

Product-Neutral Tendering of Notebooks

Guideline for Public IT Procurement
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1

Introduction

1.1 Using this Guideline

This Guideline provides an overview of the basic principles and criteria for the procurement of notebooks by contracting entities. This document aims to provide contracting entities of Germany's federal, state, and local governments with a dependable tool – one that is easy to understand – in order to help them formulate their tenders for the procurement of notebooks in a vendor-neutral manner, i.e., without the use of trademarked names and without mentioning individual manufacturers, while taking into consideration current technological requirements.

At the heart of this Guideline stands the list of technical criteria, which can be used to describe and compare the notebooks themselves as well as the requirements placed on both their operational environment and other properties. However, it should be noted that the technical criteria listed are subject to constant changes and should be weighted differently depending on the planned area of application of the equipment to be purchased. The higher the requirements for the product, the higher the offer price will tend to be and the smaller the range of products on the market will be. This Guideline can therefore not replace professional considerations and weighting of the respective criteria according to specific needs.

The authors of this Guideline also seek to support contracting entities by making special reference to sensitive criteria and requirements – i.e. those that might lead to market restrictions –, as well as decisions that are relevant to the costs. The symbols defined below are used for this purpose. This Guideline does not use the third symbol. To ensure harmonisation of the Guidelines,¹ it is still listed here.

Symbol	Meaning
	The requirement of criteria with this symbol can lead to cost increases and/or market restrictions.
	This symbol indicates the correction of a widespread error or marks particularly important statements in the text
	This symbol indicates whether criteria can be verified with certificates.

¹ Compare, for example, the [Z](#)Guideline on Vendor-Neutral Tendering of Multi-Functional Devices

1.2 Product neutrality as a legal requirement

In public procurement law, there is an obligation to treat suppliers and products on offer equally. The legal basis requires a description of the item to be procured according to objective and non-discriminatory criteria, i.e. a product-neutral description of services (cf. section 97(2) GWB and Section 31(6) VgV for EU-wide award procedures, as well as Section 55(1) BHO and Section 2(2) UVgO for sub-threshold award procedures).² Certain product designations or brand names may only be used in calls for tender in justified exceptional cases if an adequately precise description using customary designations or general criteria is not possible.

Vendor-neutral tendering processes can also be seen as an opportunity, however. They guarantee fair and open competition, and they prevent technical pre-determinations and the resulting risk of lock-in effects. If procurement is carried out solely based on general, objective and technical criteria, the number of competing suppliers increases. This results in better options for selection and savings in purchasing processes, and market opportunities through supplier changes can be exploited without major difficulties.

In the context of public tenders, the contracting authority is also required to establish criteria for the product to be procured that allow for a comparison between different offers, thereby enabling sufficient differentiation between them. A contracting authority is free to decide which criteria it will use to select the goods or services to be procured, but the award criteria must be needs-based, product-neutral and transparent.

Particularly in the area of IT product procurement, however, a product-neutral tender is by no means an easy task and is often associated with major uncertainties for the public agencies concerned. The technical complexity of the subject matter, the rapid sequence of product cycles and, above all, the difficulty of estimating and precisely describing how a system is to perform, while taking all technical requirements into account, present public procurers with significant challenges.

² This principle is also clearly formulated in Article 42 para. 4 of Directive 2014/24/EU from 26 February 2014: Unless justified by the subject-matter of the contract, technical specifications shall not refer to a specific make or source, or a particular process which characterises the products or services provided by a specific economic operator, or to trade marks, patents, types or a specific origin or production with the effect of favouring or eliminating certain undertakings or certain products.

This is precisely where this Guideline comes in, by providing compact assistance aimed at supporting compliance with the legal requirements in the formulation of technical specifications, thereby ensuring fair competition. The Guideline specifies and explains current technical standards to describe notebooks using general and pertinent characteristics. It does so on the basis of universally accepted benchmarking methods as an essential component of vendor-neutral performance specification. The product properties and technical requirements are concisely presented in tables. The Guideline will be updated regularly, taking into consideration new developments in technology while aligning the proposed benchmark values with the current state-of-the-art.





2 Notebooks as an object of procurement

2.1 Benchmarks for evaluating the object of procurement

With developments in computer technology forging ahead, it has become harder and harder to compare the performance of individual computer systems solely on the basis of its technical specifications. A processor with a higher clock frequency, for example, will not always deliver more computing power. Since frequency alone is no longer suitable when it comes to comparing performance of different processors and the products of different vendors with different internal architectures, tests were developed to better compare performance — so-called benchmarks.

Benchmarks help functionally capture notebook performance. Benchmarks are programs that measure the overall performance of a system or individual components, such as the graphics unit, working memory, hard drive or similar. The benchmark software carries out a series of standardised tests, simulating specific tasks that are typical of the usage scenario. Afterwards, a score is determined for system performance. This score reflects the current performance of a system in relation to the measured case of application, enabling objective and data-based comparisons. The benchmark should be recognised by all competitors (e.g., hardware manufac-

turers) and should have been developed by either independent industry consortiums or by software developers. Such benchmarks have the benefit of providing a standardised and reproducible method for objective notebook performance measurement, designed to compare different system architectures.

With the rapid development of notebook technology, the underlying microprocessor architectures and the application software, benchmarks generally have to be updated on an annual basis.

Benchmark overview

There is a range of benchmark software available, which sometimes makes it hard for contracting entities to determine which benchmark(s) is/are most suitable for their tender. If the entity chooses an inexpedient benchmark, it runs the risk of procuring notebook systems that are unsuitable for the public entity while discriminatorily excluding fundamentally suitable providers from the tender.

Regardless of the benchmarks on which the contracting authority bases its decision, due diligence should be exercised to ensure that the underlying benchmark uses coherent methodology and provides reproducible results. Deviations from the methodology might result in unreliable and incomparable measurement results. This might even lead to complaints about the tender procedure.

Generally speaking, there are two types of benchmarks:

- System benchmarks measure the overall performance and battery life of a notebook system using a defined user scenario;
- Component benchmarks measure the performance of individual components, such as the CPU (central processing unit), storage, graphics unit and so on.

Regardless of the above classification, a benchmark must:

- Measure overall system performance, and not just the performance of individual components, without disproportionately weighting individual components;
- Test scenarios that are aligned with the intended purpose of use. Within the scope of this Guideline for notebooks, these are typical office space applications;
- Represent all relevant vendors and notebook platforms, using an independent and transparent development process;
- Reflect the expected performance over the lifetime of PC use in a balanced manner;
- Be relevant and representative: Contracting authorities should select benchmarks that reflect the planned purpose of use of the systems to be procured;
- Meet the state-of-the-art: Contracting authorities should always use the version recommended in this Guideline.

Contracting authorities should select benchmarks developed by recognised standardisation bodies during an independent, transparent, and fair development process, in which all relevant stakeholders were involved, if possible.

Good benchmarks are continuously updated and new benchmarks are regularly introduced in order to keep up with rapid technological developments and innovations on the notebook market. Results might be distorted if outdated benchmarks were used to compare the performance of two notebook systems. To name an example: If a comparative benchmark is used for a notebook system that uses innovative technology to boost performance, but the benchmark fails to take this innovation into consideration or measure it, then this will disadvantage the system in question. The system with older technology might achieve a higher (better) result than the newer system with improved, faster technology. In short: Outdated benchmarks might disadvantage new, innovative and higher-performance products. Besides up-to-dateness of the benchmark software, the up-to-dateness of the operating system used for measurement should be considered as well.

When applying benchmarks, attention should be paid to compatibility with the chipset architecture (x86, ARM) in order to obtain a representative result. Not all of the currently available benchmarks, and possibly the later-used specialised applications, are available in a native ARM version, so they need to be emulated when used on systems with ARM chipsets. In most cases, this results in lower (worse) results than using a native ARM version of the benchmark, which may make it difficult to compare directly with results on x86 systems.

Benchmark developers

Benchmark developers can be categorised using the following criteria:

- Non-profit benchmark consortiums (e.g. BAPCo®, SPEC®, and EEMBC®)
- Non-profit open-source benchmark (e.g. Principled Technologies®)
- Commercial, independent benchmark developers (e.g. Futuremark® (UL Benchmarks) and Kishonti® Informatics)
- Smaller commercial developers (e.g., AnTuTu®)

Benchmark recommendations

Since they fully meet the above requirements for a benchmark and allow a meaningful comparison of notebooks in an office environment, this Guideline recommends the following benchmarks:

- SYSmarkmark* 2018 — overall score
- SYSmark* 25 — overall score
- PCMark* 10 Benchmark — standard score
- MobileMark* 2018
- PCMark 10 Modern Office Battery Life

More specific benchmarks may also be required for more specific application scenarios (e.g., CAD workstations)

Benchmark description

SYSmark* 2018 is the current benchmark of the BAPCo* consortium for the performance of Windows PC platforms. SYSmark* uses three application scenarios, namely »Productivity«, »Creativity«, and »Responsiveness«, to measure performance, offering a supplementary energy consumption measurement for the performance test. SYSmark* covers applications of various software developers such as Microsoft*, Google*, and Adobe*.³

SYSmark 2018 produces a score that reflects overall performance as well as a partial score for each usage scenario (the higher the score, the better). Supported operating system: 64-Bit Microsoft* Windows* 10.

- BAPCo has replaced version SYSmark2018 with version SYSmark2018 1.5, which also supports the Microsoft operating systems Windows 10 and Windows 11 (for more information see: <https://bapco.com/news/sysmark-2018-ver-1-5-released-with-windows-11-support/>). Please note that the old version of BAPCo is no longer supported. SYSmark* 25 is the current BAPCo* consortium benchmark for the performance of Windows PC platforms. SYSmark* tests three application scenarios: Productivity, Creativity, and Responsiveness, as well as the performance. SYSmark* covers applications of various software developers such as Microsoft*, Google*, and Adobe*.⁴ As measurement results, SYSmark 25 produces an overall result as well as a value for each application scenario (the higher the score, the better). Supported operating systems: 64-Bit Microsoft* Windows* 10 and 11. SYSmark 2018, the predecessor of SYSmark25, can still be used for tenders with Windows 10. Please refer to releases on the manufacturer's website (<http://www.BAPCO.com>).

PCMark(R) 10 Benchmark is a benchmark by UL that measures the performance of Windows PC platforms and notebook battery life. The PCMark(R) 10 Benchmark uses three groups to measure the performance of a system: Essential, Productivity, and Digital Content Creation. Office space applications, such as writing documents, browsing the Internet, creating spreadsheets and making video conference calls, are used during the tests. Likewise, image and video editing as well as rendering and virtualising are tested. PCMark* 10 covers the application LibreOffice Calc and the Writer of the Document Foundation, as well as proprietary applications created using standard tools from Microsoft* and the Microsoft Media Foundation*.⁵

3 The BAPCo [White paper on SYSmark* 2018](#) contains a full list of all applications, the weighting used, summaries on sensitivity, and the benchmark methodology. Published test results can be accessed on the BAPCo website under »Results« (<http://www.bapco.com>).

4 A complete list of all applications, weights, sensitivity overviews, and benchmark methodology can be found at BAPCo <https://bapco.com/products/sysmark-25/>. Test results can be viewed on the BAPCo website under »Results« (<http://www.Bapco.com>)

5 The [»Technical Guide«](#) on PCMark* 10 contains a full list of all applications, the weighting used, and the benchmark methodology. Published test results can be accessed on the UL Benchmark website (<https://benchmarks.ul.com/>)

The PCMark(R) 10 battery life test contains a selection of 5 different usage scenarios during battery discharge: Modern Office, Applications, Video, Gaming and Idle. The Modern Office test uses the same system loads for writing, video conferencing and browsing the Internet as the PCMark 10 Benchmark, with brief idle-time interruptions. The measurement results is the battery lifetime in hours and minutes, from the start of the test until the operating system of the notebook either switches the system to sleep mode or shuts down the notebook.

