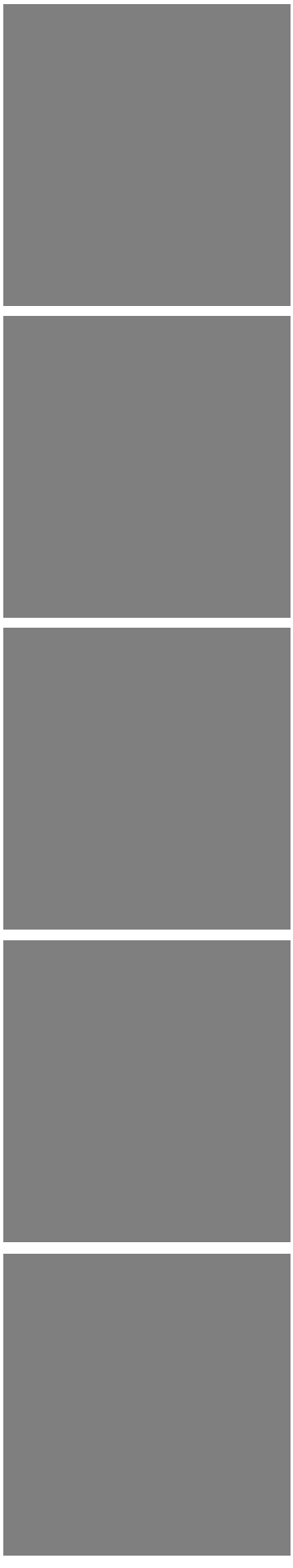


GUIDELINES FOR CARRYING OUT DIMENSIONAL MEASUREMENTS

CONTENTS

GUIDELINES FOR CARRYING OUT DIMENSIONAL MEASUREMENTS

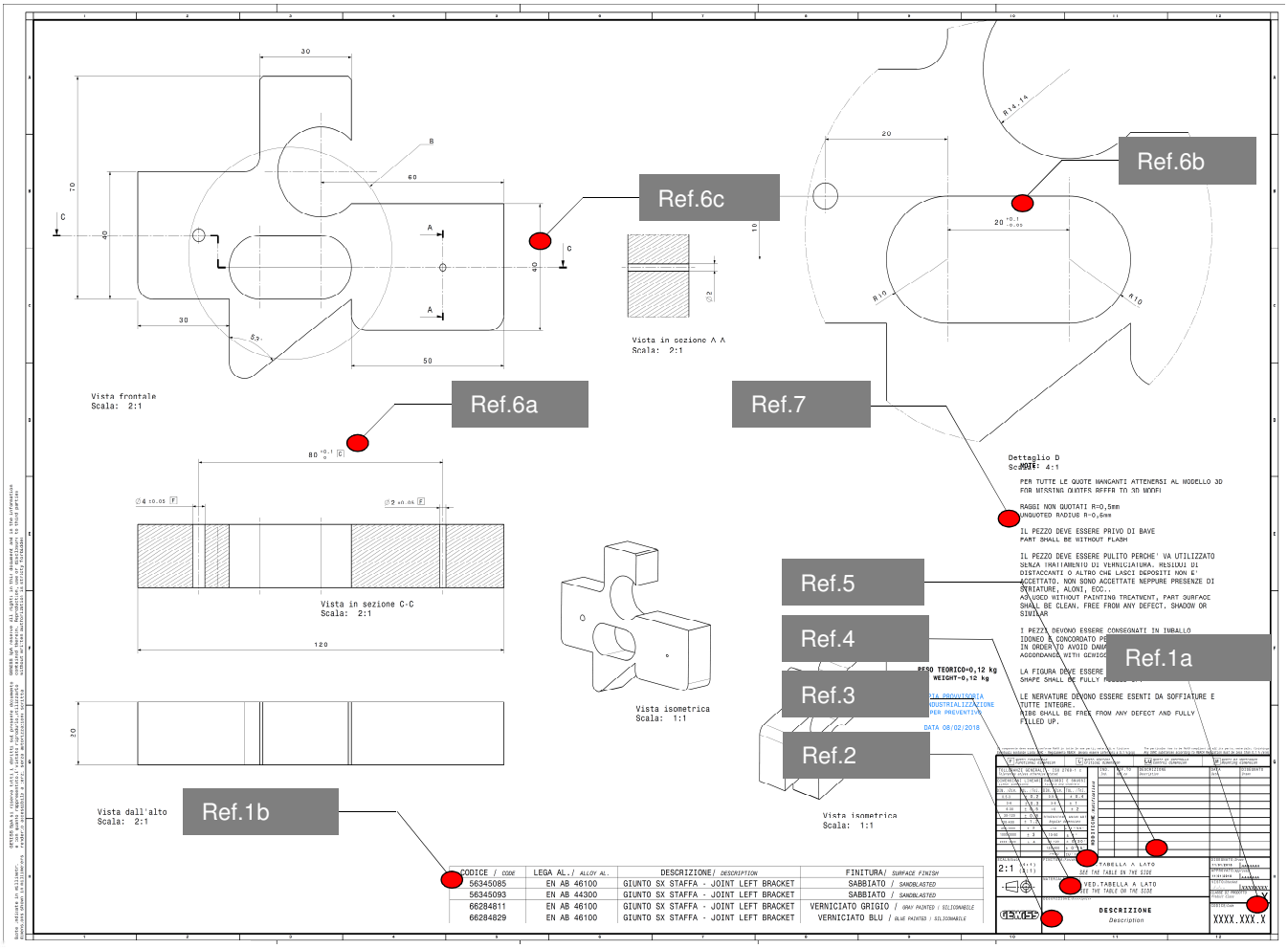
Ch.1 AIM OF THE DOCUMENT

The aim of this document is to provide guidelines for carrying out the dimensional measurements commissioned from the supplier when producing an article based on technical documentation drawn up by Gewiss.
The document classifies the technical notes given on the Gewiss technical documentation, along with the method for measuring the characteristics listed in the technical documentation, indicating how to draw up the documentation to be transmitted and all the certifications required.
The guidelines must be followed and applied by the supplier himself, or by the relative third party, in order to self-certify the sampling and any modifications made during the preparation of the process equipment and/or the article.

Ch.2 TECHNICAL DRAWING

The technical drawing supplied by Gewiss is the main document for which the sampling order is executed. It shows all the characteristics (dimensional, raw material, finishes, performance) that the requested article must have in order to be qualified by Gewiss.
Below, there is an example of a technical drawing produced by Gewiss, highlighting the main references for planning the dimensional measurements to be carried out.

Example of a technical drawing:



Ch.2 TECHNICAL DRAWING

References given in the technical drawing example:

The following table lists all the references given in the technical drawing shown as an example.

Summary table:

REFERENCE	DESCRIPTION
1a	In the space highlighted by this reference, you can find the component code. There are two types of code, singular and tabular: singular refers to the figure designed, and only matches the code shown in the title block; tabular code refers to another code table where the codes are all the same for the figure but may differ with regards the raw material, finish and other characteristics that don't have a significant effect on the shape or structure of the component. If there is a table, the reference codes are the ones shown in the table. If there is a change of raw material, all the dimensions for each individual code must be checked and repeated. In the event of a change of finish, it's sufficient to check the raw material code first of all, and then just check the change of finish for each single code (as long as the change has no significant effect on the shape of the piece).
1b	In the section highlighted, there is an example table showing the codes of two raw parts that differ in terms of raw material, and two codes of painted parts (generated by two codes of the raw parts). In this case, the general rules explained in section 1a apply.
2	In the section highlighted, there is a description of the component that the technical drawing refers to. Here too, there may be a reference to another table so, rather than appearing in the relative box in the title block, the description might be indicated in another table (as in section 1b).
3	In the section highlighted, there is the name of the raw material for the component that the technical drawing refers to. Here too, there may be a reference to another table so, rather than appearing in the relative box in the title block, the raw material name might be indicated in another table (as in section 1b).
4	In the section highlighted, you can see the type of finish required for the component that the technical drawing refers to. The "finishes" section may list different types of finish such as heat treatment, galvanic treatment, painting, etc. Here too, there may be a reference to another table so, rather than appearing in the relative box in the title block, the type of finish might be indicated in another table (as in section 1b).

Ch.2 TECHNICAL DRAWING

References given in the technical drawing example:

The following table lists all the references given in the technical drawing shown as an example.

Summary table:

REFERENCE	DESCRIPTION
5	In the section highlighted, you can find the component modification/revision index along with a brief description of the modification applied to it. The index is of the alphabetical type, and must necessarily appear in the measurement report. If it is not indicated in the title block, the index is conventionally taken blank.
6a	In the section highlighted, there is an example of a dimension with a **tolerance value** and the relative **key characteristic**. For this type of dimension, the tolerance value indicated alongside the nominal value must be taken into consideration. For its classification, use the classification shown in chapter 3 with the relative quantities to be analysed on the basis of the nature of the raw material used to make the component and indicated in chapters 4, 5, 6 and 7.
6b	In the section highlighted, there is an example of a dimension with a **tolerance value, without a relative key characteristic**. For this type of position, the tolerance value indicated alongside the nominal value must be taken into consideration. For its classification, use the classification shown in chapter 3 with the relative quantities to be analysed on the basis of the nature of the raw material used to make the component and indicated in chapters 4, 5, 6 and 7.
6c	In the section highlighted, there is an example of a dimension **without a tolerance value, and without a relative key characteristic**. For this type of dimension, the tolerance value indicated in the title block must be taken into consideration. For its classification, use the classification shown in chapter 3 with the relative quantities to be analysed on the basis of the nature of the raw material used to make the component and indicated in chapters 4, 5, 6 and 7.
7	In the section highlighted, you can find all the additional notes that the component must respect in order to guarantee the quality level requested. The notes may also be shown alongside the dimensions, or in highlighted points of the component itself, but it is fundamental that all those marked on the drawing during the dimensional analysis phase are taken into consideration and indicated in the reports. In the event of notes relating to the absence of burr, machining marks, or incompleteness, the measurement report must also contain a photo highlighting the areas not in conformity with the drawing.

