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Rev.	Data	Autore	Descrizione modifiche
0	30/05/2016	G.Di Liberto	Prima emissione
1	29/07/2016	G.Di Liberto	Inserimento nuovi criteri di valutazione (claim, trasporti speciali e csl) Ampliamento paragrafo riguardante livelli di PPAP
2	08/09/2016	G.Di Liberto	Rivista formattazione e indice
3	02/08/2017	G.Di Liberto	Rivista valutazione fornitore e cp/cpk richiesti
4	22/06/2018	G.Di Liberto	Modificato analisi preliminare fornitore e modulo PO PUR 04 01
5	02/07/2020	G.Di Liberto	Rivista valutazione fornitori secondo la VDA 6.3
6	10/09/2021	N. Cavasin	Aggiunta versione inglese
7	20/05/22	G. Fiorin	Aggiornati paragrafi 4.4 (tolto riferimento a MGPN) e ridefiniti KPI assegnazioni classi, 10.1 (gestione selezioni) e cap. 11 (dettagliati i CSL). Altre modifiche minori

NOTA: sono indicate in tabella le ultime 10 modifiche.


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1 PURPOSE

The aim of this Quality Manual is to provide a unique and structured approach to the management of external supplies and the suppliers themselves.

2 FIELD OF APPLICATION

The manual applies to all external suppliers including the contract workers.

3 QUALITY MANAGEMENT SYSTEM

The supplier must establish, implement and maintain a quality management system in accordance with the standard UNI EN ISO 9001:2015.

Suppliers of products destined for the automotive industry must have third-party certification according to UNI EN ISO 9001:2015 issued by an accredited third-party body with the aim of obtaining compliance with IATF:16949:2016.

As a minimum requirement, the supplier must be in possession of updated versions of the following Automotive Industry Action Group (AIAG) manuals:

- APQP – Advanced Product Quality Planning
- PPAP – Production Part Approval Process
- FMEA – Failure Modes Effects Analysis
- SPC – Statistical Process Control
- MSA – Measurement Systems Analysis

The above manuals can be purchased on the website www.aiag.org.

4 EVALUATION AND MONITORING OF SUPPLIERS

4.1 Prior evaluation of suppliers

The potential supplier must provide structured information about their business. Depending on the analysis of the information, mG decides whether to send an offer request to the potential supplier.


The buyer, in collaboration with SQE, U.T. and logistics, fills in the title page of the PSA card and carries out the preliminary evaluation of the supplier (M PO PUR 04 01).

If the offer submitted by the vendor is competitive, mG defines the activities to be performed for the supplier qualification. These activities include carrying out an audit with the supplier.

Once the qualification tasks are completed, mG decides whether the potential new vendor can be placed on the vendor list.

Supplier Quality evaluates the production process of all new suppliers and, at its discretion, of suppliers already acquired by carrying out a VDA 6.3 Audit.

Depending on the score obtained, the following activities are provided.

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VDA 6.3 Audit Score	Class	Activity
100 - 80	A	None
79 - 60	B	Corrective action plan to share with mG If corrective actions are not implemented effectively within the expected time > New Business Hold
59 - 20	C	Immediate containment actions Corrective action plan to share with mG with effectiveness check within 60 days If corrective actions are not implemented effectively within the expected time > New Business Hold

4.2 Evaluation of the production process

If Supplier Quality is requested, it evaluates the production process of a new component made by a supplier already on the vendor list, carrying out VDA 6.3 Audits.

Depending on the score obtained, the following activities are provided.

PCPA Audit Score	Activity
2	None
1	Corrective action plan to share with the MG If corrective actions are not implemented effectively within the expected time > New Business Hold
0	Production stop for process subjected to VDA 6.3 New Business Hold


4.3 Assigning new products to already acquired suppliers

Each mG establishment defines the quality and service criteria to be met for the allocation of new products to suppliers (e.g. having achieved quality performance above a certain objective for a certain period, etc.).

Purchasing issues a *sampling order* for the new product to the vendor already acquired.

If the production process is new and considered critical for the supplier, Supplier Quality carries out a VDA 6.3 Audit and manages any corrective action plans.

Once the vendor's PPAP has been approved, Purchasing assigns the product.