PCMark(R) 10 measurements produce an overall score, as well as a partial score for each usage scenario (the higher the score, the better). Supported operating systems: Microsoft® Windows® 10.

If desktop computers are to run on an operating system that is not Microsoft Windows (e. g., Linux or Mac OS X), benchmark scores for Windows can give an initial impression. Nevertheless, the use of a benchmark tailored to the operating system in question is advisable.

MobileMark® 2018 is a benchmark of the BAPCo® consortium that measures battery life while using Windows®. MobileMark® tests three usage patterns during battery discharge: »Productivity«, »Creativity« and »Web Browsing«, determining the »Battery Life Rating« and »Performance Qualification Rating« results (the higher the score, the better the result). The overall score is made up of the scores for each individual scenario. MobileMark® covers applications of independent software developers such as Microsoft®, Google® and Adobe®. (BAPCo_MobileMark2018_user_guide_v1.3)

Der PCMark 10 Modern Office Battery Life Test measures the battery life during typical office jobs. It reflects a realistic relationship between writing, web browsing, and videoconferencing. Typical work breaks are accounted for by short downtimes. The test result reports the battery life from the start of the test until the device is switched to sleep mode or is shut down. The time is given in hours and minutes.⁶

BAPCo's **CrossMark®** is a benchmark for different operating systems (Windows 10/11, Android, iOS and macOS) that measures system performance and system responsiveness. This test uses models from well-known applications and generates values for Productivity, Creativity, and Responsiveness. CrossMark makes it possible to compare different operating systems. For more information, visit ↗www.bapco.com/products/crossmark.

6 ↗<https://support.benchmarks.ul.com/support/solutions/articles/44002171422-modern-office-battery-life>

2.2 Recommendations for setting up systems

To ensure the comparability of benchmark results across different offers, the contracting authority should define certain minimum requirements regarding the setup of notebook systems in the tender documents. This is also the case if the contracting authority carried out benchmarks itself or commissions another party to do so, as well as in those cases in which it specifies that bidders should provide evidence of benchmark tests.

The following is an overview of the required, recommended, and optional parameters:

Parameters	Description	Classification
Installation process	It is strongly recommended to reinstall the operating system and not use an image installation. This is attributable to certain operating system properties, such as super-/prefetch, which can make the results of images hard to compare. Furthermore, it is expected that the default settings of the operating system are used during installation. Moreover, the operating system should be installed in offline mode (otherwise, daily updates will be installed automatically, making results harder to compare).	Required
Operating system	Windows 10 benchmark results should never be compared with results of older Windows operating systems – i.e., Windows 11 or Linux. It is recommended to require the current version of the operating system (including the build version). It has been found that different versions of the same operating system produce different benchmark results.	Required
Operating system – maintenance works	It is strongly recommended to include the performance of automatic maintenance works on the operating system (defragmentation of storage media) after installation as a necessary requirement in the tender documents. If the benchmark is to launch directly after installation, the result can be skewed by maintenance work carried out in the background.	Required 
Operating system – changes to settings	It is recommended to prohibit changes to the default settings of the operating system (which are not strictly required by the benchmark). An objective benchmark user should be able to reproduce the benchmark results without specialist knowledge or explanation. An exception to this rule is the energy saving plan to be used. It is recommended to use the maximum performance plan to minimise fluctuations.	Recommended
Operating system – automatic updates	It is recommended to disable the automatic updates of the operating system or generally benchmark the test system without connecting to the Internet, only with the specified updates. Allowing automatic updates can result in different software states, which might make the results harder to compare with one another.	Recommended
BIOS delivery settings	Some BIOS settings can have a significant impact on the benchmark results, and it is recommended to use the options set when the device is delivered.	Recommended
BIOS version	It is recommended to require the use of the manufacturer's most current BIOS version.	Recommended
Driver versions	It is recommended to require the most current driver package from the system manufacturer to be used.	Recommended 

Parameters	Description	Classification
Battery calibration/ battery status/brightness	Before starting a benchmark, the battery should be charged and discharged 4-5 times for consistent results. PCMARK10 (UL) (Modern Office Battery Life) and MobileMark (BAPCo) are available to measure battery life. The two battery life measurements are not comparable because they are subject to different test methods recommended by the two manufacturers. Comparability is only possible for PCMARK10 Modern Office Battery Life results or MobileMark results. In this case, the tests should be carried out in accordance with the manufacturer's recommendations. Please note that brightness has a significant impact on battery life, and the brighter the monitor is set, the shorter the battery life.	Recommended
Operating system – cumulative updates	In addition to the release version of the operating system, cumulative monthly updates can also have an impact on the benchmark results. However, this is usually not that serious. To maintain comparability with older benchmark results, it is usually more useful to specify the release version. However, if a specific update status is required, it is advisable to specify the exact name – KB number (for Windows) – of the update package to be used, e. g., Windows 10 1709 KB4090913 (so that Spectre/Meltdown patches are included).	Optional
Operating system – security updates	Since security updates can have a measurable impact on system performance, care must also be taken to ensure that appropriate measurements are taken for all systems with the same level of security updates. In addition, it is essential to ensure that the individual security features and settings of the operating system used correspond to the delivery state of the operating system manufacturer in order to prevent unfair benchmark benefits due to the deactivation of security features. Again, it is recommended to include the exact KB numbers (for Windows) of the security updates to be used.	Optional
Number of benchmark tests	When carrying out benchmark tests, all test values are subject to fluctuations of 2-5% in every round of tests. Greater accuracy is ensured by carrying out multiple measurements. The benchmarks recommended in this Guideline, however, have proven to produce reliable results with a single run. If several tests are required all the same, this must be specified in the tender documents. Experience shows that more than three tests are not required. On top of this, the calculation to determine the final score (e. g., arithmetic mean) must be indicated, if this is not already done automatically by the benchmark developer.	Optional
Resolution	It is recommended to perform the benchmarks at the currently standard resolution of 1920x1080 (FHD). No significant differences between lower and slightly higher resolutions were detected in internal measurements. Deviations from this resolution should be considered only for the primary use of ≥4k monitors.	Optional
Additional programs	Some manufacturers offer programs that can positively affect system performance by setting certain BIOS and/or operating system settings. Depending on the software used in the benchmark program, this may also have an impact on the benchmark score. It is the decision of the contracting authority whether such products are allowed. If they are allowed, it is recommended to require that the software used must be offered directly by the system manufacturer, be freely available, or already be included in the price.	Optional
Benchmark version	At the time of publication of this Guideline, the respective main versions of the benchmarks PCMark 10 and SYSmark 2018 are recommended (PCMark10 version 1.x.xxxx and SYSmark 2018 version 1.x.x.xx). According to the benchmark developer, all results of this main version should be comparable with one another. Available patches only improve compatibility and stability with later operating system versions. Therefore, the tender does not need to mandatorily prescribe these subversions. If such subversions must be demanded as a result of certain insights, however, then the version to be used must be specified exactly in the tender documents.	Optional
Operating system language versions	There are currently no performance differences between the English-language and German-language versions of the OS.	Optional

2.3 Notes on benchmark execution

This Guideline recommends that the performance of the benchmarks be specified in the tender documents or, alternatively, that reference be made to this chapter.

Settings

In addition to the basic settings of the reference system, operating systems offer many settings that can lead to significantly different results. If any settings go beyond the recommendations of the previous section and the default settings of the operating system, it is recommended to keep a log of the settings used. This log must be submitted with the tender documents. In order to obtain comparable results, it is necessary to strictly follow the specified procedure for performing benchmarks.

Performing a benchmark — checklist

These execution instructions follow the principle that a user who observes all given parameters, but is not in possession of in-depth technical knowledge, must be able to reproduce the benchmark results. Any changes to the operating system or BIOS that require a more detailed explanation, except for those changes expressly allowed or mandatory to carry out a benchmark, are not permitted.

Unless specified otherwise by the contracting authority, the following steps are to be carried out chronologically to achieve a reproducible benchmark:

1. BIOS update to the latest version and restoring the BIOS to factory settings.
2. Complete offline reinstallation of the specified operating system version (including BUILD number) with default settings from the original source of the operating system manufacturer.
3. Installing all the latest drivers provided by the manufacturer. The device manager can be used to make sure all drivers are installed and all devices are listed (without error messages, no yellow exclamation marks).
4. Installing the specified benchmark software incl. updates with default settings.
5. Carrying out and completing disc cleanup (HDD), TRIM (SSD), defragmentation, and automatic maintenance.
6. Launching the benchmark software in question with the specified default settings.
7. After carrying out the benchmark, the results should be stored as logs (PDF format).

For a detailed description of how to carry out benchmarks, see the Annex.

2.4 Commercial procurement models

Procurement of notebooks can take place by means of renting, purchasing, or leasing them. In contrast to renting, leasing usually entitles the procurer to a purchase option of the leased item at the end of the contractual service life. The approach selected by the procurer depends not least on whether it has a one-off budget or a budget covering several years.

Generally, one of the above-mentioned procurement models must be chosen in advance of the procurement measure in the context of an economic feasibility study. At the same time, it must also be decided whether the hardware and operating system are to be procured from one source on a uniform contractual basis (bundling) or from different suppliers. Software manufacturers sometimes offer special licensing models for software intended for use in public administration.

Income tax regulation acknowledges a normal service life of three years for notebooks.⁷ The Guideline on Useful Operating Life, Segregation and Recycling of IT Devices and software⁸ also stipulates a minimum useful life of three years for notebooks in public administration. Any procurement calculation can use this useful operating life as a yardstick.⁹

The choice of procurement model also carries important implications concerning value added tax. When renting, the VAT on the respective rental instalments accrues and must be paid together with the rental instalments. When purchasing, the entire VAT is incurred upon delivery (= transfer of the equipment to the client). The entire VAT is also incurred on delivery of the device if, according to the contract, ownership of the device is only to be transferred after payment of several instalments. If transfer of ownership in the case of a hire purchase depends on the exercise of an option to purchase, VAT is payable on the entire price of the equipment when the option is exercised under the contract. If rental instalments have already been paid before exercising the option, the VAT payments incurred on them must be reversed if the rental instalments are offset against the purchase price. When leasing, VAT is incurred at the time when, according to the tax regulations, the leased equipment is assigned to the client.¹⁰

⁷ Cf. ↗Tax depreciation table of the Federal Ministry of Finance regarding assets for general use

⁸ Cf. ↗IT Council (IT-Rat) Resolution 2013/07

⁹ In a statement on June 2016, the Federal Environmental Agency indicated that an excessively short useful operating life can result in higher lifecycle costs and higher external costs (e.g. costs of greenhouse gas emissions) over an observation period of 10 years

¹⁰ Cf. the statements of the tax authorities in section 3.5 para. 5 and 6 of the Value Added Tax Application Decree (UStAE) on these value added tax consequences.

	Purchase contract	Rental contract	Leasing contract (Financing)
Ownership of hardware	Client	Auftragnehmer	Contractor, generally with an option of ownership transfer to the client
Services (establishment and recovery of operational readiness)	- typically the responsibility of the client - can be assigned supplementarily, regardless of the seller	should be agreed additionally and owed by the contractor	typically the responsibility of the client
OS bundling (consider the licence model)	can be/should be the case if services are agreed	should be	can be
Burden on resources/budget	large, one-off burden	even, distributed burden over the duration of the contract	medium-high, one-off burden (deposit payment), after which an even, distributed burden over the duration of the contract. Then a medium-high, one-off burden upon exercising the option to buy or a settlement payment for the residual value.