Ch.3 DOCUMENTATION TO BE SUPPLIED FOR DIMENSIONAL MEASUREMENTS

The following table lists all the documentation to be passed on to Gewiss for the qualification/approval of the component analysed.

Summary table:

DOCUMENT	COMMENT
DRAWING	Send back the drawing transmitted by Gewiss, numbering all the characteristics analysed using a numerical reference associated with the measurement report.
MEASUREMENT REPORT	Send the measurement report, including all the dimensions indicated on the technical drawing with the relative dimensional analysis, and attaching the capability studies where required. For information about how to compile the report, refer to the appropriate section ("Filling in the measurement report").
PHOTOGRAPHIC/AESTHETIC REPORT	Send the photographic/aesthetic report, highlighting the areas subjected to a visual examination and using photos to indicate any areas of burr, incompleteness, machining marks, aesthetic finishes, etc. The photographic report must highlight all the critical elements that emerged during the dimensional and visual examination, and which will allow a more complete assessment for component approval.
RAW MATERIAL CERTIFICATION	Send the certification of the raw material used to make the component. This certification must include the chemical and mechanical characteristics of the material. If the raw material was purchased, supply the supplier's certification; if the material was analysed, supply the internal inspection documentation. If Gewiss supplied the raw material or the component, this documentation does not need to be sent and/or transmitted.
FINISHING TREATMENT CERTIFICATION	Send the certification regarding the finishing treatment. All finishes must be accompanied by certification to ensure that they have been applied to the standards, by measurements demonstrating that their application respects the requisites transmitted, and by the technical datasheets of the materials used to produce the finishing. For the requisites to be sent, an agreement should be made directly with Gewiss personnel on the basis of the type of finish requested. This requisite is required only from suppliers whose provide parts with finishing treatment.
MEASURING METHODS	Specify the instrument/equipment used to verify the characteristics, and the alignment parameters applied to the component.
SAMPLES MEASURED	Along with the sampling, send also the samples used to carry out the dimensional measurements (clearly labelled as "measuring samples").
SAMPLING FILE	The sampling file must indicate the production means/equipment/tools used to create the samples, with the relative process parameters. The sampling must be carried out with the production means/tools that will be used for mass production.

Ch.4 CLASSIFICATION OF THE DIMENSIONS AND SYMBOLS

References indicated on the drawing:

The following table lists all the symbols for classifying the characteristics (shown in the technical documentation transmitted by Gewiss) that determine the qualitative parameters, with the relative quantities to be checked during the type-approval/qualification of the customised semi-finished products.

Summary table:

SYMBOL	KEY CHARACTERISTIC	DESCRIPTION
C	CRITICAL DIMENSION	Any deviation from the specifications indicated in the drawing may lead to product failure and serious safety hazards and may jeopardise the assembly, lifespan and production operations, along with the standard product requisites.
F	FUNCTIONAL DIMENSION	Any deviation from the specifications indicated in the drawing may lead to functional problems and may have an effect on product safety, assembly, lifespan and production operations, along with the standard product requisites.
M	ASSEMBLY DIMENSION	Any deviation from the specification may have an effect on assembly and/or the quality of production operations.
CQ	TEST DIMENSION	The position created to sustain and facilitate the test method.
	AUTOMATION DIMENSION	Any deviation from the specification may have an effect on automation-based assembly, and therefore lead to reduced production efficiency.
NO SYMBOL	STANDARD DIMENSION	

Ch.5 DIMENSIONAL MEASUREMENTS ON PLASTIC PARTS

The following table lists the quantities to be checked in the case of parts made of plastic, with regards the classification of the dimensions shown in the technical documentation transmitted by Gewiss.

Summary table:

SYMBOL	KEY CHARACTERISTIC	QUANTITY OF SEMI-FINISHED PRODUCTS TO BE ANALYSED
C	CRITICAL DIMENSION	For the type of dimension indicated, at least 3 pieces must be checked for each mould/cavity. The minimum and maximum values of the 3 pieces must be indicated. For this type of dimension, Gewiss may also request a process capability study.
F	FUNCIONAL DIMENSION	For the type of dimension indicated, at least 3 pieces must be checked for each mould/cavity. The minimum and maximum values of the 3 pieces must be indicated.
M	ASSEMBLY DIMENSION	
CQ	TEST DIMENSION	
	AUTOMATION DIMENSION	
NO SYMBOL	STANDARD POSITION	For the type of dimension indicated, 1 piece must be checked for each mould/cavity.

Ch.6 DIMENSIONAL MEASUREMENTS ON METAL PARTS

The following table lists the quantities to be checked in the case of parts made of metal, with regards the classification of the dimension shown in the technical documentation transmitted by Gewiss.

Summary table:

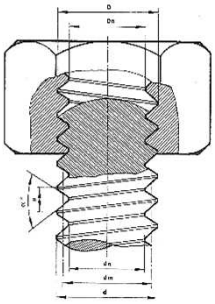
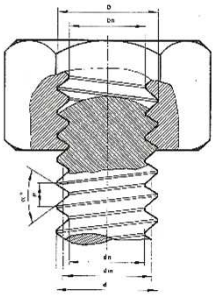
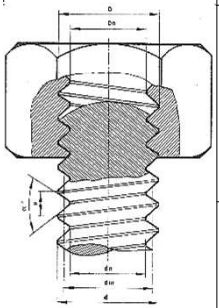
SYMBOL	KEY CHARACTERISTIC	QUANTITY OF PARTS TO BE ANALYSED		
		NON-VARIABLE DIMENSION	VARIABLE DIMENSION	
			QUANTITY	CAPABILITY
C	CRITICAL DIMENSION	For the type of dimension indicated, at least 5 pieces must be checked for each mould/cavity. Indicate the minimum and maximum values of the 5 pieces.	SPC STUDY 50/100 pieces Indicate the minimum and maximum values, and the average value.	CPK ≥ 1.33
F	FUNCTIONAL DIMENSION		SPC STUDY 50/100 pieces Indicate the minimum and maximum values, and the average value.	CPK ≥ 1.00 ≤ 1.16
M	ASSEMBLY DIMENSION		SPC STUDY 50 pieces Indicate the minimum and maximum values, and the average value.	CPK ≥ 1.00
CQ	TEST DIMENSION		SPC STUDY 50 pieces Indicate the minimum and maximum values, and the average value.	CPK ≥ 1.00
	AUTOMATION DIMENSION		SPC STUDY 50 pieces Indicate the minimum and maximum values, and the average value.	CPK ≥ 1.00
NO SYMBOL	STANDARD DIMENSION	For the type of dimension indicated, 1 piece must be checked for each mould/cavity.	At least 20 pieces Indicate the minimum and maximum values	NO CPK

***NB:** for die-cast articles, refer to the quantities shown in the "non-variable positions" column only*

Ch.7 DIMENSIONAL MEASUREMENTS ON METRIC THREADS

Apart from the dimension classification on the basis of how screws and female screws are made (as given on the previous pages), in the case of metric threads it is also necessary to verify the characteristics listed in the following table.

Summary table:

SYMBOL	KEY CHARACTERISTIC	QUANTITY OF PARTS TO BE ANALYSED			
		NUT		SCREW	
		QUANTITY	METHOD	QUANTITY	METHOD
	EXTERNAL DIAMETER (D - d)	It's not necessary to check the external diameter unless there is a specific request from the customer to do so.	NO	SPC STUDY 50/100 pieces Indicate the minimum and maximum values, and the average value.	Micrometer Contact profilometer Optic measuring device (the first two are preferable)
	Notes: the external diameter check is vital for ensuring the quality of the thread created on the screw.				
	AVERAGE DIAMETER (Dm - dm)	100 pieces with the attributive system - P/NP	Threaded gauge (check both with go and no-go)	100 pieces with the attributive system - P/NP	Threaded ring (check both with go and no-go)
	Notes: the average diameter check is vital for ensuring the quality of the thread created on the nut and the screw. The customer may request a check of the average screw diameter using the 3-wire system on a sample of 20 pieces.				
	CORE/MINOR DIAMETER (Dn - dn)	50 pieces with the attributive system - P/NP	Calibrated pins. Check 50 pieces with go and 50 with no-go. Indicate the result only.	20 pieces Indicate the minimum and maximum values	Optic measuring device
	Notes: the core/minor diameter check is vital for ensuring the quality of the thread created on the nut and for the coupling with the relative screw. The customer may request a precise quantification of the core screw diameter on a sample of at least 10 pieces.				

