

Safety Regulations (Europe)

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Safety Regulations for Restraint Systems

General

- Operations on restraint systems must be performed by trained and qualified personnel certified by valid national legislation. This is assured at all certified GM dealerships.
- The restraint system incorporates the following components:
 -
 - Driver and passenger airbag
 - Side airbag
 - Curtain airbag
 - Knee airbag
 - Beltâ€™s belt buckle tensioner with seat belt
 - Airbag and restraint system control units
 - Airbag and restraint system sensors
 - Mounting plates for airbag and restraint system sensors
 - Airbag contact unit
 - Steering column electronic module
 - Airbag and restraint system wiring harness, with yellow identification
 - Sensor padâ€™s passenger presence sensor
 - Airbag and restraint system warning lamps
- The handling of pyrotechnic unitsâ€™s (airbag and pyrotechnic seat belt tensioners) is subject to various national legislation which must be observed at all times.
- Versions with a driver's airbag can be identified by the "Airbag" logo.
- Versions with a passenger's airbag can be recognized by the inscription "Airbag" above the instrument panel compartment and by the circular child seat warning label on the right side of the instrument panel (passenger's door open) or by the rectangular warning label on the sunshade.
- If, despite equipped with a passengerâ€™s airbag, there is no label at the corresponding points, one must be applied by a certified GM workshop if there is no indication on the sunshade.
- The issuance of loose warning label to private customers is not permitted.
- Versions with a side airbag can be identified by the "Airbag" inscription on the outside of the front seat backrests. Versions with a curtain airbag can be identified by the lettering "Airbag" on the A-â€™s andâ€™s C-pillarâ€™s panelling or theâ€™s B-pillarâ€™s panelling.
- Danger of injury! Service installation of accessories in the deployment area of the airbag and storage of objects on the passenger's airbag cover is not permitted. Consoles for communication devices, cup holders, CDâ€™s cassette trays, additional mirrors, etc., which have not been authorized by GM may be torn off and flung through the passenger compartment when the airbag deploys.
- Objects must kept away from the deployment area of the side airbag, as they may affect the functioning of the side airbag and be flung through the passenger compartment - danger of injury. Only use seat covers approved by GM for the corresponding vehicle type.
- Objects (such as clothing) must kept away from the deployment area of the curtain airbag, as they may affect the functioning of the curtain airbag. Only light items of clothing with empty pockets and without coat hanger are permitted. Objects kept in of clothing may endanger the occupants if the curtain airbag deploys.

- The sale of pyrotechnic units is only permitted to properly authorized third parties in accordance with national legislation.
- Components of the restraint system must never be interchanged or replaced by used parts. Damaged parts must be replaced by an original service part.
- Repair work on restraint system components is not permitted. These components must never be forced open or modified. Repairs of airbag or restraint system covers or trims are not permitted. If damaged, the affected part has to be replaced.
- Restraint and airbag system components are all very sensitive to impacts. They must not be installed if they have fallen or have been dropped from a height exceeding 80 cm (15.75 in).
- Cables connected to gas generators for pyrotechnic units must not be repaired, removed, replaced or cross-connected.
- The airbag units and the airbag control unit must not be subjected to a temperature exceeding 85°C (185°F) also for short periods.
- Always disconnect the ground cable from the battery when performing welding or brazing operations on the vehicle. Always attach the ground cable of the welding equipment to the immediate vicinity of the welding point.
- For brazing or welding operations in the immediate vicinity of sensitive components (such as electrical/electronic/pyrotechnic components, control units, wiring harnesses, and airbags), the components must be removed.
- For brazing or welding operations on front doors or door pillars/B-pillars in the vicinity of the side airbag sensor (vehicle specific), this must be removed (store in a dry and safe place). For minor installing or body operations (for example no use of slide hammer) in this area, switching ignition OFF suffices. Remove the ignition key and keep in a safe place during the repair operation.
- Pyrotechnic units may only be purchased, transported and stored, according to safety regulations, by trained personnel of a certified GM dealer or authorized GM service dealership.
- Pyrotechnic units may be returned only if one of the following four conditions has been fulfilled:
- - Incorrect deliveries
 - Electrical defect (for example determined by a scan tool)
 - Electromechanical defects (such as damaged retaining tabs or damaged wiring harness plug housing)
 - Visual damages (such as cover panel scratched or damaged)
- The units must be returned in the original packaging only. If this is not available, it must be ordered.
- When returning pyrotechnic components and/or ordering original packaging, the standard order and return process should be adhered to.
- For vehicle repairs requiring longer periods of time, non-activated, removed airbags must be stored under lock and key. Storage with other hazardous materials (such as paint) is prohibited. The storage area must identified with the corresponding hazard symbol and contain suitable fire prevention equipment.
- Fully deployed pyrotechnic units can be disposed as residual waste.

Diagnosis

- If the pyrotechnic units are fault-free the airbag warning lamp must illuminate when the ignition is switched on and go out again after about four seconds. If the light does not go off or it comes on while operating the vehicle, there is a fault.
- The system must only be tested using a correct and GM approved scan tool.
- During the diagnosis or programming of restraint systems, the following sequence must be followed:
- 1. Make sure the ignition is OFF
 2. Connect the scan tool to the on board diagnostic connector (OBD)
 3. Turn the ignition ON

4. Note:

During diagnosis or programming (the period between switching on and switching off the scan tool) no persons are permitted to occupy the vehicle.

5. Start the scan tool

6. Select system, follow menu

7. De-select system

8. Note:

If it is not possible to exit the "Airbag" menu the ground cable must first be disconnected from the battery and the battery negative terminal covered. Wait for one minute until the capacitor in the airbag control unit has discharged.

9. Turn off the scan tool

10. Turn the ignition OFF

11. Disconnect the scan tool from on OBD-connector

- If there are no diagnostic trouble codes (DTC) in the airbag or restraint system, a diagnosis in the vehicle (such as seat occupied detection test) is permitted
- Vehicles with active DTC must not be handed over to the customer - danger for occupants.
- In order to prevent unintentional deployment, never use a test lamp or multimeter to perform measurements on the pyrotechnic units - danger of injury.
- Connections for pyrotechnic units and control unit must be disconnected when using a multimeter to check the wiring harness - danger of injury.
- If there is bodywork damage in the vicinity of the front airbag sensors, inspect the securing panels and replace if damaged.
- Always replace damaged parts.
- If the pyrotechnic belt buckle tensioners are deployed in an accident, these must be replaced by new components.
- Control units may only be re-used if fault-free.
- When checking and replacing the seat belt system (seat belts with guide rollers and belt locks) after accident damage, the following three different cases must be taken into account:
 - - 1. Very slight accident damage: (minor accidents, such as parking damage). No checks or replacements are necessary in these cases.
 - 2. Following minor accident damage (such as seat belt tensioner not deployed), check ease of unwinding and check belt buckle operation; there must be no damage to the seat belt (such as tears, shiny areas caused by overstretching) - otherwise replace the affected component. The same applies to ISO-fix mounting systems and additionally to child seat belt systems. If damaged, the child seat must be replaced!
 - 3. For other accident damage in general, replace the respective seat belt system that has been burdened by a person or child seat during an accident. Belt systems must also be replaced if it is subsequently impossible to conclusively determine whether they were burdened. These measures must be carried out in all cases where a seat belt tensioner has been deployed or where side damage has occurred. The same applies to the ISO-fix mounting systems. The same also applies to child seat belt systems. Otherwise replace the child seat. Non-burdened seat belts should be tested as described in step 2.
- Steering wheels with an inflatable restraint module may be only replaced with steering wheels approved by GM.
- Always put airbag units down with the padded side facing upwards.
- Always transport or carry the airbag or restraint units with the padded side facing away from the body.
- The impact cushion of the steering wheel and the instrument panel padding may not be glued or otherwise altered. Under no circumstances cleaning agents (aggressive materials) or grease must be used - clean with a dry or moistened cloth and using a cleaning agent approved by GM only.
- Before installation, check once more that the ground cable is disconnected from the battery, the negative terminal is covered and the ignition

key is in the OFF position.

- After completing work on restraint systems, connect the battery negative cable. No persons must be present inside the vehicle.
- Disconnecting the ground cable from the battery automatically erases the contents of certain electronic system memories (such as electric window, power sunroof). After reconnecting the ground cable to the battery, these volatile memories must be reprogrammed.

