



**Put into effect as part of the project
GAZelle - Recycling**

**Appendix 9
to GAZ Group Order
No. 231 dated March 28, 2011**

STO 01.02-10 MU02

**Methodological Instructions on Design Engineering
and DD Execution as regards Vehicle Reusability, Recover-
ability and Recyclability**

Version 1.0

**Nizhny Novgorod
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GAZ Group UEC LLC	Process Owner	Director for Product Development
Methodological Instructions on Design Engineering and DD Execution as regards Vehicle Reusability, Recoverability and Recyclability	STO Version No.	01.02-10 MU02 01

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1. Objective and Scope

1.1 Main objective of these Methodological Instructions

1.1.1 Main objective of these Methodological Instructions is the increase of recyclability, reusability and recoverability of GAZ ELVs.

1.1.2 These Methodological Instructions contain recommendations regarding vehicle design, choice of materials for components and fasteners, marking of components and materials, specification of the necessary requirements in DD for the purpose of assuring recyclability of GAZ ELVs.

1.2 Scope of these Methodological Instructions

1.2.1 Scope

Methodological Instructions shall define
<ul style="list-style-type: none"> ▪ <i>Recommendations on design engineering regarding compliance with the recycling requirements</i> ▪ <i>Regulations on marking of components and materials due to recycling requirements</i> ▪ <i>Rules of reflection of recycling requirements in DD</i>
Methodological Instructions shall not define
<ul style="list-style-type: none"> ▪ <i>Order of work and cooperation of UEC LLC divisions for the purpose of meeting recycling requirements</i>

1.2.2 Methodological Instructions shall be subject to compulsory implementation by the UEC LLC divisions and members of product project teams, who perform engineering of the vehicle design and its component parts, and ensure development, execution, issue and maintenance of design documentation.

2. Normative References, Terminology

2.1 Normative References:

GOST 2.314 – 68 – Unified system for design documentation. Instructions for marking and stamping articles.

Standard ISO 1043-1:2001 - Plastics - Symbols and abbreviated terms - Part 1: Basic polymers and their special characteristics;

Standard ISO 1043-2:2000 - Plastics - Symbols and abbreviated terms - Part 2: Fillers and reinforcing materials;

Standard ISO 1176 - Road vehicles - Masses - Vocabulary and codes;

Standard ISO 1629 - Rubber and lattices - Nomenclature. This shall not apply to the labelling of tyres;

Standard ISO 11469:2000 - Plastics - Generic identification and marking of plastics products;

Standard ISO 22628:2002 - Road vehicles - Recyclability and recoverability - Calculation method;

Directive 2000/53/EC – End-of-life vehicles. Defines requirements regarding reduction of wastes generation from end-of-life vehicles and establishes manufacturer’s responsibility for ELV treatment.

Directive 2005/64/EC – On type-approval of motor vehicles with regard to their recyclability, reusability and recoverability. The Directive regulates that minimum 85 mass per cent per vehicle shall be

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reusable and recyclable and minimum 95 mass percent per vehicle shall be reusable and recoverable plus energy shall be recovered from incineration of combustible component parts, which are not liable to be recycled.

Decision 2003/138/EC establishes component coding standards;

Decision 2005/673/EC amends Annex II of Directive 2000/53/EC;

Decision 2010/115/EC amends Annex II of Directive 2000/53/EC;

STO 01.02-10 MU03 – Methodological Instructions on calculation of recyclability and recoverability rates.

2.2 Terms and Definitions

Reusability means ability of component parts that can be diverted from an end-of-life stream to be reused (ISO 22628).

Recoverability means ability of component parts, materials or both that can be diverted from an end-of-life stream to be recovered (ISO 22628).

Recovery means reprocessing in a production process of the waste materials for the original purpose or for other purposes, together with processing as a means of generating energy (ISO 22628).

Recycling means reprocessing in a production process of the waste materials for the original purpose or for other purposes, excluding processing as a means of generating energy (ISO 22628).

Shredder means any device used for tearing into pieces or fragmenting end-of-life vehicles, including for the purpose of obtaining directly reusable metal scrap (Directive 2000/53/EC).

Vehicle mass means complete vehicle shipping mass, as specified in ISO 1176, plus the mass of lubricants, coolant (if needed), washer fluid, fuel (tank filled to at least 90% of the capacity specified by the manufacturer), spare wheel(s), fire extinguisher(s), standard spare parts, chocks, standard toolkit (ISO 22628).

Treatment means any activity after the end-of-life vehicle has been handed over to a facility for depollution, dismantling, shearing, shredding, recovery or preparation for disposal of the shredder wastes, and any other operation carried out for the recovery and/or disposal of the end-of-life vehicle and its components (Directive 2000/53/EC).

Reuse means any operation by which component parts of end-of-life vehicles are used for the same purpose for which they were conceived (ISO 22628).

Recycling means the reprocessing in a production process of the waste materials for the original purpose or for other purposes but excluding energy recovery. Energy recovery means the use of combustible waste as a means to generate energy through direct incineration with or without other waste but with recovery of the heat (Directive 2000/53/EC).

Recyclability means ability of component parts, materials or both that can be derived from an end-of-life stream to be recycled (ISO 22628).

