



Vanguard International Semiconductor Corporation

Vanguard International Semiconductor Summary

- Plant Address

123, Park Ave-3rd, Science-Based Industrial Park, Hsinchu, Taiwan 30077, R.O.C.

- Headcount

5,200

- Total Building size in sq. ft. and fab size in sq. meters

880,543.3 sq. feet (Building 1)

- Clean room floor space in sq. meters

12,600 sq. meters (Building 1)

- Fab utilization in percent

Fab 1: 100%

- Land Area in sq. meters

41,925 sq. meters

- Wafer capacity for each facility

Fab 1: 87K wafers per month (ADI's material is scheduled to run in Fab 1)

- A list of certifications (i.e. TS16949, ISO-14001, etc.)

- ISO 9001 Quality Management System (since 1996)
- ISO 14001 Environment Management System (since 1997)
- OHSAS 18001 Health & Safety Management System (since 2003)
- QC 080000 Hazardous Substance Management System (since 2007)
- ISO 27001 Information Security Management System (since 2015)
- IATF 16949 Automotive Quality Management System (since 2018)

0.6um BICMOS Vanguard Qualification Summary

TABLE 1A: LTC4270 QUALIFICATION RESULTS

TEST	SPECIFICATION	SAMPLE SIZE (LOTS X SAMPLE)	RESULTS
High Temperature Operating Life (HTOL)	JEDEC <i>JESD22-A108</i>	3 x 77	Pass
Highly Accelerated Stress Test (HAST)**	JEDEC <i>JESD22-A110</i>	3 x 77	Pass
Temperature Cycle (TC)**	JEDEC <i>JESD22-A104</i>	3 x 77	Pass
Autoclave (AC)**	JEDEC <i>JESD22-A102</i>	3 x 77	Pass
High Temperature Storage Life (HTSL)	JEDEC <i>JESD22-A103</i>	3 x 45	Pass
Early Life Failure Rate (ELFR)	MIL-STD-883, M1015	3 x 800	Pass

TABLE 1B: LTC3850 QUALIFICATION RESULTS

TEST	SPECIFICATION	SAMPLE SIZE (LOTS X SAMPLE)	RESULTS
High Temperature Operating Life (HTOL)	JEDEC <i>JESD22-A108</i>	3 x 77	Pass
Highly Accelerated Stress Test (HAST)**	JEDEC <i>JESD22-A110</i>	3 x 77	Pass
Temperature Cycle (TC)**	JEDEC <i>JESD22-A104</i>	3 x 77	Pass
Autoclave (AC)**	JEDEC <i>JESD22-A102</i>	3 x 77	Pass
High Temperature Storage Life (HTSL)	JEDEC <i>JESD22-A103</i>	3 x 45	Pass
Early Life Failure Rate (ELFR)	MIL-STD-883, M1015	3 x 800	Pass

TABLE 1C: LTC3112 QUALIFICATION RESULTS

TEST	SPECIFICATION	SAMPLE SIZE (LOTS X SAMPLE)	RESULTS
High Temperature Operating Life (HTOL)	JEDEC <i>JESD22-A108</i>	3 x 77	Pass
Highly Accelerated Stress Test (HAST)*	JEDEC <i>JESD22-A110</i>	3 x 77	Pass
Temperature Cycle (TC)*	JEDEC <i>JESD22-A104</i>	3 x 77	Pass
Autoclave (AC)*	JEDEC <i>JESD22-A102</i>	3 x 77	Pass
High Temperature Storage Life (HTSL)	JEDEC <i>JESD22-A103</i>	3 x 45	Pass
Early Life Failure Rate (ELFR)	MIL-STD-883, M1015	3 x 800	Pass

DeltaQualifikationsMatrix

Allgemeines

Kürze Produkt- und Technologiezyklen elektronischer Bauelemente sowie neue Umweltauflagen führen häufig zu prozess- und werkstofftechnischen Änderungen an Bauelementen, Leiterplatten, Verbindungstechnik und Schaltung, welche evaluiert werden müssen. Eine geeignete Methodik zur Handhabung von Änderungen an elektronischen Bauelementen beschreibt die ZVEI "Guideline for Customer Notifications of Product and/or Process Changes (PCN) of Electronic Components specified for Automotive Applications". Ein wesentlicher Teil dieser Guideline sind die hier vorliegenden Matrizen, welche sich als Empfehlungen für die Evaluierung von typischen Änderungen an elektronischen Bauelementen verstehen. Dies sollte Teil des offenen und risikobewussten Dialoges zwischen Lieferant und Kunden sein.

