanical members shall be notified by writing, according to the Body maker testing procedures, to the local After Sales department manager which, having seen the fault, shall choose whether to apply the RTU (routine tuning up) corrective intervention at an IVECO/IRISBUS servicing branch shop.

The costs for servicing interventions covered by the warranty shall be refunded according to the IVECO current procedures.

At the end of these operations, the vehicle shall be considered as delivered in all respects, faultless and ready to use.

I.9 RTU (ROUTINE TUNING UP)

I.9.1 IRISBUS direct sale

RTU must be performed by the IVECO/IRISBUS servicing network (Servicing organization or a distributor).

- ✓ RTU performed by IVECO/IRISBUS Servicing organization: upon the vehicle delivery to the client, the suitable sheet is detached from the warranty booklet and sent, enclosed to the invoice, to the distributor which contacted the Authorized Workshop, who will forward it to IRISBUS, according to the defined procedures.
- ✓ RTU performed by the distributor: upon the vehicle delivery to the client, the suitable sheet is detached from the warranty booklet and forwarded to IVECO/IRISBUS, according to the defined procedures.

In all cases, both invoices and RTU must be approved by the IRISBUS department Technical Manager.

I.9.2 Direct sale through Body repairers

As above.

I.9.3 Sale through IVECO/IRISBUS distributor

RTU is up to the distributor. If the client directly withdraws his equipped vehicle from the Body maker RTU, on the distributor request, can be performed at a local authorized workshop, which will charge the cost to the distributor who sold the vehicle; the latter shall recover according to the IVECO procedures.

N.B.: Note the above action procedure excludes payment of operations carried out on the body concerning the operation of parts added by the Body Shop (air conditioning etc) and the operation of parts and equipment already existing on the chassis and used by the Body Shop (relays, electrical system control units, etc).

I.10 COUPON

The "Servicing Coupon", for the chassis only, shall be issued by the IVECO/IRISBUS Servicing organization. The interventions shall be performed according to the procedure described in the warranty manual. Otherwise, the warranty will be nullified. (See enclosure C, Chapter 5).

I.10.1 Sale through IRISBUS distributor

The distributor who sold the vehicle shall follow the normal procedure as for issuing the "COUPON".

I.10.2 Direct sale by IRISBUS and through the Body maker

- ✓ Coupon issued by the IVECO/IRISBUS Servicing organization: the suitable sheet shall be detached from the warranty manual and sent, enclosed to the invoice, to the relevant distributor.
- ✓ Coupon issued by the distributor: the distributor shall detach the suitable sheet from the warranty manual and send it, enclosed to the invoice, to the Regional Direction.

I.11 MAINTENANCE FOR VEHICLES STORED IN THE WAREHOUSE

(Equipped vehicles and chassis)

In order to keep in good condition and operation new equipped vehicles and chassis used by Body repairers which must be stored in the warehouse for a given time, a maintenance schedule has been defined, from storage to final delivery to the client.

As for vehicles stored in areas under direct IRISBUS liability, several warehouse maintenance procedures have already been enforced, at predefined intervals.

Remember that, as soon as the goods are taken under our sales network (complete vehicles) or external Body repairers (passenger vehicle chassis) liability, these shall be held responsible for the proper maintenance. They shall act so as to ensure vehicles are delivered in the best functional and aesthetic conditions.

Annexes D, E and F of Chapter 5 list all the operations provided for, divided into complete vehicles and chassis as well as the recommended maintenance schedule for the vehicle optimum maintenance.

The maintenance schedule shall be followed starting from the date of this paper and registered on the "Maintenance sheet" which, on request, shall be shown to IRISBUS survey personnel. For a better understanding, we specify that the maintenance schedule shall apply to all chassis: those sold to the distributor or Body maker as well as those on "sales account" and "work account".

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2. SPECIFIC CHASSIS AND BODY INSTRUCTIONS

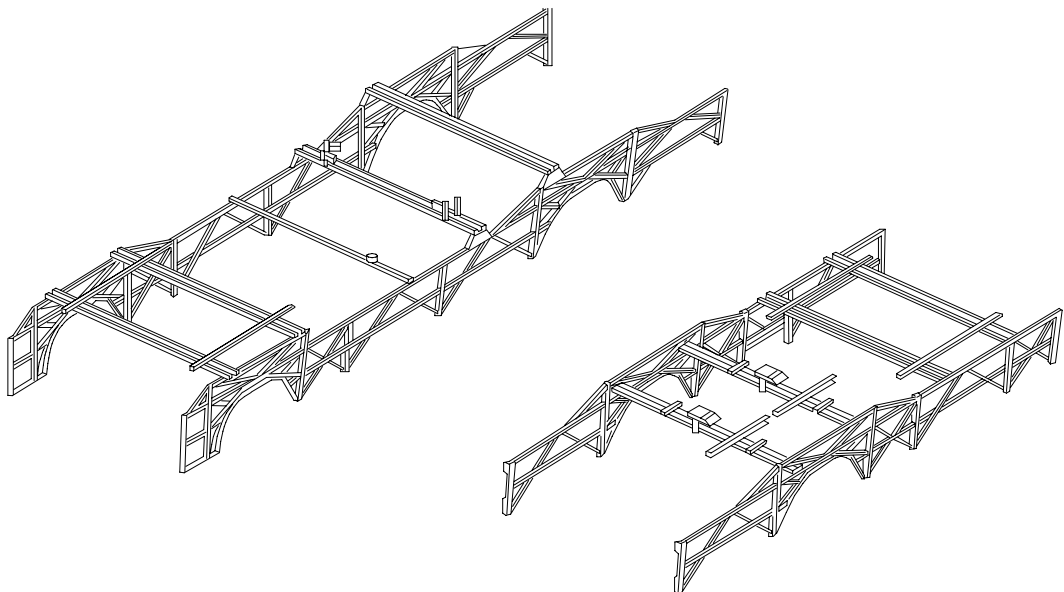
2.1 SPECIFIC CHASSIS INSTRUCTIONS

2.2 TRANSPORTING AND LOADING THE VEHICLE CHASSIS WITHOUT BODY

The chassis is supplied with a handling structure designed to assure sufficient rigidity during transportation. During the coachbuilding process, this structure must be removed. See example in Fig 2.2 for 18 m vehicles.

The chassis must always be transported on an articulated trailer.

Figure 2.2.a



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2.2.1 Loading the chassis onto ships, trains, etc.

The chassis must be lifted from the axles or wheels to be loaded onto ships, railway carriages, etc.

It is absolutely forbidden to secure crane cables to the cross members, to the rails or to the manoeuvring superstructure.

The chassis must only be anchored to the transporting vehicle using the rear drive axle or centre axle. The wheels are used to support the weight of the chassis.

Avoid exceeding the roll and yaw angles and maximum curvature specified by the fifth wheel manufacturer during manoeuvring of the jointed frame (ref. 2.8.17.1 of this manual).

2.3 CHASSIS DELIVERY AND STORAGE

2.3.1 Delivery

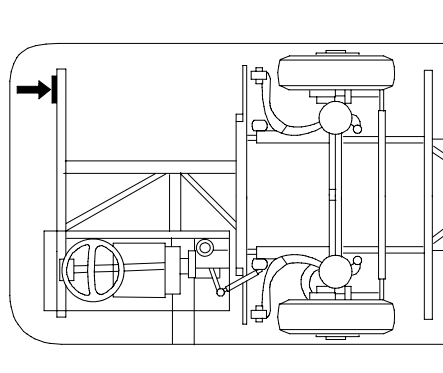
The chassis is carefully inspected before delivery by IRISBUS/IVECO.

The chassis must be inspected again by the outfitter following delivery to identify anomalies which may have arisen during transportation. IVECO/IRISBUS will not accept claims for material faults or anomalies arising during transportation after delivery which are not stated in the consignment notes signed by the forwarding agent.

Outfitters will follow the instructions in article 1.6 of "After-Market Standard for Outfitters" (see chapter 1) for how to fill in the consignment notes correctly.

The chassis ID number must be reported for any complaint. It is engraved on the right of the front cross member (welded plate). See Figure 2.3.

Figure 2.3



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2.3.2 Storage

After delivery, the chassis must be protected from intemperate weather if it is to be stored for an extended period prior to industrialization.

The coachbuilder is responsible for looking after the protection of delicate components such as the instrument panel, batteries, engine, panels, electrical and electronic equipment etc. so as to avoid shortening their service life and reliability.

The chassis must be protected against both condensation and a build up of humidity. In addition, the air inlets and exhausts must be protected against the risk of foreign objects being introduced, using plugs fitted with grilles.

You should also follow the instructions laid out in Paragraph I.II "Maintenance of Vehicles within the Warehouse" and Appendices D and F of Chapter 5.

2.4 INDICATION AND DATA ON WEIGHTS AND SIZES

2.4.1 Weight

Bodywork design, seat layout and luggage compartment location should not exceed preset maximum loads. Weighing should be carried out by the axle and with gross weight.

Due to factory-set tolerances, weight specifications can be subject to a $\pm 5\%$ tolerance. This tolerance should be taken into account for all specification values.

2.4.2 Weight table

Chassis in running order, fluids filled, without driver

Type	Front axle [kg]	Rear axle [kg]	Total [kg]
12 m S chassis 2 Doors Diesel	1440	5720	7160
12 m chassis Line 2 Doors	1620	5260	6880
12 m S chassis 3 Doors Diesel	1640	5590	7230
12 m S chassis Line 3 Doors	1820	5130	6950
12 m S chassis 2 and 3 Doors CNG	1440	5350	6790
Max weight technically permitted (1)	7245	13000	19000

Weight of CNG 8 bottle rack 500 to 650 kg depending on choice of bottle

Type	Front axle [kg]	Central axle [kg]	Rear axle [kg]	Total [kg]
18 m chassis 3 and 4 Doors Diesel	1950	2350	5800	10100
18 m chassis 3 and 4 Doors CNG	1950	2100	5550	9600
Max weight technically permitted (1)	7245	11500	13000	30000

Weight of CNG rear axle 4 bottle rack 250 to 330 kg depending on choice of bottle

Weight of CNG front axle 6 bottle rack 350 to 430 kg depending on choice of bottle

NOTES

Weights are calculated without taking the weight of the cylinder racks into consideration.

(1) The maximum weights on the axles are subject to the specific regulation of the countries where they will be shipped.

2.4.3 Centre of gravity

The following table indicates the location of the centre of gravity of 12 m frames.

MODELS	12 m, 2 Doors			12 m, 3 Doors		
	X	Y	Z	X	Y	Z
S Diesel	4890	-20	550	4730	-20	550
S CNG	4820	-20	550	4820	-20	550
Line	4680	+150	500	4520	+150	500

Dimension X Distance from front axle

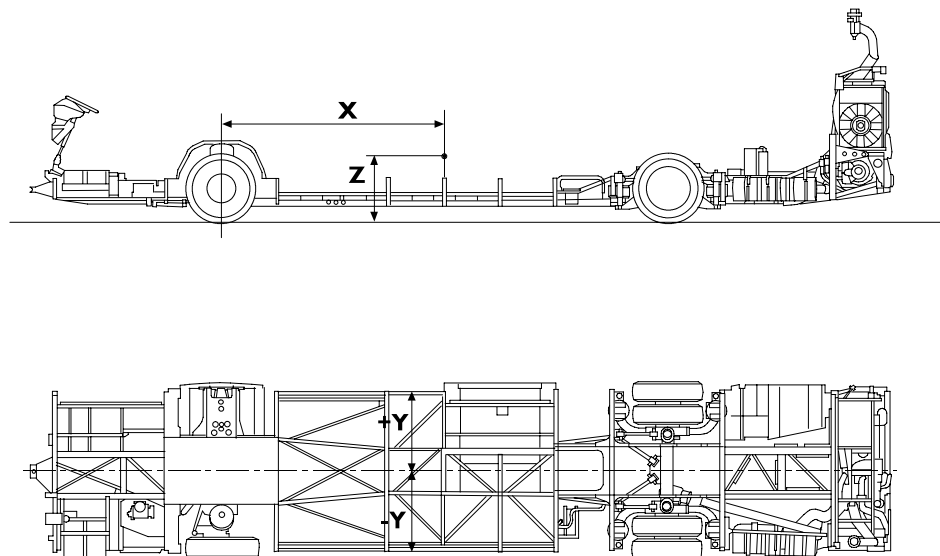
Dimension Y Distance from middle plane of the vehicle (+ right-hand side - left-hand side)

Dimension Z Distance from ground

The body-builder has to check that the height of the centre of gravity of the complete vehicle with full load does not exceed 1100 mm in the Diesel versions and 1200 mm in the CNG versions.

See also the Open Top specifications in Chapter 2.27

Figure 2.4.3.a



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The following table indicates the location of the centre of gravity of 18 m frames.

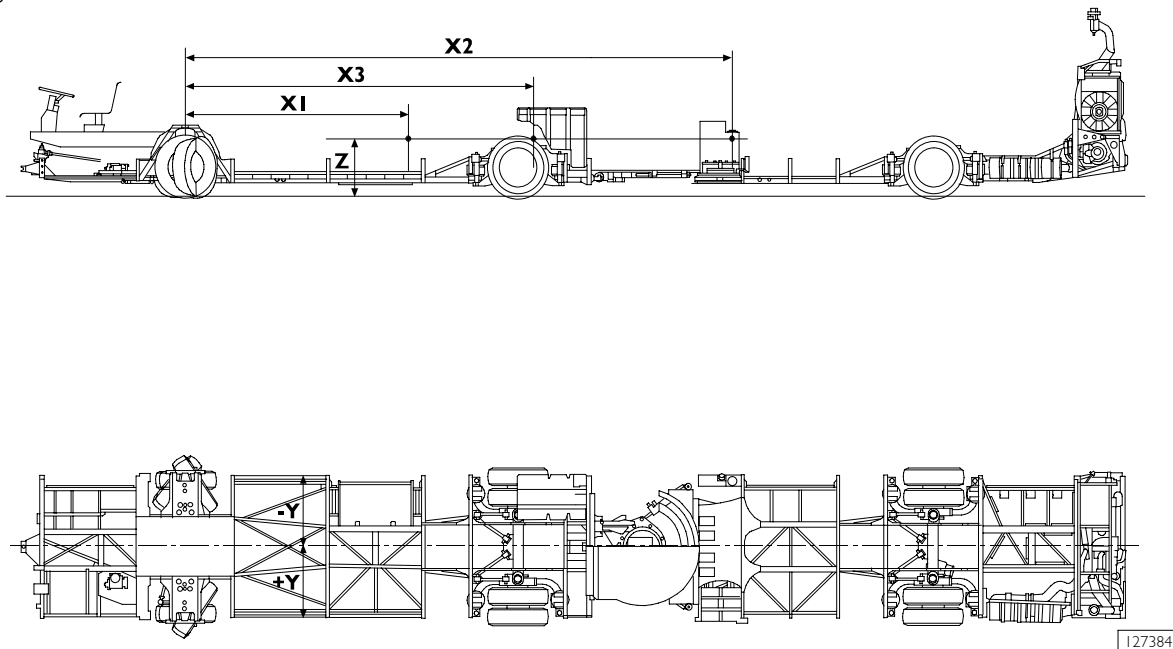
	Front section			Rear section		
COORDINATES [mm]	X1	Y	Z	X2	Y	Z
Diesel	2930	-20	550	10100	-20	550
CNG (1)	2780	-20	550	10200	-20	550
	Total					
COORDINATES [mm]	X3		Y	Z		
Diesel	7630		-20	550		
CNG (1)	7630		-20	550		

(1) The centre of gravity values are calculated without taking into account the weight of the CNG cylinder rack

Dimension X1-X2-X3 Distance from front axle
Dimension Y Distance from middle plane of the vehicle
 (+ right-hand side - left-hand side)
Dimension Z Distance from ground

The body-builder has to check that the height of the centre of gravity of the complete vehicle with full load does not exceed 1100 mm in the Diesel versions and 1200 mm in the CNG versions.

Figure 2.4.3.b



2.4.4 Body dimensions limit

Vehicle bodywork may be fitted to the maximum lengths and widths permitted by the rules in force for the country of use.

In all cases, the lengths of the front overhang, rear overhang and wheelbase must conform to the 1:20 chassis plans attached. See Appendix I

2.5 FASTENING OF BODY TO CHASSIS

2.5.1 General chassis modification rules

For interventions permitted by IRISBUS/IVECO, see the notes given in the following paragraphs, as well as the IVECO Standards list supplied in Appendix 2. Modifications to braking devices, steering, urea systems, fuel system, high pressure gas circuits and the engine compartment are forbidden.

In order to obtain IRISBUS/IVECO authorisation for any modification to the chassis, the coach-builder must present an argument including the following elements:

- List of all parts eliminated;
- List of all parts modified and/or added (specify quantities);
- Drawings for all modified and/or additional parts, specifying: The shape, dimensions, tolerances, materials, heat treatment, surface protection and references to standards or any other document to which the part must conform;
- Overall plan with the position each part is fitted;
- Detailed relations concerning the calculations of dimensions and any test results.

In particular, attention should be paid to the junctions of lateral elements of the chassis with the bodywork. The parts must be assembled either using welds or bolted in place in such a way that the maximum possible transmission of forces is guaranteed.

For bolted connections, see the recommendations laid out on the 1:20 chassis plans in Appendix I.

The structure of the bodywork must be constructed in such a way as to ensure it becomes a load-bearing structure in conjunction with the chassis: As a consequence, this assembly must be capable of absorbing the flexion, torsion and thrust forces applicable.

This measure is necessary because of the relatively flexible chassis. If any doubts exist with regard to this measure, more information can be had from IRISBUS/IVECO.

The structure must be attached to the bodywork using welds or bolts. Mixed-type connections are not recommended.

The component parts of the rear structure which are bolted onto the chassis and are removable (engine crossmember, gantry, etc.) must remain removable. With this in mind, you must not weld structural elements of the bodywork directly onto these components.

The lateral panels must be attached to the chassis at the following positions:

- Ends of all crossmembers. It should be noted that any connection to a crossmember must be strengthened if a welded joint is used onto a vertical, open tube (E.g.: T6 or T7).
- Around the edges of the wheel arches and the raised flooring panels.
- Around the edges of the risers.