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Safety Regulations for Paint and Coating

Safety Regulations for Painting Operations

General

- In order to protect electronic components and plastic parts, a temperature of 80°C (176°F) [Ampère/Volt, Speedster/VX220 60°C (140°F)] must not be exceeded during drying operations in painting facilities.
- Protect natural gas system components [Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG)] from direct heat (such as incident solar radiation) and never allow heating to temperatures in excess of 70°C (158°F) at risk of explosion.
- For repair operations in which temperatures in excess of 60°C (140°F) may be encountered (for example, during paint drying in the combined spray-drying plant, in the paint dryer or when drying with infrared radiation), for gas-powered vehicles, please note the following:
 - CNG: the gas system must be emptied and the tank pressure must not exceed 100 bar (14.5 psi). The pressure can be determined with a scan tool. A nitrogen purge is not necessary.
 - LPG: the gas system must be emptied completely.
- The evacuation procedures can be found in: "Engine Controls and Fuels"
- The compressed air that is used must be free of oil and water particles.
- Process solvent-containing substances either in painting booths or in areas with suitable extraction. Water-based paints also contain solvents. Failure to follow these instructions leads to risk of personal injury, especially respiratory injuries.
- Avoid naked flames. An adequate number of fire extinguishers must be available and routinely serviced.

Breathing Protection

- Use dust masks, active carbon masks or fresh-air masks, depending on the type of operation being performed.
- When dry-grinding, use grinding machines with integral dust-extraction unit.
- Dispose of paint and solvent residues, vacuum unit filter, grinding dust, etc. according to national regulations.

Safety Regulations for Paint Shops

Observed deviations in local orders.

Activities

Remove old paintwork by sanding, degreasing the substrates, puttying and sanding. Mix colors, enforce hardener (two components material), setting to spraying viscosity with thinner, cleaning of equipment. Storage and removal of paint materials application of coatings to vehicle or parts by spray painting (including spot painting), evaporation, dry with circulating air or infrared dryer.

Hazardous Substance Designation

- Paint materials in general: organic solvents (mixtures) such as xylol, butylacetate, ketone, methoxypropylacetate, butanol, isobutanol, test spirit, isopropanol, styrol and amine
- Cover paints (shade-dependent): ketone, rarely: lead (octo) chromate, lead chromate molybdate sulfate, lead sulfate chromate
- Primer/structured paints (product-specific): epoxy resin
- Clear covers: piperidine derivatives
- Two components acrylate hardener: isocyanate
- Peroxide hardener: organic peroxide

- Wash primer: acids
- Putty/polyethylene filler: styrene
- Spray can: propellant gases
- Abrasive dusts (of unknown composition): seldom contains chromate and plumb

Risks to health and Environment

- Follow manufacturer's instructions in safety data sheets and on containers!
- Hazardous to health if inhaled, swallowed, on contact with skin and eyes
- Peroxide hardener: causes burns, irritating to the eyes, respiratory system and skin
- High concentrations of solvent can have an intoxicating effect.
- Risk of fire and explosion on leaks
- Isocyanate: sensitization from inhalation and skin contact possible
- Irreversible damage possible. Risk of cumulative effect.
- For substances containing zinc chromate: can damage the unborn child.
- Materials are hazardous to water, therefore do not allow these to penetrate into the drains or the ground.
- Can cause cancer.

Protective Measures and Rules of Behavior

- Follow the instructions of the professional insurance association!
- Access to unauthorized persons prohibited.
- Fire, naked flames and smoking prohibited.
- Follow explosion protection document and zone classifications.
- Use integrated sanding dust extraction.
- At grinding it is recommended to you to wear a filter mask with minimum protection level P2.
- At grinding of aluminum and its alloys note special requirements for fire and explosion protection.
- Ensure effective room ventilation and extraction of spray fumes.
- Keep a safety distance of 5m (16.40ft) from sources of ignition (risk of explosion).
- Wear safety shoes with conductive soles.
- Wear forced ventilated respirators, only use combifilter with minimum protection stage A2 P2 for short-term working.
- Wear safety goggles.
- Wear appropriate gloves (refer to the safety data sheet) when degreasing and make use of safe.
- When painting, wear appropriate gloves (refer to the safety data sheet) and make use of safe.
- After painting and before breaks, clean hands according to skin protection plan.
- Follow employment prohibitions for lead/zinc chromates (young people, pregnant or breast feeding women) and isocyanates (allergies).
- Directed pressurized nozzle/hose openings never at body parts. Never blow off clothing with compressed air. When cleaning parts with compressed air always wear suitable gloves, safety glasses and ear protection.
- Do not store food, eat or drink in the working area and paint storage
- Let nothing in the drains or the ground

- Keep paint store dry and well ventilated. Keep container tightly closed and protected against falling and spillage. Hold doors and emergency exits free.
- When spray painting in the risk assessment take into account a possible threat to the neighboring workstations.

Action in an Emergency

- Ensure self protection.
- Only fight fire with carbon dioxide (CO₂), foam or powder extinguishers.
- Do not use water!
- If necessary inform the fire service.
- Inform the responsible person.
- Absorb escaped fluids with absorbent agents.
- Do not allow extinguisher agent to enter the drains, bodies of water or the ground.
- Follow the company-specific alarm plan.

First Aid

- Loss of consciousness: Bring the victim to a stable recovery position.
- Inhalation of gases or vapors: Take the victim out of the risk area into the fresh air. On irregular breathing or no breathing, apply artificial respiration.
- Call an emergency doctor.
- Skin contact: Remove wet clothing, wash skin areas concerned thoroughly with soap and water.
- Eye contact: rinse for 15 minutes with plenty of water or use an eye bath with the lid open. Protect the uninjured eye. Consult a medical doctor.
- Swallowing. Do not provoke vomiting.
- Consult immediately a medical doctor and show him the safety data sheets or original containers

Proper Disposal

- Collect waste separately in licensed disposal containers and deliver to a disposal company.
- In the event of leaks, use a suitable absorbent agent (such as wood chips).
- Observe legal regulations in particular recycling laws, and local waste disposal regulations. Check recycling facilities.

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Safety Regulations for Engine, Fuel, and Exhaust Systems

General Information - Engine

- Observe the relevant safety regulations and national legislation for health and work safety regulations regarding explosive and flammable materials.
- Details for handling with cooling fluid:
 -
 - Refrigerant vapors are heavier than air, in high concentrations - danger of suffocation!
 - Refrigerant constitutes a health hazard.
 - Avoid skin contact.
 - Do not let the refrigerant get in contact with the mucous membranes.
 - Do not swallow refrigerant.
- During all operations in the engine compartment, remember that the radiator fan can switch on - risk of injury!
- The fuel system, including the fuel lines, must not be opened while the engine is running - danger to life!
- Never touch high-voltage live components (such as the ignition system) while the engine is running - danger to life!
- Before all operations involving a risk of electrical short circuit, the battery negative cable must be disconnected from the battery.

Repair Information - Engine

- Disconnecting the ground cable from the battery automatically deletes the contents of certain electronic system memories (such as electric window lifter, time and date settings). After reconnecting the ground cable to the battery, these volatile memories must be reprogrammed and audio equipment decoded.
- In some vehicles with ESP, the steering angle sensor must be recalibrated after disconnecting the battery - consider the service information!
- Disconnect the battery from the on-board power supply before charging or rapid charging. Never start the vehicle by using a rapid charger.
- Ensure the correct seating of the battery terminals.
- Wiring harnesses and wiring troughs which are released or removed during repair work must be refastened in their original positions using genuine aftersales parts (cable ties, clips, wiring trough brackets, etc.).
- During the removal and installation of the engine or the transmission, it must be ensured that all ground connections are correctly routed. Poor ground connections lead to malfunctions in the system and, in extreme cases, to the destruction of control units. Never connect and disconnect control unit or miscellaneous electronic component wiring harness plugs with the ignition switched on.
- When mounting components in a vice, always use protective jaws made of soft metal.
- Place removed components on clean surfaces only and cover with foil - never use lint-producing cloths. If repairs cannot be carried out immediately, seal open components or cover them carefully. Only install clean parts. Remove new parts from their packaging just right prior to installation.
- Check all components for signs of wear and replace if necessary.
- To prevent damage to toothed-belt fabric, ensure that toothed belt does not come into contact with coolant, oil, fuel, brake and clutch fluid and grease.
- The components of the engine are sensitive to shock and must not be installed if damaged. This applies in particular to the throttle valve body as severe malfunctions may be result if damaged by being dropped.

Repair Information - High Pressure and Direct Fuel Injection Systems (Gasoline and Diesel Engines)

- Always wear safety glasses when working with fuel to protect against squirting fuel.
- Disconnect the battery from the on-board power supply before open the high pressure fuel system.
- Extremely high pressure is present at the high pressure system connections. Before opening or carrying out any operation on the high pressure system, ensure that the lines are not pressurized - risk of injury!
- Lines must not be opened or released when the engine is running - risk of injury!
- When installing used or new high pressure system components, existing seals must be replaced with new ones (for example injectors).
- All fuel lines must be tightened to the specified torque.
- Always check for leaks after opening the high-pressure system - visual inspection.
- The system is extremely sensitive to contamination. Dirt particles cause functional impairment, damage and destruction of the high pressure injection system. Furthermore, wearing of other components may occur. Therefore, utmost cleanliness must be ensured for operations on the fuel injection system - never use lint-producing cloths.

