Introduction to the Construction Equipment Register (BGL) 2007

English Edition 2011

1. STRUCTURE & APPLICATION

In view of adapting to the requirements of a growing European market, the construction equipment committees of all European countries had requested the construction equipment committees of France and Germany already in 1993 to work out the basis for a European Construction Equipment Register. This EUROLISTE was completed in 1998 to serve as the basis for future national construction equipment registers and presented to the construction equipment committees of the European countries. In order to be able to retain the 4-digit equipment type number for technical programming reasons, the committees of Germany and France agreed upon an alphanumeric classification for construction machinery and equipment.

With regard to the structure and to the detailed equipment code used to classify the standard equipment types required for the building sector, the German Construction Equipment Register BGL 2001 was the first national data pool to be established on the basis of the EUROLISTE.

Today, the structure and the contents of this register provide orientation and help beyond national borders on construction sites in foreign countries and for country-specific adaptations within the EU member states.

Advanced wishes for an EU-wide harmonization as well as the progress in data processing techniques resulted in the decision to publish a revised edition of the Construction Equipment Register in 2007 with regard to the contents and above all with respect to the media used by maintaining at the same time its structure already harmonized on the European level. During this process of adaption, the technical progress and the economic changes in Europe were taken into account and –where necessary – added to the register in the form of new equipment types and corrections of existing entries in the list.

The present English Edition of 2011 is based on BGL 2007. It contains in addition new data for many items which have been added since 2007. In each case, the latest state of the BGL database is always the one presented in the Internet portal: www.bgl-online.info.

The English Edition 20011 of the Construction Equipment Register contains the current equipment types and sizes required for the execution of construction work and for the installation of construction sites without stating brand names and type designations. The tried-and-proven principle of indicating the mean original values and the average values in the technical data has been retained. The construction machinery and equipment listed complies with the requirements of current laws, decrees and regulations regarding safety and health at the place of work. In conformity with the statistical base year of the producer price index for construction machines and equipment the whole database is considered on the same price basis of the year 2000. The prices of newly added equipment have been retro-evaluated on this basis. For selected equipment types, the Construction Equipment Register has been supplemented by a wear parts catalogue which is intended as guideline for the proper delimitation of repair costs from other necessary expenses within the scope of the overall equipment costs in conjunction with the replacement of wear parts the costs of which are not included in the repair cost rates.

The core data of the new Construction Equipment Register are at the same time also the master data of the EUROLISTE and hence the basis for a Europe-wide database permitting to generate in future also further country-specific versions and offers by taking national particularities into account. The further development of an integrated all-in-one solution will facilitate the exchange of data to a considerable extent and thus contribute to enhancing the coherence of project-related workflows between construction partners. This is especially true for contacts with building partners of foreign countries and in transnational joint ventures where a more efficient and hence more economical collaboration in the field of construction machinery and equipment management can be expected.

Thanks to the new programming based on „content-delivery technologies“, the EUROLISTE / Construction Equipment Register – BGL 2007 – will fulfil the latest requirements of internet-based data processing, individual intranet and extranet solutions as well as interactive data maintenance and contains latest additions of current machinery in use. The Construction Equipment Register – BGL 2007 – will continue to be available in the well-known print version and network licences. Further offers for use will are available via the new BGL Internet portal.

Against this background, the hitherto applied principle of basic reviews and new editions of the Construction Equipment Register in 5 to 10 years‘ intervals was replaced by user-oriented and closely interlocked printed and online contents with fast data updating.

The main fields of application of the Construction Equipment Register are:

- in-house accounting and intra-company calculation of equipment provision costs, e.g. between headquarters, branch office and construction site or between joint ventures and their individual members;
- organization and planning of equipment management in building companies;
- evaluation of equipment and machinery costs, especially in profitability comparisons;
- equipment value assessment in insurance cases and in court decisions.

The Construction Equipment Register does not include construction site equipment and tools which are listed in the BAL – Baustellenausstattungs- und Werkzeugliste, Bauverlag, Gütersloh.

2. CLASSIFICATION & NUMBERING

2.1 Equipment code

The Construction Equipment Register is divided into 24 equipment main groups with each group being designated by a distinct letter of the alphabet. The main groups are further subdivided into equipment groups, equipment subgroups and equipment types marked by one additional figure each. Identical equipment types have the same design and range of application. Cross-referencing is used if pieces of equipment are listed in more than one group.

In order to describe the equipment size within the equipment type for the purpose of a distinct classification, the data of one or possibly two technical parameters are used and indicated with 4 further digits (see sub-section 3.2).
If no technical parameters for classification purposes are at hand, the consecutive numbering for the respective equipment size will start with „0001".

C	**EQUIPMENT MAIN GROUP**
C.0	**EQUIPMENT GROUP**
C.0.0	**EQUIPMENT SUBGROUP**
C.0.00	**EQUIPMENT TYPE**
C.0.00.0001	**EQUIPMENT SIZE**

Example:

C	equipment main group	hoisting and lifting equipment
C.0	equipment group	tower cranes
C.0.1	equipment subgroup	tower crane, top-slewing, stationary or mobile
C.0.10	equipment type	tower crane with trolley beam
	(EDP term)	TURMKRAN LAUFKATZ
C.0.10.0071	equipment size	tower crane with trolley beam and nominal load moment of 71 tm

For equipment types to be classified in acc. with the Construction Equipment Register on the basis of their original value (see sub-sections 5.1 and 11.3), the „fictitious" equipment size placeholder of 0000 has been reserved, e.g. A.7.10.0000. This placeholder is intended for other parameters related to the equipment type (years of useful life, equipment providing months, monthly depreciation and interest and monthly repair costs) in order to permit the individual classification in the BGL database.

As in the EUROLISTE, the letters „I" and „O" are not used in the Construction Equipment Register either in order to avoid confusions. The equipment main groups „N" and „Z" are currently not in use.

2.2 Equipment options

Equipment options supplementing the standard equipment are permanently installed and usually not interchangeable pieces of equipment of a machine. They are listed after the corresponding table and designated by two letters (e.g. EQUIPMENT OPTION C.0.10.0071-AA, up to AZ, BA…BZ and so forth). Equipment alternatives such as diesel engines instead of electric motors, are treated as equipment options. Equipment options will generally lead to a value increase or a value decrease with respect to the standard equipment.