In particular, you must not modify the panels on the chassis around the diesel tank as these are subject to fire regulations if in plastic.

In addition, the leaktightness of this area must not be affected.

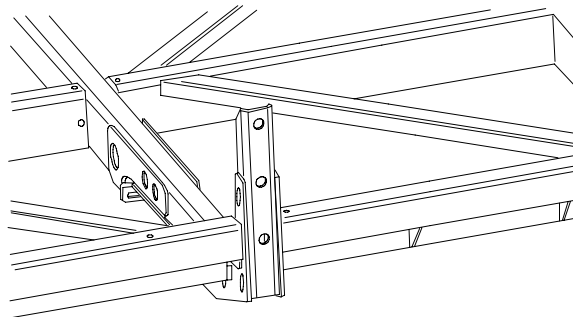
The coachbuilder must validate the service life of the chassis / side panel connections. When attempting this, the coachbuilder must, for information, supply IRISBUS/IVECO with a validation dossier including the following documents:

- The calculatory standards used
- Calculation reports
- Any test bed reports

This dossier, even if forwarded to IRISBUS/IVECO, in no way frees the coachbuilder from their responsibilities for the structural validation of the bodywork.

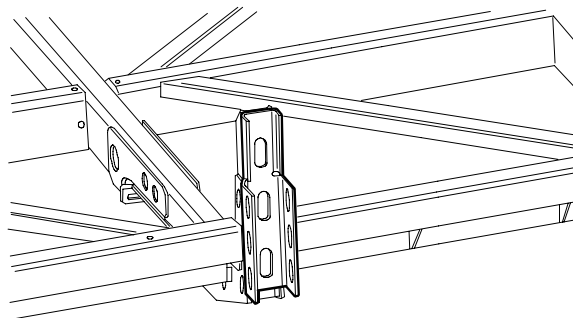
In the event that welds are used to connect the chassis and the verticals on the sides of the vehicle, the coachbuilder can use the following recommendations:

Figure 2.5.1.a Standard chassis crossmember end



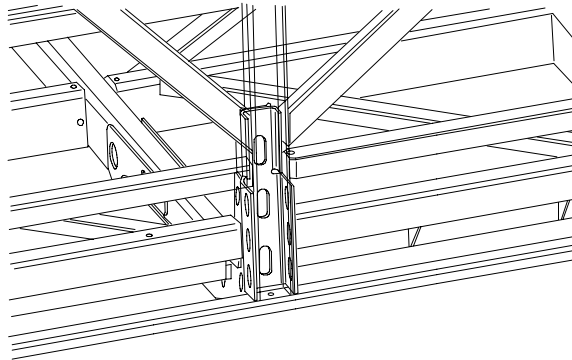
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Figure 2.5.1.b Example of a connector strengthener



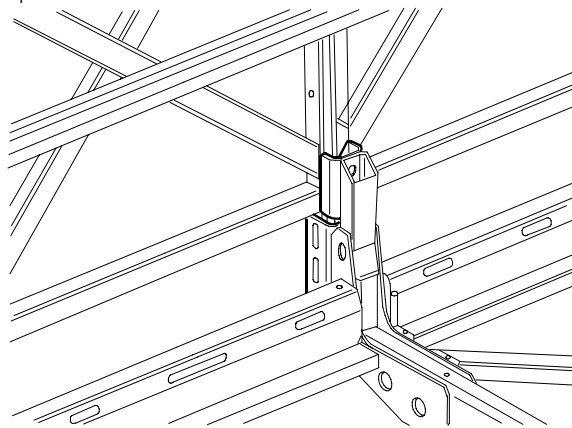
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Figure 2.5.1.c Example of a vertical side connection



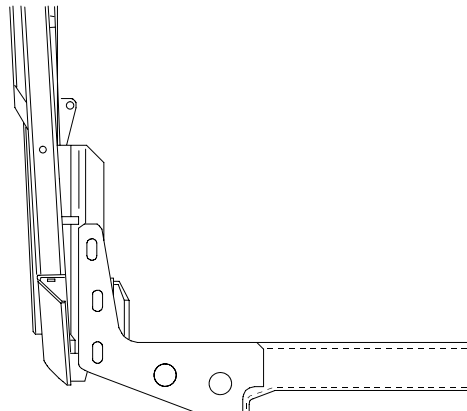
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Figure 2.5.1.d Example of a vertical side connection



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Figure 2.5.1.e Example of a vertical side connection



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IRISBUS/IVECO will make simplified chassis calculatory models available to the coachbuilder (if needed for the validation) in NASTRAN format.

2.5.2 Preparation for the fitting of the bodywork

Any chassis components removed prior to assembly on the bodywork must be stored, protected and clearly identified.

Any terminal installations and cabling on the chassis must be well fitted and protected to avoid any welding, painting or friction damage.

First clean the interfaces between the chassis and bodywork fitting points.

Prior to fitting the structure of the body to the chassis, the chassis must be supported by the various crossmembers to ensure that the assembly is totally rectilinear.

The chassis must be held in this position until the assembly of the sides is complete.

In order to guarantee the integrity of the welded, bolted or glued joints, all connections between bodywork components and chassis must be validated by the coachbuilder. (Addition of strengtheners, additional rails, load spreading plates, etc.).

Example: Seat mountings, columns, baggage racks, etc.)

For information: The maximum seating plans for the CITELIS range and the details of possible mountings are available on plans 504171432 / 423, 504188599 / 602, 504316828 and 504317508 in APPENDIX X

2.5.3 Attaching the bodywork to the chassis using welds

Before attempting any welding work, disconnect::

- The Electronic Control Units for the ABS-ASR (if fitted), automatic gearbox, engine, kneeling system, etc.;
- The battery earth cable;
- All alternator and instrument panel connections;
- Articulation Control Unit

The coachbuilder must ensure that no disconnected cables are touching one another.

It is of the utmost importance that damageable components such as the following be protected from heat, weld splattering and grinding sparks:

- Instrument panel
- Steering wheel
- Electrical installation
- Polyamide hoses
- Pneumatic cushions
- Air and water durit hoses
- Articulation etc.

As required, you should remove parts and disconnect installations to remove them from the vicinity of any welding, grinding etc. and then refit them once the operation has been completed.

You must connect the welding equipment earth to the chassis as close as possible to the welding area and not to a rotating element (transmission, hubs, etc) and, even more importantly, not above or below a component fitted with moving parts (compressor, cushions, etc.).

Zones to be welded must be cleaned of any paint in advance to ensure that the weld beading penetrates.

The welding zones on the chassis must be cleaned and the original quality of surface treatment re-applied to protect all surfaces altered using appropriate products as stated in IVECO Standard I 8-I 605 Class B - APPENDIX II.

On completion of the welding operations you must ensure that all electrical connections are correctly reconnected.

2.5.4 Welding Techniques - Quality

Welding beads on beams subjected to flexion stresses must be positioned as close as possible to the neutral point and parallel to the forces.

In certain cases, welds on the upper and lower faces of side rails may be acceptable.

Abrupt changes in cross sectional area and an accumulation of beading must be avoided.

The welding flux used must penetrate between the parts to be welded: There should be no pores nor bubbling, nor welding splatter. Avoid using specific processes to accelerate the cooling of welded sections.

See IVECO Standards I0-8012, I0-4000 and I8-0600 attached in APPENDIX II.

2.5.5 Spot welding

Spot welding must ensure resistant connection between the parts. Sizing and distribution shall comply with the transmitted stress level.

This welding procedure is only to be used on joints between sheets of the same thickness, thinner or equal to 2 mm.

See Iveco Standard I0-4127.

2.6 PERFORATING THE CHASSIS

Perforation of the chassis for fastening auxiliary units or components is allowed at the following conditions:

- it is forbidden to make holes on the upper and lower surfaces of the rails, on the cross members and on the reinforcements;
- do not perforate in the areas must subjected to stress, i.e. near the power steering mounts, suspensions and engine mounts;
- after drilling, eliminate edges so that the parts to be fitted or the screw heads rest on a perfectly flat surface.

See Iveco Standard 10-8012.

2.7 BASIC BODY CONFIGURATION REQUIREMENTS

2.7.1 Snow chains

REAR AXLE:

Snow chains can be fitted

FRONT AXLE:

Snow chains cannot be fitted.

2.7.2 Protecting the pneumatic cushions

Protective tabs between the rear cushions and wheels have been designed into the chassis. The metallic screening between the rear left hand drive axle suspension system and the exhaust silencer provides thermal protection for the cushions.

2.7.3 Wheels and tyres (275/70 R22.5)

Contact surfaces must be clean and rust-free before fitting the wheels.

Rim and wheel bolt contact surfaces shall be protected if rims or brake drums need to be repainted.

Check wheel bolt tightness before delivery to the customer (if previously removed).

Tightening Torque = 600 +50/-20 Nm I.A.W. IVECO standard 17-9219.

2.7.4 Wheel nut cover, half-bushing, hubcaps

We propose a complete range for the IRISBUS/IVECO chassis. Should the coachbuilder make a specific choice, he must ensure the good behaviour of the parts in the wheel rims and check that they have no adverse effects on the resistance of the wheels in the axles.

2.8 TECHNICAL VEHICLE SYSTEM REQUIREMENTS

2.8.1 Precautions to be adopted during vehicle outfitting

Protect all parts subject to damage against heat, against welding spray, against grinding spray and spills of liquid, oils, paints, acid etc., for example:

- dashboard, steering wheel, polyamide piping, rubber tubes, air springs, electrical connectors, etc.

2.8.2 Accessibility for maintenance

Body arrangement shall favour accessibility for inspections, maintenance, repairs or replacement of mechanical, pneumatic, hydraulic and electrical vehicle system components. Follow specifications in the "Maintenance" section of the "Instruction & Maintenance Manual" provided with the chassis.

Chassis system access flaps shall be provided for this purpose.

Two types of access flaps are described here:

- Internal servicing flaps (Hatches)
- External servicing flaps (Flaps)

2.8.2.1 Internal service hatches

The vehicle must be outfitted with appropriate hatches to allow access for inspection and maintenance.

Central engine suspension
Turbo-engine
Brake cylinder connectors and loosening bolt
Diesel-oil and urea tank gauges
Urea pump

In case of doubts to consult the IRISBUS/IVECO.

2.8.2.2 External servicing flaps

Flaps on the side or rear of the vehicle shall provide access to the following systems:

- Engine flap: Engine, air filter, gearbox, radiator fan, etc.
- to the battery boxes, pneumatic and battery connections, fuses or circuit breakers
- to the pneumatic module
- to the autonomous heating system
- to the windscreen wiper reservoir
- for air conditioning compressor and its belt
- to the filling point of the oil, power-steering and hydrostatic cooling liquid reservoirs
- to the front and rear trailers.

2.8.3 Engine air suction

The frame is delivered complete with air intake on the side, air intake pipe and filter with pipes from the filter to the intercooler and from the intercooler to the engine.

Take particular care with the air intakes in order to prevent water infiltration into the intake pipe and the ingress of foreign bodies.

If the air intake needs to be moved to carry out bodywork, this should be located on the side of the vehicle in the highest possible position.

Modifications must not alter the air flow rate nor the temperature of the incoming air, which must remain below ambient air temperature + 5°C. Avoid as far as possible the use of elbow pipes, do not reduce the cross-section of ducts, also adopt all necessary precautions to prevent water entering the intake circuit, and in any case observe the specifications set out in standard I.S. 16 - 1012

Description of the IRISBUS/IVECO CITELIS solution:

- exterior grille integrated to the rear upper plastic block;
- the air inlet will be incorporated to the top right-hand side and made in such a way as to ensure that the water pours outwards.

The engine air intake sections, air filter side, must ensure at least the value B shown in figures 2.6, 2.7, 2.8 and 2.9 of paragraph 2.8.8.

The pressure drop in the inlet lines with the engine at maximum power, measured at the turbo-charger inlet, must not exceed static 42 mBar.

The air intake is designed to absorb intake noise.

The air filter cannot be replaced with another of a different make and/or type without written authorisation from IRISBUS/IVECO.

Modifications to any piping require written authorisation by IRISBUS/IVECO.

In order to obtain authorisation, a modification plan must be submitted based on point 2.5.1, and type approval must be obtained by IRISBUS/IVECO, which will in turn carry out the inspections required to guarantee correct operation if necessary, the cost of which will be charged to the applicant.

2.8.4 Steering

The steering box must remain accessible for operations involving repairs, adjustments, purging and oil changes; with this in mind it is important that any accessories units fitted by the coachbuilder between the steering box and the side of the vehicle are accessible and easy to remove.

There must be a minimum distance of 30 mm between bodywork elements and steering rods/levers taking into consideration the maximum steering lock (right and left) and movements of the suspension.

In accordance with the indications given in Paragraph 2.5.1, it is expressly forbidden to operate any component that might modify the loading on the steering column or might create an undesirable force not covered by current regulations.

No modifications to the hydraulic circuit are permitted.

2.8.5 Engine exhaust pipe

For a transverse engine, the rear shield must be pierced to ventilate the area around the silencers in accordance with Value E given in Figure 2.8.8.a in Paragraph 2.8.8. The airflow must provide good ventilation to the rear left upper parts.

This shield must be easy to remove to facilitate the removal of the silencers.

There are 2 versions of the exhaust line following the silencer:

- 1) upper exhaust outlet
- 2) lower exhaust outlet

We do not authorise modifications to the exhaust line running from the turbo-engine to the outlet, or to the silencer (risk of decreasing engine performance and regulation emissions levels).

All structural and lining materials closest to heated areas must comply with the requirements stated in section 2.14.4 "Technical specifications of organic materials in respect to meet flammability standards".

2.8.6 Front hydraulic brake reservoir

It is necessary for the brake cylinder to be easily accessible so it can be serviced and repaired.

2.8.7 Hydrostatic fan controls

Description:

The radiator fan is driven by a hydrostatic circuit controlled by an electronic device detailed in the diagram in APPENDIX III.

The system is calibrated to maintain a minimum screw speed (approx. 600 rpm) even when the engine cooling fluid is cold.

The rotational velocity of the screw is related to various parameters such as engine coolant temperature, gearbox oil temperature, retarder phases and the temperature around the turbo for CNG vehicles.

2.8.8 Engine cooling

The cooling unit is located to the left of the transversally-mounted engine and to the right of the straight mounted engine. A grill should be fitted to the bodywork to allow cooling air to enter.

This grille must be fitted to stop dust and foreign bodies from clogging up the radiator beehive. The grille must have dimensions similar to that of the radiator and a minimum useful surface of A in accordance with Figures 2.8.8 a and b.

The coachbuilder is responsible for fitting anti-recycling panels around the cooling unit to stop hot air being sucked in from the engine compartment. All sealing components, such as gaskets, must be capable of resisting a constant temperature of +100°C with peak temperatures reaching 120°C. For vehicles running at speeds of less than or equal to 25 kmh, the air temperature in front of the cooling unit must remain below ambient air temperature +5°C.

The installation of heating equipment in the passenger compartments or modifications to the water circuit tubing must have no effect on the efficiency of the cooling system.

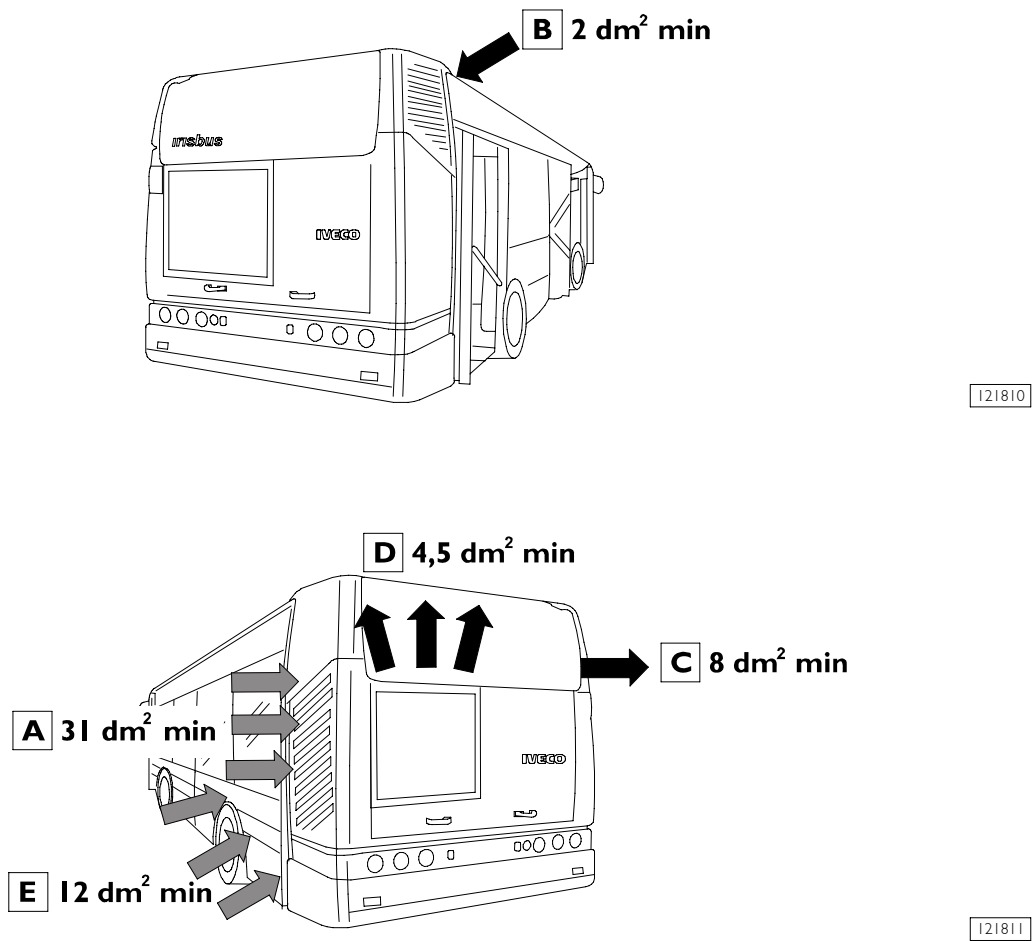
See, for example, the heating circuit diagram for a Citelis S (APPENDIX IV).