For the other characteristics that distinguish the metric thread, step and possible thread angle, in particular cases the customer may request the dimensional analysis of these features as well.

Checks with the gauge or threaded ring must be carried out with gauges with the same machining degree shown in the drawing; if the degree is not specified, indicate the value used for the checks in the reports.

For die-cast articles, where the thread is generated by subsequent operations, run the check on the female screw thread using threaded gauges only.

Ch.8 DIMENSIONAL MEASUREMENTS ON HOLE DIAMETERS

The following table shows the quantities to be checked for the hole diameters. The use of calibrated centesimal pins is mandatory for this check (it is the only checking system permitted by Gewiss).

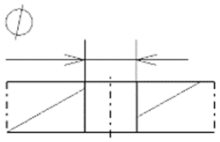
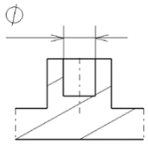
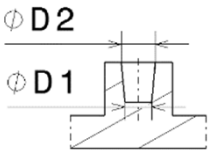
Summary table:

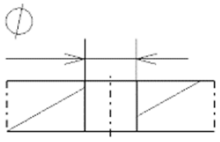
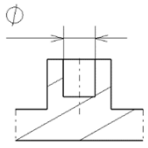
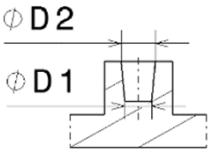
SYMBOL	KEY CHARACTERISTIC	QUANTITY OF PARTS TO BE ANALYSED
C	CRITICAL DIMENSION	For this type of dimension, 100 pieces must be checked using the attributive system - P/NP (minimum and maximum). For 10 pieces, the real diameter value must be quantified and the minimum and maximum values must be shown.
F	FUNCTIONAL DIMENSION	
M	ASSEMBLY DIMENSION	For this type of dimension, 50 pieces must be checked using the attributive system - P/NP (minimum and maximum). For 10 pieces, the real diameter value must be quantified and the minimum and maximum values must be shown.
CQ	TEST DIMENSION	
	AUTOMATION DIMENSION	
NO SYMBOL	STANDARD DIMENSION	For this type of dimension, 10 pieces must be checked using the attributive system - P/NP (minimum and maximum). For 5 pieces, the real diameter value must be quantified and the minimum and maximum values must be shown.

Ch.8 DIMENSIONAL MEASUREMENTS ON HOLE DIAMETERS

The following table shows the checking methods according to the type of hole to be checked and the nature of the material that the hole is made in.

Summary table:

SYMBOL	KEY CHARACTERISTIC	MATERIAL	CHECKING METHOD
	THROUGH HOLE	METAL	Standard method Type 1 gravity method
	DEAD HOLE	METAL	Standard method
	CONICAL DEAD HOLE	METAL	Conicity check method

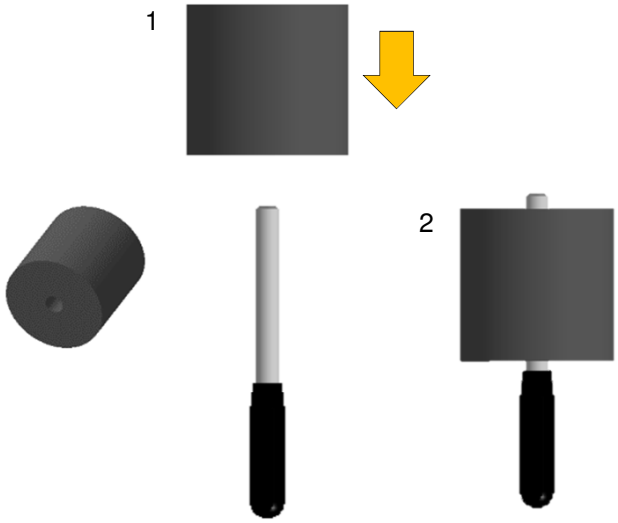
SYMBOL	KEY CHARACTERISTIC	MATERIAL	CHECKING METHOD
	THROUGH HOLE	PLASTIC	Standard method Type 1 gravity method
	DEAD HOLE	PLASTIC	Type 2 gravity method
	CONICAL DEAD HOLE	PLASTIC	Conicity check method

Ch.8 DIMENSIONAL MEASUREMENTS ON HOLE DIAMETERS

The following table outlines the measuring methods indicated in the checking method shown for each type of hole.

Measuring methods:

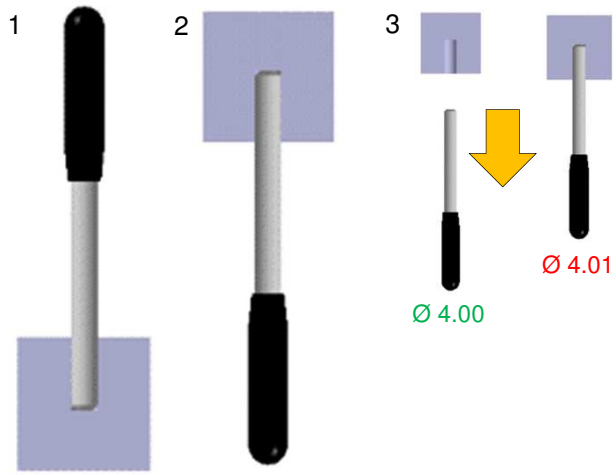
STANDARD METHOD	DESCRIPTION OF THE CHECKING METHOD
	Insert the pin in the through hole or the cylindrical dead hole. The calibrated pin must not be forced into the hole.

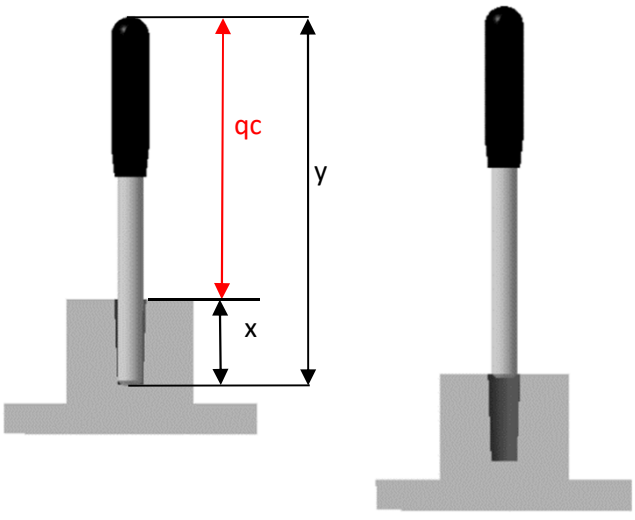
TYPE 1 GRAVITY METHOD	DESCRIPTION OF THE CHECKING METHOD
	Block the pin and drop the part into it. The piece must slide freely along the whole length of the hole. The gravity checking system highlights any burr or flaws in the through hole (which it would be hard to visualise with optical systems).

Ch.8 DIMENSIONAL MEASUREMENTS ON HOLE DIAMETERS

The following table outlines the measuring methods indicated in the checking method shown for each type of hole.

Measuring methods:

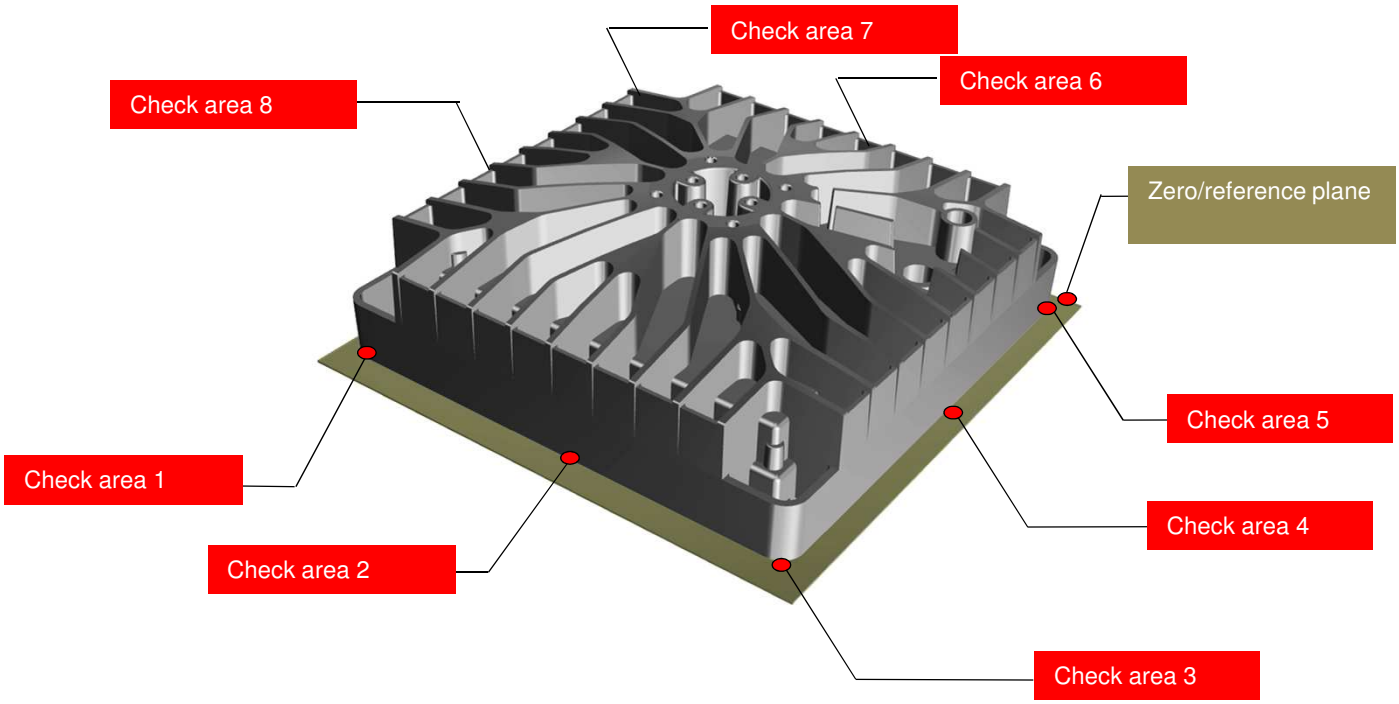
TYPE 2 GRAVITY METHOD	DESCRIPTION OF THE CHECKING METHOD
	PROCEDURE: 1) Insert the calibrated pin 2) Rotate the piece 3) The last value of the pin came out from the hole corresponds to the real hole diameter Example shown in the image: the pin with diameter 4 comes out from the hole, whereas the one with diameter 4.01 remains inside the hole. The real hole diameter is therefore 4.00mm. To carry out this type of test, move the calibrated pins forward in steps of 0.01mm starting from a diameter value of at least -0.1mm less than the nominal value shown on the drawing. For each step, insert the pin and rotate the part with the hole.

