Product-neutral tendering of multifunctional devices and printers

Guideline for public IT procurement: With product specifications on environmental protection, energy efficiency, accessibility and IT security
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1   Introduction

1.1   Application of this Guideline

This Guideline provides an overview of the principles and criteria for the procurement of printers and multifunctional devices (MFD) by public administrations. It is the result of a working group involving the Procurement Office of the Federal Ministry of the Interior and Bitkom e.V. The aim of the document is to provide public contracting authorities at federal, state and local level with reliable and comprehensible assistance so that they can formulate their tenders for the procurement of printers and multifunctional devices in a product-neutral manner, that is, without using protected brand names and without naming a specific manufacturer, but taking current technical standards into account. While printers are mainly characterized by the printing function, multifunctional devices combine several functionalities (e.g. printing, scanning, copying, faxing) in one device (comparable to the evolution of the cell phone into a smartphone).

At the heart of this Guideline is a list of technical criteria that can be used to describe and compare the devices themselves and the requirements in regard to their operating environment and other properties. In addition to the technical criteria – compliance with which guarantees the functionality of the devices for the procurement purpose – the Guideline also provides information on environmental protection, energy efficiency, accessibility and IT security. Moreover, the aspects of ecological sustainability in the form of resource conservation of materials used – e.g. through longer use of the devices or a longer service life of consumables and maintenance substances – as well as the aspects of social sustainability in the form of compliance with ILO core labour standards are becoming increasingly important. Although these issues only require partial consideration based on legal requirements (such as the Supply Chain Duty of Care Act (LkSG) with regard to social sustainability), they are becoming increasingly relevant in public administration.

It is important to note that the technical criteria and requirements listed are subject to constant change and must be weighted differently depending on the planned area in which the devices for procurement will be used. The higher the demands placed on the product, the higher the bid price will tend to be, which may further restrict the product range available on the market. For this reason, this Guideline cannot replace the procuring authority's own analysis and prioritization of the respective criteria.

However, the authors of this Guideline would also like to support procuring authorities in public administration by drawing particular attention to sensitive criteria and requirements, that is, those which may lead to market restrictions, and to cost-relevant decisions. The icons defined below are used for this purpose:

Icon	Meaning
€	The requirement of criteria bearing this symbol may lead to cost increases and/or market restrictions.

Icon	Meaning
	This icon indicates the correction of a common error or points to particularly important statements in the text.
	This icon indicates whether certificates can be used to verify criteria.

1.2 Product neutrality as a legal requirement

Under public procurement law, there is an obligation to ensure the equal treatment of suppliers and products offered. According to the legal basis, the procurement item must be described according to objective and non-discriminatory criteria, that is, product-neutral (cf. Section 97 Competition Act (GWB) and Section 31 (6) Regulation on the Award of Public Contracts (VgV) for EU-wide award procedures as well as Section 55 (1) Federal Budget Code (BHO) and Section 2 (2) Regulation on Sub-threshold Awards (UVgO) for sub-threshold awards). Certain product designations or brand names may only be used in invitations to tender in justified exceptional cases if a sufficiently precise description is not possible by means of customary designations or general criteria.

This is precisely where this Guideline steps in, providing compact assistance to support compliance with legal requirements and to hence ensure fair competition. The Guideline names and explains current technical standards that enable printers and multifunctional devices to be described according to general technical characteristics. The product features and technical requirements are presented in a compact tabular form. The Guideline is updated at regular intervals to ensure its currency. New technical developments are taken into account and the proposed criteria and requirements are adapted to the current state of the art.

2   Printers and multifunctional devices as procurement items

2.1   Trends in the procurement of printers and multifunctional devices

While printers mainly provide the printing function, the multifunctional devices are characterized by the standard functions of copying, printing, scanning (scan-to-email, scan-to-PC, scan-to-USB, scan-to-FTP, scan-to-network) and faxing. Today's and future generations of multifunctional devices are evolving technologically to support both paper-based and digital administrative processes, enabling and advancing the processing of structured and unstructured data (e.g. in form recognition or preliminary data sorting) with associated IT procedures and processes. MFD are becoming smarter with the emergence of device- and server-based solutions. As a result, they can make an increasingly significant contribution to sustainable and environmentally friendly administrative work and, as an interface between digital and printed information, are an essential IT component for the implementation of e-government solutions in public administration.

The technical development of MFD and printers is shaped by the trends described below:

- **Replacement of "single"-function devices (e.g. separate scanner or printer) with multifunctional devices:** Multifunctional systems are increasingly replacing single-function devices (separate scanners or printers) due to the varied and simultaneous demands on today's IT infrastructure in administration.
- **Increasing use of colour:** There is a growing trend towards the use of colour printing. One reason informing this trend may be that colour is used in documents in order to depict the increasing diversity of information and hence to improve comprehension.
- **Rising use of DIN A4:** The predominant use of the DIN A4 print format leads to a high demand for MFD that are designed for this format, but where final processing — such as the booklet function — is sometimes only possible to a limited extent. The high-performance MFD in A4 format meet all current and future requirements in the office sector.
- **High performance:** High demands are placed on the productivity and flexibility of printers and MFD due to the rapidly increasing volume of data for processing.
- **Simple and intuitive operation:** Along with the increasing complexity of the MFD, there are high demands for intuitive usability of the numerous functions and simple, self-explanatory navigation within the MFD. Simple navigation for the respective process is icon and text-controlled on a colour touchscreen.
- **Greater flexibility:** Printers and multifunctional devices are characterized by a high degree of flexibility. They can be adapted to user requirements thanks to open standards and integrable connections.

