

# Materials Testing and Product Liability

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## 1. The legal basis for product liability in Germany

### *1.1 Product liability*

The German law system differs between three main aspects in product liability:

- the product safety law
- the product liability
- and criminal law

There are over 1000 laws covering the product safety law, such as the CE-mark, the device and product safety law, the medical product law, the pharmaceutical law or the food law. These laws are supposed to serve the public good of the consumers and are mainly related to the product, the environment and the operational safety. They mediate a general legal security, are fixed in German law since 1900 and derive freedom of contract and claims awareness. Many other countries are geared to this system. On the contrary, many questions of product liability in America are resolved by lawyers and courts.

Product liability is composed of warranty law, delictic liability according to §823 BGB as base law, the product liability law and specified performance. It primarily serves single interests. The base of the product security law are standards, the link to product liability is the contract.

Concerning criminal law and product liability, the penal code directly applies, as well as other legal foundations reserved by the state.

## 1.2 Flaw of goods

This legal term is also used at court for services of a testing institute for a producer of objects to be tested. Hereby it is distinguished between legal flaws according to § 435 BGB and product flaws according to § 434 BGB.

Error of a Purchase Thing				
Defective Titles n. § 435 BGB			Material Defects n. § 434 BGB	
Classical	Public Expressions through	Assembly and Assembly instruction	Warranties	Aluid and Quantity
Agreement	manufacturers	IKEA clause	Condition warranty	Other Thing
Contractually Presupposed Use	Salesmans	Not use or control guidance	Durability Warranty	Wrong Quantity
Usual Suitability	Respective Assistants		Requirement against the Manufacturer	

**Picture 1:** Error of a purchase thing (On the right of and material defects [ 1 ])

According to picture 1, there should be arranged a contractual agreement or a contractually preconditioned use between the producer and the distributor concerning the service. If this is not the case, as with most testing services, a court will judge corresponding to common sense. It is questioned which service is appropriate regarding the state-of-the-art.

## 1.3. Product liability law

The product liability law applies since the 01.01.1990 [1] and is derived, amongst others, from the EU-guideline for unification of the product public liability law [2]. The product liability represents a producer liability. The producer of a product is liable for damage caused by his products under certain circumstances. However, the law only covers the private use and consumption of the product and not the companies that use the product commercially.

### 1.3.1 Producer and distributor:

The following producers and distributors are differed according to the product liability law:

- the producer that has made the final product, a binder or a partial product
- the quasi-producer which acts as producer by applying his name, mark or the mark of another producer
- the third-country-importer, an importer from a non-EU country
- the distributor, which could possibly be held responsible if the above mentioned are not identifiable and if he cannot name his previous distributors

### *1.3.2 Product liability*

The product liability concerns the flawed product as movable object. Thus, buildings and land are no objects covered by product liability. Services are no products in the legal sense. Product liability thus only renders a claim to a flaw-caused damage and not a claim for a new product, as with the warranty law.

### *1.3.3 Product flaws*

A product flaw in terms of the product liability law is:

- Construction faults, where the whole product series does not match the security expectations of the consumer and which are often caused by faulty design and planning.
- Production flaws on several pieces of the production, whereas the series matches the given security expectations. Such flaws are significant for material testing.
- Instruction flaws where the product is not provided with an adequate manual and the accompanying warning notices. The larger the hazard, the more such notices are required.
- A violation of the surveillance responsibility on part of the producer concerning possible hazards

### *1.3.4 Accountability and limitation of claims*

According to product liability, damage to persons or property caused by a flawed product or its use will be compensated. The upper limit is 85 million € for damage to persons and 500 € for damage to property [1].

A replacement of the flawed product can only be prosecuted according to the rules of the BGB. Claims concerning flawed products are limited to 2 years [1].

### *1.4 Exculpation of liability of the producer*

According to product liability law, a producer is not liable if:

- he did not put the product in circulation, e.g. if it was stolen
- he brought it in circulation correctly and it was flawed afterwards, e.g. by improper transport, storage or maintenance
- he did not design the product for sale or distribution, e.g. as production blueprint
- the production was done according to mandatory legal directions and the flaw is based on this
- the product matched the state-of-the-art at the time of production

The liability according to the product liability law can basically not be ruled out. This concerns the contract as well as the terms and conditions. An entrepreneur has to be able to prove that the employees concerned with the production were accurately chosen and supervised (organisational fault). Whilst the executive staff may be called to account, this does not yet apply to simple employees [1].