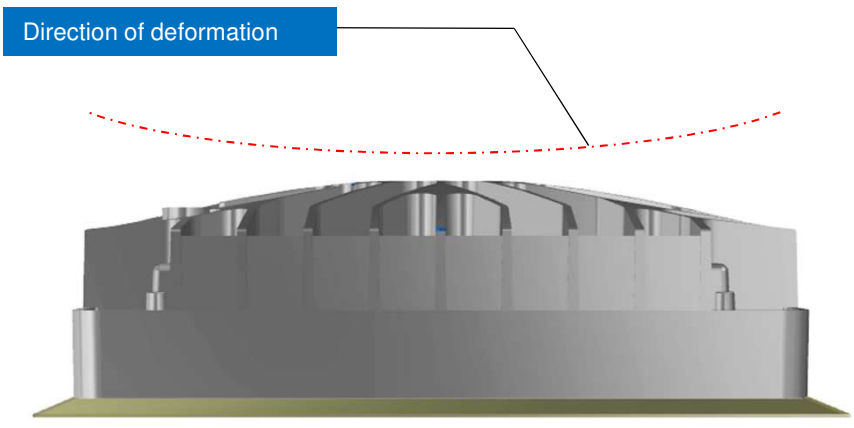
CONICITY CHECK METHOD	DESCRIPTION OF THE CHECKING METHOD
	Use a calibrated pin to measure the diameter on the base (D1) and at the entrance (D2), indicating both values in the report. For diameter D1, check how far the pin enters the hole if necessary, comparing the pin with the depth of the hole (y-x) to identify the degree of penetration (see diagram). It's necessary to know both hole diameters (base and entrance) in order to evaluate whether the conicity is suitable for coupling with self-forming screws.

Ch.9 DIMENSIONAL MEASUREMENTS FOR PLANARITY

When measuring the planarity, there must always be an indication of the reference plane or zero plane used when checking the value and the specific inspection areas, in order to establish the planarity value and possible direction of deformation.

Example1: check on the planarity of the part, and deformation following extraction from the mould



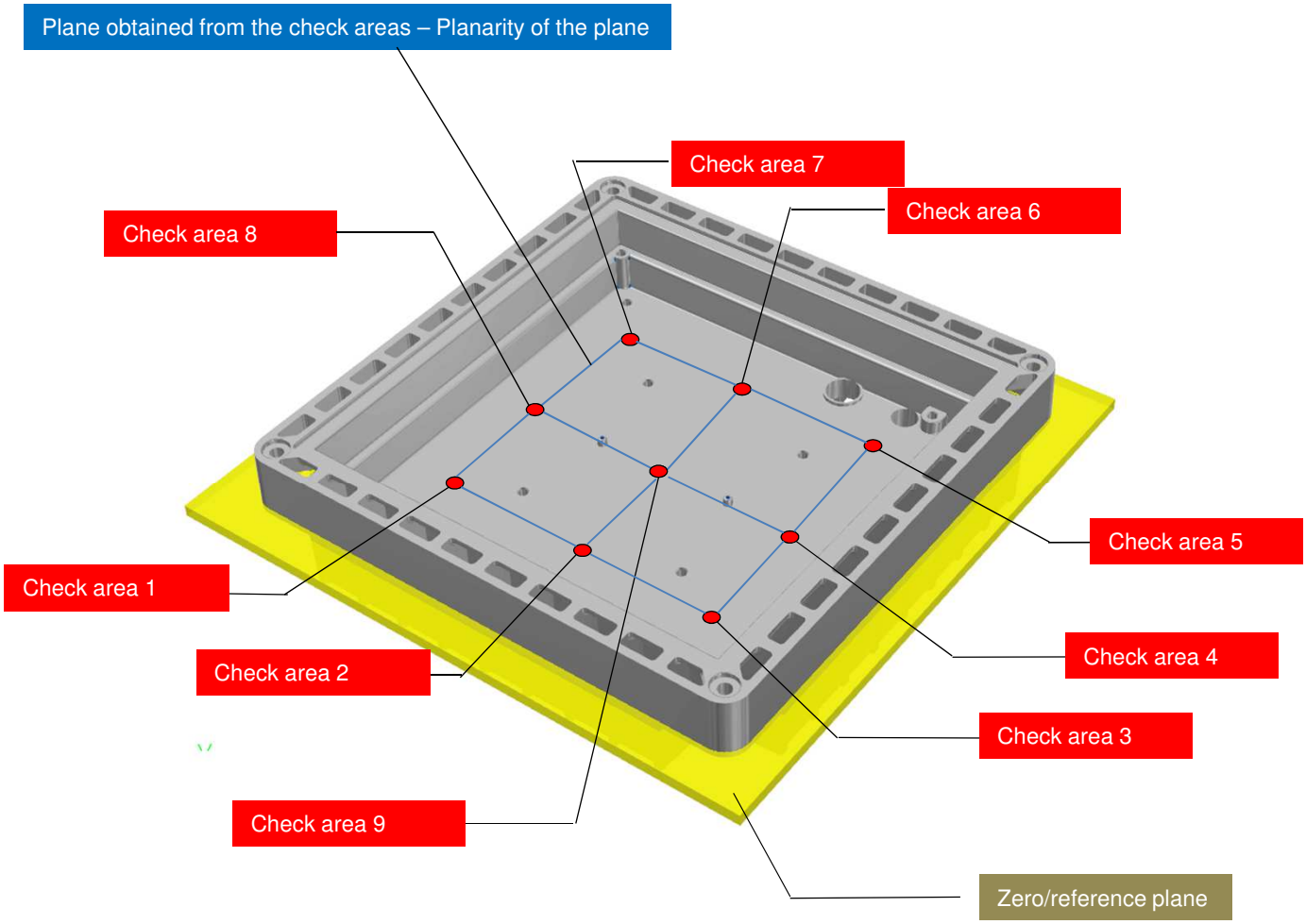


This example highlights the reference plane, the check areas, and the direction of deformation of the part.
In the case of a planarity check, the maximum deformation value noted in the check areas must always be indicated. For each area inspected however, the variation from the reference plane must be shown.

Ch.9 DIMENSIONAL MEASUREMENTS FOR PLANARITY

When measuring the planarity, there must always be an indication of the reference plane or zero plane used when checking the value and the specific inspection areas, in order to establish the planarity value and possible direction of deformation.

Example2: check on the planarity of a functional plane of the part



For the examples given here (1 and 2), apart from the information requested it's also important to indicate the measuring instrument used to identify the planarity.

Ch.10 FILLING IN THE MEASUREMENT REPORT

Chapter 2 lists all the documents that must be consigned as part of the report on the measurements taken on the part in question. This chapter gives some examples of how to fill in the reports, with information about the dimensional measurements that must be sent to Gewiss.
It's preferable to use the Gewiss test report (shown in the example) but, if this is not explicitly requested by the customer, an internal test report can be used as long as all the necessary information (shown in the example below) are included.

9.2 Measurement report

PROTOCOLLO DI MISURA / Measurement Report

Ricerca e Sviluppo / Research and Development	SERIE / Range	NUMERO / Report No.	VERSIONE / Rep. Revision	DATA / Date (9)
	SMART PRO 1.1	10000368811	00	14.11.2017

RIFERIMENTI / References	ORIGINE / Origin (10)	NUMERO / Number	UFFICIO / Office
RES.LI/pr.	CAMPIONATURA		QLP.qp

CAMPIONATURA-DATA / Sampling (8)	N° CAMPIONI / Samples no. (5)	N° EQUIPMENT / Equipment	N° IMP / Cavity no. (6)	FORNITORE / Supplier (11)
30/10/2017			1	XXXXXXXX

CODICE / Item code (1)	IND. / Rev. ind. (2)	TABELLA-DISEG ing (1a)	DESCRIZIONE CODICE / Item description (3)	PESO MEDIO / Weight (4)
56344963	/	66271974	CORPO DIS.MOTORE PROIET.A.P.SA	1642 gr.

