

EURORIDER

EURO 4

**INDEPENDENT
WHEEL SUSPENSION**

397E.12.33-SRI

397E.12.33A-SRI

397E.12.33-SRI (Dx)

397E.12.33A-SRI (Dx)

Engine Cursor 8 (F2B)

397E.12.38-SRI

397E.12.38A-SRI

397E.12.45A-SRI

397E.12.45A-SRI (Dx)

Engine Cursor 10 (F3A)

**Vehicle equipment
regulation**

The data contained in this publication was correct at the time of going to press but, owing to possible modifications made by the Manufacturer for reasons of a technical or commercial nature or for adaptation to the legal requirements of different countries, some changes may have occurred.

Full or partial reproduction of the text and illustrations prohibited.

Publication Edited by:
IVECO SpA
Customer Service Bus
Lungo Stura Lazio, 15
10156 Torino (TO) - Italy
www.iveco.com
mailbox@iveco.com

Print **603.93.748** - 1st Ed. 2007

Produced by:



B.U. TECHNICAL PUBLISHING
Iveco Technical Publications
Lungo Stura Lazio, 15
10156 Turin - Italy

EURORIDER CURSOR 8/10 - EURO 4
MOD. 397E.12.33 - 397E.12.33A - 397E.12.38 - 397E.12.38A - 397E.12.45A
Rule for vehicle equipment

Print 603.93.748 - 1st edizione
Base - April 2007

UPDATING STATUS

Section	Description	Page	Revision date

Summary

	SECTION
GENERAL SPECIFICATIONS	1
SPECIFIC CHASSIS AND BODY INSTRUCTIONS	2
PRODUCT COMPLIANCE (ELEMENTS SUBJECT TO REGULATION: EEC, ECE, etc.) TO BE REQUESTED TO BODY REPAIRERS AND THEIR CASCADE SUPPLIERS	3
HOT ROLLED/DRAWN STEEL AND SCHEDULED PAINTING/PROTECTION	4
PROCEDURES FOR DAMAGES AND/OR DENTS TO VEHICLES FORWARDED TO BODY REPAIRERS	5

Alphabetical index to subjects

A

Abrasionproof coating (optional)	4-10, 4-13
Access for maintenance	2-20
AFTER SALES REGULATION FOR BODY REPAIRERS	1-8
Air conditioning fitting requirements	2-41
Air inlet for services	2-28
ALIGNMENT	2-80
Annex (A)	5-9
Annex (B)	5-10
Annex (C)	5-11
Annex (D)	5-11
Annex (E)	5-17
Anti-corrosion coating maintenance	2-47
Anti-corrosion coating tests	2-46
Anti-corrosion coating using other materials	2-46
Anti-corrosion treatment on profile internal walls	2-45
Anti-corrosion treatment on the sheet	2-46
Anti-corrosion treatment on the structure external surface	2-46

B

B7 Tachograph signal (Output)	2-69
Battery compartment	2-46
Body maker supply	1-6
Body spare parts	1-5
BODYWORK ANTI-CORROSION TREATMENT	2-45
BODYWORK CONFIGURATION	2-42
BODYWORK CONFIGURATION - BASIC REQUIREMENTS	2-18
Bodywork connector 52A and 51B. Connection standards	2-59
Bodywork covering	2-44
BODYWORK ELECTRICAL INSTALLATION	2-57
BODYWORK MODULAR VERSION	2-80
Bodywork mounting - preparation	2-12

BODYWORK PAINTING	2-47
BUILDING THE BODYWORK	2-42

C

CENTRAL STRUCTURE CONFIGURATION	2-84
Centre of gravity	2-10
CERTIFICATE OF FITNESS FOR IRISBUS CHASSIS EQUIPMENT	3-13
Circuit board	2-32
Classification and features to be checked	4-5
Clutch actuator reservoir	2-26
Clutch control pipes	2-90
Coat of paint checking	4-14
Cold weather insulation	2-53
CONDITIONS FOR APPROVING A THIRD PARTY BODY ON AN IRISBUS CHASSIS	3-16
Control, measuring and testing equipment checkout	3-9
Controls during manufacturing	3-11
Cooling for fitting the I40 + 80 amp. optional alternator	2-30
CORPORATE IDENTIFICATION	2-78
Corrective interventions	3-9
COUPON	1-10
Change of unit position and fixing of additional equipment	2-28
Chassis acceptance	1-8
CHASSIS CUTTING	2-83
CHASSIS DELIVERY	2-80
CHASSIS DELIVERY AND STORAGE	2-7
CHASSIS DRILLING	2-17
Chassis hoisting for loading on ships, trains, etc.	2-7
CHASSIS OVERHAUL FOR COMPLETED BUSES	1-9
CHASSIS PREPARATION	2-80
Checkout procedures	3-10
Chemical composition %	4-6

D

D+ Engine running signal (Output)	2-60
DEFINITIONS	3-5
Delivery 2-7	

Delivery at the Body maker expense	5-8
Direct sale by IRISBUS and through the Body maker	1-10
Direct sale through Body repairers.	1-9
Documents	3-8, 3-16
Doors Opening Inhibition Contact with Started up Vehicle (Input)	2-74
DRIVER STATION - CHARACTERISTICS	2-42

E

Earth connection distribution on chassis	2-58
Electric control units	2-29
Electric system tapping	2-31
Electrical installation	2-88
Electrical installation - safety measures	2-29
Electronic control units	2-32
End of travel with open doors (Input)	2-73
Engine air intake	2-22
Engine cooling system	2-26
Engine start-up (Output)	2-61
Engine Start-up Disabling (Input and Output)	2-62
Ex destination delivery	5-6
Ex shop or ex established parking delivery	5-5

F

Final product checkout and testing	3-11
Fitting the CAN line	2-32
Fitting the digital tachograph	2-43
Fitting the instrument panel combined unit	2-43
Fitting the outside temperature sensor	2-33
Fixing points	2-88
FIXING THE BODY TO THE CHASSIS	2-11
Fixing the body to the chassis by welding	2-13
Front fog lights (Output)	2-71
Fuel installation	2-89

G

General chassis modification standards	2-11
General features	3-7
General information	4-5, 4-9, 5-5
General specifications	1-5

H

HATCHES AND COVERS	2-87
HEATING EQUIPMENT AND INDEPENDENT HEATING SYSTEM	2-77
High elastic limit steel specifications	4-7
Horn (Output)	2-72
HOT ROLLED/DRAWN STEEL AND SCHEDULED PAINTING/PROTECTION	4-5
Hot-rolled/drawn steel	4-5

I

Identification plates and labels mandatory in a bodied vehicle	2-41
Idle RPM increase with Active Air Conditioning (Input)	2-73
Inside service doors	2-20
Installation dimensions	2-11
Internal noise Measurement method	2-47
INTRODUCTION	2-42, 2-80
Introduction	2-45
IRISBUS direct sale	1-9
IRISBUS supply to the Body maker	1-6

J

Jumper between body builder connector	2-62
---------------------------------------	------

L

Laying out speed change control cables	2-91
LH/RH Dipped Headlights (Output)	2-67
LH/RH Front and side blinkers (Outputs)	2-66
LH/RH Front Position and Clearance Lights (Output)/ Front Position Light Signal	2-68
LH/RH Stop Light (Output) / Stop Signal	2-70
LIABILITIES BEFORE THIRD PARTIES	3-12
Locked doors (Input)	2-75

M

Main dimensions	2-42
MAINTENANCE FOR VEHICLES STORED IN THE WAREHOUSE	1-10
MODIFYING THE DRIVER STATION HEIGHT	2-94
Module protection	4-13
MOUNTING THE INSTALLATIONS	2-87

N

NOISE LEVELS AND THERMAL INSULATION	2-47
Non-compliance management	3-11

O

Organic material requirements for fire protection	2-45
Others 2-41	
Outdoor noise	2-47
Outside service doors	2-21

P

Painting cycle	4-10, 4-12
Painting/protection cycle classification, according to the equipment type	4-9
Parking Brake enabled (Output)	2-64
Particular procedures	4-10, 4-11, 4-13, 4-14
Plate pretreatment	4-9, 4-12
Plate pretreatment and painting cycle	4-11
Plates and strips reference cold bending fitness	4-8
Pneumatic installation	2-89
Pneumatic spring protection	2-19
PRODUCT COMPLIANCE (ELEMENTS SUBJECT TO REGULATION: EEC, ECE, etc.) TO BE REQUESTED TO BODY REPAIRERS AND THEIR CASCADE SUPPLIERS	3-5
Product protection and storage	3-12
Project documentation control	3-9
PROVISIONS	1-6
Purchased product control	3-10
Purpose 4-9	

R

Raw drawn steel specifications	4-8
Re-painting plastic components painted in a different color from the cab one (bumpers, fenders, radiator grid and step)	4-13
Rear Blinker (Output)	2-76
Rear Fog Light (Output)	2-71
Rear light connection	2-58
Rear Position Light (Output)	2-76
Registers	3-8
REGISTRATION BOOK	1-7
RELATIONSHIPS BETWEEN manufacturer AND SUPPLIER	3-6
RESISTANT STRUCTURAL MATERIALS	2-44
Resistant structure pipes	2-44
Reversing Light (Output)/ Reversing Signal	2-69
Riveting technical specifications	2-44
RTU (ROUTINE TUNING UP)	1-9
RULES FOR BODY REPAIRERS USING IRISBUS SAFETY PARTS	3-12
Running vehicle operation test	5-10

S

Safety	2-32
Safety main control when connected (Output)	2-63
Safety main control when not connected (Direct from Battery)(Output)	2-63
Safety tips for welding, grinding and painting mechanical components during body work assembly	2-29
Sale through IRISBUS distributor	1-10
Sale through IVECO distributor	1-10
SCOPE	3-5
Scope	4-5
SCR + UREA exhaust	2-24
Scheduled painting/protection	4-9
Soundproofing	2-49
SPECIFIC INSTRUCTIONS FOR BUS CHASSIS AND BODYWORK	2-7
SPECIFIC INSTRUCTIONS FOR THE CHASSIS	2-7
Specifications	4-7
Stamping protection	4-10

Steam free mirrors (Input)	2-74
Steering	2-23
Stop request (Input)	2-75
Storage	2-8
STRUCTURE OF THE PRODUCT COMPLIANCE CONTROL SYSTEM	3-6
Structure preparation	2-45
System organization, planning, checkouts and revisions	3-7

T

Tack welding	2-17
TARGETS	3-5
TECHNICAL INFORMATION	1-6
TEST DRIVE BY BODY BUILDER	2-55
Thermal insulation	2-53
Type of material	4-5

U

Unlocked cargo hold doors (Input)	2-75
-----------------------------------	------

V

Vehicle delivery by IRISBUS-established carrier	5-8
Vehicle delivery to the Body maker workshop	5-8
Vehicle delivery to the shop after equipping	5-8
VEHICLE DEVICES - TECHNICAL SPECIFICATIONS	2-20
VEHICLE INTERIOR CONFIGURATION AND CAPACITY	2-42
Vehicle part malfunctions	5-8
Vehicle repairing	5-7
VEHICLE TRANSPORTATION AND LOADING - TRANSPORTATION OF THE CHASSIS WITHOUT BODYWORK	2-7
Vehicle withdrawal	5-5

W

Warning activation (Input) - School transport	2-77
Water fittings for heating system	2-33
Weighing	2-8
WEIGHT AND DIMENSION SPECIFICATIONS	2-8

Weight table	2-9
Welding technical specifications	2-15
Wheel covers	2-19
Wheelhouses	2-18
Wheels and tyres	2-19
Windscreen wiper function and Windscreen washer pump	2-64
WORK ORDER COMPONENT CONSISTENCY	1-6

I. GENERAL SPECIFICATIONS

Index

I.	GENERAL INFORMATION	I-5
I.1	RULES AND INSTRUCTIONS	I-5
I.1.1	Body spare parts	I-5
I.2	TECHNICAL INFORMATION	I-6
I.2.1	IRISBUS supply to the Body maker	I-6
I.2.2	Body maker supply	I-6
I.3	WORK ORDER COMPONENT CONSISTENCY	I-6
I.4	PROVISIONS	I-6
I.5	REGISTRATION BOOK	I-7
I.6	AFTER SALES REGULATION FOR BODY REPAIRERS	I-8
I.7	CHASSIS ACCEPTANCE	I-8
I.8	CHASSIS OVERHAUL FOR COMPLETED BUSES	I-9
I.9	RTU (ROUTINE TUNING UP)	I-9
I.9.1	IRISBUS direct sale	I-9
I.9.2	Direct sale through Body repairers	I-9
I.9.3	Sale through IRISBUS distributor	I-10
I.10	COUPON	I-10
I.10.1	Sale through IRISBUS distributor	I-10
I.10.2	Direct sale by IRISBUS and through the Body maker	I-10
I.11	MAINTENANCE FOR VEHICLES STORED IN THE WAREHOUSE	I-10

1.3.	Instructions for the correct functioning of the parts of the vehicle and accessibility for maintenance	1-13
1.4.	Legal provisions and prevention of accidents	1-14
1.5.	Vehicle delivery	1-15

I GENERAL SPECIFICATIONS

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.

1.2 TECHNICAL INFORMATION

1.2.1 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.).

1.2.2 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.

Moreover, a spare parts catalog of the body and related components shall be supplied to the Body maker.

1.3 WORK ORDER COMPONENT CONSISTENCY

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

1.4 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).

1.6 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:

- sales to the distributor
- sales to the Body maker
- sales account

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

1.7 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.

1.8 CHASSIS OVERHAUL FOR COMPLETED BUSES

During the delivery stage, the Body maker will perform, directly or by means of the 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 IRISBUS servicing branch shop.

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

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

1.9 RTU (ROUTINE TUNING UP)

1.9.1 IRISBUS direct sale

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

a) RTU performed by 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.

b) RTU performed by the distributor: upon the vehicle delivery to the client, the suitable sheet is detached from the warranty booklet and forwarded to IRISBUS, according to the defined procedures.

1.9.2 Direct sale through Body repairers.

As above.

1.9.3 Sale through 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 IRISBUS procedures.

NOTE: It is understood that the above mentioned procedure is not inclusive of payments for works on the chassis, concerning the functionality of both components added by the Body maker (air conditioning , etc.) and parts and equipment already existing on the chassis and used by the Body maker (relays, electric system control boards, etc.).

1.10 COUPON

The “Servicing Coupon”, for the chassis only, shall be issued by the IRISBUS Servicing organization. The interventions shall be performed according to the procedure described in the warranty manual. Otherwise, the warranty will be nullified.

1.10.1 Sale through IRISBUS distributor

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

1.10.2 Direct sale by IRISBUS and through the Body maker

- a) Coupon issued by the IRISBUS Servicing organization: the suitable sheet shall be detached from the warranty manual and sent, enclosed to the invoice, to the relevant distributor.
- b) 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.

1.11 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 C, D and E 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."

2. SPECIFIC CHASSIS AND BODY INSTRUCTIONS

Index

2	SPECIFIC CHASSIS AND BODY INSTRUCTIONS	2-3
2.1	General	2-5
2	SPECIFIC INSTRUCTIONS FOR BUS CHASSIS AND BODYWORK	2-7
2.1	SPECIFIC INSTRUCTIONS FOR THE CHASSIS	2-7
2.2	VEHICLE TRANSPORTATION AND LOADING - TRANSPORTATION OF THE CHASSIS WITHOUT BODYWORK	2-7
2.2.1	Chassis hoisting for loading on ships, trains, etc.	2-7
2.3	CHASSIS DELIVERY AND STORAGE	2-7
2.3.1	Delivery	2-7
2.3.2	Storage	2-8
2.4	WEIGHT AND DIMENSION SPECIFICATIONS	2-8
2.4.1	Weighing	2-8
2.4.2	Weight table	2-9
2.4.3	Centre of gravity	2-10
2.4.4	Installation dimensions	2-11
2.5	FIXING THE BODY TO THE CHASSIS	2-11
2.5.1	General chassis modification standards	2-11
2.5.2	Bodywork mounting - preparation	2-12
2.5.3	Fixing the body to the chassis by welding	2-13
2.5.4	Welding technical specifications	2-15
2.5.5	Tack welding	2-17
2.6	CHASSIS DRILLING	2-17
2.7	BODYWORK CONFIGURATION - BASIC REQUIREMENTS	2-18
2.7.1	Wheelhouses	2-18
2.7.2	Pneumatic spring protection	2-19
2.7.3	Wheels and tyres	2-19
2.7.4	Wheel covers	2-19
2.8	VEHICLE DEVICES - TECHNICAL SPECIFICATIONS	2-20
2.8.1	Access for maintenance	2-20
2.8.2	Inside service doors	2-20
2.8.3	Outside service doors	2-21
2.8.4	Engine air intake	2-22
2.8.5	Steering	2-23
2.8.6	SCR + UREA exhaust	2-24
2.8.7	Clutch actuator reservoir	2-26

2.8.8	Engine cooling system	2-26
2.8.9	Change of unit position and fixing of additional equipment	2-28
2.8.10	Air inlet for services	2-28
2.8.11	Electrical installation - safety measures	2-29
2.8.12	Electric control units	2-29
2.8.13	Safety tips for welding, grinding and painting mechanical components during bodywork assembly	2-29
2.8.14	Cooling for fitting the 140 + 80 Amp.	2-30
2.8.15	Electric system tapping	2-31
2.8.15.1	Circuit board	2-32
2.8.15.2	Electronic control units	2-32
2.8.15.3	Fitting the CAN line	2-32
2.8.15.4	Safety	2-32
2.8.15.5	Fitting the outside temperature sensor	2-33
2.8.16	Water fittings for heating system	2-33
2.8.17	Air conditioning fitting requirements	2-41
2.8.18	Identification plates and labels mandatory in a bodied vehicle	2-41
2.8.19	Others	2-41
2.9	BUILDING THE BODYWORK	2-42
2.10	INTRODUCTION	2-42
2.11	BODYWORK CONFIGURATION	2-42
2.11.1	Main dimensions	2-42
2.12	VEHICLE INTERIOR CONFIGURATION AND CAPACITY	2-42
2.13	DRIVER STATION - CHARACTERISTICS	2-42
2.13.1	Fitting the instrument panel combined unit	2-43
2.13.2	Fitting the digital tachograph	2-43
2.14	RESISTANT STRUCTURAL MATERIALS	2-44
2.14.1	Resistant structure pipes	2-44
2.14.2	Bodywork covering	2-44
2.14.3	Riveting technical specifications	2-44
2.14.4	Organic material requirements for fire protection	2-45
2.15	BODYWORK ANTI-CORROSION TREATMENT	2-45
2.15.1	Introduction	2-45
2.15.2	Structure preparation	2-45
2.15.3	Anti-corrosion treatment on profile internal walls	2-45
2.15.4	Anti-corrosion treatment on the structure external surface	2-46

2.15.5	Anti-corrosion treatment on the sheet	2-46
2.15.6	Anti-corrosion coating using other materials	2-46
2.15.7	Anti-corrosion coating tests	2-46
2.15.8	Battery compartment	2-46
2.15.9	Anti-corrosion coating maintenance	2-47
2.16	BODYWORK PAINTING	2-47
2.17	NOISE LEVELS AND THERMAL INSULATION	2-47
2.17.1	Outdoor noise	2-47
2.17.2	Internal noise Measurement method	2-47
2.17.3	Soundproofing	2-49
2.17.4	Thermal insulation	2-53
2.17.5	Cold weather insulation	2-53
2.18	TEST DRIVE BY BODY BUILDER	2-55
2.19	BODYWORK ELECTRICAL INSTALLATION	2-57
2.19.1	Rear light connection	2-58
2.19.2	Earth connection distribution on chassis	2-58
2.19.3	Bodywork connector 52A and 51B. Connection standards	2-59
2.19.3.1	+15 A With keyswitch (Output)	2-59
2.19.3.2	+30 A Through the battery isolating switch (Output)	2-60
2.19.3.3	D+ Engine running signal (Output)	2-60
2.19.3.4	Engine start-up (Output)	2-61
2.19.3.5	Engine Start-up Disabling (Input and Output)	2-62
2.19.3.6	Jumper between body builder connector	2-62
2.19.3.7	Safety main control when connected (Output)	2-63
2.19.3.8	Safety main control when not connected (Direct from Battery) (Output)	2-63
2.19.3.9	Parking Brake enabled (Output)	2-64
2.19.3.10	Windscreen wiper function and Windscreen washer pump	2-64
2.19.3.11	LH/RH Front and side blinkers (Outputs)	2-66
2.19.3.12	LH/RH Dipped Headlights (Output)	2-67
2.19.3.13	LH/RH Dipped Headlights (Output)	2-67
2.19.3.14	LH/RH Front Position and Clearance Lights (Output)/ Front Position Light Signal	2-68
2.19.3.15	Reversing Light (Output)/ Reversing Signal	2-69
2.19.3.16	B7 Tachograph signal (Output)	2-69
2.19.3.17	LH/RH Stop Light (Output) / Stop Signal	2-70

2.19.3.18	Front fog lights (Output)	2-71
2.19.3.19	Rear Fog Light (Output)	2-71
2.19.3.20	Horn (Output)	2-72
2.19.3.21	Idle RPM increase with Active Air Conditioning (Input)	2-73
2.19.3.22	End of travel with open doors (Input)	2-73
2.19.3.23	Doors Opening Inhibition Contact with Started up Vehicle (Input)	2-74
2.19.3.24	Steam free mirrors (Input)	2-74
2.19.3.25	Stop request (Input)	2-75
2.19.3.26	Locked doors (Input)	2-75
2.19.3.27	Unlocked cargo hold doors (Input)	2-75
2.19.3.28	Rear Position Light (Output)	2-76
2.19.3.29	Rear Blinker (Output)	2-76
2.19.3.30	Warning activation (Input) - School transport	2-77
2.20	HEATING EQUIPMENT AND INDEPENDENT HEATING SYSTEM	2-77
2.21	CORPORATE IDENTIFICATION	2-78
2.22	BODYWORK MODULAR VERSION	2-80
2.23	INTRODUCTION	2-80
2.24	CHASSIS DELIVERY	2-80
2.25	CHASSIS PREPARATION	2-80
2.26	ALIGNMENT	2-80
2.27	CHASSIS CUTTING	2-83
2.28	CENTRAL STRUCTURE CONFIGURATION	2-84
2.29	HATCHES AND COVERS	2-87
2.30	MOUNTING THE INSTALLATIONS	2-87
2.30.1	Fixing points	2-88
2.30.2	Electrical installation	2-88
2.30.3	Pneumatic installation	2-89
2.30.4	Fuel installation	2-89
2.30.5	Clutch control pipes	2-90
2.30.6	Laying out speed change control cables	2-91
2.31	MODIFYING THE DRIVER STATION HEIGHT	2-94

2 SPECIFIC INSTRUCTIONS FOR BUS CHASSIS AND BODYWORK

2.1 SPECIFIC INSTRUCTIONS FOR THE CHASSIS

2.2 VEHICLE TRANSPORTATION AND LOADING - TRANSPORTATION OF THE CHASSIS WITHOUT BODYWORK

Transportation of the chassis without bodywork should always be carried out on low flat platform semi-trailers.

2.2.1 Chassis hoisting for loading on ships, trains, etc.

To load the chassis on ships, train, cars, etc., it must be hoisted only by the axles or wheels. Fixing the crane cables to the cross-pieces and chassis members is strictly forbidden. The chassis must be secured on the transportation vehicle only by the axles. The wheels must support the chassis weight.