### *1.5. Risk precaution concerning product liability*

Product flaws may lead to endangering of the position on the market, the image and, long-dated, also the continuance of the company. To prevent this, the enterpriser should perform a risk analysis to evaluate the product risk as exactly as possible. An event plan derived from such actions for third party risk based quality assurance, equitable marketing and personnel development should ensure risk minimization.

## **2. International quality standards for testing facilities**

### *2.1 DIN ISO 9000 ff (2000)*

The oldest and internationally most spread quality standard DIN ISO 9000 ff [4] is a scheme for organisation and quality assurance of a company. However, this series of standards does not hold a scale for evaluation of component quality or services. Certain quality requirements for testing services, the testing personnel, the testing equipment and the testing results are not effectually specified. Thus, a certification according to DIN ISO 9000 ff is only a confirmation of conformity for the respective quality management system [5].

### *2.2 DIN ISO 17025 (2005)*

The cons of DIN ISO 9000 ff concerning the accreditation of testing facilities are annulled by DIN EN ISO 17025 [6]. This standard aims at competence verifications for testing facilities concerning testing personnel, testing equipment and testing results in order to perform testing services corresponding to the state-of-the-art. The new DIN EN ISO 17025 (2005) depicts a QM-system which matches the requirements of DIN ISO 9000 ff and focuses on management systems and quality systems, administration systems and technical systems. This means that:

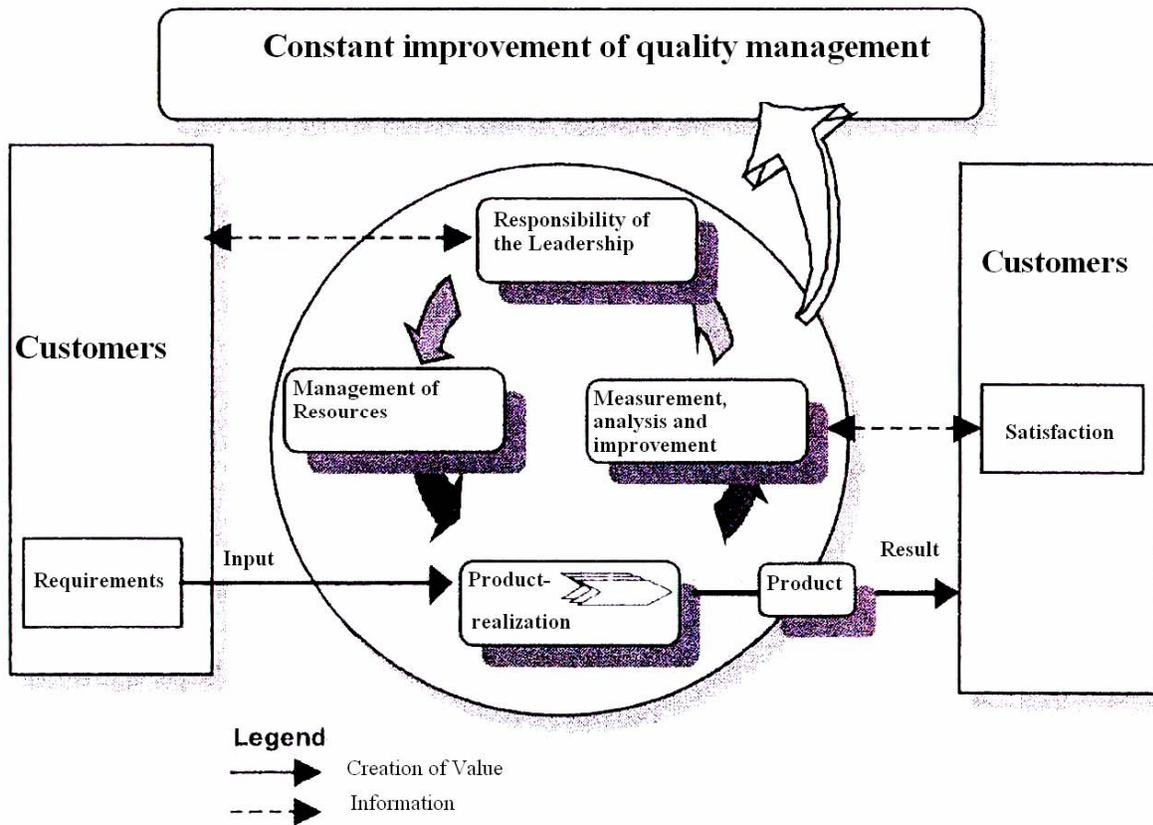
- the management has to establish, attend and control communication in the company and constantly improve the QM-system
- legal and official changes concerning customer claims have to be included
- the customer satisfaction has to be evaluated
- the functionality of the QM-system and thus the company activity has to remain operating after major changes
- the effectivity of employee training has to be evaluated and documented
- the quality guidance data have to be analyzed.