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4.4 Monitoring and development of suppliers

Every mG plant communicates annually to its suppliers the quality improvement and service objectives to be achieved.

Supplier Quality identifies which suppliers to include in improvement programs and manages improvement plans. If the supplier does not achieve the objectives agreed in the improvement program, Supplier Quality will propose its withdrawal to Purchasing.

Every mG plant manages service level improvement projects according to its own internal procedures.

The overall assessment of the supplier is defined through the Radar Chart as an overall evaluation method that takes into account 5 evaluation aspects such as

- PPM values
- Number of NC's in rolling year
- OTD (On Time Delivery), i.e. Punctuality of deliveries
-
- Service, a discretionary KPI related to suppliers skills on giving technical and quality support to the customer and its competitiveness

For each of these aspects a score is assigned that goes from a minimum of 1 to a maximum of 5, each evaluation is attributed a specific weight that will affect the overall judgment that will define the class to which the supplier belongs


- Class A Supplier eligible to supply mG
 Class B Supplier in need of improvement plan
 Class C Potentially removable supplier

A From 85 to 100

B From 65 to 84,9

C Up to 64,9

PPM	5	0
	4	1 - 500
	3	501 - 2000
	2	2001 - 10000
	1	> 10000
NC	5	0
	4	1
	3	2
	2	3
	1	>3

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On time deliveries	5	Deliveries performances from 90% to 100%
	4	Deliveries performances from 75% to 89,9%
	3	Deliveries performances from 60% to 74,9%
	2	Deliveries performances from 30% to 59,9%
	1	Deliveries performances up to 30%
Service	5	Supplier that takes care promptly customer requests with competence and competitiveness
	4	Supplier that takes enough care on customer requests with competence and competitiveness
	3	Supplier that only sometimes takes care on customer requests with competence and competitiveness
	2	Supplier that rarely takes care on customer requests with competence and competitiveness
	1	Supplier that doesn't take care on customer requests with competence and competitiveness

The final score that defines the final class of supply also affects 3 other parameters evaluated annually: the number of special transports that had to be faced to comply with deliveries, controlled shipping levels, and complaints from the field originated from the suppliers.

The total count of the cases received for each supplier results in a 3-point reduction from the final assessment for each case submitted.

For example: supplier A with score 58, CSL 1 case, special transport 0 cases, complaints from the field 3 cases; the final rating will be: $58 - (3 \times 1 + 3 \times 0 + 3 \times 3) = 46$.

5 PRODUCT QUALITY PLANNING

Advanced product quality planning is a structured method to define the tasks necessary to ensure that a product complies with customer requirements during the development and launch phases.

The supplier, without prejudice to its autonomy in the selection and development of its processes, must be able to carry out an advanced planning of product quality in accordance with the provisions of the *AIAG Advanced Product Quality Planning and Control Plan (APQP)* manual.

Following the issuance of the sampling order of each new product, the Quality of the mG receiving establishment will communicate to the supplier:

- which Advanced Product Quality Planning activities to carry out.
- when it is necessary to prove that these activities are carried out during the product approval process by sending the relevant documentation (e.g. flowcharts, FMEA, capacity studies, etc.).


At mG's request, the supplier must make readily available for consultation documentation relating to the activities carried out that does not need to be sent during the product approval process.

Some of the principal Advanced Product Quality Planning activities are listed in the following paragraphs.

5.1 Flowchart of the production process

The supplier must prepare a flowchart that illustrates the sequence of all stages of the process, from the receipt of the material to the shipment of the finished product, including subcontracting and re-processing processes and control, handling and packaging activities.

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5.2 FMEA

The *Potential Failure Mode & Effects Analysis* (FMEA) is an analysis aimed at predicting, solving or controlling potential product or process problems by systematically evaluating possible failure modes based on their probability of occurrence, the severity of their effects, and the possibility of detection by controls. Potential problems must be minimised through the implementation of appropriate corrective actions.

FMEA is a tool that must be applied to both the design of the product (DFMEA – Design Failure Mode and Effect Analysis) and the production process (PFMEA – Process Failure Mode and Effect Analysis).

The supplier must perform the FMEA as required by the AIAG *Potential Failure Mode & Effects Analysis* (FMEA) Manual.

When applicable, the supplier can process FMEA for product families.