2.3 CHASSIS DELIVERY AND STORAGE

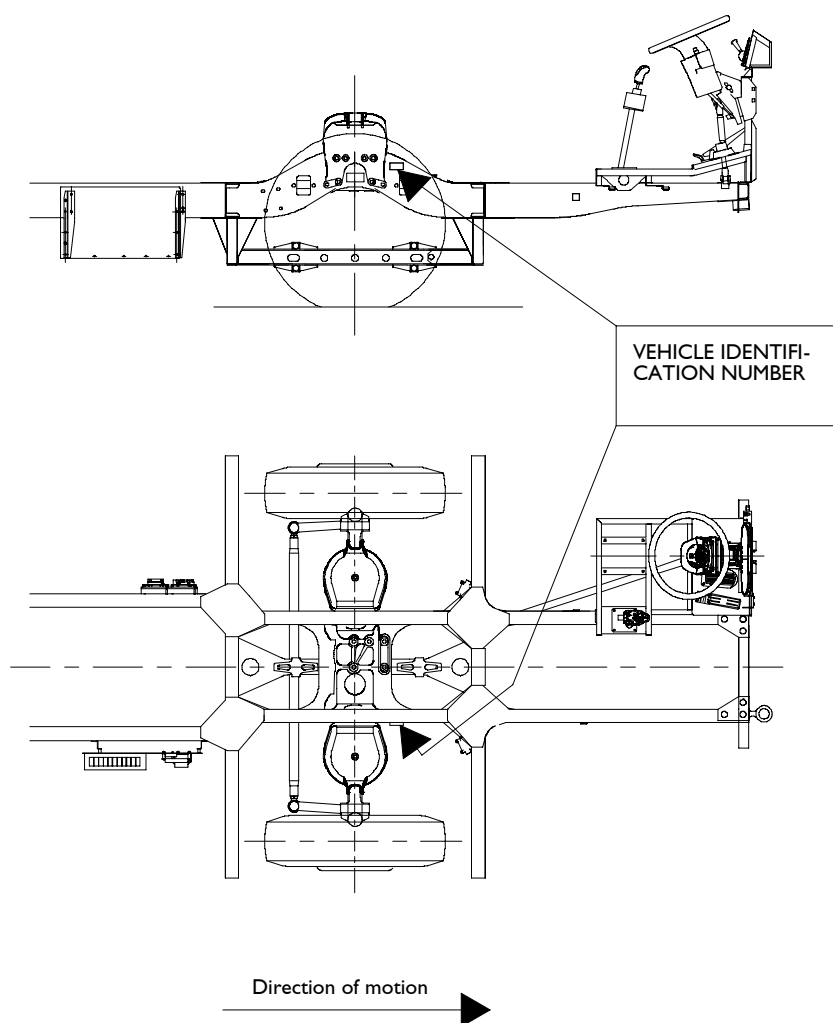
2.3.1 Delivery

IRISBUS carries out a thorough quality assurance procedure on every chassis before delivery. However, upon reception, the Bodywork builder should check for anomalies that might have occurred during transportation. IVECO shall not be held responsible for missing materials or anomalies during transportation or after delivery if said problems are not noted on the forms supplied to that end, and that the road haulier has signed in conformity.

In order to fill the complaint forms correctly, the Bodywork builder must observe section 1.6 of "After sales rules for Bodywork builders" (see Chapter 1). For any complaint, the vehicle identification number, stamped on the core of the right chassis member, in front of the pneumatic spring support must be quoted.

See Figure 2.1.

Figure 2.1



2.3.2 Storage

Once the delivery check has been carried out, should the vehicle be stored, it is necessary to protect it adequately, taking into account the immobilization period and the ambient characteristics.

It is the Bodywork builder's responsibility to protect the delicate components- instrument panel, batteries, relay and fuse box, etc.- so as to ensure their long useful life and reliability.

Observe section 1.11 "Maintenance of vehicles in stock".

2.4 WEIGHT AND DIMENSION SPECIFICATIONS

2.4.1 Weighing

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

Type	Chassis in running order (1)	Max. weight technically allowed (2)	Max. weight authorised (2)
397E.12.33-SRI (Cursor 8)			
Front axle	640	7100	7100
Rear axle	5460	12600	11500
Total	6100	19000	18000
397E.12.38/45A-SRI (Cursor 10)			
Front axle	380	7100	7100
Rear axle	5760	12600	11500
Total	6140	19000	18000

- (1) BOGIE version - vehicle status when leaving the factory - wheelbase: 3,000 mm (With empty gas tanks, oil and other fluids at maximum level, batteries, spare tyre, without driver).
- (2) Standard version according to type-approval in Spain.

2.4.3 Centre of gravity

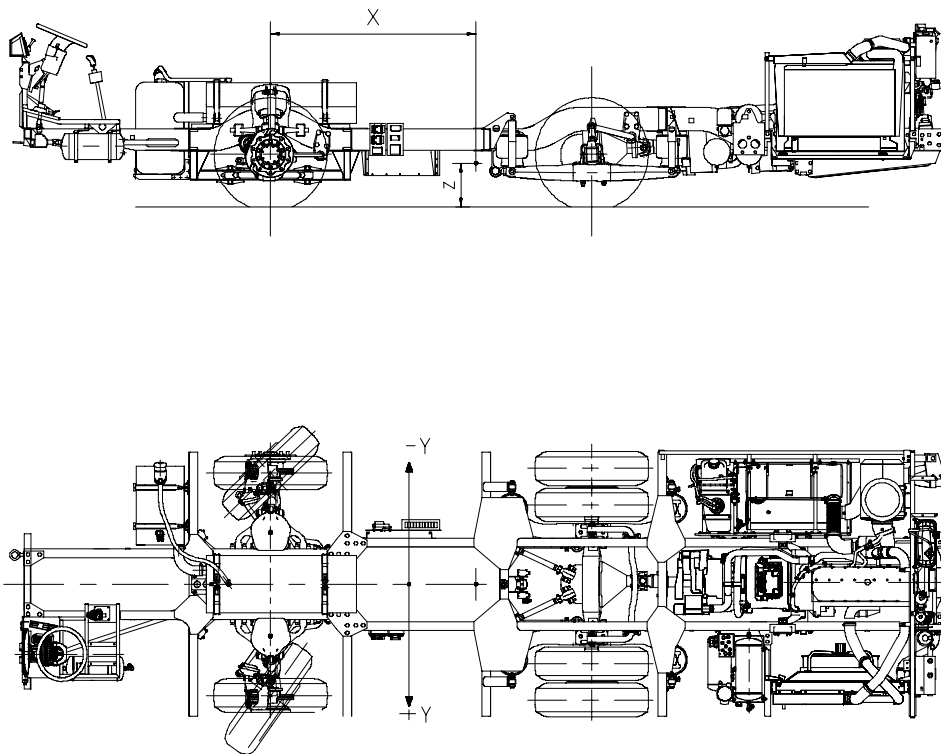
In order to calculate the centre of gravity of bodied vehicles, chassis centre of gravity location is reported below for type-approval according to ECE Regulation No. 66.

- Measurement X Distance to front axle
- Measurement Y Distance to vehicle medial plane (+ left-hand side - right-hand side)
- Measurement Z Distance to ground

Specifications are supplied taking into account the conditions of sections 2.3.1 and 2.3.2, i.e. with standard tyres.

Type	X	Y	Z
397E.12.33-SRI	0	0	0
397E.12.33A-SRI	0	0	0
397E.12.38-SRI	0	0	0
397E.12.38/45A-SRI	0	0	0

Figure 2.2



CENTRE OF GRAVITY - MEASUREMENTS X-Y-Z

2.4.4 Installation dimensions

Installation dimension layouts for each type of vehicle.

Type	IRISBUS reference diagram
397E.12.33-SRI	500 631 0739 DL
397E.12.33A-SRI	500 631 0736 DL
397E.12.33-SRI (Dx)	500 631 0735 DL
397E.12.33A-SRI (Dx)	500 631 0733 DL
397E.12.38-SRI	500 631 1421 DL
397E.12.38A-SRI	500 631 1419 DL
397E.12.45A-SRI (Sx)	500 631 0740 DL
397E.12.45A-SRI (Dx)	500 631 1425 DL

Both the wheelbase and the bodied vehicle rear overhang can be modified within the values specified in the installation dimension layouts so as to best adapt the bodywork to the chassis.

2.5 FIXING THE BODY TO THE CHASSIS

2.5.1 General chassis modification standards

See the instructions on chassis operations allowed by IRISBUS on the corresponding sections.

Besides the allowed operations, expressly specified on the present Standard, any other modification must be performed with written permit by IRISBUS Bus Quality Department.

Modifying the steering and the braking systems is strictly forbidden.

To get IRISBUS approval for chassis modification, the Bodywork builder must submit due documentation justifying the change project. Documentation should include:

- List of all removed parts.
- List of all the modified and/or added parts, specifying quantity.
- Plans of each of the modified and/or added parts, specifying: shape, dimensions, tolerances, material, heat treatment, surface protection, reference to standards or other specifications they should comply with.
- Exploded view, with mounting position for each part.
- Descriptive memory, including dimension calculations and possible test results.

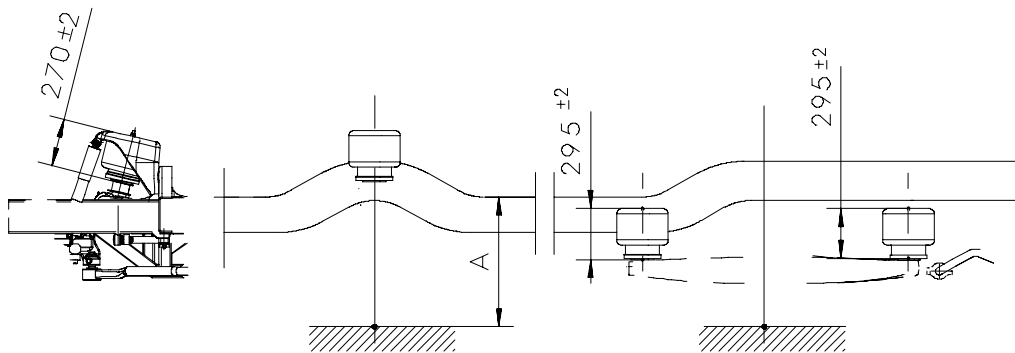
2.5.2 Bodywork mounting - preparation

The parts removed from the chassis should be adequately stored, protected and identified. The chassis must be on level ground before assembling the body. Engine weight should be taken away from the chassis until bending deformations on the latter are less than 3 mm.

Figure 2.3 shows levelling measurements for the front and rear axles, and the chassis member bending deformation tolerance.

The chassis must remain in this position until the assembly welding process is completed.

Figure 2.3



LEVEL MEASUREMENTS WITH DEAD LOAD

	S. Front (A)	S. Rear (B)
295/80 R-22,5"	726	926

***NOTE:** These measurements are given dead load conditions. The chassis, levelled with the bellows at 270 ± 2 and 295 ± 2 , and the vehicle without load will be higher because the radius of the tyre under load is greater due to the fact that it lacks the dead load weight.

Special attention should be taken so that the chassis elements and bodywork sides are correctly attached. These unions should guarantee perfect stress transmission.

These unions are specially critical at the front and rear elements of the wheelhouses, since stress transmission to the rest of the structure happens mainly through these points.

Excessive pressure at the body union points should be avoided.

Body structure should be so conceived that it forms a bearing unit together with the chassis; bending, torsion and thrust stresses should be absorbed by the whole unit.

This is necessary due to the relative flexibility of the chassis. For further information, contact IRISBUS Bus Quality Department.

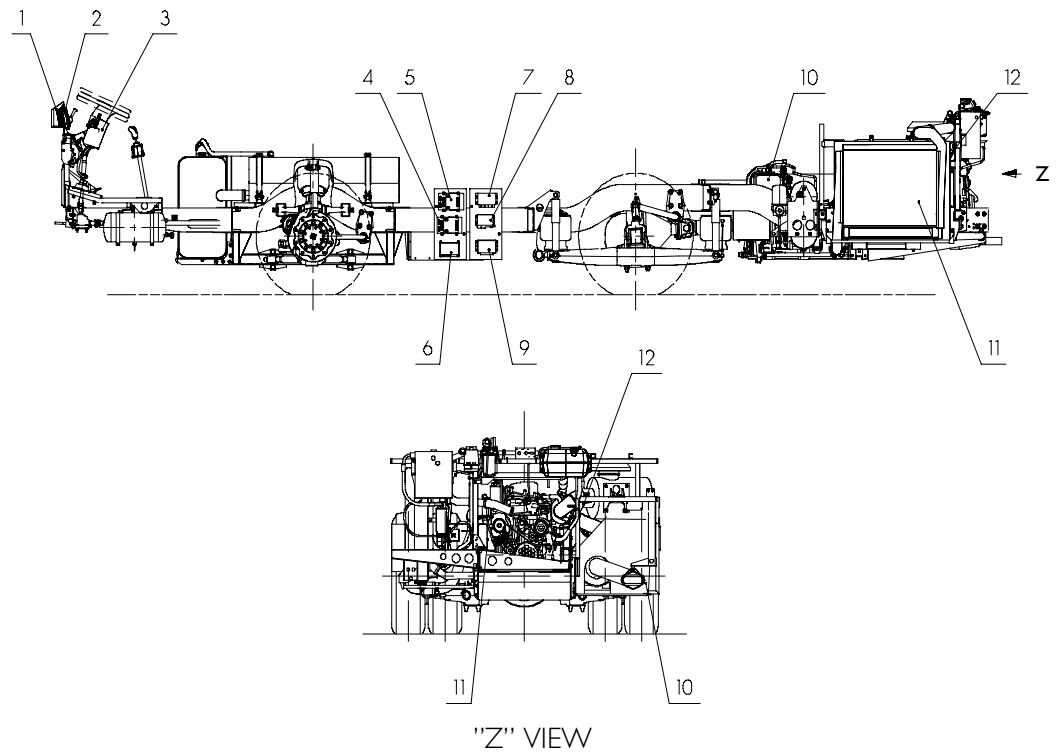
Bodywork can be welded or screwed to the structure. The use of both assembly systems at the same time is not recommended.

Bodywork elements shall be fixed by means of intermediate plates.

2.5.3 Fixing the body to the chassis by welding

- Before any welding procedure is attempted, the following items must be disconnected:
- Electronic control units installed in the vehicle (see figure 2.3.1).
- Battery earth cable.
- All alternator and instrument panel connexions.
- Disconnected cables must not be in contact with each other.

Figure 2.3.1



DRIVER SEAT CONTROL UNITS

1. INSTRUMENT PANEL (SRPI combined unit)
2. DIGITAL TACHOGRAPH
3. SWI (Comfortable)

CHASSIS CONTROL UNITS

4. CAMU (VBC)
5. IOU
6. VCM
7. ABS / ASR
8. ELF (Suspension)
9. INTARDER (EST42) / ZF AUTOMATIC (EST 146) / VOITH / ASTRONIC

ENGINE COMPARTMENT CONTROL UNITS

10. DCU(Urea)
11. ECM
12. NOX

It is important to protect the following parts against heat, weld spatter and grinding / drilling ejected particles:

- Instrument panel
- Steering wheel.
- Electrical installation.
- Polyamide pipes.
- Pneumatic springs.
- Rubber sleeves, etc.

If required, these parts should be detached from the welding or grinding area and eventually replaced to their original location once the operation is finished.

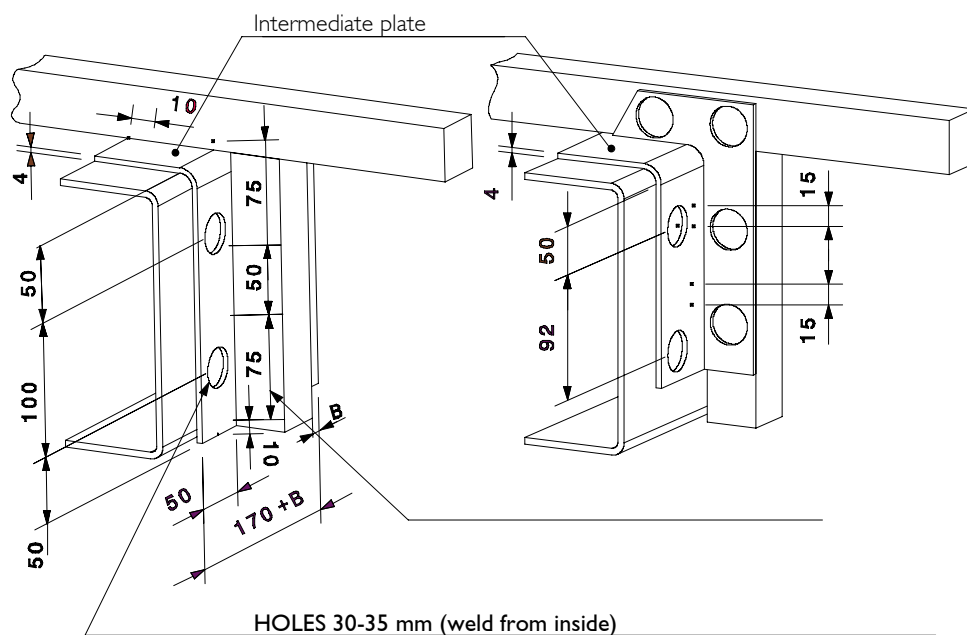
The welder earth cable should be connected as close to the welding area as possible but never close to any rotating part (transmission, bushings, etc.) nor above or below a component with moving parts (compressor, bearings, etc.).

Welding surfaces should be clean and paint-free in order to guarantee a good penetration.

The places in the chassis where welding procedures were carried out should be carefully cleaned and protected with a primer containing zinc tetraoxichromate or similar, and a second coat of a two-component epoxy primer plus an IRISBUS IC-444 (RAL 7021) chassis grey, two-component polyurethane paint.

Fig. 2.4 shows two examples of welding attachment. Dimensions are estimates only.

Figure 2.4



2.5.4 Welding technical specifications

The welding seams on beams subject to flexion should be as close to the neutral axis as possible and should be parallel to the stress direction.

Abrupt section changes and seam accumulation should be avoided.

The welded material should have a good root bead penetration, and show no pores, notches, weld spatter or slag inclusions.

No special means should be used to cool down welded areas. Welding quality should be CS/BK complying with DIN 8563 - Part 3.

Figures 2.5 and 2.6 show the location of the weld beads in unions with longitudinal seams on chassis members.

Figure 2.5

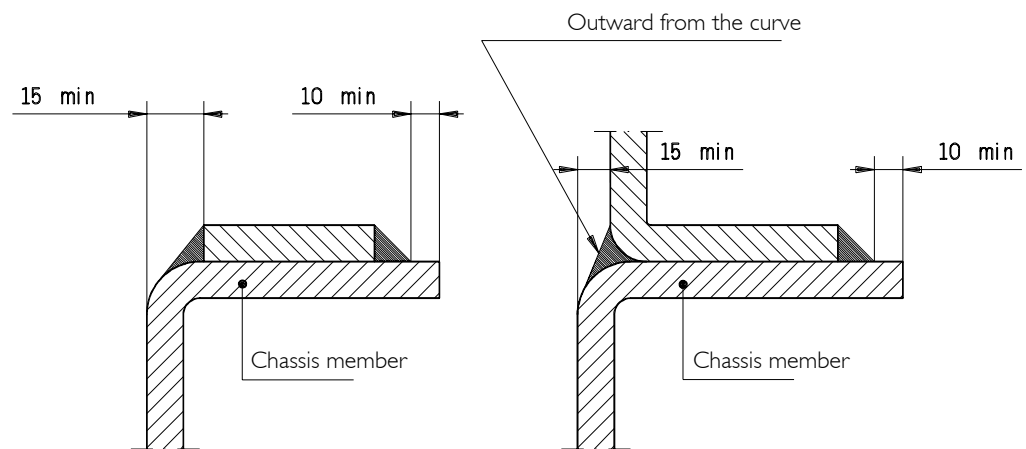


Figure 2.6

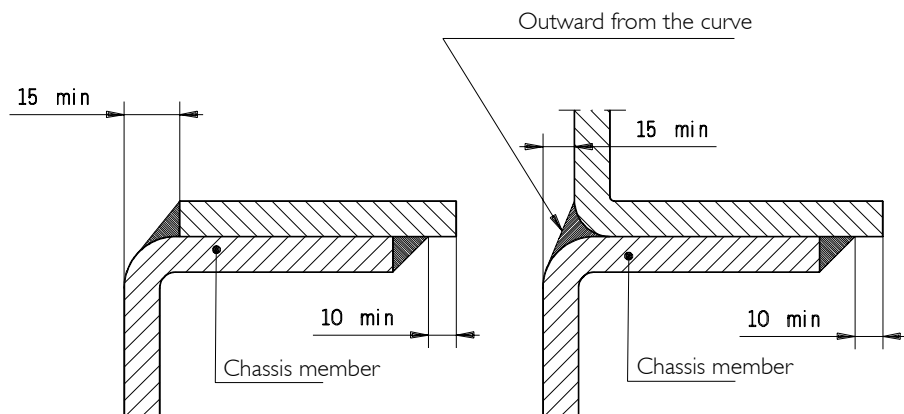


Figure 2.7 shows the layout of flat reinforcements welded to the chassis member. Figures 2.8 and 2.9 show the recommended layout for pieces over the chassis members and the attachment of L-shaped reinforcements.

Figure 2.7

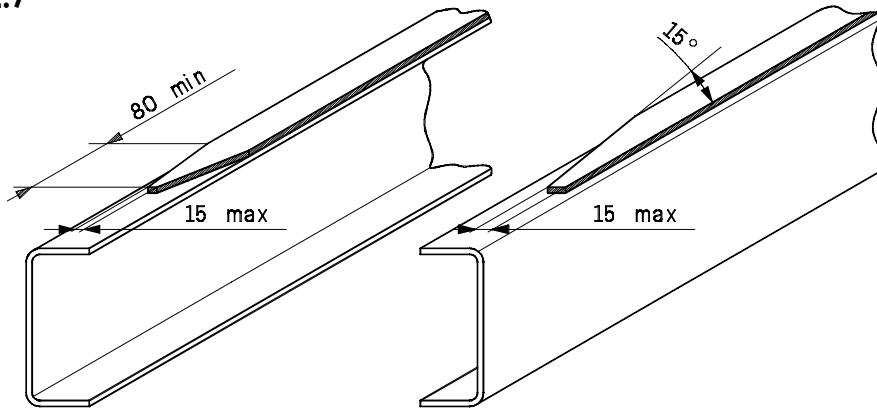


Figure 2.8

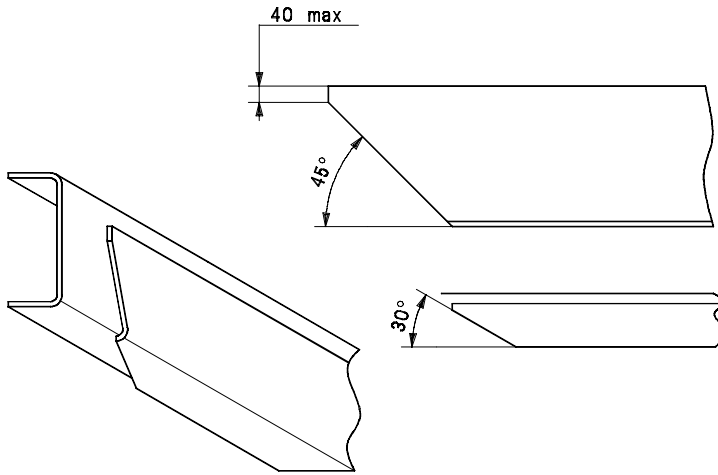
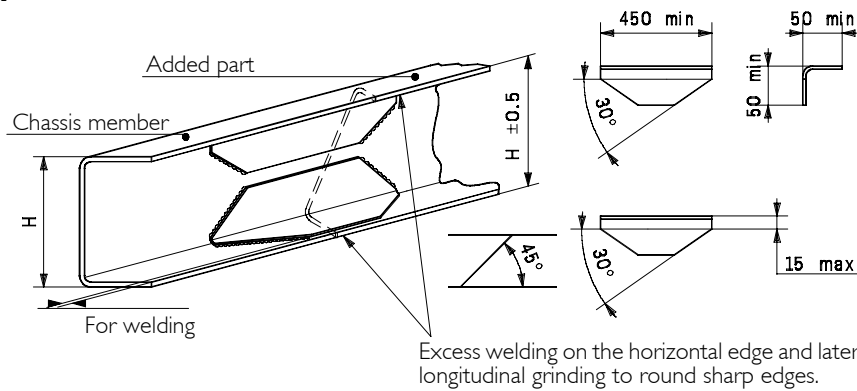


Figure 2.9



2.5.5 Tack welding

Tack welding should guarantee a strong attachment between parts; dimension and distribution will be according to the stress level to be transmitted.