General - Fuel System

- Observe the relevant safety regulations and national legislation for health and work safety regulations regarding explosive and flammable materials.
- Perform work on the open fuel system in a well ventilated work area only.
- When working on the open fuel system, danger signs are to be set up.
- When working on the open fuel system, fires and open light are prohibited in the closer environment - Keep away ignition sources and avoid sparks.
- Never drain fuel tanks over or near workshop pits. Fuel vapors are heavier than air and collect at the bottom of the pit - risk of suffocation and danger of explosion.
- During all operations in the engine compartment, remember that the radiator fan can switch on - risk of injury!
- Never touch high-voltage live components (such as ignition system or xenon lamps) - danger to life!
- Before operations involving a risk of electrical short circuit, the ground cable must be disconnected from the battery.
- Never tighten fuel lines to brake lines, movable components or sharp edges.
- Never tighten wiring to fuel lines.

Repair Information - Fuel System

- When working on the fuel system, ensure that any escaping fuel is captured in suitable containers. Ensure that no engine or vehicle components come into contact with escaping fuel. Dispose escaped fuel immediately and clean contaminated components.
- Reduce fuel pressure via test connector on fuel pressure gage and collect escaping fuel in suitable container.
- Drain fuel tank using a suitable fuel refilling unit. Store drained fuel in suitable, lockable containers.
- Do not mix fuels types - danger of damage to the engine.
- The utmost cleanliness is important when working on the open fuel system.
- Never use lint-producing cloths to working at the fuel system.
- Before removing fuel system components, thoroughly clean connections and their immediate vicinity.
- Open fuel lines must be securely sealed using the appropriate special tool.
- If repairs cannot be carried out immediately, seal open components or cover them carefully.
- Repair information for fuel pipes and vacuum pipes:
 - Damaged lines, connections and components have to be replaced.

- Install the fuel lines torsion-free.
- Fuel lines must not be pinched.
- Fuel lines must not be kinked.
- Avoid chafing of all lines and pipes.
- Fuel lines must be installed and tightened in their original positions.
- Always check for leaks after opening the fuel system - visual inspection.

Repair Information - Exhaust System

Warning:

In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

Warning:

Always wear protective goggles and gloves when removing exhaust parts as falling rust and sharp edges from worn exhaust components could result in serious personal injury.

Caution:

Do not bend the exhaust flex pipe more than 10° in any direction. Bending of more than 10° or twisting in a range of 0.5° will damage the exhaust flex decoupler.

- Utmost accuracy must be ensured for all operations on the exhaust system. Each leakage at the exhaust system can lead to the fact that exhaust gases arrive into the interior - health hazard!
- Utmost accuracy must be ensured for all operations on the exhaust gas recirculation system. Each leakage at the exhaust gas recirculation system can lead to the fact that exhaust gases arrive into the interior - health hazard!
- Leakages (leak air) in the intake and exhaust system upstream from the catalytic converter result in incorrect oxygen sensor measurements.
- Leakages in the exhaust system result in incorrect exhaust pressure sensor measurements (vehicles with diesel particulate filter).
- Exercise utmost care during all operations on the secondary air system. Any leak in the secondary air system can cause damage to the catalytic converter and/or the engine.
- Repair information for oxygen sensors:
 - - Protect oxygen sensor from contact with silicon.
 - Clean the oxygen sensor not with fuel, or bring it in contact with it.
 - When re-using oxygen sensor, coat thread with special grease.
 - The thread of new oxygen sensors is already coated with special grease.
- Repair information for exhaust systems:
 - - Defective components of the exhaust system have to be replaced.
 - Install the exhaust system free of tension and aligned according to the contours of the vehicle underbody.
 - Exhaust system must be tightened in their original position.
 - When replacing the exhaust system or individual components, use vehicle-approved parts only.
- Repair information for heat shields:
 - - Defective heat shields have to be replaced.

- Heat shields must be tightened in their original position.
- Heat shields may have only at the tightening points contact to the body. Otherwise an air gap between body and sheet metal must be present.
- No wax, underbody protection, or similar substances may be laid on heat shields - fire danger!
- After conclusion of the work, check the exhaust system for leaks - visual inspection, audible inspection.

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General Warnings and Safety Regulations

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Definition

Carefully read and observe safety regulations and important instructions before beginning diagnostic and repair work. Safety regulations and important information in Diagnostic Procedures, Service Instructions, Service Plan and Pre-delivery Inspection and are subdivided in Danger, Warning, Caution, and Note. For the correct definition of these additional information, refer to [Definition of Danger, Warning, Caution, and Note](#).

Legislation

These "Safety Regulations" are not exhaustive, as GM cannot reasonably anticipate every conceivable service and repair method and the consequences thereof.

It is therefore vital for anyone carrying out repair work on a vehicle to ensure that the repair method that has been selected will not affect their own safety or the vehicle.

Since different laws apply in the different countries, it is not possible to go into details in the service literature. Anyone involved in maintenance and repair work must be aware of the guidelines and laws that apply to their job and follow them accordingly.

It is expressly pointed out that all work on the systems described in the following must be carried out in accordance with the applicable guidelines and regulations issued by the local authorities and the health and safety, accident prevention and environmental protection authorities. Contact with certain operating materials may be damaging to health. Specific national legislation pertaining to hazardous substances governs the proper handling of materials. The identification code is printed on the material container label. Restrictions are subject to national legislation. Danger classes applicable in individual countries govern the proper storage of combustible liquids; relevant danger classes are printed on the container label. Restrictions are subject to national legislation. Observe the relevant national regulations when handling and disposing of hazardous substances (such as non-deployed airbag modules) and recyclable materials (such as plastic, metal, used oil). The safety data sheets must be observed.

Safety Data Sheets

The Opel/Vauxhall safety data sheets for various countries can be read on the Internet: www.ifz-berlin.de

Chemical Products

Handling Chemical Products

Do not use adhesives that are after date of expire - they pose a threat to vehicle passengers and to the environment - danger of injury.

Fuels

- Fuel/air mixtures are explosive. Keep away from flames and naked lights when working on the fuel system and avoid ignition sources and sparks. The relevant environmental and health regulations applicable to explosive, extremely flammable substances must be observed.

- The fuel system must be checked for leaks before and after repair work. Build-up of explosive petrol concentrations is possible at leaking fuel-bearing components. Appropriate warning signs must be set up during operations on the fuel tank.
- Gasoline and diesel, compressed natural gas (CNG) and liquefied petroleum gas (LPG) fuels are toxic. Swallowing of fuel or inhalation of the vapors or gas can be fatal. Contact with the skin must be avoided.
- Do not drain fuel tanks above a workshop pit. Fuel vapors settle at the bottom of the pit and remain there. Engine adjustment operations can also lead to the release of fuel vapors and exhaust gases that pose health risks. Work on lifting ramps in sufficiently ventilated areas only.
- The fuel tank must only be emptied using a fuel refilling unit. Keep drained fuel in suitable containers.
- Escaping fuel must be removed immediately, by using a binding agent for example.
- The utmost cleanliness is important when working on the open fuel system.
- Among other things, engine exhaust contains carbon monoxide, hydrocarbons and nitrous oxide. Ensure that there is an effective extraction system. Exhaust from diesel engines can lead to skin and respiratory organ diseases. Carbon monoxide is a powerful blood poison.

Oils and Lubricants

- Explosive mixtures can result from heating or spraying oils and lubricants - danger of explosion.
- Breathing or generating oil mist or vapors must be avoided. Oils and lubricants are toxic when ingested.
- Oils and lubricants are flammable.

Solvent Containing Substances

- The following materials and compounds contain solvents:

- - Paints
 - Primers, varnishes
 - Glass primers
 - Fillers
 - Putties
 - Hardeners
 - Thinners
 - Activators
 - Additives
 - Content of spray cans
 - Body seals
 - Cavity sealants
 - Underseals
- Follow storage instructions on container packages when storing solvent-containing substances - fire hazard.
- Process solvent-containing substances either in painting booths or in areas with suitable extraction.

Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

To comply with the communication obligation under REACH article 33 we inform you herewith, that the following substances of very high concern (SVHC) published on the candidate list can be included in packaging materials above 0,1 weight percent.

The substances are identified identical by its chemical abstracts service registration number (CAS).

Substance	CAS number

Substance	CAS number
Hexabromocyclododecane (HBCDD), alpha- hexabromocyclododecane, beta- hexabromocyclododecane, gamma- hexabromocyclododecane	3194-55-6, 25637-99-4, 134237-50-6, 134237-51-7, 134237-52-8

Protective Clothing

Employers and superiors are responsible for ensuring that working environments are safe. The user must be protected from hazards and possible pollution constituting a risk to health.