Check the ATB (Air To Boil: Temperature at max. ambient operating temperatures for a vehicle) without de-rating the engine:

	12 m S and 18 m L		18 m L High power	Line
	Diesel	CNG		
Of maximum power	46°C	49°C	45°C	40°C
Of maximum torque	52°C	58°C	45°C	48°C

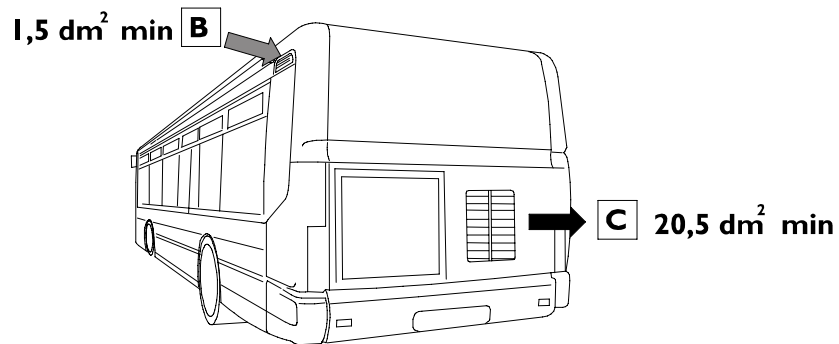
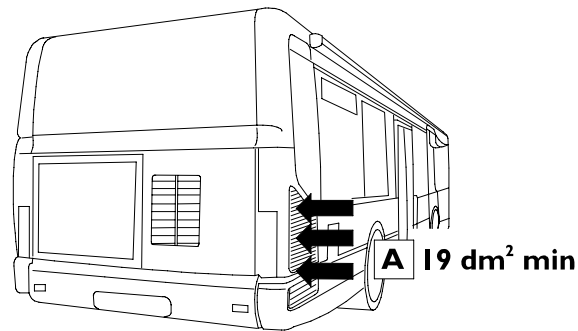
Figures 2.8.8 a and 2.8.8.b show the inlet and exhaust positions for cooling air on the rear of the bodywork.

Figure 2.8.8.a S and L transverse engine key



- A : Engine radiator air intake
- B : I40A Engine air intake and alternator cooling
- C : Air outlet
- D : Air outlet
- E : Exhaust ventilation

Figure 2.8.8.b Line longitudinal engine key



- A : Engine radiator air intake
- B : 140A Engine air intake and alternator cooling
- C : Air outlet
- D : Air outlet
- E : Exhaust ventilation

2.8.9 Change in position of functions and fixing of devices

When making the structure requires a change in the position of functions (for example: the fuel tank, the battery, etc.) and provided that this change makes no difference to their functioning, the coachbuilder shall obey the instructions given in section 2.5.1. of these specifications.

2.8.10 Service air intakes

The pressure intake assembly will be centralised on the left-hand side, beneath the driver's position. In the case of 18 m versions, the pressure intakes will be fitted to the front left-hand side of the rear wheels, near the pneumatic box.

Depending on the chosen option, the inflating intake will be placed on the forward cross-member or on the left-hand side, either to the front or to the rear.

2.8.11 Cooling the alternator

The engine can have different versions:

- 1) 2 x 90 A or 120 A self-ventilating alternators
- 2) 2 x 140 A + 80 A air-intake alternators.

Respecting the air intake and outlet surfaces is essential to guaranteeing that the alternators remain at the correct temperature.

Cooling the electronic box of the engine

In order to ensure that the engine electronics function correctly, it is necessary to ensure that there is ventilation to the rear of the CNG.

2.8.12 Water connection for heating the cabin

The vehicle has one tube leading into and another leading out of the front defrosting block. These tubes are fitted with derivations in both directions for the unit heaters which shall be installed by the coachbuilders. See an example of the forced heating circuit diagram for a 12-meters in APPENDIX IV.

2.8.13 AC system assembly requirements

The equipment ready in the chassis frame for driving the air-conditioning compressor includes a compressor support.

The preliminary tension must be no greater than 25 kg for each belt.

The air cooling system will respect the environment protection specifications and avoid ozone depletion, i.e. systems whose emission contain CFC will not be permitted.

Body configuration will permit easy access for maintenance and repair of the compressor. Drive belts shall not touch body parts and will be accessible without removing the fenders or other components.

Under no circumstances should the preliminary tension be greater than 280 N per strand (560 N of force (max.) on the compressor shaft).

2.8.14 Electrical system precautions

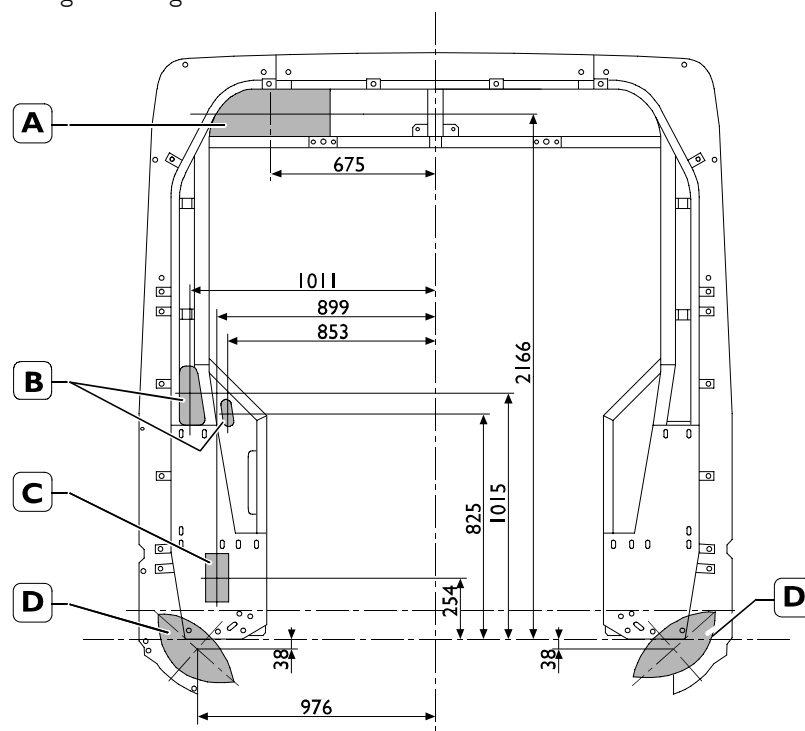
When welding in the vicinity of electrical equipment components they must be protected against heat and welding splatter.

When welding you must disconnect electronic control units.

If electrical wiring bundles are to be routed through sharp-edged panels, they must be protected by cable glands or anti-friction ducting. You must not attach cables or other electrical components to other hydraulic or pneumatic systems cable routing.

Particular attention must be paid to the routing of bodywork across the articulation of 18 m vehicles to ensure there is no interference with the movement. See recommendations below as approved for CITELIS:

Figure 2.8.14.a Passages through the rear arc



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Figure 2.8.14.b Passages through the central arc

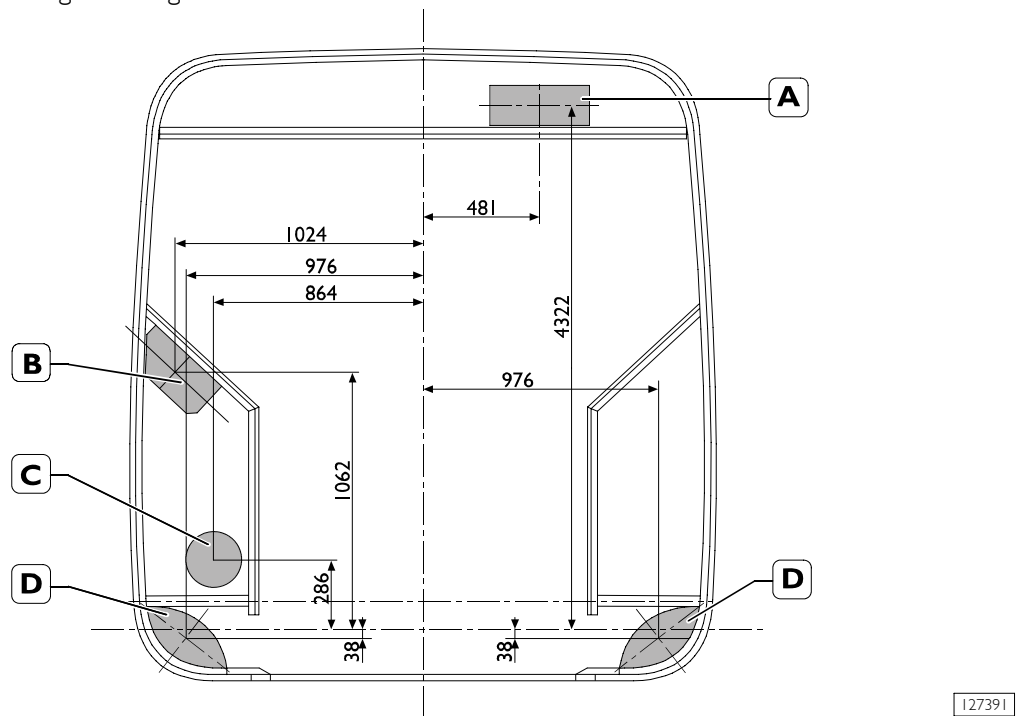
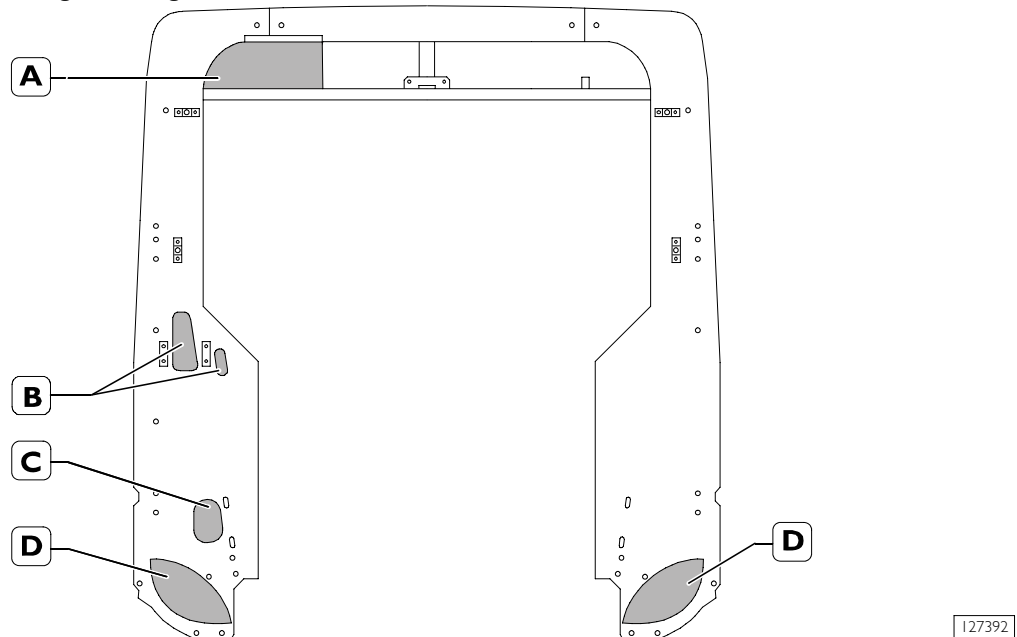


Figure 2.8.14.c Passages through the front arc



- A : The upper sections of the air conditioning passage
- B : The electrical systems passage sections
- C : The pneumatic systems passage sections
- D : The lower zones within the footprint of the lateral articulation bellows

In the event the vehicle is passed through a baking kiln the temperature must not exceed 60°C for a maximum of 1 hour. During the paintwork phase all electrical connections must be protected to avoid defective contacts.

The electrical installation must meet the requirements of the regulations in force in the country of use and must be fitted with all fuses or circuit breakers required to protect the wiring and electrical/electronic components, in addition to being compatible with operating voltages and current levels. Notably, the functioning of the emergency stop device must conform to the regulations in force for the country of use.

EMI authorisation remains the responsibility of the coachbuilder.

Under no circumstances will it be permitted to modify the lengths of the urea piping, this criteria has an important effect on the validation of the software associated with this system.

2.8.15 Electrical installation

See Specific Specifications Manual 504 238 247 + IVECO Standard 10-4156 APPENDIX II

2.8.16 Multiplexing

See Specific Specifications Manual 504 238 247

2.8.17 Articulation

2.8.17.1 General information and operational description of the articulation system

The articulation unit plays an important role in the safety and stability of the vehicle, as a consequence, maintenance operations and removal & refitting must be carried out with a great deal of care.

The maximum operating angles are:

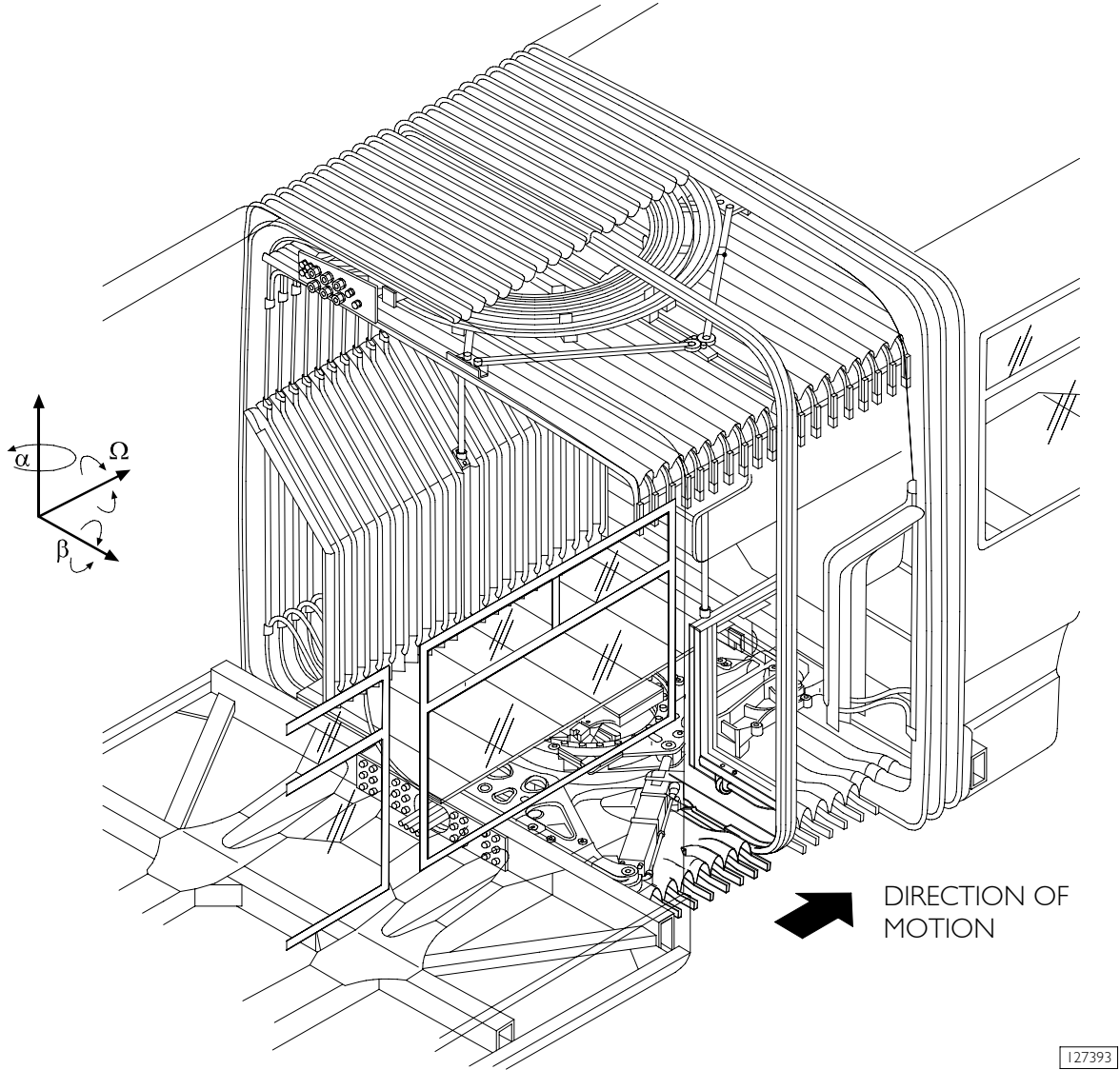
- α = maximum turning angle $\pm 52^\circ$
- β = maximum vertical clearance angle V1/V2 $\pm 9^\circ$
- Ω = maximum roll angle with road at 7° $\pm 3^\circ$

These are pre-set in the factory and must not be modified.

2.8.17.2 System components

Figure 2.8.17.2 shows the principal components of the articulation system.

Figure 2.8.17.2.a



2.8.18 Identification Plates

On the basis of the regulations in force in the country of use, the final product (vehicle fitted-out) must be fitted with identification plates, notably including:

The manufacturer's chassis identification plate by IRISBUS/IVECO.

See plans 504 I 66 404 APPENDIX V

2.8.19 Other

- Horns: the completed vehicle must be in conformity with the minimum noise limit provided by regulations, and the EEC 70/388 regulation in particular must be observed.
- The frame is arranged for the attachment of a front manoeuvring hook able to withstand a compression and pulling force equal to at least 15,000 kg.
The coachbuilder shall envisage a rapid access for assembly of the trailer elements and compatibility of the bodywork with his client's trailers.
- No authorisation is given to modify any elements capable of altering the way in which the vehicle functions.
- Absolutely no authorisation is given to manipulate the braking systems and/or to replace any elements (valves, tanks, etc.) implying the risk of altering the original compliance of the chassis with applicable regulations. Moreover, the compressed air tanks are approved on the basis of specific regulations.
- In the case of an incident or accident, any elements dismantled shall be replaced with IRISBUS/IVECO original spare parts compliant to the models tendered and described in the technical assistance manuals.
- The chassis is supplied with all air bottles required for vehicle operations. Certain of these air tanks, fitted to the chassis, must be fitted by the coachbuilder. Concerning the brake circuit, any increases in lengths from the version supplied with the chassis will require re-verification of the response times - this is to be carried out at the expense of the coachbuilder.
For flexible polyamide tubing used in the air circuit it is recommended that you use material A12 / PA50.400 / FR in accordance with IVECO standard I8-0400.
- The labelling for the oil and coolant liquids supplied with the chassis must be fitted by the coachbuilder in such a position as to ensure it is visible during maintenance operations. To achieve this it is recommended that the adhesive label be attached to the inner partition of the engine compartment, positioned to assure legibility and in an area where the temperature will not exceed 120°C.
- Any interventions on the urea injection installation shall mean the obligatory replacement of the watertight joints on the urea pipes.