Table 1: Commercial procurement models

2.5 Services

The supplier's service portfolio does not need to be limited to the delivery of hardware and software, but can also include other services related to the delivery item. For instance, it would be conceivable to offer to maintain and keep the delivered hardware and any software supplied up to date on the basis of a separate service contract or via a warranty extension. Furthermore, additional services, such as troubleshooting or hotline services can be contracted in addition to the pure hardware or software procurement.

If necessary, the corresponding support should be agreed together with the specification of response times/repair times.

Standard market offers differ according to:

- Duration of the contract
- Response times (time between fault report and first response from support)
- Restoration time (time between fault report and restoration of the system to operational readiness)
- Spare parts logistics
- Additional technical services offered (billing based on hourly rates and travel expenses).

Depending on the needs, requirements can be:

- 3, 4 or 5 years' on-site service
- On-site service with a response time of x hours. A common response time is one hour (can also be an auto-response) within regular business hours (e. g. 8 a. m. to 5 p. m.). Otherwise, on the next working day
- On-site service with a restoration time of x hours (type and scope depend on the purpose of use. Lower surcharge for restoration time of two working days, shorter times are possible but affect pricing)



- Availability of the German-speaking hotline x hours y days a week.
- Spare parts delivery without replacement by the service technician.
- Spare part storage at the customer's premises.
- After a replacement data carrier has been sent, the client should be allowed to destroy defective data carriers without returning them (depending on security requirements).

In the procurement of high-availability or security-relevant solutions, individual agreements can be made. In this case, a trade-off must be made between the urgency of the requirements and the resulting costs.

For the purchase of notebooks, for example, the following additional specifications can be stipulated if necessary:¹¹

- Maximum delivery time
- Free delivery
- Delivery abroad
- Delivery to different locations
- Delivery to individual rooms
- Pre-installation of the operating system to be included in the delivery
- Pre-installation of additional software
- Creation of backup copies of the operating system to be supplied.

¹¹ In the delivery information, the tender may refer to standards, e. g., DAP/DPU according to Incoterms (¹²<https://www.freightos.com/de/freight-resources/incoterms-plain-english-freight-shipping-guide/>).

3

User profile that reflects the workstation

In addition to computing power, mobility is a key factor when it comes to notebooks. Therefore, this Guideline recommends assigning the determined need into various performance classes. The performance classes correspond to common usage scenarios in companies and public administration. A variety of devices sold on the free market can be selected within the recommended demands of the performance classes.

3.1 Mobility classes

Whether or not a notebook is suitable for mobile use primarily depends on its weight and battery life. Battery capacity affects battery life. Longer operating times usually result in a higher weight.

Category	Use outside of the workplace (e.g. on business trips)	Properties
Easy mobility	Occasionally	Weight up to 2.5 kg (excl. power unit), display size from 14.00 to 16.00 inches
High mobility	Frequent 	Weight up to 1.8 kg (excl. power unit), ▪ common display size between 10.00 and 15.00 inches ▪ Deviating display sizes might lead to higher costs and/or market restrictions. ▪ Restricted interfaces (i.e. type and number of interfaces)

Table 2: Mobility classes

3.2 Performance values and battery life

The performance requirements and battery life within the individual mobility classes are broken down using benchmarking procedures and compared to one another in the following table.

	Easy mobility	High mobility
SYSmark® 2018¹² overall score	Min. 1300 points (for all mobility classes)	
SYSmark® 25 overall score	Min. 1000 points (for all mobility classes)	
PCMark 10 standard score	Min. 4300 points (for all mobility classes)	
MobileMark 2018	Min. 6 hrs	Min. 8 hrs
PCMark 10 Modern Office Battery Life¹³	Min. 6 hrs	Min. 8 hrs

Table 3: Performance requirements and battery life for the specific mobility classes

PCMARK10 (UL) (Modern Office Battery Life) and MobileMark (BAPCo) are available to measure battery life. The two battery life measurements are not comparable because they are subject to different test methods recommended by the two manufacturers. Comparability is only possible for PCMARK10 Modern Office Battery Life results or MobileMark results. In this case, the tests should be carried out in accordance with the manufacturer's recommendations. Please note that brightness has a significant impact on battery life, and the brighter the monitor is set, the shorter the battery life.

Both the number of active cores as well as the frequency of the CPU/APU in battery mode significantly influence battery life, as does the display. As such, performance values can be reduced for a longer battery life, depending on the system configuration. Battery life measurements should be carried out in »Better Battery Mode«.

For a detailed description of how to carry out benchmarks, see the Annex. Performance requirements and battery life should always be obtained using the same benchmark.

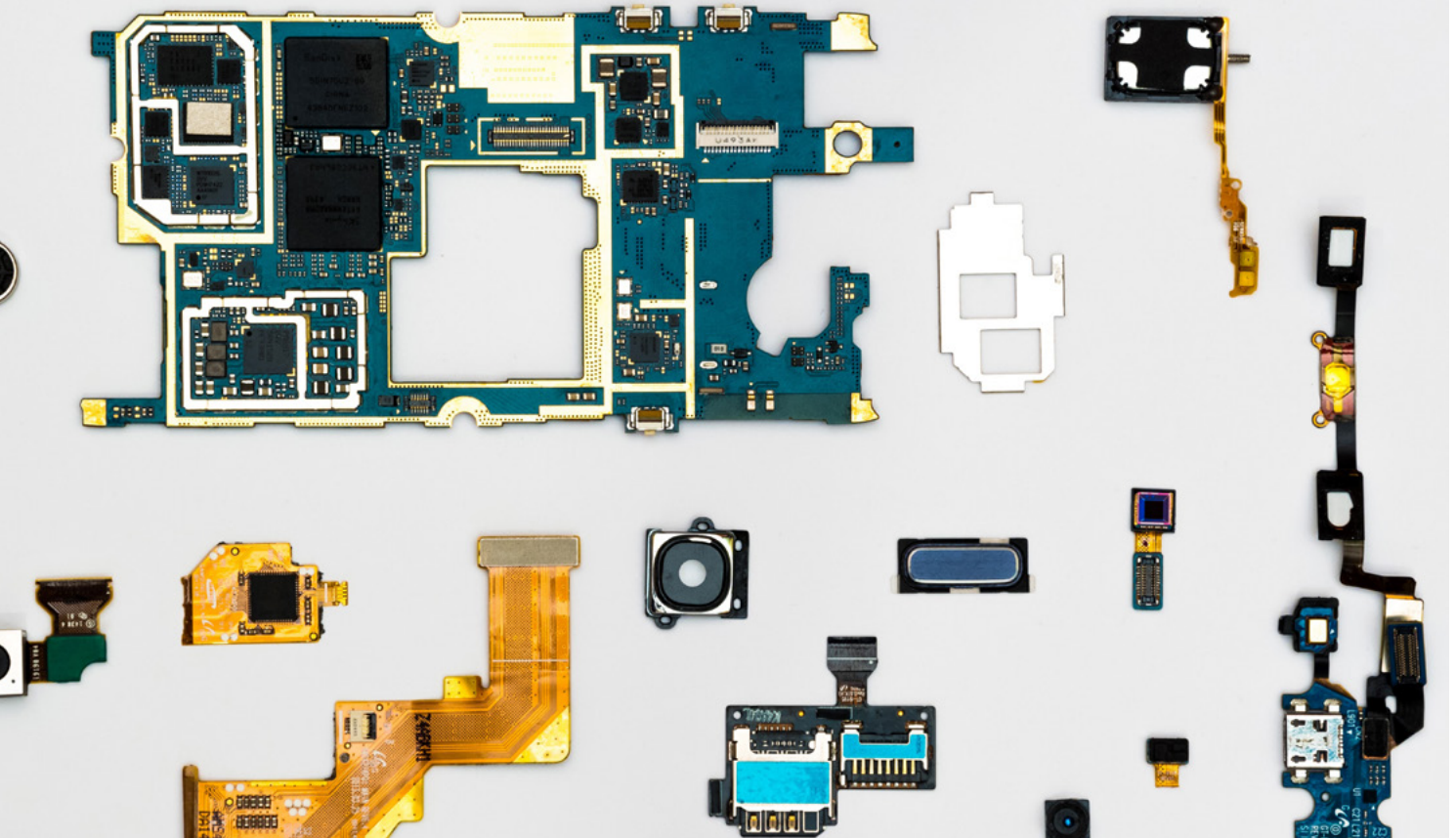
¹² AMD (not a member of BAPCo) draws attention to the following:

According to BAPCo, the following should be taken into account when applying BAPCo SYSmark 2018:

The »Cyberlink PowerDirector 15« test software used to test the video encoding uses so-called hardware encoders on the platforms of a processor manufacturer (Intel), which are made available by this processor manufacturer. A software encoder is used on all other platforms, although hardware encoders are available for these platforms.

The share of encoding in the overall result (according to BAPCo) is 3.2% for the Intel-based calibration system and 2.7% for the AMD-based system (cf. current version of the »BAPCo White Paper (currently version 1.1, page 26). Technologically, hardware encoders are usually much faster than software encoders (taking into account the test design and environment). An adaptation of the testing software (to a uniform solution of the encoding process) is suggested.

¹³ Different benchmarks produce different performance and battery life values, which cannot be directly compared to one another. For more information, see Glossary Benchmarks.



4

Technical criteria and requirements

The tendering party is to describe the object of procurement using general characteristics, in such a manner that it allows for a comparison between the relevant offers. This Guideline provides an overview of the various criteria which are suitable as parameters for the procurement of notebooks, with the criteria summarised in tables. Technical requirements are assigned to the criteria to make the parameters assessable and comparable. Minimum requirements add up to a standard that can be expected in line with the current state of the art, is reached by all newer device models currently available on the market, and should always be reached in tenders. The last column contains additional notes and more detailed specifications on the technical requirements.

Beyond the scope of the minimum requirements recommended here, additional requirements can be formulated as parts of weighted assessment criteria. In addition, if they are placing special requirements on the object of procurement, the contracting entity can define extra criteria and requirements in the tendering documents. Some specific requirements are particularly relevant for notebooks. They are elucidated in the following, together with relevant technical aspects.

4.1 Processor, memory, and optical drives

No.	Criteria	Requirements	Suitable as	Remarks
1	Processor type (CPU)	x86, ARM/Multi-core architecture	Minimum requirement	Cf. Notes on the processor type when using specialised applications or benchmark procedures (Chapter 2.1.1) 
2	Working memory (RAM)	8 GB - From DDR 4 and LPDDR4	Minimum requirement	Perspective development towards DDR5. LPDDR memory is not pluggable. 
3	Mass storage	Construction: M.2 or 2.5 inch/240 GB SSD (SATA III/NVMe)	Minimum requirement	

Table 4: Criteria and requirements Processor, memory, and optical drives

4.2 Graphics units

Criteria	Requirements	Suitable as	Comments
Graphics units	- Integrated into CPU - DirectX-12-capable	Minimum requirement	The graphics unit is located in the CPU/APU.
	- Discrete - DirectX 12-capable	Evaluation criterion	The graphics unit is an independent unit on the motherboard. For mobile workstations, e.g. CAD/CAM workspaces. 

Table 5: Criteria and requirements Graphics

4.3 Display

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	Aspect ratio/display resolution	16:9 or 16:10, at least Full HD	Minimum requirement	Some 1920 x 1200 pixel (WUXGA) devices are now available on the market. These are considered to be at least equivalent to Full HD.
		More than Full HD	Evaluation criterion	Adjustments to the font and symbol sizes may be possible in the operating system.
2	Antireflection	Antireflective (anti-glare)	Minimum requirement	Adhering to an anti-glare display with touch functionality will lead to market restrictions. 