RIALE / Material code	SCRIZIONE MATERIALE / M n	STRUMENTI UTILIZZATI (COD. Used instruments (code)
	LEGA DI ALLUMINIO EN AB 44300 (7)	

COMPILATORE / Filled by: XXXXXXXX

N° RAPPORTO DI PROVA / Test Rep. No.

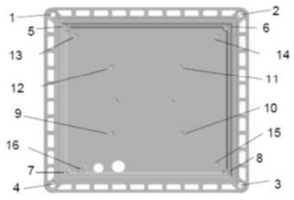
MODIFICA CON IMPATTO CE/MARCHI DI QUALITA' - ARTICOLO SPECIALE - ALTERNATIVA DI FORNITURA
Engineering Change Note with EC/Quality Marks impacts - Special Articles - Alternativ. Supplier

NOTE / Notes
1) xxxxxxxxxxxxxxxxxxxxxxxx
2) xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

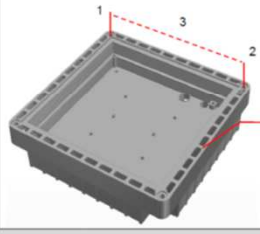
9.3 Measuring methods

SCHEMA DI MISURA

Riferimento numerico dei fori per misurazione interassi e dei diametri dei fori



Parametri di allineamento



RIF	PARAMETRO
1	Origine
2	Foro per allineamento con origine
3	Allineamento foro 1 e 2
4	Piano di riferimento

(1)

MISURAZIONI ESEGUITE SU VISTA FRONTALE

RIF. Ref.	POS. Pos.	DISEGNO / Drawing QUOTA Dimension	TOL SUP. Up Tol	TOL INF. D. Tol.	Q.TA' Q.ty	TIPO Type	RISCONTRI / Notes VALORE Value	MIN Min	MAX Max	NOTE Notes	F. TOL. O. Tc	DECISIONE* Decision*	MODIFICA Change
1	D1	82	0,8	-0,8	5	C	82,20						
2	D1	80,5	0,8	-0,8	5	C	80,80						
3	D1	79	0,8	-0,8	5	C	79,06						
4	E2	69,5	0,8	-0,8	5	C	69,70						
5	E2	58	0,8	-0,8	5	C	58,10						
6	E2	30	0,8	-0,8	5	C	30,20						
7	D5	101	0,8	-0,8	5	C	101,04			Lato fori nr.3-4			
8	C5	101	0,8	-0,8	5	C	101,04			Lato fori nr.3-5			
9	D5	101	0,8	-0,8	5	C	101,10			Lato fori nr.2-1			
10	C5	101	0,8	-0,8	5	C	101,10			Lato fori nr.2-1			
11	D5	101	0,8	-0,8	5	C	101,20			Lato fori nr.1-4			
12	C5	101	0,8	-0,8	5	C	101,20			Lato fori nr.1-4			
13	D5	101	0,8	-0,8	5	C	101,20			Lato fori nr.4-3			
14	C5	101	0,8	-0,8	5	C	101,20			Lato fori nr.4-3			
15	D5	86,3	0,8	-0,8	5	C	86,53			Rif foro nr. 8			

(2)

(2)

Measurement report (heading)
The measurement report must contain the following fundamental information:

1. Part code
1a. Table code (if present)
2. Review index
3. Part Description
4. Part Weight
5. No. of samples tested
6. No. of mould cavities
7. Description of the raw material
8. Date of the sampling
9. Date of the measurements
10. Sampling origin/reason
11. Supplier / Customer

Measuring methods:
the measuring method must show the alignment parameters of the part (ref.1).
Alongside each position (even if not shown in the example), indicate the measuring instrument used (ref.2); this is necessary in order to ensure the instrument is suitable (the supplier taking the measurements is responsible for the suitability of the measuring tools - also in terms of their calibration - and hence the reliability of the readings).
The alignment parameters may be managed with a separate document, as long as they are consigned along with all the other documentation required. Detailed photographic documentation of the measuring systems may also be sent.

Ch.10 FILLING IN THE MEASUREMENT REPORT

The following examples show how to fill in the test report, with all the information needed for each single measurement taken.

9.2 Measurement report

1	2	3			4		5	6	7	8		9	10		
RIF. *Ref.*	POS. *Pos.*	DISEGNO / *Drawing* QUOTA *Dimension*			TOL SUP. *Up Tol*	TOL INF. *D. Tol.*	Q.TA' *Q.ty*	TIPO *Type*	VALORE *Value*	RISCONTRI / *Notes* MIN *Min*	MAX *Max*	NOTE *Notes*	F. TOL. *O. Tol.*	DECISIONE* *Decision**	MODIFICA *Change*
8	A2	Ø	4		0,1	0	20			4,02	4,04	Spine calibrate			
20	A4	3a	20	3c	0,1	-0,1	50	F	20,00	19,99	20,01	Comparatore CPK = 1,22 - vedi rapporto istogramma allegato			
18	B3		22,2 (3b)		0,1	-0,1	50	F	22,40	22,35	22,45	Comparatore CPK = 0,65 - vedi rapporto istogramma allegato	X		

Measurement report (entering the measurements)
The report must contain the following fundamental information for each single measurement:

1. Dimension reference, in the REF section: the numerical reference of the identification on the technical drawing (ballooning)

2. Dimension coordinates/position, in the POS section: the reference of the coordinates where the characteristic shown on the technical drawing is located

3. Dimension/characteristic references

3a. If the dimension/characteristic is preceded by an ID symbol (e.g. diameter, thread), the marked box must contain the symbol that precedes the value (to facilitate the identification of the position)

3b. Indicate the nominal value of the dimension/characteristic

3c. Indicate the measurement unit value of the characteristic (e.g. Nm - µm - ° - %). If the value is mm, this is not necessary.

4. Tolerance of the characteristic measured (the upper and lower tolerance values). Note that this must be the nominal value, not the engineering one.

5. Quantity of the sample measured: for each measurement, indicate the sample quantity (respecting the specifications given in the previous chapters with regards the type of characteristic).

6. Type of dimension checked: indicate the type of position in terms of its classification (critical, functional, assembly, etc.). If there is no classification, the box can be used to classify a dimension/characteristic with an ID reference (e.g. hole1, hole2, etc.).

7. Measured value of the characteristic: indicate the real value of the measurement in the box. The value may be of the absolute type if there are no variations in the measurement, or if a single part is measured; otherwise, the value may be an average if there are variations (with upper and lower limits) due to an increase in the sample. If there is a dimension variation however (e.g. SPC check), it's important to indicate not only the minimum and maximum values but also the average position value.

8. Minimum and maximum value of the characteristic/dimension measured: indicate the real minimum and maximum value measured, if the dimension/characteristic shows a variation due to an increase in the sample. In the case of an SPC check, indicate the real minimum and maximum values measured.

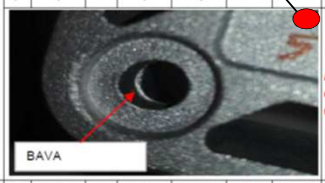
9. Notes field, for information linked to the dimension/characteristic measured (e.g. defects deriving from the position measured). Indicate the CPK values if the check is made with SPC. Indicate the measuring instrument used, any annexes referring to the characteristic, etc.).

10. Outside tolerance range: each dimension/characteristic found to be outside the tolerance range, or with a defect that requires a detailed examination, must always be indicated.

ATTENTION: the measurement report must also contain all the industrialisation aspects laid out in the technical drawing (e.g. laminating directions, shearing directions, etc.), confirming or otherwise the information given on the technical drawing transmitted).