### *2.3 ISO/TS 16949 (2003)*

The technical specification ISO/TS 16949 [7] is of importance for the series production and component production in the automobile industry. Together with according customer-specific claims, this standard defines general claims to a QM-system model of the users (picture 2). This standard frames the requirements to internal and external testing facilities. For internal facilities, which are associated with the producer or editor of products, the technical requirements are specified as follows:

- The adequacy of the testing method
- The competence of the testing personnel
- the testing of the product
- the ability to perform services orderly and according to the respective standard
- the ability to evaluate the records

External, independent and commercial testing facilities either have to prove that they match the requirements of their customers (e.g. by performing a customer audit) or have to be accredited according to DIN EN ISO 17025.



**Picture 2:** Model of a process orientated quality management system after ISO/TS 16949

### 3. Accreditation and certification of testing facilities

The DIN EN ISO 17020 [8] defines the terms accreditation and certification

Accreditation	Certification
Procedure, according to which an authorized Side determines the formal acknowledgment given that a place or a person is competent to accomplish certain tasks	Procedure, in which a third side confirms in writing that a product, a process or a service with fixed requirements are conformal.
Accreditation = Authority confirmation	Certification = Conformity confirmation
Proof for a Laboratory of Inspection that	Proof for an organization that
❖ it operates a QM-System	❖ it operates a QM-system which meets the requirements of the DIN EN ISO 9000 (2000)
❖ it is technically competent, that means it is able to meet the technical minimum requirements	
❖ it is able to obtain technically founded results.	

**Picture 3:** Differences between accreditation and certification after [ 9 ]

The introduction of quality management systems in connection with accreditation and certification of companies advances, because this does not only match political and financial interests of the state, but also those of the testing facilities. The reasons are that an accreditation helps to improve the market situation or enables the facility to hold this position. Sadly, an accreditation is not yet a general reason for improvements of financial benefits of orders.

It has to be mentioned that there is a difference between the nationally regulated and the private, non-regulated areas of such methods. Referring to this, the German Accreditation Council (DAR) and its accreditation points aim at a harmonisation, because currently there is no acceptance of analogical system inspections. Mutual acceptations such as those with the possibility of activity in other fields would be advantageous for German testing facilities, especially on an international scale. The mutual acceptance and comparability in Europe and beyond has to rely on the application and implementation of the same standards and testing methods, as well as on the same professional competence of the testing personnel to archive the goal of "tested once and accredited for the whole market".

#### 3.1 Accreditation of testing facilities as trust building step

The European domestic market helps to generate the competitiveness and the free goods traffic. The growing claims to products and services related to this have increased the relevance of testing and certification services. The mutual acceptance of tests and certificates is the goal of this concept, which, however, can only be successful if there is confidence. This means confidence in the professional competence of the producers, the quality of the products and the competence and reliability of the testing facilities and certification facilities. Measures of building confidence are EU-guidelines, European product standards, measures for quality assurance and also the

accreditation of testing facilities and certification facilities. Picture 4 shows the accreditation method of the DAR concerning testing facilities.