Strategy means a large-scale plan consisting of coordinated actions and technical measures to be taken as regards dismantling, shredding or similar processes, recycling and recovery of materials to ensure that the targeted recyclability and recoverability rates are attainable at the time a vehicle is in its development phase (Directive 2005/64/EC).

EU – European Union;

DD – Design Documentation;

UEC LLC (UEC) –United Engineering Centre, Limited Liability Company;

ELV – end-of-life vehicle;

CoC – Centre of Competence.

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3. General provisions

3.1 According to regulatory documents (e.g. Directive 2000/53/EC) the basic principle regarding end-of-life vehicles (ELVs) is multiple use and waste recovery, and preference shall be given to reuse and recovery.

3.2 Reusability of vehicle components, material recyclability and recoverability are of great significance for collection, disposal and treatment of waste. According to the requirements of Directive 2005/64/EC vehicle manufacturers and their suppliers shall stipulate for these measures at early stages of new vehicle development for the purpose of facilitation of ELVs' recovery and recycling.

4. Vehicle Recycling Requirements

4.1 In accordance with the requirements of Directive 2005/64/EC all vehicles belonging to categories M1 and N1 shall be so constructed as to be:

- reusable and/or recyclable to a minimum of 85% by mass;
- reusable and/or recoverable to a minimum of 95% by mass.

Vehicle recyclability and recoverability rates are calculated in accordance with STO 01.02-10 MU03.

4.2 In accordance with Directive 2000/53/EC in order to facilitate identification of those components and materials, which are suitable for reuse and recovery, corresponding markings shall be applied to them.

4.2.1 Component and material coding requirements are set by Decision 2003/138/EC according to which:

- signs and symbols that are defined by standards ISO 1043-1, ISO 1043-2 and ISO 11469 and mentioned in the referential Attachments 1, 2, 3 to the present STO shall be applied in order to mark and identify polymer components, weighing more than 100 g;
- symbols defined by standard ISO 1629 shall be applied in order to mark components made of rubber and latex, weighing more than 200 g.

Marking requirements in accordance with GOST 2.314 shall be introduced into component drawings.

4.2.2 Component marking must stay clear and legible during the whole product life cycle and have such a location so that it is not damaged and stays readable during component dismantling.

Preferably the marking on the product shall be relief and shall be made:

- either by forming (molding), when a corresponding symbol is made in the mold;
- or by stamping, branding, impression, sealing, burning or any other method that allows to make a legible and indelible marking.

At the same time the marking shall not create stress raisers in the product, due to which its lifecycle can be shortened.

A mark made on the product's surface with paint or by any other method shall not bleed, fade or significantly change in any other way, among them upon possible contact with other materials during full product life cycle.

4.2.3 In case there are several different types of markings on the product besides the marking made on the product in accordance with the requirements of the present document, it is recommended to spatially bring them close to each other.

5. Requirements to a vehicle regarding the content of dangerous substances

5.1 Materials and components, used in a vehicle, must not contain lead, mercury, cadmium and

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hexavalent chromium except for the cases, stipulated for in Annex II to Directive 2000/53/EC with regard to the changes introduced by Decision 2010/115/EC.

5.1.1 Presence of hexavalent chromium in anticorrosive coating of components (including fastening parts) is not tolerated.

5.1.2 It is allowed to use lead as alloying element in:

- 1) Steel for machining purposes and galvanized steel with content up to 0.35% by weight;
- 2) Aluminium with content up to 0.4% by weight;
- 3) Copper alloys with content up to 4% by weight.

5.1.3 It is allowed to use lead and lead compounds in:

- 1) batteries;
- 2) vibration dampers;
- 3) solders in vehicle components (including electric system components);
- 4) electrical connections;
- 5) electrical components, which contain lead in a glass or ceramic matrix compound except glass in bulbs and glaze of spark plugs;

all the mentioned components shall have corresponding marking; total limit value of lead mass according to items 3), 4) and 5) after dismantling (separation from ELVs of components that are mandatory and recommended for dismantling according to STO 01.02-10 MU03) and before entering the shredder shall be equal to 60 g per vehicle.

5.1.4 A maximum concentration in homogeneous material (but for the above mentioned exceptions) of lead, hexavalent chromium and mercury up to 0.1% by weight and cadmium up to 0.01% by weight shall be tolerated. Paint and lacquer, noise insulation, vibration-damping and other coatings that have significant thickness also belong to homogeneous materials.

5.1.5 The Annex, specified in item 5.1, also contains requirements on mandatory marking of components containing lead:

- batteries;
- vibration dampers;
- components, containing lead in solders;
- electrical components, which contain lead in a glass or ceramic matrix compound except glass in bulbs and glaze of spark plugs.

5.2 Pursuant to the above mentioned it is allowed to use limited content of dangerous substances in homogeneous materials, presence of hexavalent chromium in anticorrosive coating is not tolerated. Associated requirements shall be contained in design documents.

5.2.1 The following item 'A maximum concentration in paint and lacquer coating of lead, hexavalent chromium and mercury up to 0.1% by weight and cadmium up to 0.01% by weight is tolerated' shall be included into the technical specification on the drawing field of components or assembly units that have paint and lacquer coating.