2.9 BODY CONSTRUCTION

2.10 INTRODUCTION

This chapter gives the instructions required for the construction of the bodywork and, in particular, specifies the major technical and legal aspects. The definition of bodywork is the responsibility of the coachbuilder on the basis of the specific requirements of each customer.

2.11 BODY CONFIGURATION

2.11.1 Main dimensions

Angle of attack and pitch angle: 7°

Internal and external turning circles: The construction of the bodywork must be consistent with the turning circles in accordance with the regulations in force in the country of use.

Side flaps: It is recommended that the vehicle be fitted with side flaps around the wheel arches.

2.12 INTERNAL CONFIGURATION AND VEHICLE CAPACITY

The surface area dedicated to passengers and the number of seats shall comply with applicable regulations in the country of use.

2.13 CHARACTERISTICS OF THE DRIVER'S SEAT

The installation shall be arranged in such a way as to ensure that the driver has a comfortable (seat, sunshade, etc.) and ergonomic (layout of the controls, outside visibility) space.

The driver's seat shall be adjustable in height, in inclination and shall be able to move towards and away from the steering wheel. Each of these adjustments shall be independent.

Visibility, rear view mirrors and control devices in and from the driver's seat shall comply with applicable regulations in the country of use.

Adapted devices shall be installed to guarantee:

- An air speed on the windscreen surface superior to at least 1 m/sec of 90% of the surface
- heating of the driver's position.

- Clear driver visibility, even during night driving. In this latter situation, reflections off the windscreen can be avoided if the lighting levels in the front right hand side zone of the vehicle can be adjusted by the driver him or herself. In addition, darker colours are preferable for the internal trim.

2.14 RESISTANT STRUCTURE MATERIAL

The construction materials used shall comply with Iveco Standard 10-801 I. Any other materials used shall be of identical or superior mechanical characteristics.

2.14.1 Resistant structure tubes

List of profiles recommended in accordance with IVECO Standard 10-8012 APPENDIX II.

The internal radius of the pipe profiles shall be at least equal to the width of the pipe.

The surface must be free of rust.

The welding bead must be recessed in relation to the external surface but must still be visible.

2.14.2 Body panelling

The coverings must be in a material capable of resisting corrosion for a period of at least 12 years (lightweight alloy panels, polyester resin, and glass-fibre).

Notably, refer to IVECO Standard 18-1605 APPENDIX II

2.14.3 Requirements technical of the fixings

These shall be watertight to prevent water from entering the vehicle. We recommend that the coachbuilder carry out watertightness tests.

2.14.4 Organic material requirements for fire prevention purposes

The cladding used in the bodywork, around the engine compartment, shall particularly respect the demands of the applicable regulations in the country of use. Under no circumstances do we authorise the use of materials which can absorb oil or diesel oil.

The polyamide conduits or electric cables running alongside the hot parts of the engine, such as the collector or exhaust pipes, turbo-engine, etc. shall be protected by an aluminium or stainless steel screen.

2.15 ANTIRUST BODY TREATMENT

2.15.1 Introduction

Anti-corrosion treatment has a primordial role to play in the service life of the bodywork.

The bodywork anti-corrosion treatment must not adversely effect the chassis components such as polyamide pipes, electrical wiring, mechanical and electrical components, etc. It must also be applied to the internal surfaces of the framework (tubes, re-built hollow bodies).

2.15.2 Design of the structure

Avoid cavities where water, gravel or mud is likely to build up.

When painting or applying anti-corrosion treatment you should avoid blocking any holes.

Notably, see IVECO Standard I8-I605 APPENDIX II.

2.15.3 Anti-corrosion characteristics: Materials

In order to protect the various bodywork components from corrosion, the materials used must be compatible with other components and chemical agents.

In particular you should avoid galvanic couplings, the use of isolating profiles is recommended between different metals (example - joints between aluminium and stainless steel).

Anti-corrosion protection can also be provided by using materials with a high resistance to corrosion, for example, stainless steels, plastics, aluminium, glass-fibre resins, etc. The use of this type of material must meet the resistance requirements.

2.15.4 Verification of the anti-corrosion protection

See IVECO Standard I8-I605 APPENDIX II, notably for resistance to salty atmospheres.

2.15.5 Battery compartment

Particular attention must be paid to the anti-corrosion characteristics of this zone, notably by using non-oxidising materials or acid-proof protection.

2.15.6 Maintenance of the anti-corrosion protection

To ensure the anti-corrosion treatment remains efficient it should be subjected to periodic maintenance. The coachbuilder must provide the vehicle with the maintenance instructions necessary for the various bodywork components, notably for zones subjected to external attack (battery compartment, projections from the road surface, etc.)

2.16 BODYWORK PAINTING

To achieve the level of quality required by IRISBUS/IVECO, see IVECO Standard I8-I605 - Appendix II.

2.17 NOISE LEVELS AND THERMAL INSULATION

Within the framework of the complete vehicle approval process implemented by the coachbuilder, the latter is responsible for conformity with the regulations in force in the country of use in terms of noise levels.

In order to obtain the highest levels of comfort within the vehicle and with the regulatory requirements for noise emissions in mind, you must achieve the objectives laid out in 2.17.1 and 2.17.2.

2.17.1 External noise

The exterior noise levels must respect the limits laid down in Directive CE 99/101

Readings of 3 to 5 dB below those of Directive CE99/101 would be appreciated.

2.17.2 Interior noise

The noise levels considered optimum are as shown in the table:

Measurement area	Value (1) [dBA]	Value (2) [dBA]
Front	65	< 76
Central	68	
Rear	72	

(1) WITHOUT AIR CONDITIONING

(2) WITH AIR CONDITIONING

The measurements must be carried out in accordance with specifications laid down in standards CUNA 504-01 and 504-02.

2.17.3 Soundproofing

Particular attention must be devoted to optimising the soundproofing of mechanical units and body parts. This may be summarised as:

- Insulating the passenger compartment from noise sources (engine compartment, gearbox, transmission lines);
- Appropriate noise absorption level in the engine housing shall be achieved by means of sound absorbers. In this case, the materials used shall not be inflammable in compliance with European directive 95/28. They shall also be impermeable to combustible liquids and water-tight cladding should therefore be applied where necessary.
- The parts used to fix the soundproofing elements in place shall ensure the perpetuity of the phonic characteristics, particularly guaranteeing the absence of contact with sources of heat and moving parts during the entire life of the vehicle.

2.17.4 Heat isolation

The same impermeable characteristics are required for combustible liquids.

Thermal insulation of the vehicle may be summarised as:

- insulation between engine compartment and passenger compartment;
- insulation between passenger compartment and exterior;
- insulation between sources of heat and body parts;
- **insulation between engine compartment and passenger compartment**

Carefully insulate the passenger compartment from any sources of heat in the engine bay. Use thermal insulative materials compatible with radiant temperatures of close to 100°C.

A verification of the efficiency of the engine bay ventilation must be carried out by the coach-builder;

- insulation between the passenger compartment and the outside world.

The coachbuilder must ensure the vehicle is insulated in order to optimise the performance of the heating and air conditioning systems.

Notably, he must ensure that the vehicle conforms to the thermal comfort requirements laid out by the customer.

- insulation between heat sources and bodywork elements.

In particularly hot areas, for example, in the vicinity of the turbo or exhaust manifold, the materials used must be capable of resisting temperatures approaching 250 °C.

Certain components within the engine bay, such as the air circuit, the engine block and sump, the coolant circuit, etc. do not feed critical heat sources; it is however recommended that heat-sensitive equipment is not fitted in their vicinity.

2.18 FUNCTIONAL ROAD TESTS TO BE CARRIED OUT BY OUTFITTER

The following tests will be carried out with the vehicle stationary before starting the function test procedure:

- tyre pressure, engine oil level, transmission and axle, clutch, brake and steering fluids, coolant, suspension height, maximum braking pressure on each axle and maximum pressure in reservoirs, exhaust pressure in pressure regulator; check and hold pressure in pneumatic circuits;
- handbrake operation;
- operation of door, emergency button sensitivity, warning lights, windscreen wiper, windscreen washer and horn;
- external lights: taillights, dipped-beam, main-beam, indicators, brake, reversing, engine disconnect rear flap interlocking, battery status and level;
- body alignment with respect to the chassis;
- no interference of steering linkage in all steering wheel and wheel positions.

Conduct road test on a distance of 50 km on various types of roads (flat, curves, gradients, rough surface) and check the following parameters:

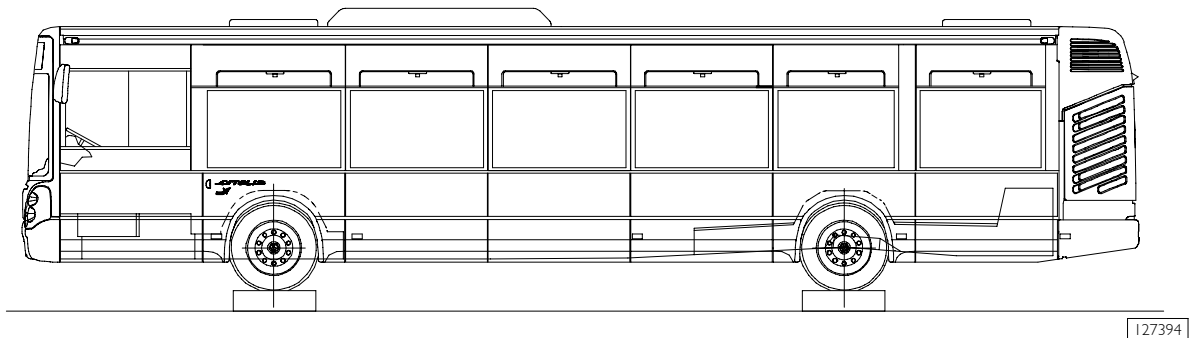
- No anomalous vibrations or noise during normal vehicle operation due to transmission, axle and other parts of chassis or body.
- Correct transmission operation, normal gear shifting up and down without jerking (automatic transmission versions).
- Braking must be responsive, gradual without requiring excessive effort on the pedal.
- Operation of ABS system.
- Operation of the retarder incorporated in the automatic transmission: prompt response and gradual action in each points of operation.
- Operation of the speed limit (if present); check that this comes on at the correct speed and that its activation does not cause juddering.
- Operation of the emergency button: check that activation locks the engine, turns on the warning, disconnect the batteries and fuel flow.
- Operation and sealing of tachograph (if present).
- Check correct operation of HVAC system.
- Steering must be gradual, without stiffness or jerking; the vehicle must be held straight without requiring continuous corrections and will ensure total control also in the event of sudden manoeuvres.
- Body watertightness of wheelhouses under rain.
- Check internal and external sound levels.
- Check ergonomics of controls and dashboard; seat position: regulation and access to controls and pedals. Access to pedals and stiffness of operation.
- Height and slant of steering wheel must be adjustable.
- Dashboard: visibility, correct operation of indicators and buzzers, visual interference of steering wheel, luminosity and illumination.
- At the end of the run, check for leaks of water, oil, diesel and fluids (brakes, steering and fan drive).
- Check that the radiator fan turns both when the engine is cold and warm.
- The suspension shall be checked to ensure that the raising, lowering and kneeling actions function according to the chosen option.

2.18.1 Torsion test 12 meters vehicle

The test involves measuring the vehicle's angle of twist in accordance with the following requirements:

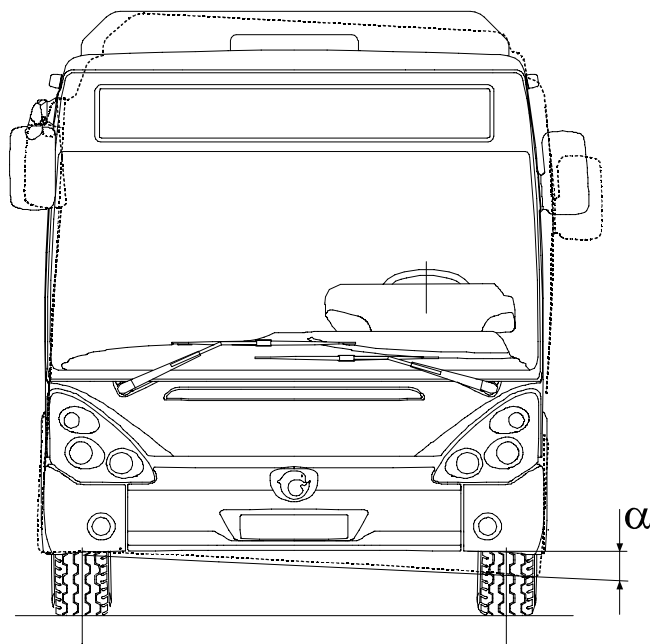
- Set the vehicle to horizontal, using lifting points under each tyre (See Fig. 2.18.1.a);
- Lower the contact device under the front left tyre to twist the structure.
- Measure the change in weight (P) on the front left wheel;
- Calculate the moment of torsion $M_t = P \times \text{front track}$;
- Measure the angle of torsion (roll) at the front of the vehicle (See Figure 2.18.1.b).

Figure 2.18.1.a



127394

Figure 2.18.1.b



127395

- Calculate the stiffness of the torsion using the following equation: $K_t = M_t / \Delta\alpha$
The calculated stiffness must be greater than: $K_t = 1.000.000 \text{ kgm/rad}$.

Example with a CITELIS vehicle:

- * $M_t = 1410 \times 2,049 = 2889 \text{ Kgm}$
- * Front angle = $0,80^\circ$; Rear angle = $0,68^\circ$
- * $\alpha = 0,12^\circ = 0,00209436 \text{ rad}$.

$$K_t = 2889 / 0,00209436 = 1.379.420 \text{ Kgm/rad}$$

2.18.2 Torsion test on 18 meters vehicle

The test involves measuring the vehicle's angle of twist in accordance with the following requirements:

- Set the vehicle to horizontal, using lifting points under each tyre (See Fig. 2.18.2.a);
- Lower the contact device under the rear left tyre to twist the structure.
- Measure the change in weight (P) on the rear left wheel;
- Calculate the moment of torsion $M_t = P \times \text{rear track}$;
- Measure the angle of torsion (roll) at the rear of the vehicle (See Figure 2.18.2.b).

Figure 2.18.2.a

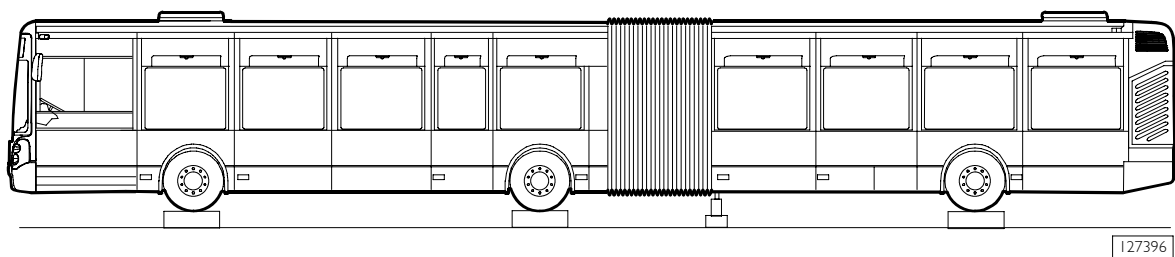
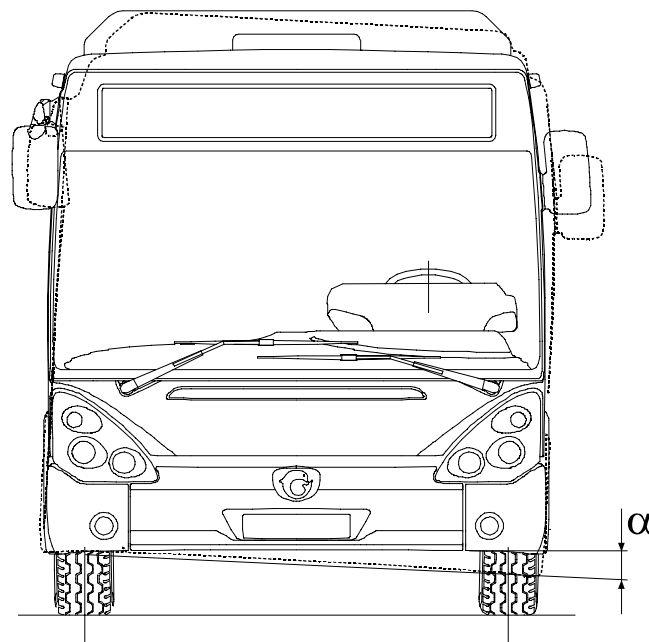


Figure 2.18.2.b



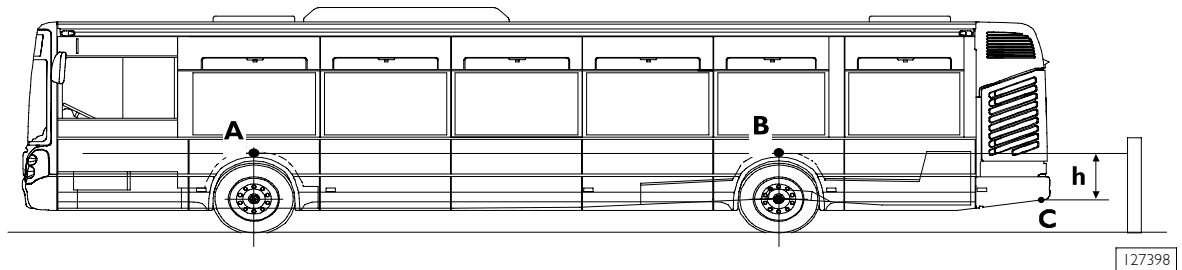
- Calculate the torsional stiffness using the following equation: $K_t = M_t$

The calculated stiffness must not be greater than $K_t = 500\,000 \text{ kgm/rad}$

2.18.3 Flexion testing of the rear overhang

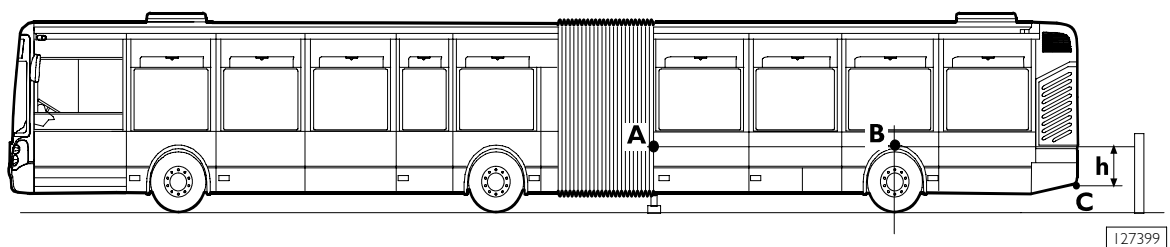
The test involves measuring the maximum static flexion (bending) of the rear overhang in accordance with the instructions below (See Fig. 2.18.3.a and 2.18.3.b):

Figure 2.18.3.a 12 meters vehicles



- Trace points A and B plumb with the centrelines of the front and rear axles corresponding to the front and rear centreline at a predefined height.
- Stretch a cord passing through the traced points.
- Measure the vertical distance 'h' between the cord and a point 'C' at the end of the rear overhang.
- Check the theoretical height using the vehicle plans.
- Check the difference between the measurement h on the vehicle and the theoretical h'.
- The difference between h and h' must not exceed +/- 9 mm.