- Note:

The following parts of the body require special protection:

- Eyes:
- Wear protective goggles when performing machining operations, welding and when handling chemical products. If chemicals come into contact with eyes, wash immediately with clean water (eye bath) and seek medical attention. Failure to comply results in: Damage to the eyes.
- Respiratory organs:
- Perform adhesive and welding operations in well-ventilated areas. Always process paints, primer and filler in painting booths. For long-term welding operations, also ensure that vapors are effectively extracted. Failure to comply results in: Damage to respiratory organs.
- Skin:
- Wear protective clothing and protective gloves (such as refrigerant-resistant). Wear silicone-free barrier creams or salves. If adhesive comes into contact with skin, wash skin with soap and water without using solvents of any kind. Failure to comply results in: Damage to the skin.

Personal Protective Equipment

- Work clothes
- Safety boots
- Protective goggles
- Ear protection
- Protective gloves as required
- Note:

In addition, dependent upon work area.

- Respiratory equipment, as required
- Filter masks
- Special protective clothing (such as leather apron, painting overall, protective gloves with sleeves, or appropriate leak-proof clothing for air conditioner operations)
- High voltage protective gloves, Face mask, Multipurpose protective clothing

Workplace

Behavioral Rule at the Workplace

- These safety instructions and all other service information must be accessible to all persons in the workshop area who are directly or indirectly involved in maintenance, repair, diagnosis and vehicle handovers. This includes supervisors, who have a special duty of care (such as to employees, the environment, equipment and vehicles being repaired). The operating instructions issued by the manufacturers of devices, machines, diagnosis tools and special tools must also be followed.
- Hazardous substances may only be stored and transported in clearly marked, unbreakable, unmistakable and sealed containers. Vessels intended for food and drink may not be used for storing and decanting hazardous substances.
- The quantity of hazardous substances kept at the workplace may not exceed the amount required for the direct or expedient dispatch of work.

- Personal protective clothing must be worn which corresponds to the characteristics of the hazardous substance.
- Hazardous concentrations of gases, vapors and dust must be removed immediately using suitable extraction equipment. Generally, adequate ventilation of working areas must be ensured.
- Operations that can lead to the generation or release of gases must never be performed in workshop pits, since gases such as refrigerants that are heavier than air can collect in high concentrations.
- Contact between wet cleaning materials and residues of combustible hazardous materials and skin, eyes and clothing must be avoided. Areas of the body which have come into contact with hazardous materials must be washed off immediately with copious quantity of water. If personnel are injured or feel unwell after contact with a hazardous substance, call a medical doctor immediately. If possible, inform the doctor giving treatment of the name of the hazardous substance.

Work Safety

- Strict observance of the use of materials and additives is required for certain operations in the Service Instructions. Only parts from the "Service" area or parts and additives corresponding to identical specifications must be used for these operations.
- All components that have been released or removed during repair work must be re- tightened at their original installation locations.
- During operations on the underbody or in the engine compartment, it must be ensured that a safe distance is maintained from components which become hot during driving operation (such as engine, engine attaching parts, exhaust system, brakes and transmission). Suitable protective measures must be taken (such as wearing of protective gloves).
- Work that has not been properly executed poses a threat, not only to your own safety, but also to the safety of the vehicle driver and third parties involved in road traffic. All work on vehicles must be performed with the utmost care and diligence.
- Several operations require special tools that may only be utilized for the purpose specified in the Service Instructions. Only the use of these tools ensures safe and technically reliable repair work, as approved by GM.
- The continuous, diligent observance and implementation of the relevant repair method is a prerequisite for maintaining road traffic safety and operational safety of the vehicle.
- Specific national legislation, guidelines and information of trade associations for the respective country, as well as those of the chemical industry, must be observed to ensure work safety.

All employees are obligated to uphold and observe the work safety measures. These duties include:

- Adhering to regulations and operating instructions.
- Making use of technical equipment.
- Using personal protective equipment.
- Participating in seminars.
- Reporting and eliminating faults.
- The disabling of the high voltage system is must be strictly performed by observing the service instruction.
- Reporting malfunctions and avoiding accidents.
- Eating or drinking are prohibited when handling toxic, carcinogenic, or mutagenic hazardous substances
- Do not smoke when handling flammable or explosive substances.

Fire Hazards

- In order to prevent fire hazards in conjunction with cutting, grinding or welding operations and material processing, the appropriate guidelines and regulations with regard to accident prevention issued by the specific national authorities must be observed.
- During cutting operations, grinding operations or welding operations, ensure that a suitable device for extraction of vapors and dust particles is present. This is especially applicable to galvanized body components.
- Additional protection is required for flying sparks.
- Follow storage instructions on container packages when storing solvent-containing substances - fire hazard.
- Avoid naked flames.
- Fire extinguishers must be available in adequate numbers and routinely serviced.

Vehicle Hoist

- Only lift and support the vehicle at the prescribed lifting points. Refer to [Lifting and Jacking the Vehicle](#). The lifting points on the body are specific to the vehicle. They must be observed. Lifting or supporting the vehicle weight on other vehicle components, engine, gearbox, axle components, tank, oil sump etc., is not permitted.
- Always follow the relevant and manufacturer's instructions and specifications for lifting platforms
- When using a trolley jack, use jack stands to secure the vehicle against tilting, rolling or slipping.

Diagnosis

If the "Airbag system" indicator light is active, the fault in the airbag system must first be remedied before starting diagnosis and repair on other systems.

A pyrotechnic unit that has been diagnosed as defective must not be deployed locally but must be returned. Refer to [Safety Regulations for Restraint Systems](#) for restraint systems.

Do not suspend the scan tool from the steering wheel by the bracket. Follow the special instructions in the [Safety Regulations for Restraint Systems](#) for restraint systems. Vehicles with a diagnostic trouble code (DTC) set in the airbag system ("Airbag System" indicator light on) must not be handed over to customers - danger to occupants!

Fasteners

- Microencapsulated bolts must not be re-used and have to be DISCARDED after removal. Clean the thread of the bore and replace the bolt by a new one. Service may offer new bolts, which are not microencapsulated. In this case, apply a GM approved thread lock agent to the new bolt.
- Torque-to-yield fasteners must not be re-used and have to be DISCARDED after removal. Always replace torque-to-yield fasteners with new fasteners.
- Self-locking nuts must not be re-used and have to be DISCARD after removal. Always replace self-locking nuts with new ones.

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Safety Regulations for Air Conditioning Systems

General

Air conditioning systems reduce the stress on the vehicle occupants during summery ambient temperature and prevent the steaming up of the panes by desiccation of the air in the passenger compartment.

For the maintenance of a proper air conditioning the following operations may need to be carried out:

- Emptying (Evacuating) the air conditioning system
- Filling the air conditioning system
- Leakages in refrigerant circuit
- Fault diagnostics on the air conditioning system
- Miscellaneous maintenance or repair work

The air conditioning system contains a mixture of refrigerant and air conditioning compressor oil. The refrigerant used up to now in vehicle air conditioning systems, R134a, has a high Global Warming Potential (GWP) of 1,430. EC Directive 2006/40/EG mandated that only refrigerant with a GWP lower than 150 may be used. To meet this requirement, R1234yf was developed as new refrigerant, having a GWP of 1.

The new EC Directive refers to vehicles of category M1 (Vehicles for passenger transportation with a maximum of 8 seats excluding driver seat) and Class 1. It affects all vehicles registered as of 01.01.2017 which are operated in the European Union. All other vehicles are permitted to be filled with the previous refrigerant R134a.

Essential part of guaranteeing work safety while handling either R134a or R1234yf is on the one hand wearing suitable personal protective equipment according to risk assignment as, for example, long-sleeved workwear, leather gloves and safety goggles (facial protection when opening the condenser), on the other hand a technically leakproof connection between the air conditioning system and the service device.

At normal atmospheric pressure and ambient temperature, liquid refrigerant (R134a/R1234yf) evaporates so fast that it can cause frostbites on contact with the skin or the eyes. Appropriate personal protective equipment must be worn.

After contact with evaporating refrigerant the eyes must not be rubbed. Eyes and other affected areas need to be rinsed with a lot of cold water for some minutes, medical treatment needs to be carried out immediately afterwards.

R134a and R1234yf are liquefiable gases in air conditioning systems. Their vapors are heavier than air and sink downwards at atmospheric pressure. They can cause suffocation due to displacing the oxygen in the air being breathed. The thermodynamic characteristics of R134a and R1234yf are similar.

To avoid an ignitable mixture, a sufficient ventilation must be provided. Open fire and light as well as ignition sources, e.g electrical arc while welding, are not allowed at workplaces where the refrigerant is handled and therefor must be kept away.