- **Sustainability:** Printers and MFD are increasingly characterized by compliance with high sustainability standards (ecological, social and economic sustainability) (see also Blue Angel quality mark). In this context, requirements for climate-neutral and socially responsible procurement are becoming increasingly important in particular.[1] There are various methodological approaches for determining and limiting greenhouse gas emissions in the procurement of technical devices.

- **Accessibility:** Many printers and MFD now offer barrier-free accessibility. It is important to enable users with different abilities and physical capabilities to interact easily with customers, colleagues and workflows (see also the chapter on accessibility).

2.2 Further individual application solutions

Unlike printers, MFD can adapt administrative processes, applications and data storage to the specific needs of users thanks to their multifunctionality and additional customizable software solutions. Today, they offer a wide range of advanced software solutions that support and optimize office processes and administrative procedures. This can, for example, extend the possible uses of the devices, save time or reduce costs. There are essentially three variants of extended application solutions for MFD, namely device-based, cloud-based and network-based user solutions.

a) Device-based user solutions

Device-based user solutions are free or paid additional functions or solutions that can be integrated into MFD in addition to standard functions. These additional functions are primarily used to provide processed information (files) that can be edited and used in the user's wider environment and with the user's applications. An example of this would be the provision of an additional OCR font recognition function, which converts scanned data as raster data into PDF files or so-called ASCII or RTF/text files and makes them available for further processing in the applications, e.g. for Office applications. Other device-based user solutions are intended to support operation of the MFD, to forward generated information (e.g. scan files) to applications or as additional security functions to heighten the device security of the MFD.

The intended purpose should be taken into account when using device-, network server- or cloud-based solutions, e.g. the scope of the documents to be recorded and the associated data volumes. Device-based user solutions may come at the expense of MFD performance. It is therefore important to consider whether the use of a network- or cloud-based user solution would be more purposeful for these applications.

b) Network-based user solutions

There is a large selection of implemented extended user solutions (apps) available on the market that enable the exchange of information between software applications and specialist procedures. Deployment tools/platforms can also be used to quickly and easily design and create

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1   Recommendations are found, for example, in the publication "The path to greenhouse gas-neutral administration" published by the Federal Environment Agency.

proprietary work and administrative processes.[2] These user solutions are generally not integrated into the MFD, but are located in the customer's surrounding IT infrastructure, e.g. on servers or as a client program/cloud. These user solutions primarily support the control (administration) of the MFD within the user's IT infrastructure, map electronic process workflows or secure the use of the MFD and the information generated with the help of these solutions.

c) Cloud-based user solutions

There is a trend towards migrating more and more applications to the cloud. They enable more optimized mapping of print and scan management processes and the delivery of wider functionalities to users.

Cloud-based management solutions do not require the customer to have their own IT infrastructure[3]. External service providers provide all the IT resources required to process data and information.

Ensuring the required flexibility and productivity, they also provide a variety of solutions for employees who commonly work from different locations. These services range from simple configuration, management and analysis of the print environment to the provision of a wide range of solutions (see the Functions section). These types of management solutions offer scalability that can be flexibly adapted to the respective customer requirements. A basic distinction is made between the public and private variants of the cloud.

IT security must also be taken into account for cloud-based management solutions. It is advisable to conduct a thorough review of the current legal or operational requirements for communication with a cloud and the storage location of the shared data. The data protection requirements in accordance with the EU GDPR and BSI security recommendations should be met at minimum.

The former means in particular that the data must be stored and retained on servers within the European Union or third countries with an adequacy decision[4]. Limiting the storage location to Germany may lead to a restriction of the market.

Moreover, the tendering body is at liberty to instruct the respective provider to describe in the response how it guarantees IT security in the cloud-based management solution. The evaluation criterion is particularly suitable for distinguishing between different bids, without restricting the number of bids. Given the rapid evolution of the market, it is essential to find out exactly which solutions are available before organizing a tender. The functionalities listed below – which do not claim to be exhaustive – are intended to provide an indication of how to ensure that a tender includes product-neutral wordings of requirements for the necessary cloud management solution.

Functions of cloud-based management solutions:

2   Cf. the Glossary for more detailed information on administration tools.
3   This applies to public clouds, but not to individual private clouds.
4   A list of third countries with an adequacy decision can be found ↗ here.

- **Fleet management/administration:** includes the option of remote administration, configuration of printing systems, firmware updates, and other functions.
- **Print management:** Provision of printing from any device (e.g. notebooks, smartphones). Collection or management of print jobs at the print system/MFD by authentication of the authorized user or, for example, via a guest print function. Management of print jobs directly in/via the cloud or in a hybrid setting, whereby only the print job credentials are managed in the cloud and the print jobs remain in the customer's infrastructure.
- **Scan to the cloud:** Provides the ability to digitally capture analogue documents (e.g. paper documents) and store them directly in a central, secure, cloud-based storage location, ensuring access from different locations and by different users.

d) Fleet management applications

Functions and services are required that can be used with the help of one or more applications in order to fully guarantee operation and administration of the device fleet. These tools are offered both as "on premises" solutions, that is, installation of the application within the customer's infrastructure, and as cloud-based web solutions.