Example:
Machine with equipment options (deviation from standard equipment):

C.0.10.0071-AA	Tower crane with trolley beam, nominal load moment of 71 tm and adjusting/ hoisting gear with 1.15 to 1.4-fold motor output

2.3 Attachments

Attachments, e.g. add-on units or boom extensions which are not permanently and firmly attached to the basic machine and which can also be combined with identical or with different sizes of an equipment type are treated as independent devices and designated by two figures (e.g. ATTACHMENT C.0.10.0071-00). Together with the indication of the respective equipment size and the technical parameter an independent attachment is thus clearly defined and identified.

Example:

C.010.0071-01	Boom extension with holding ropes and fastenings for tower crane with trolley beam, 71 tm
(EDP term)	AUSLEGERSTÜCK *

With a 10-digit alphanumeric code, all construction machines and equipment, equipment options and attachments of the Construction Equipment Register, including the pertaining technical data, mean original values, periods of depreciation (years of useful life) and provision costs are thus clearly identified.

* Please note: The predefined short terms of the German Construction Equipment Register BGL are taken over as a proposal. User may feel free to chose other short terms. For more information see section 12.

3. TECHNICAL DATA & EXPLANATIONS

3.1 Preface

In so far as necessary, the explanations of the equipment types include technical details and provide information as to possible fields of application. The definition refers to the standard version of the respective equipment types on which the values set out in the tables for each equipment size are based.
For each equipment type as defined by the first 4 digits of the code, the technical characteristics which are necessary for the evaluation of this equipment type are listed in the so-called table header. These technical characteristics vary with the large number of equipment types. For this reason, the respective technical parameter is of special importance (see sub-section 3.2). The technical data of a device described by 8 digits of the code under an equipment type identify this device according to size, performance and application.
As a new feature, the BGL 2007 now also includes information on wear parts for various equipment types (see sub-section 7.3).

3.2 Technical parameter

The technical parameter is always indicated in the first column of the table containing the technical data. Because of its importance for the numbering system (see section 2) it is printed in bold letters in the title row of each equipment type entry. One technical parameter is generally sufficient to clearly identify the size of an equipment type and thus to permit an evaluation of the equipment.

Some equipment types require two technical parameters for the unequivocal classification and identification of a piece of equipment. In these cases, both parameters are printed in bold letters. The special conditions for the interpolation of devices to be classified between two equipment sizes in the tables are explained in sub-section 11.2.

Each technical parameter is indicated together with the corresponding legal units and arranged in ascending order in the respective data tables. Since one or both parameters are indicated for equipment type classification purposes with the mandatory 4-digit code, it is often necessary to use the units multiplied by 100 or divided by 10 or by 100 for instance.
In the case of two parameters, the first parameter is represented by the first figure(s) while the second parameter is represented by the last figure(s).

Example:

A.5.11	Conveyor belt, portable Parameter: width of belt (mm), distance between axles (m)
A.5.11.0504	Conveyor belt, portable, with a belt width of 500 mm and a distance between axles of 4 m
A.5.11.0506	Conveyor belt, portable, with a belt width of 500 mm and a distance between axles of 6 m

In a few cases where it does not make sense to indicate technical parameters, these will be replaced by numbers (see also sub-section 2.1).

3.3 Weights

The weights indicated are average values and serve the purpose of evaluating the costs for transport and loading. They are always referred to the design weights (without ballast, counterweights, consumables and operator).

3.4 Engine power rating and consumption of consumables

The technical parameter for prime movers is the engine power rating expressed in kilowatts [kW]

- For construction machines the engine power rating is defined as the „blocked effective power“ (IFN)“ according to ISO 3046/1 and ISO 9249

- For automobiles, the engine power rating is defined according to ISO 1585, supplemented by EC directive 97/21/EC

The specific fuel consumption of diesel engines varies with load, speed, operating condition and state of wear. Of practical importance for operations in conjunction with construction work is fuel consumption specified by the manufacturer in kg per operating hour [kg/h] for a defined operating condition. The conversion factor used by the customs authorities for the density of diesel fuel is 0.84 [kg/l] (0.82 – 0.86 according to ISO 3675 and ASTM D 4052).

Taking operation-specific interruptions into account, the fuel consumption of construction machines can generally be assumed to be between 100 and 175 [g/kWh]. The costs for lubricant consumption are generally 10 to 12 % of the fuel costs.

3.5 Units

The units of measurement used for technical parameters and data are based on the international SI system in accordance with DIN 1304. Deviations from this principle for reasons of practicability and ease of understanding will only be made in a few justified cases.

4. TIME-RELATED TERMS FOR EQUIPMENT USE AND EVALUATION

4.1 Useful life

Useful life means the period of time during which a device can – according to experience – be used with economical and technical success. It is measured in months or in years.

The useful life of a device is influenced by

- technical obsolescence
- wear
- maintenance and care
- repairs
- climatic conditions
- loading and mode of operation (e.g. shift work)

In the Construction Equipment Register, the useful life span is expressed in years of use and equipment providing months.

4.1.1 Years of use

At the time of publication of the BGL 2007, the years of use are mainly based on the useful life spans defined in the official fiscal depreciation tables for the building sector, released on December 6, 2001 as well as in the official depreciation tables for generally usable investment goods of December 15, 2000 in so far as they contain additionally construction-related equipment. The useful life spans indicated in the aforementioned depreciation tables serve as a guideline for the tax deductibility of goods acquired after December 31, 2000. Upon proper showing, shorter spans of useful life may be used for fiscal depreciation purposes as well. Owing to many years of practical experience gained in construction projects, the equipment providing months indicated in the Construction Equipment Register therefore deviate in some cases from the above-mentioned fiscal depreciation periods.

4.1.2 Equipment providing months

The equipment providing months are empirical values for economically achievable total periods of utilization as determined during many years of experience in building projects. They are indicated as “from…to” values to account also for those individual cases which deviate from typical average values. The equipment providing months are valid for medium-duty loading and single-shift work of the equipment and on condition that the equipment is properly maintained and cared for and that repairs are carried out whenever necessary.
The equipment providing months are the basis for cost-accounting depreciation as well as a determining factor for the computation of interest (see section 6).

4.2 Total lifetime

Total lifetime is to be understood as the time span between the production (year of construction) and the definite withdrawal (scrapping) of a device.

4.3 Providing period

The providing period is the time span during which a device is held at the disposal of a specific construction site and cannot be used for other purposes.

Start: day of dispatch to the place of use

End: day of dispatch to the new place of use or to the storage yard or the effective date of re-availability
If the device is transported back to the storage yard, the providing period may, if applicable, also comprise the times for loading and return transport.