Diese DeltaQualifikationsMatrizen wurden durch den Industriearbeitskreis "PCN DeltaQualifikationsMatrix" und den Bauteilexperten des ZVEI Arbeitskreises "PCN-Methodik" erarbeitet. Der Inhalt wurde basierend auf dem aktuellen Stand der Technik erstellt und erhebt keinen Anspruch auf Vollständigkeit. Im Einzelfall ist ggf. ein abweichendes Vorgehen abzustimmen, da kundenspezifische Vereinbarungen zur Qualifikation zu berücksichtigen sind.

Anwendung der DeltaQualifikationsMatrix (auszufüllen durch den Bauelementehersteller)

- Diese Tabelle ist nur bei Änderungen anzuwenden. Neuqualifikationen und Sonderqualifikation (z.B. Verfuß von Modulen) sowie Information Notes bleiben von diesen Matrizen unberührt.
- Ist eine Änderung in dieser Tabelle nicht aufgeführt, so ist der Qualifikationsumfang zwischen Kunde und Lieferant abzustimmen.
- Die Matrix der Aktiven Bauelemente ist so aufgebaut, dass zwischen integrierten Halbleitern (AEC-Q100 Rev. H) und diskreten Halbleitern (AEC-Q101 Rev. D1) auszuwählen ist (Zelle D4). Für passive Bauelemente gilt die AEC-Q200. Für LED's gilt die AEC-Q102. Für Multi-Chip-Module gilt die AEC-Q104.
- Alle Änderungen in der PCN sind in der Spalte B durch ein Kreuz (x) zu markieren und werden dadurch farblich hervorgehoben. Sofern dies geschehen ist, werden im Feld "Tests, which should be considered for the appropriate process change" alle in Betracht zu ziehenden Zuverlässigkeitstests angezeigt.
- In "Tests, which should be considered for the appropriate process change after selection of condition table" wird die Anpassung der in Betracht zu ziehenden Tests in Folge der Relevanz bezüglich der Änderung berücksichtigt. Dazu ist die Tabelle "Conditions" entsprechend der Auswahl (A/B/C) mit einem (x) zu bewerten.
- In "Suppliers performed tests" dokumentiert der Bauelementehersteller die durchgeführten bzw. geplanten Tests.
- Falls von der Testempfehlung abgewichen wird, so sollten diese Abweichungen vom Bauelementehersteller angezeigt und kommentiert werden. Hierzu ist der Bereich "Reason for exception of tests" zu verwenden. Werden die in Betracht zu ziehenden Tests durch generische Daten (G) belegt, ist dies ebenfalls hier anzuzeigen und zu begründen.

Die Einstufung des Untersuchungslevel erfolgt in folgende Kategorien

- "C: Component level":** Die Evaluierung der Änderung am Bauelement ist durch Untersuchungen ausschließlich am Bauelement beim Bauelementehersteller durchführbar. Zur Evaluierung der Änderung dürfen Ergebnisse aus bereits durchgeführten Untersuchungen herangezogen werden, wenn diese zu einem ähnlichen Bauelement bereits vorliegen (**Generische Daten**).
- "B: Board level":** Die beschriebene Änderung hat möglicherweise Einfluss auf die Verarbeitbarkeit des Bauelementes im Steuergerät. Die Evaluierung der Änderung wird wie unter C beim Bauelementehersteller durchgeführt. Zusätzlich ist durch den Kunden/Steuergerätehersteller die Verarbeitbarkeit zu prüfen, die z.B. abhängig von der Änderung, Zuverlässigkeitsuntersuchungen auf applikationsrelevanten Testboards erfordert.
- "A: Application level":** Die beschriebene Änderung hat möglicherweise Einfluss auf die Applikation/ das Steuergerät. Die Evaluierung der Änderung wird wie unter C oder B durchgeführt. Zusätzlich ist vom Kunden/Steuergerätehersteller der Einfluss der Änderung im Steuergerät durch geeignete Untersuchungen zu bewerten. Dieses Vorgehen ist mit dem OEM abzustimmen. Hierbei ist zu berücksichtigen, ob die Steuergeräte- / Baugruppenanforderungen durch andere Qualifikationen bereits hinreichend abgesichert sind (**applikationspezifische Risikobetrachtung**).
- *: Not relevant for qualification matrix:** Änderung(en), die nicht in A, B oder C eingestuft werden können und somit nicht relevant für die DeQuMa sind