It is advisable to provide detailed descriptions of the desired functions according to your specifications, as there are sometimes overlaps in the functions and in the understanding of the terminology. (E.g.: Automatic consumables supply or configuration of devices instead of fleet management) Some common functions are described here as examples.

One area of these software applications is primarily concerned with recording data and information on the installed printers and MFD for the purpose of providing the necessary consumables and maintenance materials in good time, as well as ensuring proactive maintenance and servicing of the devices, connection to asset or other databases, and options for automatic invoicing.

Function	Description
Consumables and wear material	- Continuous monitoring of installed devices for the status of consumables and maintenance materials - Automated management and control of the supply chain for consumables and maintenance materials - Basis for estimating possible future requirements for consumables and maintenance materials
Connection to databases	Integration/connection to databases (e.g. asset database) for the purpose of collecting statistical data and processing it into the required information.
Fault messages	Monitoring of fault messages and automatic processes for troubleshooting
Invoicing	Provision of necessary data and information for the purpose of invoicing

Device administration

Administration of printers and multifunctional devices in the network must also be possible. In addition to the device's own web interface, manufacturers provide central applications for this

purpose. They enable the responsible operator to configure and secure several devices simultaneously and to distribute firmware updates.

As a rule, cross-vendor applications cannot fully access all settings and information on the devices. You should therefore check the required functions in advance in order to be offered suitable applications.

Function	Description
Device configuration	Adjustment of the settings on one or more devices. (e.g. passwords, technical settings, host names, etc.)
Firmware updates	Central firmware updates on one or more devices via the network
Certificate management	Applications for and updating of certificates on one or more devices
Grouping devices	Combine devices into groups, e.g. by model or location, for clear administration
Warning messages	Generate warning messages, e.g. for proactive support in the event of error messages or low consumables levels
Reports	Generation of individual reports, e.g. on the utilization of the device fleet or for safety audits
User and role administration	Authorization management for users

2.3 Printing technologies

> (!) All printing technologies (laser, ink and gel) can produce document-quality printouts.

2.4 Commercial models of procurement

Procurement can take place via rental, purchase, leasing or a combination (e.g. rental of hardware, purchase of consumables). Which approach the procuring authority chooses depends not least on whether a one-time budget or one extending over several years is available. As a rule, the decision in favor of one of these models must be made in advance of the procurement measure as part of a profitability analysis. The total costs for a printer or MFD, including costs for associated maintenance parts and consumables, can also be calculated on the basis of printed pages (cf. also the calculation model in 10.2). This comes into play when the consumables and maintenance parts are purchased separately in order to make the offers comparable.

This should not be confused with billing per page. Here it is necessary for the procuring authority to define which services are to be included in the page price (e.g. supply of consumables, service and maintenance of the systems). It is important to note that the scanning volume should also be included in this model, especially if the devices are used primarily to digitize printed information. This avoids risk premiums among bidders.

The following table shows the possible commercial models of procurement that are currently available on the market. It is important to bear in mind that not every potential bidder can offer all commercial models. Accordingly, you place inquiries with your potential bidders as part of a market survey.

	Commercial models			
	Purchase	**Purchase and consumption (mixed model)**	**Financing (rent/leasing)**	**Consumption-based billing**
Hardware	Purchase	Purchase	Rent or leasing	Billing by page or cartridge ("all-in")
Consumables and wear parts	Purchase	Billing by page or cartridge	Billing by page or cartridge	
Services (e.g. repair, maintenance, software maintenance)	Commissioning	Includes services	Includes services	
Hardware ownership	Procuring authority	Procuring authority	Contractor	Contractor

Tabelle 1: Commercial models of procurement

The number of multifunctional devices and printers and the number of printed pages are falling as digitization progresses. Companies are responding to this market trend by developing new commercial models (e.g. Print-as-a-Service, Software-as-a-Service). We recommend that you obtain information about the current possibilities from potential bidders as part of the market survey.

Turnover tax is another criterion for selecting the procurement model. Refer to the Glossary for more information in this regard.

3 Performance classes as a reflection of use cases

As a first step, this Guideline recommends determining the need for printers and MFD based on different performance classes. The performance classes primarily correspond to the use cases and the intended deployment of the devices by the user. The use cases for public clients do not differ significantly from the use cases in corporate settings. In this respect, there is a wide range of devices available on the free market.

Based on the use cases, this Guideline roughly distinguishes between the following performance classes:

- **Workstation devices,** primarily for individual offices and smaller print volumes,
- **Workgroup devices,** primarily for groups/departments and medium print volumes,
- **Departmental devices,** primarily for entire departments and high print volumes.

In reality, the transitions between the individual performance classes are fluid. This is taken into account in the following table showing the most important delimitation criteria for the performance classes, in particular due to overlaps in the print volume.