No.	Criteria	Requirements	Suitable as	Comments/explanations
3	Viewing angle	At least +/- 85 degrees horizontally and vertically	Minimum requirement	Wide Viewing Angle (WVA) display
		At least +/- 40 degrees horizontally, +10/- 30 degrees vertically	-or- Minimum requirement	e.g., TN display Additional details given in the panel data sheet
4	Luminance	200 cd/sqm	Minimum requirement	Higher luminances generally result in higher energy consumption, current availability approx. 200 cd/sqm – approx. 1,000 cd/sqm
5	Contrast ratio (static)	300:1	Minimum requirement	Current availability approx. 200:1 – approx. 1500:1. Typical values include: - from 500:1 (for WVA panels) - from 300:1 (for TN panels)

Table 6: Criteria and requirements Display

4.4 Network connections

No.	Criteria	Requirements	Suitable as	Remarks
1	Ethernet	RJ 45 Ethernet 10/100/1000 Mbit, can be achieved with adapter	Minimum requirement	Small and flat notebooks usually do not have an RJ-45 interface, as a result of their compact design. For this reason, a solution with an adapter should be considered equivalent.
		Native interface, no adapter solution	Evaluation criterion	
		WOL/PXE 2.x	Minimum requirement	WOL should also be possible from energy-saving states S4 and S5
2	Wi-Fi	Wi-Fi according to IEEE 802.11ac (Wi-Fi 5)	Minimum requirement	Prospective availability to newer version 802.11ax (Wi-Fi 6E)
3	Bluetooth	Version 5.x	Minimum requirement	The Wi-Fi/Bluetooth modules are usually combo modules.
			Evaluation criterion	Bluetooth and Wi-Fi must be switched off separately.
4	WWAN	4G LTE (integrated), data transmission rate ≥ 100 Mbit/s for download and ≥ 50 Mbit/s for upload	Minimum requirement	Higher data transmission rates available on the market.
			-or- Evaluation criterion	Prospective availability of 5G (if a prospective upgrade is to take place, the devices must already be WWAN-enabled upon purchase).



Table 7: Criteria and requirements Network connections

4.5 Interfaces/equipment

No.	Criteria	Requirements	Suitable as	Remarks
1	USB	2 x USB 3.x, of which, at least 1x Type A and 1x USB-C, or adapter solution to provide Type A.	Minimum requirement	Please note: If one of the USB Type C interfaces is also used to charge the notebook, it will not be free during charging and cannot be used to connect peripherals. If no USB Type A is available, deliveries including a USB-C to USB-A adapter should also be considered to meet the requirement.
2	Display output	1 digital interface for displays	Minimum requirement	The exact type should be specified (e.g., HDMI or DisplayPort). Adapters should be allowed to ensure wide competition.
3	Audio	Audio In & Audio Out	Minimum requirement	Can also be met by providing a combination interface
4	Keyboard	- German keyboard layout - Backlit keyboard	Minimum requirement Evaluation criterion	Separate number block uncommon on models smaller than 15 inches.
5	Front camera	Resolution 720p HD	Minimum requirement	When using Windows Hello, advanced camera functionality requirements (infrared camera).
6	Smartcard reader	Security class 1, card format: ID1 (85.60 mm × 53.98 mm)	Evaluation criterion	Not available with all design heights. Moreover, no longer customary on the market, can still be included as an assessment criteria. External solutions should also be allowed, particularly for small and thin devices.
7	SD card reader	SD version ≥3.0	Evaluation criterion	Not available with all design heights. Moreover, no longer customary on the market, can still be included as an assessment criteria. External solutions should also be allowed, particularly for small and thin devices.
8	Biometric sensor	- Fingerprint sensor - Infrared webcam	Evaluation criterion Evaluation criterion	
9	Speaker	Stereo	Minimum requirement	
	Microphone	Mono	Minimum requirement	
10	Touchpad	Two-button function	Minimum requirement	

Table 8: Criteria and requirements Interfaces and equipment

4.6 Docking functionality

The manufacturer designation for a docking station is not uniform. Depending on the manufacturer, names such as Port Replicator, Travel Dock, or Mini Dock are also used. The connection to the docking station is realised either using a manufacturer-specific (proprietary) interface or via USB-C (universal/currently the industry standard). The docking interface used largely determines the number and speed of the connections provided and whether or not the notebook can be charged via the docking station. Dockings can also be classified according to their functionality. Docking stations with a universal connection can have additional manufacturer-specific functions, which can be either proprietary or universal. These are marked accordingly in Table 10.

No.	Criteria	Requirements	Suitable as	Remarks
1	Docking connection	- Universal docking port (USB-C) -or- - Proprietary (mechanical) docking connection	Minimum requirement	Basic functionality over USB-C is usually end-device-independent. Special functional requirements (e.g.,: MAC address Pass Through, turn on via docking, ..) often only work with the original docking stations of the respective device manufacturers. Meanwhile, solutions without a proprietary docking connection have become available on the market.
2	Docking functionality	- Charging function - Universal charging function	Minimum requirement Evaluation criterion	The charging capacity of the docking station should be at least equal to the power requirements of the notebook. Universal charging function only with USB-C docks.
		Mechanical docking station theft protection	Minimum requirement	Docking station has a fixture that can be used to attach a cable lock.
		Mechanical theft protection for the docked notebook	Evaluation criterion	Option to lock the notebook with the docking station. Only with a proprietary docking connection.
		WOL/PXE 2.x	Minimum requirement	WOL should also be possible from energy-saving states S4 and S5. Always implemented as a manufacturer solution.
		Use of a device-specific MAC address (MAC address Pass Through)	Evaluation criterion €	Always implemented as a manufacturer solution.

No.	Criteria	Requirements	Suitable as	Remarks
3	Interfaces	▪ 2 digital interfaces for displays (can be used in parallel)	Minimum requirement	Specify the exact type (e.g. HDMI, Mini HDMI, USB-C, DisplayPort, Mini DisplayPort); adapters should be allowed in order to ensure broad competition.
		▪ RJ45	Minimum requirement	
		▪ 4 x USB, of which, at least 2x USB3.x	Minimum requirement	
		▪ Audio In & Audio Out	Minimum requirement	
4	Power supply unit	▪ PSU for the docking station	Minimum requirement	The docking station should be delivered with a sufficiently dimensioned PSU.

Table 9: Criteria and requirements Docking functionality

4.7 Operating system

Kriterium	Anforderungen	Geeignet als	Anmerkungen
Operating system	▪ OEM licence	Minimum requirement	The most commonly used operating system is currently Windows 10. Windows 11 currently comes with a downgrade option to Windows 10. If operating systems older than Windows 10 are used, procurement should be used as an opportunity to switch to a later operating system. Making Windows LTSC/LTSC a requirement is specifically not recommended, as these versions are only intended for industrial PCs and similar static IT systems. Depending on the requirements, the use of a Linux or Mac OS X operating system can be expedient. Mac OS X is only available on Apple hardware.

Table 10: Criteria and requirements Operating system

4.8 Power supply

No.	Criteria	Requirements	Suitable as	Remarks
1	Weight power supply unit and cable	▪ High mobility: max. 430 g ▪ Low mobility: No specific recommendation, can be heavier than 430 g	Minimum requirement	If the total length (socket to notebook) of cable and power supply is to be more than 1.80 m, the maximum total weight of power supply and cable must be increased. Weight is dependent on PSU capacity:
2	Overall length cable and PSU (socket to notebook)	▪ 1,80 m	Minimum requirement	

No.	Criteria	Requirements	Suitable as	Remarks
3	Power	When it comes to ongoing office operation, a battery with a charge level of 10 percent should be charged to at least 90 percent of capacity within 3 hours.	Minimum requirement	Battery charge time is dependent on PSU capacity and battery capacity.
4	Battery interchangeability	- Interchangeable by a trained professional (no bonded batteries) - Interchangeable with a tool, possibly by using a special tool (by the user's IT department) - Interchangeable without tools (by the user's IT department)	Minimum requirement Evaluation criterion Evaluation criterion	The notebook housing must generally be opened to replace the battery. The housing does not need to be opened. On top of this, currently only restricted market availability. The form and design of the solution is larger and heavier, which conflicts with general requirements for smaller and less heavy devices.

Table 11: Criteria and requirements Power supply

Air freight

The United Nations (UN) has laid down international rules and regulation on the transport of batteries.¹⁴

From 1 January 2020 onward, much more comprehensive documentation on passing the UN 38.3 Test must be provided, in the form of the UN38.3 Test Summary. According to the German Federal Aviation Authority, shippers are obliged to provide UN 38.3 Test Summaries on lithium battery tests upon request¹⁵.

¹⁴ One source of more information on this is: http://www.unece.org/fileadmin/DAM/trans/danger/publi/manual/Rev7/Manual_Rev7_E.pdf

¹⁵ Source: https://www.lba.de/SharedDocs/Downloads/DE/B/B32_Gefahrgut/Fachinformation_neu/B32_Transport_Zellen.pdf;jsessionid=048EE30ED3717F88758F4206CF432F9F.live!1294?__blob=publicationFile&v=2

5 Environmental and health protection

5.1 General legal requirements

All legal requirements must be complied with, in particular Regulation 2013/617 on the implementation of Ecodesign requirements for computers and computer servers.

The Ecodesign Regulation for computers and computer servers specifies legal minimum requirements for placing these product types on the EU market. These include, in addition to desktop PCs, thin clients and smaller servers, notebooks as well as mobile workstations, tablet computers, slates and mobile thin clients. The criteria of the Ecodesign Regulation for computers and computer servers can be accessed here: [↗https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02013R0617-20170109](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02013R0617-20170109)

The European Commission is currently revising the Regulation. In addition to adjusting energy consumption values, the discussion is also about the introduction of energy efficiency labels based on energy consumption in the active state.

Legal requirements apply equally to all notebooks and must not be included in the performance specification.

5.2 Accessibility

Public entities in Germany are legally obliged to procure accessible hard- and software. General accessibility requirements are legally defined in § 4 of the Equality for Persons with Disabilities Act (Behindertengleichstellungsgesetz, BGG, see: [↗https://www.gesetze-im-internet.de/bgg/BJNR146800002.html](https://www.gesetze-im-internet.de/bgg/BJNR146800002.html)) (cf. Annex B to this Guideline for legal foundations and more information on accessibility). More details are laid down in, for example, Part 1 of the German Information Technology Accessibility Act (Barrierefreie-Informationstechnik-Verordnung, BITV 2.0) ([↗https://www.gesetze-im-internet.de/bitv_2_0/BJNR184300011.html](https://www.gesetze-im-internet.de/bitv_2_0/BJNR184300011.html)) of the German Equality for Persons with Disabilities Act (Behindertengleichstellungsgesetz, BGG)). Tenders should refer to these or equivalent requirements (cf. Annex B.2). The provider submits a self-declaration laying out which accessibility requirements are met by the offered product and which cannot be met. DIN EN 301 549:2020-02 Accessibility requirements for ICT products and services should be used for this purpose. Direct reference to this standard is made in Part 1 of the Information Technology Accessibility Act BITV 2.0 ([↗https://www.gesetze-im-internet.de/bitv_2_0/BJNR184300011.html](https://www.gesetze-im-internet.de/bitv_2_0/BJNR184300011.html)) of the German Equality for Persons with

Disabilities Act (BGG). As laid down in § 31 para. 2 no. 1 Ordinance on the Award of Public Contracts (VgV), reference can be made to DIN EN 301 549 in the performance specifications, in order to appropriately take the user needs of persons with disabilities into account. Clause 4 of the Technical Report CEN/CLC/ETSI TR 101 552 (2014-03, [↗https://www.etsi.org/deliver/etsi_tr/101500_101599/101552/01.00.00_60/tr_101552v010000p.pdf](https://www.etsi.org/deliver/etsi_tr/101500_101599/101552/01.00.00_60/tr_101552v010000p.pdf)) provides self-declaration templates.