Before welding, the contact surfaces should be thoroughly cleaned. After welding, they should be protected with a coat of two-component epoxy rust inhibitor or similar product; finishing with a coat of one- or two-component paint.

2.6 CHASSIS DRILLING

Chassis drilling aimed at fixing auxiliary units or components is allowed under the following conditions:

- Never drill the wings of the chassis members, free beams and cross-pieces.
- Never drill near the areas of greater stress, i.e. near power-steering, suspension and engine supports.
- Never drill on the chassis member curved areas.
- Drilling minimum diameter will be equal to plate thickness whereas maximum diameter should not exceed 15 mm.
- The minimum distance between the bore centre and the chassis member outer edge should be 35 mm.
- The minimum distance between bore centres should be 50 mm.
- Only a maximum of two holes can be drilled along a perpendicular line to the chassis member.
- After drilling, burr should be removed, so that the parts assembled or the screw heads will have a perfectly flat contact surface.

See figure 2.10 showing the relative location of holes.

Figure 2.10

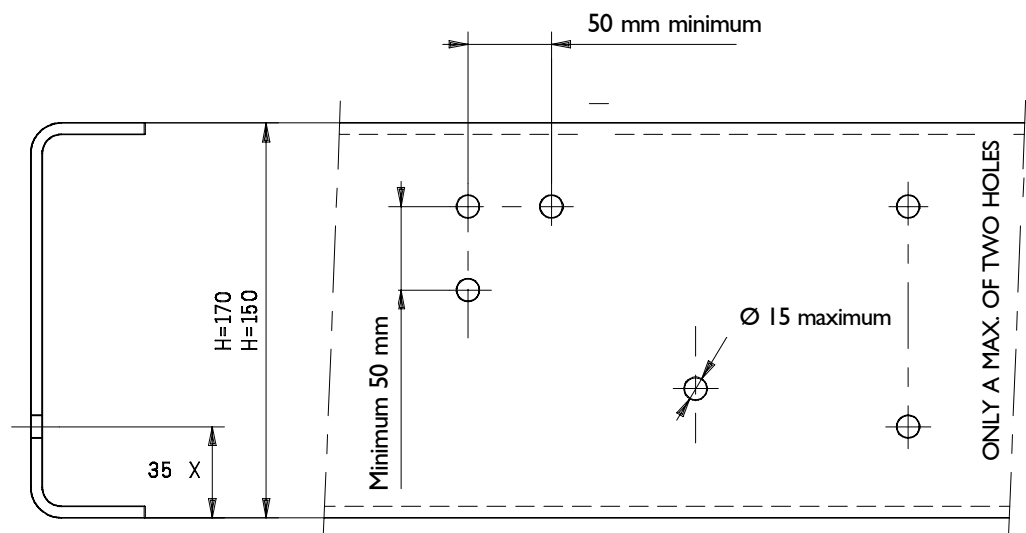
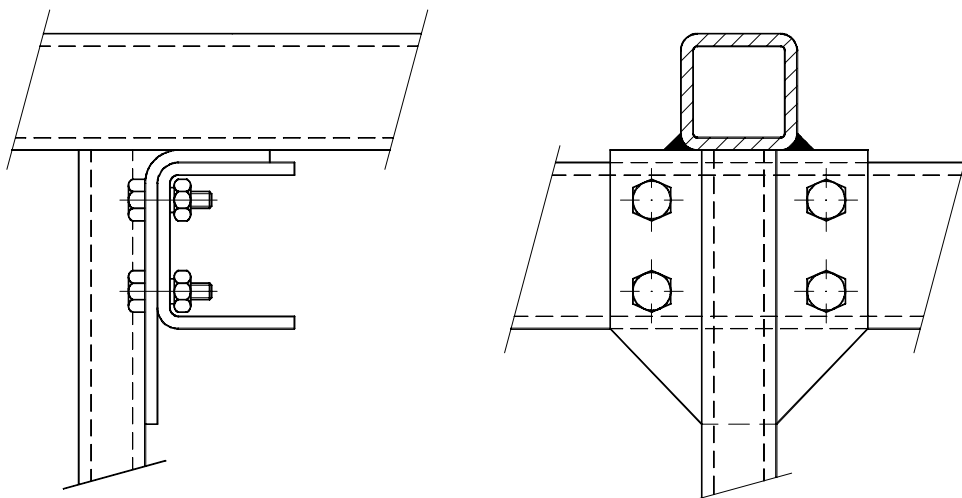


Figure 2.11 shows an example of bodywork attached to the chassis with screws.

Figure 2.11



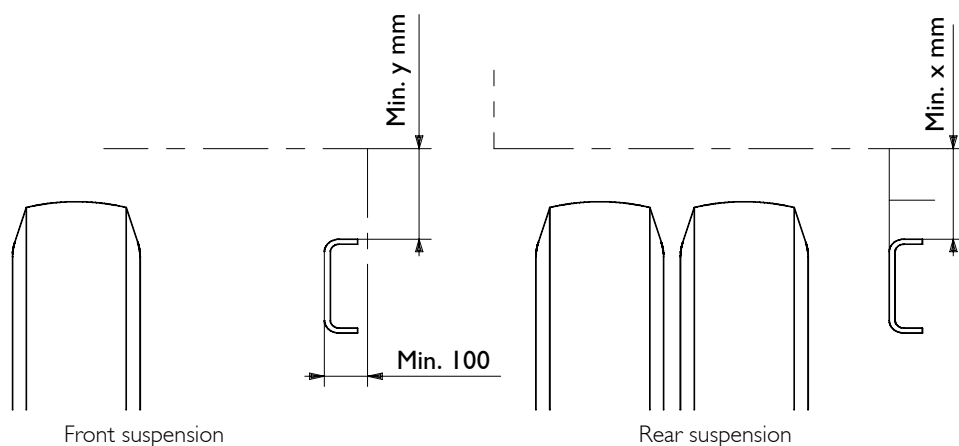
2.7 BODYWORK CONFIGURATION - BASIC REQUIREMENTS

2.7.1 Wheelhouses

Type - BOGIE	IRISBUS ref.	Type - BOGIE	IRISBUS ref.
397E.12.33-SRI	500 631 0739 DL	397E.12.38-SRI	500 631 1421 DL
397E.12.33A-SRI	500 631 0736 DL	397E.12.38A-SRI	500 631 1419 DL
397E.12.33-SRI (Dx)	500 631 0735 DL	397E.12.45A-SRI (Sx)	500 631 0740 DL
397E.12.33A-SRI (Dx)	500 631 0733 DL	397E.12.45A-SRI (Dx)	500 631 1425 DL

Figure 2.12 shows the clearances to be observed between the wheels and their housing.

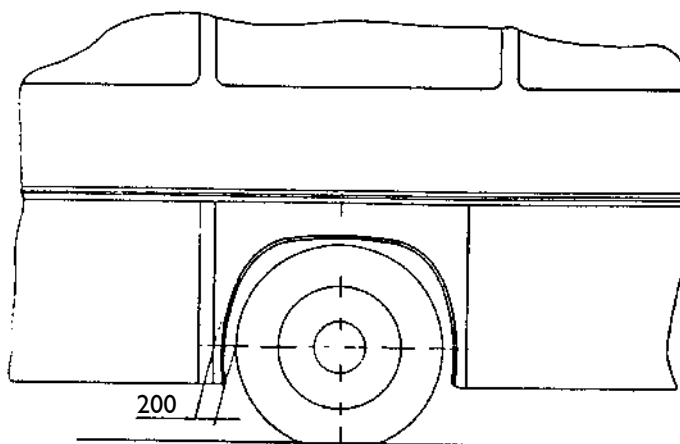
Figure 2.12



Measurement Y	Measurement X	Tyre
425	425	295/80

Fixing the crane cables to the cross-pieces and chassis members is strictly forbidden. The chassis must be secured on the transportation vehicle only by the axles. The wheels must support the chassis weight.

Figure 2.13



The wheelhouse lateral cover should be hinged to allow inspection and maintenance operations for the pneumatic springs.

2.7.2 Pneumatic spring protection

The bodywork should include a bulkhead separating the wheels from the pneumatic springs, so that these are protected against sand, mud or stones. The bulkhead will leave a free diameter of 350 mm around the spring and should allow easy access for inspection and maintenance operations for the pneumatic springs and other suspension components.

2.7.3 Wheels and tyres

When fitting the wheels, contact surfaces should be clean and rust-free.

If the rims or brake drums need painting, the contact surfaces between them should be protected, as should the contact surfaces between the rims and the wheel nuts.

Before delivery to customer, wheel nut tightening should be checked (in case they have been removed) applying the correct tightening procedures and torque shown in the "Use and maintenance manual". See section 2.18.

2.7.4 Wheel covers

Series 397 is designed to allow mounting "Front wheel optional caps", Ref. IRISBUS 5006219063, "Rear wheel optional caps", Ref. IRISBUS 5006219062, and front and rear wheel covers, Ref. 5006229005 (x2) for both caps.

The shape and dimension of such parts are suitable to adequately protect the wheel nuts and cool the brakes, and they should be used if hub-caps are used.

Caps are included if optional 2300 or 2309 "aluminium rims" are fitted.

The use of any other cap will void the warranty and will place the responsibility for any braking problems that may arise on the bodywork builder.

2.8 VEHICLE DEVICES - TECHNICAL SPECIFICATIONS

2.8.1 Access for maintenance

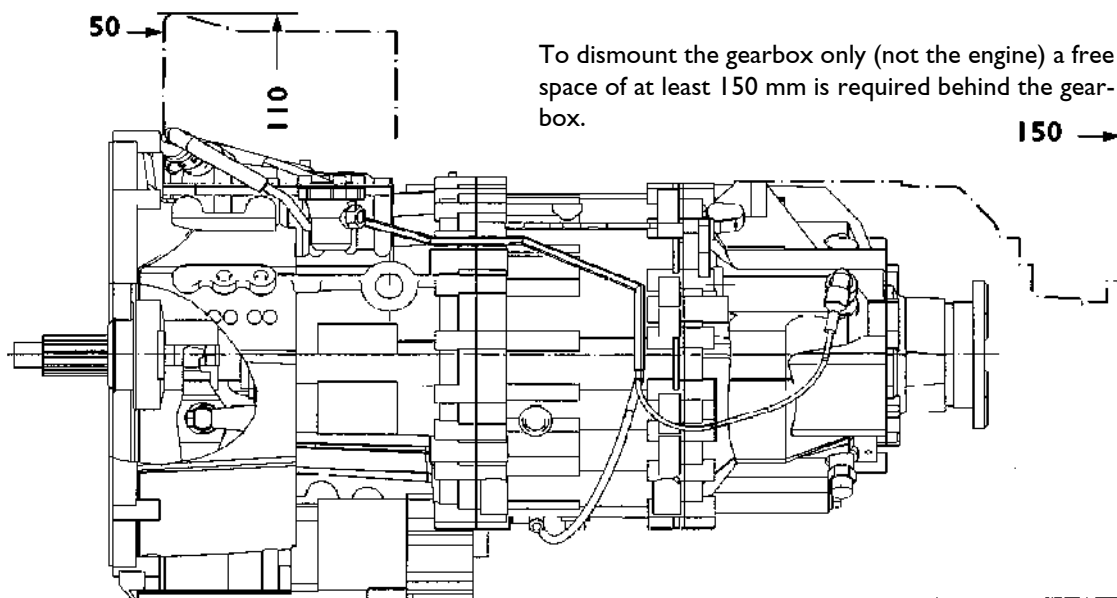
The bodywork should grant easy access for inspection, maintenance, repair and replacement of the vehicles mechanical, pneumatic, hydraulic and electric parts. It is, therefore, necessary to observe the instructions described in the "Maintenance" chapter of the "Use and maintenance manual" supplied together with the chassis.

Inspection doors should be provided to get access to the chassis components. Two types of access should be considered:

- Inside service
- Outside service

A minimum 110mm space should be left above the ZF-AS Tronic gearbox to remove the electronic unit. A 50 mm space should also be left to dismount/ mount the clutch actuator. See figure 2.14.

Figure 2.14



2.8.2 Inside service doors

Service doors opened from inside the vehicle which allow access from above for:

- Gear shift lever cable adjustment (not necessary with automatic gear-shift).
- Lever and gear selector turret removal.
- Fuel tank flowmeter.
- Front bellows.
- Rear shock absorbers.
- Rear bridge.
- Gear shift.
- Engine.

Service door location and minimum dimensions are indicated on the "Installation dimensions" layout.

Type - Boogie	IRISBUS ref.
397E.12.33-SRI	500 631 0739 DL
397E.12.33A-SRI	500 631 0736 DL
397E.12.33-SRI (Right)	500 631 0735 DL
397E.12.33A-SRI (Right)	500 631 0733 DL
397E.12.38-SRI	500 631 1421 DL
397E.12.38A-SRI	500 631 1419 DL
397E.12.45A-SRI (Left)	500 631 0740 DL
397E.12.45A-SRI (Right)	500 631 1425 DL

All service doors mentioned before are necessary in case of a low-floor bodywork (approximately 800 mm from the ground). If the inside floor level is higher, some of them may not be necessary, as long as adequate access from the outside is guaranteed. For further information contact IRISBUS Bus Quality Department.

2.8.3 Outside service doors

Service doors opened from the side or rear of the vehicle which allow access to:

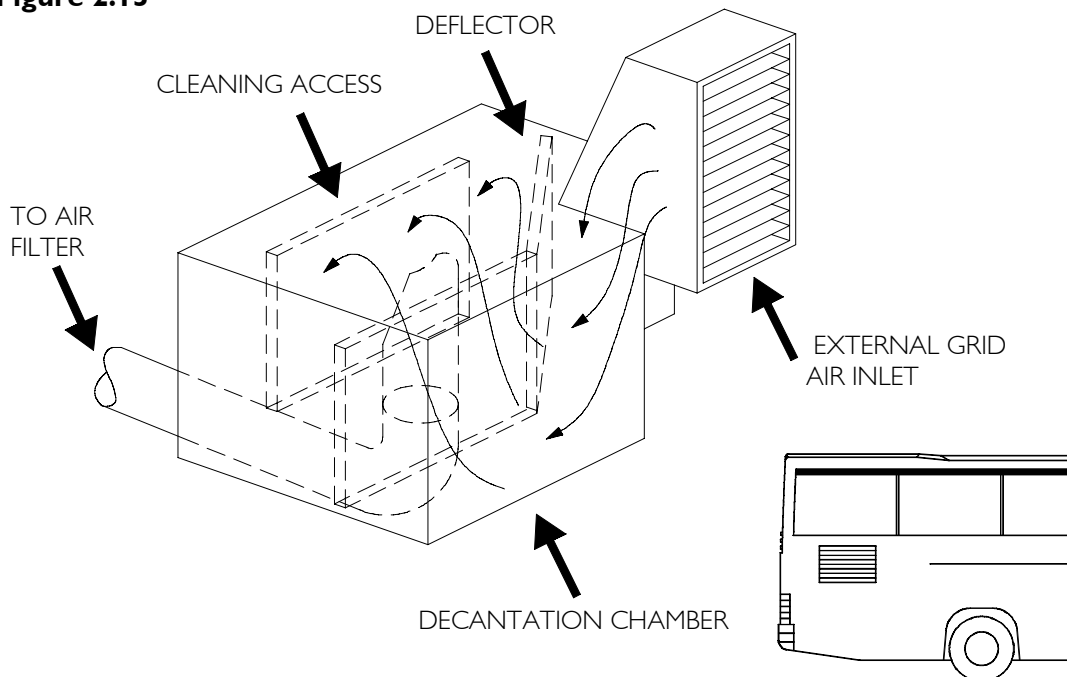
- Engine compartment. Access through rear hood and side service door.
- Engine, air filter, coolant and power-steering oil reservoirs for maintenance.
- Radiator and injection pump.
- Urea tank and pump.
- Exhaust and muffler.
- Batteries.
- Front and rear pneumatic springs.
- Shock absorbers.
- Power unit.
- Windshield wiper motors.
- Towbar.
- Connection for fast pneumatic circuit filling.
- Power steering.
- Brake actuation valve.
- Clutch fluid and hydraulic brake fluid reservoirs.
- Heating and air conditioning devices.
- Defrost device.

2.8.4 Engine air intake

The chassis is delivered complete with air filter and pipe lines from the filter to the intercooler and from the latter to the engine. Filter position should be preserved for easy cartridge replacement and name plate reading. Special care should be taken to prevent water and dust from getting inside the air inlet. The air inlet should have:

- External grid. With horizontal louvers to keep water out. Located on the side of the vehicle, as high as possible. Its minimum effective area will be 300 cm².
- Decantation chamber. Fitted between the inlet and the filter; it drains out water and dust. The communication pipe between this chamber and the grid will have a minimum section of 300 cm², the same as the internal passages inside the chamber. At the bottom, the chamber will have a \varnothing 15 mm hole that will allow settled water and dust to drain. From the chamber outlet up to the filter, there will be a pipe line with the same diameter as that of the filter inlet. If section changes were necessary, a 30° conical coupling should be used for minimal pressure drop. Bends and section changes should be avoided. If they were unavoidable, increase section to reduce their effect. See relative position on figure 2.15.

Figure 2.15



Total pressure drop due to the grid, the chamber and the pipes should not exceed 350÷400 mm of water flow, measured at full throttle.

The internal walls of the chamber and the ducts should be varnished. The chamber interior should be soundproof to avoid intake noise.

Never replace the air filter with another of a different make or type, unless there is written permit by IRISBUS Bus Quality Department.

A written permit by the IRISBUS Bus Quality Department is needed to modify the pipe line.

In order to obtain such permit, a modification project should be submitted -according to section 2.5.1- to get the type approval from IRISBUS Bus Engineering. If required, tests will be carried out -at customer's expense- to guarantee engine correct operation.

2.8.5 Steering

The steering gearbox should be accessible for maintenance, adjustment, and oil topping up, bleeding and drainage operations. It is therefore important that the relay and fuse box be located so that it is easily accessible and/or removable. Power steering fluid reservoir should also be easily accessible to allow topping up, level checking and filter cartridge change. There should be a minimum distance of 30 mm between the bodywork and the steering moving parts, in all rotating positions to right and left, taking into account the extreme suspension positions. According to point 2.5.1, it is strictly prohibited to actuate on any element that could modify the steering column stresses, or that could result in any effect not within current legislation prescriptions on "steering systems" and/or "devices against unauthorised use of motor vehicles" (anti-theft systems).

2.8.6 SCR + UREA exhaust

Exhaust pipe and muffler should be accessible to allow easy mounting and removal, and easy nominal plate reading. If required, service doors should be made available.

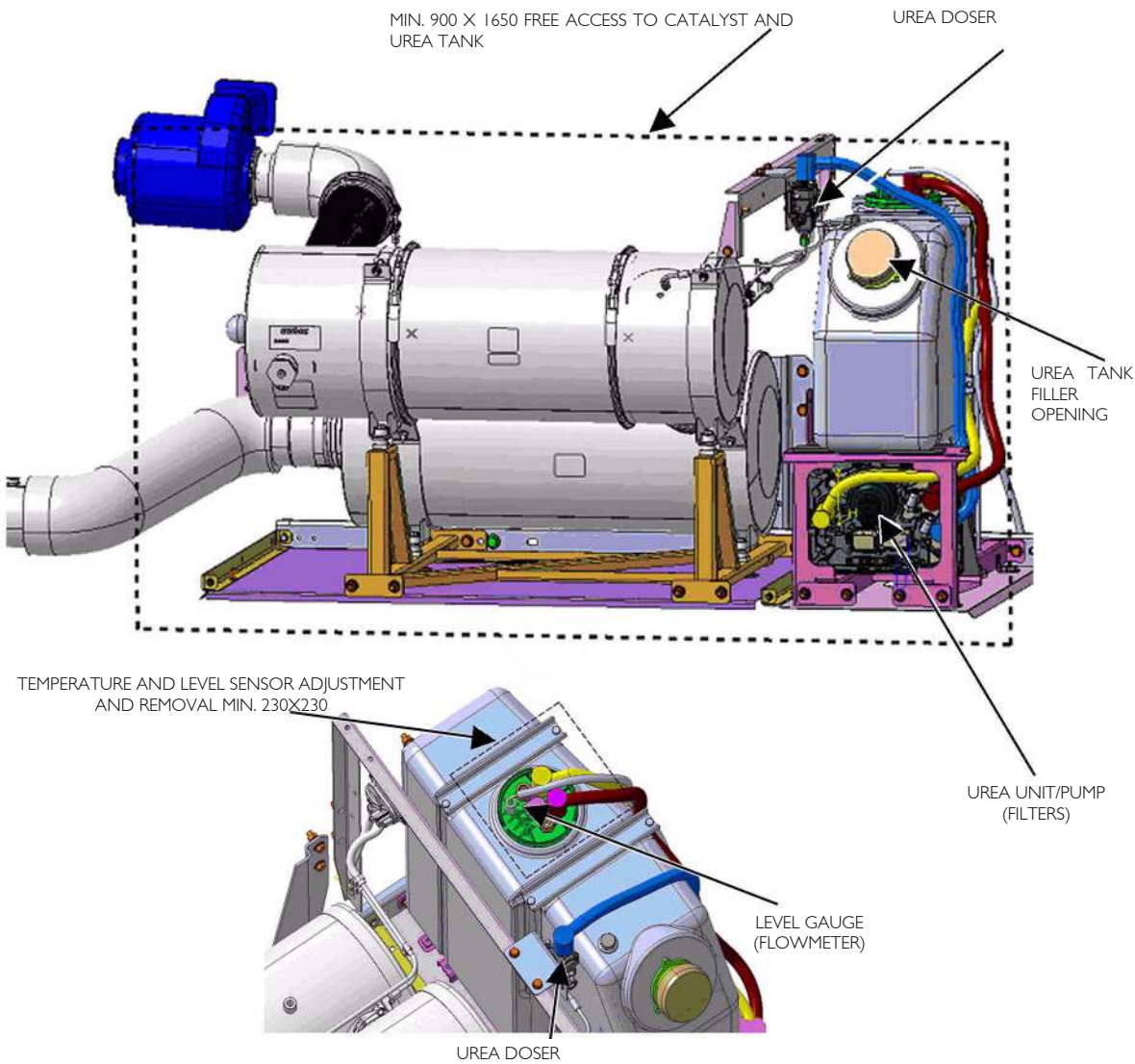
The chassis exhaust pipe and muffler grant correct engine operation and it is prohibited to modify them.

All structural and lining materials in the vicinity of hot points should comply with section 2.14.4 on "Organic material requirements for fire protection".

The body should have a service door to allow access to refill the urea tank and it should also allow enough room for maintenance operations on the urea tank level gauge.

The urea doser position cannot be changed when it is added to the bodywork. Urea pump/unit position cannot be changed and the bodywork should have an access door to allow maintenance operations, fitting and removal of the filter. See Figure 2.16.