	Workstation device	Workgroup device	Departmental device	Remarks/explanations
Recommended print and copying volume per month	500 – 5000 pages	2000 – 20,000 pages	5000 – 50,000 pages	Typical print jobs are found in the middle of the described volumes
Design character	Usually desktop device and A4	Desktop or floor-standing device	Usually floor-standing device	
Paper stock	At least 250 sheets	At least 1000 sheets	At least 1500 sheets	
Size of the RAM	256 MB	512 MB	1 GB	The size of the RAM alone does not indicate the device's performance or range of functions. ❗
Paper output capacity – standard tray	100 sheets	200 sheets	250 or more sheets	Data based on grammages of 80 g/m²

Tabelle 2: Guide values for the performance classes

4 Criteria and requirements for all performance classes

The tendering authority must use general characteristics to describe the procurement item to enable a comparison between the bids received in response. This Guideline lists various criteria in tabular form that are suitable as parameters for the description of the procurement items. Technical requirements are assigned to the criteria in order to make these parameters assessable and comparable. Another column indicates whether the requirements are suitable as minimum requirements. Minimum requirements add up to an expected standard for printers and MFD according to the current state of the art, is achieved by all newer devices currently available on the market and should not be undercut. The last column (Remarks/Explanations) contains additional information and clarification on the technical requirements.

In addition to the minimum requirements recommended here, further requirements can be formulated as part of the[5] evaluation criteria. The contracting authority may also define further criteria and additional requirements in the tender documents if it has special requirements for the procurement item.

The criteria and requirements listed in this Chapter 4 refer to functions and properties that apply to all performance classes.

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5   In this Guideline, evaluation criteria are defined as those award criteria that meet specific functional or performance requirements. The procuring authority can always include an evaluation criterion in its performance specifications if the tendered product is to deliver special services in certain areas or is intended for special purposes.

4.1 Printing

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**First page DIN A4 in the output tray from print standby mode**	▪ Max. 15 seconds	Minimum requirement	Value varies considerably depending on the printing technology. Values of less than 10 seconds are also possible.
2	**Print resolution**	▪ At least 600 x 600 dpi physical	Minimum requirement	Higher resolutionscan be requested as an option.
3	**Duplex printing**	▪ Automatic	Minimum requirement	
4	**Universal feeder**	▪ Universal feeder is offered	Minimum requirement	
5	**Document-quality prints**	▪ Verifiable ability to produce originals, copies and certified copies of notarial deeds and other documents in accordance with the Service Regulations for Notaries (DONot)	Minimum requirement	Document-quality prints can be guaranteed with laser and ink technologies. Proof is provided by a PTS certificate or comparable certificate. The unit consisting of printer, toner or ink (both black and colour) and paper is tested and certified
6	**Printer command language**	▪ At least PCL 5 or PCL 6 or PostScript compatible	Minimum requirement	The standard is now PCL 6; PCL 5 is increasingly no longer supported

Tabelle 3: Criteria and requirements in regard to printing and copying

4.2 Copying and scanning (multifunctional devices)

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Scan resolution: monochrome**	▪ At least 600 x 600 dpi optical possible	Minimum requirement	Higher resolutions can be requested as an option. High resolutions generate exponentially increasing amounts of data during use. A configuration of 300 x 300 dpi is recommended for operation. If you require the scanning speed data according to ISO standard 17991, the comparability of the bids may not be ensured, as the standard requirement is that manufacturers must use their own default settings during measurement. However, these default settings differ from manufacturer to manufacturer. The standard only specifies how measurements must be performed (additional explanations in the Glossary)

No.	Criterion	Requirements	Suitable as	Remarks/explanations
2	Scan resolution: colour	• At least 300 x 300 dpi optical possible • External colour depth 24 bit, 8 bit for grayscale	Minimum requirement	Higher resolutions can be requested as an option. High resolutions generate exponentially increasing amounts of data during use. A configuration of 300 x 300 dpi is recommended for operation.
3	Scan formats	• At least PDF, JPG, TIFF	Minimum requirement	TIFF can generate large amounts of uncompressed data
4	Duplex ADF scan	• Automatic	Minimum requirement	
		• Double-sided scanning either in one pass (dual scan) or with turning	Evaluation criterion	A duplex scan can be technically implemented with an automatic turning device (RADF) or by scanning on both sides via two scanner bars (DADF). DADF generally produces a higher scanning speed, but may increase the costs and restrict the market.
5	Scan targets	• To file on client (= Scan-to-PC)	Minimum requirement	
		• To network folder (folder)	Minimum requirement	
		• To e-mail	Minimum requirement	
		• To FTP	Evaluation criterion	
		• To USB stick	Evaluation criterion	
		• To document/content management/ archive system • To cloud destinations	Evaluation criterion	See also Paragraph 2.1 "Trends in the procurement of multifunctional devices"
6	Zoom in/ out	• At least 50-200 percent in 1 percent increments	Minimum requirement	Applies to multifunctional devices.
7	Multiple copies	• More than 99 copies	Evaluation criterion	Applies to multifunctional devices.

Tabelle 4: Criteria and requirements in regard to scanning

4.3 Media

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Print media**	▪ Plain paper	Minimum requirement	According to DIN EN 12281
		▪ Recycled paper	Minimum requirement	According to DIN EN 12281
		▪ Transparent film	Evaluation criterion	Must be suitable for the respective printing technology.
		▪ Envelopes	Evaluation criterion	
		▪ Labels	Evaluation criterion	
2	**Formats**	▪ DIN A4 ▪ DIN A5	Minimum requirement	
		▪ DIN A3	Evaluation criterion	
		▪ DIN A6 ▪ DIN B5 ▪ DIN C6	Evaluation criterion	
3	**Grammage for printing**	▪ Universal feeder min. 70 – 160 g/sqm	Minimum requirement	
		▪ Paper cassette min. 70 – 90 g/sqm	Minimum requirement	
4	**Grammage for scanning**	▪ ADF min. 70 – 95 g/sqm	Minimum requirement	Applies to multifunctional devices.