Ch.10 FILLING IN THE MEASUREMENT REPORT

9.2 Dimensional Measurement report

RIF. Ref.	POS. Pos.	DISEGNO / Drawing QUOTA Dimension	TOL SUP. Up Tol	TOL INF. D. Tol.	Q.TA' Q.ty	TIP Type	VALORE Value	RISCONTRI / Notes MIN Min	MAX Max	NOTE Notes	F. TOL. O. Tol.	DECISIONE* Decision*	MODIFICA Change
16	C5	86,3	0,8	-0,8	5	C	86,38			Rif foro nr. 6			
17	D5	86,3	0,8	-0,8	5	C	86,45			Rif foro nr. 7			
18	C5	86,3	0,8	-0,8	5	C	86,40			Rif foro nr. 5			
19	D5	76,5	0,8	-0,8	5	C	76,70			Rif foro 15			
20	C5	76,5	0,8	-0,8	5	C	76,54			Rif foro 14			
21	C5	76,5	0,8	-0,8	5	C	76,51			Rif foro 13			
22	D5	39,6	0,8	-0,8	5	C	39,70			Rif foro 10			
23	C5	39,6	0,8	-0,8	5	C	39,60			Rif foro 11			
24	D5	39,6	0,8	-0,8	5	C	39,73			Rif foro 9			
25	C5	39,6	0,8	-0,8	5	C	39,60			Rif. foro 12			
26	B4	86,3	0,8	-0,8	5	C	86,43						
27	B3	86,3	0,8	-0,8	5	C	86,45						
28	B4	76,5	0,8	-0,8	5	C	76,60						
29	B3	76,5	0,8	-0,8	5	C	76,60						
30	B4	37,5	0,8	-0,8	5	C	37,60						
31	B3	37,5	0,8	-0,8	5	C	37,44						
32	B3	30	0,8	-0,8	5	C	30,15			0,05 mm fuori da centro asse			
33	B3	30	0,8	-0,8	5	C	29,95			0,01 mm fuori da centro asse			
34	#	Ø 3,7	0,3	0	5	foro 8		3,70	3,82	Fondo - alto (foro conico)			
35	#	Ø 3,7	0,3	0	5	foro 15		3,70	3,84	Fondo - alto (foro conico)			
36	#	Ø 3,7	0,3	0	5	foro 10		3,70	3,84	Fondo - alto (foro conico)			
37	#	Ø 3,7	0,3	0	5	foro 11		3,71	3,84	Fondo - alto (foro conico)			
38	#	Ø 3,7	0,3	0	5	foro 14		3,71	3,84	Fondo - alto (foro conico)			
39	#	Ø 3,7	0,3	0	5	foro 6		3,71	3,82	Fondo - alto (foro conico)			
40	#	Ø 3,7	0,3	0	5	foro 5		3,69	3,82	Fondo - alto (foro conico)	X		
41	#	Ø 3,7	0,3	0	5	foro 13		3,71	3,84	Fondo - alto (foro conico)			
42	#	Ø 3,7	0,3	0	5	foro 12		3,71	3,84	Fondo - alto (foro conico)			
43	#	Ø 3,7	0,3	0	5	foro 9		3,70	3,83	Fondo - alto (foro conico)			
44	#	Ø 3,7	0,3	0	5	foro 7		3,70	3,83	Fondo - alto (foro conico)			
45	#	Ø 3,7	0,3	0	5	foro 16		3,73	3,84	Fondo - alto (foro conico)			
46	D2	Ø 4	0,3	-0,3	5		3,90						
							3,90						
						oro 1	5,40						
49	#	Ø 5,5	0,3	-0,3	5	foro 2	5,30	Attenzione foro senza bava ma più piccolo rispetto agli altri					
		Ø 5,5	0,3	-0,3	5	foro 3	5,45	5,15		→ con bava	X		
50	#							Attention: Bava sul fondo del foro, il foro del diametro misura 5,45 mm ma sul fondo è presente una bava che riduce il suo valore a 5,15 mm					
51	#	Ø 5,5	0,3	-0,3	5	foro 4	5,48						
52	#	Ø 10,49	0,5	-0,5	5	foro 1	10,50						

9.3 Photographic/design report

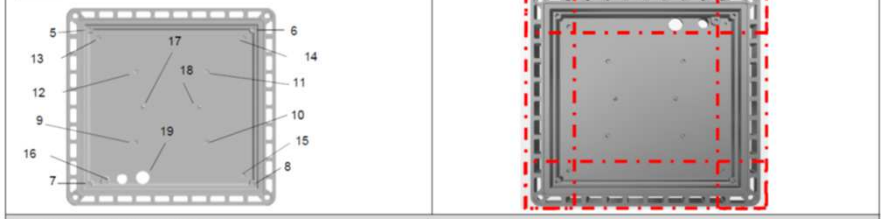
Photographic/Aesthetic report
The photographic report must contain all the aspects resulting from an overall visual examination of the component, or emerging from a non-conformity or an element that differs from the design transmitted.
It's important to highlight every single imperfection, incompleteness, burr, deformation and difference noted when examining the component.
The aim is to provide as much information as possible for evaluating the component in question.
The photographic report can be managed with separate documentation, as long as the measurement report contains all the references to the photographic annex.

Ch.10 FILLING IN THE MEASUREMENT REPORT

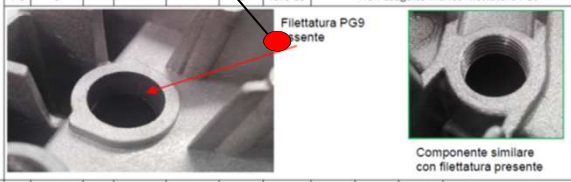
9.2 Measurement report

RIF. Ref.	POS. Pos.	DISEGNO / Drawing QUOTA Dimension		TOL SUP. Up Tol	TOL INF. D. Tol.	Q.TA' Q.ty	TIPO Type	VALORE Value	RISCONTRI / Notes MIN Min	MAX Max	NOTE Notes	F. TOL. O. Tol.	DECISIONE* Decision*	MODIFICA Change
53	#	Ø	10,49	0,5	-0,5	5	foro 2	10,50						
54	#	Ø	10,49	0,5	-0,5	5	foro 3	10,50						
55	#	Ø	10,49	0,5	-0,5	5	foro 4	10,55						
56	D3	Ø	16,2	0,5	-0,5	5		16,20						
57	D3	Ø	14,2	0,5	-0,5	5		14,60						
SCHEMA DI MISURA														
MISURAZIONI ESEGUITE SU SEZIONE B-B														
									48,10	48,30				
								8,20						
								9,70						
61	D6		5	0,3	-0,3	1		5,20						
62	D6	PG	9			1	foro 19	Non eseguito manca filettatura PG9				X		
63	C6-D6		9	0,5	-0,5	1	foro 13	9,00						
64	C6-D6		9	0,5	-0,5	1	foro 12	9,17						
65	C6-D6		9	0,5	-0,5	1	foro 9	9,12						
66	C6-D6		9	0,5	-0,5	1	foro 15	9,10						
67	C6-D6		9	0,5	-0,5	1	foro 11	9,10						
68	C6-D6		9	0,5	-0,5	1	foro 10	9,10						
69	C6-D6		9	0,5	-0,5	1	foro 16	9,10						
70	C6		10	0,5	-0,5	1	foro 5	10,15						
71	C6		10	0,5	-0,5	1	foro 7	10,15						
72	C6		10	0,5	-0,5	1	foro 6	10,15						
73	C6		10	0,5	-0,5	1	foro 8	10,15						
74	C7		3	0,3	-0,3	1	perno 17	3,00						
75	C7		3	0,3	-0,3	1	perno 18	3,00						
76	B6		15,6	0,5	-0,5	1			15,50	15,60				
77	B6		19	0,5	-0,5	1			18,80	19,00				
78	B7		7	0,5	-0,5	1			7,25	7,40				
79	B7		2	0,2	-0,2	1			2,00	2,20				
SIDE VIEW MEASUREMENT														
80	B9		66,5	0,8	-0,8	1			66,40	66,50				

9.3 Measuring methods



9.3 Photographic/Aesthetic report



Ch.10 FILLING IN THE MEASUREMENT REPORT

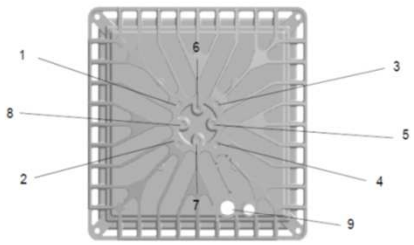
9.2 Measurement report

RIF. Ref.	POS. Pos.	DISEGNO / Drawing QUOTA Dimension	TOL SUP. Up Tol	TOL INF. D. Tol.	RISCONTRI / Notes Q.TA' Q.ty	TIPO Type	VALORE Value	MIN Min	MAX Max	NOTE Notes	F. TOL. O. Tol.	DECISIONE* Decision*	MODIFICA Change
81	B9	39,6	0,8	-0,8	1			39,80	39,90				
82	B9	31	0,8	-0,8	1			31,10	31,20				
83	B9	26	0,5	-0,5	1			26,30	26,70		X		
84	C9	19,6	0,5	-0,5	1		19,40						
85	C9	19,6	0,5	-0,5	1		19,60						
86	C9	19,6	0,5	-0,5	1		19,40						
87	C9	19,6	0,5	-0,5	1		19,60						
88	D9	19,6	0,5	-0,5	1		19,40						
89	D9	19,6	0,5	-0,5									
90	D9	19,6	0,5	-0,5									
91	D9	19,6	0,5	-0,5									

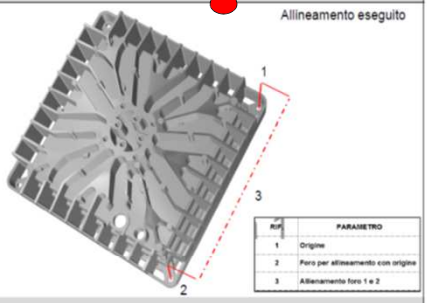
9.3 Measuring methods

SCHEMA DI MISURA

Riferimento foro per misurazione degli interassi



Allineamento eseguito



RIF.	PARAMETRO
1	Origine
2	Foro per allineamento con origine
3	Allineamento foro 1 e 2