Figure 2.16



Muffler frame should be added to the bodywork observing the fixing points for muffler free removal and refitting from under the bodywork. See figure 2.17 and 2.17.1

Figure 2.17

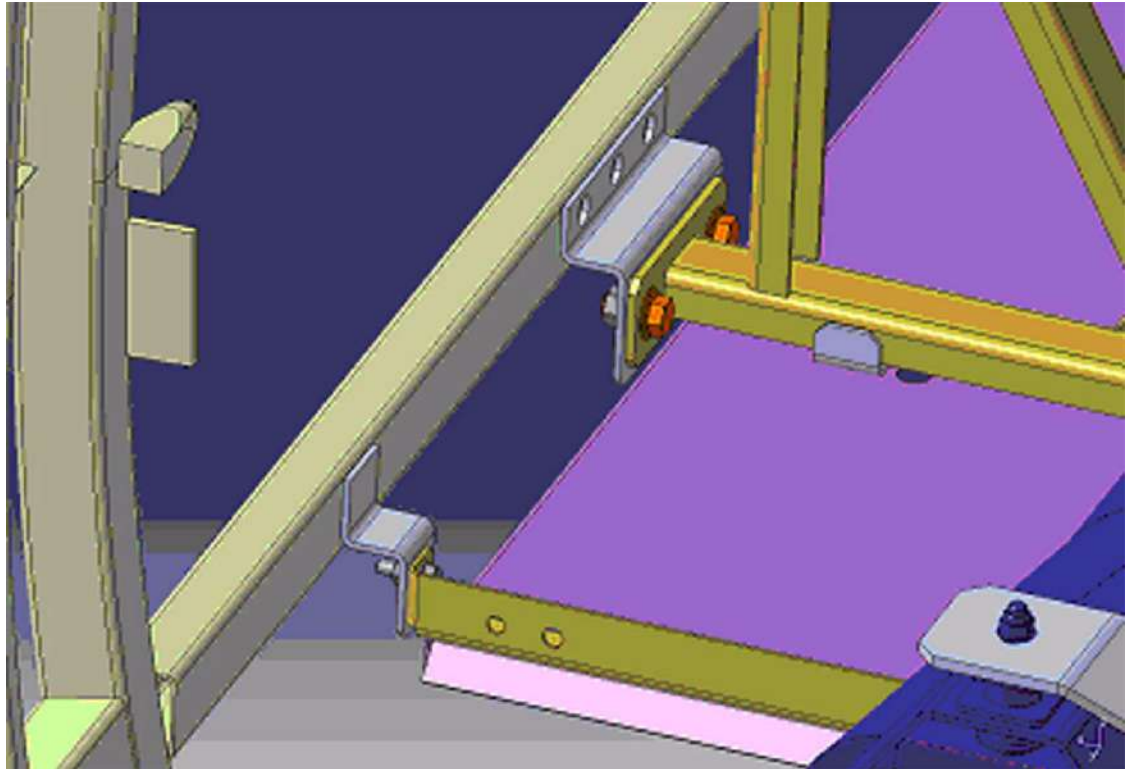
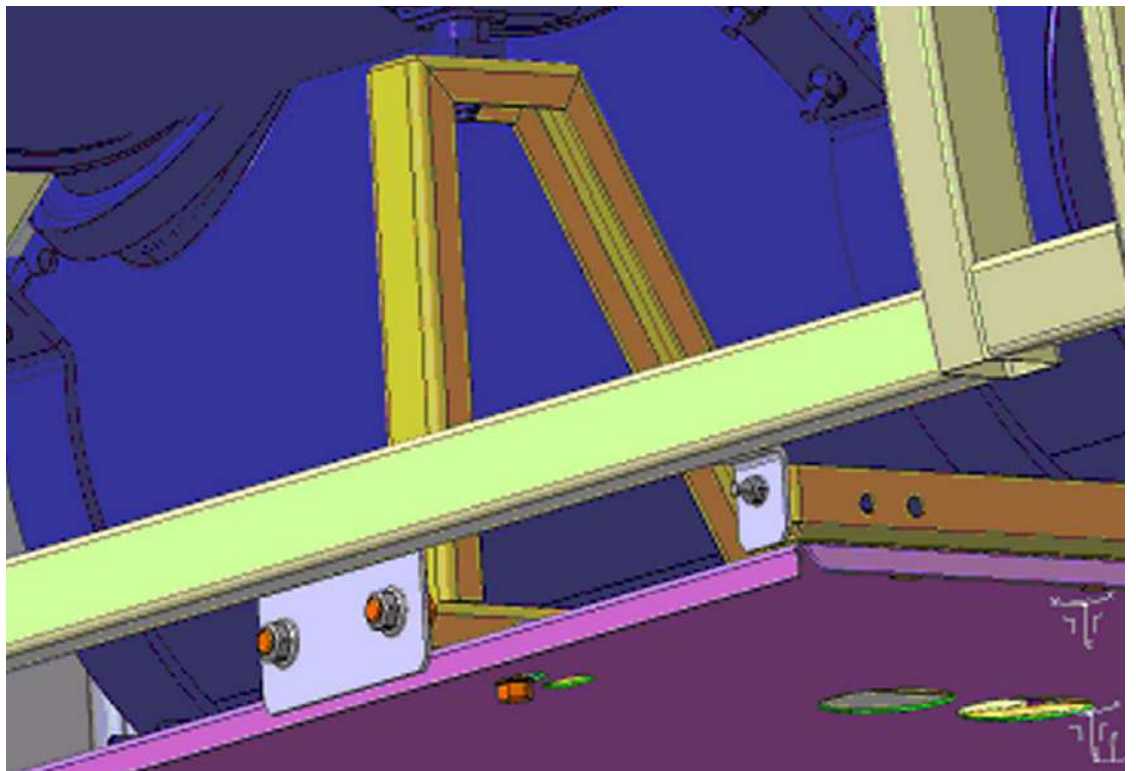


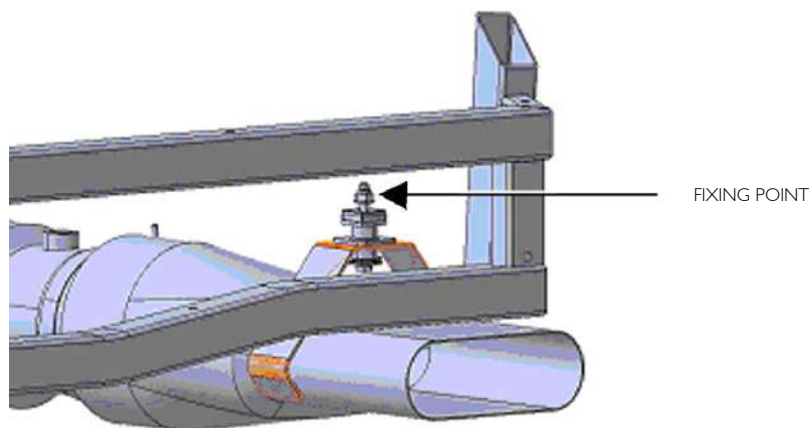
Figure 2.17.1



Encapsulated mufflers:
Mufflers should be insulated with.
ACUTERM NC
ACUTERM NC + AL
ACUSTICELL FG/NC

Exhaust pipe:
The exhaust pipe end should be fixed to the bodywork observing its position and fixing point.
See figure 2.17.2

Figure 2.17.2



2.8.7 Clutch actuator reservoir

Located at the front of the chassis, to the left of the steering wheel. On the front of the bodywork there should be a service door to check and refill the tank. If you wish to change its position, the criterion applied is the same as for the previous section, but with a variation: height should be 150 mm above clutch actuator cylinder.

For modular versions, once chassis transformation is completed, the system should be topped up and bled using TUTELA DOT 4 fluid. See Workshop Manual.

2.8.8 Engine cooling system

The radiator-intercooler unit is located to the left of the engine. The bodywork should have an inlet compartment, communicating the radiator to the outside through a grid. The grid should keep dust and foreign bodies from getting to the honeycomb. The grid dimensions should be similar to the radiator's and should have a minimum area of 5,000 cm² (Cursor 8) and 7,500 cm² (Cursor 10). The inlet compartment shape and dimensions should allow free air flow from grid to honeycomb with no obstructions or narrowings that could diminish that flow. Contact IVECO if you have any queries and have the cooling system capacity tested if required.

There should be an access door to the injection pump on the fan inlet compartment wall that is closest to the engine. The door tightness should be perfect; its dimensions are shown on the installation dimensions layouts.

The inlet compartment should be perfectly tight, with rubber gaskets preventing hot air recirculation. The gaskets should stand, without getting deformed or worn, a constant temperature of 100 °C and temperatures of 120 °C for short periods. The compartment should ensure efficient airflow all along the duct.

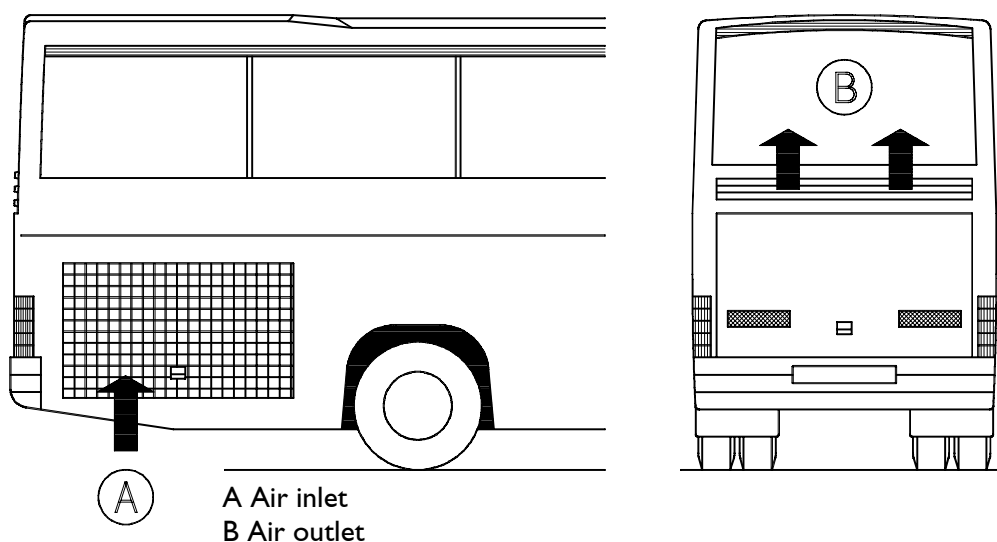
Hot air outlet should be through a grid, located on the highest section of the engine compartment and it should have a minimum section of 2,000 cm².

If a heating equipment is installed in the passenger compartment or pipes are modified, this should not affect the cooling system efficiency. In this case, cooling circuit operation should be checked taking into account filling, deaeration / water circulation, as follows:

- Open heating system feeding cocks and heater breathers.
- With engine off, top-up the water circuit with a constant flow of 8 - 10 l/min, and close the heater breathers once they are air-purged.
- Start the engine and leave it running at idle speed for 5 minutes. Once this time has elapsed, the water level in the feeding reservoir should not have decreased beyond minimum.
- Gradually, rev up the engine, checking that the pressure on the water pump outlet pipe increases gradually and without pressure pulses.
- Keep the engine revved up, until the thermostat opens, checking there are air bubbles passing through the transparent pipes installed between:
 - . engine outlet and radiator;
 - . filling reservoir and water pump;
 - . engine deaerator and filling reservoir.
- 15 minutes after thermostat opening, there should be no bubbles in the circuit.
- With open thermostat and idling engine, the pressure measured at the water pump outlet should be above 500 mm of water flow.

Figure 2.18 shows the cooling air inlet and outlet relative position at the back of the bodywork.

Figure 2.18



2.8.9 Change of unit position and fixing of additional equipment

A position change for units (such as fuel tank, batteries, spare tyres, etc.) due to bodywork structure is allowed as long as relocated unit performance is not compromised, original connections remain unchanged, new supports allow original coupling and support, and new location and earth connection are compatible with vehicle design.

In order to install additional equipment (reservoirs, compressors and condensers for air conditioner, etc., or spare tyres and batteries supplied as standard), refer to sections 2.5.4 on "Welding technical specifications" and 2.6 "Chassis drilling".

Fixing heavy components (e.g. batteries) overhanging is not allowed. Its supports, besides resting on the chassis member, should be fixed to other elements such as free beams or any side bodywork structure.

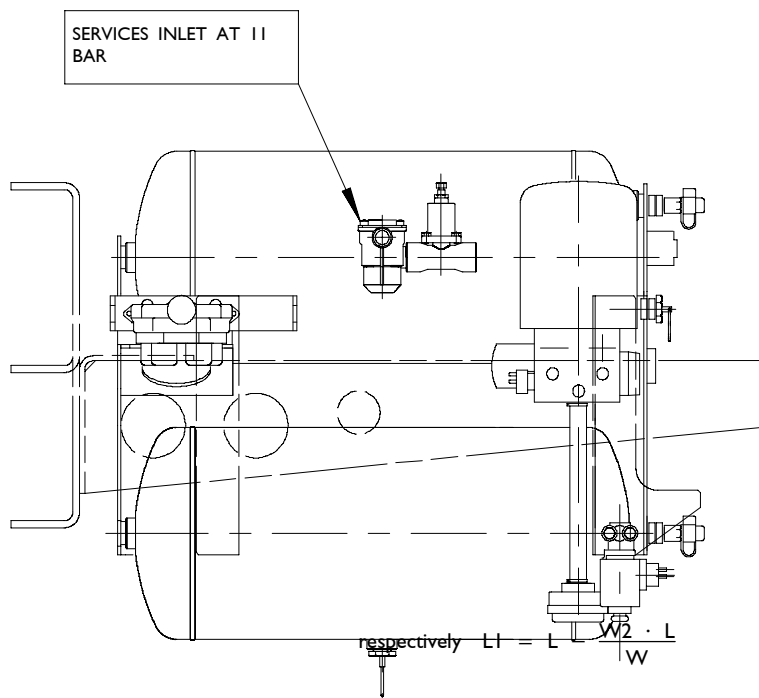
The spare tyre support should facilitate removal and comply with a minimum entry angle of 7° or greater depending on the service the vehicle is intended for.

2.8.10 Air inlet for services

It will be taken from the overflow valve mounted on the auxiliary services reservoir located in the rear section of the chassis, on the left chassis member, and never from the brake reservoirs.

Figure 2.19 shows the location of valve and reservoir.

Figure 2.19



2.8.11 Electrical installation - safety measures

The electrical installation should be protected against heat and spatter during welding operations. If required, the electrical wiring should be removed from the area near the welding procedure and be laid again afterward.

The electric system should be disconnected in case of electric welding.

When the electrical installation is laid through the bodywork sheets, the wiring harnesses and cables should be protected with cable glands. It is strictly forbidden to fix cables or any other electrical component to fuel pipes.

If paint is oven-dried, temperature should not exceed 80 °C. At the painting phase, electrical connections should be protected to prevent paint from causing short-circuits.

When there are connections at the terminals, maximum intensity allowed should not be exceeded.

Bodywork electrical installation should have a suitable fuse protecting each and every circuit. The wiring harnesses and cables used should be correctly protected and have adequate dimensions complying with ECE Regulation 36 and/or any other standard in force in the country where the vehicle will be registered or run.

The safety central control unit should operate according to applicable standards in force.

2.8.12 Electric control units

Before handling the electrical installation or electrical / electronic components, batteries should be disconnected to prevent system reset.

Before connecting the batteries, all electrical and electronic components should be correctly connected to avoid system setting failure.

See figure 2.3.1.

2.8.13 Safety tips for welding, grinding and painting mechanical components during bodywork assembly

- Before any electric welding procedure is attempted, disconnect all cables connected to the (24 V) battery positive and negative terminals and join them physically by means of bolt and nut.
Furthermore, the vehicle electronic central control units should be disconnected before any welding process. See figure 2.3.1.
ECM motor built-in control unit should also be disconnected.
- Certain components should be protected against heat, weld spatter, grinding and drilling ejected particles. Such components include the instrument panel, steering wheel, polyamide pipes, sleeves, rubber pipes, pneumatic springs, electrical connectors, etc., and any other element that could be affected by the above mentioned agents.
- It is strictly forbidden to paint the following items: rubber diaphragms and metal plungers of suspension pneumatic springs, brake discs and callipers; shaft with slip joint (between steering pinion and power steering gearbox); heat exchange surfaces (radiator panels and air coil pipe); radiator fan and fan hub.
Specific instructions for bus chassis and bodywork

It is not advisable to paint the chassis mechanical parts that have been treated at the factory, electrical component housings, valves for hydraulic and pneumatic installations, control cable terminals, nameplates and die cuts of components. Should the engine (except catalytic muffler) need painting, "Red" Code IRISBUS 41589 is recommended.

Wheel rims should not be painted unless specifically required by the Customer, and in no case should the area of the rim relative to the fixing nuts be painted

2.8.14 Cooling for fitting the I40 + 80 A

In order to guarantee cool airflow to the alternator, there should be an air inlet in the radiator air inlet compartment or in any other place exterior air can be sucked in. At the air inlet, it is advisable to fit a minimum 40-cm² section mesh, fine enough to prevent foreign bodies from getting into the alternator. An adequate air filter can also be fitted at the end of the suction pipe.

Air will flow through sleeves 99438818 and 500321736 supplied. Figures 2.20 and 2.21 show the alternator cooling pipe layout.

Figure 2.20
(for motor types 397E. 12.33
Cursor 8)

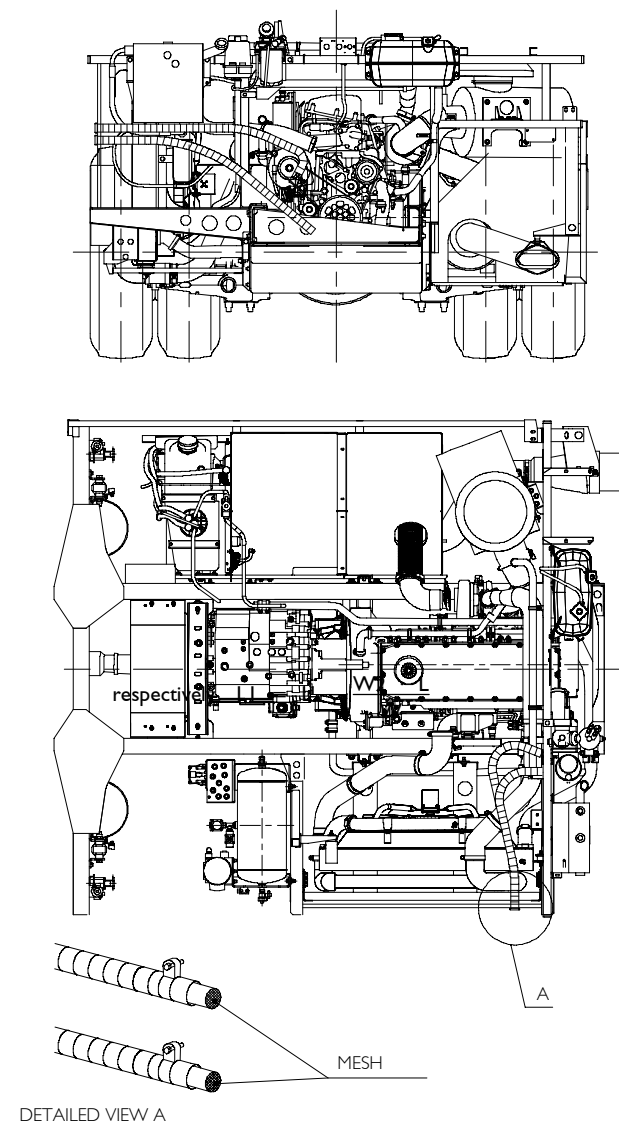
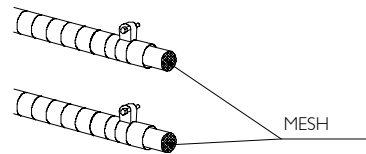
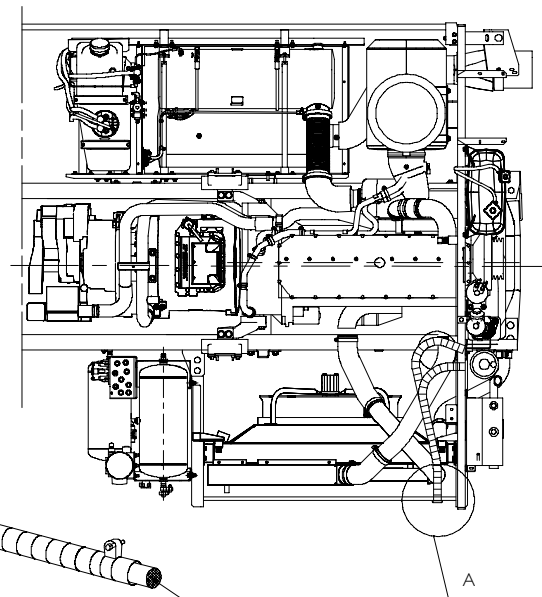
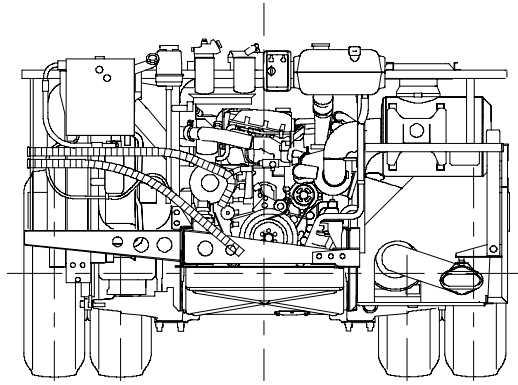


Figure 2.21
(for motor types 397E.12.38/45
Cursor 10)



DETAILED VIEW A

2.8.15 Electric system tapping

The basic electrical installation fitted to the chassis, instruments panel and relay and fuse box should not be tampered with.

The connections for the bodywork services, except those defined in the basic installation, must be carried out on a bodywork circuit board, with the appropriate relays, connectors, fuses and other components.

Power to feed the circuit board will be taken directly from the output terminal of the battery electromagnetic disconnecting switch (never directly from the battery terminals) with the relevant protection (fuse) and suitable wire section.

The chassis is fitted with two 90 A alternators as standard. The maximum installed power of all the components will be 3600W. If the vehicle is fitted with an electronic retarder, the installed power must not exceed 3300W.

As optional, a 140A alternator plus a second 80A alternator are fitted (instead of two 90A). With these two alternators (140+80) the total admissible power will be 4600W. If the vehicle is fitted with an electronic retarder, the installed power must not exceed 4300W.

If more power is needed, install of a second 80A alternator, activated by the air conditioning compressor.

In this case, the second alternator wiring will form part of the bodywork. The second alternator fitted should be a Bosch NI type to ensure functioning and adjustment compatibility. If the electrical installation requires 12V power supply, do not make the connection directly at the terminals of one of the batteries. A 24/12V converter of suitable capacity should be foreseen for the intended power requirement.

2.8.15.1 Circuit board

Relays, fuses and connexions box must be so fitted that it can be opened at its hinged fittings for maintenance and fitting operations. The relays and fuses box nor the installations can be altered without written consent by Irisbus Bus Quality Department.

The circuit board features two connectors for bodywork services linked to the chassis installation, see point 2.19.3.

If a new connexion not specified in point 2.19.3 is needed, it must be asked in written to the Quality Department, which will process this request. The bodywork electrical installation, however, must not be tampered with in order to obtain the signal needed.

2.8.15.2 Electronic control units

The electronic control units supplied onto a transporting plate on the right side of the vehicle must be assembled over a rigid and conductive (not varnished) surface in a cabinet inside the hold, placed in an area near the front axle, and it must comply with the ambient conditions specified for the (SPRI) instrument panel combined unit.

There should be a physical union between the metal plate and the vehicle earth connection, as short as possible, with a 20mm metal mesh, and along its path, it should be as close as possible to the crossing surfaces to avoid static.

Temperature - 40°C a +70°C, acceleration +/-2g

The control unit wiring harnesses should not be modified.

2.8.15.3 Fitting the CAN line

The CAN line is a data transmission installation among every electronic unit in the vehicle. This wiring is different from any other because it has a protective bellowed sheath in a different colour. A bipolar wire, made up of two twisted conductors with a specific number of loops per metre. It must be at least 10 cm away from any other wiring.

2.8.15.4 Safety

The end-of-stroke switch, provisionally in the engine compartment area, must be fitted permanently so it can change status when the boot is open.

The purpose of activating this circuit is to prevent starting the engine from the driver's seat, with the engine compartment cover open.

Do not tamper with (coupling, branching, cutting or lengthening) the chassis fixed electrical installations to avoid compromising tightness, excess current in the circuits or the chance to possibility of mechanical wear of the protections of wiring harnesses and cables.

2.8.15.5 Fitting the outside temperature sensor

The outside temperature sensor is located over the chassis, fitted to its holder and fixed at the lowest section of the pedal base over the first cross-member. The permanent position of the outside temperature sensor must so that the temperature-sensitive area does not receive direct sunlight or the influence of any hot area that result in a misreading. The sensor should not be screened as this could retard sensor reaction to more or less rapid temperature variations caused by passing through courses or areas with different temperatures (entering a tunnel, passing through wooded areas, etc.)

It is important that the actual ambient temperature be correctly detected as this may help anticipate the presence of ice.