The providing period comprises:

- time for loading and, if applicable, return transport
- set-up and take-down time
- times for retrofitting
- times of operation
- construction site-induced waiting times
- distribution time and time losses
- times of transfer on the construction site
- downtimes due to force majeure (see sub-section 4.4)
- maintenance and repair periods in so far as the site is responsible for maintaining the equipment in a ready-for-operation state; generally repairs at the place of use.
- periods of maintenance and repair due to damage caused by force

4.4 Downtimes

Downtimes are time spans within the providing period forcing the device user to immobilize a device for reasons of force majeure or similar circumstances beyond the user‘s control. The accounting of downtimes is explained in sub-section 8.4

5. MEAN ORIGINAL VALUE & PRODUCER PRICE INDEX

5.1 Mean original value & original value

The indicated mean original values are average list prices in EURO (€) of the most common brands on the price basis 2000 including the cost of acquisition. New equipment types recently incorporated in BGL 2007 have been retro-evaluated on this price basis by means of the official producer price index (see sub-section 5.2).
The acquisition costs include freight, packaging and customs duties. The mean original values are valid for completely equipped devices ready for operation, but without spare parts and without fuel.

Especially for data processing reasons, the mean original value for mobile construction equipment includes the respective standard tires. In the case of tires other than the standard tires, e.g. rock tires for wheel loaders, the mean original value must be adapted in each individual case on the basis of the original value of the tires (see sub-section 11.4).

If it is not possible to indicate a mean original value for a construction device, the evaluation must be based on the original value (see sub-section 11.4).
This applies in particular to some equipment types listed in the EUROLISTE, which are of no importance for the German building industry and for which no mean original values have as yet been determined.
The mean original values and the original values do not include the VAT.

5.2 Producer Price Index

Experience has shown that the acquisition costs of devices do not remain constant over time. It is therefore necessary to account for the evolution of the acquisition costs and of the mean original values.

The official producer price index for construction machinery as published by the Federal Statistical Office in Wiesbaden (see tables 1 and 2) the weighting scheme of which was published at the time of publication of BGL 2007 on the basis 2000 = 100 and which is being updated monthly and for average annual values can be used for this purpose.
By multiplying the mean original values with the producer price index ix referred to basis 2000, the mean original values can, on average, be easily updated for an equipment inventory and the current replacement values thus be determined.

$$Ax = A * ix / 100 \qquad (1)$$

Ax mean original value for replacement in the year X
A mean original value according to the Construction Equipment Register 2001
ix producer price index for construction machinery in the year X, referred to 2000 = 100 (cf. table 1).

The average annual values are published regularly by the Hauptverband der Deutschen Bauindustrie [Federation of the German Construction Industry] and by the Zentralverband des deutschen Baugewerbes [German Construction Confederation]

Table 1: Official producer price index for construction machinery and equipment without VAT; producer price index ix in acc. with the weighting scheme 2000 = 100 referred to the price basis of Construction Equipment Register BGL 2007 (and Construction Equipment Register BGL 2001):

Reference year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
2000 = 100*	**100,0**	100,9	101,8	101,6	102,7	105,3	106,7	108,2	110,9	114,5	115,5

* Source: Federal Statistical Office, Wiesbaden

In 2009, the official producer price index was changed by the German Federal Statistical Office to a new weighting scheme and to base year 2005 = 100.

Based on the changed composition of the shopping basket and the weighting portions, the index ix of the Construction Equipment Register BGL 2007 will – from 2009 onwards – continue to be indicated on the price basis 2000 = 100. The conversion for a specific year x from the new official index with base year 2005 = 100 to the index ix of the Construction Equipment Register (BGL) 2007 with base year 2000 = 100 will be effected by multiplying the respective official producer price index with base year 2005 = 100 by the factor 1.053.
For the evaluation of equipment in special cases and for discontinued equipment types no longer included in the Construction Equipment Register (BGL) 2007 (see sub-sections 11.3 and 11.4), the producer price index of previous years is needed with the price basis 1990 = 100 (price basis of Construction Equipment Register 1991) in acc. with table 2, line 1, and 1995 = 100 in acc. with table 2, line 2.

Table 2: Producer price indices 1990 = 100 for construction machinery and equipment without VAT,
price basis: Construction Equipment Register 1991

Year of reference	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1990 = 100*	**100,0**	103,5	107,0	110,2	110,7	112,4	113,4	113,7	113,6	115,0	115,5
1995 = 100*						**100,0**	100,9	101,2	101,1	102,3	102,8
2000 = 100*											**100,0**

* Source: Federal Statistical Office, Wiesbaden

The conversion of an index with the price basis 1990 or 1995 for a specific year X to the index ix with the price basis 2000 of the Construction Equipment Register 2007 as a reference is effected by dividing the respective index to be converted by 1.155 (for price basis 1990) or by 1.028 (for price basis 1995).

For the base year x = 2000 of the Construction Equipment Register the calculation yields a result of i_{00} = 100.0 (cf. table 2, line 3).

6. COST-ACCOUNTING DEPRECIATION & COMPUTED INTEREST

Cost-accounting depreciation is the process of determining the loss of value of machines and equipment and the taking into account of this loss as costs. The starting value is the mean original value indicated in the Construction Equipment Register (see sub-section 5.1). Due to the fact that the mean original value is updated continuously (see sub-section 5.2), it is possible that the costs of replacement for a device which is technically equivalent and comparable in terms of performance are available at the end of the useful life span.

The computed interest is the fictitious interest which would be yielded by the capital tied up in the residual value of the equipment not yet written off.

The monthly rates and amounts for depreciation and interest determined from the mean original value in the Construction Equipment Register are based on the following elements:

- mean original value
- linear depreciation
- simple interest calculation
- computed interest rate of p = 6.5% p.a.
- time unit: 1 equipment providing month

The monthly rates for depreciation and interest as a percentage of the mean original value result from the following equation:

$$K = \frac{100}{v} + \frac{p \times n \times 100}{2 \times v} = \frac{100}{v} \times \left(1 + \frac{p \times n}{2}\right) [\%] \qquad (2)$$

K — monthly rate of depreciation and interest in percent of the mean original value

v — equipment providing months

n — years of use

p — computed interest rate of 6.5% = 0.065

$\frac{100}{v} = a$ — rate of monthly depreciation as a percentage of the mean original value (see table 3)

$z = p \times n \times \frac{100}{2 \times v}$ — average rate of interest per month as a percentage of the mean original value (see table 4)

p * n * 100 / 2 — total rate of interest

k = a + z [%] — all values of k usually encountered in the construction industry are indicated in table 4