### *3.2 Expenses and investment of accreditation*

Contrary to the requirements for standards for certification of a QM-system, the requirements for an accreditation are much more substantial. Therewith, costs of personal, time and money of the companies grows. A survey done at the BAM showed that the expenses of an accreditation and its upkeep are too high compared with its use. These results proved that the internal costs for the testing facilities make up the largest part of this investment. At the least, the following expenses have to be calculated:

- basic fees of the accreditor
- fees of the auditor (system auditor and professional auditor)
- employee fees for preparation and performance of the
- implementation of a QM-system QMH, VA, AA, forms
- calibration of testing equipment
- qualification of testing personal
- training of employees
- interlaboratory tests
- re-accreditation and surveillance expertise

#### Application method

- a) application
- b) preliminary talk
- c) application for accreditation
- d) confirmation of the application for accreditation
- e) application testing
- f) accreditation contract

#### Expertise procedure

- a) choice of assessors in agreement with the applicant
- b) assignment of the assessors
- c) professional testing of the application documents
- d) assessment on site
- e) assessment report

#### Accreditation

- a) testing of assessment results and accreditation results
- b) accreditation certificate
- c) publication in the register

## Surveillance procedure

The surveillance of accredited facilities and the extension of accreditation is performed according to the rules of the accreditation facilities.

To what extent the investments before an accreditation actually are required should be evaluated by the testing facilities. Further, the rating of technical and professional competence compared to formal aspects during the process of accreditation should be observed more carefully. A stronger accentuation of connection between accreditation and competence could achieve a greater effect. However, the present structure of accreditation in Germany leads to a competition among the accreditation facilities which can result in quality loss and a negative effect for the acceptance of accreditation on part of the customer.

### *3.3 Use of an accreditation*

The main use of an accreditation is the certificate of competence and conformity of the testing facility for certain services and industrial sectors which means the general acceptance on part of the customer without precedent customer-distributor audits. By controlling the facilities through independent accredited facilities confidence in the testing results is created.

The facilities internally benefit from the accreditation process by

- improvement of quality, reduction of fault rate, fewer reclamations and thus customer satisfaction
- indexing of potentials and resources for improving the professional and functional work in the company
- optimisation of working processes and system processes, decrease of cycle times and the testing costs

In general, it can be differed between internal and external use of an accreditation. The main external aspect is that testing facilities increasingly experience allowance if they have an accreditation, especially in the nationally controlled domains. Paradoxically, the accreditation is expected when advertising for a testing service, but not necessarily regarded for the placing, because there the costs are the most important aspect. Thus, the higher effort which is necessarily for the accreditation is not considered for the price of the service. The competence of a testing facility is rated to low in this matter. There also is no immediate solution for this in the competition of testing service provider. Contrary, territorial advantages, long term business connections or financial arrangements are crucial.

The purchasing department of contractors tend to demand an all round price form the service provider that preferably includes all costs, partially also repairing costs. One proposal in this matter in order to improve the relations between customer and distributor is to ensure impartiality and financial independence by not letting the producer order the quality controlling, but the investor [10]. This would mean that e.g. not the welding company that is assigned to produce a duct also accounts for the testing, but the operator of the duct. Unfortunately, the testing service provider will not know of these connections in the most cases or is not introduced to them.

#### 4. Testing services of accredited facilities and product liability

Testing services must be planned when manufacturing the product and have to be included in the production process. The origination often is derived by the customer's contract for delivery, but also the constructor or technologist have to include testing operations in the production process in order to ensure the construction safety. 50 years ago, security factors of 2.0 were standard, nowadays the approach 1.2. The results are extensive tests for identification of flawlessness and thus the given stability properties, reliability and safety of particular components as well as working load under service conditions.

If differed between destructive and non-destructive testing methods, one can see that the NDT methods are more informative due to the direct measurement at the component compared to the destructive methods which give comparative values based on sample tests. The aim of the use of testing methods is the proof by test results that the component will meet the technical requirements under service conditions. This proof of technical informational value has priority over other procedural, apparatus or personal influences [11]. In order to satisfy product liability as producer, the products have to be controlled under service conditions as well (e.g. call-backs in the automobile industry). An adequate information chain can considerably contribute to choice, use and evaluation of technical informational value of testing processes. The informational value of these processes grows from materials testing described by standard and guidelines to individual component testing up to test of operational stability [11].