Tabelle 5: Criteria and requirements in regard to media for copying, printing and scanning

4.4 Interfaces

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**USB for client**	▪ At least USB 2.0	Minimum requirement	A USB port with a higher version number generally enables higher transfer speeds. Nevertheless, this is not decisive for a USB connection.
2	**USB for sticks**	▪ At least USB 2.0	Minimum requirement	Usability of different USB sticks depending on the formatting of the USB stick.
3	**Network connection**	▪ RJ 45 Ethernet 10/100	Minimum requirement	Currently and in future also available as RJ 45 Ethernet 10/100/1000.
4	**Modem**	▪ RJ 11	Evaluation criterion	Must be declared as a minimum requirement if fax functionality is requested
		▪ RJ 11 and RJ 45 separated	Minimum requirement	Separate connections increase security

No.	Criterion	Requirements	Suitable as	Remarks/explanations
5	Wireless connections	▪ Wi-Fi infrastructure (according to IEEE 802.11 n/ac/ax)	Evaluation criterion	
		▪ Direct Wi-Fi access to the MFD (according to IEEE 802.11 n/ac/ax)	Evaluation criterion	Security note: Disconnection from the network may be necessary, depending on internal requirements.
		▪ Bluetooth	Evaluation criterion	Market restriction possible €
		▪ Near Field Communication NFC	Evaluation criterion	Market restriction possible €

Tabelle 6: Criteria and requirements in regard to interfaces

4.5 Display

Displays are available for the devices recommended in this Guideline.

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	Display	▪ Colour display	Minimum requirement	There may also be bids without a colour display in the lower price segment.
2	Operation	▪ Touch functionality	Minimum requirement	Applies to multifunctional devices.
3	Language	▪ Multilingual (at least DE, EN)	Minimum requirement	

Tabelle 7: Criteria and requirements in regard to the display

4.6 Accessibility

The procurement of accessible hardware and software is always necessary when people with disabilities are employed. The general requirements for accessibility are enshrined in law in Section 4 of the Disability Equality Act (BGG, s: https://www.gesetze-im-internet.de/bgg/BJNR146800002.html). There are also other relevant standards and regulations, such as Part 1 of the Barrier-free Information Technology Ordinance BITV 2.0 (https://www.gesetze-im-internet.de/bitv_2_0/ BJNR184300011.html).

When preparing the performance specifications for the procurement of printers and MFD, the accessibility criteria for people with disabilities must be taken into account, except in factually justified exceptional cases (Section 121 (2), 1 GMB, old version). In this regard, particular attention must be paid to ensuring that the requirements are geared towards user needs and are also technology-neutral and open to innovation. The following example is intended to illustrate this aspect using an MFD:

Visually impaired employees may also need to use the MFD. According to the tender, the MFD must be equipped with a touchscreen for control purposes. Control of the touchscreen requires visual acuity. However, it must also be possible to control the MFD without visual acuity in order to meet the user needs of visually impaired employees. The procuring authority should not dictate how the control system is technically implemented for persons without visual acuity. This is because the specification of a particular technology would exclude other technologies and innovations. In the present case, user needs could be met, for example, by control via an audio user interface or by control via the touchscreen with haptic operating elements.

The European Commission instructed the European standardization organizations CEN, CENELEC and ETSI to create a standard (Mandate 376) in order to harmonize the accessibility requirements for the procurement of information and communication technology products and services by the public sector in Europe. This led to the issue of the European Standard EN 301549.

Further accessibility requirements must be taken into account due to the increasing use of advanced web-based software applications (e.g. cloud applications). The accessibility requirements are defined here by the guideline for accessible web content / - ↗ Web Content Accessibility Guidelines (WCAG). The current version is WCAG 2.1.

This European standard was implemented with DIN EN 301549:2015-11 ("Accessibility requirements for public procurement of ICT products and services in Europe (Recognition of the English version EN 301549 as a German standard"). In accordance with Section 31 (2) No. 1 VgV, this allows a reference to DIN EN 301549:2015-11, or equivalent standards such as the US ICT accessibility standard US Section 508, to be made in the performance specifications in order to adequately consider in the award procedure the user needs of people with disabilities.

> **!** Proof should be provided by the contractor in the form of a self-declaration. Templates for (self)-declaration of conformity with EN 301 549 are provided in Table C.4 of the Technical Report CEN/CLC/ETSI TR 101 552.

Certificates cannot be requested as proof, as a suitable certification option does not currently exist.

The following table categorizes and explains different aids for overcoming barriers or impairments:

Aids for ...	
Seeing	Enables a wide range of people to see, including people with visual impairments such as blindness, impaired vision and colour blindness
Yield and strength	Enables access and reduces the effort required to operate a device
Language, cognitive aspect and learning	Helps users by simplifying and streamlining tasks and making user interactions more intuitive and easier to understand

Aids for …	
Fine motor skills	Provides a simple alternative for tasks that normally require manual skills
Hearing	Helps users by providing adjustable volume and troubleshooting messages on the control panel

Tabelle 8: Aids for overcoming barriers

The following table classifies the above criteria and aids and shows how configuration settings and/or optional accessories can be used to make devices easier to use as a means of accommodating various user impairments.