5.2.2 The following item 'A maximum concentration in the material of lead, hexavalent chromium and mercury up to 0.1% by weight and cadmium up to 0.01% by weight is tolerated' shall be included into the technical specification on the drawing field of components or assembly units made of polymer materials and rubber.

5.2.3 An item of the following type 'И.9xp. (carbon steel, thickness 9 micrometers). Use of hexavalent chromium is not tolerated. Other requirements are contained in GOST 9.301-86' shall be included into the technical specification on the drawing field of components that have anticorrosive coating, which contains chromium.

5.2.4 On the first page of specification on assembly units, which contain fastening units with content of chromium in anticorrosive coating, the following note 'Presence of hexavalent chromium in anticorrosive coating is not tolerated' shall be introduced above the main title.

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6. Requirements to purchased products and materials

6.1 Recycling requirements to a purchased component shall be defined in Chapter 6.17 in the Technical Specification to a Component.

6.1.1 In item 6.17.1 specific requirements, stipulated for in Annex II to Directive 2000/53/EC with regard to changes introduced by Decision 2010/115/EC, shall be set forth regarding:

- content of restricted, dangerous substances in component's materials: lead, mercury, cadmium and hexavalent chromium;
- mandatory marking of components, containing lead:
 - batteries;
 - vibration dampers;
 - components, containing lead in solder;
 - components, containing lead in electrical connections;
 - electrical components, which contain lead in a glass or ceramic matrix compound except glass in bulbs and glaze of spark plugs.

Dimensional drawing of a component (from the abovementioned) introduced by its manufacturer, shall contain information about marking that states the presence of lead in a component.

Item 6.17.1 of the Technical Specification to a Component shall also contain requirement regarding submission by the manufacturer of the Material Data Sheet of the materials, which are used in the component, according to the template stipulated for in Appendix 5 to the present STO, as well as other necessary documents, which confirm carrying-out of recycling requirements by the component. Procedure for execution of the Material Data Sheet of the materials, which are used in the component, is set forth in Appendix 6.

Compliance with the requirements of the applicable recycling regulatory documents shall be stipulated for in component specification.

6.1.2 Special requirements to components regarding dismantling and reuse concept shall be set forth in item 6.17.2 including requirements of Decision 2003/138/EC to component and material coding, according to which:

- to mark components made of polymers weighing over 100 g identification scheme according to standards ISO 1043-1, ISO 1043-2, ISO 11469 shall be used;
- to mark components made of rubber and elastomers weighing over 200 g identification scheme according to standard ISO 1629 shall be used.

Marking location and its content shall be indicated in a dimensional drawing or in technical specifications, received from the manufacturer.

6.1.3 Requirement for submission of component disassembly instruction for the purpose of recycling shall be set forth in item 6.17.3;

6.2 Requirements to the materials, which are used for manufacturing of components, for decorative and protective coatings etc regarding recycling and presence of dangerous substances shall be defined in Technical Requirements to Material.

An item about mandatory submission of the Material Data Sheet according to the template, set forth in Appendix 7, shall be introduced in Technical Requirements to Material. Material Data Sheet is filled out for each material separately.

Content in the materials of dangerous substances like lead, mercury, cadmium and hexavalent chromium must comply with Annex II to Directive 2000/53/EC with regard to the changes, introduced by Decision 2010/115/EC (see item 5 of these Procedural Guidelines).

Compliance with this requirement shall be confirmed in material specification, developed by the

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manufacturer and submitted for approval.

6.3 Manufacturer's obligations regarding carrying out of the requirements of the Technical Specification to a Component and Technical Requirements to Material, as well as requirements of design documentation for components that are manufactured by way of cooperation, with regards to the content of dangerous substances in used materials shall be recorded in component supply agreements.

Mandatory submission by the manufacturer of Data Sheets of the materials, which are used in the component, executed according to Appendices 5 and 6 to this STO, as well as amended Data Sheets, shall be set forth in supply agreements for assembly units that are manufactured according to the documentation, developed in UEC LLC, when introducing changes into design documentation regarding design and influencing changes of weight, used material, coating type, marking of products made of plastics and rubber (elastomers).

In case the Technical Specification to a Component and Technical Requirements to Material are missing then specific recycling requirements, stipulated for in items 6.1 and 6.2 of these Procedural Guidelines, are set forth in supplement agreements on components and materials.

6.4 Fully executed, signed and sealed Data Sheet, which was received from the component supplier/manufacturer, shall be attached to the notice of issuance of the electronic Material Data Sheet, which is issued according to STO 01.02-10 MU04. At entry to CoC Document Support the Data Sheet is scanned, inventory number is assigned to it, and then it is stored in technical archive of UEC LLC. By means of an inventory number the Material Data Sheet is connected in the data base with a corresponding electronic Material Data Sheet of a component.