The monthly rates of depreciation and interest indicated in the Construction Equipment Register are calculated as follows:

K = k * A [€/month] (3)

K — monthly rate of depreciation and interest [€]

A — mean original value [€]

Table 3: Monthly rates of depreciation a as a percentage of the mean original value depending on the number of the equipment providing months v

v [Mon.]	15	20	25	30	35	40	45	50	55	60	65	70
a [%]	6,67	5,00	4,00	3,33	2,86	2,50	2,22	2,00	1,82	1,67	1,54	1,43

Table 4: Monthly rates of depreciation and interest k = a + z
Total rates of interest and monthly rates of interest z as a percentage of the original value

years of use	total rates of interest	Mmonthly rates z and k as a percentage of the original value and equipment providing months v of:																					
		15		20		25		30		35		40		45		50		55		60		65		70	
n	%	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**
3	9,75	0,65	**7,3**	0,49	**5,5**	0,39	**4,4**	0,33	**3,7**	0,28	**3,1**														
4	13	0,87	**7,5**	0,65	**5,7**	0,52	**4,5**	0,43	**3,8**	0,37	**3,2**	0,33	**2,8**	0,29	**2,5**										
5	16,25	1,08	**7,8**	0,81	**5,8**	0,65	**4,7**	0,54	**3,9**	0,46	**3,3**	0,41	**2,9**	0,36	**2,6**	0,33	**2,3**	0,3	**2,1**	0,27	**1,9**				
6	19,5			0,98	**6,0**	0,78	**4,8**	0,65	**4,0**	0,56	**3,4**	0,49	**3,0**	0,43	**2,7**	0,39	**2,4**	0,35	**2,2**	0,33	**2,0**	0,30	**1,8**		
7	22,75			1,14	**6,1**	0,91	**4,9**	0,76	**4,1**	0,65	**3,5**	0,57	**3,1**	0,51	**2,7**	0,46	**2,5**	0,41	**2,2**	0,38	**2,0**	0,35	**1,9**	0,33	**1,8**
8	26			1,30	**6,3**	1,04	**5,0**	0,87	**4,2**	0,74	**3,6**	0,65	**3,2**	0,58	**2,8**	0,52	**2,5**	0,47	**2,3**	0,43	**2,1**	0,40	**1,9**	0,37	**1,8**
9	29,25			1,46	**6,5**	1,17	**5,2**	0,98	**4,3**	0,84	**3,7**	0,73	**3,2**	0,65	**2,9**	0,59	**2,6**	0,53	**2,4**	0,49	**2,2**	0,45	**2,0**	0,42	**1,8**
10	32,5			1,63	**6,6**	1,30	**5,3**	1,08	**4,4**	0,93	**3,8**	0,81	**3,3**	0,72	**2,9**	0,65	**2,7**	0,59	**2,4**	0,54	**2,2**	0,50	**2,0**	0,46	**1,9**
11	35,75			1,79	**6,8**	1,43	**5,4**	1,19	**4,5**	1,02	**3,9**	0,89	**3,4**	0,79	**3,0**	0,72	**2,7**	0,65	**2,5**	0,60	**2,3**	0,55	**2,1**	0,51	**1,9**
12	39			1,95	**7,0**	1,56	**5,6**	1,30	**4,6**	1,11	**4,0**	0,98	**3,5**	0,87	**3,1**	0,78	**2,8**	0,71	**2,5**	0,65	**2,3**	0,60	**2,1**	0,56	**2,0**
13	42,25			2,11	**7,1**	1,69	**5,7**	1,41	**4,7**	1,21	**4,1**	1,06	**3,6**	0,94	**3,2**	0,85	**2,8**	0,77	**2,6**	0,70	**2,4**	0,65	**2,2**	0,60	**2,0**
14	45,5			2,28	**7,3**	1,82	**5,8**	1,52	**4,9**	1,30	**4,2**	1,14	**3,6**	1,01	**3,2**	0,91	**2,9**	0,83	**2,6**	0,76	**2,4**	0,70	**2,2**	0,65	**2,1**
15	48,75			2,44	**7,4**	1,95	**6,0**	1,63	**5,0**	1,39	**4,3**	1,22	**3,7**	1,08	**3,3**	0,98	**3,0**	0,89	**2,7**	0,81	**2,5**	0,75	**2,3**	0,70	**2,1**
16	52							1,73	**5,1**	1,49	**4,3**	1,30	**3,8**	1,16	**3,4**	1,04	**3,0**	0,95	**2,8**	0,87	**2,5**	0,80	**2,3**	0,74	**2,2**
18	58,5							1,95	**5,3**	1,67	**4,5**	1,46	**4,0**	1,30	**3,5**	1,17	**3,2**	1,06	**2,9**	0,98	**2,6**	0,90	**2,4**	0,84	**2,3**
20	65							2,17	**5,5**	1,86	**4,7**	1,63	**4,1**	1,44	**3,7**	1,30	**3,3**	1,18	**3,0**	1,08	**2,8**	1,00	**2,5**	0,93	**2,4**
21	68,25							2,28	**5,6**	1,95	**4,8**	1,71	**4,2**	1,52	**3,7**	1,37	**3,4**	1,24	**3,1**	1,14	**2,8**	1,05	**2,6**	0,98	**2,4**
25	81,25																								

Since the equipment providing months v are indicated in the Construction Equipment Register as „from ...to“ values, the monthly amounts of depreciation and interest resulting are „from … to“ values as well.

The following values are correlated:

The higher value for v corresponds to the lower value for k resp. K,
The lower value for v corresponds to the higher value for k resp. K,

The monthly amounts K indicated in the different sections are rounded like all other values of the Construction Equipment Register as follows:

			up to	<	0,50 €	rounded up to	0,01 €
from	≥	0,50 €	up to	<	1,00 €	rounded up to	0,05 €
from	≥	1,00 €	up to	<	10,00 €	rounded up to	0,10 €
from	≥	10,00 €	up to	<	100,00 €	rounded up to	0,50 €
from	≥	100,00 €	up to	<	500,00 €	rounded up to	1,00 €
from	≥	500,00 €	up to	<	1.000,00 €	rounded up to	5,00 €
from	≥	1.000,00 €	up to	<	5.000,00 €	rounded up to	10,00 €
from	≥	5.000,00 €	up to	<	10.000,00 €	rounded up to	50,00 €
from	≥	10.000,00 €	up to	<	100.000,00 €	rounded up to	100,00 €
from	≥	100.000,00 €	up to	<	1.000.000,00 €	rounded up to	500,00 €
from	≥	1.000.000,00 €				rounded up to	1.000,00 €