The process FMEA must analyse potential failure modes that can occur at all stages of the process described in the flowchart (maintaining the same numbering) and pay special attention to the critical and safety features indicated in the mG technical documentation.

The FMEA needs to be updated every time products or processes are changed, production is transferred, or new ways of failure are discovered.

When requested, the supplier must participate in the drafting of the product or mG process FMEA related to the product provided by them.

5.3 Control plan

The supplier must ensure optimum management of the manufacturing processes by checking the parameters of the production processes and product characteristics, formalised in the control plans. mG requires all suppliers to develop control plans following the indications and model found in the AIAG *Advanced Product Quality Planning and Control Plan* (APQP) manual.


When drafting control plans, the supplier must take into account the flowchart, the process FMEA results, and experience with similar products. Methods of continuous process improvement must be applied.

Control plans must be developed for all stages of production and must include the control of all safety and key product and process characteristics (critical and important) indicated in the drawings and technical specifications referred to in them or resulting from the FMEA analysis.

There must be an unambiguous link between the control plans and the flowchart and FMEA phases. The control plans must be developed, where applicable, for the production of prototypes, pre-series batches and standard batches.

The control plans must be reviewed, and possibly updated, when a change occurs affecting the product, production process, measurements, logistics, sources of supply or the FMEA.

Without prejudice to its responsibility for the quality of the product, the supplier undertakes not to make changes to the control plans that result in reductions in the effectiveness of the controls (e.g. less accurate phases, frequencies or control methods) without prior notification to Quality of the mG plant that issued the product approval.

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5.4 Monitoring and measuring devices

The supplier shall have at his disposal monitoring and measuring devices, in such quantity and quality as to ensure the carrying out of all checks and tests to ensure compliance with the product characteristics and the process parameters referred to in the control plans.

Such devices, including those owned by mG, must be adequately identified and included in a calibration program.

In the event that the devices are used to verify a safety feature or product key, the supplier must perform measurement system analyses that include R&R studies as required by the *AIAG Measurement System Analysis (MSA)* manual.

Where provided, the personnel carrying out non-destructive tests must be qualified in accordance with the legislation in force in the country of the receiving establishment (e.g. EN 473, ISO 9712, ASNT TC 1A).

Where suppliers use external laboratories to carry out checks and tests on safety and key characteristics or on products intended for the automotive industry, they must be accredited in accordance with ISO/IEC 17025 or equivalent national names.

5.5 Planning of process capacity studies

The supplier must plan studies of the capacity of its process (detection of Pp, Ppk, Cp and Cpk), which it will carry out in accordance with the provisions of the *AIAG Statistic Process Control Manual (SPC)*, to monitor and control the production process in order to ensure that it operates to the maximum of its potential to produce products that comply with the requirements.

The supplier will have to carry out capacity studies on the safety and key characteristics indicated in the drawing.


The safety features are the product characteristics or the parameters of the production process that can affect end-user safety and/or product compliance with applicable legislative regulations.

The key features are the product characteristics or the parameters of the production process that can affect the functions and performance of the product and on the subsequent phases of the productions process, without impacting the safety or compliance of the product with applicable legislative regulations.

Unless otherwise stated in the design or technical specifications referred to therein, the supplier must comply with the requirements set out in the following table.

Feature type	Capacity for pre-series batches	Capacity for series batches
Safety features <S>	$Pp - Ppk \geq 2$	$Cp - CpK \geq 1.67$
Functional critical features <A>	$Pp - Ppk \geq 1.67$	$Cp - CpK \geq 1.33$
Functional features 	$Pp - Ppk \geq 1.33$	$Cp - CpK \geq 1.2$

If the supplier fails to obtain the prescribed values, he must use a poka yoke control system or carry out the 100% check.

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6 IDENTIFICATION AND TRACEABILITY OF PRODUCTS

The supplier must have a system that guarantees:

- the identification of the raw materials and semi-finished products in stock in their warehouses;
- the identification of the state of progress of the products in relation to monitoring and measurement requirements;
- the identification of the non-compliant product to avoid its inadvertent use or delivery;
- the identification of the finished product deemed compliant.

In the case of products manufactured for other customers as well, the supplier must affix a mark on the containers of the products constituting the safety stock, if requested, intended for mG.