Figure 2.18.3.b 18 meters vehicles



- Park the vehicle on a flat surface and insert the lifting jacks as shown in Figure 2.18.3.b
- Trace points A and B plumb with the rear of the articulation and the centreline of the rear drive axle.
- Stretch a cord passing through the traced points.
- Measure the vertical distance 'h' between the cord and a point 'C' at the end of the rear overhang.
- Check the theoretical value h'
- Check the difference between the measurement h on the vehicle and the theoretical h'.
- The difference between h and h' must not exceed +/- 9 mm.

2.19 BODY ELECTRICAL SYSTEM

The electrical installation supplied with the chassis is needed for its functioning. No geometric or loading changes may be made to these lines, above all to the power circuits.

Electrical cabling fitted by the coachbuilder for other electrical equipment must have the following qualities:

- All installations must be made using non-flammable plastic tubing;
- Said protections will be extended to the point in which they are as close as possible to the connection.
- Wire cross-section area will be suitable to satisfy voltage drop and maximum current density requirements. Minimum cross-section area will be 1 mm^2 .
- All circuits will be protected by fuses. Relays will be grouped together in a box for protection. A diagram indicating internal connections will be applied on the lid of the box.
- Their routing and mountings must be clear of any of the vehicle's moving parts liable to damage them, for example, pulleys or other rotating elements, suspension components or steering system levers or the battery trolley, the articulation systems of 18 m vehicles, etc.
- When fitting the connections, take care to ensure that the terminals are properly secured to the corresponding elements.
- For safety reasons, avoid the installation where possible of control units, control panels and electrical system parts in visible positions in the area used for the transport of passengers and not monitored by the driver.

The body electrical system connection diagram is contained in the "frame for bodybuilders" documentation.

2.20 SELF-STANDING HEATER

An additional autonomous chauffeur may be installed on the chassis. This, depending upon the chosen option, can be fully equipped by IRISBUS/IVECO or only prepared for this purpose.

Any installations other than this will require the coachbuilder to send a written request for authorisation to IRISBUS/IVECO.

In order to obtain this authorisation, the coachbuilder will have to present a project of modification on the basis of that stipulated in paragraph 2.5.1.

In addition to this, the installation must be tested in operation and approved by the coachbuilder.

Additional pipes shall be in brass or another alloy resistant to corrosion by the cooling liquid. Pipe sleeves and fittings shall comply with the specifications of IVECO standard 18-0400.

Water hoses must conform to IVECO Standard 15-3438 and 10-4302 APPENDIX II.

2.21 HEATING SYSTEM

In general, the heating of the passenger compartment must adhere to the customer's requirements. You may consider the objectives given in the air-conditioning and heating systems summary document APPENDIX IV.

2.22 SUSPENSION

The body builder is not authorised to alter the parameters entered in the electronic control unit. Any changes that may become necessary must be requested from the nearest IVECO service centre.

The following characteristics will apply depending on the chosen option:

- kneeling: -70 mm at the step overhang
- lowering: -50 mm
- raising:

2.23 PNEUMATIC SYSTEMS INSTALLATION

The chassis is fitted with an operational pneumatics system used to connect to the doors and driver's seat.

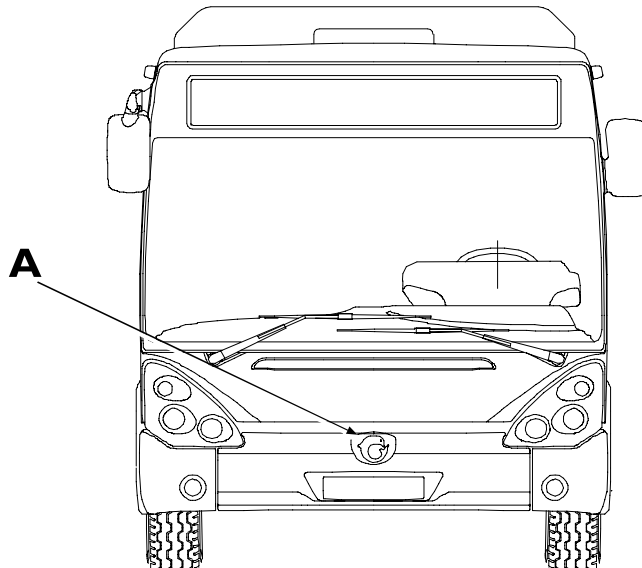
All pneumatics circuits are detailed in the diagrams in APPENDIX VI.

2.24 VEHICLE IDENTIFICATION

Front:

A) Depending on the individual case: Logo IRISBUS 5010522279.
See position - Fig. 2.24.a

Figure 2.24.a



127400

Side:

Two codes located beneath the first passenger side window on both sides.

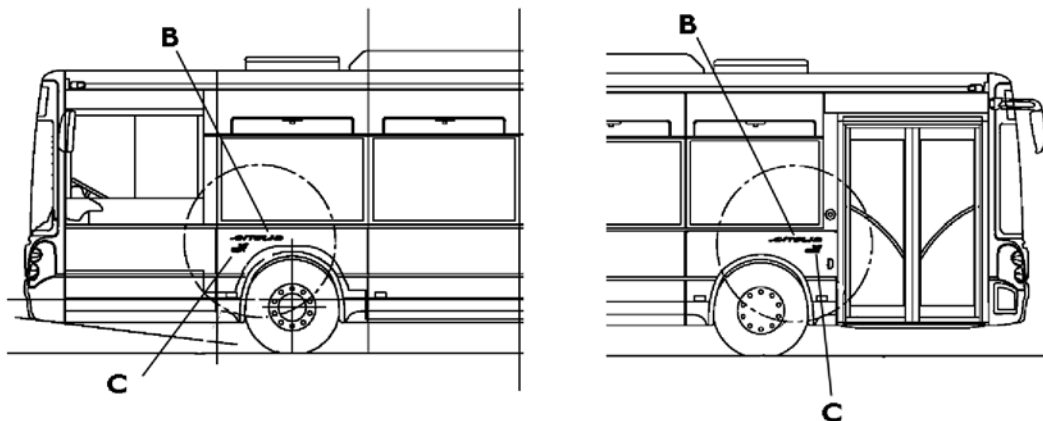
B) Citelis logo - Ref.: IVECO 504150365 (for information only)

C) Low emission vehicle code Ref. IVECO

	504153213 (EURO 4)
	504172041 (EURO 5)
	5006246534 (EEV)
	5006239405 (CNG)

See arrangement in Fig. 2.24.b

Figure 2.24.b



121855

For the positioning measurements of the logos, see the plans - Ref.: IVECO 504143241 & 504226072 in APPENDIX VIII.

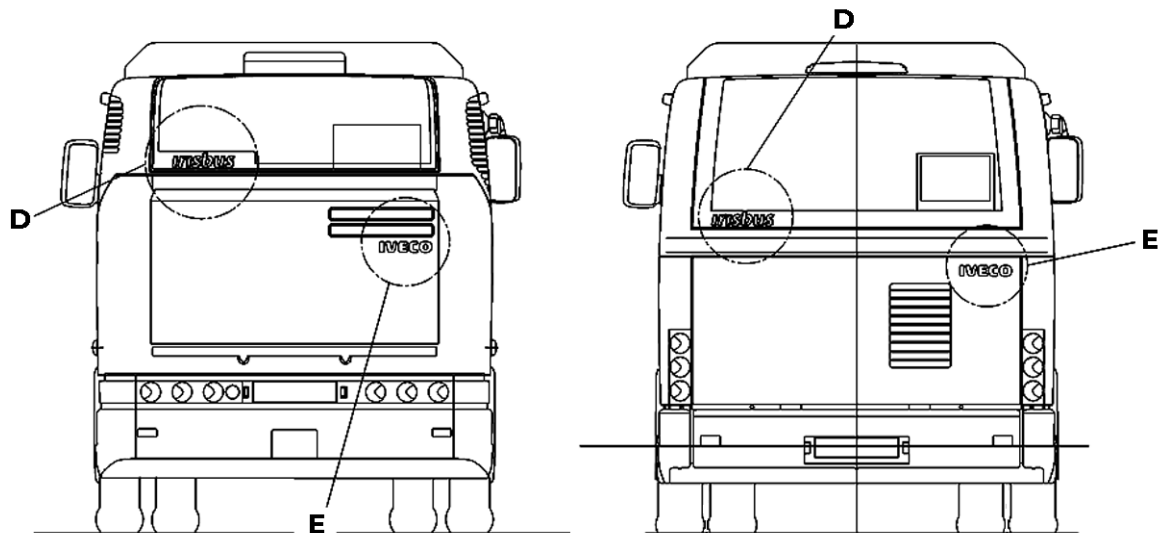
Rear:

D) An "IRISBUS" code ref. 5006222577

E) an "IVECO" code Ref. 5006230579

See arrangement in ig. 2.24.c.

Figure 2.24.c



121856

For the positioning measurements of the logos, see plan - Ref.: 504143241

Different positioning requires written authorisation from IRISBUS/IVECO marketing.

To obtain this authorisation the coachbuilder must present a project for the positioning of the logos and badges on the vehicle. Additionally, no other logo must be fixed to the vehicle unless specifically authorized by IRISBUS/IVECO.

For the IRISBUS logo the standard is 10-0806.

For the IVECO logo the standard is 10-0804.

2.25 REQUIREMENTS FOR CNG VEHICLES (NATURAL GAS-POWERED)

2.25.1 Requirements for the installation of the engine electronic control unit

No modifications to the positioning, mountings or operations involving the electrical wiring connecting the ECU to the engine are authorized.

In general, the coachbuilder must refer to the various paragraphs of this specifications manual when dealing with electrical and electronic components, as well as to the Particular Specifications Manual 504238247.

It should be noted that the openings recommended in Paragraph 288 are essential for the cooling of the unit.

2.25.2 Requirements for the installation of the FIS device (First Inertia Switch)

The FIS is a new electronic safety component fitted to the vehicle. Thus, if the vehicle is involved in an accidental collision, the sensor cuts off the electrical supply to the solenoids, starving the engine of gas. The coachbuilder is responsible for its installation in accordance with the Supplier's Specifications Manual given in APPENDIX VII.

The coachbuilder must take charge of its definitive installation on the vehicle, respecting the requirements shown in the plans - Ref.: IVECO 5006144030 and 5006197619.

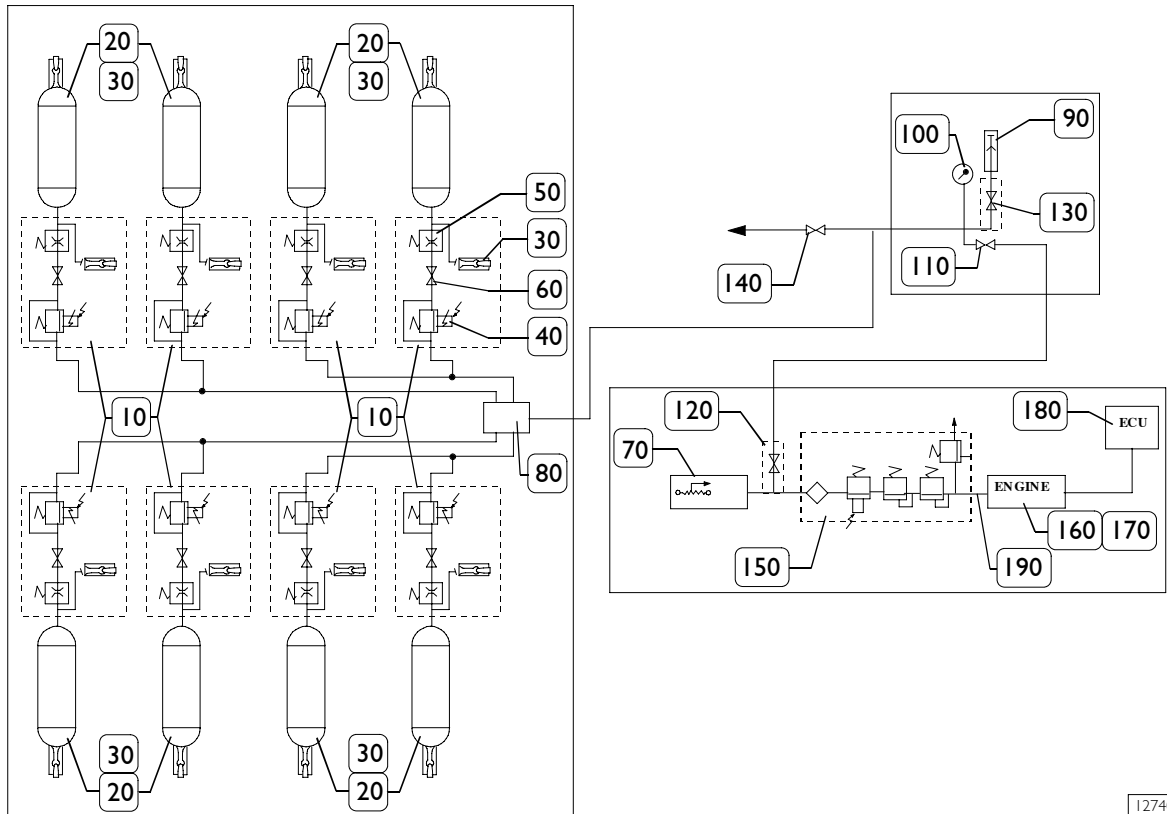
CAUTION! Once the vehicle is operational, if this sensor is tripped it can only be reset by authorised personnel once the safety of the fuel system has been checked.

2.25.3 Requirements for the installation of the gas pressure reducing valve

No modifications to the installation of this component or to the gas and engine re-heating water circuits are authorized.

2.25.4 Requirements for the installation of the high pressure circuit

Figure 2.25.4.a Description of the high pressure gas circuit



- 10. Multifunction solenoid (bottle)
- 20. Bottle
- 30. Thermal fuse
- 40. Solenoid
- 50. Mechanical overpressure valve and flow limiter
- 60. Manual valve
- 70. Pressure sensor
- 80. Distribution unit
- 90. Filler connector with integrated non-return valve
- 100. Manometer
- 110. Engine supply isolation valve
- 120. Solenoid (reducing valve)
- 130. Filler connection isolation valve
- 140. Autonomous heating supply isolation valve
- 150. Pressure reducing valve
- 160. Injector rail
- 170. Injectors
- 180. Engine Electronic Control Unit
- 190. Low pressure gas hosing

For information on the installation of the gas bottle cradle and the filler plate as recommended by IRISBUS/IVECO: 1:20 scale plans for 12 and 18 m vehicles plus assembly plan 504237028 plus an example of the CNG equipment fitted to a CITELIS - Photos in APPENDIX VII.

The coachbuilder may organise the installation differently as long as the regulations in force for the country of use are respected and the structural integrity of the vehicle is maintained, including the chassis, by means of a correctly dimensioned framework and correct chassis/side, side/roof and roof/cradle connections which will last the full service life of the vehicle.

The coachbuilder must also guarantee the leaktightness of the high pressure gas circuit using a leak-testing and correction operation on every single vehicle.