Information Notes

Änderungen die nur eine Information Note benötigen (bei der Bewertung Risk on Supply Chain als "I" gekennzeichnet), dürfen nicht in der DeQuMa angekreuzt werden, da Sie ansonsten den erforderlichen Evaluierungslevel verfälschen. Für als "I" bewertete Änderungen ist das Information Note Formblatt zu verwenden.

Wichtige Hinweise

- Zur formgerechten Anwendung der DeltaQualifikationsMatrizen steht auf der Homepage des ZVEI AK ein Tutorial bereit (ZVEI-Tutorial).
- ID Nummer: ist eine eindeutige Identifikationsnummer für jede angegebene Änderung, die in den ZVEI PCN DeltaQualifikationsMatrizen identifiziert ist. Die gleiche ID Nummer wird zur Identifizierung der Änderung im PCN Form Sheet verwendet.
- Die mittels Matrix identifizierten Tests sind in **Betracht zu ziehen**, d.h. es ist zu prüfen, ob der jeweilige Test für die spezifische Änderung in dieser Form notwendig ist. Abweichungen oder generische Daten sind im Detail zu begründen.
- Die Spalte "Further applicable conditions", Bemerkungen und Fußnoten sind unbedingt zu beachten, da sie wichtige Hinweise und Einschränkungen enthalten.
- Zur Nutzung aller Funktionen muss in Excel die Anwendung von Makros freigegeben sein.

Form provided by ZVEI - Revision 4.1 - November 2019

DeltaQualificationMatrix

General

Short product and technology cycles as well as new environmental regulations frequently result in process and material changes of components, printed circuit boards, assembly techniques and circuit layout which have to be evaluated. The ZVEI "Guideline for Customer Notifications of Product and/or Process Changes (PCN) of Electronic Components specified for Automotive Applications" describes an appropriate methodology for dealing with changed electronic components. The qualification matrices in this guideline are recommendations for how to assess typical changes of electronic components. These recommendations promote an open risk-based discussion between supplier and customer regarding qualifications.

The DeltaQualificationMatrices were developed by the Industry Task Force Team "PCN DeltaQualificationMatrix" together with component experts from the ZVEI Working Group "PCN-Methodology". Actual content represents state-of-the-art technology and does not claim to be comprehensive. Deviation from proposed guideline should be mutually agreed as customer specific requirements have to be considered.

DeltaQualificationMatrix Application (completion by component manufacturer)

- This table has to be used for changes only. The matrices are not applicable for new product, special qualifications (for instance for encapsulation of module) or Information Notes.
- If a change is not listed in this table, the qualification plan has to be defined and agreed between customer and supplier.
- The matrix for Active Components requires the user to choose between integrated circuits (AEC-Q100 Rev. H) and discrete semiconductors (AEC-Q101 Rev. D1) (cell D4). For Passive Components AEC-Q200 is used. For LED's the AEC-Q102 is used. For Multi-Chip-Modules the AEC-Q104 is used.
- All changes as listed in the PCN have to be marked by a cross (x) in column B and will appear colored. The relevant reliability tests are then shown in "Tests, which should be considered for the appropriate process change".
- In "Tests, which should be considered for the appropriate process change after selection of condition table" is for modification of the found relevant tests under consideration of the weight of change. Related table "Conditions" has to be assessed per proposed letters with an (x).
- In "Suppliers performed tests" the component manufacturer documents the planned and performed tests.
- In case of deviations from tests, which should be considered this should be notified and commented by the component manufacturer in the area "Reason for exception of tests". Test results in form of generic data (G) are allowed when notified and justified.

Evaluation Levels are categorized as follows

"C: Component level": The evaluation of a change at component level by the component manufacturer is sufficient. Generic data from other relevant evaluations can be used.

"B: Board level": The intended change described in the PCN may influence processability / manufacturability of the component at board level. Therefore additional evaluation by customer may be necessary, for example reliability tests on application relevant testboards, depending on change.