2.8.16 Water fittings for heating system

When the caloric source for the heating system is the engine only, the installation must be done connecting the pipe fitted for this purpose at the engine water collector outlet, if the vehicle is equipped with manual gearbox. If the vehicle is fitted with an automatic gearbox or hydraulic retarder, the installation must be done the joint with the engine water outlet pipe the gear shifter or retarder. See details in figures 2.22; 2.23; 2.24 (for 397E. 12.33, Cursor 8 engines) and 2.25, 2.26, 2.28 (for 397E .12.38/45, Cursor 10 engines).

1 " 1 / 4 cocks should be fitted at in both inlets and outlets to isolate the heating circuit. The minimum diameter for the heating pipes will be 32 mm.

Figure 2.22
Heating system intake, C.V. MANUAL
(Cursor 8 engines)

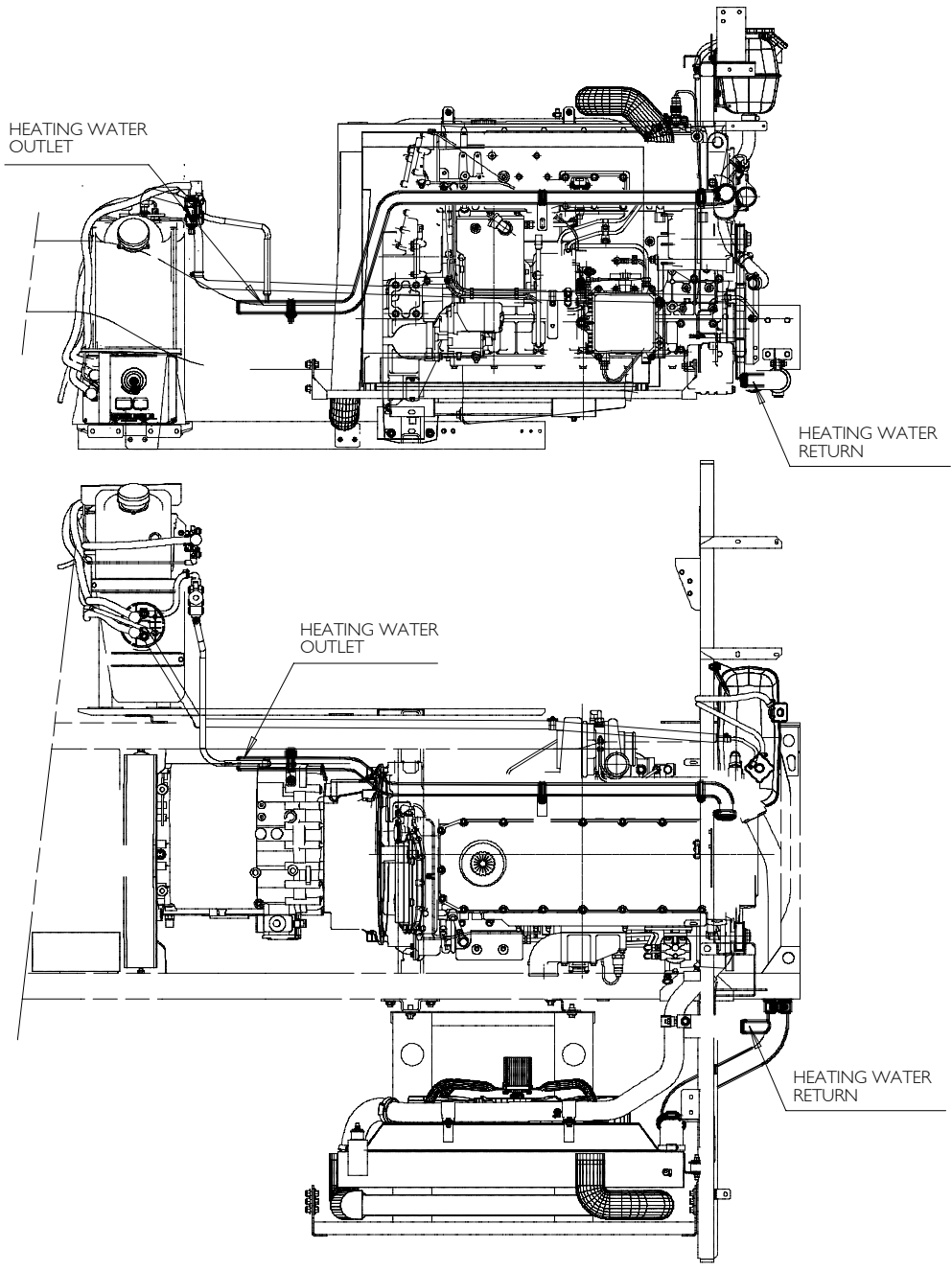


Figure 2.23
Heating system intake, C.V. AUTOMATIC ZH 6HP604
(Cursor 8 engines)

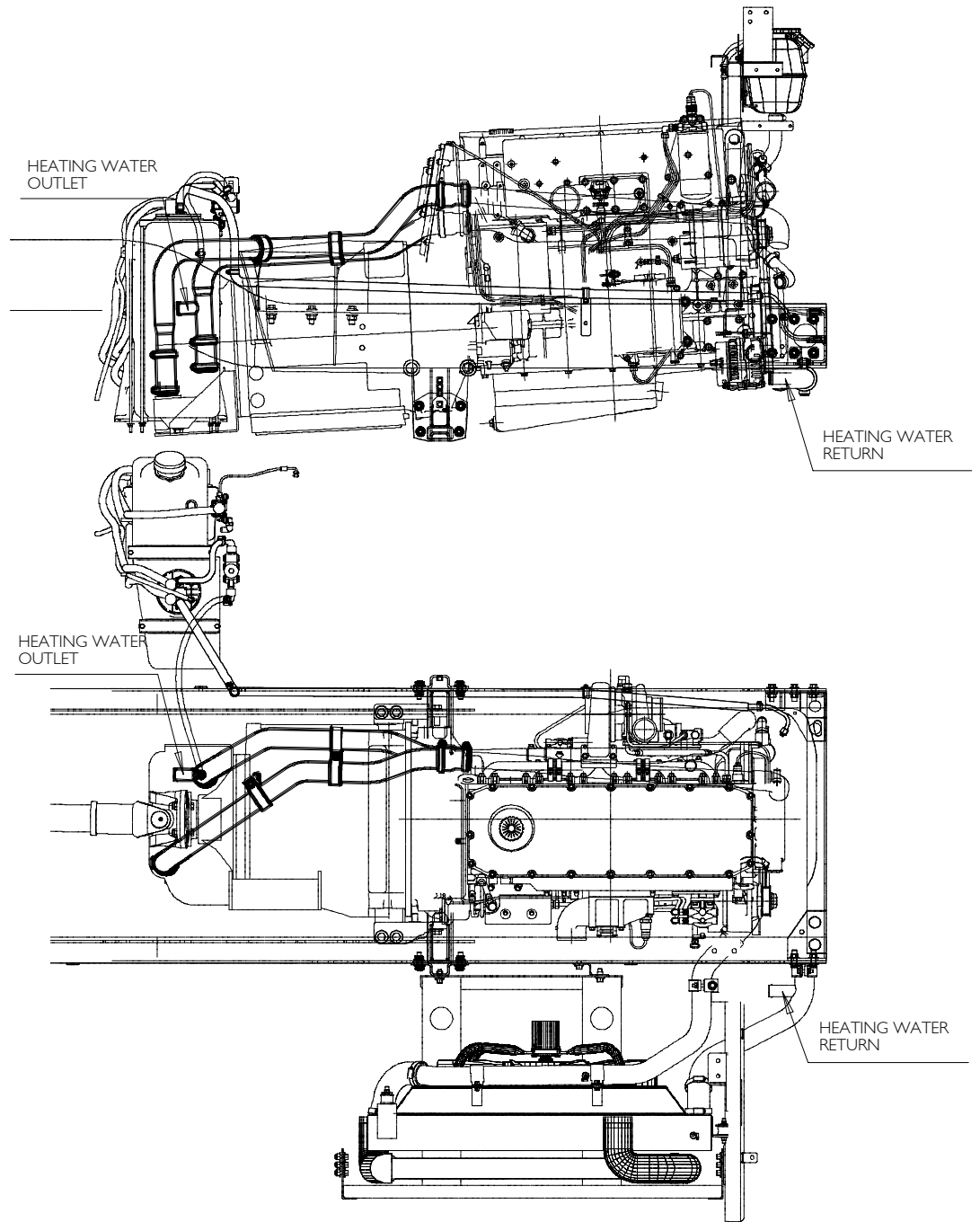


Figure 2.24
Heating system intake, C.V. ZFS6-1600 + INTARDER
(Cursor 8 engines)

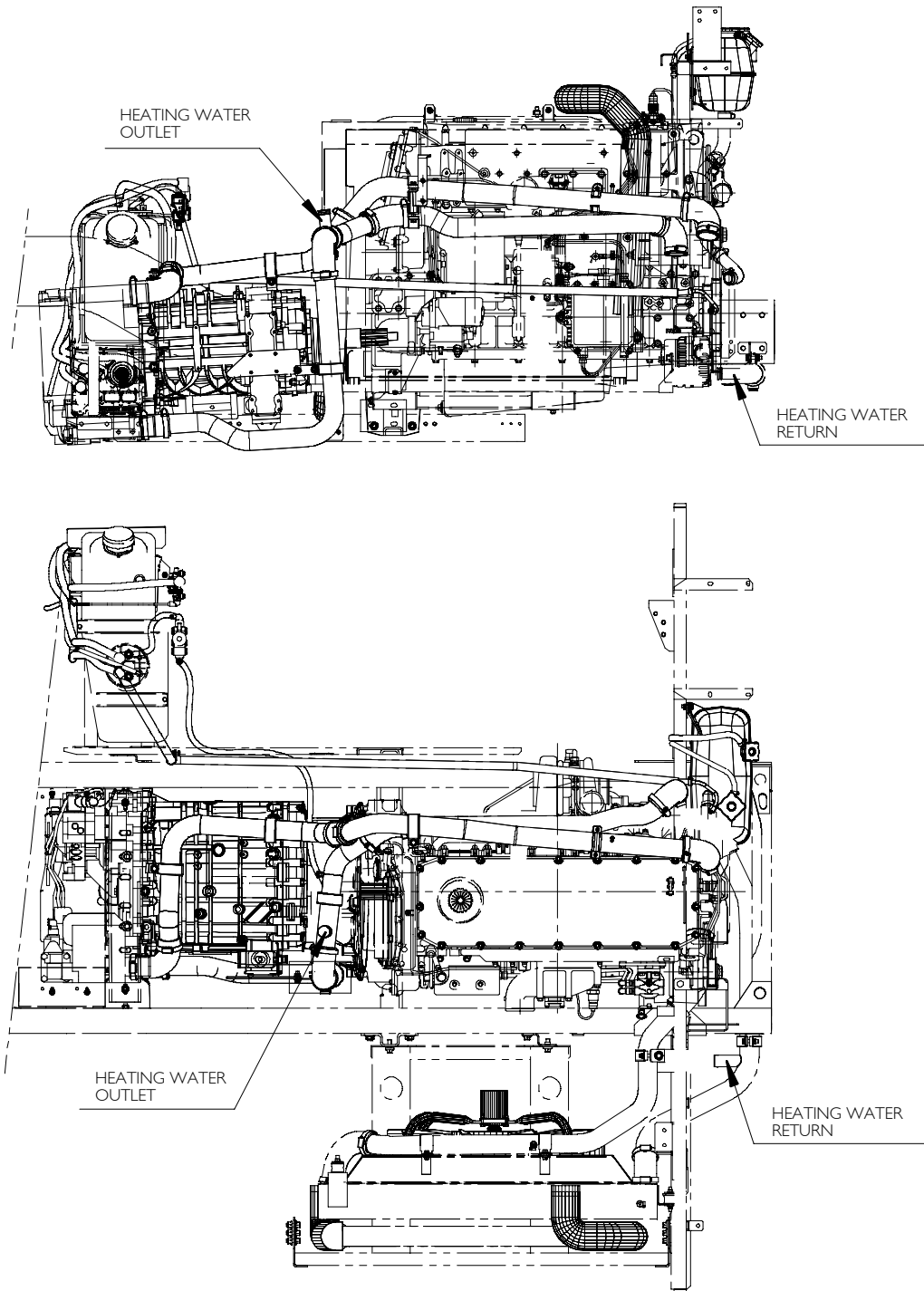


Figure 2.25
Heating system intake, C.V. MANUAL
(Cursor 10 engines)

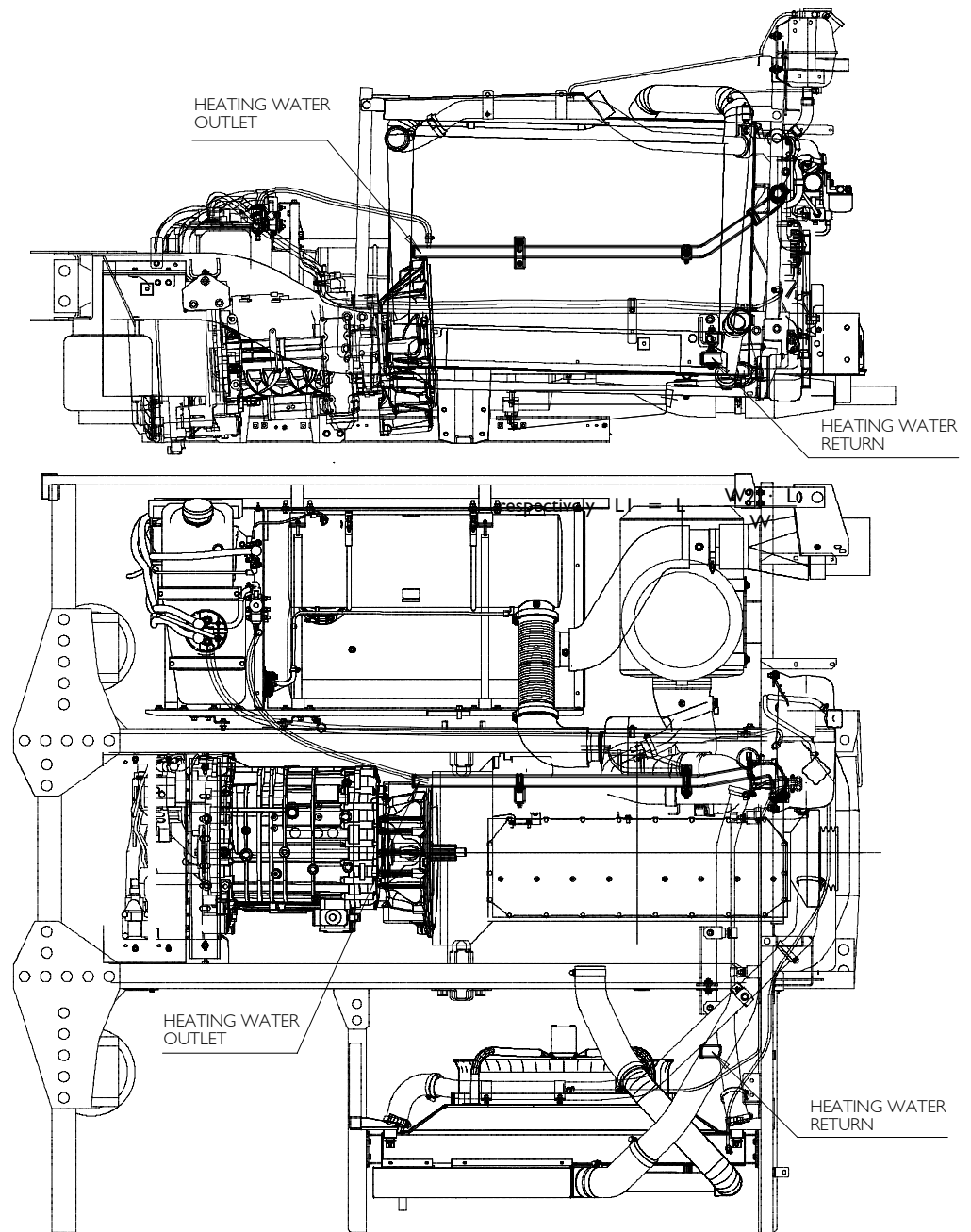


Figure 2.26
Heating system intake, MECHANICAL C.V + INTARDER
(Cursor 10 engines)

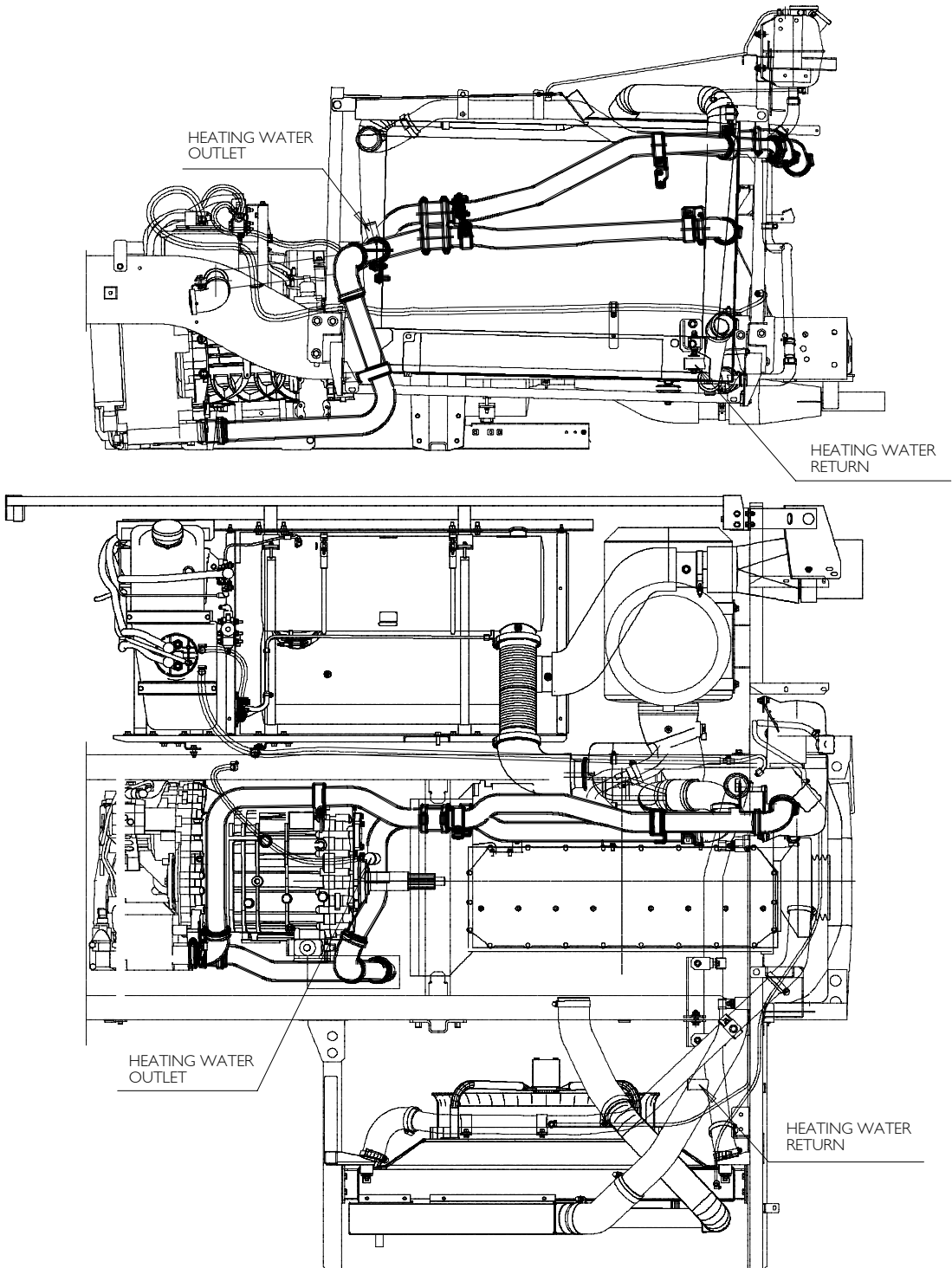


Figure 2.27
Heating system intake, C.V. AUTOMATIC VOITH
(Cursor 10 engines)

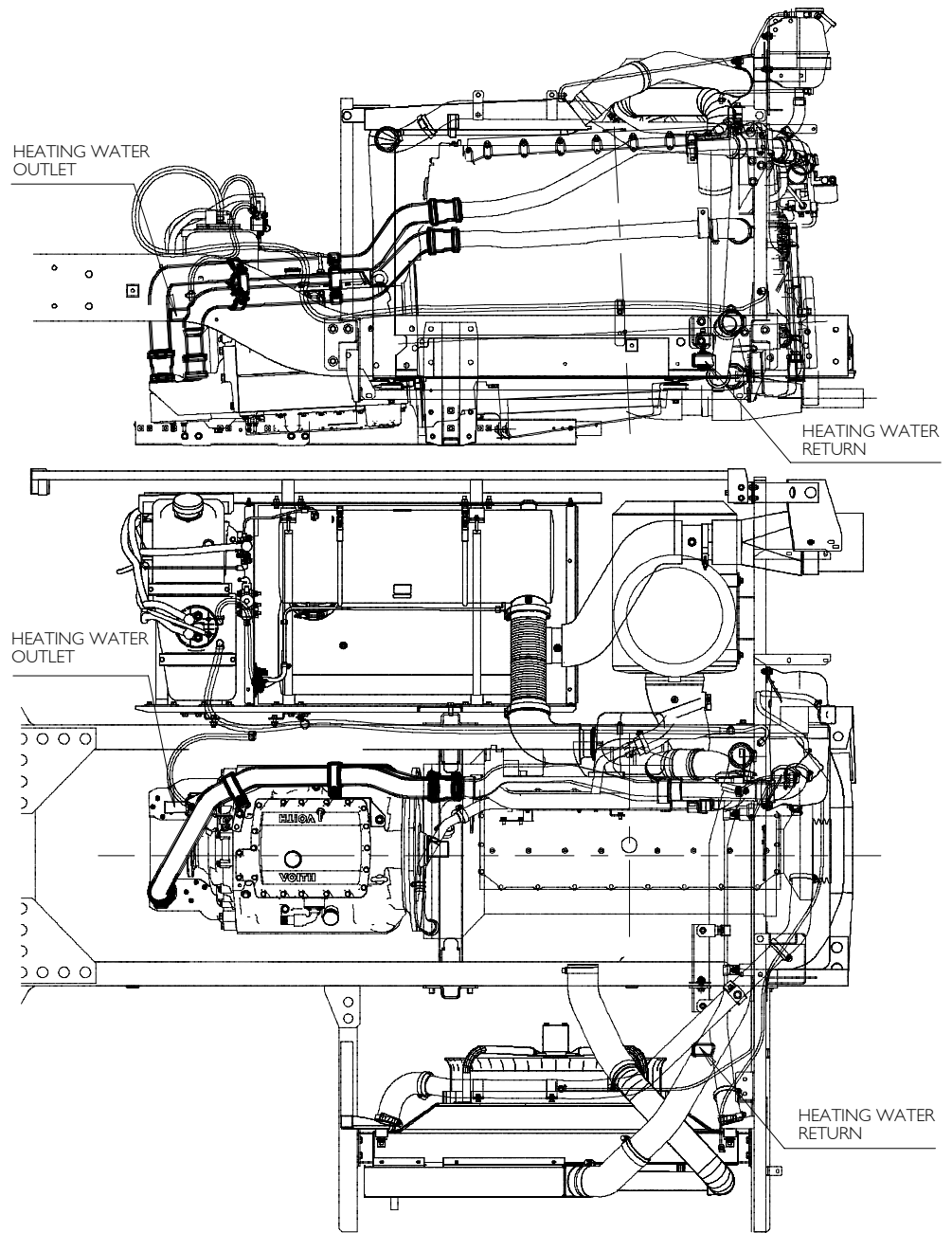
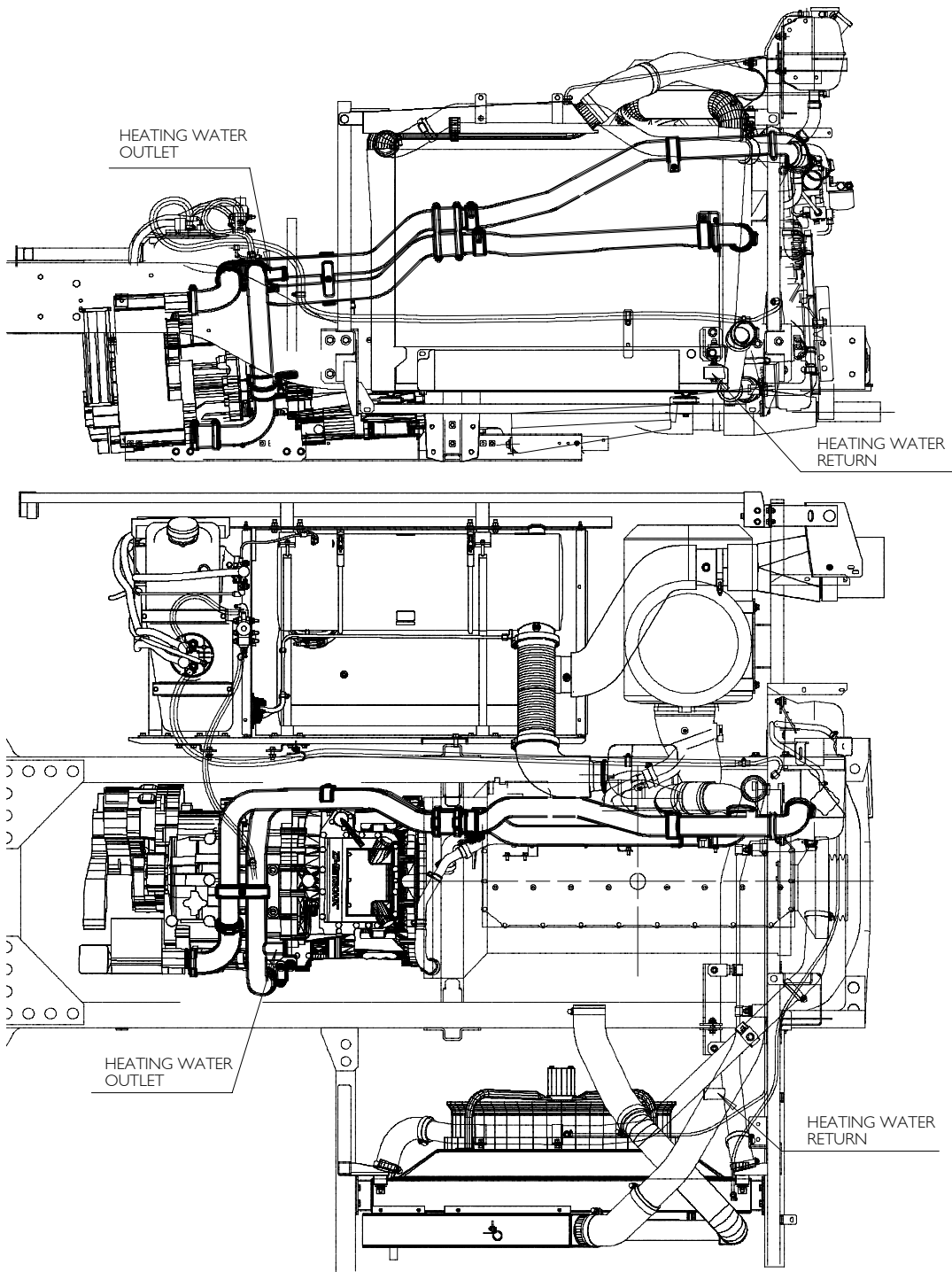


