

ENGEL

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MACHINE SPECIFICATION

EVER-Q

ALBIN BURGHOFER

TECHNICAL INFORMATION

ENGEL Machine Specification EVER-Q

ADVANTAGES BY EVER-Q

- Machine ability proof according to ISO 9001 (element 9 - process control)
- prevents mould provings and productions with wrong data
- prerequisite for the employment of statistic methods for process optimization (e.g. Expert Control)
- enables quality assurance via process data
- facilitates the data exchange between the machines
- early recognition of machine errors and wear
- important decision basis for necessary maintenance

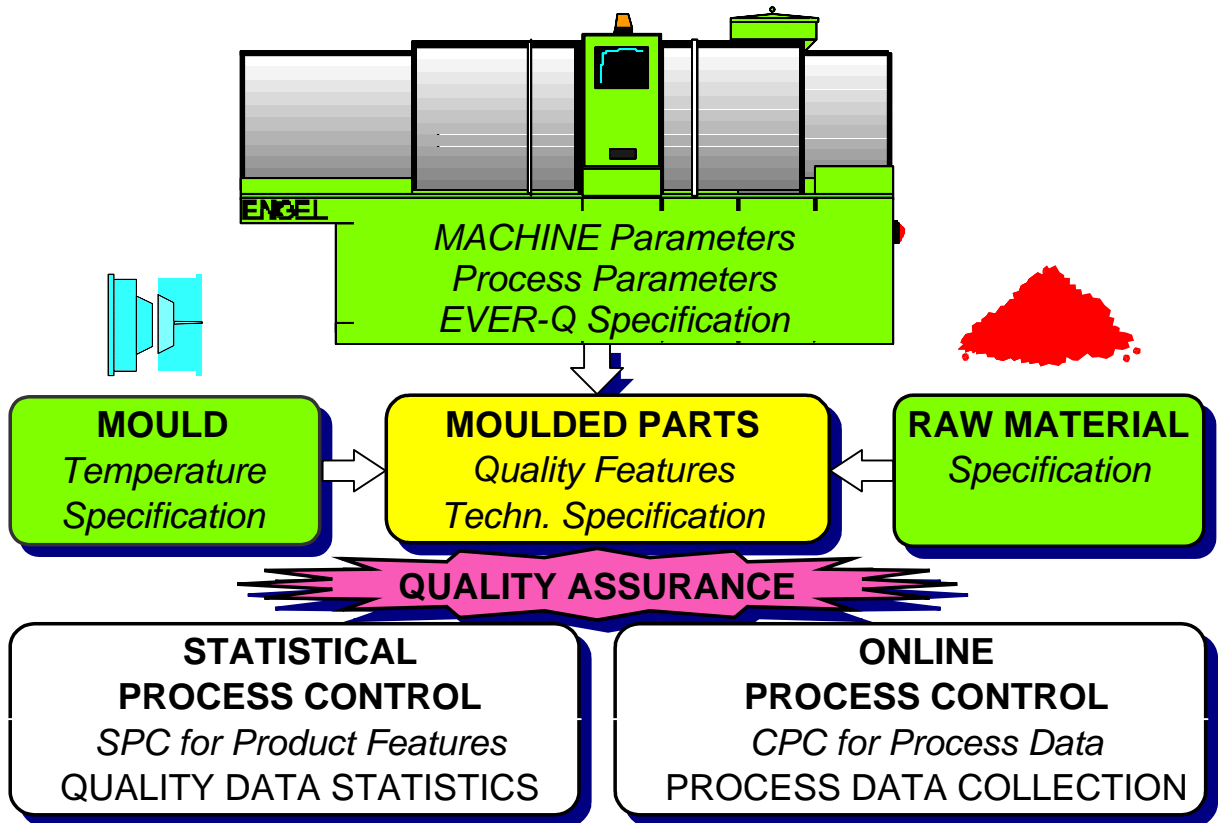


Figure: Quality assurance in the injection moulding process.