DIN EN 301549 (particularly Chapters 5, 8, and 11) contains an overview of accessibility requirements that notebooks also have to meet (cf. Annex B.2 Relevant standards and regulation). ISO/IEC 20071-5 (cf. Annex B.3 Standards on accessibility features) contains a comprehensive overview of accessibility features that can also be applied to notebooks.

When procuring notebooks, clients must ensure that a sufficient number of suitable interfaces for connecting assistive technology, such as a braille terminal or special keyboards, are available, and that OS-specific drivers are available for them. Notebook-specific drivers, e.g. for built-in card readers to be operated through the user interface, must also be programmed in an accessible way. Physical requirements, such as key size, display properties and single-hand operability, must be observed in detail. On top of this, the additional resource demands placed by screen readers, screen magnifiers and voice recognition on the computing power, storage and, above all, video controller must be considered during planning. Moreover, it must be observed that any tools attached to the notebook, such as a braille terminal, are to be supplied with power by the notebook, which will reduce the battery life.

Notebooks to be put on the market after 28 June 2025 fall under Article 2A of the European Accessibility Act, which demands accessibility of "a) consumer general purpose computer hardware systems and operating systems" (cf. Annex B.5 Outlook).

5.3 Packaging

The German Packaging Act (Verpackungsgesetz, VerpackG¹⁶) regulates acceptance of returned packaging. If the private end user is left with the packaging, the distributor or dual system commissioned by the distributor has an acceptance obligation. Other entities equal to private end users are, among others, administrative bodies, barracks and hospitals (see §3 VerpackG para. 11). The Central Agency Packaging Register has a detailed overview ([↗https://www.verpackungsregister.org/en](https://www.verpackungsregister.org/en)). In principle, the return of packaging should always be free of charge. With no additional costs incurred besides logistics costs at the moment, the demand for exclusion criteria should be assessed.

16 [↗https://www.gesetze-im-internet.de/verpackg](https://www.gesetze-im-internet.de/verpackg)

5.4 Certifications and labels for verification purposes

A distinction must be made between legal requirements and **voluntary** certifications and labels that highlight special product characteristics or that serve to verify compliance with special requirements in certain usage environments.

Contracting entities can demand presentation of such verifications to more readily determine that the offer complies with the characteristics demanded in the description of service.

If the procurer demands presentation of such a certificate, it must be usable within the meaning of public procurement legislation, i. e. in particular, for providing suitable verification of the characteristics demanded in the service description (§34 para. 2 of the Ordinance on the Award of Public Contracts (VgV)). Moreover, alternative certificates that place similar requirements on the service must be accepted as well. A distinction should be made between the certificate as potential verification and the actual requirements placed on the object to be procured. Requirements must be formulated in a call for tender in a binding manner. Certificates can verify compliance with these requirements. Declarations of manufacturers should be recognised as evidence if their credibility can be suitably asserted, e. g., with test and inspection reports or if they meet international standards.

The recommended and widely accepted environmental labels as well as their criteria and their scopes of application are listed in the following. They are relevant for certain requirements. The procurer must decide which of these verifications is required for the scope of use in question on a case-by-case basis. These criteria can be verified through manufacturer declarations or via the environmental labels above.

ENERGY STAR: ENERGY STAR is a voluntary programme run by the EPA (US Environmental Protection Agency). ENERGY STAR products are certified by independent certification authorities and are listed in the ENERGY STAR database (<https://www.energy-star.gov/productfinder/>). The EPA also demands that a product sample is tested.

After the EU Energy Star Programme expired in 2018, this specific label should no longer be demanded in EU tenders. Alternatively, the Energy Star criteria can be used in the tender documents.

EPEAT: EPEAT is a leading global eco-label for the IT industry (administered by the Global Electronics Council, GEC). The EPEAT program offers independent verification of manufacturer specifications, and the EPEAT Online Register has a list of sustainable products offered by a wide range of manufacturers. The criteria for notebooks (IEEE 1680.1a-2020 in conjunction with IEEE 1680.1-2018) can be found here: [↗https://ieeexplore.ieee.org/browse/standards/get-program/page/series?id=86](https://ieeexplore.ieee.org/browse/standards/get-program/page/series?id=86). With the EPEAT standard, note that the registration is valid for Germany. This search function can be used to look up currently approved notebooks: [↗https://epeat.net/search-computers-and-displays](https://epeat.net/search-computers-and-displays). There are currently 600 notebooks registered for the German market (as of 15 August 2022).

TCO Certified for notebooks: TCO Certified is a leading global sustainability certification for various product categories. Comprehensive criteria promote social and ecological sustainability over the entire IT product lifecycle. Compliance with each requirement is assessed separately, both before as well as after certification. The current version (as of March 2022) is Generation 9. Care should be taken to always request the currently valid version.¹⁷ The current criteria for notebooks can be found here: [↗https://tcocertified.com/files/certification/tco-certified-generation-9-for-notebooks-edition-2.pdf](https://tcocertified.com/files/certification/tco-certified-generation-9-for-notebooks-edition-2.pdf).

The Blue Angel: The Blue Angel for computers and keyboards (current version as of March 2022: DE-ZU 78) is a voluntary eco-label designed to distinguish particularly environmentally-friendly products. For all products that meet the label criteria, a request can be submitted to RAL gGmbH, after which permission can be granted to use the environmental label for the product in question on the basis of a label use agreement. The award criteria can be found here: [↗https://www.blauer-engel.de/en/productworld/computers-and-keyboards](https://www.blauer-engel.de/en/productworld/computers-and-keyboards). There are currently no label holders for notebooks (as of 14 March 2022). The Environmental Information for Products and Services flyer by the German Federal Ministry for the Environment gives a general overview and assessment of these and other environmental labels (Berlin 2019).¹⁸

5.5 Comparability of eco-labels

Today, taking environmental issues into account is one of the basic requirements for all office devices. Mandatory requirements for environmental sustainability (e.g., environmentally friendly disposal of old devices, a ban on certain substances in products, electromagnetic compatibility) must be met by the manufacturers of electronic products by law. If a manufacturer does not meet these basic legal environmental requirements, they are not permitted to place their products on the EU market at all.

¹⁷ The TCO criteria are usually revised every three years, while certificates are valid for two years. Thus, for a transitional period, certified devices for different versions may be available on the market, which should be taken into account when tendering. The purchaser can use the TCO Certified Product Finder to get an overview of the devices already certified ([↗https://tcocertified.com/en/product-finder/](https://tcocertified.com/en/product-finder/)).

¹⁸ [↗https://www.umweltbundesamt.de/publikationen/umweltinformationen-fuer-produkte-dienstleistungen-0](https://www.umweltbundesamt.de/publikationen/umweltinformationen-fuer-produkte-dienstleistungen-0)

Requirements that go beyond the legal minimum standard are being increasingly stipulated, especially in the areas of energy consumption, service life, and noise emissions. Some requirements (both mandatory by law and those that go beyond this) are collectively checked and evaluated by eco-labels. However, one should tread lightly when using eco-labels in calls for tender, because, depending on the choice of quality mark, certain devices or providers will be excluded from submitting a tender offer, resulting in the market being narrowed accordingly. Moreover, not all eco-labels check for the same criteria pursuant to the same standards. Thus, they can hardly be compared. Not least for this reason, this Guideline recommends issuing specifications for the device criteria and requirements in calls for tender. Not only should eco-labels be allowed as proof of meeting these criteria, but also test protocols. When updating eco-labels, there may be delays between the application and the approval of the new quality mark. In this case, self-declarations that state compliance with the relevant requirements should also be accepted.

5.6 Determination of energy consumption to take into account energy efficiency in public procurement

When awarding public contracts for energy-related supplies or services, requirements that take into account the highest performance level of energy efficiency (e.g., according to Sec. 67 VgV (highest performance level of energy efficiency)) are to be complied with.

Energy efficiency describes the ratio of a given power output to its energy consumption. At constant power, energy efficiency increases as energy consumption decreases. In order to determine energy consumption (energy input), this Guideline recommends using the calculation rule to determine the Etec (Typical Energy Consumption in (kWh) per year) value of the ENERGY STAR® Program Requirements for Computers, as applicable. The ENERGY STAR® Program Requirements for Computers provide standardised rules to determine typical energy consumption per year in (kWh).

Here, one of the predefined scenarios with different weighing parameters (Mode Weightings) can be selected.

If the pre-defined scenarios of the ENERGY STAR® Program Requirements for Computers are not adequate, an individual energy calculation requirement may be considered by the contracting authority. This individual design should be limited, as far as possible, to a customised change in mode weights according to the ENERGY STAR® Program Requirements for Computers, in order to remain as close as possible to accepted standards.

Due to different calculation methods/weightings, ETEC values of different Energy Star versions cannot be compared with each other. If specific ETEC values are required in a tender, the ENERGY STAR® version that defines the calculation method must be specified.

An appropriate energy price per kWh to be set by the contracting authority can be used to calculate the corresponding energy costs. For example, energy costs can be taken into account in the form of a valuation price for energy costs at the time of the award.

5.7 Social sustainability

Besides economic and ecological criteria, social aspects should be considered in tender procedures (Section 97 (3) German Competition Act (Gesetz gegen Wettbewerbsbeschränkungen, GWB), Sec. 31 (3) VgV for upper-threshold procurements, Sec. 2 (3), Sec. 22 (2) German Sub-Threshold Procurement Ordinance (Unterschwelvenvergabeordnung, UVgO) for lower-threshold procurements). Such social aspects include, in particular, the rights of employees, the prohibition of child labour and employee discrimination, and compliance with the working hours framework at both the tenderer and their suppliers. To make sure these aspects are taken into consideration in the tender procedure for IT products and IT services, the contracting authority can require each bidder in the tender procedure to submit a declaration of social sustainability for IT. This declaration, one of the so-called text components for contract design and elaborations on the scope of application, can be retrieved from the website of the German Ministry of the Interior's Procurement Office.

More detailed information on the declaration of commitment to social sustainability for IT can be found here: http://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/Verpflichtungserklärung_ILO_BeschA_Bitkom_2019.html?nn=3631266

The website of the German Federal Ministry of the Interior's Procurement Office provides a summarised overview of additional aspects of sustainable IT product procurement: http://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/Produktblätter/Informationstechnik.pdf?__blob=publicationFile&v=10

6 Security

Notebooks can become the target of cyber attacks, data theft, and data misuse. Such attacks jeopardise the confidentiality, availability, and integrity of the data processed and stored on the devices, as well as the functionality of the devices themselves. Modern notebooks can come with integrated security features by default. These features can support compliance with security regulations. Data protection and data security can ultimately only be established through a combination of organisational measures, due diligence on the part of the device user, and security functions inherent in the device.