Figure 2.28
Heating system intake, C.V. AS TRONIC
(Cursor 10 engines)



2.8.17 Air conditioning fitting requirements

The crankshaft output pulley has two free grooves for activating the air conditioning compressor. Excessively taut belts should be avoided or the crankshaft neck lock stop can be damaged; the pre-tension value should not be over 25kg per belt.

The compressor will be fitted at the rear hatchback due to its activation requirement. The condenser and the evaporators are so fitted as to allow an adequate load distribution according to the vehicle limitations.

The air conditioning system should respect all environmental-protection measures, specifically those regarding the ozone layer. Therefore, all systems emitting halons or CFCs are prohibited.

The bodywork configuration must allow an easy access for maintenance and repair operations for the compressor, its driving belts should not touch any part of the bodywork and they should be easily reached without the need of removing the bumper or any other component.

2.8.18 Identification plates and labels mandatory in a bodied vehicle

According to the actual legislation in force, the final product (the bodied vehicle must feature at least the following identification plates and labels):

- Chassis manufacturer nameplate (by IRISBUS), supplied as standard.
- Plate or label indicating the maximum set cruise control speed for the vehicle complying with the European Directive on "Vehicle Speed Limiters" (it is advisable to stick this label to the windscreen central upper part) IRISBUS reference 4100 4446, supplied as standard.
- Body builder nameplate To be fitted by the bodywork builder
- Plate indicating the vehicle dimensions complying with EEC Directive 83/364 To be installed by the body builder.

2.8.19 Others

The following elements or systems must be taken into consideration:

- Sound alarms: The bodied vehicle must comply with the minimum noise limit specified in the relevant regulations.
- Do not modify any element that can alter the correct functioning of the system or the mandatory "speed limiter" pursuant the current regulation.
- The braking system of these vehicles includes ABS. Pursuant point 25.1, it is absolutely prohibited to tamper with the braking system and/or change elements (valves, tanks, etc.) in a way that could damage the original characteristics of the chassis according to the current regulations.
- You are reminded that the compressed air reservoirs are type-approved according to a specific regulation.
- The vehicle fuel tanks have been type-approved as well as their fillers, caps and other elements. Therefore, modifying any of their parts will involve a new type-approval test, at the body builder's expense.

2.9 BUILDING THE BODYWORK

2.10 INTRODUCTION

This chapter provides instructions to build the bodywork and deals with the most important technical aspects and regulations. The definition of the bodywork is left to the body builder's discretion, according to the specifications of each order.

2.11 BODYWORK CONFIGURATION

2.11.1 Main dimensions

Angles of inflow and departure: equal or greater than 7° for all vehicles.

Outer and inner steering circles: bodywork configuration must allow steering circles according to what is specified in ECE Regulation 36 or equivalent regulations, applicable in the country where the vehicle is registered or run.

Mudguards: vehicles will be equipped with mudguards on the back part of every wheel, up to 75mm from the ground.

Bodywork configuration must allow an easy reading of a vehicle identification number, placed at the front of the right chassis member. See section 2.3.1.

2.12 VEHICLE INTERIOR CONFIGURATION AND CAPACITY

For every vehicle class (I, II / II) the passenger area and the number of seats should comply with ECE Regulation 36 or the regulations of country the vehicle is shipped.

2.13 DRIVER STATION - CHARACTERISTICS

Heating system: it is mandatory to have hot air outlets for the windscreen demister.

Sun visor: a sun visor must protect the driver; it should be foldable and adjustable in height while the vehicle is running. A sun screen or a tinted glass can be fitted, total or partial.

Driver's seat: it will be adjustable in height, inclination and longitudinal distance to the steering wheel. Each one of these adjustments will be independent. The seat should have the suitable suspension and will be upholstered with perspirable material.

Driver station - ergonomics: the instrument panel supplied with the vehicle can be added to the front case or the instruments can be disassemble and then fitted in a customised panel but keeping the original instrument distribution layout to optimise ergonomics. The panel supplied as standard complies with the Directive on "Indicators, controls and telltale lights". If a modification is introduced, this aspect should be checked and type-approved, if required.

Upon fitting and surfacing the floor of the driver station, the body builder must take care not to limit the clutch pedal travel, as well as the full action of the foot pedal (step-on) to reset steering adjustment.

2.13.1 Fitting the instrument panel combined unit

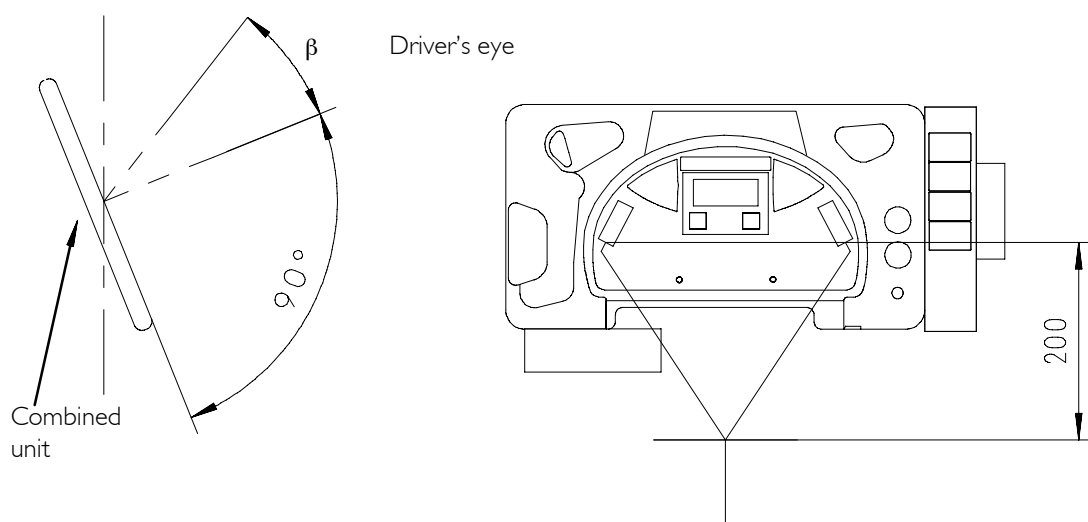
The (SPDR1) combined unit is an electronic device to indicate and display to the driver the vehicle performance conditions. This device, fitted on its supporting casing, can withstand the vibrations and temperatures that may occur while using the vehicle as follows:

Temperature: 40°C to + 70°C; acceleration: +/-2g.

The electrical connection wiring harness of the combined unit must be fixed at a distance that does not exceed the 200mm from the 2 connectors on the back of the device.

To have a good field of view to read the information that is shown on the display; the β angle (formed by the line perpendicular to the display and the driver's vision) will be between 0 and 30°. The closer the β value is to 0°, the better the reading will be.

Figure 2.29



2.13.2 Fitting the digital tachograph

A tachograph is an electronic device to view and save vehicle speed. It also helps to obtain additional information given by the corresponding menus. As per the regulations in force for these devices, the tachograph is to be fitted on the vehicle so that the driver can have access to the functions needed for driving from the driver station. The tachograph display must be seen from the driver station while driving.

The tachograph must be fitted into a supporting casing and be firmly secured through a rear pin; if required, use angle bracket to fix it to the casing.

2.14 RESISTANT STRUCTURAL MATERIALS

The resistant materials used to build the structure must be included in the table of materials of Chapter 4. If different materials are employed, they must at least have similar characteristics.

To obtain a good weight-resistance ratio it is advisable to use Fe 430 C sheets or profiles or their equivalents.

In Spain and pursuant to ECE Regulation 66, all types of vehicles used for passenger transportation (class I / II) which are currently registered should be type-approved. The side structure must be designed, calculated and sized to comply with this requirement.

2.14.1 Resistant structure pipes

They should be preferably made of Fe 430 C material. See table of materials, Chapter 4.

The resistant pipes must comply with the flattening test according to the DIN 50136 standard. Profile torsion should be 0.5° maximum per length metre.

The maximum deviation of the profile regarding to the straight line should be 0.25% of its length.

The outside rounded radius of the edges will be twice the thickness of the wall maximum, the inside radius will be equivalent to the wall thickness.

The inside radius should correspond to the outside evenly, without crushings or creases.

The surface must be free of rust.

The welding seam must be trimmed on the outside surface but still visible.

The status of the outside surface should allow tack welding unions using regular welding pliers.

2.14.2 Bodywork covering

Use preferably matte finished galvanised sheets without spangle, STE-280 3Z 200-SC-CHROMAT, according to DIN 17162-2 standard.

This one will be used to apply sheet plates to wheelhouses, boards, etc.

Either stainless steel or composite materials can be used for wheelhouses.

2.14.3 Riveting technical specifications

Rivets used to fix the outside covering of the bodywork must be watertight so that no water can get inside. It is advisable to perform water-tightness tests in case of doubts. If the union is carried out on a pipe, it is advisable to locate the drill at the centre of the pipe wall and in any case at a distance of at least 10mm from the edge.

2.14.4 Organic material requirements for fire protection

The covering organic materials used inside the engine compartment must be non-flammable or fuel or lubricant resistant.

The rest of the bodywork organic materials must be non-flammable or self-extinguishing, complying with the legislation in force in each country of destination.

The polyamide piping and electrical wiring harnesses laid next to an engine hot zone, like the manifold or exhaust pipe, turbocharger, etc., must be protected by a metal screen made of aluminium or stainless steel, covered with insulating material.

2.15 BODYWORK ANTI-CORROSION TREATMENT

2.15.1 Introduction

To guarantee a long duration of the bodywork, the anticorrosive treatment is essential. Avoid diminishing structural pipe sections with thin walls, profiles, sheet, etc.

Applying this anticorrosive treatment should not adversely affect the chassis components-polyamide piping, electrical wiring harnesses, valves, etc.

2.15.2 Structure preparation

Bear the following points in mind:

- Avoid the points where water, dust and dirt can form deposits.
- Generally the pipe ends must be plugged.
- In open profiles, the opening must be facing downwards.
- In closed profiles and in all bodywork hollows where water can deposit, drill approx. 8-mm holes, oriented downwards. Avoid blocking these holes when painting or applying the anticorrosive solution.

Edges, flaps with folds, ribs, ridges, etc. of the external pieces to the structure must be reinforced so as to facilitate water drainage. Apply suitable sealants where required by the design.

2.15.3 Anti-corrosion treatment on profile internal walls

It is compulsory to apply a wax-based anti-corrosion coating to the internal side of the structural pipes in the following cases:

- From windows, downwards.
- Door pillars.
- Horizontal pipes of the structure.
- Chassis areas exposed to the elements.
- As an option, polyester foam can be used at the same points. The specifications of this product must comply with the current health standards.

The auger bits used to inject wax-based products should be covered with plastic caps.

2.15.4 Anti-corrosion treatment on the structure external surface

The pipes must be protected externally with a primer.

The areas welded to the sheet plates should be protected with a weldable product.

2.15.5 Anti-corrosion treatment on the sheet

To insulate and protect against corrosion all the bodywork internal areas, use materials to render them resistant to chemicals and mechanical wear. For example:

- Roofs
 - 1) Apply of dry primer, from 20 to 30 μm , check bonding periodically.
 - 2) Apply polyurethane foam or expanded polystyrene layers.

To provide protection against ejected chips and strange elements, seal the wheelhouses subject to water splashes, apply an underbody protection anti-corrosion.

To protect the underbody apply an anti-corrosion treatment consisting of a high-density thixotropic, with a film thickness from 300 to 800 μm .

Special attention should be given to the coupling areas of structural pieces, folded couplings / weldings, where a non-drying sealing paste with good bonding should be applied.

For applying anti-corrosion products adequately, strictly follow the instructions provided by the manufacturers.

At the request of the IRISBUS Bus Quality Department, the body maker will provide samples of the products employed.

2.15.6 Anti-corrosion coating using other materials

One way to guarantee anti-corrosion protection is to use materials offering a good resistance to corrosion, such as stainless steel, plastic materials, resin-laminated fibreglass, etc. The use of these materials must be always compatible with the resistance required for each part.

2.15.7 Anti-corrosion coating tests

The anti-corrosion coating must pass a corrosion resistance test in a salt fog chamber. Test duration depends on the type of material and treatment. See Chapter 4.

2.15.8 Battery compartment

The base of the battery compartment must be painted with a high-corrosion resistance process, see Chapter 4. Applying over it a wax-based coating, 100 μm thick, taking into account that this will require a periodic maintenance that the Body builder must foresee.

2.15.9 Anti-corrosion coating maintenance

Periodic maintenance is required to render an anti-corrosion treatment effective. The body builder must provide, with the vehicle, the necessary instructions for this maintenance according to the bodywork in question.

2.16 BODYWORK PAINTING

To guarantee the quality level IRISBUS wants to ensure for the bodyworks it manufactures, the processes specified on Chapter 4 should be applied.

2.17 NOISE LEVELS AND THERMAL INSULATION

Once the vehicle is finished, the Body builder must ensure that the vehicle complies with all the noise level specifications required for each case. It is the Body builder's responsibility to obtain the type-approval certification for the vehicle, if required.

In order to obtain a high level of internal comfort and to comply with regulations about noise emissions, it is advisable to proceed as follows.

2.17.1 Outdoor noise

According to current regulation for European Union countries, the maximum outdoor noise emission level must be 83+1 dBA, in force until I.10.95.

The same regulation requires a maximum level of 80+1 dBA and adds the requirement of a noise level limit produced by pneumatic component exhausts, from I. 10.95 for new type approvals and from I.10.96 for new registrations.

2.17.2 Internal noise Measurement method

The measurements will be carried out according to what is specified by the ISO 5128 standard, given the following conditions:

The tests will be carried out at the following set speeds:

- With manual gearbox
60, 80 and 100 km/h for the penultimate gear.
80 and 100 km/h for the top gear.
- With automatic gearbox
40, 60, 80 y 100 km/h, with D key.
- Sound level meter location.
- Penultimate seat row, rear central area, at passenger ear level.
- Front area, at driver's ear level.

Under these conditions, the results obtained must never exceed the following values:

- Long distance intercity vehicle
 - Without air conditioning 72 dBA
 - With air conditioning, maximum power 74 dBA
- Suburban or city vehicle
 - Without air conditioning 74 dBA
 - With air conditioning, maximum power 76 dBA

Figures 2.30 and 2.31 show where microphones are located to measure internal noise.

Figure 2.30 (Cursor 8 engines)

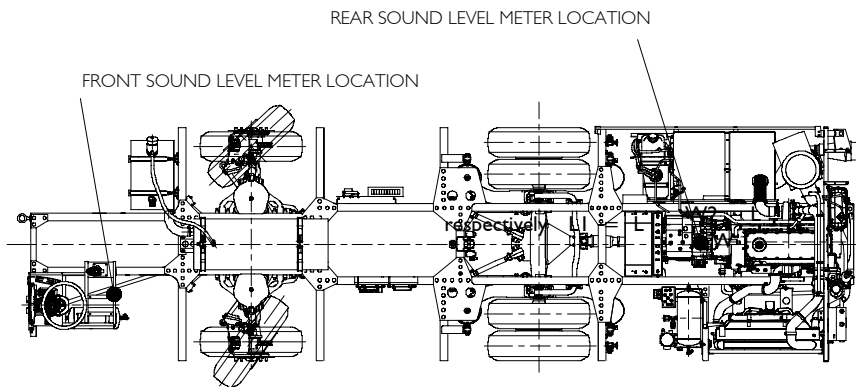
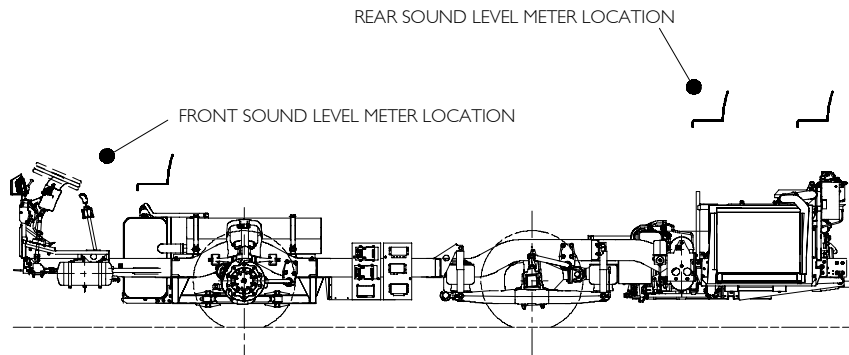
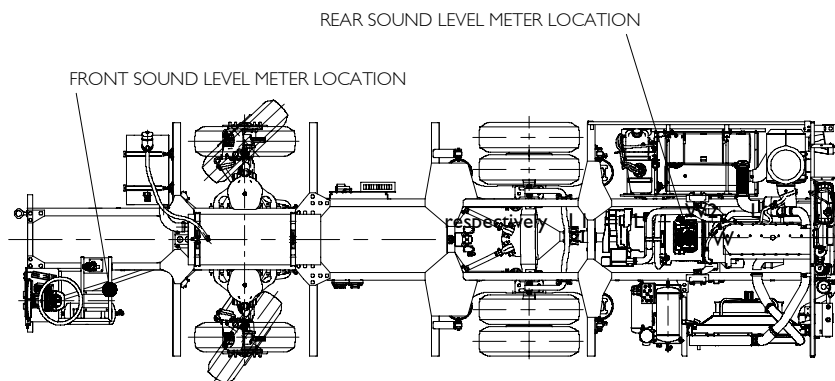
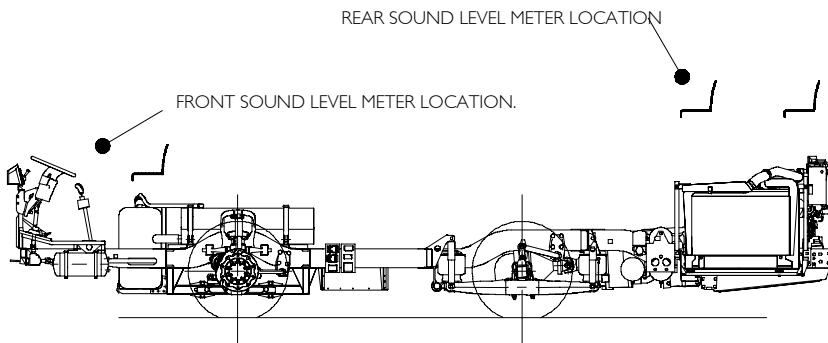


Figure 2.31 (Cursor 10 engines)



2.17.3 Soundproofing

The insulation should be as homogeneous and regular as possible, avoiding interruptions.

It is very important that flaps or service doors that communicate the passenger compartment with the engine, gear, cover areas, etc., are well sealed.

The engine compartment walls can have three insulating elements:

- A) Board with an interposed layer of insulating material (Septum or similar).
- B) Heavy mixture, to be fixed to the walls of the compartment metal plate. It will have a minimum surface weight of 5 kg/m².
- C) Sound-absorbing material, fixed over the heavy mixture or the structural wall, 30 mm thick, which must comply with the specifications defined on tables I or II.

The walls of the engine compartment separating it from the outside (side and rear walls) must have a heavy mixture layer joined directly to the plate and covered with sound-absorbing material as soundproofing cover. According to definitions B) and C).

For the lower acoustic enclosure, take into account that it should not obstruct the air outlets of the radiator cooling system. It is advisable that the enclosure only affect the area under the engine and, if necessary, the right area of the engine. Avoid covering the bottom radiator so that its outlet is as free as possible.

In case of doubts, request the coating type-approval from the IVECO Bus Engineering Dep., which will carry out tests, charged to the applicant.

If the walls separating the engine compartment from the vehicle interior are made of board with Septum, they will be covered with sound-absorbing material on the engine side, according to definition C). If these walls are very close to the engine (vehicles with a floor level of 800 mm or less) it may be necessary to include also a heavy mixture under the sound-absorbing material. If these walls are made of sheet, their coating must be the same as the one described for the walls separating from the outside in the previous section.

The service doors in the engine compartment must comply with the general specifications defined for walls.

To cover the floor, the service doors on the floor and openings for doors and steps, it is advisable to use a 15 mm thick board minimum, with an interposed layer of Septum.

The step hole fixings should not have slots or cracks which allow noise getting in. The same applies to the area under the doors.

To comply with the 80+1 dBA outdoor noise standard, it may be necessary to cover the lower part of the engine compartment.

To that end, the Body builder can request the optional "03590 engine acoustic enclosure" If the optional feature cannot be used due to bodywork characteristics, you can build your own enclosure version bearing the following points in mind:

In this case the lower acoustic closure will be made up of:

- Structural part. It must be removable, made of plastic, steel sheet, aluminium sheet, etc.
- Heavy mixture with a thickness depending on the mass of the structural material so that both together make up a minimum surface density of 10 kg/m².
- 15mm-thick sound-absorbing material which complies with the specifications on tables I or II.
This material must also be protected against potential fluid leakage coming from the engine (oils, diesel fuel, coolant).