The injection moulding process for manufacturing an injection moulded part is mainly influenced by the raw material, by the mould with temperature control system, and by the injection moulding machine. Useful quality assurance concepts comprise all fields and factors, which have and/or can have influence on achieving a requested quality. The mechanisms and interfaces of quality assurance are described comprehensively in the ISO 9001. The demands on a quality management system are to design the systems and processes so that a continuous quality improvement can be reached and assured.

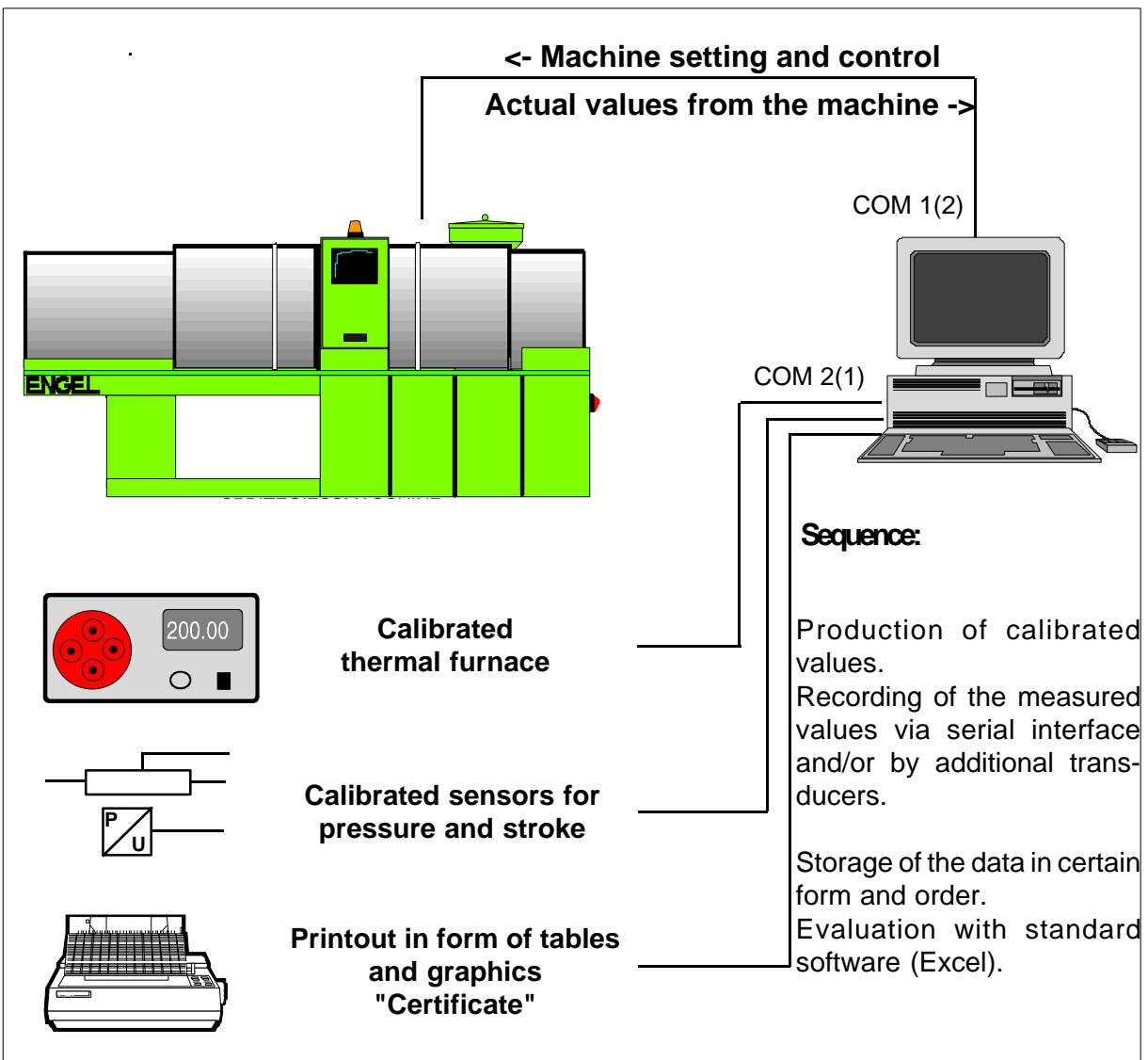
For assuring the requested quality of the injection moulded part often the statistic process control (SPC) for product properties and the continuous process control (CPC) for relevant process data are used.