7. Recommendations on development of vehicle components

7.1 When component designers and specialists, who are responsible for organization of design works and supply of components by third parties, choose materials for component parts, they shall consider following recommendations, which facilitate further treatment of components, besides technical, technological and economic parameters:

- use materials, which are recycled according to existing recycling technologies, e.g. such polymers as PE, PP, PA, ABS, POM, PS, PBT, PC, PUR, and thermoplastic elastomers. Table of environmental priorities of polymer materials, which are used in vehicles, is given below:

No.	Name (Identification according to ISO 1043-1)
1	Polyethylene (PE); Polypropylene (PP)
2	Polyamide (PA); Acrylonitrile butadiene styrene plastic (ABS), Polyoxymethylene, Polyacetal, Polyformaldehyde (POM); Polystyrene (PS)
3	Styrene Maleic Anhydride plastic (SMA); Acrylonitrile Styrene Acrylate plastic (ASA); Styrene acrylonitrile plastic (SAN); Poly(methylmethacrylate) (PMMA)
4	Poly(ethyleneterephthalate) (PET); Poly(butyleneterephthalate) (PBT); Polycarbonate (PC)
5	Polyurethane (PUR); Phenol-formaldehyde resin (PF); thermoplastic elastomers
6	Poly(vinylchloride) (PVC); Poly(propylene oxide) (PPOX)
7	Elastomers; thermosetting plastics
8	Combinations of incompatible materials

- reduce or eliminate coating where possible, as it is easier and less expensive to recycle uncoated materials;

- reduce the quantity and types of materials in a unit in order to enhance separation and reduce recycling costs;

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- reduce use of components, composed of different materials, which are difficult to separate;
- it is necessary to consider following provisions for polymer components:
 - thermoplastic polymers are more preferable than thermosetting plastics and resins;
 - it is more difficult to recycle painted parts and parts with coating;
 - it is difficult to recycle glass-fibre reinforced polymer materials;
 - it is difficult to recycle composite materials, containing more than two types of fillers (reinforcing materials);
 - unpainted polymers of black and natural colors increase recyclability rate;
- the following rules shall apply to non-metal components of assemblies (units):
 - 1) a unit shall be designed as a system on the basis of one material;
 - 2) in case action 1) is impossible, use those materials, which are appropriate for joint recycling, e.g. according to the table of compatibility of thermoplastic polymers (Appendix 4);
 - 3) in case action 2) is impossible, stipulate for an easy separation of the unit's component parts from each other;
 - 4) in case action 3) is impossible, use such material combinations, which can be easily separated.

7.2 It is recommended to consider the following while making decision regarding the connection method for vehicle's parts and units:

- to assemble components, which are dismantled from an ELV in order to be reused, apply fixtures, which allow easy dismantling of the component, preferably without use of special tools;
- number of unit's parts, which are to be separated, shall be minimized where possible. Use mechanical joints for their quick separation;
- it is reasonable to eliminate combination of dissimilar materials by such methods that do not allow their easy separation;
- it is reasonable to eliminate adhesive joints, if necessary apply adhesives, which can be recycled together with the bonded component;
- large components such as thermal and noise insulation, upholstery and decorative materials, as well as lining, and plates shall be fixed in such a way so as to be easily dismantled.

8. Recording Changes

Version	Approval date	Effective date	ID of the approving person

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Appendix 1

(Reference)

Identification of polymers according to ISO 1043-1

No.	Abbreviation	Name
1	AB	Acrylonitrile-butadiene plastic
2	ABAK	Acrylonitrile-butadiene-acrylate plastic
3	ABS	Acrylonitrile-butadiene-styrene plastic
4	ACS	Acrylonitrile-chlorinated polyethylene-styrene
5	AEPDS	Acrylonitrile-(ethylene-propylene-diene)-styrene plastic
6	AMMA	Acrylonitrile-methyl methacrylate plastic
7	ASA	Acrylonitrile-styrene-acrylate plastic
8	CA	Cellulose acetate
9	CAB	Cellulose acetate butyrate
10	CAP	Cellulose acetate propionate
11	CEF	Cellulose formaldehyde
12	CF	Cresol-formaldehyde resin
13	CMC	Carboxymethyl cellulose
14	CN	Cellulose nitrate
15	COC	Cycloolefin copolymer
16	CP	Cellulose propionate
17	CTA	Cellulose triacetate
18	EAA	Ethylene-acrylic acid plastic
19	EBAK	Ethylene-butyl acrylate plastic
20	EC	Ethyl cellulose
21	EEAK	Ethylene-ethyl acrylate plastic
22	EMA	Ethylene-methacrylic acid plastic
23	EP	Epoxide; epoxy resin or plastic
24	E/P	Ethylene-propylene plastic
25	ETFE	Ethylene-tetrafluoroethylene plastic
26	EVAC	Ethylene-vinyl acetate plastic
27	EVOH	Ethylene-vinyl alcohol plastic
28	FEP	Perfluoro(ethylene-propylene) plastic
29	FF	Furan-formaldehyde resin
30	LCP	Liquid-crystal polymer
31	MABS	Methyl methacrylate-acrylonitrile-butadiene-styrene plastic
32	MBS	Methyl methacrylate-butadiene-styrene plastic
33	MC	Methyl cellulose
34	MF	Melamine-formaldehyde resin
35	MP	Melamine-phenol resin
36	MSAN	α -methylstyrene-acrylonitrile plastic
37	PA	Polyamide
38	PAA	Poly(acrylic acid)
39	PAEK	Polyaryletherketone
40	PAI	Polyamidimide
41	PAK	Polyacrylate
42	PAN	Polyacrylonitrile