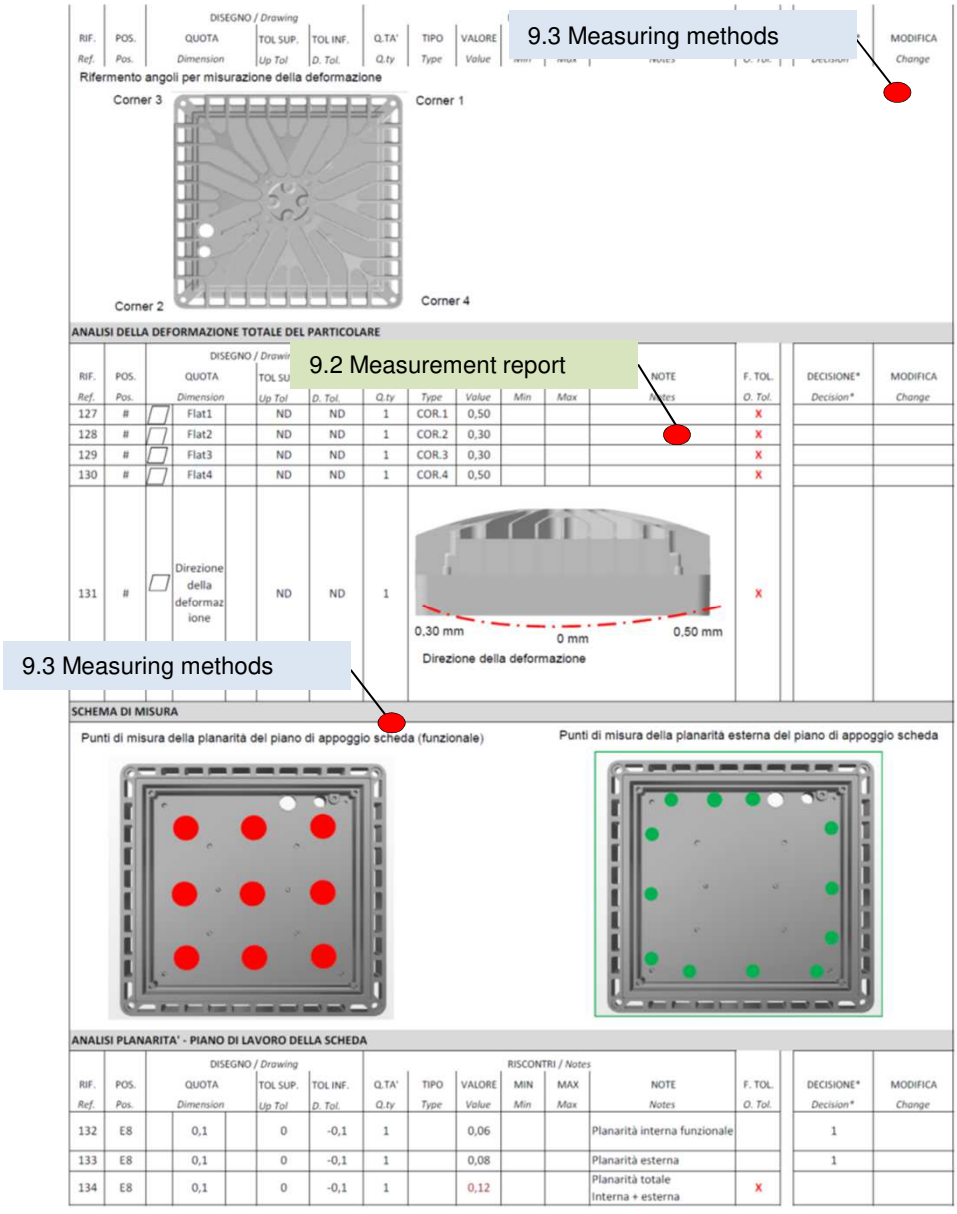
MISURAZIONE VISTA POSTERIORE

RIF. Ref.	POS. Pos.	DISEGNO / Drawing QUOTA Dimension	TOL SUP. Up Tol	TOL INF. D. Tol.	RISCONTRI / Notes Q.TA' Q.ty	TIPO Type	VALORE Value	MIN Min	MAX Max	NOTE Notes	F. TOL. O. Tol.	DECISIONE* Decision*	MODIFICA Change
92	E11	14,75	0,5	-0,5	1	foro 8	14,75						
93	E12	14,75	0,5	-0,5	1	foro 5	14,75						
94	C10	14,75	0,5	-0,5	1	foro 6	14,60						
95	D10	14,75	0,5	-0,5	1	foro 7	14,80						
96	B12	19	0,5	-0,5	1	foro 1	19,00						
97	B12	19	0,5	-0,5	1	foro 2	19,00						
98	B12	19	0,5	-0,5	1	foro 3	19,00						
99	B12	19	0,5	-0,5	1	foro 4	18,95						
100	C13	19	0,5	-0,5	1	foro 1	18,80						
101	C13	19	0,5	-0,5	1	foro 2	19,00						
102	C13	19	0,5	-0,5	1	foro 3	18,80						
103	C13	19	0,5	-0,5	1	foro 4	19,00						
104	B12	220	1,2	-1,2	1			220,10	220,50	in centro			
105	D13	220	1,2	-1,2	1			220,10	220,50	in centro			
106	D12	Ø 21	0,5	-0,5	1	foro 9	21,10						

MISURAZIONE SEZIONE E-E

RIF. Ref.	POS. Pos.	DISEGNO / Drawing QUOTA Dimension	TOL SUP. Up Tol	TOL INF. D. Tol.	RISCONTRI / Notes Q.TA' Q.ty	TIPO Type	VALORE Value	MIN Min	MAX Max	NOTE Notes	F. TOL. O. Tol.	DECISIONE* Decision*	MODIFICA Change
		M 12 X 1,5			2		Conforme test di montaggio con codice 56216658						

Ch.10 FILLING IN THE MEASUREMENT REPORT



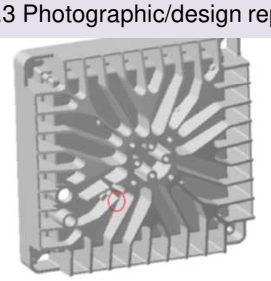
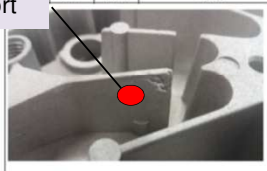
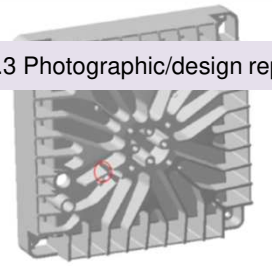
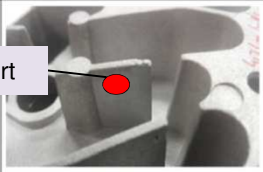
Ch.10 FILLING IN THE MEASUREMENT REPORT

9.2 Measurement report

9.4 Raw material certification

9.3 Photographic/design report

9.3 Photographic/design report

RIF. Ref.	POS. Pos.	DISEGNO / Drawing QUOTA Dimension		TOL SUP. Up Tol	TOL INF. D. Tol.	Q.TA' Q.ty	TIPO Type	RISCONTRI / Notes VALORE Value	MIN Min	MAX Max	NOTE Notes	F. TOL. O. Tol.	DECISIONE* Decision*	MODIFICA Change
ANALISI MATERIA PRIMA														
135		Si	13,5 %	0	-3	1		10,50			Valore in percentuale			
136		Fe	0,9 %	0	-0,45	1		0,87			Valore in percentuale			
137		Cu	0,08 %	0	-0,08	1	C	0,08			Valore in percentuale			
138		Mn	0,55 %	0	-0,55	1		0,10			Valore in percentuale			
139		Mg	0 %	0	0	1		0,00			Valore in percentuale			
140		Cr	0 %	0	0	1		0,00			Valore in percentuale			
141		Ni	0 %	0	0	1		0,00			Valore in percentuale			
142		Zn	0,15 %	0	-0,15	1		0,08			Valore in percentuale			
143		Pb	0 %	0	0	1		0,00			Valore in percentuale			
144		Sn	0 %	0	0	1		0,00			Valore in percentuale			
145		Ti	0,15 %	0	-0,15	1		0,00			Valore in percentuale			
146		Al	89 %	0	-4,5	1		88,00						
ISPEZIONE VISIVA														
147	#							 Area incompleta				x		
148	#							 Area incompleta				x		

Raw material certification
The certification of the raw material used to make the component must be attached to the measurement report, to certify and declare the suitability of the material itself.
If the appropriate instrument/equipment for checking the raw material are available, the documentation must contain not only the certification of the supplier who provided the material but also certification relating to the internal analysis carried out.
Cross-checking certification is not compulsory if the tools needed for checking the material are not available, but the raw material purchase certification **(indicating the chemical and mechanical characteristics of the material)** is needed for type-approval.