For the lower acoustic enclosure take into account that:

- It should not obstruct the air outlets of the radiator cooling system.
- It should not interfere with the discharge pipe of the engine deareator.
- It should have a bore with an approximate diameter of 150 mm to access the engine oil outlet. This bore will be generally covered with an aluminium cap with an internal coating of sound-absorbing material, easy to use when draining engine oil, and holes with a diameter of 25 mm to drain fluids.

Find below a list of materials with soundproofing characteristics which have been tested at IRISBUS laboratories. Using these materials guarantees the specified results will be obtained.

All the materials used must comply with the specifications at point 2.14.4., regarding fire protection. Make sure that the elements fixing the insulating or sound-absorbing materials are durable enough, will not become detached and touch hot parts or moving components. It is advisable the use of good quality adhesives or metal meshes or other retaining devices.

TABLE I		TABLE II	
Measurement in reverberation room wo/ DIN 52215 standard		Measurement in Kundt's tube wo/DIN 52212 standard	
Thickness 30 mm		Thickness 15 mm.	
Octave band	Absorption coeff.	Octave band	Absorption coeff.
125	0.18	125	0.06
250	0.3	250	0.08
500	0.7	500	0.17
1000	0.9	1000	0.32
2000	0.95	2000	0.64
4000	0.98	4000	0.80

Figures 2.32 and 2.33 show where sound insulation is located in all vertical walls of the engine compartment.

Figure 2.32 (Cursor 8 engines)

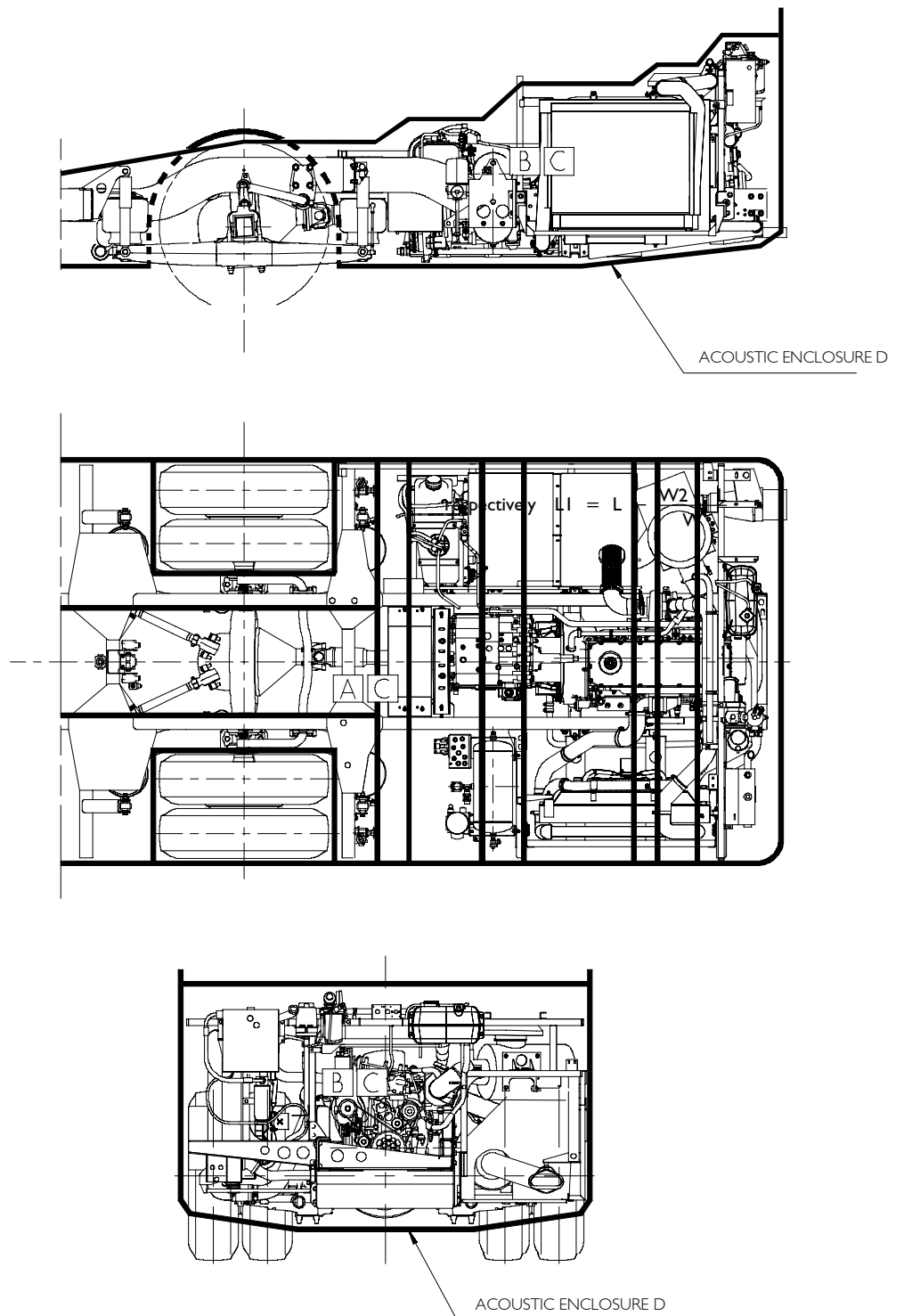
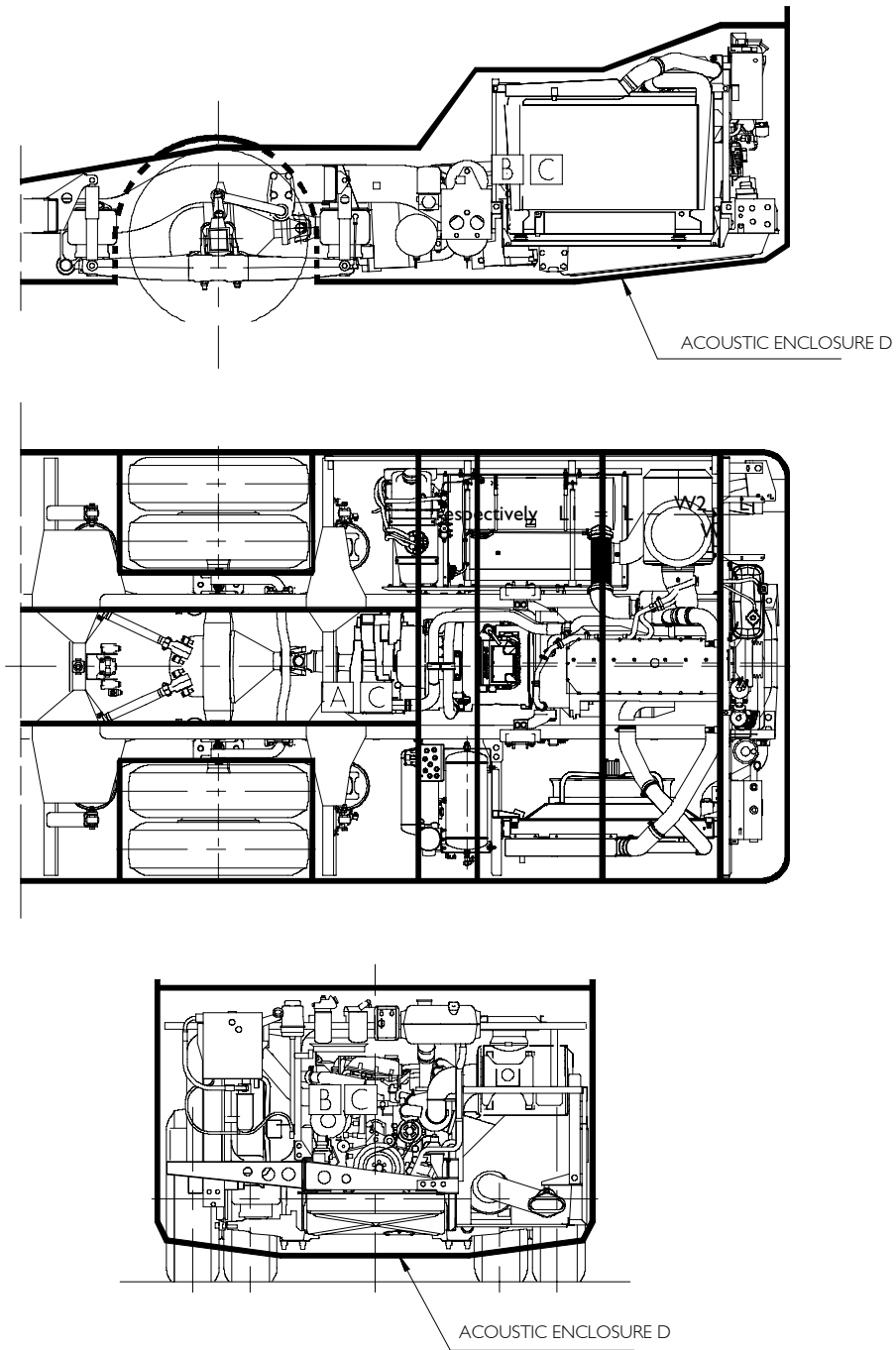


Figure 2.33 (Cursor 10 engines)



2.17.4 Thermal insulation

The most critical points from the point of view of thermal insulation are the points where operating temperature is higher:

Turbo, manifold and exhaust pipes, silencer and the electrical retarder rotors.

When an organic material element of the bodywork is so close to one of these critical points as to reach a temperature higher than the admissible one, protect such part by means of a layer of insulating felt covered with an aluminium sheet able to endure a set temperature of 250 °C and a maximum conduction coefficient of 0.1 W/m²K. In any case, the minimum distance between a critical point and the insulation will be 80 mm at least.

When the available space is limited, especially to protect the polyamide piping and the electrical wiring harnesses, it is advisable to shield them by means of an aluminium plate with sandwich insulation. The plate must have a conduction coefficient equivalent to the felt coefficient value. Between the protected component and the shield there must be a minimum distance of 20mm. See section 2.14.4.

In order to keep a comfortable temperature inside the vehicle, the sound insulating material located in the gear and engine compartment must have a minimum conduction coefficient of 0,08 W/m²K and a minimum operating temperature of 85°C. The correct arrangement of the soundproofing-thermal insulating material must cover all the distance surface between the engine compartment and the interior, also covering steps, walls and any other surface which may let heat in.

In areas that do not require sound insulation, such as the area close to the electrical retarder, insulation with polyurethane foam with similar characteristics to the ones described before is allowed.

Some points are not critical from the point of view of heat transmission, but must be taken into account to keep them away from the bodywork components or installations which can be damaged by an excessive temperature. The most important are:

air duct from turbo to intercooler, air compressor and outlet pipe, crankcase and engine block, coolant pipes.

2.17.5 Cold weather insulation

Vehicle insulation for cold weather conditions must guarantee that the engine cooling water temperature must not drop below 80°C under regular operation.

The thermostat integrated to the heating circuit, with an triggering temperature of 68° ± 2°C ensures correct engine operation. In cold weather it may be necessary to close the engine compartment in order to keep heat for heating. Closing the compartment must be done according to figures 2.32 and 2.33 and consists of the following insulation areas:

- Side Walls.
- Rear.
- Division walls of the engine compartment inside the vehicle.
- Lower closing. (Acoustic Enclosure D in figures 2.32 y 2.33).
- Front Wall. Its arrangement must show a 30 mm clearance approximately with the change in order to allow the engine suspension movements.

Both materials and their arrangement must comply with the specifications in sections 2.17.3. (Those insulations which also act as soundproofing) and 2.17.4 in all cases.

It is advisable that the insulating panels be partially movable so that they can be removed to facilitate engine cooling in summer.

If the engine works with less than 80°C or the water for heating is not enough despite the insulation, a pre-heater should be installed (pre-heater fitting mandatory when the vehicle works regularly at a temperature below 0°C) Figure 2.34 shows the recommended fitting layout; always follow the instructions of the pre-heater manufacturer; in case of any doubt, contact IVECO The minimum pre-heater power must be 25000 kcal/hour.

Once the engine insulation is defined, it is necessary to measure its efficiency and to time it, if required.

Two tests will be carried out; one for the cooling system capacity, the other for the heating capacity.

Cooling capacity test:

Test conditions

- Engine rpm: 1300 approx.
- Power: maximum at given rpm.
- Duration: enough to stabilize temperatures
- Engine thermostats locked in open position
- Cooling fan with clutch locked so that it is continuously working
- Insulating movable panels in open position.

Measurements:

- | | |
|------------------------------------|------|
| – Cooling water temperature | WT |
| – Ambient air temperature | AT |
| – Engine oil temperature | Eot |
| – Engine shock mount temperature | EmT |
| – Engine compart. max. temperature | maxT |

Maximum values allowed:

- WT - AT = 65 °C
- Eot - AT = 90 °C
- EmT - AT = 45 °C
- maxT - AT = 55 °C

Heating test.

Measurement conditions. Motorway and mountain roads combined, with an ambient air temperature close to the minimum that can be reached give in the weather the vehicle has been designed for.

Measurements:

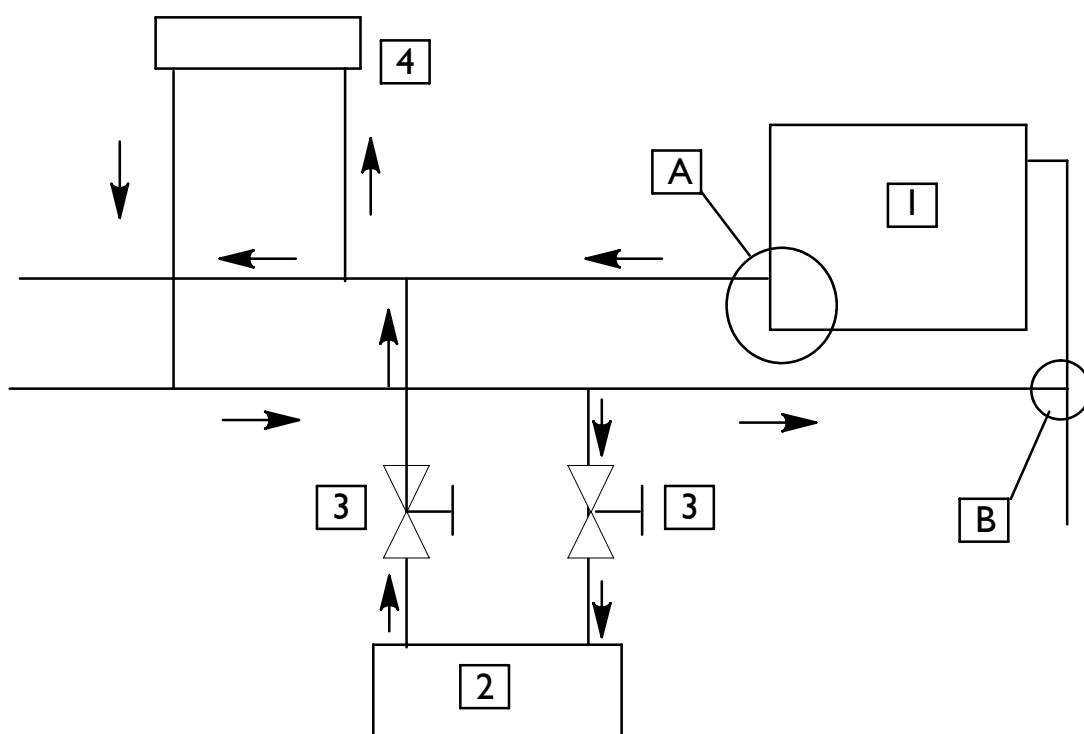
Engine water temperature. Temperature inside the passenger compartment.

Values allowed:

engine water temperature must never drop below 80°C. The internal temperature must never be below 18 °C. As a consequence, the heating system will be defined depending on outdoor working temperature of the vehicle.

After the tests, it may be necessary to time both insulation and the heating system. Increase heating power or insulation if testing temperatures for the heating system are low, or increase the air flow and decrease insulation if the temperatures obtained when testing the cooling system are too high. It is advisable to inform IVECO of the results obtained at the tests and consult about any possible modifications in timing.

Figure 2.34



Water pre-heater mounting layout

I. ENGINE - 2. PRE-HEATER - 3. COCK - 4. HEATER HEATING

- A. HEATING WATER OUTLET (See point 2.8.16, Figures 2.22 - 2.23 - 2.24 (Cursor 8 engines) and 2.25 - 2.26 - 2.27 - 2.28 (Cursor 10 engines))
- B. HEATING WATER RETURN (See point 2.8.16, Figures 2.22 - 2.23 - 2.24 (Cursor 8 engines) and 2.25 - 2.26 - 2.27 - 2.28 (Cursor 10 engines))

2.18 TEST DRIVE BY BODY BUILDER

Before starting the functional test, carry out the following checks, with the vehicle at a standstill:

- Tyre pressure, engine oil levels, gear and bridge, clutch fluids, brakes and steering, cooling water from booster pump, suspension heights, maximum braking pressures at each axle and maximum at tanks, discharge pressure in the pressure regulator; make sure to keep pneumatic circuit pressures, parking brake operation.
- Door operation, emergency buttons sensitivity, check lights, windscreen washer and wiper and horn.
- External lights : position light, dipped headlights, road lights, blinkers, brake lights and reversing gear light, engine start-up disconnection from the rear compartment, battery charge level and status.
- Bodywork alignment with the chassis.
- No obstructions in the steering controls, flywheel and wheel turning.

Ride 50 km along varied roads (flat ground, bends, slopes and sections with irregular road surface), check the following parameters:

- During regular vehicle operation no vibrations or anomalous sounds are produced, deriving from gear, bridge, transmission and any other chassis or bodywork units.
- The gear shift operates correctly, gears are engaged normally, no jamming or disconnections are produced in the version with automatic gear.
- Brakes are sensitive, progressive and no excessive efforts are needed to push the pedal. Once once the regulator discharge is finished, all the warning lights must be off.
- System operation. Check that no failure message is displayed and that no relevant hazard or warning indicators is on.
- Retarder operation, Telma, Intarder or integrated to the automatic gearbox; the must have a short time response and its action must be progressive at each actuation points.
- Speed limiter operation, check that it limits to the correct speed and that its operation does not cause tugs.
- Emergency button operation pursuant to Regulation 36, check its operation: linked to the engine, connects the warning and disconnects batteries.
- Tachograph operation and sealing.
- Check the correct operation of the air conditioning installation and the heating system.
- The steering must operate progressively, smoothly, without stops; it must allow to keep the vehicle running in a straight line without the need to make continuous corrections. It will allow to have full control over the vehicle even in rough manoeuvres.
- Steering circles according to Regulation 36.
- Bodywork tightness test, passage along a water arch.
- Outdoor and internal noise level check.
- Controls and panel ergonomics check:
 - Gear lever: paths, hardness, interferences with panel and seat.
 - Seat position adjustment, access to controls and pedals.
 - Access to pedals and operation difficulty.
 - It must be possible to adjust the height and angle of the steering wheel The clutch lever must operate progressively.
 - Instrument panel: visibility, correct operation of light and sound indicators, visual interferences with the steering wheel, brightness and lighting.
- At the end of the travelled distance, check for potential water, oil, diesel fuel and brake fluid leakage, steering and clutch fluid leakage.
- Check and tighten again the wheel nuts to 599-732 Nm.

2.19 BODYWORK ELECTRICAL INSTALLATION

The electrical installation supplied together with the chassis is the one required for its operation, there are no load variations nor modifications in the lines.

A written permit from IRISBUS Bus Quality Department is needed for the Body builder to modify any of the points mentioned before. Should it be necessary to shorten or lengthen the battery cables, keep the same original characteristics, regarding terminal dimensioning, protective sheaths and cable sections.

The specific location of batteries, manual and electromagnetic isolating switch requires fitting of a fuse holder box to connect and protect power supply cables to the relay and junction box supplied with the chassis with an 80A fuse in the cable connected to the electromagnetic isolating switch output, and another 50A fuse connected to the input of the same switch.

The electric lines that the Body builder adds for the operation of electrical elements must comply with the following requirements:

- All the wirings will be sheathed with fireproof and self-extinguishing plastic pipes.
- These sheaths will cover a stretch as close as possible to the connection point.
- The conductors will have the appropriate section to comply with the requirements of voltage drop and maximum current density. The minimum section will be 1 mm².
- All the circuits will be protected with fuses, which these together with the relays used will be found in a box that ensures their protection. Stick a diagram of the internal circuit on the cover of this box.
- Circuit layout and fitting will be adequate to keep them away from any moving component of the vehicle that could damage them- pulleys or any other rotating part, suspension or steering wheel components, battery carrier, etc.

2.19.1 Rear light connection

The connectors located in the chassis rear part will be used to connect the rear pilot lights.

Right rear connector.

<u>Path No.</u>	<u>Cable No.</u>	<u>Function</u>
1	1454	BLINKER
2	1733	FOG LAMP
3	9842	EARTH CONN.
4	1569	POSITION LIGHT
5	1557	REVERSING LIGHT
6	1329	STOP LIGHT

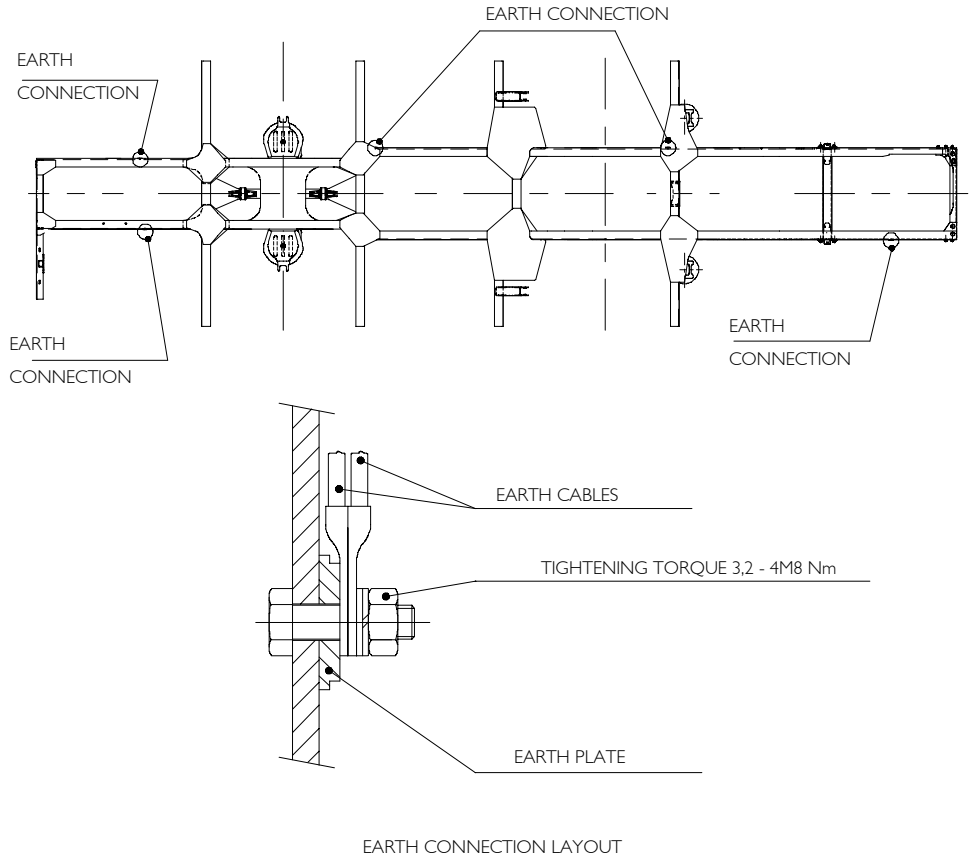
Left rear connector

<u>Path No.</u>	<u>Cable No.</u>	<u>Function</u>
1	1453	BLINKER
2	1733	FOG LAMP
3	9841	EARTH CONN.
4	1570	POSITION LIGHT
5	1557	REVERSING LIGHT
6	1467	STOP LIGHT

2.19.2 Earth connection distribution on chassis

In case that the bodywork installations need chassis earthing, the already fitted earth connections can be used; the Body builder should always respect the tightening torque and the maximum contact surface. (See figures 2.35)

Figure 2.35



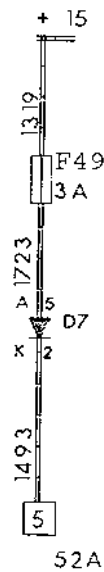
2.19.3 Bodywork connector 52A and 51B. Connection standards

Find below a description of vehicle signals and how to handling them for correct operation, available for the Body builder.