The following measures provide a secure handling of R1234yf in particular:

- One-fold air change for the whole shop-floor level
- Three-fold air change for the workshop pits
- Exclusive usage of certified service devices

For air conditioning service on vehicles with R134a or R1234yf, special air conditioning service devices must be used. The devices must be labeled appropriately so they cannot be interchanged. The filling valves on the vehicle side are geometrically different between R134a and R1234yf air conditioning systems. Therefor the R1234yf service device has different service connectors than a R134a service device. Only service devices certified by OPEL are to be used. (see TIS/News)

A mixture of the refrigerants is prohibited by law. Furthermore the components of the R1234yf air conditioning system are especially developed and approved for this new refrigerant only. In case of an intermixture of R134a and R1234yf, the resulting mixture must be professionally evacuated from the air conditioning system and disposed of. See the procedure for contaminated refrigerant for this. (see TIS/News)

Works on air conditioning systems are only to be performed by trained professionals. Workshop staff carrying out operations relating to air conditioning systems in vehicles need a certificate of training in terms of a certificate of competence according to EG regulation (EG) Nr. 307/2008 issued by the European Commission on 02.April 2008. There is no additional certificate of competence needed for working with refrigerant

Repair Information

- For vehicles with R1234yf a gas analysis is mandatory before evacuating the system.
- Keep refrigerant bottles away from direct heat (such as an incident solar radiation) and avoid temperatures in excess of 50°C (122°F) - risk of explosion.
- The refrigerant bottle has to be stored tightly closed in a cool, well ventilated place and must be prevented from tipping.
- When filling refrigerant bottles, the specifications on the individual bottles concerning maximum permissible weight must be observed. Otherwise there is a danger of explosion.
- Always reseal refillable refrigerant bottles immediately when not in use. Seal the cut-off valve and safety plug with a screw cap to protect these parts from damage - danger of injury.
- Do not point quick-release mechanism in direction of YOUR body when removing service hoses - residual refrigerant may emerge.
- When cleaning the engine compartment using a high pressure steam cleaner, do not direct the jet directly onto air conditioning system components.
- The air conditioning system must be evacuated before carrying out painting work during which the vehicle is present in the drying oven for more than 20 minutes at temperatures exceeding 80°C (176°F).
- PAG/POE (polyalkylen glykolen/polyolester) oil (compressor lubricant) is extremely hygroscopic and must be stored in an air-sealed container.
- It is not permitted to re-use compressor lubricant.
- When replacing components of the refrigerant circuit, such as lines, receiver-dryer, evaporator or compressor, the separation points must be sealed in order to prevent moisture entering the refrigerant circuit.
- A completely or partially assembled system must not be left unconnected for any longer than is absolutely necessary.
- When testing the function of heating, ventilation and A/C systems, never reach into the mechanical components of the heating or A/C system.
- The basic setting of the expansion valve must not be changed.
- Repairs to the air conditioning have to be performed immediately after evacuation, as otherwise refrigerant in the system can evaporate causing a build-up of pressure - danger of injury.
- In order to equalize temperatures and prevent moisture from condensing, the A/C components must be at room temperature before installation.
- Only remove sealing caps (plugs) immediately before connecting the fitted parts. Keep the sealing caps of new parts for use in later maintenance operations.
- When replacing components of the refrigerant circuit (such as lines, receiver dehydrator, evaporator) the compressor lubricant remaining in the removed component must be replaced by new compressor lubricant when refilling the refrigerant circuit.
- Connections with missing catches and parts that have been penetrated by dirt, grease or dampness must not be installed. Only install pipes, hoses and units if the connections are in perfect condition.
- The dryer (cleaner/filter of the air conditioning) in the refrigerant circuit is enriched with moisture and must be replaced in accordance with repair instructions. When replacing the dryer cartridge, high pressure in the dryer housing was present in individual cases, despite previous evacuation of the system. When opened, the pressure was suddenly released and the dryer cartridge was ejected. Therefore a face shield must be worn when opening the dryer housing instead of goggles. Do NOT lean directly over the opening of the dryer housing when opening. Special caution is advised for systems, whose cover is held with a retaining ring.
- Use new O-rings.
- When using green O-rings: coat all O-rings with the oil that is specified in the service information before assembling.
- Compressor connections must be sealed immediately after removal of the compressor. In warranty cases, returned compressors which have not been sealed cannot be accepted.
- Only use vehicle-specific synthetic compressor lubricants approved by GM - otherwise, damage to the compressor may result.

- When replacing the compressor, mind the oil calibrating procedure
- The receiver-dryer must not be connected until all other parts of the system have been connected.
- For depressurized refrigerant lines systems, it is essential that the receiver-dryer cartridge is replaced.

Fire Protection Information

For fire protection and prevention of refrigerant decomposition (hydrogen fluoride (HF) formation) at the service workstation following rules are required:

- No naked flames or electric arc welding
- No operation of open radiant heaters
- No smoking
- Correct storage of refrigerant inventories
- Proper shutdown of the A/C filling device
- Good ventilation in the workshop (1 air change per hour)
- Good ventilation in assembling pits (3 air changes per hour)
- Exclusive use of a suitable A/C filling device.

Run-in Procedure

The following run-in procedure must be observed after installing a new compressor:

- Open all the air outlet ducts on the instrument panel.
- Start vehicle engine and allow idle speed to stabilize (approx. 5 seconds).
- Switch fan to maximum speed.
- Switch on A/C system and allow to run continuously for at least 2 minutes at an engine speed below 1500 rpm.

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Safety Regulations for Steering Systems

General

- Operations on the steering system must be performed by certified, qualified personnel only. This is assured at all GM certified dealerships.
- Before performing operations involving a risk of an electrical short circuit, the battery negative cable must be disconnected.
- - On certain vehicles equipped with electronic stability program (ESP) it is necessary to calibrate the steering angle sensor after disconnection of the battery negative cable. Refer to the corresponding service instruction.
- Microencapsulated bolts must not be re-used and have to be DISCARDED after removal. Clean the thread of the bore and replace the bolt by a new one. Service may offer new bolts, which are not microencapsulated. In this case, apply a GM approved thread lock agent to the new bolt.
- Torque-to-yield fasteners must not be re-used and have to be DISCARDED after removal. Always replace torque-to-yield fasteners with new fasteners.
- Self-locking nuts must not be re-used and have to be DISCARD after removal. Always replace self-locking nuts with new ones.
- Never heat-treat steering components; potential alterations of the material properties can otherwise adversely affect the operational safety of the vehicle.
- When working on the steering (steering gear, tie rods, steering column etc.) the steering must be locked in the straight-ahead position during removal and installation.
- When removing the steering wheel, lock the steering column in the straight-ahead position to avoid destroying the contact unit during the subsequent reinstallation of the contact unit and steering wheel.
- If the driver's airbag has been deployed, the steering wheel, steering column and steering column attachment must be subjected to a functional test and inspection and replaced if damaged.
- Only use GM approved steering gear fluids and oils – never re-use drained fluid.
- After an accident, the following components should be visually checked for bending, cracks or damages, independently of the wheel alignment check, which should always be performed:
 - - The chassis and all related components, such as spring, strut, steering knuckle, lower control arm, drivetrain and front suspension frame, stabilizers, stabilizer links and their fastening parts.
 - Steering gear and steering linkage. In addition, check for correct operation through the entire steering range of motion.

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Safety Regulations for Suspension, Tires, and Wheels

General

- Consider the running direction when installing directional tires.
- If installing aftermarket wheels (such as snow tires) with wheel hub caps that cover the whole wheel, make sure that long tire valve stems are installed to keep the valves accessible.
- Only use GM approved wheel hub caps validated to GM specifications to ensure proper brake system cooling.
- After an accident, the following components should be visually checked for bending, cracks or damages, independently of the suspension alignment check, which should always be performed:
 -
 - The suspension and all related components, such as spring, strut, steering knuckle, lower control arm, drivetrain and front suspension frame, stabilizers, stabilizer links and their fastening parts.
 - Steering gear and steering linkage. In addition, check for correct operation through the entire steering angle.
 - Check wheels, rims and tires additionally, check tires for cuts, tread-depth and radial and lateral runout

Repair Information - Suspension

- Danger of injury! NEVER use heat to release a joint connection e.g. a knuckle to ball joint.
- Before performing operations involving a risk of an electrical short circuit, the battery negative cable must be disconnected.
- Microencapsulated bolts must not be re-used and have to be DISCARDED after removal. Clean the thread of the bore and replace the bolt with a new one. Service may offer new bolts, which are not microencapsulated. In this case, apply a GM approved thread lock agent to the new bolt.
- Use hand tools only, and do not use any kind of impact or power tools to tighten a fastener.
- Torque-to-yield fasteners must not be re-used and have to be DISCARDED after removal. Always replace torque-to-yield fasteners with new fasteners.
- Self-locking nuts must not be re-used and have to be DISCARD after removal. Always replace self-locking nuts with new ones.
- Danger of injury! Only use suitable and GM approved special tools to perform service repairs on suspension parts.
- Always replace damping bushings, damping rings and springs pairwise.
- Shock absorbers can be replaced individually, as long as the mileage of the vehicle has not exceeded 50.000 km (31.000 mi) and the shock absorber is replaced by a new one with the same part number.