The supplier must identify each container of the products to be shipped to mG via a label showing at least the mG identification code, lot, date of shipment and quantity of the goods delivered.

The supplier shall have at his disposal a system for identifying and clearly tracing, for each production lot, the date of manufacture, the results of the checks and tests to which the products have been subjected and any corrective action taken. This requirement also applies to products and processes manufactured by subcontractors.

For metallic machined parts traceability to the raw material, the supplier shall send the raw material certificate for each hGears part number in pdf format to the mailing list cqa@hgears.com. The file has to be named as "code_deliverynote". A correl


When requested, the supplier must mark the products, keep an audit and record their unique identification.

7 PRODUCT APPROVAL

7.1 PPAP Product Approval Process

Unless otherwise indicated, the supplier must present 5 sample pieces taken from a lot made with the process anticipated for mass production accompanied by the following documentation.

The following instructions are detailed regarding the requirements for PPAP. With particular reference to the automotive sector, section 1.4.1 of the AIAG manual is provided

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I.4 SUBMISSION TO CUSTOMER - LEVELS OF EVIDENCE

I.4.1 Submission Levels

The supplier shall submit the items and/or records specified by the level as requested by the customer:

- Level 1 - Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to the customer.
- Level 2 - Warrant with product samples and limited supporting data submitted to the customer.
- Level 3 - Warrant with product samples and complete supporting data submitted to the customer.
- Level 4 - Warrant and other requirements as defined by the customer.
- Level 5 - Warrant with product samples and complete supporting data available for review at the supplier's manufacturing location.

See Retention/Submission Requirements Table I.4.1 for exact requirements for each level.

The supplier shall use level 3 as the default level for all submissions unless specified otherwise by the responsible customer product approval activity. A supplier of bulk material only shall use level 1 as the default level for all bulk material PPAP submissions unless specified otherwise by the responsible customer product approval activity.

NOTE 1: The customer will identify the submission level that will be used with each supplier, or supplier and customer part number combination. Different customer locations may assign different submission levels to the same supplier manufacturing location.


NOTE 2: All of the forms referenced in this document may be replaced by computer-generated facsimiles. Acceptability of these facsimiles is to be confirmed with the responsible part approval activity prior to the first submission. The Automotive Industry Action Group (AIAG) offers for sale a diskette with the PPAP/APQP/FMEA forms.

At this point four separate categories are provided to distinguish the suppliers:

- I. AUTOMOTIVE COMPONENTS TO SPECIFICATION
- II. AUTOMOTIVE COMPONENTS FROM CATALOGUE
- III. OTHER COMPONENTS TO SPECIFICATION
- IV. OTHER COMPONENTS FROM CATALOGUE

I. AUTOMOTIVE COMPONENTS TO SPECIFICATION

A level 3 PPAP, including IMDS declaration, is required for this category. The following table taken from the AIAG manual, which distinguishes what is needed for each level of PPAP, is valid in order to understand what is required.

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Retention/Submission Requirements Table I.4.1
(Normative - See I.2.2 Note 2)

<i>Requirement</i>	Submission Level				
	<u>Level 1</u>	<u>Level 2</u>	<u>Level 3</u>	<u>Level 4</u>	<u>Level 5</u>
1. Design Records of Saleable Product	R	S	S	*	R
- for proprietary components /details	R	R	R	*	R
- for all other components/details	R	S	S	*	R
2. Engineering Change Documents, if any	R	S	S	*	R
3. Customer Engineering approval, if required	R	R	S	*	R
4. Design FMEA (See I.2.2.4)	R	R	S	*	R
5. Process Flow Diagrams	R	R	S	*	R
6. Process FMEA	R	R	S	*	R
7. Dimensional Results	R	S	S	*	R
8. Material, Performance Test Results	R	S	S	*	R
9. Initial Process Study	R	R	S	*	R
10. Measurement System Analysis Studies	R	R	S	*	R
11. Qualified Laboratory Documentation	R	S	S	*	R
12. Control Plan	R	R	S	*	R
13. Part Submission Warrant (PSW)	S	S	S	S	R
14. Appearance Approval Report, (AAR) if applicable	S	S	S	*	R
15. Bulk Material Requirements Checklist (for bulk material PPAP only)	R	R	R	*	R
16. Sample Product	R	S	S	*	R
17. Master Sample (See I.2.2.17)	R	R	R	*	R
18. Checking Aids	R	R	R	*	R
19. Records of Compliance With Customer-Specific Requirements	R	R	S	*	R

S = The supplier shall submit to designated customer product approval activity and retain a copy of records or documentation items at appropriate locations, including manufacturing.