It is the function of the testing facilities, like testing service providers or in-shop testing sections, to ensure the technical informational value and reliability of test results by:

- qualification and certification of personal, according to e.g. DIN EN 473 or SNT-TC-1A
- calibration of the used testing equipment based on certified comparison standards
- continuing inspection equipment controlling
- observance of measurement inaccuracy and mention of such in testing reports

The qualifications based on accordant standards for the testing personnel document the approved engineering rules, according to which the individual testing procedures have to be evaluated. Only the sum of technical informational value and personnel influence on testing results enables traceable, reviewable and confidential conclusions concerning the testing method and its spreading and confidence interval. Not until this the tests may resist judicial decisions based on assessor expertise.

As an example, the large number of testing parts tested during one year for the supplier of the automobile industry shall be pointed out. It is medically proven that the testing personnel concerned tires very quickly due to the similar and repetitive operations. The erroneous reactions caused by this affect the evaluation "flawless" or "flawed". According to the FMEA-analysis law, these components have to be tested seven times repeatedly to ensure absolute security of the result. Of course, no client will finance this. Thus, there is a general insecurity concerning the testing process which leads to a should-be distinction between

- flawless components
- debarment components and
- quasi-debarment components

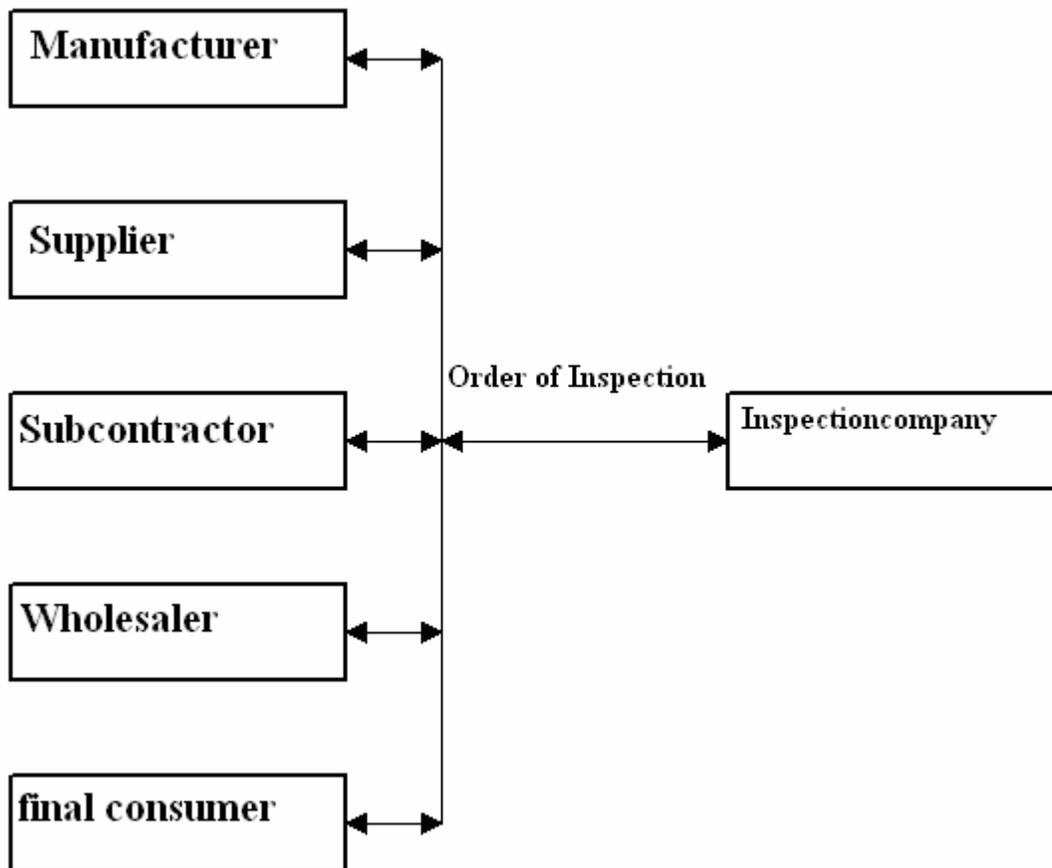
The latter could be included in either category. A re-examination is necessary if they are discovered. Partially, however, this is done too late, namely if discovered during the production process on the production line. This is the classic case of a client trying to call to account the testing service provider for reasons of product liability and warranty claims. Then, money also is a crucial matter, and not exclusively the tested components, no matter how large their number. Approximately 20% of all flaws are not found or classified incorrectly.