Assuring the quality also means to preserving the state which had led to the once desired quality. Therefore it must be ensured that by a well-planned maintenance of the production, equipment wear does not lead to a displacement of the operating point. Quite especially when quality-relevant process parameters of the machine are used for quality control, a cyclic check of the machine sensors is necessary.

In this sense EVER-Q has been developed. EVER-Q offers the possibility to document the process capability of the injection moulding machine already at the purchase during the acceptance tests and to check it later again at a certain moment, e. g. in a 3 year period.

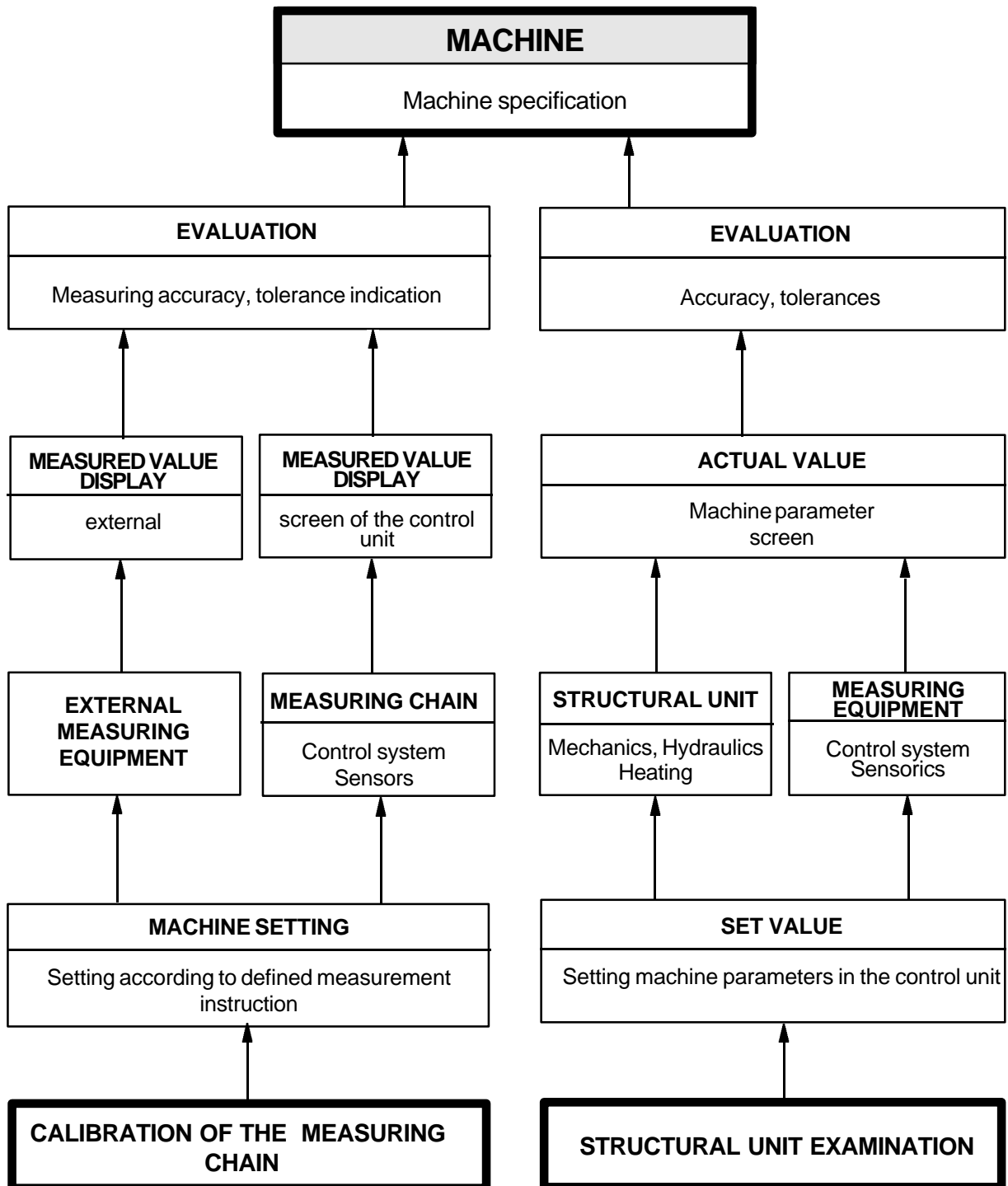
For the program-part of EVER-Q a CAT (Computer Aided Testing) system has been developed, which enables a partial automatic control of the fixed test sequence. The machine set-up, measured value recording as well as the processing of the measured values are supported. Some of these functions are only possible with a certain ebias and system version.