"A: Application level": The intended change described in the PCN may influence the properties of the application (e.g. Electronic Control Unit). In addition to the evaluation under C or B the influence of the change in the application is evaluated by suitable investigations by the customer. The scope of the evaluation has to be aligned with the OEM. It has to be considered whether the application / assembly requirements are already sufficiently safeguarded by other qualifications (**application specific risk assessment**).

***: Not relevant for qualification matrix:** Changes which fulfill neither A,B nor C definitions

Information Notes

Changes indicated as "I" shall not be marked in the DeQuMa. For those changes the Information Note sheet shall be used. As the DeQuMa is desired for PCN only, a marking of "I"-changes would automatically influence evaluation level and test effort.

Important Notes

- To use the matrices in the right form the ZVEI working group provides a Tutorial on its homepage (ZVEI-Tutorial)
- ID number: is a unique identification number for each indicated change defined in the ZVEI PCN DeltaQualificationMatrices. The same ID number is used in the PCN Form sheet to identify the change.
- Tests identified by the matrix have to be considered and checked if they are necessary to assess the specific change. Test modifications or generic data have to be justified in detail.
- "Further applicable conditions", comments and notes need attention, as they provide important hints and limitations.
- In order to use all functions in EXCEL, macros have to be allowed.

History of DeQuMa

Version	Remarks
2.0	Revised by ZVEI PCN Methodology Workgroup in March 2015
2.1	Released March 2015
2.1.1	Active Components - delete write protection in comments
2.2	Solved problems with some ActiveX configurations
2.2.2	Solved Problems in Active Components
2.2.3	Solved Problems ActiveX, Active Components SEM-DE-02 (Design changes in routing) error fixed
2.2.4	Minor fixes
3.0	General Revision by ZVEI PCN Methodology Workgroup in June 2016 Changes are indicated by underlining in the read only version named Changes_DeQuMa_rev3_vs_rev2.xlsx
3.0.4	Expert Release
3.0.5	Fixing of macro bugs
3.1	Final Release (orthographic and punctuation corrections)
4.0	General Revision by ZVEI PCN Methodology Workgroup in July 2019. Muliti Chip Modules newly added to DeQuMa LED Components now based on the AEC Q102 Further Changes see separate PDF's <u>Excel-File</u> , where changes are indicated by underlining
4.1	LED worksheet: Content of columns had been swapped due to rearrangement and omission of columns.