R = The supplier shall retain at appropriate locations, including manufacturing, and make readily available to the customer representative upon request.

* = The supplier shall retain at appropriate locations, and submit to customer upon request.

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II. AUTOMOTIVE COMPONENTS FROM CATALOGUE

These components require a Level 4 PPAP, which includes PSW, 5 sample pieces, dimensional report, and packing sheet.

III. and IV. OTHER COMPONENTS TO SPECIFICATION and OTHER COMPONENTS FROM CATALOGUE

For non-automotive components the following table applies

	Other Design-based	Other from catalogue
Part submission warrant	X	X
5 pieces numbered and delivered separately	X	X
Registration of dimensional characteristics (5 samples)	X	X
Material certificate	X	
Heat treatment certificate	X	
Process capability chemical dimensions	X	
Control plan	X	
Production process cycle with machines		
R&R on critical dimensions		
FMEA		
Traceability		
Packaging form	X	

Before shipping the sample lot it is the responsibility of the supplier to ensure that all the product characteristics comply with the requirements required through appropriate checks and tests.

mG may request to assist in the execution of such checks and tests at the supplier's establishment.


If the characteristics do not comply with the requirements, the supplier must communicate it to the Quality department of the receiving mG establishment and can send the sample lot only after its express authorization.

The supplier will send the required documentation before the shipment of the sample lot or, if agreed with Quality of the mG receiving establishment, at the latest at the same time as the shipment.

The sample lot must be appropriately identified with a sign indicating the supplier's name, the customer's design number, the design review index and the reference to the purchase order.

The sample parts must be identified individually and the traceability of the relevant measurements and tests contained in the PPAP documentation must be ensured.

The approval of the product and the authorization of the supply will be issued by the Quality office of the receiving mG establishment on the basis of the compliance of the documentation provided and the

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results of the checks and tests carried out. The supplier will not be able to deliver the standard supply without such approval.

If non-conformities are detected, the Quality of the mg receiving establishment will not grant approval of the standard supply. Purchasing will then issue a new first sampling order. At the time of the subsequent supply, the Product Approval Process must be repeated. The new samples will be provided free of charge. The supplier will be charged for the costs of checking the new sampling (e.g. cost of personnel and use of control tools).

In special cases, conditional approval may be granted for a limited quantity or time. Purchasing will proceed with the assignment of the product to the supplier. At the time of the next standard supply, the supplier will have to submit the necessary documentation to prove the conformity of the characteristics waived.

8 CERTIFICATE OF QUALITY AND CONFORMITY

When required by the Quality office of the mG receiving establishment, supplies must be accompanied by the Certificate of Quality and Conformity (CQC), a document by which the supplier certifies the quality of the product supplied and declares its compliance with the requirements.

The information to be included in the CQC will be agreed with the Quality office of the mG receiving plant. This procedure may be requested following a non-compliance

9 VERIFICATION OF CONFORMITY OF SUPPLIES

mG reserves the right to carry out conformity checks on the supply products:

- at the supplier and/or its subcontractors;
- during receiving using sampling plans based on supplier performance; if a non-compliant piece is detected, the entire lot will be considered as such;
- in the commercial network;
- at the final customers.

10 MANAGEMENT OF NON-COMPLIANT PRODUCTS


mG is not required to carry out acceptance checks, except to seek damages due to transport and visible defects of the product. The Supplier is therefore fully responsible for the products supplied and undertakes to carry out all the necessary checks to ensure that these are free from defects or defects (even hidden) of design and manufacture.

The management of any non-compliance products will be carried out as follows.