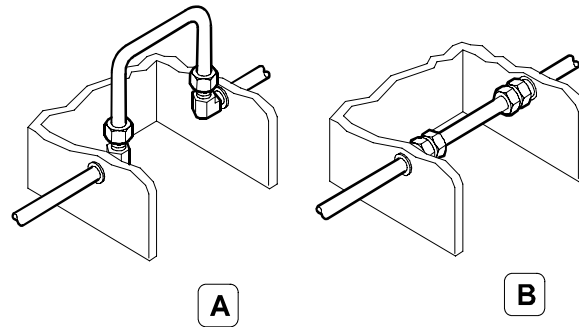
IRISBUS/IVECO, through the regulatory conformity ECER110, also recommends the following construction components and assembly instructions for the high pressure gas circuit:

- Bottles (Service life = 20 years) / solenoids / fuses
CNG3 Steel Liner: FABER 158L + Emer MARK 155 + PRD 211
CNG3 Alum. Liner: DYNETEK 155L + Emer MARK 156
CNG4 : RAUFOSS 154L + Emer MARK 156 + PRD 212
- Bottles fixed using spring-mounted clips without metallic forces applied to the bottles.
- Tubes - Stainless Steel 304 or 316 - Diameter 16 mm - no welds.
- Double ring stainless connectors - Swagelok.
- No metallic forces applied to gas tubing. Notably, you must not attach any other runs or components to the gas tubing.
- The coachbuilder must also respect the regulations in force for the country of use in terms of the mountings attaching the cradle to the vehicle. Thus, beyond the simple structural validation of the roof, and if the high pressure gas equipment is supplied by IRISBUS/IVECO, the coachbuilder must use the fittings supplied with the gas bottle cradle, applying a tightening torque of 90 Nm +/- 20% for the HM12 x 1.75 bolts. It is recommended that spacers be used between the cradle and the roof to aid rainwater clearance.
- Filler zone: To guarantee total safety when connecting the vehicle to the filler station, the coachbuilder must ensure that the design of the bodywork and electrical systems functionalities are such that the following conditions are met:
 - Access to gas filler impossible when engine is running.
 - Engine cannot be started whilst gas filling is taking place.
 - Manometer is visible during filling operations.
 - Access to manual valves on the filler plate is possible during filling operations.
- The protective cover for the CNG cradle against UV light and other external attacks gives easy access to the technical equipment of the high pressure gas circuit. This cover must not compromise adherence to the regulations for the country of use, nor should it interfere with maintenance operations. The coachbuilder must ensure that the design of this cover is compatible with the temperature around the bottles never exceeding 65°C, during prolonged exposure to direct sunlight for example. It is recommended that dark colours be avoided on the protective cover and that there is sufficient ventilation, avoiding direct UV radiation reaching the bottles.
- For additional information, see the table giving the principal components of the high pressure gas circuit used by IRISBUS/IVECO as well as the Swagelok's general catalogue in APPENDIX VII.

Precautions / Tube handling

Avoid stresses on the tube.

Figure 2.25.4.b



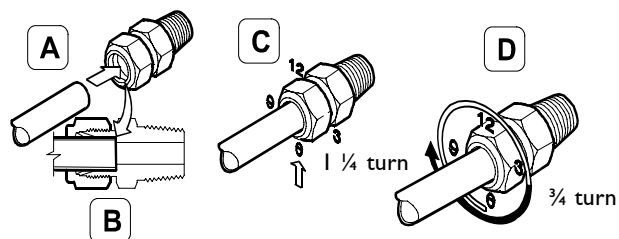
127402

- A. Correct
- B. Incorrect

Installation procedures

Swagelok tubing connectors are fitted in four (4) simple steps:

Figure 2.25.4.c

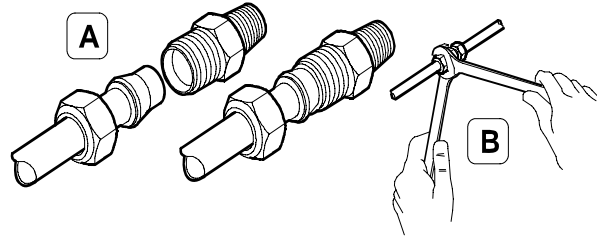


127403

- A. Insert the tube into the connector.
- B. Ensure the tube is correctly seated in contact with the shoulder on the connector and that the nut is tightened by hand.
- C. Mark the tube and nut at the 6 O'clock position.
- D. Hold the body of the connector firmly and tighten the nut $1/4$ of a turn.

Re-tightening instructions

Figure 2.25.4.d



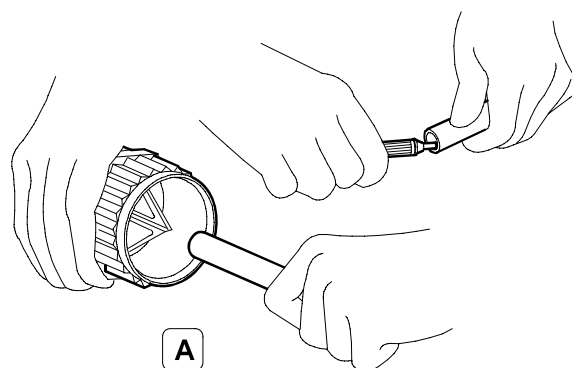
127404

- A. Retighten by hand until there is contact.
- B. Tighten the nut a further 1/4 of a turn.

Tube cutting and de-burring

De-burring the tubes

Figure 2.25.4.e

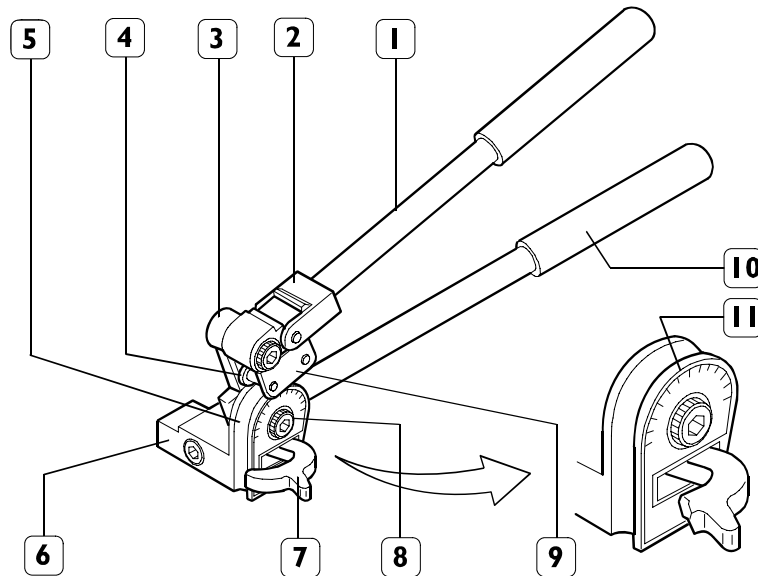


127405

- A. De-burr the internal diameter with a Swagelok de-burring tool.

Tube bending

Figure 2.25.4.f

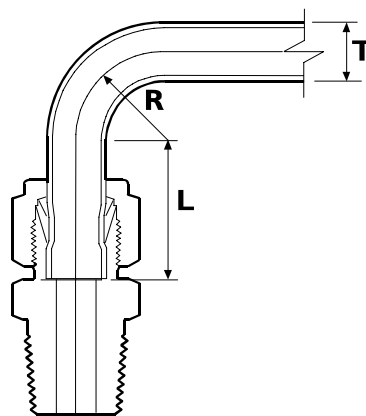


127406

1. Movable handle - 2. Yoke - 3. Lever - 4. Roller - 5. Bending matrix - 6. clamp socket - 7. Tube lock - 8. Plate - 9. Roller mounting - 10. Fixed handle - 11. Marks for straight length of tube

Minimum admissible bend radius

Figure 2.25.4.g



127407

- R. Minimum recommended bend radius as stated by the tube manufacturer. This radius is dependant on the thickness and diameter of the tube.
- S. Straight length of tube required from the end of the tube to the start of the bend.
- T. External tube diameter.

2.25.5 Requirements for the handling and storage of the high pressure cradle

2.25.5.1 Disconnecting the gas cradle from the chassis

- Manually close all bottle valves.
- Ensure that the manual engine supply valve is open.
- Run the engine until it stops to empty the high pressure gas piping.
- Ensure that the manometer shows a pressure of virtually zero Bar.
- Disconnect the gas piping and electrical wiring from the chassis gas cradle.

2.25.5.2 Handling the chassis gas cradle

- Attach slings to the gas cradle using the 4 lifting rings designed for this purpose (The slings must be fitted with safety hooks).
- Unscrew all fixings attaching the cradle to the chassis strengtheners.
- Remove the gas cradle using a lifting yoke.

2.25.5.3 Storing the gas cradle

- As for the safety instructions applicable to a gas vehicle under pressure, the cradle must be stored out of the weather and away from UV light in an enclosed, well ventilated workshop clear of any sources of ignition (welding operations, grinding work, boiler/catalytic/electrical heating systems, etc.).
- The tanks offered by IRISBUS/IVECO are authorized for temperatures of up to 65°C. This temperature must not be exceeded. This means protecting the tanks (reflective covering for example) if stored for an extended period without a cover in direct sunlight.

2.25.6 Safety instructions applicable to high pressure gas circuits

2.25.6.1 Fire risk.

- No smoking in the vicinity of an operational natural gas-powered vehicle
- Do not approach an operational gas-powered vehicle with a source of ignition (naked flame or incandescent object).
- Do not park the vehicle in an inappropriate location.
- All circuit draining operations must be carried out whilst attempting to recover the gas. If this is impossible, the operation must be carried out outside. Take into account the strength of the wind and its direction to avoid discharged gas penetrating buildings or vehicles (up to a distance of 50 metres downwind).

2.25.6.2 Maximum temperatures

- For an ambient temperature of 15°C, the tanks are considered full when the gas pressure is equal to 200 Bar.
- The tanks offered by IRISBUS/IVECO are authorized for temperatures of up to 65°C. This temperature must not be exceeded when, for example, the vehicle is placed in a baking kiln (painting).

2.25.6.3 Zones hazardous to a natural gas-powered vehicle

- All natural gas-powered vehicles must be kept away from high voltage power lines, trees or any other structure likely to attract lightning during a storm.
- All natural gas-powered vehicles must be kept away from heat sources or premises with points of ignition.

2.26 RECOMMENDATIONS FOR TROLLEYBUS VEHICLES

2.26.1 Roof loading

2.26.1.1 12 metres

See Roof Installation Recommendations - APPENDIX XI.

2.26.1.2 18 metres

See Roof Installation Recommendations - APPENDIX XI.

2.26.2 Engine compartment loading

- Drive motor and cooling: 650 kg
- Autonomous heating unit (optional): 1000 Kg
- Air compressor: 100 Kg
- Hydraulic pump: 30 Kg
- Electrical heating system: 80 Kg

A calculation of completed components (the responsibility of the fitter) will be required if there is a difference of greater than 5% from these recommendations.

2.26.3 Admissible power and torque levels

- Max. power: 210 to 240 kW
- Max. torque: I.A.W. example given in APPENDIX XI.

For information: final drive ratio (axle loading):

- 12 metres: 9,82
- 18 metres: 5,74

2.26.4 Pneumatic and power steering circuits

See the pneumatics diagrams in APPENDIX XI - TROLLEYBUSES

2.26.4.1 Pneumatic circuit

- Air quality: 2 g oil per hour (max.)
- Maximum service pressure: 12.5 Bar
- Admissible temperature for functioning components:
 - Oil separator: 85°C
 - APU : 60°C

2.26.4.2 Power steering circuit

- Oil quality: DEXRON II or DEXRON III
- Cleanliness / filtration: 12.5 Bar
- Min. flow: 16 l/mn
- Max. pressure: 180 Bar

2.26.5 Heating circuit

Under no circumstances should the water temperature exceed 100°C.

For information, APPENDIX IV, the circuit diagram for the CITELIS 12 & 18 m vehicle heating circuit as well as the plan for the booster pump.

2.26.6 Access lockouts

Specific requirements in accordance with the regulations in force in the country of use. Final validation is the responsibility of the electrical equipment fitter.

2.27 REQUIREMENTS FOR OPEN TOP 10M46 and 12M VEHICLES

2.27.1 Vehicle speed

Limited to 70 kmh empty and 50 kmh with passengers on the top floor only.

This speed may be changed depending on the outcome of the vehicle behaviour tests carried out by IRISBUS/IVECO. The coachbuilder must thus make a vehicle available for road testing.

2.27.2 Height of the centre of gravity

In addition to Chapter 2.4.3 and included in the configuration of an Open Top vehicle with passengers onboard with passengers on the top deck only, the centre of gravity must be below 1625 mm from the ground.

2.27.3 Approval

In addition to classic vehicle approval processes for a completed vehicle handed over to the coachbuilder, the latter must carry out a Tilt Test in accordance with the regulations in force for the type of vehicle.

2.28 TECHNICAL VEHICLE ACCEPTANCE

In addition to the road tests in Chapter 2.18, the coachbuilder must supply an operational validation dossier including the following elements:

- zero load weight and vehicle axle loading;
- Z position of the vehicle centre of gravity of the empty vehicle;
- manoeuvrability drawings;
- angles of attack and retreat for the fitted out vehicle = 7°;
- wheel bodywork clearance and locks;
- absence of interference from the routing crossing the articulation for articulated vehicles;
- windscreen de-icing air speed > 1.5 m/s across 90% of the surface;
- waterproof engine air inlet to the top left;
- external inlet cross section;
- max. turbo inlet pressure drop < 42mBar;
- turbo inlet air temperature < Ambient temperature +5°C;
- rear left hand side shield pierced;
- bodywork elements protected from exhaust system hotspots (temperature readings);
- cooling unit inlet grille;
- radiator inlet air temperature < Ambient temperature +5°C;
- efficiency of the anti-recycling and sealing plates around the cooling unit
- ATB without de-rating the engine at maximum power and torque;
- air evacuation from engine compartment;
- temperatures around engine and plastic tanks, hydraulic hoses, air filter, air conditioning compressor, belts, alternators and engine ECU notably;
- results of vehicle torsion testing;
- results of flexion testing on the rear overhang;
- general vehicle leaktightness;
- external noise levels CE 99/101;
- interior noise level in accordance with CUNA 504_01 & 504_02;
- evaluation of the quality of the thermal insulation around the engine compartment: Rear bulkhead contact temperature;
- detection and correction of low and high pressure gas leaks for CNG vehicles.

The coachbuilder must make a vehicle available for global validation by the Quality and Tests Dept. IRISBUS/IVECO.

Validation process:

ATB: 16-1920 in APPENDIX II

Engine compartment temperatures, turbo and radiator inlet temperatures, turbo inlet pressure drop: To be carried out at an ambient temperature of between 25°C and 40°C.

3. PRODUCT COMPLIANCE (ELEMENTS SUBJECT TO REGULATION: EEC, ECE, etc.) TO BE REQUESTED TO BODY REPAIRERS AND THEIR CASCADE SUPPLIERS

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3. PRODUCT COMPLIANCE (ELEMENTS SUBJECT TO REGULATION: EEC, ECE, ETC.) TO BE REQUESTED TO BODY REPAIRERS AND THEIR CASCADE SUPPLIERS

3.1 TARGETS

This chapter defines and describes the Control System requirements during the production process, which are necessary to ensure the final product compliance (either complete vehicles, vehicle systems, components or technical units) as for matters subject to regulations (EEC regulations, Geneva/UNO/ECE Regulations, national laws, etc.).

3.2 SCOPE

The instructions contained in this chapter are applied during production process control of complete vehicles, components and technical units.

3.3 DEFINITIONS

In this chapter the following terms are so defined:

- Final product: the result of the production process, which must fully comply with the requirements defined by law (at various levels: Local Government/ Self-governing body/State/ European Union, etc.); this applies to either complete vehicles, components or technical units.
- Vehicle systems: any vehicle system, for example braking system, subject to regulations.

- Component: device to be supplied with a vehicle, for example warning horns, and subject to any regulation according to which it can or must be approved independently of the vehicle.
- Technical unit: device subject to statutory provisions, whose function is to be part of a vehicle; it can be separately approved, but only for one or more vehicle models specified in the “technical unit” approval.
- Maker (Manufacturer): the person or body liable, before the approval body, for all concerning the approval procedure, and the subject charged with production compliance.
- Supplier: any natural or legal person, body or organization from which the manufacturer purchases “not final” products and which can affect in some way the “final product” manufacture compliance.
- Legislation/Regulation: the technical requirements required and defined according to the various EEC, ECE, national regulations, etc.
- Production compliance control system: the set of procedures adopted by the manufacturer, correctly registered and retained, to ensure and prove that the product fully complies with the applicable law.
The system includes organization, procedures, methods and tools provided by the manufacturer to ensure the final product compliance.

3.4 RELATIONSHIPS BETWEEN MANUFACTURER AND SUPPLIER

Considering that the manufacturer is fully liable for the control process on components and technical units compliance with the related requirements, the relationships with the suppliers can be included in one of the following categories, according to the adopted contractual provisions:

- a) Planning, project development, experimentation, industrial systems, production, testing and shipment.
- b) Industrial systems, testing and shipment.
- c) Production, testing and shipment.

In order to ensure the final product compliance, the manufacturer will require a) and b) group suppliers to prove and properly implement their own Production Compliance Control System; a similar system will be requested of c) group suppliers or the manufacturer will directly check the products.

For each of the above groups, the System required by the manufacturer to the supplier shall cover either a), b) or c) supply category, as per contract.

3.5 STRUCTURE OF THE PRODUCT COMPLIANCE CONTROL SYSTEM

The system is composed of the following items:

- General specifications of the product compliance check system;
- System organization, planning, checkouts and revisions.
- Documents.
- Registers.
- Corrective interventions.
- Project documentation control.
- Control equipment checkout.
- Testing/approval procedure.
- Purchased product control.
- Checks during manufacturing.
- Final product checkouts and tests.
- Non-compliance management.
- Product protection and storage.

NOTE: As for b) and c) groups, at 3.4 item, the "Project documentation control" item and information contained in other items and concerning the project will be omitted.

3.5.1 General specifications of the product compliance check system

The manufacturer shall define, register and update his own System, according to the production features and order of priority, to ensure and prove the product compliance with the related requirements, both if an in-house processing procedure has been experimented and if the system has been partly supplied by external suppliers.

In the latter case, the manufacturer may compare it to the System adopted by his own suppliers according to 3.4 item.

The system must include all provisions listed at paragraph 3. However, development ranges, implementation and tools can vary according to the product types and size, the organization structure followed by the manufacturer, existing automation types and degrees.

The manufacturer is liable for the overall System procedures (thus, we used the term "cascade").

Since the tools used to manage and transmit information are continuously in development because of new methods, each procedure must be meant and valued on the basis of the result to be obtained, not according to the method used to obtain it.

3.5.2 System organization, planning, checkouts and revisions

1) System Organization

The manufacturer must set up its own system, authorised by IVECO and/or certified by an authorised organisation, that allows the relevant departments to establish the required correspondence with this specification with the aim of ensuring that the product complies with the relevant regulations.

2) Training

The manufacturer shall define the training requirements of the personnel involved in the production process and in the relevant control system.