PC-supported test and measuring system for establishing the machine specification CAT - system

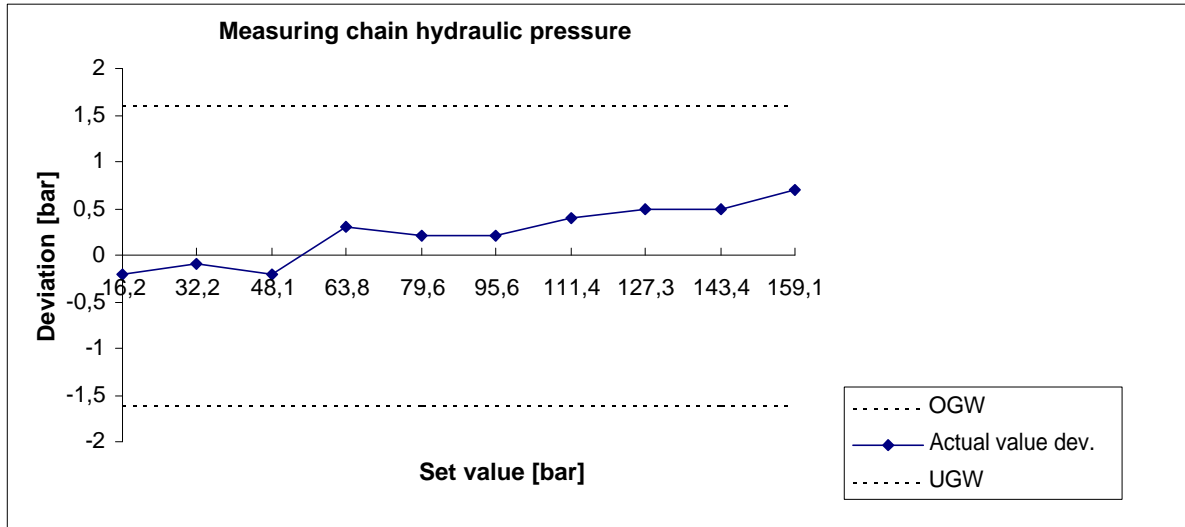


All the examinations are based on rules created by ENGEL in cooperation with an external institute, which are uniform basics for the preparation and execution of the measurements. They further include indications of the conditions under which the measurements shall take place. The kind of execution as well as the condition under which the measurements shall take place are modelled on the recommendation of the EUROMAP10. Primarily it is provided to determine the accuracy of the measuring system of the control system including the sensors. This is achieved by a comparative measurement utilizing a calibrated measuring device. (calibration of the measuring chain). Afterwards the relevant technical features of the individual structural units and/or sequences are determined practice-oriented. (structural unit examination)