2.19.3.1 +15 A With keyswitch (Output)

Signal at connector 52A path 5. +24V is supplied through the keyswitch for use by the Body builder. This output is protected by the D7 diode and the 3 A F49 fuse.

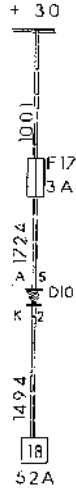
Figure 2.36



2.19.3.2 +30 A Through the battery isolating switch (Output)

Signal at connector 52A path 18. +24V is supplied through the battery keyswitch. This output is protected by the 3 A F17 fuse and the D10 diode.

Figure 2.37

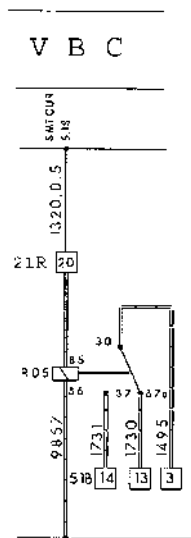


2.19.3.3 D+ Engine running signal (Output)

The Body builder is provided with 3 Volt-free contacts for use. The contact that includes relay terminals 30 and 87 is closed when the engine is off. The contact that includes relay terminals 30 and 87 remains closed when the engine is running.

Maximum charge between contacts		
Charge type	30-87a (A)	30-87 (A)
Lamp	1.4	2
Inductive	6	15
Ohmic	10	20

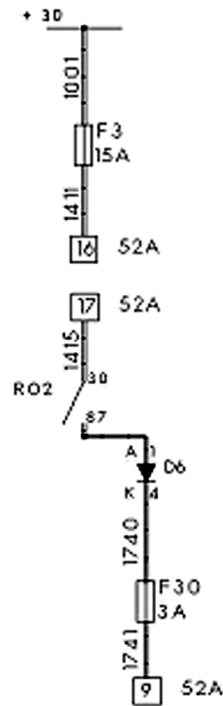
Figure 2.38



2.19.3.4 Engine start-up (Output)

This signal is at connector 52A path 9. It is protected by diode D33 and fuse F30. This signal supplies +24V when the conductor starts up the vehicle. The body builder maximum charging current should not exceed 1 A.

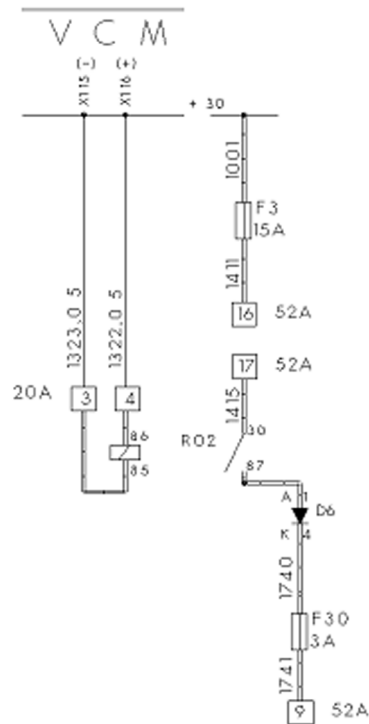
Figure 2.39



2.19.3.5 Engine Start-up Disabling (Input and Output)

Available to the Body builder: path 16 of the 52A connector (+24V output) and path 17 of the 52A connector (+24V input) to be used for the Engine Start-up disabling system. The Body builder will need to install his own system to disable start-up between these paths. The cable found in the 52A connector counter-part must be previously removed.

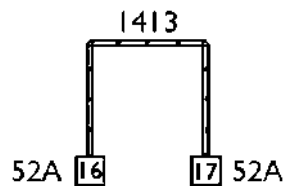
Figure 2.40



2.19.3.6 Jumper between body builder connector

In case the Immobilizer is used, the Body builder will remove the jumper and add the appropriate signal to each path.

Figure 2.41



2.19.3.7 Safety main control when connected (Output)

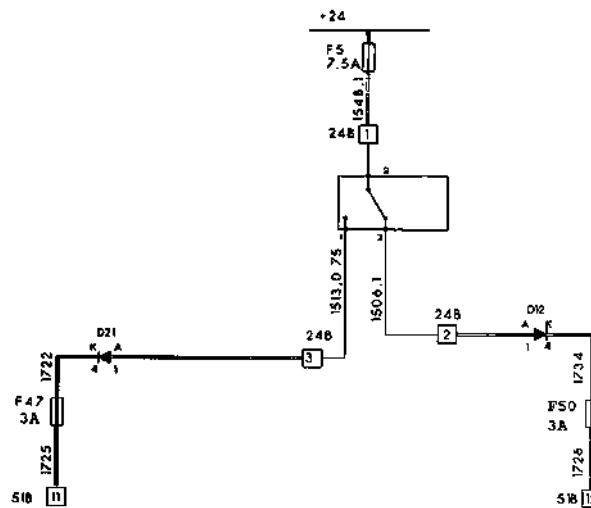
This signal at connector 51 B, path 11. +24V is supplied, protected by D21 diode and F26 fuse. Once the conductor has enabled the switch of Regulation 36, +24V will be directly supplied from battery. The body builder is allowed a maximum charge of 1A.

Note: According to Regulation 36 the body builder must never use this output to supply any kind of control unit or any other device. This output is only a representation of the status of the Regulation 36 switch.

2.19.3.8 Safety main control when not connected (Direct from Battery) (Output)

Signal at connector 51 B path 12. +24V is directly supplied from the battery provided that the switch of Regulation 36 is disabled. This output is protected by D12 diode and F50 fuse. The body builder maximum charging current should not exceed 1 A.

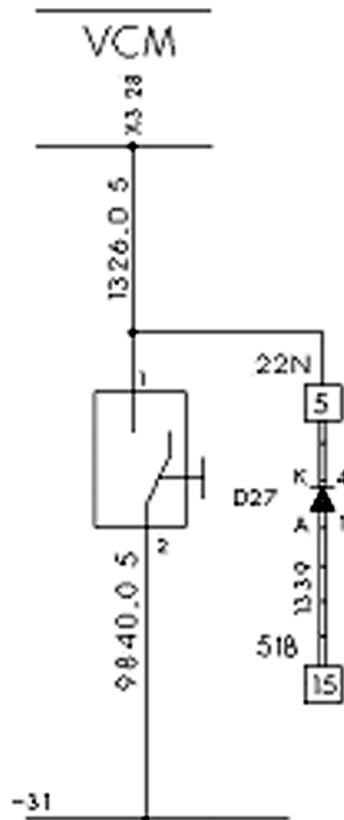
Figure 2.42



2.19.3.9 Parking Brake enabled (Output)

This signal is available for the body builder at connector 51 B, path 15. This output is protected by diode D33. There is an earth connection when the Parking brake is enabled. The body builder maximum charging current should not exceed 100 A.

Figure 2.43



2.19.3.10 Windscreen wiper function and Windscreen washer pump

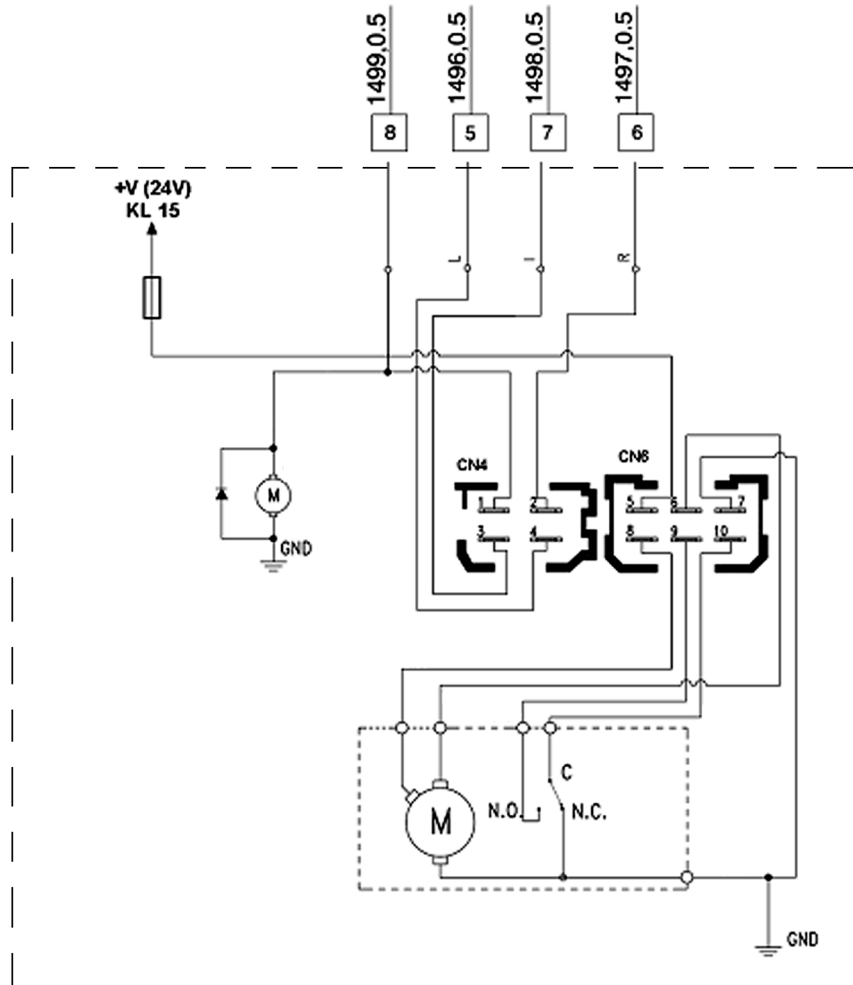
The Body builder is provided with a unit for interface with the windscreen wiper motor and the windscreen washer pump.

The CN6 connector must be connected to the windscreen washer motor. The path 5 of this connector must be connected through a fuse and afterwards the switch key, to the vehicle power supply. The CN4 connector must be interfaced with the 51 B connector which has the following functions: 51 B path 5 (to CN4, path 4) to enable windscreen wiper at low speed. 51 B, path 6 (to CN4, path 2) to enable windscreen wiper at fast speed. 51 B path 7 (to CN4, path 3) to enable timed windscreen wiper functioning. It produces a pulse every 5 seconds.

51 B, path 8 (to CN4, path 1 and windscreen washer pump) to enable the windscreen washer pump and the windscreen wiper. Once the windscreen washer pump has stopped, the windscreen wiper keeps sweeping 3 times before stopping.

It is compulsory to fit a protective diode in inverse connection, parallel to the pump power supply. The windscreen wiper motor and the windscreen washer pump must be connected to negative.

Figure 2.44



POS	FUNCTION
1	Wash In
2	Fast In
3	Intermittent In
4	Slow In
5	15 (+24V)
6	Slow Motor Output
7	31 (GND)
8	Fast Motor Output
9	Positive Motor Output
10	53s Motor Feedback

2.19.3.11 LH/RH Front and side blinkers (Outputs)

Left front blinker: signal at connector 52 A, path 6. EARTH is supplied to connect the blinker bulb.

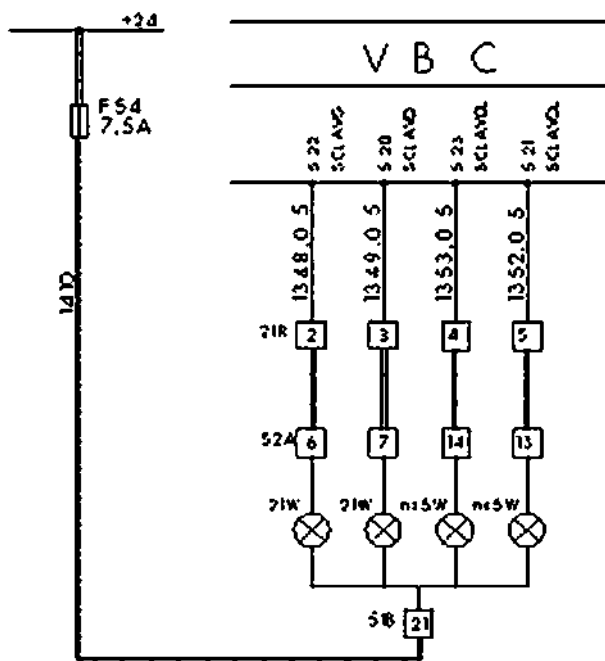
Right front blinker: signal at connector 52 A, path 7. EARTH is supplied to connect the blinker bulb.

Left side blinkers: signal at connector 52 A, path 14. EARTH is supplied to connect the blinker bulbs.

Right side blinkers: signal at connector 52 A, path 13. EARTH is supplied to connect the blinker bulbs. The VBC control unit supplies 1.5 amp per output

The power supply positive of the blinker bulbs is placed at connector 51 B, path 21. +24 V is supplied protected by the 7.5A, F54 fuse.

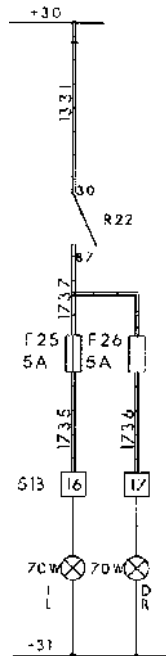
Figure 2.45



2.19.3.12 LH/RH Dipped Headlights (Output)

The left Dipped Headlight is at connector 51 B, path 16. It is protected by the 5A, F25 fuse and +24 V is supplied.
The right Dipped Headlight is at connector 51 B, path 17. It is protected by the 5A, F26 fuse and +24 V is supplied.

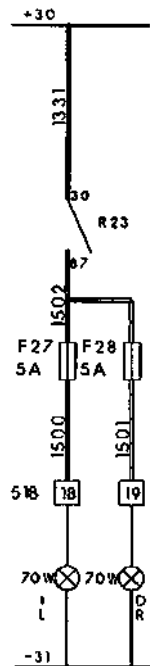
Figure 2.46



2.19.3.13 LH/RH Dipped Headlights (Output)

The left Main Beam connection signal is at connector 51 B, path 18. It is protected by the 5 A, F27 fuse and +24V is supplied. The right Main Beam connection signal is at connector 51 B, path 19. It is protected by the 5A, F28 fuse and +24V is supplied.

Figure 2.47

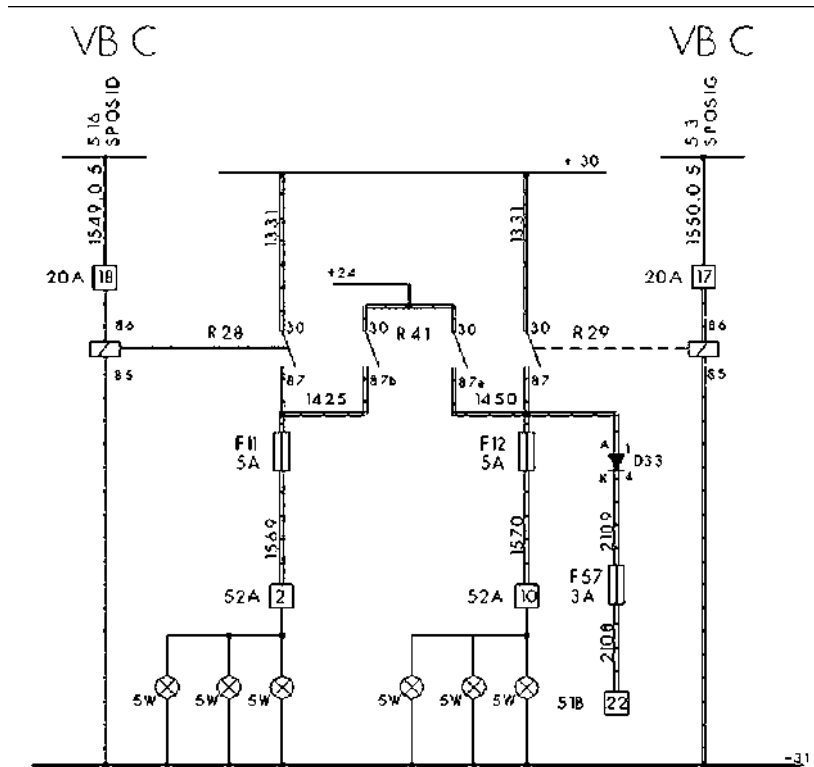


2.19.3.14 LH/RH Front Position and Clearance Lights (Output)/ Front Position Light Signal

The right Position and Clearance Lights are at connector 52A, path 2. It is protected by the 5 A, F11 fuse and +24V is supplied. The left Position and Clearance Lights are at connector 52 A, path 10 and +24 V is directly supplied from battery. It is protected by 5 A, F12 fuse. Front Position Light signal.

The front position light signal to be used is the one at connector 51 B, path 22. The Body builder maximum charging current should not exceed 1A.

Figure 2.48



2.19.3.15 Reversing Light (Output)/ Reversing Signal

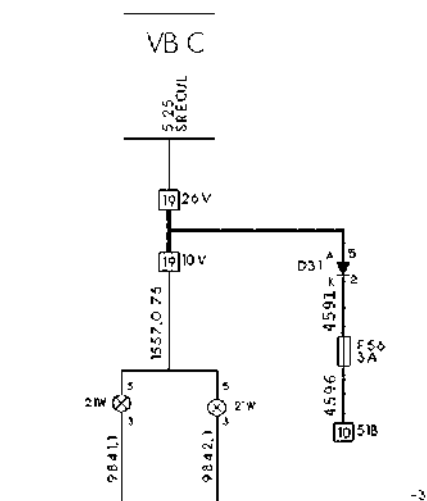
To connect Reversing Lights, paths 5 and 3 of every connector placed in the chassis wiring harness and marked as RIGHT REAR PILOT LIGHT and LEFT REAR PILOT LIGHT must be used. The light bulbs maximum power should be 21W for each one.

Reversing Signal

The signal at connector 51 B, path 10 should be used as reversing signal.

The Body builder maximum charging current should not exceed 1 A.

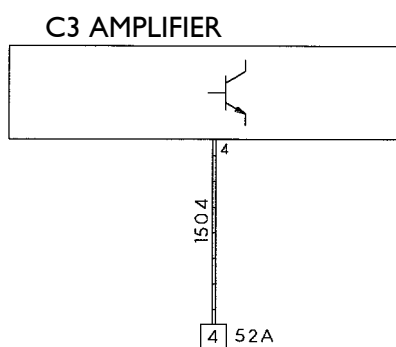
Figure 2.49



2.19.3.16 B7 Tachograph signal (Output)

The B7 signal given by the tachograph is available for the Body builder. Such signal is at connector 52 A, path 4. The Body builder maximum load current should not exceed 5 mA.

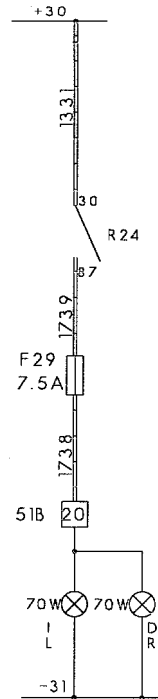
Figure 2.50



2.19.3.18 Front fog lights (Output)

The signal to connect the front fog lights is at connector 51 B, path 20. This output is protected by the 7.5 A, F29 fuse and +24 V is supplied.

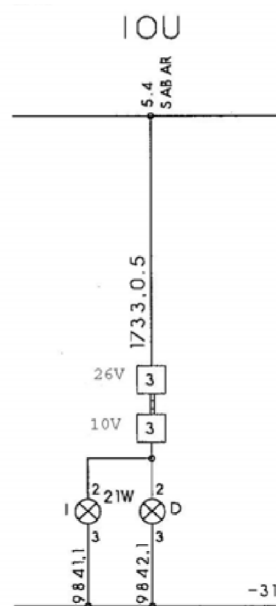
Figure 2.52



2.19.3.19 Rear Fog Light (Output)

To connect Rear Fog Lights, paths 2 and 3 of the connectors placed in the chassis wiring harness and marked as RIGHT REAR PILOT LIGHT and LEFT REAR PILOT LIGHT must be used. The light bulbs maximum power should be 21W for each one.

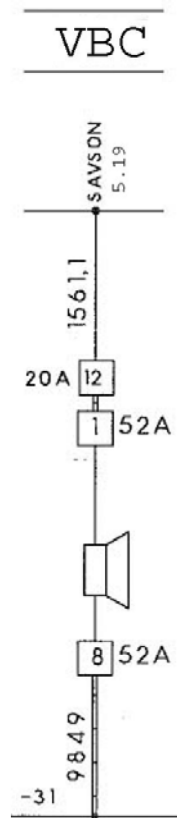
Figure 2.53



2.19.3.20 Horn (Output)

Two signals are provided to connect the horn. Control unit +24 V is supplied in connector 52 A, path 1.

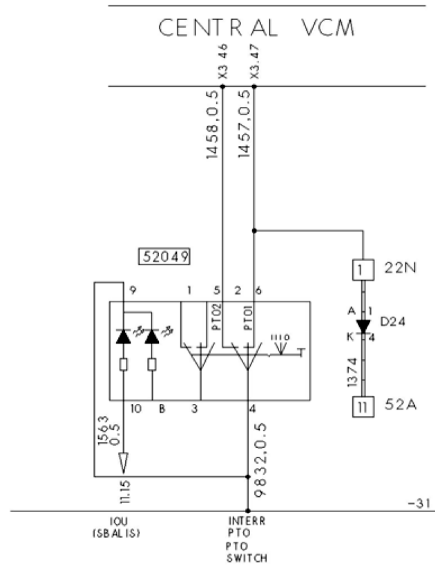
Figure 2.54



2.19.3.21 Idle RPM increase with Active Air Conditioning (Input)

The Body builder must provide an earth connection to connector 52 A, path 11 when the air conditioning system is started. Thus, engine idle speed will be increased from 600 to 800 rpm.

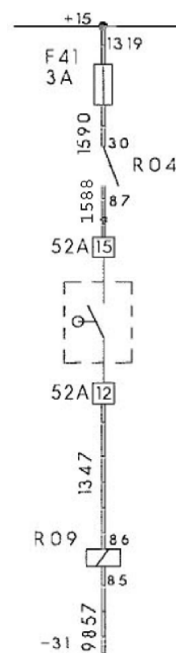
Figure 2.55



2.19.3.22 End of travel with open doors (Input)

The Body builder must provide a no-voltage contact between paths 15 and 12 of connector 52 A, which will close when either front, rear or central doors are opened. Such contact must remain open when the doors are closed. If there is no connection in this signal, neither the Stop brake system nor the accelerator pedal inhibition function will work, with open doors. Besides, the driver could accidentally enable some ELF function.

Figure 2.56



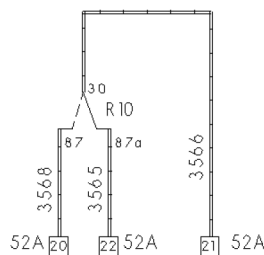
2.19.3.23 Doors Opening Inhibition Contact with Started up Vehicle (Input)

A Normally Open contact and a Normally Closed, and No voltage contact are available for the Body builder, who must include them in the doors opening circuit so that they cannot be accidentally opened while the vehicle is moving. These contacts operate as follows:

The contact at connector 52 A, path 21 and 22 is managed by the VBC through relay R10. When the vehicle speed is below 3 km/h, this contact remains open. The contact at connector 52 A, path 21 and 20, is managed by the VBC through relay R10. When the vehicle speed is above 3 Km/h, this contact remains closed. Over that speed, the contact between paths 21 and 20 of connector 52A remains open, and it should not be possible to open the vehicle doors.

The Body builder must include this contact in the doors opening circuit mounted on the board. Such contact must never be included in the vehicle external emergency switches. The maximum current in R10 contacts should be 10 A.

Figure 2.57



2.19.3.24 Steam free mirrors (Input)

The Body builder must connect + 24 V at connector 52 A, path 3. The Body builder must provide a +24 V signal when the steam free mirrors are connected to activate the telltale control lamp on the instrument panel.

Figure 2.58