Table 3 (continued)

v [Mon.]	75	80	85	90	100	110	120	130	140	150	160
a [%]	1,33	1,25	1,18	1,11	1,00	0,91	0,83	0,77	0,71	0,67	0,63

Table 4 (continued)

years of use	total rates of interest	monthly rates z and k in percent of the original value and equipment providing months v of:																					
		75		80		85		90		100		110		120		130		140		150		160	
n	%	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**	z	**k**
3	9,75																						
4	13																						
5	16,25																						
6	19,5																						
7	22,75	0,30	**1,6**																				
8	26	0,35	**1,7**	0,33	**1,6**	0,31	**1,5**																
9	29,25	0,39	**1,7**	0,37	**1,6**	0,34	**1,5**	0,33	**1,4**	0,29	**1,3**												
10	32,5	0,43	**1,8**	0,41	**1,7**	0,38	**1,6**	0,36	**1,5**	0,33	**1,3**	0,30	**1,2**										
11	35,75	0,48	**1,8**	0,45	**1,7**	0,42	**1,6**	0,40	**1,5**	0,36	**1,4**	0,33	**1,2**										
12	39	0,52	**1,9**	0,49	**1,7**	0,46	**1,6**	0,43	**1,5**	0,39	**1,4**	0,35	**1,3**	0,33	**1,2**	0,30	**1,1**						
13	42,25	0,56	**1,9**	0,53	**1,8**	0,50	**1,7**	0,47	**1,6**	0,42	**1,4**	0,38	**1,3**	0,35	**1,2**	0,33	**1,1**						
14	45,5	0,61	**1,9**	0,57	**1,8**	0,54	**1,7**	0,51	**1,6**	0,46	**1,5**	0,41	**1,3**	0,38	**1,2**	0,35	**1,1**						
15	48,75	0,65	**2,0**	0,61	**1,9**	0,57	**1,8**	0,54	**1,7**	0,49	**1,5**	0,44	**1,4**	0,41	**1,2**	0,38	**1,1**	0,35	**1,1**	0,33	**1,0**	0,30	**0,9**
16	52	0,69	**2,0**	0,65	**1,9**	0,61	**1,8**	0,58	**1,7**	0,52	**1,5**	0,47	**1,4**	0,43	**1,3**	0,40	**1,2**	0,37	**1,1**	0,35	**1,0**	0,33	**1,0**
18	58,5	0,78	**2,1**	0,73	**2,0**	0,69	**1,9**	0,65	**1,8**	0,59	**1,6**	0,53	**1,4**	0,49	**1,3**	0,45	**1,2**	0,42	**1,1**	0,39	**1,1**	0,37	**1,0**
20	65	0,87	**2,2**	0,81	**2,1**	0,76	**1,9**	0,72	**1,8**	0,65	**1,7**	0,59	**1,5**	0,54	**1,4**	0,50	**1,3**	0,46	**1,2**	0,43	**1,1**	0,41	**1,0**
21	68,25	0,91	**2,2**	0,85	**2,1**	0,80	**2,0**																
25	81,25	1,08	**2,4**	1,02	**2,3**	0,96	**2,1**	0,90	**2,0**	0,81	**1,8**	0,74	**1,6**	0,68	**1,5**	0,63	**1,4**	0,58	**1,3**	0,54	**1,2**	0,51	**1,1**

7. REPAIR & REPAIR COSTS

7.1 General

The expenditures required for maintaining equipment in a ready-for-operation state are an essential part of the overall equipment costs. The necessity of maintenance is due to the utilization of the equipment in construction work, frequent change of the place of use, insufficient protection against the weather throughout the seasons and changing operating and maintenance personnel.

The actual repair costs generally rise with longer utilization. In spite of this fact, the Construction Equipment Register is based on the assumption of repair costs remaining constant throughout the whole service life as only the accounting of age-independent average costs is feasible in practice. For this reason, repair costs are indicated in the Construction Equipment Register as average costs over the whole service life.

All repair cost rates and amounts stated in the Construction Equipment Register are valid for medium-severe working conditions, single-shift work and appropriate maintenance and care.

The costs are calculated as follows:

$R = r * A$ [€/Monat] (4)

R monthly amount of repair [€/Month]

r monthly rate for repair costs as a percentage of the mean original value

A mean original value [€]

For rounding up or rounding down, the rounding table of section 6, last paragraph applies accordingly.

7.2 Scope of repair work and repair costs

Equipment repair in terms of the indicated rates for repair costs includes:

1. the work performed at the place of use as well as in internal and in external workshops (labour costs) required for maintaining and for restoring the state of operational availability of a device;
2. the installation of spare parts, units, working equipment and other structural components (costs of material) required for maintaining and for restoring the state of operational availability of a device.

The repair cost rates and amounts do not include:

maintenance and care (e.g. lubrication, oil change, filter change, setting and adjusting work and the respective costs of material, cleaning and removal of contaminations by building materials and soil) removal of damage caused by force; exchange of wear parts (see sub-section 7.3).

7.3 Wear parts

Certain machine components are subject to increased wear even under average load conditions. The repair of these components is generally not economical so that these parts always be replaced again and again depending on their degree of wear. The replacement or the reworking of these parts (e.g. deposit welding) within repair or maintenance activities is not included in the repair cost rates.

The Construction Equipment Register BGL 2007 takes this into account by indicating for specific equipment sizes those typical wear parts with a generally higher than usual rate of wear.

In case of extreme conditions of use, even such structural components which would normally not be classified as wear parts and which – under normal conditions of use - would be replaced in the course of maintenance work, may be exposed to abnormal wear. Frequent examples are the teeth of excavator buckets, cutting edges, gyros, casings of sand/water pumps, milling and hinged teeth.

7.4 Types of repair work and repair costs

Repair work required for maintaining and for restoring the operational availability of a device are divided into:

- **Maintenance**
  Maintenance includes the permanent repair activities necessary during the providing period in order to keep the equipment in a ready-for-operation state on the construction site.
- **Overhaul**
  Overhaul includes all repair activities outside the providing period, which are required to restore the equipment for the next deployment on a construction site to the best possible state of operation and optimum performance.

The repair costs can be roughly divided into:
30% for maintenance
70 % for overhaul
of the repair costs and amounts indicated in the Construction Equipment Register.

The costs are approximately composed as follows:
60 % wage costs (gross wages)
40% material costs
(costs for repair materials and spare parts free place of repair without VAT)

100%

Incidental wage costs as well as supplements related to hourly wage rates, e.g. overheads for construction site repair shops are not included.