Criterion	Requirements	Suitable as	Remarks/explanations
Suitability for people with disabilities	Supports the essential require-ments for the area of application in accordance with DIN EN 301549, US Section 508 or equivalent	Minimum requirement	It is not always necessary for all points of the standard to be complied with in full in order to procure an ITC device. The standard describes various requirements and test methods that may be of differing relevance depending on the specific applica-tion and user needs. As a rule, conformity with the essential requirements of the standard is sought in order to ensure that the products and services are accessi-ble to people with disabilities.
Backlit control panel	Control panel lighting that opti-mizes visibility in poor lighting conditions	Minimum requirement	For all performance classes (relevant for LCD displays, not relevant for colour touchscreens)
Keypad	Touchscreen keypad displayed on the printer control panel when input is required	Evaluation criterion	Suitable for workgroup/depart-mental MFD **€**
Integrated keypad or third-party keypad	Physical keypad for entering commands or BigKeys LX keypad (TAA compliant) for larger keys and greater yield	Evaluation criterion	Only suitable for departmental MFD **€**
Braille overlays	Self-adhesive Braille labels for compartments, keypad, USB port, power switch	Evaluation criterion	Only suitable for workgroup and departmental MFD/may restrict the market **€**
Quick settings/commands for jobs	Saved settings for frequent jobs	Minimum requirement	Only suitable for workgroup and departmental MFD
High contrast and/or brightness mode on the control panel	Adjustable contrast and/or brightness between text and background.	Minimum requirement	Only suitable for workgroup and departmental MFD

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Criterion	Requirements	Suitable as	Remarks/explanations
Invert colours on the control panel	Option to swap the colours used for text and background.	Evaluation criterion	Only suitable for workgroup and departmental MFD €
Zoom screen on the control panel	Enlarging the content on the control panel	Minimum requirement	Only suitable for workgroup and departmental MFD €
Volume button	Button-controlled volume adjustment	Minimum requirement	Only suitable for workgroup and departmental MFD
Gesture-controlled navigation	Operating a device using hand movements	Evaluation criterion	Only suitable for workgroup and departmental MFD €
Optical and/or acoustic signal for ADF	Visual and acoustical signals to indicate feeder readiness	Evaluation criterion	Only suitable for workgroup and departmental MFD €
Extension handle (accessory)	Adjusting the control panel, lifting the document feeder (ADF), adjusting the guides on the ADF, moving paper	Evaluation criterion	Only suitable for workgroup and departmental MFD €
Accessibility wizard (accessories)	Function for voice commands (spoken instructions) and on-screen voice output that reads aloud the content shown on the control panel	Evaluation criterion	Only suitable for workgroup and departmental MFD/may restrict the market €
Remote operation	Clients or mobile devices (e.g. smartphone, tablet) can be used to control the device	Evaluation criterion	Only suitable for workgroup and departmental MFD €
Tiltable display	Display can be tilted	Evaluation criterion	Only suitable for workgroup and departmental MFD €

Tabelle 9: Criteria and requirements for accessibility

Control panel height 101.6 119.4 cm above the floor	Position the printer high enough so that the control panel is between 101.6 and 119.4 cm above the floor. This is considered the ideal position for all users, including wheelchair users
Table edge	If the printer is placed on a table or base cabinet, make sure that it is no more than 30.5 cm away from the edge of the surface so that the control panel can be reached easily
Control panel angle 52˚ − 75˚	Adjust customizable touchscreen control panels by tilting them to an angle of between 52˚ and 75˚. This is considered the ideal position for all users to easily see or reach the control panel

Tabelle 10: Practical tips

4.7 Final document processing

MFD can be equipped with a unit for downstream document processing. This provides automated functionalities that make manual post-processing superfluous, such as punching, stapling or folding. This can save a considerable amount of additional work.

It is essential that employees are trained accordingly in order to use these functionalities. Aside from any setting options on the device itself, particular attention must be paid to the printer driver configuration.

The following criteria are not a Guideline standard. They can be considered optionally.

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	Sorting	▪ Determination of the sheet sequence	Evaluation criterion	
2	Stapling		Evaluation criterion	Market restriction possible (may be available as internal or external accessory option, limited availability for A4 MFD). €
3	Punching	▪ E.g. double, quadruple	Evaluation criterion	Market restriction possible (may be available as internal or external accessory option, limited availability for A4 MFD). €
4	Brochure creation		Evaluation criterion	Market restriction possible (only available for A3 MFD). €
5	Offset	▪ Laterally offset storage in an output tray	Evaluation criterion	
6	Grouping (more than 2)	▪ Several storage trays	Evaluation criterion	Market restriction possible. €
7	Folding	▪ E.g. internal/external multi-folding unit	Evaluation criterion	Only in conjunction with external booklet finisher. Some MFD solutions offer wrap folding for A3.

Tabelle 11: Criteria and requirements for final document processing

4.8 Fax functionalities

Transmission speed is the crucial factor for fax machines. Workstation, workgroup and departmental devices are equipped with a modem with a speed of up to 33,600 bps. If the line quality is poor, the fax machine automatically selects a lower transmission speed at which secure transmission is possible.

No.	Criterion	Requirements	Suitable as
1	Memory	▪ Transmit and receive memory is available	Minimum requirement
2	PC fax	▪ Fax to PC/network possible	Evaluation criterion
3	Marking/ versioning	▪ Fax receipt stamp	Evaluation criterion
4	Transmission protocol	▪ Transmission protocol can be switched on and off	Evaluation criterion
5	Number memory/ address book	▪ Number memory for at least 99 numbers	Evaluation criterion
6	Forwarding	▪ Forwarding to other numbers possible	Evaluation criterion

Tabelle 12: Criteria and requirements in regard to fax functionalities

With methods such as LAN fax via a fax server, the specific requirements of the user must be determined instead.