10.1 Raw materials, printed, semi-finished, finished products or products whose non-conformity was caused by non-compliant materials, printed or semi-finished products

The Quality office of the mG receiving establishment may decide, in agreement with the supplier, to:

- handle the entire potentially non-compliant lot as if it were waste and return it to the supplier, with or without request for replacement, as needed;

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- have the supplier select the products in their factory; non-compliant products found during selection are then returned to the supplier or reworked in their own establishment or by third-party suppliers at the supplier's expense;
- select the potentially non-compliant products with their own personnel or of this party suppliers in their own plant at the supplier's risk and expense; the non-compliant products found during the selection are then returned to the supplier or reworked in their own plant or by third-party suppliers at the supplier's expense. mG reserves the right to have the products sorted by third party suppliers indicated by itself after confirmation of the rework order issued by the supplier in favor of the third party supplier.

10.2 Non-conformities caused by contract work operations

The Quality office of the mG receiving establishment may decide, in agreement with the supplier, to:

- return the potential non-compliant products to the supplier for selection and possible rework; the supplier must then return all the products (both compliant and non-compliant) appropriately marked;
- make the selection and any rework in their own establishment or entrust it to third-party suppliers at the supplier's expense.

11 MANAGEMENT OF CORRECTIVE ACTIONS

Upon detection of a non-compliance, the mG receiving establishment issues a non-compliance report.

The supplier must identify the causes of the non-compliance and take appropriate actions to eliminate them and prevent their recurrence.

When requested in the non-compliance report, the supplier must complete a corrective action report (8D) within 24 hours of the reporting with at least containment actions (that means D1, D2, D3). The supplier must use the mG form or their own form that contains at least all the information anticipated in it.


Unless otherwise requested, the supplier must send to the Quality office of the mG receiving establishment:

- confirmation of the receipt of the non-compliance report within 1 working day, regardless of whether they are required to process an 8D;
- evidence of the application of the containment actions carried out within 2 working days of receipt of the non-compliance report;
- 8D containing the planning of long-term corrective actions within 14 days of receipt of the non-compliance report; if the supplier is unable to meet these deadlines, they must agree on alternative deadlines with the Quality office of the mG receiving establishment;
- 8D documenting the effectiveness of the long-term corrective actions performed on the first batch following their implementation ("effectiveness check" section)

If corrective actions are evaluated as not effective by mG Quality dept. or there are repetitive non-conformities, mG reserves the right to apply containment processes in order to:

- ensure supplies that comply with what has been agreed;
- support the supplier in the troubleshooting of quality issues that caused the non-conformity.

These containment processes are called *Controlled Shipping Levels (CSL)* and are divided into three different levels: CSL 1, CSL 2 and CSL 3. The choice of which level of CSL to apply is at mG's discretion and depends on the severity and repetitiveness of the non-conformities found in the supplies.

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SUPPLIERS QUALITY MANUAL - DIRECT MATERIALS

CSL 1 essentially consists in the request to the supplier to implement for a predetermined period, possibly extendable, a 100% inspection on specifications complained by mG in order to identify non-compliant products and consequently to ensure that they are not sent to mG.

CSL 2 provides for the same activity as CSL 1, but this must be carried out by a third-party accredited certifying body, chosen by the supplier and communicated by mG

CSL 3 provides, in addition to the activities provided for by CSL 2, that the third-party accredited certifying body provide support to the supplier to improve their process and eliminate the causes of the non-compliance detected.

In the most serious cases of quality problems of supplies, mG may initiate the *New Business Hold* (NBH) procedure, which provides for the blocking of the assignment of new products to the supplier for the duration of that provision.

When required by hGears, the supplier shall grant the access to its premises within 10 days since complaint notification

12 RECOVERY OF THE COSTS ARISING FROM THE NON-CONFORMITIES

Costs arising from qualitative non-conformities (detected during acceptance, during production or reported by the customer) or logistic problems attributable to suppliers will be charged to them.

These costs may include, but are not limited to:

- > management costs of the non-conformity;
- > costs of the non-compliant product or the processes that generated non-conformity;
- > costs of the moulds or semi-finished products on which the processes that generated the non-conformities were carried out;
- > non-compliant product management costs such as selections, tests, rework, disassembly, assembly, handling, transport, etc.;
- > any line stops caused by the impossibility to use non-compliant products;
- > costs of the materials possibly damaged due to non-compliant products;
- > costs of any processing carried out by mG or other suppliers before the detection of the non-conformity;
- > any costs charged by mG customers for the management of the non-conformity, such as for example but not limited to, selections, tests, rework, disassembly, assembly, handling, transport, etc.;
- > warranty costs.