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43	PAR	Polyarylate
44	PARA	Poly(aryl amide)
45	PB	Polybutene
46	PBAK	Poly(butyl acrylate)
47	PBD	1,2-polybutadiene
48	PBN	Poly(butylene naphthalate)
49	PBT	Poly(butylene terephthalate)
50	PC	Polycarbonate
51	PCCE	Poly(cyclohexylene dimethylene cyclohexanedicarboxylate)
52	PCL	Polycaprolactone
53	PCT	Poly(cyclohexylene dimethylene terephthalate)
54	PCTFE	Polychlorotrifluoyethylene
55	PDAP	Poly(diallyl phthalate)
56	PDCPD	Polydicyclopentadiene
57	PE	Plyethylene
58	PE-C	Plyethylene, chlorinated
59	PE-HD	Plyethylene, high density
60	PE-LD	Plyethylene, low density
61	PE-LLD	Plyethylene, linear low density
62	PE-MD	Plyethylene, medium density
63	PE-UHMW	Plyethylene, ultra high molecular weight
64	PE-VLD	Plyethylene, very low density
65	PEC	Polyestercarbonate
66	PEEK	Polyetheretherketone
67	PEEST	Polyetherester
68	PEI	Polyetherimide
69	PEK	Polyetherketone
70	PEN	Poly(ethylene naphthalate)
71	PEOX	Poly(ethylene oxide)
72	PESTUP	Polyesterurethane
73	PESU	Polyethersulfone
74	PET	Poly(ethylene terephthalate)
75	PEUR	Polyetherurethane
76	PF	Phenol-formaldehyde resin
77	PFA	Perfluoro alkoxyl alkane resin
78	PI	Polyimide
79	PIB	Polyisobutylene
80	PIR	Polyisocyanurate
81	PK	Polyketone
82	PMI	Polymethacrylimide
83	PMMA	Poly(methyl methacrylate)
84	PMMI	Poly – N – methylmethacrylimide
85	PMP	Poly – 4 – methylpent - 1 – ene
86	PMS	Poly – α – methylstyrene
87	POM	Polyoxymethylene; polyacetal; polyformaldehyde
88	PP	Polypropylene
89	PP-E	Polypropylene, expendable

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90	PP-HI	Polypropylene, high impact
91	PPE	Poly(phenylene ether)
92	PPOX	Poly(propylene oxide)
93	PPS	Poly(phenylene sulfide)
94	PPSU	Poly(phenylene sulfone)
95	PS	Polystyrene
96	PS-E	Polystyrene, expandable
97	PS-HI	Polystyrene, high impact
98	PSU	Polysulfone
99	PTFE	Polytetrafluoroethylene
100	PTT	Poly(trimethylene terephthalate)
101	PUR	Polyurethane
102	PVAC	Poly(vinyl acetate)
103	PVAL	Poly(vinyl alcohol)
104	PVB	Poly(vinyl butyral)
105	PVC	Poly(vinyl chloride)
106	PVC-C	Poly(vinyl chloride), chlorinated
107	PVC-U	Poly(vinyl chloride), unplasticized
108	PVDC	Poly(vinylidene chloride)
109	PVDF	Poly(vinylidene fluoride)
110	PVF	Poly(vinyl fluoride)
111	PVFM	Poly(vinyl formal)
112	PVK	Poly – N – vinylcarbazole
113	PVP	Poly – N – vinylpyrrolidone
114	SAN	Styrene-acrylonitrile plastic
115	SB	Styrene-butadiene plastic
116	SI	Silicone plastic
117	SMAH	Styrene-maleic anhydride plastic
118	SMS	Styrene – α -methylstyrene plastic
119	UF	Urea-formaldehyde resin
120	UP	Unsaturated polyester resin
121	VCE	Vinyl chloride-ethylene plastic
122	VCEMAK	Vinyl chloride-ethylene-methyl acrylate plastic
123	VCEVAC	Vinyl chloride-ethylene-vinyl acetate plastic
124	VCKMAK	Vinyl chloride-methyl acrylate plastic
125	VCMMA	Vinyl chloride-methyl methacrylate plastic
126	VCOAK	Vinyl chloride-octyl acrylate plastic
127	VCVAC	Vinyl chloride-vinyl acetate plastic
128	VCVDC	Vinyl chloride-vinylidene chloride plastic
129	VE	Vinyl ester resin

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Appendix 2

(Reference)

Symbols for identification of fillers and reinforcing materials according to ISO 1043-2

Symbol	Material*
B	Barium
C	Carbon
D	Trihydrate aluminium oxide
E	Clay
G	Glass
K	Calcium carbonate
L	Cellulose
M	Mineral, metal**
N	Natural organic substance (cotton, sisal, hemp, lint etc.)
P	Mica
Q	Quartz
R	Aramid
S	Synthetic organic substance (e.g. fine PTFE, polyamides or thermosetting resins)
T	Talcum
W	Wood
X	Not regulated
Z	Other materials, not included in this list

* - this material can be further described, e.g. by means of chemical symbols or additional markings, stipulated for in a corresponding international standard.