Repair Information - Tires and Wheels

Wheel Bolts/Nuts and Studs

- Always clean the cone seat of wheel bolts and nuts.
- Insert the wheel bolts by hand and turn at least 5 convolutions to make sure that the bolts are seated correctly.
- Make sure not to grease the thread of the wheel bolts, nuts or studs.
- Never apply grease to wheel nut cones. Any debris on the cones must be cleaned away with a clean cloth. Apply a thin coat of wheel bearing grease on wheel bolt cones where applicable. Refer to [Tire and Wheel Removal and Installation](#).

Tires

To avoid damage during removal and installation of tires, especially RunFlat or low profile tires, always use GM approved workshop equipment.

Wheels

- To prevent the wheel centering seat from seizing up on the wheel hub, always apply a thin coat of wheel bearing grease to the wheel inner centering seat before installation. Refer to [Tire and Wheel Removal and Installation](#).
- Any contamination or debris on the mating surfaces of the wheels and brake discs or drums have to be removed using a suitable tool.
- Degrease the mating surfaces of the brake discs and drums before installing the wheels.
- Grease should only be applied to the centering seat, but not to the mating surfaces (on rims, brake discs and drums, etc.). Refer to [Tire and Wheel Removal and Installation](#).

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Safety Regulations for Brake Systems

General

- Operations on the braking system may only be performed by certified, qualified personnel only. This is assured at all GM certified dealerships.
- Before performing operations involving a risk of an electrical short circuit, the battery negative cable must be disconnected.
- After completing any repairs or replacement on braking systems, a functional check must be performed and the brake efficiency must be checked.
- Never use aftermarket brake disc covers, disregarding this will cause a malfunction of the brake system due to overheating.

Repair Information

- When replacing brake discs, the disc brake pads on this axle must be also replaced. Always replace all brake pads on one axle. After the replacement of disc brake pads, full brake application should be avoided for the first 200 km (124 mi) to allow for proper brake-in at brake pads and discs.
- Microencapsulated bolts must not be re-used and have to be DISCARDED after removal. Clean the thread of the bore and replace the bolt with a new one. Service may offer new bolts, which are not microencapsulated. In this case, apply a GM approved thread lock agent to the new bolt.
- Torque-to-yield fasteners must not be re-used and have to be DISCARDED after removal. Always replace torque-to-yield fasteners with new fasteners.
- Self-locking nuts must not be re-used and have to be DISCARD after removal. Always replace self-locking nuts with new ones.
- Do not perform machining work when overhauling parts of the brake system. Machining work is only allowed on brake discs and brake drums.
- Friction surfaces of brake pads, brake discs and brake drums must not come into contact with grease or lubricants. Only use GM approved special brake cleaner.
- Remove any debris or dirt between the brake disc and brake drum and wheel hub mating surface before installation. Check if the mating surfaces are flat and burr-free.
- Install brake hoses to designated brackets - ensure correct, twist-free routing of the hoses.
- After working on the brake system hydraulics, the brake system must be bled and checked for leaks. Refer to [Hydraulic Brake System Bleeding](#).
- For vehicles equipped with ABS:
 -
 - When welding in the immediate vicinity of control units, disconnect wiring harness connectors and remove control unit.
 - Electronic brake control modules can be damaged at temperatures above 80°C (176°F).

Brake Fluid

Brake fluid is a hazardous substance and must be treated, stored and identified appropriately.

- Brake fluid is flammable - fire hazard.
- Explosive mixtures are easily formed from brake fluid vapors.
- Brake fluid is toxic - do not inhale brake fluid vapor or swallow brake fluid.
- Brake fluid can cause irritation of the skin - use rubber gloves.
- Escaping brake fluid must be rinsed away immediately with water.

- Never re-use drained brake fluid
- Brake fluid damages paint work, clean away spilled brake fluid immediately!
- When disposing brake fluid, never mix it with other substances (such as used oil). National legislation or regulations must be strictly adhered to.

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Safety Regulations for Clutch and Transmission

General

- Country specific regulations for health, safety, and environmental protection, as well as regulations in reference to easily ignitable materials must be adhered to at all times.
- Before performing operations involving the risk of an electrical short-circuit, the battery negative cable must be disconnected.
- When disconnecting wiring harness connectors, never pull on the wires themselves. Carefully disengage any wiring harness connector locking retainers, and grasp the connector to disconnect.
- When removing or installing engines and/or transmissions, exercise extreme caution that all cable connections have been properly disconnected/connected before removal/installation. Starting the engine with disconnected or otherwise improperly connected cable connections can damage control modules.
- Never re-use seals, sealing-rings, O-rings, and/or fuses. Use caution not to damage clips, snap-rings, or other retainers/fasteners upon reassembly of components.
- When performing transmission repairs, always exercise the highest level of cleanliness with respect to all parts and tools used, to avoid transmission damage.
- Clean all disassembled parts, and inspect for wear and damage. Inspect and make sure, that all grooves and seating surfaces are free from burrs, grit, or damage.
- Only use the recommended sealant when assembling the transmission housing.
- Those transmission components, which must be coated with transmission fluid before assembly, can be found in the appropriate service manual.
- Use assembly lube on bearings, seals, and sealing rings.
- Use only proper, GM-approved fluids. Do NOT re-use drained fluids.
- When disconnecting battery cables, certain electronic memory data will be erased (for example: electric windows, and time and date). When reattaching the battery cables, this volatile memory must be reprogrammed, as well as affected audio components.
- Because transmission hydraulic systems are very susceptible to damage caused by dirt and other foreign bodies, the utmost of cleanliness MUST be observed at all times when working on transmission components. Failure to preserve cleanliness can result in loss of function, accelerated wear, or other transmission damage.
- If it will not be possible to complete a repair in a timely manner, carefully cover all open or exposed parts.
- Inspect all parts for signs of wear, and replace all worn parts.
- Parts which have been removed must be placed in a clean location, and covered with film or other media, NOT a lint-producing cloth.
- Only reinstall parts which have been properly cleaned. To preserve cleanliness, only remove new parts from packaging shortly before installation.

Clutch, Clutch Hydraulic System

- Friction surfaces of the clutch disc must never come into contact with any lubricants, grease, or oil of any kind
- Clutch hoses and fluid lines may only be reinstalled using the correct brackets, and in the proper position.
- After repairs to the clutch hydraulic system, the clutch must be bled, and all connections checked for leaks.
- Brake fluid is a hazardous substance and must be treated, stored and identified appropriately.
- - Brake fluid is flammable - fire hazard!

- Explosive mixtures are easily formed from brake fluid vapors.
- Brake fluid is toxic - do not inhale brake fluid vapor or swallow brake fluid.
- Brake fluid can cause irritation of the skin - use rubber gloves.
- Spilled or drained brake fluid must be rinsed away immediately with water.
- Never re-use drained brake fluid
- Brake fluid attacks paint work, clean away spilled brake fluid immediately!
- When disposing brake fluid, never mix it with other substances (such as used oil). National legislation and other applicable regulations must be strictly adhered to.
- Before any repair to the hydraulic system, carefully clean hydraulic connections, as well as the areas surrounding them.
- While the engine is running, never open or loosen fluid lines or hoses.
- All hose or fluid line connections must be tightened according to the proper torque specification.

Easytronic - M20 - Manual Transmission Automatically Shifted (MTA)

Note:

In addition to the general hazard precautions and safety regulations, the following "Easytronic" (M20-MTA) safety precautions must also be followed!

- Because the transmission lines can contain very high pressure up to 75â€%barâ€%(1088â€%PSI), it is of utmost importance that line pressure has been released before opening any MTA-system high-pressure line.
- The pressure within the high-pressure system can only be released by using the proper diagnostic test equipment. It is of utmost importance that the diagnostic test equipment instructions are followed. Failure to follow the instructions and steps exactly as described can result in high-pressure system re-pressurization.
- Should the communication between the diagnostic test equipment and the Easytronic control module fail (for instance if the MTA-system pressure sensor is defective), it is not allowed to release MTA-system pressure using the diagnostic test equipment. Should such a case arise, the complete MTA-system must be replaced when the transmission is removed. Opening the MTA-system lines and/or repairing or replacing components is, in this case, is NOT allowed.
- Safety glasses must be worn before opening any high-pressure lines.
- If the complete MTA-system will be replaced, install the new MTA-system holding clip before removal of the defective MTA-system, in order to avoid damage to the hydraulic lines during MTA-system installation. Once installation of the new MTA-system is complete, attach the old MTA-system holding clip to the defective MTA-system, and return the complete unit.
- In order to avoid damage to the clutch hydraulic system, MTA-system hydraulic fluid must never be allowed to come into contact with the clutch hydraulic system
- Before repairing the M20-6 MTA transmission, an inspection must be run, using the proper diagnostic test equipment, following the instructions in the proper inspection manual.
- Before any repair to the hydraulic system, carefully clean hydraulic connections, as well as the areas surrounding them. After opening high-pressure lines, use the proper special tool to close them.
- A leak test must be performed after any repair to the high-pressure system
- If a repair will not be completed immediately, or the repair must be delayed, carefully cover all open or exposed parts.
- When installing components of the high-pressure system replace all old seals with NEW seals.
- After repairs to the M20-6 MTA-system, follow the "Return-To-Service of the Easytronic Transmission" instructions in the proper service information.
- While the engine is running, never open or loosen fluid lines or hoses.
- When replacing the Easytronic electronic control module the proper special tools must be used. Refer to the "Special Tools" in the service information.
- Always replace the return line from the shift module to the hydraulic fluid reservoir with a NEW part, whenever the line is removed.