An improvement can be achieved by mechanisation or automation of the testing method to up to 3% quasi-defective components. Especially the surface abridgement method requires human personnel due to the necessary observation and evaluation. Automatic image recognition systems cannot fully compare because of high costs and the need of control for correctly differing between real or quasi flaws. With help of a system analysis the technical informational value of testing methods, especially for large numbers of components to be tested, can be made safer and the efficiency of the tests can be accounted for.

## **5. Liability of facilities and their employees**

### *5.1 Contract design*

A contract design between the client, which can be producer, supplier, sub-supplier, wholesaler or consumer (picture 5), and the contractor in terms of a testing facility is either done by a contract for work and labour or by supply of temporary workers. The borders between both possibilities are blurred, because the basic conditions for a contract for work and labour often refer to supply of temporary workers. It will thus not be differed further between both forms.



**Picture 5:** Contractual relationships

### 5.1.1 Contractual duties

Contracts between a testing facility and a client are often done orally if they do not surpass a certain value. Thus, the duties and rights of the parties are only arranged abrasively (place of performance, testing method, tester, gratuity, documentation). The general terms and conditions (AGB) are only preset in written form in contracts, and in most cases the client will intermingle. In these cases, were no written contract has been issued, the BGB is considered as contractual basis. Thus, the testing company as contractor is obligated to accomplish the testing task in that way that the testing result is not flawed, its value is not increased or decreased and efficiency of the test is not increased or decreased. It is assumed that the test has been done professionally, diligent and based on the state-of-the-art and the scientific insights on this field. The testers primarily have to avoid errors in measurement and mention the measurement inaccuracy.

Accredited facilities are expected to render such mentions concerning measurement inaccuracy of testing methods in their work instructions. The measurement inaccuracy is already being included in the standards for destructive materials testing, where agreements concerning measurement inaccuracy are closed and where it is already supposed to be included in the testing reports.

However, up to now there are no positions to include such agreements for the non-destructive testing, with very few exceptions. Of late, a suchlike interlaboratory test for defectoscopic ultrasonic test is offered [12]. Maybe such tests should be judged primarily concerning quality norms or with comparing the quantitative norms of the destructive testing.

### *5.1.2 Facility faults (breach of duty)*

Faults of a testing company can be interpreted as a breach of duty if there is / are [12]:

- a undetected flaw in the product
- an erroneously detected flaw in the product
- unfounded testing results with very abnormal measurement inaccuracies.

Such faults can cause damage to the client, because

- the product has to be re-worked to eradicate the flaws
- such flaws can cause consequential damage (damage to property or persons)
- a flawless product has to be reworked or scrapped without reason

### *5.1.3 Purpose and gross negligence*

An important question for evaluating the question of guilt in court is if gross negligence or purpose have led to the flaws of the concerned product. In case of gross negligence it can be presumed that the producer knows that his product is dangerous, but he hopes that it will turn out all right. In case of purpose, he does not care if damage is caused.

Default is the generic term for gross negligence or purpose. Thereafter, purpose is deliberate or wanted action or assenting acceptance of damage. A testing institute which deliberately uses a non-calibrated and thus unusable testing device is purposely testing false. Gross negligence is careless and inaccurate conduct. A testing company which does not train its employees in use of the equipment or where the devices are not regularly calibrated, maintained and controlled would be such a case. The level of negligence is important for the question of liability.

## *5.2 Warrantee liability*

This means that the client has the right to oblige the contractor - within an appropriate period - to remove the detected flaws by amendment at no cost, thus repeating the tests.

### *5.2.1 Amendment*

An appropriate period is often a scant period, because the client can expect that the testing company had enough time to render the testing service. Often the amendment is not possible because

- the flaw removal is objectively impossible
- the testing company refuses the amendment
- the immediate assertion of the warrantee claims of the client are justified, e.g. by a lack of confidence in the contractual relationship

The client can remove the flaws by himself or let the flaws be removed by a third party and demand adequate expenditures from the contractor if the latter cannot accomplish the amendment in the given period.