** - in case of metals (M) metal type must be indicated by its chemical symbol (symbols).

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Appendix 3

(Reference)

Symbols for identification of the form or structure of fillers and reinforcing materials according to ISO 1043-2

Symbol	Form or structure
B	Beads, balls, spherical shape
C	Chippings, saw dust, cuttings
D	Dust, powder
F	Fiber
G	Ground
H	Threads, hair
K	Textile fabric
L	Layer, interlayer
M	Matting substance, (thick) filler
N	Nonwoven (thin fabric)
P	Paper
R	Roving
S	Flakes, scales
T	Braid fabric, braid
V	Veneer wood
W	Woven fabric
X	Not regulated
Y	Yarn
Z	Other forms or structures, not included in this list

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Appendix 4

Compatibility of thermoplastic polymers with regard to joint recycling

«+» - good compatibility

«O» - restricted compatibility

«-» - incompatibility

	ABS	ASA	PA	PBT	PBT +PC	PC	PC+ ABS	PC+ PBT	PE	PET	PMMA	POM	PP	PPO	PPO +PS	PS	PVC	SAN	TPUR
ABS	+	+	O	+	+	+	+	+	O	O	+	O	O	O	O	O	+	+	+
ASA	+	+	O	+	+	+	+	+	O	O	+	O	O	O	O	O	+	+	+
PA	O	O	+	O	O	-	-	-	O	O	O	O	O	-	O	O	-	O	+
PBT	+	+	O	+	+	+	+	+	O	O	O	O	O	O	O	O	+	+	O
PBT+PC	+	+	O	+	+	+	+	+	O	O	O	-	O	O	O	O	-	+	+
PC	+	+	-	+	+	+	+	+	O	+	+	-	O	O	O	O	-	+	O
PC+ABS	+	+	O	+	+	+	+	+	O	+	+	O	O	O	O	O	-	+	+
PC+PBT	+	+	-	+	+	+	+	+	O	+	+	O	O	O	O	O	-	+	+
PE	-	-	O	-	-	O	-	-	+	-	-	-	+	-	O	-	O	-	O
PET	+	+	O	+	+	+	+	+	O	+	O	O	O	O	O	O	-	+	O
PMMA	+	+	O	O	O	+	+	+	O	O	+	-	O	O	O	O	O	+	O
POM	O	O	O	O	O	-	-	-	O	O	-	O	O	O	O	O	O	O	O
PP	-	-	O	-	-	-	-	-	O	-	-	-	+	-	O	-	O	-	O
PPO	O	O	O	O	O	O	O	O	O	O	O	O	O	+	+	+	-	O	O
PPO+PS	O	O	+	O	O	O	O	O	O	O	O	O	O	+	+	+	-	O	O
PS	O	O	O	O	O	O	O	O	O	O	O	O	O	+	+	+	O	O	O
PVC	+	+	-	-	-	-	-	-	O	-	+	+	O	-	O	O	+	+	+
SAN	+	+	O	+	+	+	+	+	O	O	+	O	O	O	O	O	+	+	O
TPUR	+	+	+	O	+	+	+	+	O	+	+	+	O	O	O	O	+	+	+

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Appendix 5.

Template of a Data Sheet of materials, which are used in a purchased/cooperative product

Data sheet of materials, which are used in a component part

1. Information about the supplier/manufacturer of the product

	Supplier	Manufacturer
Name		
Legal address		
Contact person (position, full name)		
City code and phone number		
Fax		
E-mail		
Registration with IMDS (Yes/No)		
Availability of a certified QMS at the manufacturer's (certificate number)		

2. General information about the product

Product name	
Product identification	
Product weight, kg	
Identification of product specification	
Specification change notice, date	
Presence of coating at least on one part, Yes/No	
Presence of marking on polymer and resin parts, Yes/No	
Marking's content (if any)	
Lead weight in a component, g	

Note. In line 'Lead weight in...' one indicates the weight of lead that is contained in solders, used in components, electrical connections and components of electrical equipment, which contain lead in a glass or ceramic matrix compound except glass in bulbs and glaze of spark plugs.

3. Information about the product BOM regarding material categories

Code	Material category	Weight, kg
1	Ferrous metals	
2	Non-ferrous metals	
3	Polymer materials	
4	Resins (elastomers)	
5	Glass	
6	Liquids	
7	Natural organic materials (wood, leather, cotton, cardboard, flocks etc.)	
8	Other materials, which do not refer to categories 1 – 7)	
	Product weight	

Note. Sum of weights according to material categories must correspond to the product weight in total; weight of materials in category 8 must not exceed: for products (besides components of the electrical equipment system) – 5%, for components of the electrical equipment system – 15% of the product weight in total.

4. Information about coatings of component parts

Name of part	Identification of part	No. of parts in a product	Type of coating	Coating thickness, micrometer	Coating weight, g

Note. Parts with coating (anti-corrosive, protective, decorative, paint and lacquer, etc.) are shown in the table.