8. EQUIPMENT PROVIDING COSTS

8.1 Time units for calculating the providing of equipment

The time unit applied is the month in terms of the monthly rates indicated in the Construction Equipment Register for depreciation and interest as well as for repair costs. The conversion to smaller time units is based on the following rule:
1 equipment providing month = 30 calendar days = 170 providing hours (single-shift work).

8.2 Calculation of providing costs

Equipment providing costs are composed of

- depreciation and interest (interest payments)
- repair costs
- overall providing costs = providing period * providing costs / time unit
- providing costs per calendar day = 1/30 of the monthly rate
- providing costs per equipment providing hour = 1/170 of the monthly rate

8.3 Equipment extra hours

Equipment extra hours are the hours of utilization exceeding 170 providing hours per month or – in the case of providing periods of less than one month – the hours of utilization exceeding the corresponding proportion of hours.

Costs of an equipment extra hour = costs of the normal providing hour for single-shift work.

No extra hours will be charged for the following equipment and installations:
distribution boards for construction sites, transformers, pipelines for air and water supply, reservoirs, fittings, air vessels, site caravans, mobile toilets, barracks, huts, containers, scaffolds, office equipment, measuring and testing equipment, cars.

8.4 Providing costs for downtimes

In case of downtimes as mentioned under 4.4 within a providing period of more than 10 successive calendar days, the following costs will be considered as providing costs:

- for the first 10 calendar days the full depreciation and interest as well as the full repair costs;
- from the 11th calendar day onwards, 75 % of depreciation and interest as well as 8% of the depreciation and interest rates for maintenance and care, but without repair costs.

9. OVERALL EQUIPMENT COSTS WITH PARTICULAR REGARD TO EQUIPMENT RENTAL

9.1 Additional equipment costs

Aside from the costs for maintaining devices (see chapter 8) additional costs occur from ownership and usage, as far as:

- costs of operation,
- consumables and lubricants,
- maintenance and care,
- equipment insurance costs and taxes,
- set-up and take-down costs, loading, transports
- storage costs
- work-related equipment options (e.g. GPS, anemometer, extensometer) as well as
- proportional general overheads
- general and special business risks

If equipment is rented to third parties, an appropriate extra charge for risk and profit has to be added.

9.2 Model agreement for equipment lease

If equipment is leased or hired, the question as to whether and to what extent the hirer takes over a proportional amount of the overall costs remains a matter of negotiation (see sub-section 9.1). An appropriate contractual basis for such purpose is the „Model Leasing Agreement for Construction Equipment“ published by Hauptverband der deutschen Bauindustrie e.V. and which has been developed especially as a typical example of the general terms of business and recommended contract conditions used in the construction industry.

10. CURRENT VALUE OF CONSTRUCTION EQUIPMENT

The current value of a device is the price that can be achieved when a used device is sold.

The current value depends on the mean original value, the age and the state of a device.

The current value must be known when a device is to be sold, for „sale and lease-back“ agreements, for evaluations within joint ventures, for rental and insurance and in case of device loss during a rental period or during construction work.

There is no relationship whatsoever between current value, cost-accounting depreciation and interest or depreciation for tax purposes.

The current value of construction devices is calculated as follows:

$$A_z = ½ * A * i_x / 100 * ((n - g) / n + e) \qquad (5)$$

A_z current value [€]

A mean original value [€]

I_x producer price index for construction equipment in year x, based on 2000 = 100 (see table 1)

n service life in years

g age of equipment

e state of equipment coefficient

e = 1,0 as good as new
0,9 very good
0,8 good
0,7 satisfactory
0,6 fair
0,5 poor, limited ready for operation
0,3 poor, not ready for operation, repair possible

g ≥ n is calculated as follows: (n - g) / n = 0

Referred to price basis 2000, the following values of ix can be used in the formula (5):

Year of reference	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991
2000 = 100	100	99,6	98,4	98,4	98,2	97,3	95,8	95,4	92,6	89,6
Year of reference	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981
2000 = 100	86,6	83,6	80,8	79,5	77,7	75,8	73,5	72,1	70,0	66,8
Year of reference	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971
2000 = 100	64,4	61,9	60,4	59,2	56,8	54,3	50,6	47,3	45,2	43,7
Year of reference	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961
2000 = 100	41,1	37,5	35,4	36,7	36,0	35,4	34,5	34,2	33,9	

11. CLASSIFICATION, INTERPOLATION AND EVALUATION

11.1 Classification

The devices must be classified in accordance with their technical parameters.

If a parameter is defined by a „from… to“ value and if the parameter of the device to be classified lies inside the range bounded by these two values, then the device belongs to the corresponding equipment size. If the parameter of a device can be found between two individual values, then the device has to be classified by means of interpolation. The number of the respective device contains the value of the actual parameter:

Example:

C.0.10	Tower crane with trolley beam
C.0.10.0075	Tower crane with trolley beam and nominal load moment of 75 tm (the parameters listed in the table are 71 tm and 80 tm).

If two parameters are needed for complete classification of a device, it is necessary to proceed accordingly.
For space-saving reasons, the applicable parameter for equipment options and attachments is represented by an asterisk (placeholder). The respective parameter is to be entered when the device is classified.

Example:

C.0.10.0071	Tower crane with trolley beam and nominal torque of 71 tm
C.0.1*.****	Equipment option: hoisting/lifting gear with a 1.15 – 1.4-fold engine rating (general)
C.0.10.0071-AA	hoisting/lifting gear with a 1.15 – 1.4-fold engine rating for a tower crane with trolley beam and a load moment of 71 tm
C.0.10.0090-AA	as above, but with a nominal load moment of 90 tm

If a parameter is replaced by consecutive numbering (see sections 2 and sub-section 2.3), the specific device is classified under the respective equipment type with its listed original value and the corresponding producer price index (see tab. 1, line 2) (see also sub-section 11.3).

11.2 Interpolation

If the technical parameter of a device lies between two indicated values of larger and smaller equipment sizes, the mean original value can be determined with sufficient accuracy by means of the following formula:

$$A = A_1 + (A_2 - A_1) * (P - P_1) / (P_2 - P_1) \quad [€] \quad (6)$$

A	mean original value of the device to be evaluated
P	technical parameter of the device to be evaluated
P_1	technical parameter of the next smaller size
A_1	mean original value of the next smaller size
P_2	technical parameter of the next larger size
A_2	mean original value of the next larger size

This is also valid in a similar way for equipment options and attachments.