5 Special criteria and requirements in regard to workplace devices

In addition to the general requirements in all performance classes, the following applies to
workstations:

5.1 Page speed for DIN A4 devices

The output speed of MFD is measured in ipm (images per minute) for both the print and scan functions. For improved comparability, the page throughput must be determined as an averaged ESAT value in accordance with ISO/IEC 24734 for single-sided printing of a DIN A4 document in monochrome mode. This also applies to devices that can handle larger document formats, such as DIN A3. The devices offered are capable of achieving the specified values. The page speeds given in this Guideline apply in the same way to monochrome prints (black and white prints) and to colour prints.

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Printing**	▪ At least 20 ipm for DIN A4 according to ISO/IEC 24734	Minimum requirement	Generally also suitable as an evaluation criterion. The page speed is measured in ipm (= images per minute) in accordance with ISO/IEC 24734.
2	**Scanning (one-sided)**	▪ At least 20 ipm from ADF for DIN A4 (monochrome[6])	Minimum requirement	Generally also suitable as an evaluation criterion.
3	**Scanning (two-sided)**	▪ At least 20 ipm from ADF for DIN A4 (monochrome)	Evaluation criterion	

Tabelle 13: Special criteria and requirements in regard to page speed for DIN A4 devices

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6   Measurements are taken in the "monochrome" setting

5.2 Page speed for DIN A3 devices

The following parameters for page speed must be met if MFD with DIN A3 format are required or approved.

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Printing**	▪ At least 20 ipm for DIN A4 according to the ISO/IEC 24734 standard	Minimum requirement	Generally also suitable as an evaluation criterion. The page speed is measured in ipm (= images per minute) in accordance with ISO/IEC 24734. A4 is also used to measure the page speed according to ISO/IEC 24734 for A3 devices.
2	**Scanning**	▪ At least 20 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.

Tabelle 14: Special criteria and requirements in regard to page speed for DIN A3 devices

5.3 Paper stock

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Paper stock**	▪ At least 250 sheets DIN A3 or A4	Minimum requirement	

Tabelle 15: Special criteria and requirements in regard to printing and copying

6   Special criteria and requirements in regard to workgroup devices

In addition to the general requirements in all performance classes, the following applies to workgroup devices:

6.1   Page speed for DIN A4 devices

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Printing**	▪ At least 24 ipm for DINA4 according to ISO/IEC 24734	Minimum requirement	Generally also suitable as an evaluation criterion. Requirements apply to monochrome and colour prints. The page speed is measured in ipm (= images per minute) in accordance with ISO/IEC 24734.
2	**Single-sided scanning**	▪ At least 25 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.
3	**Two-sided scanning**	▪ At least 25 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.

Tabelle 16: Special criteria and requirements in regard to workgroup devices: Page speed for DIN A4 devices

6.2   Page speed for DIN A3 devices

The following parameters for page speed must be met if MFD with DIN A3 format are required or approved.

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Printing**	▪ At least 24 ipm for DINA4 according to ISO/ IEC 24734	Minimum requirement	Generally also suitable as an evaluation criterion. Requirements apply to monochrome and colour prints. The page speed is measured in ipm (= images per minute) in accordance with ISO/IEC 24734. A4 is also used to measure the page speed according to ISO/IEC 24734 for A3 devices.
2	**Single-sided scanning**	▪ At least 25 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.
3	**Two-sided scanning**	▪ At least 25 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.

Tabelle 17: Special criteria and requirements in regard to workgroup devices: Page speed for DIN A3 devices

6.3   Paper stock

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Paper stock**	▪ At least 500 sheet standard cassette ▪ At least 500 sheets additional cassette ▪ DIN A3 and A4	Minimum requirement	

Tabelle 18: Special criterion and requirements in regard to workgroup devices: Printing and copying

7 Special criteria and requirements in regard to departmental devices

The following applies to departmental devices in addition to the general requirements in all performance classes:

7.1 Page speed for DIN A4 devices

In addition to the general requirements for printing and copying in all performance classes (cf. Paragraph 4.1 above), the following applies to workgroup devices:

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	Printing	▪ At least 30 ipm for DINA4 according to ISO/IEC 24734 for all devices	Minimum requirement	Generally also suitable as an evaluation criterion. The page speed is measured in ipm (= images per minute) in accordance with ISO/IEC 24734.
2	Single-sided scanning	▪ At least 35 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.
3	Two-sided scanning	▪ At least 35 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.

Tabelle 19: Special criteria and requirements in regard to departmental devices: Page speed for DIN A4 devices

7.2 Page speed for DIN A3 devices

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	Printing	▪ At least 30 ipm for DIN A4 (mono-chrome) according to ISO/IEC 24734	Minimum requirement	Generally also suitable as an evaluation criterion. The page speed is measured in ipm (= images per minute) in accordance with ISO/IEC 24734. A4 is also used to measure the page speed according to ISO/IEC 24734 for A3 devices.
2	Scanning, one-sided	▪ At least 35 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.
3	Scanning, two-sided	▪ At least 35 ipm from ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as an evaluation criterion.