3) System planning

- Project and manufacturing documentation control.
- Technical project identification and acquisition.
- Personnel training.
- Tool checkout and testing techniques updating, if needed.
- Testing procedure definition and diffusion.
- Quality control programs, if foreseen by the related requirements.

4) System checkout and revision

The manufacturer shall perform periodical checks to the implemented system, adopting techniques best suiting his organization, in order to:

- Verify the system effectiveness, according to the estimated results.
- Detect any fault/inconsistency in all checked System sections.
- Find out missing items.
- Check for the corrective intervention procedures effectiveness.

3.5.3 Documents

The documents shall support the work development through planning, production, testing and shipment stages. As concerning the legislation/regulation in force, the documents can include:

- Projects.
- Rules and procedures.
- Product and/or project changes.
- Test and acceptance procedures for supplies.
- Production process control programs.
- Product control, repairing and rejecting procedures.
- Tools, gauges and equipment periodic checkout procedures.
- Storage, packing and shipment instructions.
- Registration and filing procedures of the production process control results.
- Evidence management instructions (if any).

However, information supplied by means of computer-aided techniques are applicable, even if the final target is to provide the necessary documents to the right persons and at the right moment, and/or needed for.

3.5.4 Registers

The manufacturer shall fill-in and retain the registers provided for by his system in order to prove the actual compliance and the control System effectiveness.

Moreover, the manufacturer shall ensure that products supplied by any supplier are in compliance with the necessary requirements. To do this the manufacturer can avail himself of the registers compiled by his own suppliers, following the procedures and methods previously agreed on.

The registers must be stored and kept available for a least the periods laid down in national and international law under EEC directive N5 85/374. The registers compiled by any supplier are included in this data group.

The registers shall include, at least:

- Plain identification of each element and group they are composed of, in compliance with the necessary requirements.
- Moreover, according to circumstances, the type and number of performed checkouts, accepted and rejected amounts and the nature of any adopted corrective intervention.

Besides data relevant to the control system checkouts, the registers shall also include those relevant to testing and measuring equipment adjustment.

3.5.5 Project documentation control

The manufacturer system shall ensure overall control on the project.

If applicable, the above mentioned provisions shall include:

- Identification of the activities considered as involved in the project by the administration.
- Liability for the projects and/or relevant rules and/or procedures.
- Instructions to comply with the necessary requirements.
- Project revision procedures, to ensure the final product compliance.

3.5.6 Corrective interventions

The manufacturer must define and keep efficient all documented procedures allowing him to detect any non-compliance causes through all stages from the product purchase to the final product sale and able to possibly affecting planning, procurement, manufacturing, tests and any other element/function which could change the final product compliance with the necessary requirements, according to the legislation/regulation in force.

Particularly, the Manufacturer shall act as follows:

- Select useful information to find out non-compliance causes and start the necessary corrective interventions.
- Monitor manufacturing processes and working procedures, as well as check the registers, to eliminate all final product non-compliance causes.
- Start the suitable interventions, following any non-complying item.
- Check the corrective interventions effectiveness.

3.5.7 Control, measuring and testing equipment checkout

The manufacturer shall provide specific procedures to locate, control, adjust and keep efficient all measuring and testing equipment, which will prove the final product compliance with the necessary requirements.

These procedures shall be checked as for the related response, as well as to verify their effectiveness, both following a preset maintenance schedule and by means of extraordinary interventions if necessary.

The measuring tools accuracy shall be checked at regular intervals and compared to reference patterns.

The periodic checkout results shall be retained, so to always be easily available.

3.5.8 Checkout procedures

The manufacturer shall define and register the checkout procedures adopted. Similar procedures shall be used by suppliers dealing with compliance control.

Both checkout procedures based on statistic methods and test results shall be suitably registered and valued, in order to assess fault and all significant reject causes and start the necessary corrective interventions on the product and/or manufacturing process.

The manufacturer shall define and keep efficient a system identifying the product testing conditions.

The manufacturer shall mark all not complying products, using suitable identification techniques, namely stamps, labels, tags, etc.

3.5.9 Purchased product control

According to what provided at 3.4 item, the manufacturer must ensure the purchased products fully comply with the necessary requirements.

Supply sources and control methods will be chosen according to the product type and the supplier capacities. The manufacturer shall therefore prepare a list of selected and qualified suppliers.

The compliance of purchased products shall be proven by means of the following:
(for a) and b) group supplier products),

- “a priori” effectiveness of the proprietary Compliance Control System, which includes cascade suppliers.
- Proper use of the system.
- Manufacturer checkouts performed by the manufacturer according to what provided at 3.5.2 item for in-house checkouts.
- Direct statistic controls on the supplies performed, performed by the manufacturer (for c) group supplier products, as an alternative)

➤ As for a) and b) groups or simply by means of direct statistic controls performed by the manufacturer on the supplies.

✓ By means of direct statistic controls on the supplies performed by the manufacturer.

The manufacturer buy order shall include a technical description of the required product and the data needed by the supplier to check for compliance.

Faulty products coming from the suppliers, delivered at the manufacturer's premises, must undergo the same procedures followed for faulty products detected in-house.

The manufacturer shall ensure the supplied product compliance as per the "supply contract" or make the supplier carry out compliance control, according to the system adopted by the latter.

3.5.10 Controls during manufacturing

The manufacturer shall ensure that manufacturing processes are performed under close control, to ensure the Product Compliance with the necessary requirements. The control must be based on documented working instructions, defining control equipment to be used and methods to be applied.

The manufacturer must ensure that production rules, projects and/or any other necessary technical data are made available to whoever needs them; these data must always be updated.

The manufacturer must perform the necessary checkouts to ensure the product compliance with the necessary requirements. These checkouts can be performed by means of processing survey automatic controls or by means of product test performed with suitable equipment and qualified personnel (for example: self-control).

The checkout and control methods adopted by the manufacturer must be quickly enhanced if resulting unsuitable; the procedures defined by the manufacturer shall name the body or person liable for the processing and control rules issue, checkout and modification.

The working instructions defined by the manufacturer and duly registered shall include all manufacturing stages which could affect the product compliance with the necessary requirements, assembly and installation included.

Moreover, the control methods must be specified.

3.5.11 Final product checkout and testing

The manufacturer, to prove the final product compliance (single elements or whole production lot) with the necessary requirements, shall define the checking procedures.

The manufacturer shall consider the following factors: testing procedures and involved personnel, testing equipment (accuracy and fitness), testing conditions and data to be registered. The manufacturer System shall ensure that all materials, parts and subsets are in compliance with the requirements before their assembly. This because, once assembled and built-in in the final product, accessing and monitoring could result difficult.

3.5.12 Non-compliance management

The manufacturer shall define and keep efficient the compulsory intervention management procedures in case of non-compliance.

These procedures shall include operations to be carried out to identify, locate and work on non-compliance parts. Non-compliances shall be suitably labeled to avoid using or shipping non-complying final products.

Moreover, it is recommended to suitably retain the related registers, which shall report the non-compliance nature and extent, as well as the adopted remedies.

3.5.13 Product protection and storage

The manufacturer must define and keep efficient a system to identify, store, group and handle products, starting from the arrival and through the whole production process. This System shall define product management methods to avoid faults, improper use and deterioration, as well as provide suitable information concerning single elements and subsets handling and stocking. Moreover, the system shall ensure that the defined procedures are actually carried out.

Suppliers must comply with these requirements, ensuring a similar check on materials and final product protection.

3.6 LIABILITIES BEFORE THIRD PARTIES

If, when the bus equipped by an external Body maker on IRISBUS chassis is in transit, with passengers on board, or during a modification carried out by an external Body maker, on behalf of himself or of IRISBUS, an accident or unpredictable event occurs resulting in casualties or damages, the Body maker shall be held liable. This in case the damage survey or inquiry prove that it was due to body faults (design and/or manufacturing) and/or changes made on the chassis which were neither agreed on nor authorized by IRISBUS, or irrespective of the rules or recommendations included in this chapter.

In this case the Body maker can not recover from IRISBUS, as for claims/actions started by third parties or expenses borne by IRISBUS must in connection with or in consequence of these actions or claims.

Therefore, the Body maker shall draw a (Product liability) insurance, whose terms and conditions will be defined according to the above criteria.

3.7 RULES FOR BODY REPAIRERS USING IRISBUS SAFETY PARTS

Constantly striving to achieve higher safety standards and in view of the specific regulation enforcement within the European Union, IVECO/IRISBUS has drafted a regulation concerning safety parts.

It deals with vehicle components, elements and parts on whose safety the driver's and third parties' durable safety directly depends.

The safety part drawing must be marked with the letter "S".

In the drawing all levels, features, notes, materials, etc. corresponding to project critical elements must be marked with asterisks.

Work orders for "S" parts shall be delivered to Body repairers as soon as the presence of equipment, machines and control organization able to grant the required reliability is ascertained.

The procedure for "S" parts, with which the Body maker shall comply, is as follows:

- 1) Compulsory compliance with safety features.
- 2) Fifteen year retention of all the documents reporting the tests performed on safety feature.
- 3) Notice of faults detected as for critical features; the form is given at page no. 81.
- 4) Notice of parts and/or components modification proposals, as for materials, processing and testing; the form is given at page no. 81.
- 5) Dispatch, for each batch sent, of the project identification quality certificate on the basis of provisional IVECO standard n5 0103 of 25-01-1982 and/or I.S. 18-0013 of 10-02-97;
- 6) Written statement, by the Body maker, attesting the acceptance of all provisions given at 1, 2, 3, 4 and 5 items; the form is given at page no. 82.

After acceptance of the above mentioned items, the Body maker shall allow IVECO/IRISBUS, if needed or reasonably requested, to survey, at any time, his safety product control system effectiveness.

IVECO will classify the DRAWING-DENOMINATION.

3.8 CERTIFICATE OF FITNESS FOR IRISBUS CHASSIS EQUIPMENT

IRISBUS

TURIN

The company (business name and address) asks for the issue of the Certificate of Fitness, authorizing the model chassis equipment, as well as approval of the enclosed drawing copies no

From this moment it is engaged to:

- Equip the chassis work-manlike.
- Comply with the limits and provisions, as for masses provided for the model.
- Carry out no modification on the chassis as delivered by the shop.
- Duly assemble the body structure with the frame provided by IRISBUS (which is not load bearing), carefully performing frame seams.
- Be liable, before its clients, for the body as well as faults resulting from improper equipment (such as frame failure) and for all possible consequence.

Particularly, as for the current chassis, we state the related diagram has been received and surveyed, namely:

- Drawing. Sheet.
- Drawing. Sheet.
- Drawing. Sheet.

and we will thoroughly follow the instructions given, in compliance with generic IRISBUS equipment regulation.

As for body strength specific requirements, within the overall structure, we state suitable calculation and/or testing shall be provided for all implementations, which shall be suitably registered and retained, on our liability.

As for the acceptance of our structural drawings, for approval purposes, it is understood that, in the event your theoretical and/or practical checkouts prove unfeasible, due to economic or technical reasons, we shall be fully liable for the project development and implementation, dimensioning and materials included.

Safety parts
Notice of “S” parts faults

Our Company (business name and address) has detected the part (reference number-denomination) non-compliance with one of the safety specifications.

The lot containing faulty parts is possibly composed of no..... parts, of which about no..... parts are faulty and has been manufactured between and

This fault has been due to

It could be corrected by means of the following actions:

Date

Supplier stamp and sign

Safety parts
Modification request

Our company (business name and address) has detected enough reasons to request the following modification of the part (reference number-description), belonging to the group

for the following purposes

To carry out the modification, the following actions are recommended:

- Planning (if the group has been designed by the supplier)
- Processing
- Equipment
- Machinery
- Test cycles
- Testing equipment

Time required for the modification:

.....

Date

Supplier stamp and sign

Safety parts
Retention of documents obligation

Our Company (business name and address) as the supplier of the part (reference number-denomination), undertakes to retain for 15 years all documents relevant to the above mentioned parts.

THESE DOCUMENTS SHALL INCLUDE:

- Work orders and amendments.
- Test sheets, checkouts and subsequent rules attesting the product quality. These sheets shall expressly refer to the single part or lot (specifying the relevant date), according to quality regulations.
- Modification requests as for processing, testing or drawings of parts belonging to a group.
- Notice of defects of workmanship detected on "S" parts.
- Modifications performed on "S" parts on our request.

These documents must always be made available in the event of surveys, also if the safety part has been manufactured by one of our subsuppliers.

Date

Supplier stamp and sign

4. HOT ROLLED/DRAWN STEEL AND SCHEDULED PAINTING/ PROTECTION

When choosing plates, executing steel pipes and welding metal elements (with relevant strength and protection parameters), refer to the IVECO Standards provided in the table.

IVECO Standard	Description
10-8011	CHOOSING STEEL PLATES WHEN BUILDING BUSES
10-8012	ADVICE ON CHOOSING AND TRANSFORMING STEEL PIPES
10-4000	HEAT BONDING OF METALLIC ELEMENTS
18-0600	CLASSIFICATION AND LIMITS OF RELIABILITY OF DEFECTS PERMITTED IN ARC AND GAS WELDING
10-4127	ENDURANCE STRENGTH OF STEEL PLATE JOINTS SPOT-WELDED AND WITH CONTINUOUS BEAD
18-1605	PROTECTION OF THE METAL PARTS OF THE BUS AT THE FINAL STAGE

5. PROCEDURES FOR DAMAGES AND/OR DENTS TO VEHICLES FORWARDED TO BODY REPAIRERS

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5. PROCEDURES FOR DAMAGES AND/OR DENTS TO VEHICLES FORWARDED TO BODY REPAIRERS

5.1 GENERAL INFORMATION

The procedure is based on a damage and dents entry sheet, supplied with the vehicle from the shop to its final destination.

Vehicles are supplied with this sheet when leaving the shop. The person responsible for the transportation must check for the presence of this sheet or, if missing, require a duplicate.

Vehicles leaving established parking areas always must have on board the sheet provided from the shop to the parking area.

5.2 VEHICLE WITHDRAWAL

According to the contractual clauses contained in the order, the delivery to the Body maker may occur as follows:

- 1) Ex shop or ex established parking delivery.
- 2) Ex destination delivery.

5.3 EX SHOP OR EX ESTABLISHED PARKING DELIVERY

- 5.3.1** The person charged by the Body maker of the vehicle withdrawal must check for the presence of the damage sheet and the vehicle integrity and outfits.
- 5.3.2** Any damage and dent must be reported to the parking area attendant, then written in the 1st strip of the sheet (in case of vehicle withdrawn from the shop) or in the 1st available strip of the same sheet (in case of vehicle withdrawn from the established parking area) and confirmed by the transferee.
- 5.3.3** This strip will be given to the transferee, whereas the remaining parts of the document will remain with the vehicle.
- 5.3.4** In case of withdrawal from the shop, even if no damages are detected, the first strip must be struck through and signed by the receiver.
- 5.3.5** The procedure to be followed in case of damages or dents occurred at the shop has been provided: in these cases the shop will repair any damage and dent. As for the established parking area, any damage and dent detected at the vehicle arrival will be repaired and restored at IRISBUS expense before it is withdrawn or delivered to the Body maker.
Unless exceptions, each vehicle coming out of shop or established parking area must be integer. Particular cases must be notified, with the relevant documentation, to IRISBUS, which will deal with the procedures and indemnify the damage.

5.4 EX DESTINATION DELIVERY

- 5.4.1** In this case, the driver of the designed carrier must follow the procedures described at 5.3.1, 5.3.2, 5.3.3 and 5.3.4 items.
- 5.4.2** At the vehicle arrival, the Body maker parking area attendant, together with the carrier driver, must check for any damages or dents.

- 5.4.3** Any damage/dent will be reported on the first available strip: the transferee and receiver must sign in the relevant spaces.
- 5.4.4** The Body maker attendant will detach the corresponding strip and give it to the carrier driver.

5.5 VEHICLE REPAIRING

- 5.5.1** According to the rule in force between IRISBUS and the carrier, any damage caused by the carrier in transit must be divided into the following two categories, according to their entity:
- a) Slight damage, below the threshold:
The Body maker can directly repair the damage without previous communication to the carrier.
 - b) Damage greater than the threshold:
The Body maker must send a repair estimate to the carrier, by telex or registered mail with return receipt, within 5 workdays following the date of receipt of the damaged vehicle.
- 5.5.2** A copy of this estimate must be sent to IRISBUS.
- 5.5.3** Within 5 workdays following the sending date of the telex or registered mail with return receipt, the carrier must contact the Body maker; if he wishes to avail himself, for the vehicle, of his insurance company he must send a copy to IRISBUS; otherwise, the repair will be meant as authorized.
For the repair of mechanical or electrical/electronic units, the bodybuilder must contact the nearest IVECO/IRISBUS dealership.
- 5.5.4** Once the repair is made, the Body maker must make out a debit note to the carrier, V.A.T. free according to DPR 633/72 article 15, 2nd comma, enclosing all the necessary receipts (damage sheet copy, failure reports, third party workshop invoices) and sending a copy of all documents to IRISBUS.
- 5.5.5** When sending the estimate telex, the Body maker will ask the carrier if he is interested in withdrawing the rejected parts which, in case of affirmative answer, will be available for a maximum of 45 days from this communication date.
- 5.5.6** After 45 days, if the carrier has not withdrawn the parts he was interested in, these will be scrapped at the Body maker expense, without any payment pro carrier.

5.6 VEHICLE DELIVERY TO THE SHOP AFTER EQUIPPING

5.6.1 Delivery at the Body maker expense

At the vehicle arrival, the Conformity department will perform the checkout, together with the driver committed by the Body maker. Any damage/dent will be reported in the 1st available strip of the damage sheet. The transferee and the receiver will sign in the relevant spaces and the Conformity department will give the corresponding strip to the transferee.

As for the damage estimation, the Conformity department will draft an estimate for a cost above the threshold, timely sending it to IRISBUS, so that the information can be sent within 5 workdays after the date of receipt of the vehicle.

The Body maker has the right to subject the vehicle to a survey. To do so, he must inform IRISBUS within 5 workdays after the sending date of the telex or registered mail with return receipt. If no answer will be received within the set time, the repair will be meant as authorized.