Category	Code	Description	Impact	Priority	Change Type	Technical Details	Risk Assessment	Control Measures	Verification	Validation	Approval	Release	Production	Post-Production	Customer	Supplier	Environment	Health & Safety	Other	Notes				
PTC	PAS-REC-05-01	Change of test coverage used by the supplier to ensure data sheet compliance (e.g. re-introduction of electrical measurement flow block, re-orientation/enhancement of monitoring procedure or sampling)	-	P	Change of test coverage	e.g. change from 100% to sample inspection e.g. test flow block, reduction from three to two test points measurement e.g. change in burn stress in process.	C													Characterization depends on impact of test coverage. If (check: functionality) test coverage is (re-)introduced, only for change in burn in process.				
	PTC																							
	PAS-ICR-AN-01	Any change with impact on agreed upon technical contractual agreements	P	P	Intended to be used if no other type of change is applicable but the change affects agreed technical contractual agreements	Not relevant for technical evaluation	*																	
	PAS-PTC-AN-02	Any change with impact on processability/manufacturability at customer, which is not covered in the main system	P	P		Technical checklist means component terminals. See processability on board of part.	B																	
	DATASHEET																							
	PAS-PTC-DS-01	Change of datasheet parameters/electrical specification (min./max./typ. values) and/or AC/DC specification	P	P	Change of application relevant information Not included: External changes	e.g. signs of electrical parameter distribution	A															Risk assessment depending on change for each application.		
	PAS-PTC-DS-02	Correction of data sheet or issue of errata	I	I	No technical change of product, process or test. New description of behavior which was not included before or which is different from those included already. That indicates contains the type of change Assessment is application request!	e.g. data sheet correction because of new information about component behavior	A																	
	PAS-PTC-DS-03	Specification of additional parameters	I	P	Description of a new not previously covered parameter. No technical change of the product. (See also: section 1P). Risk assessment depending on change to test, application to provide evidence of additional parameters. (see evaluation)	e.g. adding new (tested) parameter.	A																	
	MATERIAL																							
	PAS-PTC-MN-01	Change of material composition - Ceramic: Binder	P	P	Change of binder material to bind ceramics		C																	
PAS-PTC-MN-02	Change of material composition - Ceramic	P	P	Change of ceramic composition	e.g. change in additives amount	C																Parameter analysis only necessary if an anticipated impact on electrical performance.		
PAS-PTC-MN-03	Change of material composition - Polymer	P	P	Change of polymer composition		C																Parameter analysis only necessary if an anticipated impact on electrical performance.		
PAS-PTC-MN-04	Change of material composition - Encapsulation	P	P	Change of encapsulation material	e.g. change of coating e.g. change in thickness as an insulation.	B																Parameter analysis only necessary if an anticipated impact on electrical performance.		
PAS-PTC-MN-05	Change of material composition - Lead material / Termination	P	P	Change of lead (Sn/Pb) material, termination material or attachment material	e.g. change from SnPb to pure Sn	B																Risk assessment needed to evaluate compatibility of soldering process.		
PAS-PTC-MN-06	Change of supplier of material	-	P	Change to a new or additional material supplier at component manufacturer.	e.g. for 2nd source purpose	C																Characterization means specifications remain unchanged. Otherwise see change of material.		
DESIGN																								
PAS-PTC-DE-01	Change of termination, surface finish, shape, color, appearance or dimension structure - Lead: Change	I	P	Change of lead diameter	e.g. change lead diameter from 0.5 to 0.4 mm	B																		
PAS-PTC-DE-02	Change of termination, surface finish, shape, color, appearance or dimension structure - Termination: Size	I	P	Change of termination area	e.g. change of termination layer thickness e.g. change in termination dimensions	B																	SMD components only!	
PAS-PTC-DE-03	Change of termination, surface finish, shape, color, appearance or dimension structure - Internal Connection	I	P	Change of inner connection	e.g. change from internal connection to solder connection	C																		
PAS-PTC-DE-04	Change of termination, surface finish, shape, color, appearance or dimension structure - Termination	I	P	Change of appearance. Note: Marking or shape is defined as separate change (PAS-PTC-DE-05)	e.g. change or adding of color on component Marking is considered with other changes!	B																		
PAS-PTC-DE-05	Change of inner construction - Electrode	I	P	Change of electrode layer thickness or geometry	e.g. change of electrode design	C																		
PAS-PTC-DE-06	Change of inner construction - Layer: Thickness	I	P	Change of ceramic layer thickness. For multi-layer technology only.	e.g. change from 0.1mm to 0.12mm	C																		
PAS-PTC-DE-07	Change of inner construction - Number of Layers	-	P	Change of number of ceramic or electrode layers. For multi-layer technology only. (Check in combination with PAS-PTC-DE-06)	e.g. also layer thickness	C																		
PROCESS																								
PAS-PTC-PR-01	Change in process technology or manufacturing methods - Lamination	P	P	Change of termination / press technique technology	e.g. stamp press to isostatic press	C																		
PAS-PTC-PR-02	Change in process technology or manufacturing methods - Firing	-	P	Change of firing / sintering profile	e.g. temperature and/or time and/or atmosphere, e.g. from tunnel to batch furn.	C																		
PAS-PTC-PR-03	Change in process technology or manufacturing methods - Clong	-	P	Change of clong / filling	e.g. change from cutting to sewing	C																		