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5. Information about the content of dangerous substances in component's materials.

5.1 Information about the content of dangerous substances (lead, cadmium, hexavalent chromium, mercury) in component parts

Name of part	Identification of part	Part weight, kg	No. of parts in a product	Part material	Content of dangerous substances by weight, %			
					Pb	Cd	Hg	Cr (6+)

5.2 Information about the content of dangerous substances (lead, cadmium, hexavalent chromium, mercury) in coatings of component parts

Name of part/ product	Identification of part / product	Name and material of the coating	Content of dangerous substances by weight, %			
			Pb	Cd	Hg	Cr (6+)

6. Declaration of compliance of the product with the requirements of Directive 2005/64/EC and Directive 2000/53/EC

6.1 The product corresponds to the requirements of Directive 2000/53/EC regarding restriction of content of lead, cadmium, hexavalent chromium and mercury in materials with regard to the amendments introduced by Decision 2010/115/EC.

6.2 The product corresponds to the requirements of Directive 2005/64/EC and Decision 2003/138/EC regarding presence of a mandatory marking of materials on parts made of polymer materials weighing 100 grams and over, and on parts made of resin weighing 200 grams and over.

6.3 Marking corresponds to the standards for polymer materials: ISO 1043-1, ISO 1043-2 and ISO 11469; and ISO 1629 for resins.

Position of the responsible person	Full name	Signature	Date

LS

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Appendix 6

Regulation on execution of Data Sheet of materials, used in a component part

1. Data Sheets of materials, which are used in a component part (hereinafter – Data Sheets), are required to fill in electronic Material Data Sheets of component parts of GAZ vehicles in the UEC LLC data base, and also to submit them to certification authorities.

2. Data Sheets must be issued for all purchased and cooperative component parts by their manufacturers and submitted to UEC LLC. Data Sheet is issued for each component part separately.

3. Regulation on execution of a Data Sheet.

3.1 Chapter 2. General information about the product.

3.1.1 Boxes with information about the product are filled in according to design documents and technical specification for the product, numbers and dates of change notices of these documents.

3.1.2 Product weight is given in kilograms with three decimal places of precision.

3.1.3 Coating availability. In case there is at least one coating layer on one of the parts being part of the product's BOM, 'Yes' is recorded in the box. Under coating is understood any anticorrosive, protective, decorative, paint and lacquer and other type of coating, which has certain thickness and BOM, different from material of the main component part. Surface hardening, heat treatment, ion implantation, grinding, processing with electrical and physical methods etc. are not considered to be coatings in this case. If material with preliminary applied coating is used, marking 'Yes' is also recorded in the box.

3.1.4 Presence of material marking. Presence or absence of material marking on polymer and resin parts is checked against design documentation. Such a marking is obligatory for polymer parts weighing 100 grams and over, and for resin (elastomers) parts weighing 200 grams and over. In case there is a requirement in design documentation that marking shall be applied at least to one product part, 'Yes' shall be recorded in the box. In this case the box 'Marking content' shall be filled in. In case there is no design documentation for the product parts, 'No' shall be recorded in the box with requirements to material marking, in this case the box 'Marking content' is not filled in.

3.1.5 Marking content. The actual content of a material marking (for polymer and resin parts) is indicated in this box according to the design documentation requirements. In case there are several component parts with different markings in product BOM, three markings are recorded in the box, if there are more markings record 'and others' is made. In this case the preference is given to parts that weigh more; markings are recorded in weight decreasing order. It is allowed to enter records about marking content separated by a comma and a space or to start a new line for each record.

Examples:

Presence of marking on polymer and resin parts, Yes/No	Yes
Marking content (if any)	>PMMA< >PP-T20< >PC< and others

or

Presence of marking on polymer and resin parts, Yes/No	Yes
Marking content (if any)	>PMMA<, >PP-T20<, >PC< and others

3.2 Chapter 3. Material categories

Product BOM is filled in regarding categories of the used materials. Weight of all the materials used in the product, applicable to a certain category, is recorded with three decimal spaces of precision opposite each of the eight material categories in the box 'Weight'. In case of absence of materials of some category in the product, '0' is recorded in the corresponding box. Sum of weights of all eight categories must comply with the total product weight.

3.3 Chapter 4. Information about coatings used on component parts.

3.3.1 Table from Chapter 4 is filled in if there is at least one coating layer on one of the BOM's parts. Name, part identification and coating type are entered according to the product design documentation. For products, which contain materials with preliminary applied coating, the coating type is entered according to technical specifications or technical requirements to material. Coating thickness is indicated in integral micrometers, coating weight is indicated in grams with one decimal place of precision. In case the coating is non-homogeneous with several layers of different materials, data on all the layers are entered into the table separately one after another, starting from the surface towards the main material.

3.3.2 Considering the fact that paint and lacquer, noise insulating, vibration damper and other polymer coatings have significant thickness and weight, it is mandatory to fill out the boxes 'Coating thickness' and 'Coating weight'. The coating weight must be also included in the corresponding material category in Chapter 3 of the Material Data Sheet.

Information about the coating must correspond to its actual state (thickness, weight, relative density) on the component,

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being part of the vehicle, and not at the moment of technological operations of applying that coating.