No.	Criteria	Requirements	Suitable as	Remarks
1	Mechanical theft protection	▪ Fixture to attach mechanical theft protection ▪ anchored in the inner housing of the notebook	Minimum requirement	Fitting locks etc. are accessories that must be procured separately. Might influence the design/thickness/dimensions of the device. For additional locking options, see docking functionality.
2	TPM	▪ TPM 1.2/2.0 ▪ If TPM is available: Can be shut down in the firmware (see also TCG PC Client Platform Firmware Profile 6.1). The OS may not have the option of undoing such a shutdown. -or- ▪ No TPM or irrevocably deactivated	Minimum requirement	TPM (Trusted platform module) is a feature that stores keys, passwords & digital certificates. For use with Windows 10, delivery of a TPM 2.0 is recommended. For use with Windows 11, TPM 2.0 is mandatory. For other use (virtualisation, Linux): Delivery recommended without TPM or with deactivated TPM. Depending on the intended purpose of use, the option of an upgrade/downgrade between TPM 1.2 and 2.0 can be requested.
		▪ Pre-boot hard disk password, option in firmware	Evaluation criterion	If configured accordingly, the hard disk should only be able to boot after the password has been entered.
		▪ Password option for firmware access (e.g. BIOS/UEFI)	Minimum requirement	Access to firmware with graded rights with firmware passwords. Depending on the internal security Guideline of the public entity, an access password should be set on initial commissioning.
		▪ Individual firmware settings	Evaluation criterion	The delivery state can contain BIOS/UEFI/coreboot settings pre-defined by the client.
		▪ Secure boot to check hardware component integrity ▪ Can be shut down in the firmware	Minimum requirement	

No.	Criteria	Requirements	Suitable as	Remarks
3	Out-of-band management	If available, delivered with firmware deactivation; can only be activated with the firmware password	Minimum requirement	Remote-maintenance functions that can make firmware and/or data changes independent of the OS must be delivered in deactivated state, if any are available. Activation of the functions must be protected and must only be possible with a firmware password. When deactivated, the functions must neither establish nor accept network connections. €
4	BIOS/UEFI/coreboot manipulation security	Detecting and protecting against manipulation, reliable notification of the owner or user.	Minimum requirement	The systems must have mechanisms that prevent manipulation of the firmware itself (e.g. with write protection) or detect manipulations (e.g. with a signature check) and reliably report the incident to the owner or user.
5	Firmware, hardware	Patch management available and information on patch management for firmware and hardware vulnerabilities	Minimum requirement	Firmware referenced here is firmware that is either running on the main processor (e.g. BIOS, UEFI, Coreboot) or capable of influencing it (e.g. Intel ME, AMD PSP).
		After a critical firmware vulnerability becomes known by the public (CVSS 2.0 Base Score 7.0–10.0), it must be fixed immediately with corresponding communication.	Minimum requirement	The bidder should provide detailed documentation on the intended handling of hardware and firmware vulnerabilities, including any third-party dependencies (e.g. suppliers). This documentation specifies estimated periods for remedying firmware vulnerability.
		After a critical hardware vulnerability becomes known by the public, the client must be informed immediately. If the nature of the vulnerability allows, a workaround or patch should be provided within 6 months.	Minimum requirement	Hardware vulnerabilities (e.g. spectre variants) might not be able to be patched, which is why a duty to inform is the priority here. Usage restrictions as a result of workarounds are permitted.
		The firmware passes the BITS/CHIPSEC test suite without errors	Minimum requirement	The bidder carries out the protocols of the BITS/CHIPSEC test suite and updates these protocols with firmware updates and hardware changes.
		The Windows Platform Binary Table (WPBT) is not used.	Evaluation criterion	Can be used for malware infiltration.
6	Encryption	Drive encryption	Minimum requirement	Encryption is achieved either by the drive's integrated hardware and firmware (e.g., Opal, eDrive) or by software.
7	Interface protection	Interfaces in BIOS/UEFI/coreboot can be deactivated	Minimum requirement	e.g. Ethernet, USB, WLAN, WWAN, Bluetooth, camera, microphone, fingerprint sensor etc.
8	User authentication	Possibility of multifactor authentication	Minimum requirement	e.g. smartcard, fingerprint, other biometric characteristics etc.
9	Webcam cover	Integrated, physical webcam cover	Bewertungskriterium	€
10	Privacy protection	Monitor filter	Minimum requirement	Solution depending on the system manufacturer. €

Table 12: Criteria and requirements Security

7

Award criteria

Pursuant to Sec. 127 GWB, the award must go to the most economically advantageous tender. The most economical tender is determined on the basis of the best price-performance ratio. Qualitative, environmental and social award criteria can also be included in addition to the price/costs. With delivery performances relevant to energy consumption, energy efficiency is to be considered appropriately, § 67 para. 5 Ordinance on the Award of Public Contract (VgV).

The performance requirements can either be formulated within the context of award criteria with minimum technical requirements, or as assessment criteria. It is up to the procuring entity to decide which category to assign individual performance characteristics to. Criteria usually specify minimum requirements that are essential for the intended use of a device. Where this Guideline recommends minimum requirements for the equipment, this is marked with »minimum requirement« in the criteria tables. If the criteria or requirements are marked with »evaluation criterion«, the Guideline recommends using these requirements only in the context of evaluation criteria.

The formulation of the performance requirements with the aid of evaluation criteria can grant the competitors specific leeway to allow for a differentiated consideration of the services offered in the evaluation. In this way, the individual characteristics of the competitors' services can be taken into account, which promotes more diversified competition. Care should be taken when formulating the performance requirements to present a detailed, comprehensible and objectively assessable horizon of expectations or evaluation.

The increased or even exclusive application of minimum technical requirements in the performance specification entails the risk of an undesirable restriction of competition.

The Guideline recommends the use of evaluation criteria to promote the widest possible competition.



8

Contractual provisions

[EVB-IT \(Supplementary Terms of Contract for the Procurement of IT\)](#)

The provision of the tendered services or the delivery of the tendered products after successful completion of the award procedure is based on respectively applicable contracts. To support the contracting authorities, the German Federal Ministry of the Interior and Bitkom have drawn up various contracts which can be used for this purpose. The contracts can be found on the website of the Federal Government Commissioner for Information Technology (https://www.cio.bund.de/Web/DE/IT-Beschaffung/EVB-IT-und-BVB/Aktuelle_EVB-IT).

Annex A – Benchmarks

1. Benchmark environment variables

To ensure the comparability of benchmark results across different offers, the contracting authority should define certain minimum requirements regarding notebook system setup in the tender documents. This is also the case if the contracting authority carried out benchmarks itself or commissions another party to do so, as well as in those cases in which it specifies that bidders should provide evidence of benchmark tests. As settings and version number requirements for operating systems and benchmark processes are more precisely specified in the tender, the number of follow-up questions will drop



Environmental parameters, for example, influence the benchmark results, which is why we recommend that the manufacturer or provider performs the benchmark measurement under the following conditions:

- Air temperature 20-22 degrees Celsius
- Relative humidity max. 50%
- Air flow speed max. 15 m/s

Measurements by independent measurement labs, manufacturer labs and accredited measurement labs

EU law specifies that measurement labs can draft adequate measurement protocols, regardless of whether they are operated by the manufacturer or not. Accreditation is not required. Examples are the CE Declaration and the ECO Declaration. ECO labels demand more stringent requirements to be met.

ECO labels such as Energy Star and TCO demand inspection protocols of an independent inspection lab, accredited for measurements following DIN EN ISO/IEC 17025.

There is no reason why a manufacturer lab cannot be such an accredited measurement lab. Only accreditation following DIN EN ISO/IEC 17025 is required.

Display brightness

The setting must be maintained for the duration of the test, except for those cases in which the screen is dimmed, shut down, or the system goes into stand-by mode (see below).

If a brightness of 200 nits is not achieved in battery operation, measured at the centre of the screen with a bright background, the brightness of the display must be set to

the max. value for the tests, except for those cases in which the display is dimmed (see below).

Whenever systems cannot reach 200 cd/m² on battery operation, this must be documented

2. BIOS/Firmware

Parameters	Description	Classification
BIOS version	The manufacturer's most current BIOS version must be used.	Required
BIOS delivery settings	Some BIOS settings can significantly influence the benchmark results; the default settings of the device on delivery must be used.	Required

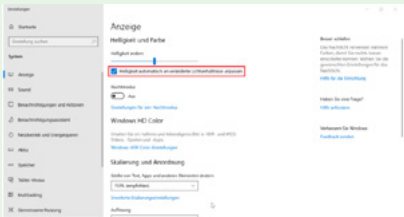
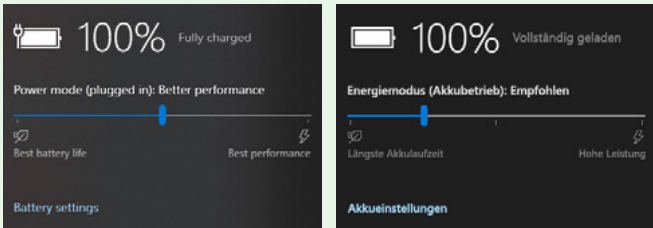
3. Operating system/driver

Parameters	Description	Classification
Installation process	It is strongly recommended to reinstall the operating system and to refrain from using an OS image file with pre-installed drivers or other (manufacturer-specific) software. This is attributable to certain operating system properties, such as super-/prefetch, which can make the results of images hard to compare. Furthermore, it is expected that the default settings of the operating system are used during installation. Moreover, the operating system should be installed in offline mode (otherwise, daily updates will be installed automatically, making results harder to compare). The current basic version of Windows 10 (e.g. 1909) can be created using the Microsoft Media Creation Tool (»MediaCreationTool1909.exe«). The tool generates an ISO image or a bootable (UEFI) USB stick (at least 8 GB): https://www.microsoft.com/en-gb/software-download/windows10 Furthermore, the exact version of Windows (basic version & build) should be specified in the tender. More information can be found on this website: https://docs.microsoft.com/en-gb/windows/release-information/ The relevant build can be installed via the KB article (available from the website).	Required
Operating system	Windows 10 benchmark results should never be compared with results of older Windows operating systems or Linux.	Required
Operating system – maintenance works	It is strongly recommended to include the performance of automatic OS maintenance works (defragmentation of storage media) after installation as a necessary requirement in the tender documents. If the benchmark is to launch directly after installation, the result can be skewed by maintenance work carried out in the background.	Required
Operating system – changes to settings	It is recommended to prohibit changes to OS default settings (which are not strictly required by the benchmark). An objective benchmark user should be able to reproduce the benchmark results without specialist knowledge or explanation.	Required

Parameters	Description	Classification
Operating system – automatic updates	Automatic OS updates must be deactivated. The test system must generally be benchmarked without an Internet connection, using only the specified updates. Allowing automatic updates can result in different software states, which might make the results harder to compare with one another.	Required
System manufacturer's driver versions	The system manufacturer's most current driver package must be used. The current driver package can be obtained from the system manufacturer's website.	Required



4. Benchmarks

Parameters	Description	Classification
Ambient light sensor	Ambient light sensors adapt screen brightness to ambient light. If possible, it is recommended to deactivate ambient light sensors. Screen brightness must be set to a value not lower than 200 cd/m², measured in battery operation on the middle of the screen with a white background. It is recommended to carry out the benchmarks using the minimum resolution specified in the tender. 	Optional
Battery calibration	For new devices, it is recommended to run through two charge cycles (full charge & full discharge) before carrying out the battery life measurement. This gives precise battery life values. 	Optional
Battery measurement – Windows 10 Power Management	Unless specified otherwise, the »balanced (better performance)« battery setting should be selected. 	Optional

MobileMark 2018 – WLAN

For MobileMark 2018, the system's wireless network adapter must be activated and assigned to a wireless network, which will be continuously disconnected from the Internet for the duration of the test. (BAPCo_MobileMark2018_user_guide_v1.3)

Parameters	Description	Classification
Number of benchmark tests	When carrying out benchmark tests, all test values are subject to fluctuations of 2-5% in every round of tests. Greater accuracy is ensured by carrying out multiple measurements. The benchmarks recommended in this Guideline, however, have proven to produce reliable results with a single run. If several tests are required all the same, this must be specified in the tender documents. On top of this, the calculation to determine the final score (e.g. arithmetic mean) must be indicated, if this is not already done automatically by the benchmark developer. For battery life measurements, it is recommended to use a new battery, in order to make sure the results are not skewed by a used battery.	Optional

BAPCo Sysmark/MobileMark 2018

Parameters	Description	Classification
Benchmark version	At the moment of publication of this Guideline (April 2020), the following main versions of the BAPCo Benchmarks are available: SYSmark 2018 (Version 1.0.2.58) and MobileMark 2018 (Version 1.0.4.50). According to the benchmark developer, all results of this main version should be comparable with one another. Available patches only improve compatibility and stability with later operating system versions. Therefore, the tender does not need to mandatorily prescribe these subversions. If such subversions must be demanded as a result of certain insights, however, then the version to be used must be specified exactly in the tender documents.	Recommended
Operating system language versions	There are currently no performance differences between the English-language and German-language versions of the OS.	Optional

UL PCMark 10

Parameters	Description	Classification
Benchmark version	At the moment of publication of this Guideline (April 2020), the following main version of the PCMark® 10 benchmark is available: Version 2.X.XXXX. According to the benchmark developer, all results of this main version should be comparable with one another. Available patches (indicated by the X's in the version designation) only improve compatibility and stability under later OS and hardware versions. Therefore, the tender does not need to mandatorily prescribe these subversions. If such subversions must be demanded as a result of certain insights, however, then the version to be used must be specified exactly in the tender documents.	Recommended
		

A.1 Notes on benchmark execution

SYSmark 2018/MobileMark 2018

SYSmark2018/MobileMark2018 can be installed once the OS has been installed. The software can be obtained via download or from a data carrier.