Repair or restoration will be performed at the shop Conformity department expense, which will transfer the relevant documents to the administration office, so that the debit note can be made out at the Body maker expense.

The amount of this note will be deducted as a compensation for the payments still due to the Body maker.

5.6.2 Vehicle delivery by IVECO/IRISBUS-established carrier

As specified in the previous item; also in this case, IVECO/IRISBUS will pay the damage/dent as a compensation for the payments still due to the Body maker.

5.6.3 Vehicle delivery to the Body maker workshop

If damage or faults are detected during inspection, the bodybuilder must prepare the vehicle as a matter of urgency to comply with the delivery times. The bodybuilder is responsible for paying the repair costs.

The vehicle may be withdrawn at the Body maker workshop:

by the client who must receive an integer vehicle; by an IRISBUS carrier, which will deliver it to the shipment place or the final client; also in this case the Body maker must guarantee the vehicle integrity. Obviously, the carrier, at withdrawal, must perform the routine vehicle tests, according to the procedure described at 5.3.1, 5.3.2, 5.3.3 and 5.3.4 items.

5.7 VEHICLE PART MALFUNCTIONS

Any vehicle part damage/malfunction must be suitably communicated to IRISBUS, which will make the Service Department repair the vehicle.

Annex (A)

IVECO, S.P.A.	DAMAGES/MISSING PARTS SERVICE SHEET	SHOP STORAGE CODE
WARNING: if the damage description is too long please use the following slip		
SHEET	STORAGE AREA	CARRIER
	(To be struck through if there are no claims)	
AMOUNTS		
TOTALS		
SHEET	PARKING	CARRIER
	(To be struck through if there are no claims)	
AMOUNTS		
TOTALS		
SHEET	PARKING	CARRIER
	(To be struck through if there are no claims)	
AMOUNTS		
TOTALS	TRANSFEROR	RECEIVER
	_____	_____
SHEET	PARKING	CARRIER
	(To be struck through if there are no claims)	
AMOUNTS		
TOTALS	TRANSFEROR	RECEIVER
	_____	_____
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>NOTE: In case of loss the responsible is charged with any damages to the vehicle, until he gives it up to the following operator</p> </div>	

Annex (B)**Static checkouts on the chassis**

- Check the engine oil level and top up if necessary.
- Check the hydrostatic fan system fluid level and top up if necessary.
- Check the hydraulic steering system fluid level and top up if necessary.
- Check the engine coolant level and top up if necessary.
- Check the gearbox oil level and top up if necessary.
- Check the rear axle fluid level.
- Check the wheel nut fastening.
- Check tyre condition and pressure and adjust if necessary
- Check hydraulic brake system fluid level
- Check horn operation
- Check the operation of instruments and warning lights.
- Check the operation of the air suspension raise and lower device.
- Check turn signal operation
- Check the battery level.
- Check the battery bracket and terminal fastening.
- Check the tension in the alternator belts or belts and adjust if necessary.
- Grease the gearbox linkage, the propeller shaft and the stub axle
- Bleed the air from the fuel feed circuit.
- Check engine start-up.
- Start at the engine and check for leaks from the air system. If necessary, tighten the fittings using a torque wrench.
- Check and tighten the coolant system collars.
- Fix the steering wheel by means of the hexagon nut and adjust it.
- Balance the front wheels by means of the specific equipment.

Running vehicle operation test

- Testing and checking vehicle operation: Suspension, gearbox, brakes, steering, acceleration, deceleration, road-holding, control and command equipment, performance of installed bodywork (e.g. noise, vibrations etc) by means of road testing or roller benches.
- Check the standing vehicle immediately after the test: pneumatic system, motor belt tension and liquid levels.
- Check the chassis low parts for leakages or other damages.
- Overhaul all mechanic and pneumatic parts according to what detected during the test (after the road test).
- Overhaul the electric system to remove all malfunctions detected during the test (after the road test).
- Start the vehicle (after the mechanic and electric overhauling of the detected malfunctions) and test again to be sure all faults have been corrected.
Clarify any doubt over this annex with IRISBUS.

Annex (C)**Service coupon (II)****Engine**

- Check engine idle speed.
- Check engine exhaust system by sight.
- Check the condition of the various belt drives

Frame and mechanical units

- Check seal of mechanical unit fluids
- Check seal of hydraulic brake and cooling system pipes
- Check hydraulic steering system fluid level
- Check fastening of supports, brackets.
- Check steering linkages, joints and steering column
- Check air suspension levelling
- Check fuel pipe seal
- Check hydraulic shock absorber seal.
- Check operation of central lubrication system
- Check condition of air suspension gaiters.
- Check power steering hydraulic stop
- Check operation of retarders.
- Check tyre wear by sight.
- Check condition of gaiters and gearbox/steering hoses

Electrical equipment

- Check the operation of instruments and warning lights.
- Check the operation of the air suspension raise and lower device.
- Check operation of exterior lighting
- Check for presence of protective coating on battery terminals
- Check the battery bracket and terminal fastening.
- Check operation of general battery switch
- Checked various services controlled from dashboard

Miscellaneous

- Check instrument operation (during inspection).
- Check maintenance services carried out (I).
- Noise test (with engine warm).
- Operational inspection and handling operations.

NOTES:

- (I) Check the tables in the Owner Handbook for notes certifying that the Scheduled Maintenance Services have been carried out.
- (II) The service must be carried out in accordance with instructions issued by each market, between 10° and 12° months and no later than the expiry date of the 1st year of warranty.
The service must be carried out in order for the 2nd year of warranty to be recognized.

Annex (D)**Procedures to be followed upon the vehicle arrival at the warehouse (buses and chassis)**

- Store the provided box.
- Operate the battery disconnection switch (if any).
- Remove the fuse from the tachograph (if any).
- Attach the suitable caution label.
- Fits appropriate spaces between the axle, rear axle and frame.
- Place some protection covers, as during the parking at IVECO, which will be requested to the carrier (for chassis only).

Annex (E)**Maintenance of finished buses stored into warehouses****1) Three-monthly cycle**

- 1.1 Withdraw the units from the park, with move batteries, and move them into the test area.
- 1.2 Check the vehicle general external conditions and locate parts to be repaired (if any).
- 1.3 Start and run the motor at medium speed for about 10 minutes.
- 1.4 Check the external lights, windscreen-wipers and doors operation.
- 1.5 Check the coolant level.
- 1.6 Check the vehicle inside as regards the internal covering in those specific points considered as critical at that moment.
- 1.7 Check the operation of:
 - lights and signaling instruments on board;
 - internal lighting;
 - auxiliary preheater (if present);
 - air conditioner (if present);
 - operation of demisting and heating systems;
 - mirrors and/or rear windows resistance;
 - watch-microphone (if present);
 - starter safety.
- 1.8 Correct any malfunction.
- 1.9 Check the corrections and move the vehicle to the storage area with the original equipment.

2) Half-yearly cycle

- 2.1 Withdraw the units from the parking area, with move batteries, and move them to the test area.
- 2.2 Wash the vehicle (remove the waxy protection from waxed vehicles), check its general external conditions and locate parts to be repaired (if any).
- 2.3 Start and run the motor at medium speed for about 10 minutes.
- 2.4 Check the external lights, windscreen-wipers and doors operation.
- 2.5 Check the vehicle inside as regards the internal covering.
- 2.6 Check the operation of:
 - lights and signaling instruments on board;
 - internal lighting;
 - auxiliary preheater (if present);
 - air conditioner (if present);
 - operation of demisting and heating systems;
 - mirrors and/or rear windows resistance;
 - watch-microphone (if present);
 - starter safety.
- 2.7 Check the levels (density), Paraflu, motor oil, clutch oil, brake fluid and tire pressure, retighten the rubber manifolds.
- 2.8 Operation test on track for an 8 km run. Brake and ABS test. Apply protective grease, vaseline or similar, on the electric contacts, as originally provided.

- 2.9 Lubricate the propeller shaft, the kingpin and the rear brake levers.
- 2.10 Correct any malfunction.
- 2.11 Check the correction, restore the waxy protection (if necessary) and move the vehicle to the parking area with the original equipment.

3) Nine-monthly cycle

- 3.1 Withdraw the units from the parking area, with move batteries, and move them to the test area.
- 3.2 Check the vehicle general external conditions and locate parts to be repaired (if any).
- 3.3 Start and run the motor at medium speed for about 10 minutes.
- 3.4 Check the external lights, windscreen-wipers and doors operation.
- 3.5 Check the coolant level.
- 3.6 Check the vehicle inside as regards the internal covering in those specific points considered as critical at that moment.
- 3.7 Check the operation of:
 - lights and signaling instruments on board;
 - internal lighting;
 - auxiliary preheater (if present);
 - air conditioner (if present);
 - operation of demisting and heating systems;
 - mirrors and/or rear windows resistance;
 - watch-microphone (if present);
 - starter safety.
- 3.8 Correct any malfunction.
- 3.9 Check the corrections and move the vehicle to the storage area with the original equipment.

4) Yearly cycle

- 4.1 Withdraw the units from the parking area, with move batteries, and move them to the test area.
- 4.2 Wash the vehicle(remove the waxy protection from waxed vehicles), check its general external conditions and locate parts to be repaired (if any).
- 4.3 Restore the lower parts protection.
- 4.4 Start and run the motor at medium speed for about 10 minutes.
- 4.5 Check the external lights, windscreen-wipers and doors operation.
- 4.6 Check the coolant level and the tire pressure.
- 4.7 Check the vehicle inside as regards the internal covering.
- 4.8 Check the operation of:
 - lights and signaling instruments on board;
 - internal lighting;
 - auxiliary preheater (if present);
 - air conditioner (if present);
 - operation of demisting and heating systems;
 - mirrors and/or rear windows resistance;
 - watch-microphone (if present);
 - starter safety.

- 4.9 Body leak test, by driving under an arch with a sprinkler.
- 4.10 Operation test on track for a 12 km run; testing brakes and ABS /ASR (if present).
- 4.11 Check and eliminate any leakage from the pneumatic, hydraulic and cooling systems retighten the rubber manifold brackets.
- 4.12 Replace motor oil, brake and clutch fluids, power steering fluid and hydraulic fan fluid.
- 4.13 Retighten the wheel nuts.
- 4.14 Correct any malfunction and clean the inside.
- 4.15 Check the waxy protection restoration (if necessary) and move the vehicle to the parking area with the original equipment.
- 4.16 Notification letter from the bodybuilder to IRISBUS to allow engineers to check the condition of preservation of the bus.

5) Fifteen-monthly cycle

- 5.1 Withdraw the units from the parking area, with move batteries, and move them to the test area.
- 5.2 Check the vehicle general external conditions and locate parts to be repaired (if any).
- 5.3 Start and run the motor at medium speed for about 10 minutes.
- 5.4 Check the external lights, windscreen-wipers and doors operation.
- 5.5 Check the coolant level.
- 5.6 Check the vehicle inside as regards the internal covering in those specific points considered as critical in that moment.
- 5.7 Check the operation of:
 - lights and signaling instruments on board;
 - internal lighting;
 - auxiliary preheater (if present);
 - air conditioner (if present);
 - operation of demisting and heating systems;
 - mirrors and/or rear windows resistance;
 - watch-microphone (if present);
 - starter safety.
- 5.8 Correct any malfunction.
- 5.9 Check the waxy protection restoration (if necessary) and move the vehicle to the parking area with the original equipment.

6) Eighteen-monthly cycle

- 6.1 Withdraw the units from the parking area, with move batteries, and move them to the test area.
- 6.2 Wash the vehicle (remove the waxy protection from waxed vehicles), check its general external conditions and locate parts to be repaired (if any).
- 6.3 Start and run the motor at medium speed for about 10 minutes.
- 6.4 Check the external lights, windscreen-wipers and doors operation.
- 6.5 Check the vehicle inside as regards the internal covering.
- 6.6 Check the operation of:
 - lights and signaling instruments on board;
 - internal lighting;
 - auxiliary preheater (if present);
 - air conditioner (if present);
 - operation of demisting and heating systems;
 - mirrors and/or rear windows resistance;

- watch-microphone (if present);
starter safety.
- 6.7 Check the levels (density), Parafllu, motor oil, clutch oil, brake fluid and tire pressure, retighten the rubber manifolds.
- 6.8 Operation test on track for an 8 km run. Brake and ABS test. Apply protective grease, vaseline or similar, on the electric contacts, as originally provided.
- 6.9 Lubricate the propeller shaft, the stub axle pin, the steering ball joints (accelerator, brakes, clutch, etc.).
- 6.10 Replace:
Brake master and operation cylinder
Brake limit switches.
- 6.11 Check the correction, restore the waxy protection (if necessary) and move the vehicle to the parking area with the original equipment.

7) Twenty-one-monthly cycle

- 7.1 Withdraw the units from the parking area, with move batteries, and move them to the test area.
- 7.2 Check the vehicle general external conditions and locate parts to be repaired (if any).
- 7.3 Start and run the motor at medium speed for about 10 minutes.
- 7.4 Check the external lights, windscreen-wipers and doors operation.
- 7.5 Check the coolant level.
- 7.6 Check the vehicle inside as regards the internal covering in those specific points considered as critical in that moment.
- 7.7 Check the operation of:
lights and signaling instruments on board;
internal lighting;
auxiliary preheater (if present);
air conditioner (if present);
operation of demisting and heating systems;
mirrors and/or rear windows resistance;
watch-microphone (if present);
starter safety.
- 7.8 Correct any malfunction.
- 7.9 Check the waxy protection restoration (if necessary) and move the vehicle to the parking area with the original equipment.

8) Twenty-four-monthly cycle

- 8.1 Withdraw the units from the parking area, with move batteries, and move them to the test area.
- 8.2 Wash the vehicle(remove the waxy protection from waxed vehicles), check its general external conditions and locate parts to be repaired (if any).
- 8.3 Restore the lower parts protection.
- 8.4 Start and run the motor at medium speed for about 10 minutes.
- 8.5 Check the external lights, windscreen-wipers and doors operation.
- 8.6 Check the coolant level and the tire pressure.
- 8.7 Check the vehicle inside as regards the internal covering.

- 8.8 Check the operation of:
 - lights and signaling instruments on board;
 - internal lighting;
 - auxiliary preheater (if present);
 - air conditioner (if present);
 - operation of demisting and heating systems;
 - mirrors and/or rear windows resistance;
 - watch-microphone (if present);
 - starter safety.
- 8.9 Body leak test, by driving under an arch with a sprinkler.
- 8.10 Operation test on track for a 12 km run; testing brakes and ABS /ASR (if present).
- 8.11 Check and eliminate any leakage from the pneumatic, hydraulic and cooling systems retighten the rubber manifold brackets.
- 8.12 Replace motor oil, brake and clutch fluids, power steering fluid and hydraulic fan fluid.
- 8.13 Retighten the wheel nuts.
- 8.14 Correct any malfunction and clean the inside.
- 8.15 Check the waxy protection restoration (if necessary) and move the vehicle to the parking area with the original equipment.
- 8.16 Notification letter from the bodybuilder to IRISBUS to allow engineers to check the condition of preservation of the bus.

Annex (F)**Maintenance of the chassis in the Body maker warehouse****1) One or two-monthly cycle**

- 1.1 Remove the rust from the front wheel hubs by means of glass paper and protect with grease.
- 1.2 Check the coverings: steering wheel cover and protection housing, bonnet, hand brake lever cover, remote control switch cover, horn protection bag, deceleration gearcase, motor cover and any other panelboard covers.
Replace damaged covers, place and fix loosened covers.

2) Three-monthly cycle

- 2.1 Remove the covers: steering wheel cover, motor, front structures, etc. and check the vehicle general conditions.
- 2.2 Install the move batteries.
- 2.3 Start and run the motor at medium speed for about 10 minutes.
- 2.4 Brake many times and discharge condensation from air tanks.
- 2.5 Apply protective grease, vaseline or similar, on the electric contacts on which it is originally provided.
- 2.6 Retighten the rubber piping brackets of the cooling system and hydraulic feeding.
- 2.7 Remove the move batteries and install the original covers.

3) Four to five-monthly cycle

Perform the operations described at item (1).
Usually these operations do not require to move the vehicle.

4) Six-monthly cycle

- 4.1 Remove the covers (steering wheel cover, motor, front structures, etc.) and check the vehicle general conditions.
- 4.2 Apply the move batteries.
- 4.3 Check the levels, Paraflu density, motor oil, clutch oil, brake fluid and tire pressure.
- 4.4 Retighten the rubber manifold brackets.
- 4.5 Operation test on track or rollers, for a 15 km run. Check and remove any leakage from the pneumatic, hydraulic and cooling systems.
Retighten the wheel nuts.
- 4.6 Grease the transmission, leaf spring pins and stub axle pins.
- 4.7 Spot the paint in damaged areas (with a brush).
- 4.8 Check the waxy protection where it has been originally applied.
- 4.9 Remove the move batteries and replace the polyethylene covers with other new ones, then fix them.

5) Seven to eight-monthly cycle

Perform the operations described at item (I).

Usually these operations do not require to move the vehicle.

6) Nine-monthly cycle

- 6.1 Remove the covers (steering wheel cover, motor, front structures, etc.) and check the vehicle general conditions.
- 6.2 Install the move batteries.
- 6.3 Replace the motor oil, clutch and brake fluids, power steering fluid and hydraulic fan fluid. Check the levels, Paraflu density and tire pressure.
- 6.4 Retighten the rubber manifold brackets.
- 6.5 Operation test on track or rollers, for a 15 km run. Check and eliminate leakages from the pneumatic, hydraulic and cooling systems.
Retighten the wheel nuts.
- 6.6 Grease the transmission, leaf spring pins and stub axle pins.
- 6.7 Spot the paint in damaged areas (with a brush).
- 6.8 Check the waxy protection where it has been originally applied.
- 6.9 Remove the move batteries and replace the polyethylene covers with other new ones, then fix them.

7) Ten to eleven-monthly cycle

Perform the operations described at item (I).

8) Yearly cycle

Notify the IRISBUS that the bus is at the warehouse, so the IRISBUS Technicians can check the storage conditions.