### *5.2.2 Warrantee claims*

The following warrantee claims can be asserted by the client [12]:

- annulment action by re-exchange of the mutual services
- mitigation by cutting the contracted gratuity amounting to the value of the flaw
- compensation due to default of the contract by fault of the testing company
- suffrage of the client concerning the warrantee claims

### *5.3 Liability for consequential damage (positive violation of contract)*

Whilst the warrantee liability concerns the faultiness of the tested product, consequential damage is caused if the testing is causally responsible for damage at the client's products. [12] E.g. the oversight of a gross flaw of a component on part of the testing company can lead to a complete destruction of the component and even to damage to persons. In such cases it can be spoken of product liability, with which the contractor can only be charged if the guiltiness can be proven.

### *5.4 Delictic liability according to §823 BGB (product liability)*

In such cases the §823 BGB is used so that a replacement of the flawed product becomes pending [12]. A liability for damage still requires that the tester acted against the law, which means he breached an essential duty. It is assumed that a testing company will do everything to avoid damage to others caused by their actions. Thus, it is presumed that only an accredited testing company can meet these requirements and thus ensures that

- its employees are qualified and certificated according to the contract
- its testing equipment is calibrated
- the measurement inaccuracy of the equipment is considered in the testing method
- the testing facility has a quality management system

### *5.5 Limitation of claims*

If both contractual partners did not agree on something deviant and thus not cutting or extending the limitation period, the following periods apply:

- warrantee claims for amendment, conversion, mitigation or compensation due to default prescribes within 6 months
- prescription within 2 or 5 years for buildings
- prescription within 30 years for maliciously concealed faults
- prescription within 3 years for delictic liability according to §823 BGB

### *5.6 Allocation of the burden of truth*

To prove the levied claim, a court has to clearly prove the rightness of it by [12]:

- documents
- witnesses
- appraisers
- taking of inspection
- party interrogation

However, the claimant has to prove that the liability requirements according to §823 BGB are met. If the producer can prove that he did not commit any breach of duty at all or that no fault applies, the burden of proof is inverted, and now the producer has to prove that he acted dutifully and blameless.

### *5.7 Personal liability of the director and employees*

Director and employees of a testing company can be made liable if it can be proven that they acted deliberately and contrary to duty, ergo deliberately causing damage. This mainly applies to warranty claims and is judged according to §823 BGB. Contractual claims generally can not be accomplished concerning employees, because a contract never is disposed with them, but always with the employer. It is assumed that an employee has a so called right of recourse concerning his employer, because only services of median kind and quality are expected, but no success. Gross negligence is excluded from this.

### *5.8 Insurance possibilities*

If the requirements for delictic liability by acting guilty and contrary to duty are met according to §823 BGB, each person that matches these facts can be called to account. In such cases the comprehensive general liability insurance applies, if the damage is covered by it (amount of coverage). Concerning damage to persons and property, this is the case. The damaged has to prove all requirements according to §823 BGB in such cases.

## **6. Summary and preview**

The accreditation of testing facilities improves the confidence between the client and the testing company in contractual relationships. Accreditations ensure that the facilities possess qualified and certified personnel, calibrated testing equipment and a consistent quality management system. It can be assumed that the certificate of accreditation is becoming increasingly important in matters of commissioning. Thus, it is not only the task of the testing facilities to balance cost and use of an accreditation, but also a task of the client associations to cover the relatively high costs.

Product liability is almost completely excluded for testing facilities, because services are no products in terms of the product liability law. It can only apply in cases of guilty and duty-breaching action of testing facilities and their employees, if this can be proven. If damage is caused at the testing facility's client, it is judged in almost all cases concerning delictic liability

according to §823 BGB. At this, the court judges based on the state-of-the-art and common sense if no contractual agreements exist. It thus is of use for testing facilities to secure themselves from the effects of such cases of loss by to effect accordant comprehensive general liability insurances or special insurances with accordant compulsory cover shares. Accredited facilities already have to do this.

Due to stronger demand on part of the lawgiver and of the offices of the EU the importance of testing with competent testing results grows. Preferably, these can be shown by accredited testing facilities. If a facility is supposed to be accredited it is necessary to estimate cost and use, because it can indirectly be assumed that the company has to make an investment. This, in turn, has to be estimated realistically concerning the company figures.

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