3.4 Chapter 5. Information about the content of dangerous substances.

3.4.1 Dangerous substances are: Cd – cadmium; Cr (+6) – (hexavalent) chromium; Hg - mercury; Pb – lead.

Names and identifications of product components, which material contains dangerous substances, names of dangerous substances and their percent composition in the material by weight are indicated in table 5.1. Data about the concentration of dangerous substances in the material must have precision not lower than 0.01%. If span of concentrations is indicated for dangerous substances then arithmetic mean value is used for the calculation. If hazardous substance is absent 0 (zero) shall be entered in the corresponding column.

3.4.2 In case there is coating on the product or its parts table 5.2. must be filled in. Requirements to filling in the box regarding the content of dangerous substances are similar to the requirements to filling in table 5.1.

3.5 Chapter 6. Declaration of compliance of the product with the requirements of Directive 2005/53/EC and Directive 2000/53/EC.

Signing of the Material Data Sheet practically implies that the supplier accepted the Declaration of compliance and that:

- the information, contained in the Material Data Sheet, fully represents the facts and corresponds to the design documentation;
- marking of materials fulfills the requirements of Decision 2003/138/EC regarding the presence of obligatory material marking on polymer parts weighing 100 grams and over, on resin parts weighing 200 grams and over;
- content of dangerous substances in the product corresponds to the requirements of Directive 2000/53/EC regarding restriction on content of lead, cadmium, hexavalent chromium and mercury in materials taking into account changes, which were introduced by corresponding EC Decisions.

3.6 Fully executed Data Sheet is signed by responsible persons and sealed by the supplier.

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Appendix 7

Template of Material Data Sheet

Material Data Sheet (filled in for each material separately)

1. Information about the supplier/manufacturer of the material

	Supplier	Manufacturer
Name		
Legal address		
Contact person (position, full name)		
City code and phone number		
Fax		
E-mail		

2. General information about the supplied material

Name of the material	
Material grade	
Material identification when placing an order	
Regulatory document for material supply (GOST, technical specification)	
Presence of at least one layer (coating) made of another material, Yes/No	

3. Information about application of the material to the set categories

Code	Material category	%
1	Ferrous metals	
2	Non-ferrous metals	
3	Polymer materials	
4	Resins (elastomers)	
5	Glass	
6	Liquids	
7	Natural organic materials (wood, leather, cotton, cardboard, flocks etc.)	
8	Other materials, which do not refer to categories 1 – 7)	
	Total	100.0%

Note: For material categories values are indicated in percent by weight. For homogeneous (one layer) material 100.0 is recorded in the right column. In case material is non-homogeneous (having several layers, coatings, additional reinforcing elements made of other materials) data are entered separately for each material category, which is present in the supplied material, with precision up to 0.1% by weight. Sum of values, which are indicated for different material categories in the right column, shall be equal to 100.0%.

4. Information about layers and coatings of the material

Number of the layer (coating)	Material of the layer (coating)	Layer thickness, micrometer	Layer weight, g/m ²
1			
2			
3			

Note: The table is filled in if there is at least one layer (coating) made of another material. Number of the layer (coating) is indicated in sequence starting from the surface to the main material, then inner layers and reinforcing materials (if any) are described.

5. Information about the content of dangerous substances in the material.

5.1 At the moment requirements regarding content of dangerous substances in the material are set by Directive 2000/53/EC and Decision 2010/115/EC. Content of dangerous substances in homogeneous material, layer, and coating shall not exceed:

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lead, mercury, hexavalent chromium – 0.1% by weight, cadmium – 0.01% by weight.

As an exception lead can be contained in the following materials:

- steel for machining purposes and galvanized steel containing up to 0.35% by weight;
- aluminium – 0.4% by weight;
- copper alloy – 4% by weight;
- batteries;
- vibration dampers;
- solder and material of pin connections (this exception shall be reconsidered in 2014);
- glass or ceramic matrix compound except glass in bulbs and glaze of spark plugs;

For vehicles type-approved before July 1, 2012 presence of lead is tolerated in:

- discharge lamps used in head lights;
- luminescent lamps used in instrument panel displays.

5.2 Information about the content of dangerous substances (lead, cadmium, hexavalent chromium, mercury) in the material

Name of the dangerous substance	Concentration in 1 layer, %	Concentration in 2 layer, %	Concentration in 3 layer, %	Concentration in 4 layer, %	Concentration in the main material, %
Pb					
Cd					
Cr (+6)					
Hg					

Note: Content of each dangerous substance in percent by weight is specified separately for main material and for each layer (coating) indicated in item 4. If there is a value range in the regulatory documents arithmetic mean value for dangerous substances is indicated. If hazardous substance is absent 0 (zero) shall be entered in the corresponding column.

6. Declaration of compliance of the material with the requirements of Directive 2005/64/EC and Directive 2000/53/EC

The material corresponds to the requirements of Directive 2000/53/EC regarding restriction of content of lead, cadmium, hexavalent chromium and mercury in materials with regard to the amendments introduced by Decision 2010/115/EC

Position of the responsible person	Full name	Signature	Date