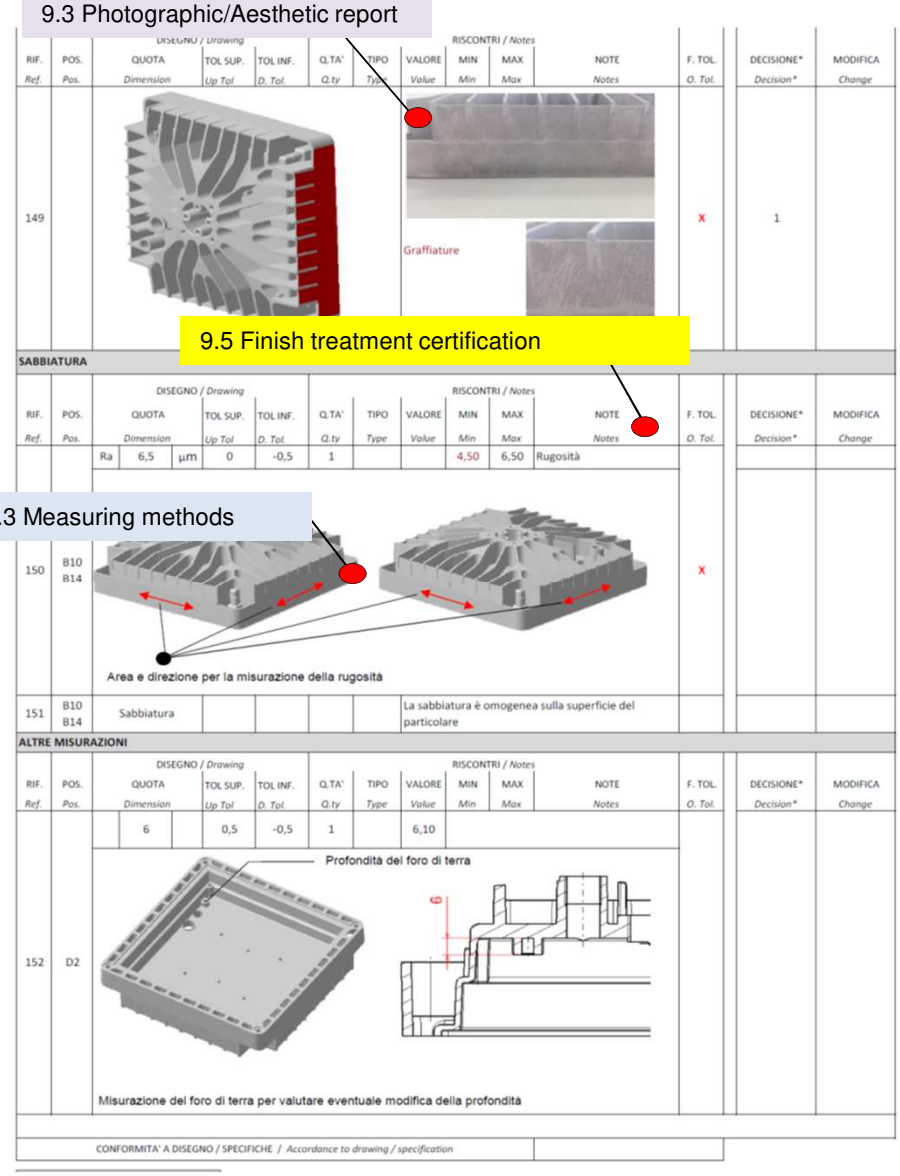
Photographic/Aesthetic report
If there is a non-conformity on the component, the photographic report must highlight the area where it was found, as shown in the adjacent example.

Ch.10 FILLING IN THE MEASUREMENT REPORT

9.3 Photographic/Aesthetic report

9.5 Finish treatment certification

9.3 Measuring methods



Finish treatment certification
The certification relating to finish treatments applied to the component must be attached to the measurement report.
The measurement report must also indicate the finish characteristic if the latter requires a test in order to be approved.

Examples:

Heat treatment: (that alters the post-machining hardness value) - the certification of the post-machining cycle must be attached, and the hardness value measured and indicated in the measurement report must be checked (indicating the certification annex).

Galvanic treatment: the certification of the finish thickness measurement must be attached, and the same data must be indicated in the report.

Aesthetic finish treatment: attach the certification relating to the paints used, the colour mapping check, any possible adhesion tests, and any visual comparisons with the reference standard.

Some examples are listed above. It's important to fully certify the finish treatment, attaching certifications relating to the cycles and materials and the test outcome, to confirm the suitability of the finish treatment.

NOTE: all the information listed in chapter 9 for preparing the measurement report must be provided for all the cavities if the mould has more than one cavity, and each single cavity must be identified in the report, attaching all the necessary certification.

Ch.11 3D SCANS

This chapter sums up all the documentation that must be sent to Gewiss if the measurements are taken with a 3D scanning system (tomography, optical scanning, laser scanning, etc.).
The documentation indicated in this chapter is in addition to that requested in chapter 2, which must always be transmitted in any case.

The 3D scan must be made at the customer's request, with an agreement of the documentation to be transmitted. If the scan is supplementary to measurements taken on the 2D drawing, only one piece per mould needs to be scanned.
Otherwise (if the scan produces a measurement report with the dimensions indicated on the 2D drawing), the scan quantities must be those indicated according to the type of material that the component is made of (plastic or metal).

When a 3D scan is commissioned, the requisites and the documentation to be transmitted are as shown in the table below (unless indicated otherwise by Gewiss).

Summary table:

the following table shows the minimum requisites needed for a 3D scan

REQUISITES AND DOCUMENTS	COMMENT
STL FILES	Send the STL files of the scans made on all the samples subjected to measurement checks.
ALIGNMENT PARAMETERS	Send the alignment specifications used for the matching between the mathematical model and the scanned component. The alignment parameters must be agreed with the Gewiss. A best fit may also be requested (without aligning the piece), but this must be clearly indicated in the relative report.
MATCHING BETWEEN SCAN AND MATHEMATICAL MODEL WITHOUT COLOUR MATRIX	Send the report of the matching between the scanned component and the mathematical model (aligned with the agreed parameters), without a tolerance setting or colour matrix. The aim is to check the scanned piece variations directly with the mathematical model (immediate visual examination).
MATCHING BETWEEN SCAN AND MATHEMATICAL MODEL WITH COLOUR MATRIX	Send the report of the matching between the scanned component and the mathematical model (aligned with the agreed parameters), with a tolerance setting (agreed with the customer) for variations from the mathematical model; use the colour code and labels to show the measurement variations.
SAMPLES MEASURED	Along with the sampling, send also the samples used to take the measurements (clearly labelled as "measuring samples").

Ch.11 3D SCANS

Examples of matching between the mathematical model and the scanned piece, with or without a colour matrix.

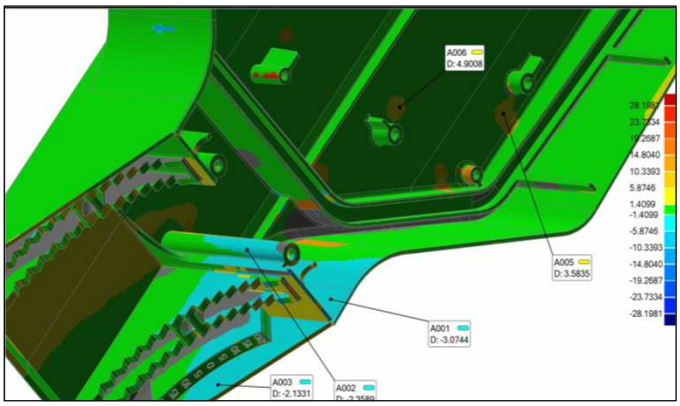


Fig.1: Example of matching with a colour matrix and labels highlighting the variations with the mathematical model.

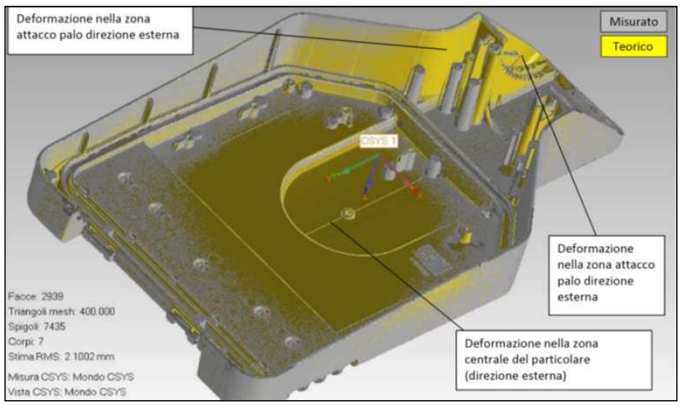


Fig. 2: Example of matching without a colour matrix.

In addition, further requisites may also be required in the case of a 3D scan:

ATTENTION: the following table lists the additional requisites needed for a 3D scan; they must necessarily be requested from Gewiss.

Summary table:

the following table shows the additional requisites needed for a 3D scan

REQUISITES AND DOCUMENTS	COMMENT
SCAN STEP FILES	Simple conversion of the STL scan into STEP files (without any reconstruction and closure of the surfaces).
COMPLETE REVERSE ENGINEERING	Send the complete reverse engineering of the scanned component (with the reconstruction and closure of all the scanned surfaces) in STEP format.
DEFECT ANALYSIS	In the case of a tomographic type scan, send the report relating to the defect analysis (e.g. porosity).

Ch.12 GEWISS REFERENCES

References for sending the documentation or for requesting information about dimensional measurements

AREA	E-MAIL ADDRESS
Gewiss SpA Test Laboratory	lab@gewiss.com
Gewiss SpA Product Quality	productquality.calcinate@gewiss.com

List of revisions of this document:

EDITION	DATE	DESCRIPTION OF THE MODIFICATION
00	10.05.2018	First issue
01	25.02.2019	Notes added for measurements on die-cast components