Download:

1. Download SYSmark 2018 from the BAPCo Store.
 - a. Create a back up of the downloaded ZIP on a USB stick or on different external storage device.
2. Unzip the benchmark files.
 - a. Create a folder titled »SYSmark2018« to unzip the content of the Store download into.
3. Use Windows Explorer to navigate back to »DataCarrier1«, the folder created in step 2.
4. Double-click the »SYSmark2018_setup.exe« file and follow the instructions to complete the installation



SYSmark 2018 Installation window



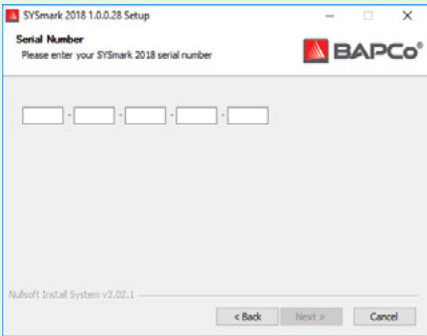
MobileMark 2018 – installation window

By clicking the »I accept the terms of the License Agreement« option and then »Next«, you confirm that you have read the BAPCo End User Licence Agreement (EULA) and accept it.



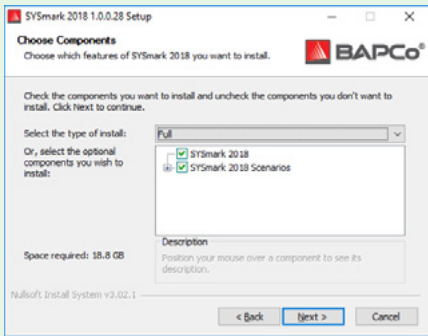
SYSmark 2018-EULA

Enter the serial number included with the benchmark package and click »Next« to continue.

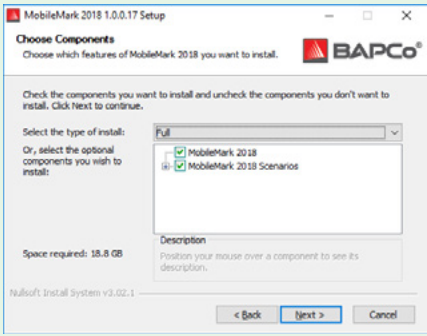


Enter a valid SYSmark 2018 serial number to continue the installation.

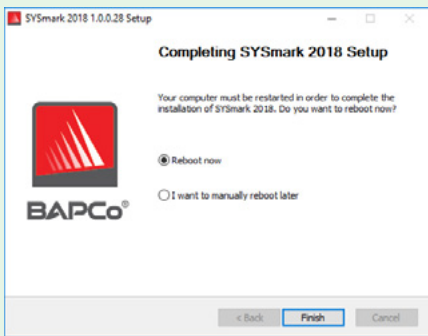
The following illustration shows the complete standard installation of the benchmark. All core components, all scenarios and the results display are shown after the user clicks »Next«.



Complete standard installation of SYSmark 2018



Complete standard installation of MobileMark 2018



The installation of SYSmark 2018 has been completed successfully.

After installation, reboot before executing SYSmark 2018 or MobileMark2018.

SYSmark2018 benchmark

Launch SYSmark 2018 by double-clicking the desktop symbol. This calls up the user interface.

Important: If user account control has not been deactivated before launching, right-click on the symbol and select »Run as administrator«. User account control can be deactivated using the integrated configuration tool. For more information on the integrated configuration tool, visit http://bapco.com/wp-content/uploads/2018/10/BAPCo_SYSmark2018_user_guide.pdf »System Configuration Tool«. SYSmark 2018 must be run using the same user account that was also used for installation.

Click »Run Benchmark« to perform a benchmark with the standard configuration. The following steps are carried out.

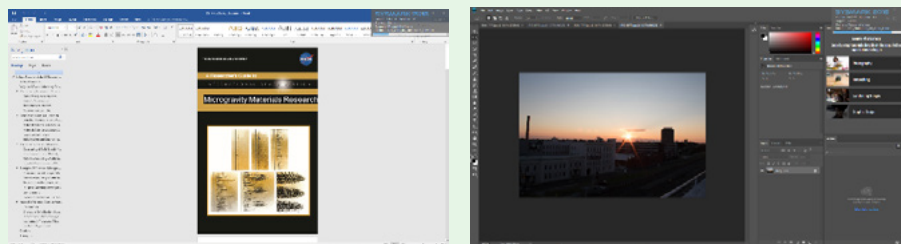


- Executing an instance of all three scenarios.
 - The project name for the first project is »Project01«. Any following projects are designated »Project02«, »Project03« and so on. A custom project name can also be used
- An integrity check is executed, but this is not taken into account as part of the performance score calculation.
- »Process idle tasks« is deactivated.
- The system configuration tool is executed with the following options
 - Required elements – set to ON
 - Recommended elements – set to ON
 - Optional elements – set to OFF
- The energy test is carried out if an energy consumption meter is installed and identified on system testing.

After all settings and options are checked (red arrow in the following illustration), launch the benchmark. Detailed information: http://bapco.com/wp-content/uploads/2018/10/BAPCo_SYSmark2018_user_guide.pdf



Images of the different scenarios



At the end of the benchmark, a PDF with the results incl. an FDR (full disclaimer report) is generated and can be transmitted to BAPCo.



MobileMark 2018 battery benchmark

Launch MobileMark 2018 by double-clicking the desktop symbol. This calls up the user interface (see Ill. 6).

Important: If »User Account Control« has not been deactivated before launching, right-click on the symbol and select »Run as administrator«. User account control can be deactivated using the integrated configuration tool. For more information on the integrated configuration tool, visit https://bapco.com/wp-content/uploads/2020/09/BAPCo_MobileMark2018_user_guide_v1.6.pdf, and consult the section »System Configuration Tool«. MobileMark 2018 must be run using the same user account that was also used for installation.



MobileMark 2018 has a redesigned user interface that has been optimised for easier project configuration. Click »Run Benchmark«.

- An integrity check is executed, but this is not taken into account as part of the performance score calculation.
- »Process idle tasks« is set to »OFF«.
- The system configuration tool is executed with the following options:

- Required elements – set to »ON«
- Recommended elements – set to »ON«
- Optional elements – set to »OFF«

Performance/Power Slider in Windows 10

The Performance/Power Slider in Windows 10 has four settings, which can be used for MobileMark 2018: »Best battery life«, »Better battery«, »Better performance« and »Best performance«.

The Performance/Power Slider is only available if the test system is configured with the »Balanced« energy plan or if a user-defined energy plan has been created as a template for the »Balanced« energy plan.

For more information on the test devices with Performance/Power Slider and energy-saver mode, visit https://bapco.com/wp-content/uploads/2020/09/BAPCo_Mobile-Mark2018_user_guide_v1.6.pdf and consult the section »Mobilemark 2018 Benchmarking Rules«.

You can execute the test using the options »Better battery«, »Better performance«, or »Best performance« as follows:

1. Disconnect the system to be tested (System Under Test, SUT) from the power supply.
2. Click the battery symbol in the notifications section to access the Performance/Power slider.
3. Set the slider to the desired position.
4. Reconnect the power supply.
5. Check whether the slider is set to the right position by disconnecting the SUT from the power supply and clicking the battery symbol in the notifications section. The slider should now be in the same position as it was set to in step 3.
6. Reconnect the power supply.
7. Launch the MobileMark 2018-GUI and start the test. BAPCo MobileMark 2018 – User Guide Page **14** of **40**

You can execute the test using the »Best battery« option as follows:

1. Right-click on the start menu and select »Power options > battery«.
2. Make sure that the option »Turn on battery saver automatically if my battery falls below:« is activated.
3. Set the threshold value for activating power-saving mode to 100%.
4. Disconnect the system from the power supply.
5. Click the battery symbol in the notifications section and check whether the slider is set to the »Best battery life« position.
6. Reconnect the power supply.
7. Launch the MobileMark 2018-GUI and click the settings symbol to access the configuration tool.
8. In the »Recommended« tab, deactivate the »Verify Battery Saver Threshold« setting.
9. Return to the MobileMark 2018 main screen and click »Run benchmark« to launch the test.

PCMark 10 performance test

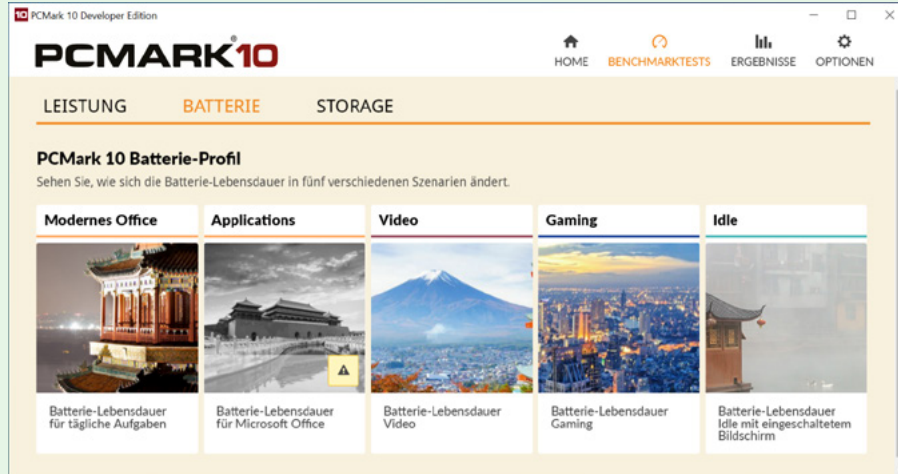
After PCMark 10 has been installed, the program must be activated with a licence key. An Internet connection is briefly required for activation. After activation, the PCMark 10 performance and battery life test can also be used without an Internet connection

1. Launch the »PCMark10.exe« program
2. Click »Execute« in the home screen. The performance test recommended by the Bitkom Guideline for Office Applications is then executed. The benchmark now automatically starts the tests for the 3 assessment criteria (Essential, Productivity, and Digital Content Creation).