- All hose or fluid line connections must be tightened according to the proper torque specification.

Automatic Transmission

- With automatic transmissions it is necessary to check the torque converter stall speed. In order to avoid transmission damage from the rapid transmission overheating that occurs during this procedure, this procedure may only be performed for a time span of a few seconds.
- Due to the fact that during the converter stall speed inspection procedure the vehicle brakes alone must hold a great deal of force still, the vehicle drive wheels must be chocked. During the procedure, wheels and wheel chocks are to be monitored by a second person.
- Before repairs to the automatic transmission, an inspection must be performed, using the proper diagnostic test equipment, following the instructions in the proper inspection manual.
- Should, during repairs, clutch-plate material, metallic particles, dirt, or other deposits be found in the automatic transmission fluid, the automatic transmission must typically be completely disassembled and thoroughly cleaned, if the transmission may be disassembled, otherwise replace the complete transmission. Refer to the appropriate service information. All parts and oil passages must be blown clean and dried using compressed air.

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Safety Regulations for Electrical/Electronic Systems

General

- Never touch high-voltage-bearing components (e.g.: ignition system, xenon lamps) - can be fatal.
- Before disconnecting the ground cable from the battery in vehicles with alarm system and power sounder, disarm the power sounder. Disconnect the ground cable from the battery within 15 seconds of switching off the ignition.
- If an alarm is unintentionally triggered via the power sounder, switch on the ignition (battery connected) in order to override the alarm.

General Repair Information

- When performing work where there is a danger of an electrical short circuit, disconnect the battery negative cable from the battery. For Crossland X and Grandland X, disconnect the battery positive cable, as the battery negative cable is not accessible for these vehicles. The following procedure must be observed to avoid injury to persons and damage to sensitive electrical components:
 - The battery terminals must be covered so that accidental contact does not occur because the battery cable has gradually moved backwards. This also prevents accidental contact during assembly, e.g. with bright metal components or tools.
 - If individual connection cables forming part of the battery connection have to be dismantled, always remove the battery negative cable from the battery terminal first so that all the power circuits on the vehicle are free from voltage. For Crossland X and Grandland X, disconnect the battery positive cable, as the battery negative cable is not accessible for these vehicles. Non-adherence to this ruling can lead to electronic components being damaged. Reconnection takes place in reverse order, the earth clip is the last to be connected to the battery.
- Never connect/disconnect control unit or miscellaneous electronic component wiring harness plugs with the ignition switched on to avoid damaging the control units.
- Never pull on cable when disconnecting wiring harness plugs. Carefully release locking mechanism at wiring harness plug.
- When cleaning and contact sprays are being used, the manufacturer's recommendations must be followed. Improper use can damage sensitive electrical and electronic components.
- When returning a unit containing a CD unit (such as radio, navigation control unit, and CD changer), remove all CD's to avoid damage to the laser head or CD.
- To charge the battery, use a battery charger approved by service.
- When programming the control unit memory system, ensure that no persons are present in the interior - risk of injury!
- After completing repair operations, ensure that wiring harness connections and battery connections are correctly seated and that ground connections have been made correctly. Defective electrical connections cause functional problems and destroy control units.
- Wiring harnesses and wiring troughs which are released or removed during repair work must be tightened in their original positions using genuine aftersales parts (cable ties, clips, wiring trough brackets, etc.).
- It is essential to ensure that retrofitted components must not be installed in the trigger path of the pyrotechnic restraint systems or airbags.
- Disconnecting the ground cable from the battery automatically erases the contents of certain electronic system memories (e.g. electric window winder, time and date). After reconnecting the ground cable to the battery, these volatile memories must be reprogrammed and audio equipment decoded.
- - At certain vehicles equipped with ESP it is necessary to calibrate the steering angle sensor after disconnection of the battery negative cable. Refer to the corresponding service instructions.
- Active safety features, like e.g. lane keep assist, may cause unintended activity while vehicle is lifted or at the hoist with Ignition On/Vehicle in Service Mode. Make sure to de-activate all pro-active safety features and/or turn the ignition/vehicle Off before lifting the vehicle. If that is not possible because e.g. a measurement needs to be performed below the vehicle for diagnostic purpose, stay clear of the controlled components, like e.g. front wheels and the steering wheel for lane keep assist feature.

- While working below the vehicle with Ignition On/Vehicle in Service Mode, ensure that no hydraulic, fuel, pneumatic or other pipes and hoses are open to avoid the risk of unintended leakage of substances like e.g. fuel or oil.

Wiring Harness Repair

- Wiring harness repairs must be performed by certified, qualified personnel only.
- For specific wiring harness repair instructions, refer to [Wiring Repairs](#).
- Wiring harness repair parts are available for the following harnesses:
 - - Body
 - Engine
 - Headliner
 - Instrument Panel
 - Headlights (Front Body)
 - If a connector/terminal repair is required on a wiring harness at the Door, Fuel tank, Bumper, Seat and other jumper harnesses, the affected wiring harness needs to be replaced entirely.
 - No wiring harness repair parts are available for Light Commercial Vehicles. If a connector/terminal repair is required, the affected wiring harness needs to be replaced entirely.
 - No repair is allowed on the following wiring harnesses:
 - - Supplemental Inflatable Restraints (Airbag)
 - - Caution:

If the SIR/SRS wiring, connector, or terminal is damaged, the affected wiring harness must be replaced. Do not attempt to repair the wiring, connector, or terminals. Any attempt to repair the wires, connectors, or terminals could result in performance problems of the SIR/SRS System. Operations on restraint systems must only be performed by trained and qualified personnel.
 - High Voltage
 - - Danger:

In order to reduce the risk of personal injury, loss of high voltage isolation to ground and higher system impedance, do not attempt to repair any HV wiring, connector, or terminal that is damaged. High voltage coaxial type cables are not repairable. Never attempt to repair a coaxial type cable. The entire cable/harness or component must be replaced. In order to maintain system integrity and personal safety, never attempt to repair any high voltage wiring, cables, or terminals. Performing this procedure on high voltage circuits may result in serious injury or death.
 - Irreparable wiring harnesses are:
 - - Wires with a size bigger than 6â€mm²
 - USB cables
 - Coaxial cables
 - Flat wires within the flex wiring harness
 - - Note:

If a wire, connector, or terminal is damaged on one of these wiring harnesses, the affected wiring harness must be replaced.

Vehicle Battery

- Lead-Acid vehicle batteries must only be stored and charged in well-ventilated areas. Gaseous hydrogen released when the battery is charged is lighter than air and combines with air to form an explosive mixture. Avoid the formation of sparks, smoking and naked flames.
- If, on batteries fitted with a "magic eye", this is colorless or light yellow, the acid level is too low and overheating may occur during recharging - danger of explosion. Only charge undamaged batteries.
- To charge the battery, use a battery charger approved by service.
- Consider current battery type settings (Standard/AGM/etc.) during charging.
- The recommended battery acid temperature during charging is between 10°C (50°F) and 30°C (86°F). Reduce the charging current if the temperature exceeds 50°C (122°F) and terminate charging if it exceeds 55°C (131°F). The battery cannot be charged at temperatures below 0°C (32°F). The temperature of the battery acid can be estimated from the temperature of the battery casing.
- Electrolyte (sulfuric acid) escaping from vehicle batteries can lead to serious acid burns - danger of injury. Escaping electrolyte must be diluted and flushed away using large volumes of water, soaked up with sawdust or with an absorbent cloth.
- Due to the quiescent current of control units (such ATWS, radio units), the battery may become discharged during long standing periods (for example stored vehicles) - disconnect battery and recharge if necessary.
- Battery vent tubes, if installed, need to be corrected. Some new batteries provide different vent opening positions. In case of installing a new battery make sure that the not used vent is closed (if applicable). Never close all openings.

Diagnosis

- For testing purposes, use only a high-resistivity voltage tester.
- The pyrotechnic system (such as airbags) may only be tested using the scan tool. In order to prevent unintentional deployment, never use a test lamp or multimeter to perform measurements on the pyrotechnic units - danger of injury.
- The test operations during which wiring harness plug contacts or control units are connected to ground or the battery voltage (+12 V) must be performed with extreme care and concentration. A wrong contact can destroy internal circuits in the relevant control units.
- The battery must be in good condition and adequately charged when performing diagnosis on electrical/electronic systems.
- Only suitable test probes may be used for measuring so as to avoid damage to the contacts.