PAS-PTC-PR-04	Change in process technology or manufacturing methods - Termination	-	P	Change for termination preparation like plating or gold / termination burn test	e.g. change in plating technology (first termination) or change from 60/40 to 60/30 (second termination)	B																		
PAS-PTC-PR-05	Change in process technology or manufacturing methods - Electrode apply	-	P	Change of electrode apply. For multi-layer technology only.	e.g. change of inner electrode by down method	C																		
PAS-PTC-PR-06	Change in process technology or manufacturing methods - Assembly	-	P	Change of assembly process for finished or semi-finished devices.	e.g. soldering method for heat which is different or change in encapsulation process	B																		
PAS-PTC-PR-07	Process: Highly varying with specification	-	P	Variation within process specification.	e.g. process control	C																		
PACKING / SHIPPING - NEW MATERIAL, CRITICAL DIMENSIONS																								
PAS-PTC-PA-01	Packing / shipping specification: change (dimension of tolerance)	P	P	Change of packing specification	e.g. number of pieces on reel	B																		
PAS-PTC-PA-02	Dry pack requirements change	P	P	Change of drypack requirements	e.g. change of bags e.g. change in dry pack assurance (IEC, MIL)	B																		
PAS-PTC-PA-03	Change of carrier (dry, wet)	P	P	Change of carrier	e.g. change to master e.g. change of dispenser	B																		
PACKING / SHIPPING - VISUAL INSPECTION																								
PAS-PTC-PI-01	Change of labeling	I	P	Change of labeling, also on reel	See e.g. additional information (MDF) stamp (P) e.g. change of customer specific information	B																		
PAS-PTC-PI-02	Change of product marking	I	P	Marking on device	e.g. change of marking e.g. change of marking e.g. change of appearance of marking	B																		
PAS-PTC-PI-03	Change of packaging/shipping specification	P	P	Change in packing specification which does not result in a change of dimension or material of the packing	e.g. change of disassembly / packing specification	-																		
LOGISTICS / CAPACITY / TESTING - EQUIPMENT																								
PAS-PTC-EQ-01	Production from a new experimental unit which uses a different technology or which does not fit in the current form or function can be expected to influence the length of the test process	P	P	Change in process technique which is not already covered above. Note: Changes affecting the product not covered by the table require also a PFCN	e.g. change from wet to dry technology.	C																	Test effort depends on final test measurement. Performance test according to affected process change.	
PAS-PTC-EQ-02	Production from a new experimental unit which uses the same basic technology (replacement equipment or extension of existing equipment)	-	P	PFCN required for dedicated equipment for separate component production	e.g. automation of manual handling processes	C																	Test effort depends on final test measurement. Performance test according to affected process change.	
PAS-PTC-EQ-03	Change in final test equipment type that uses a different technology	P	P	Change of final test equipment which use different technology. PFCN required for dedicated equipment for separate parameters.	e.g. change of test platform	C																	Large R&D / delta combination	
LOGISTICS / CAPACITY / TESTING - PROCESS FLOW																								
PAS-PTC-PR-01	Manufacturing site transfer or movement of a part of production process to a different location	P	P	Change of manufacturing site. Transfer of a part of a production site. Note: Reorganization inside one plant is not included.	e.g. movement or transfer of manufacturing site or process from one site to another location. e.g. plant expansion/relocation	B																	Characterization depends on impact of production flow.	
PAS-PTC-PR-02	Elimination or addition of a manufacturing process step	-	P	Change of manufacturing process sequence	e.g. welding / cleaning process e.g. change of order of processes	C																	Characterization depends on impact of production flow.	
LOGISTICS / CAPACITY / TESTING - Q-SAFE																								
PAS-PTC-QS-01	Change of test coverage used by the supplier to ensure data sheet compliance (e.g. re-introduction of electrical measurement flow block, re-orientation/enhancement of monitoring procedure or sampling)	-	P	Change of test coverage	e.g. change from 100% to sample inspection e.g. test flow block, reduction from three to two test points measurement e.g. change in burn stress in process.	C																	Characterization depends on impact of test coverage. If (check: functionality) test coverage is (re-)introduced, only for change in burn in process.	
ISR																								
IRV																								
PAS-ICR-AN-01	Any change with impact on agreed upon technical contractual agreements	P	P	Intended to be used if no other type of change is applicable but the change affects agreed technical contractual agreements	Not relevant for technical evaluation	*																		
PAS-ICR-AN-02	Any change with impact on processability/manufacturability at customer, which is not covered in the main system	P	P		Technical checklist means component terminals. See processability on board of part.	B																		
DATASHEET																								
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PAS-ICR-DS-02	Correction of data sheet or issue of errata	I	I	No technical change of product, process or test. New description of behavior which was not included before or which is different from those included already. That indicates contains the type of change Assessment is application request!	e.g. data sheet correction because of new information about component behavior	A																		
PAS-ICR-DS-03	Specification of additional parameters	I	P	Description of a new not previously covered parameter. No technical change of the product. (See also: section 1P). Risk assessment depending on change to test, application to provide evidence of additional parameters. (see evaluation)	e.g. adding new (tested) parameter.	A																		
MATERIAL																								
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