STEPS TO THE MACHINE SPECIFICATION

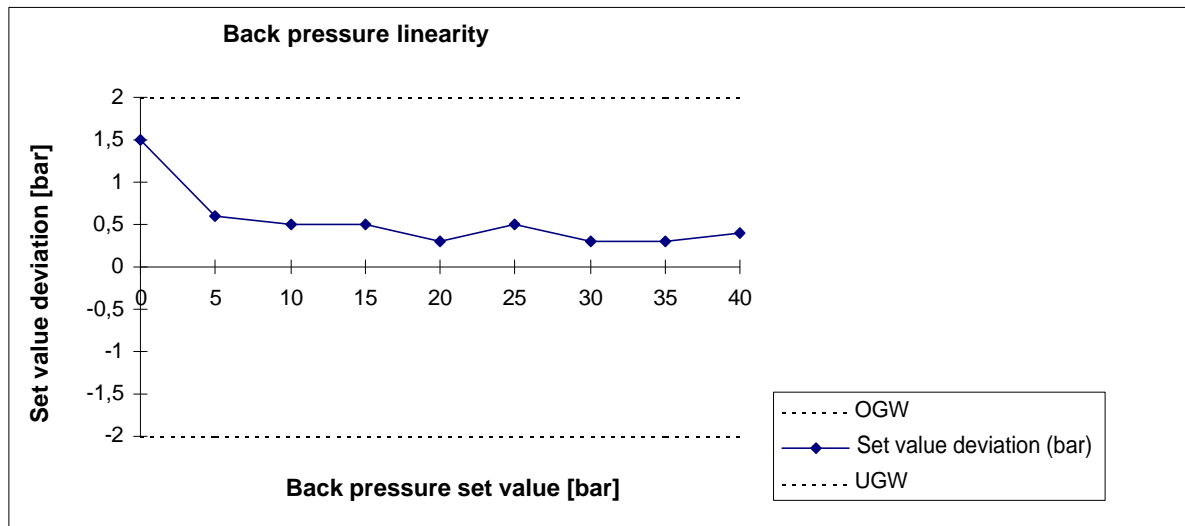


Example for the "calibration of the measuring chain":

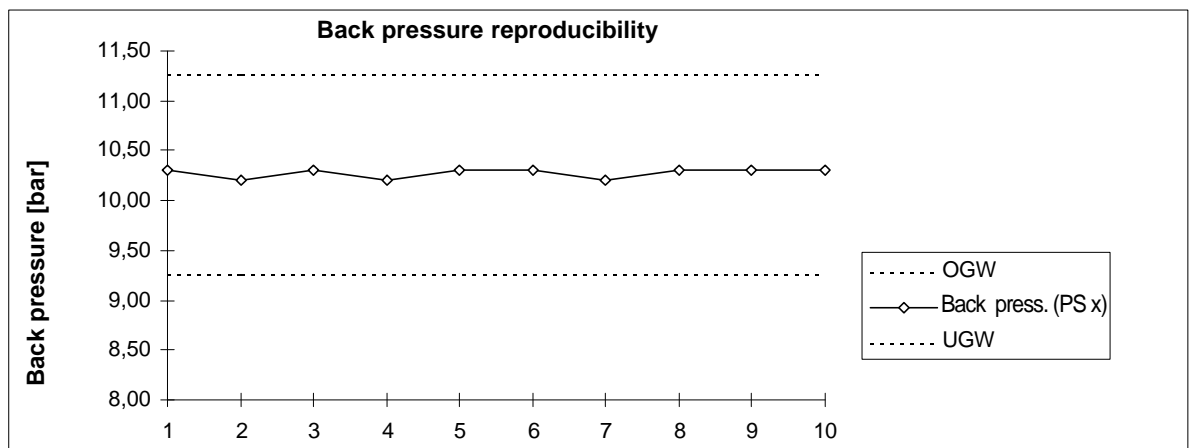


The actual value deviation and the linearity of the display are checked. This examination is done for all process relevant measuring chains.