Instead of the corresponding values for A1 and A2 it is also possible to use the monthly amounts for depreciation and interest K1 and K2 as well as the monthly amounts for repair R1 und R2 in the formula in order to obtain K or R, i.e. the amount for depreciation and interest respectively the monthly amount for repairs of the equipment to be evaluated, directly.

If two technical parameters are necessary for classifying a device, formula (6) is not applicable and cannot be used for interpolating the mean original value either. In each case it is necessary to evaluate the corresponding interpolated value with regard to its plausibility.
In data tables based on two technical parameters (e.g. conveyor belts), an interpolation may only be made between successive values of the second parameter. No interpolation may be made between successive values of the first technical parameter (e.g. no interpolation between different belt widths of a conveyor under equipment A.5.11). For the classification of devices with intermediate values in the first technical parameter, the evaluation must be based on the respective original values of the device.

Further explanations are set out in sub-section 11.4.

11.3 Extrapolation

Extrapolation becomes necessary if the technical parameter of the device under evaluation is at maximum 20% below the lowest or above the highest parameter listed. For this purpose, formula (6) can be applied in a similar way by using the mean original values resp. the technical parameters of the two smallest or the two greatest equipment sizes as variables in the formula.
For greater deviations see formula (7) in sub-section 11.4.

In the case of two technical parameters, it is possible to proceed in the same way by taking the limitations imposed in sub-section 11.1 into account.

11.4 Evaluation in special cases

If a device cannot be classified or evaluated under existing equipment types (e.g. in cases of new product developments, multiple and non-applicable technical parameters, equipment types in the EUROLISTE for which mean original values have not yet been fixed) or in case of substantial further developments, the respective original values are to be used as a basis for the evaluation by taking years of use, equipment providing months, depreciation and interest rates as well as repair costs in accordance with the Construction Equipment Register into consideration. For classification of the corresponding devices, the equipment code reserves the „empty“ equipment sizes „0000“ (see sub-section 2.1).

If the original value Ax is to be adapted to the price basis of the Construction Equipment Register BGL 2007 – for instance, in such cases where in consortiums (joint ventures) the Construction Equipment Register BGL 2007 has been agreed upon as calculation basis – the theoretical mean original value A on price basis 2000 of the Construction Equipment Register BGL 2007 can be determined with the following formula:

$$A = A_x * 100 / i_x \qquad (7)$$

A theoretical mean original value, price basis 2000

A_x original value in the year x (e.g. the year of construction)

I_x producer price index for construction machines in the year x, based on
2000 = 100 (see table 1, line 2)

11.5 Evaluation of discontinued equipment

Due to the ongoing further development on the construction machinery and equipment sector and in the field of construction process engineering, numerous machines and devices still listed in older issues of the Construction Equipment Register have been discontinued or have lost their importance for practical building and construction work.

If devices belonging to equipment types still listed in the tables of former Construction Equipment Registers 1991 or BGL 2001 are still existing and in use, the following data can be taken over from those Registers:

- the transcoded 4-digit number of the device
- the equipment type
- the respective EDP term
- service life, equipment providing months, monthly depreciation and interest rates, monthly rate for repair costs

Example: The mean original values of an equipment type in BGL1991 which is presently no longer listed are to be converted to the price basis of the Construction Equipment Register BGL 2007 as follows:

$$A = A_{91} * i_{00} / 100 = 1{,}155 * A_{91} \cong 1{,}16 * A_{91} \qquad (8)$$

A mean original value in accordance with price basis 2000 of the Construction Equipment Register 2007

A_{91} mean original value in accordance with Construction Equipment Register 1991

i_{00}=115,5 producer price index for construction machines of the year 2000 (price basis of Construction Equipment Register 2007) based on 1990 = 100 (price basis of Construction Equipment Register 1991) cf. table 2, line 1.

12. CONSTRUCTION EQUIPMENT REGISTER AND EDP

The requirements of data processing (EDP) were taken into consideration already in the German Construction Equipment Register BGL 1991 by placing utmost importance on unequivocal definitions and labelling. This principle was also applied in BGL 2001 and retained with the implementation of the database solution for the Construction Equipment Register – BGL 2007.

- Numbering and labelling of all equipment sizes, attachments and equipment options including modifications of the standard equipment (value increase, value decrease) with a 10-digit system
- Predefined German short terms for each equipment type, all equipment options and all attachments, which can be stored as EDP terms with max. 20 digits. Users are free to choose new short terms in other languages for their own data processing requirements.

The short terms are shown in capital letters directly under the printed 4-digit designations of the equipment types as well as under the descriptions of the additional equipment options and attachments.

All short terms in alphabetical order and in combination with the corresponding equipment type (4-digit code), are listed in an extra register following the keyword index.
For individual indexing by means of inventory numbers in companies, 8 further digits are usually sufficient so that a classification in accordance with the Construction Equipment Register would have the following format:

Classification example with 38 available digits:

Classification example with 38 available digits:

Digits	Description
4	Labelling of the equipment type types according to BGL by means of the equipment code.
4	Labelling of the equipment size according to BGL by means of the parameter code; in exceptional cases without technical parameters by means of consecutive numbering.
2	Alphanumeric labelling of permanently installed equipment options or modification of the standard equipment according to BGL (A1 ...Z1, A2 ...Z2 etc.), alternatively labelling of exchangeable attachments with nos. 01-99.
20	Short version of the equipment terms. Due to the limitation of available digits it is not possible to cover all es sential features of a specific device. Different short-text versions consisting of 20 digits have been created for each equipment type, each equipment option and each attachment for a specific equipment type.
8	Company-specific identifiers for type designations (e.g. in the case of several devices of the same type exis ting in the company).
—	
38	

The following overview shows an example with 38 available digits:

Equip-ment type	Tech-nical parame-ter (s)	Equipment option	Alternative attachment	Short term according to BGL	Manufacturer's type designation, Technical data, Inventory no.	Complete labeling according to BGL 1991
				Number of digits		
4	4	2	(2)	Max. 20	8	
C010	0071			TURMKRAN LAUF-KATZ	...	tower crane with trolley beam and nominal load moment of 71 tm
C010	0071	AA		VERSTELL HUB MOL	...	as above: with adjusting/hoisting gear and 1.15 – 1.4-fold motor output as permanently installed equipment option
C010	0071		01	AUSLEGERSTÜCK	...	boom extension piece with holding rope and mounting pieces for tower crane with trolley beam and nominal load moment of 71 tm, C010007101 as interchangeable attachment

13. INGRESS PROTECTION RATINGS FOR ELECTRICAL MACHINES AND EQUIPMENT

The degree of protection against accidental contact and ingress of foreign bodies and water is designated by the two letters IP (Ingress or International Protection) followed by two figures and two additional letters according to EN 60529.