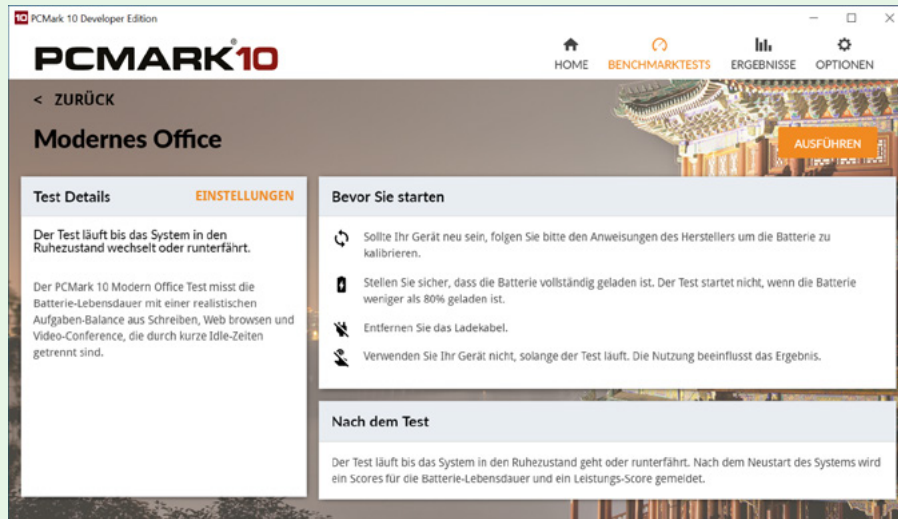


PCMark 10 battery life test

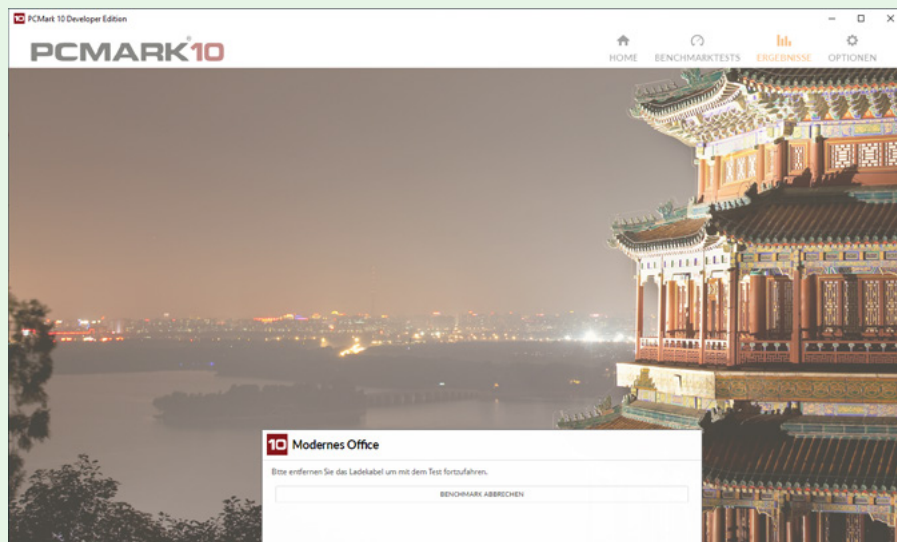
1. Launch the »PCMark10.exe« program
2. Click »Benchmark tests«
3. Select the »Battery« category



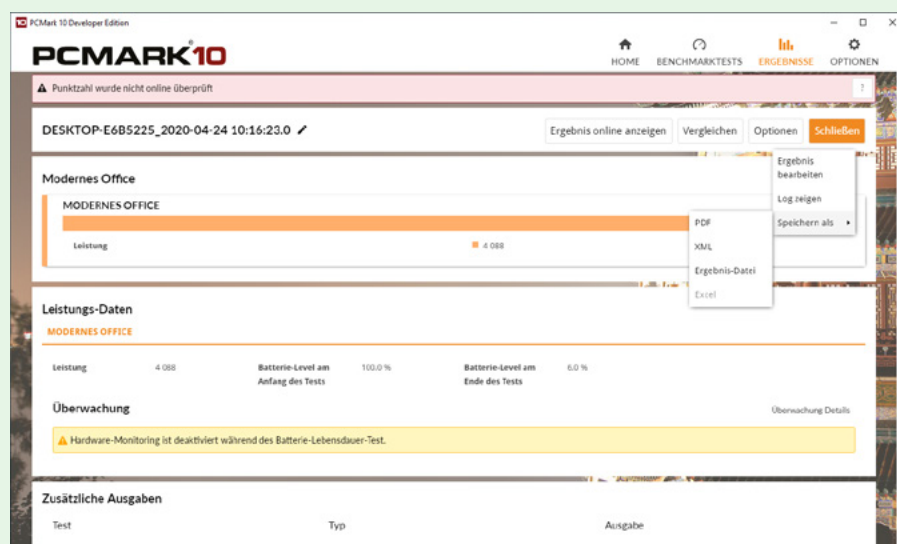
4. Click »Modern Office«



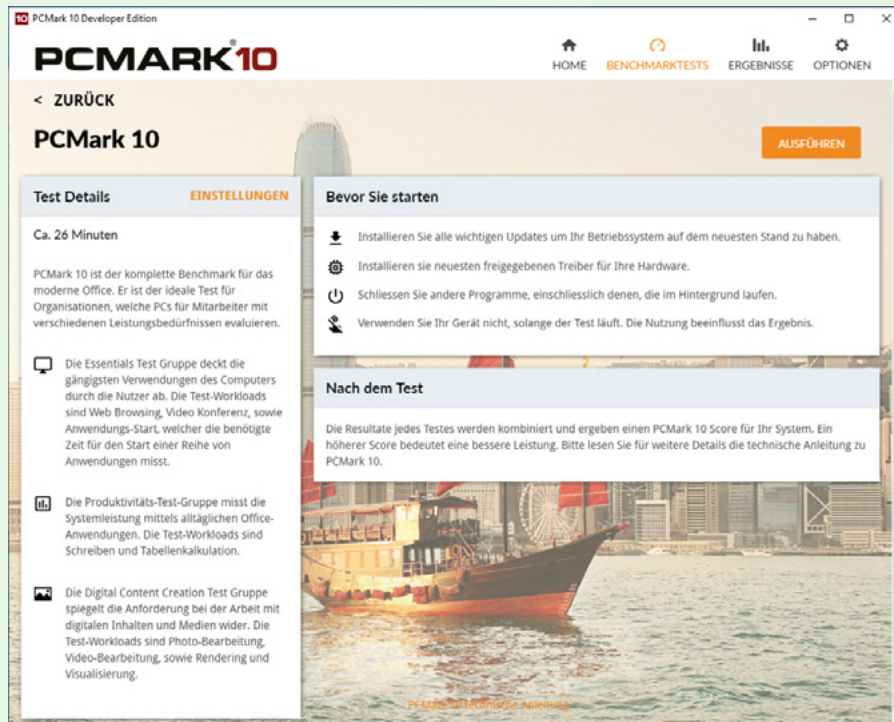
5. Click »Execute«
6. After the benchmark has been initialised, the PSU must be disconnected from the device. The test will then launch automatically. The battery must be 100% charged. Exact information on the battery state is given in the protocol.



After the test is completed, the results of both benchmarking processes (performance test and battery life test) can be stored as an XML, PDF, or PCMark 10 results file. Click »Options« -> »Save as...«



Optional (merely for informational purposes before or after the actual performance measurement): If the user wants more exact information on which performance tests were carried out for the »Modern Office« scenario, click »Benchmark tests« and then »Details« in the main screen.



Annex B – Information on accessibility

B.1 Definition of accessibility

»Information processing systems are (...) defined as accessible (...) if people with disabilities

- can find, access and use them
- without it being exceptionally difficult for them and
- without them requiring any third-party

assistance in general.

The use of special tools for disabilities is allowed.« (BGG §4)

Tools are devices such as special keyboards, alternative pointing devices, screen readers and screen magnifiers.

B.2 Relevant standards and regulation

When creating the performance specification for the procurement of notebooks, accessibility criteria must be considered, except for justified exceptions:

- Act to Modernise Procurement Law (Vergaberechtsmodernisierungs-Gesetz, VergModG) (18/4/2016) (implementation of Directive 2014/24/EU and Directive 2014/25/EU) §121 Performance description paragraph 2
- Equality for Persons with Disabilities Act (Behindertengleichstellungsgesetz, BGG), (10/7/2018) Section 12 Accessible information technology, paragraph 2.

Care should be exercised here to ensure that the requirements are aligned with user needs and are both technology-neutral and open to innovation.

In order to harmonise accessibility requirements in the procurement of information and communication technology products and services by public entities in Europe, the European Commission tasked the European Standards Organisations CEN, CENELEC and ETSI with the creation of a standard. The result of this assignment is European Standard EN 301 549:2018-08 (https://www.etsi.org/deliver/etsi_en/301500_301599/301549/02.01.02_60/en_301549v020102p.pdf), listed in the Official Journal of the European Union under Directive (EU) 2016/2102 **on the accessibility of the websites and mobile applications of public sector bodies**. This European standard was implemented with DIN EN 301 549:2020-02 Accessibility requirements for ICT products and services. Verification should be provided by means of a contractor self-declaration.

Currently, there is no relevant certification option available, which is why certificates cannot be demanded as verification.

Die Nachweisführung sollte über eine Eigenerklärung des Auftragnehmers erfolgen. Zertifikate können nicht als Nachweise gefordert werden, da eine entsprechende Zertifizierungsmöglichkeit zurzeit nicht besteht.

B.3 Standards on accessibility features

A comprehensive overview of accessibility features that must also be met by notebooks is given in ISO/IEC 20071-5 "Information technology – User interface component accessibility – Part 5: Accessible user interface for accessibility settings on information devices". This standard is available as a draft and is expected to be published in 2021. The annex to the standard can serve as a checklist when drafting the offer. The accessibility features are listed in Chapter 4.2 of the standard.

B.4 Management system standards for accessibility

DIN EN 17161: »Design for All – Accessibility of products, goods and services in accordance with a »Design for All« approach – Extending the range of users« is a management system standard that helps organisations ensure accessibility in its processes. It is not mandatory to apply this standard, but doing so is helpful with regards to the self-declaration.

B.5 Outlook

An updated version of the standard is already available as EN 301 549 (2019-11, https://www.etsi.org/deliver/etsi_en/301500_301599/301549/03.01.01_60/en_301549v030101p.pdf) Its publication in the Official Journal of the EU, as well as its implementation as DIN EN 301 549, is expected in 2021.

Article 2 »Scope« (1), »Products«, and other provisions of EU Directive 2019/882/EU on accessibility requirements for products and services Dienstleistungen (European Accessibility Act, EAA) (<https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:32019L0882&from=EN>) demand the accessibility of the following products if they are placed on the market after 28 June 2025:

»a) Hardware systems and operating systems intended for these hardware systems for all-purpose computers for consumers«;

The EAA envisages accessibility to be part of the self-declaration as part of the CE marking process.

B.5 International self-declaration

The following information might be helpful for internationally active ICT providers in creating their self-declaration:

The Information Technology Industry Council» (ITI) provides a free reporting tool – the Voluntary Product Accessibility Template (VPAT) – to help determine whether ICT products and services meet accessibility requirements, including the rules following US Rehabilitation Act Section 508. The ITI has published updated versions of the VPAT (2.4) that are based on the updated 508 rules of the US Access Board (VPAT 2.4 508). Additionally, versions for WCAG 2.1 (VPAT 2.4 WCAG) and EN 301 549 (VPAT 2.4 EU) are offered, as well as an additional version based on all three (VPAT 2.4 INT).

↗<https://www.itic.org/policy/accessibility/vpat>

Bitkom represents more than 2,000 companies of the digital economy. Through IT- and communication services alone, our members generate a domestic annual turnover of 190 billion Euros, including 50 billion Euros in exports. The members of Bitkom employ more than 2 million people in Germany. Among these members are 1,000 small and medium-sized businesses, over 500 startups and almost all global players. They offer a wide range of software technologies, IT-services, and telecommunications or internet services, produce hardware and consumer electronics, operate in the digital media sector or are in other ways affiliated with the digital economy. 80 percent of the members' headquarters are located in Germany with an additional 8 percent both in the EU and the USA, as well as 4 percent in other regions of the world. Bitkom promotes the digital transformation of the German economy, as well as of German society at large, enabling citizens to benefit from digitalisation. A strong European digital policy and a fully integrated digital single market are at the heart of Bitkom's concerns, as well as establishing Germany as a key driver of digital change in Europe and globally.

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