Example for "Structural unit examination"



The correspondance of the actual value to the set value is proven. This examination is done for all process relevant machine parameters.



The reproducibility for each of the relevant parameters is determined.

The difference between the standard function control every machine has to go through and EVER-Q is that the sensors of the machine are checked. Measurements are made with material as well and the results are documented (compared with tolerance limits) and processed graphically to be able to see the difference when you do the same test again e.g. 3 years later once.

SUMMARY OF AN EVALUATION

			Tol. ±		in tolerance
1.1	Measuring chain cylinder temp.	Actual value display	3.00	°C	<input type="checkbox"/> YES
	Measuring chain oil temperat.	Actual value display	3.00	°C	<input type="checkbox"/> YES
	Measuring chain traverse temp.	Actual value display	3.00	°C	<input type="checkbox"/> YES
1.3	Cylinder temperature	Control deviation	2.00	°C	<input type="checkbox"/> YES
2.1 a)	Measuring chain clamping force	Actual value display	2.00	%	<input type="checkbox"/> YES
2.1 b)	Clamping force	Linearity	3.00	%	<input type="checkbox"/> YES
2.2	Clamping force	Reproducibility	3.00	%	<input type="checkbox"/> YES
2.3	Mould platen parallelism	Difference	0.10	mm	<input type="checkbox"/> YES
3.1	Measuring chain screw stroke	Actual value display	0.20	%	<input type="checkbox"/> YES
3.2 a)	Measuring chain hydr.pressure	Actual value display	1.00	%	<input type="checkbox"/> YES
3.2 b)	Injection pressure	Linearity	2.00	%	<input type="checkbox"/> YES
3.3	Holding pressure	Linearity	2.00	%	<input type="checkbox"/> YES
3.4	Holding pressure	Reproducibility	0.50	%	<input type="checkbox"/> YES
3.5	Speed	Linearity	2.00	%	<input type="checkbox"/> YES
3.6	Speed	Reproducibility	1.00	%	<input type="checkbox"/> YES
3.7	Stroke switchover	Reproducibility	0.05	%	<input type="checkbox"/> YES
4.1 a)	Metering stroke	Reproducibility	0.20	%	<input type="checkbox"/> YES
4.1 b)	Back pressure	Reproducibility	1.00	bar	<input type="checkbox"/> YES
4.1 c)	Screw speed	Reproducibility	1.00	%	<input type="checkbox"/> YES
4.1 d)	Plasticizing time	Reproducibility	5.00	%	<input type="checkbox"/> YES
4.1 e)	Hydraul.pressure switchover	Reproducibility	3.00	%	<input type="checkbox"/> YES
4.1 f)	Shot volume	Reproducibility	0.50	%	<input type="checkbox"/> YES
4.2	Non-return valve	Tightness	0.10	mm/s	<input type="checkbox"/> YES
4.3	Back pressure	Linearity	2.00	bar	<input type="checkbox"/> YES
					<input type="checkbox"/>
					<input type="checkbox"/>



EVER-Q

Werksprüfzeugnis

Specific test report

Gegenstand / <i>Object:</i>	Spritzgießmaschine
Hersteller / <i>Manufacturer:</i>	Fa. Engel Maschinenbau GmbH
Type / <i>Type:</i>	ES1300/250
Maschinennummer / <i>Machine Number:</i>	17746
Auftraggeber / <i>Orderer:</i>	Fa.
Auftragsnummer / <i>Order Number:</i>	10338/018
Seitenanzahl / <i>Number of pages:</i>	27

Die Prüfungen erfolgen auf der Grundlage genau definierter Messvereinbarungen. Dieses Werksprüfzeugnis dokumentiert die Rückführbarkeit der Maschinensensorik auf nationale Normale und dokumentiert die Maschinenfähigkeit. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Messungen ist der Benutzer verantwortlich.

The tests occur on exactly defined measurement agreements. This Certificate documents that the machine sensorics can be traced back to national standards and documents the machine capability. For observing a reasonable period for repeating the measurements the user is responsible.

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