- The first figure (0 to 6 or letter X) designates the degree of protection against access to hazardous parts and against the ingress of solids.
- The second figure (0 to 8 or letter X) designates the degree of protection against the ingress of water.
- The first additional letter (A, B, C, D) designates the level of protection against access to hazardous parts by persons.
- The second appended letter (H, M, S, W) is of additional importance for the protection of the equipment.

The following overview describes the degrees of protection for electrical machines and equipment in acc. with EN 60 529.

Degrees of protection against accidentalcontactand ingress of solids

First index figure	Degree of protection	
	Short description	Definition
0	No protection	—
1	Protected against access to hazardous parts by the back of a person‘s hand	The access probe (ball with a diameter of 50 mm) must be at a sufficient distance from hazardous parts
	Protected against solid objects with a diameter 50 mm	The object probe (ball with a diameter of 50 mm) must not intrude entirely into the enclosure
2	Protected against access to hazardous parts by a person‘s finger	The articulated test finger (diameter 12 mm, length 80 mm) must be at sufficient distance from hazardous parts
	Protected against solid objects with a diameter 12.5 mm	The object probe (ball with a diameter of 12.5 mm) must not intrude entirely into the enclosure
3	Protected against access to hazardous parts by a tool	The access probe (diameter 2.5 mm) must not intrude entirely into the enclosure
	Protected against solid objects with a diameter 2.5 mm	The object probe (diameter 2.5 mm) must not intrude at all into the enclosure
4	Protected against access to hazardous parts with a wire	The access probe (diameter 1.0 mm) must not intrude into the enclosure
	Protected against solid objects with a diameter 1.0 mm	The object probe (diameter 1.0 mm) must not intrude at all into the enclosure
5	Protected against access to hazardous parts with a wire	The access probe (diameter 1.0 mm) must not intrude into the enclosure
	Dust-protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation or the safety of the equipment
6	Protected against access to hazardous parts with a wire	The access probe (diameter 1.0 mm) must not intrude into the enclosure
	Dust-proof	No ingress of dust

Degrees of protection against the ingress of water

Second index figure	Degree of protection	
	Short description	Definition
0	No protection	—
1	Protected against dripping water	Vertically falling drops shall have no harmful effect
2	Protected against dripping water when the enclosure is tilted by up to 15°	Vertically falling drops shall have no harmful effect when the enclosure is tilted at an angle of up to 15° to both sides of the vertical
3	Protected against spray-water	Water falling as a spray at an angle up to 60° from both sides of the vertical shall have no harmful effect
4	Protected against splash-water	Water splashing against the enclosure from any direction shall have no harmful effect
5	Protected against water jets	Water projected in a jet against the enclosure from any direction shall have no harmful effects
6	Protected against strong water jets	Water projected in a strong jet against the enclosure from any direction shall have no harmful effects
7	Protected against the effects of temporary immersion in water	Ingress of water in harmful quantities shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8	Protected against the effects of permanent immersion in water	Ingress of water in harmful quantities shall not be possible when the enclosure is permanently immersed in water under conditions to be stipulated between the manufacturer and the user, but in any case more severe than those of code number 7

Levels of protection against access to hazardous parts (additional letter)

The first additional letter designates the level of protection against access to hazardous parts by persons. Additional letters are used only in the following cases:

- if the actual protection against access to hazardous parts is greater than indicated by the first index figure;
- if the level of protection against access to hazardous parts by persons only is indicated and if the first digit is replaced by the letter X.

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Additional letter	Degree of protection	
	Short description	Definition
A	Protected against access by the back of a person‘s hand	The access probe (ball with a diameter of 50 mm) must be at a sufficient distance from hazardous parts
B	Protected against access by a person‘s finger	The articulated test finger (diameter 12 mm, length 80 mm) must be at a sufficient distance from hazardous parts
C	Protected against access by a tool	The access probe (diameter 2.5 mm, length 100 mm) must be at a sufficient distance from hazardous parts
D	Protected against access with a wire	The access probe (diameter 1.0 mm, length 100 mm) must be at a sufficient distance from hazardous parts

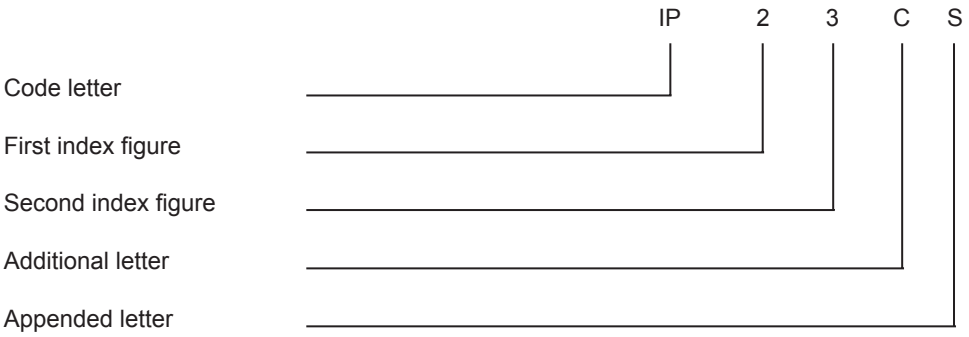
Appended letter

Additional information can be provided in the respective product standard by an appended letter behind the second index figure or behind the additional letter. These exceptional cases must be compatible with the requirements of EN 60529 and the supplementary procedure adopted during the execution of the tests for this classification be clearly specified in the product standard.

Letter	Designation
H	High-voltage equipment
M	Tested for harmful effects due to the ingress of water when the moving parts of the equipment are in operation
S	Tested for harmful effects due to the ingress of water when the moving parts of the equipment are stationary
W	Suitable for use under defined weather conditions and equipped with additional protective means or procedures

IP code designation example

IP code use with optional letters



An enclosure with the following IP code designation:

2 – protects against access to hazardous parts by a person‘s finger
– protects the equipment in the enclosure against the intrusion of solids with a diameter of 12,5 mm and greater

3 – protects the equipment in the enclosure against harmful effects of water sprayed against the enclosure

C – protects persons using tools with a diameter of 2,5 mm and greater and a length not exceeding 100 mm against access to hazardous parts (tool penetrating into the housing with its full length)

S – tested for the protection against harmful effects due to the ingress of water while all parts of the equipment are stationary