1. GENERAL INFORMATION
2. SAFETY REGULATIONS (EUROPE)
3. REGULATED
- 4.

Safety Regulations for Body

Safety Regulations for the Bodywork

General

- Most procedures are shown in the form of illustrations. Explanatory text has been added only at points where instructions are important for proper and appropriate repair.
- The illustrations with the inserted operational instructions show the order of the operations. No special reference is made to repeated standard operations such as cutting operations or grinding connecting surfaces down to the bare metal, since the "Aftersales" companies are aware of these operations.
- The repair methods specified in section body repair must be complied with in areas in which both cutting and connecting operations affect the strength and road worthiness of the body.

Repair Information - Preparation

- For the prevention of fire and explosive hazards along with drilling, cutting, grinding or welding operations and material processing, the appropriate guidelines and regulations with regard to accident prevention issued by the specific national legislations must be observed. This is especially applicable to natural gas-driven vehicles.
- For gas-powered vehicles, please note the following:
 - No holes may be drilled in the underbody area from the interior of on gas-driven vehicles. This is indicated by the stickers "Caution, tank system: drilling–grinding prohibited" in the vehicle interior and on the cover for the pressurized gas tanks. The presence–absence of such stickers does not replace the need to establish the location of the tank system before starting drilling and grinding work. If there are no stickers in the appropriate places, these must be applied.
 - Pressurized gas tanks with carrier frames, gas lines as well as all natural gas-bearing components must always be removed when performing operations involving the generation of significant amounts of heat, e.g. cutting, grinding, brazing or welding, working with hot-air blowers or cutting torches etc., at a distance of less than or equal to 1 meter from these components.
 - Compressed Natural Gas–(CNG): The gas system must be emptied and the tank pressure must not exceed 100–(14.5–psi). The pressure can be determined with a scan tool. A nitrogen purge is not necessary.
 - Liquefied Petroleum Gas–(LPG): the gas system must be emptied completely.
- Note:

The evacuation procedures can be found in: –Engine–Controls and Fuels– in the service information.

- During any cutting, grinding, brazing or welding operations, it must be ensured that a suitable device for extracting vapors and dust particles is available. This is especially applicable to galvanized body components. Additional protection is required for flying sparks.
- Always wear protective goggles and a dust mask during cutting, grinding or welding operations and material machining.
- Follow storage instructions on container packages when storing solvent-containing substances - fire hazard.
- Avoid naked flames.
- Fire extinguishers must be available in adequate numbers and routinely serviced.
- Observe environmental and health protection regulations.
- For the sake of fire prevention, never apply protective materials to or in the immediate vicinity of components near the engine and exhaust system (such as catalytic converter, oxygen sensor).
- The fuel tank and fuel pipes must always be removed if welding operations are performed near these components - danger of explosion.
- Following accidents indicating considerable stress on the chassis, the following components in particular should be checked, independently of checking wheel alignment, which should be carried out in all cases.

- - Ensure proper operation of steering and steering linkage through the entire steering angle. Visual check for deformation and cracks.
 - In addition, check the suspension and all related components for deformation and cracks, including spring struts, steering knuckles, control arms, axle bodies, stabilizers and associated fastening parts.
 - Visually check wheel rims and tires for damage, for cuts in tread and side walls, and for true running and balance.
- All components that have been loosened or removed during repair work must be tightened to their original installation locations. Replace damaged components with new parts.
- Always attach the earth terminal of the welding equipment to the immediate vicinity of the welding point. Ensure perfect ground connections.
- Before operations involving a risk of electrical short circuit, the battery negative cable must be disconnected from the battery. This also applies for welding and brazing work on the vehicle.
- Control units may be damaged at temperatures above 80°C (176°F).
- During brazing, welding and straightening work in the immediate vicinity of sensitive components (such as electrical/electronic/pyrotechnical components, control units, wiring harnesses and A/C components) the components must be removed. If minor assembly or bodywork operations are being performed (no use of slide hammer, for example) it is sufficient to switch the ignition OFF. When repair work is being carried out in the vicinity of the airbag system sensors, the sensors must be checked for damage and replaced if necessary. Remove the ignition key and keep in a safe place during the repair.
- Example for the removal of airbag components/sensors:
- - Area of airbag sensors on upper front of vehicle, front doors or door pillars/B-pillars on vehicles with side airbag sensors in front doors.
 - In vicinity of roof and upper rear quarter panel including A-, B-, C- and D-pillars for vehicles with curtain airbag.

Repair Information - General

- Never grind or smooth butt welds/brazing solder joints at frame parts.
- A professional and proper repair of structural body damages shall be performed with an electronic measurement device or vehicle specific jig set, to document the affected body measuring points before and after repair.
- The following suppliers are using and publishing the Opel / Vauxhall provided body measuring points: Blackhawk, Carbench, Car-O-Liner, Celette.
- Since all welded/brazed parts (primary and secondary frames) - especially in the area of the floor frame group - are enormous important to the driving, operating and, above all, accident safety (deformation characteristics) of the vehicle, the specified cutting points, weld seam formations and joining processes must be performed according to the specifications in the Service Instructions.
- Body sheet metal parts and body members (underbody) are made of cold-workable, deep-drawn sheet steel in standard production. Damaged parts must be cold when restoring them to their original shape.
- Body parts of high tempered press-hardened steel must not be straightened!
- If any deformities are present in the primary and secondary bearer areas, the repair must always be carried out using body measuring and aligning systems.
- Only when these preconditions are fulfilled a correct diagnosis can be made for establishing the proper repair procedure.
- The separating points, welding/braze solder seam forms and joining methods specified must be implemented with particular care in order to restore the original strength conditions. For inert gas welding (MAG), active inert gases must be used such as carbon dioxide and mixed gases with high argon proportion and mixtures of oxygen and carbon dioxide. For brazing, the original brazing wire (CiSi3) must be used as the brazing parameters of the equipment are set to this.
- The required electrode contact pressure during resistance spot welding using handheld spot welding tongs is inadequate when using electrode holders that are longer than 50cm (19.7in)
- The welders, types and parameters recommended by GM must be used.
- The weld point adhesive recommended by GM must be used.

Repair Information - Corrosion Protection

Guidelines for restoration of the original corrosion protection:

- In order to ensure that long-term protection after repairs or part replacement is also guaranteed in "Aftersales", the damaged area must be treated with cavity preservation.
- Clean the welding points (spot-welded galvanized body panels have only minimal erosion around the welding spot).
- Prime bare metal points immediately after repair work.
- Use sealing compound to protect sheet metal overlaps, abutting joints, flanges and welding seams.
- Seal with protective wax following repair work. Water drains in the A-, B-, C-, D-pillars, in the rear quarter panelling and in the area of the floor group must remain intact and free of dirt and sealing compound.
- Always apply sprayable seam seal to primed and cured surfaces.
- There is no difference between the welding of body untreated deep drawn sheet metal and of alloy-galvanized sheet metal.
- Spot welding is the preferred procedure for alloy-galvanized sheet metal.
- Remove all paint layers from welding and brazing points.
- Use corrosion protection materials from "Aftersales".
- Grind bare adhesive surfaces of new part with cathodic painting primer in vicinity of spot-welds only (also applies to galvanized sheet metal parts).
- Perforating punches (plug welding) are not to be used for materials thicker than 1.6 mm. For new-part material thicker than 1.6 mm, use a drill preparatory to plug welding.
- Always apply spot weld paint between the connection flanges. Perform a test weld prior to welding in new parts.
- For any cutting, grinding, brazing or welding operations, apply heat barrier paste in the area of adhesive and sealant materials to protect the adhesive against burning.
- Do not apply spot weld paint to bare-ground adhesive flanges.
- Remove polyvinyl chloride (PVC) underbody coating/sealant materials in the area of the wheel housing using hot air or rotating wire brush.
- Use plastic or wire brush to remove paint and primer.
- Do not use thermal cutting processes (cutting torch/plasma burner) for cutting operations.

Repair Information - Galvanized Sheet Metal Parts

- To reduce zinc-layer damage in cutting areas to a minimum, preference should be given to mechanical cutting processes (such as spot weld drill, body saw).
- Preparation and welding: Do not use spot weld paint for cemented and welded flanges (incompatibility/loss of adhesion).
- Grind new parts at welding points only (high-grade galvanized new parts with cathodic painting primer are thus preserved).

Information - Fixed Windows

- Refer to corresponding tables in the service information for lay-over times for freshly cemented windows.
- For reasons of safety and quality, it is necessary to maintain vehicle lay-over times after cementing windows in service/see corresponding service information.
- Cement in windows at room temperature 18°C (64°F) to 28°C (82°F) and under dust-free conditions.