Tabelle 20: Special criteria and requirements in regard to departmental devices: Page speed for DIN A3 devices

7.3   Paper stock

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Paper stock**	• At least 500 sheet standard cassette • Can be retrofitted or optionally upgraded to at least 1,500 sheets total paper stock	Minimum requirement	Applies to DIN A4 and DIN A3 devices

Tabelle 21: Special criterion and requirements for departmental devices: Printing and copying

8 Environmental and health protection

8.1 Legal requirements

Manufacturers of MFD are legally obliged to meet strict requirements even beyond procurement law. Mandatory requirements for environmental compatibility (e.g. environmentally friendly disposal of old devices, ban on certain ingredients for products) result from the following laws and regulations, among others:

- The WEEE Directive (2012/19/EU) transposed into German law by the Electrical and Electronic Equipment Act (ElektroG), which regulates the disposal of products.
- The ROHS Directive (2011/65/EU) transposed into German law by the Electrical and Electronic Equipment Substances Ordinance (ElektroStoffV), which regulates the pollutant content of products.
- The EU Directive 2006/66/EC transposed into German law by the Battery Act (BattG).[7] or EU Battery Ordinance, which came into force on August 17, 2023.
- The substance requirements defined by the REACH Chemicals Regulation (EC/1907/2006) and the POP Regulation (EC/850/2004).

Manufacturers who do not meet these basic legal requirements for the protection of the environment and health as well as the legal requirements for product safety and electromagnetic compatibility are not allowed to place their products on the EU market. The CE mark, for example, indicates conformity with the mandatory legal requirements.

> (!) The statutory regulations on environmental and health protection apply equally to all MFD and printers and therefore do not need to be included in the performance specifications.

> (!) By affixing the CE mark, the manufacturer declares that the product complies with the applicable legal requirements laid down in the Community harmonization legislation providing for its affixing.

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7   An update of the directive was under discussion at European level when this Guideline was published.

8.2   Energy efficiency in public procurement law

Procurement law attaches particular importance to energy efficiency in the procure-ment of technical equipment (Section 67 VgV). If the procuring authority sets require-ments for the energy efficiency of MFD and printers, this must be specified in the performance specifications, if possible with reference to relevant technical standards and specifications (cf. Section 31 (2) VgV).

The question of how proof of compliance with these requirements is to be provided must be separated from the performance specification and the performance and functional requirements contained therein (see Paragraphs 8.4 and 8.5 below)

(Z) In accordance with Section 67 (2) No. 1 VgV, the highest level of energy effi-ciency must be required in the performance specifications for the procure-ment of MFD in the upper threshold range. The requirements of the current ENERGY STAR program for imaging products and the requirements of, for example, the Blue Angel eco-label for office devices with a printing function as amended help to determine the highest level of energy efficiency.

The ENERGY STAR(R) measurement method has become established for measuring the typical power consumption of a multifunctional device. The so-called "TEC" value is then determined. The **"TEC" method** assesses the typical electricity consumption ("**T**ypical **E**lectricity **C**onsumption") of a device in standardized operation over a repre-sentative period of time.[8] The electricity consumption for MFD and printers is stated in **kWh per week**. This measuring method has now been fully adopted by the "Blue Angel" eco-label for all printing technologies and performance classes.

The "Blue Angel" also takes other parameters into account:

- Maximum power consumption in watts in sleep mode,
- Maximum preset times for device power-saving states,
- Maximum return times from power-saving states to print standby.

The average power consumption in the individual operating modes is also determined during award of the "Blue Angel" eco-label.

(!) If the average power consumption is to be used to assess the energy efficiency of devices, the measuring method and the definition of the operating states must be specified by the procuring authority (see Glossary).

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8   The exact requirements for the individual criteria are found in the Basic Award Criteria for these quality marks.

Note on ENERGY STAR®: The **EU-ENERGY STAR program** followed an agreement between the European Community (EU) and the US government to coordinate the energy labelling of office devices. It was managed by the European Commission. The US partner was the Environmental Protection Agency (EPA), which launched the program in the USA in 1992.

The EU-US agreement expired on February 20, 2018.

Since the termination of the agreement, manufacturers are no longer allowed to affix the mark to devices that are only intended for the European market or to use it for advertising purposes. However, a reference to compliance with the criteria is still possible. It is also possible to use the test procedure to determine the TEC value as a means of specifying the electricity consumption per week.

The ENERGY STAR(R) criteria were harmonized with the Blue Angel criteria when the new Blue Angel DE-UZ 219 for office device with a printing function was released in 2021. This enables the demonstration of compliance with the energy criteria of ENERGY STAR(R) with the Blue Angel.

Furthermore, pursuant to Section 67 (2) No. 1 VgV, specific information on energy consumption must be requested in the performance specifications or at another suitable point in the tender documents. The procuring authority has no discretion in this respect (BT-Drs. 18/7318, p. 202). The public procuring authority must take appropriate account of energy costs as an award criterion when determining the most economically advantageous bid, although it has a margin of discretion with regard to the appropriateness of the consideration (loc. cit.). For the award criterion "energy costs", the costs of a printing system should therefore be determined for a complete utilization cycle[9] in order to record and evaluate the expected energy costs (for more details, see 10.1 Energy consumption costs in the utilization cycle).

9   Use during the intended contract period

8.3   Environmental requirements in public procurement law

In addition to energy efficiency, the procuring authority may include other environmental aspects in the performance specifications (Section 31 (3) sentence 1 VgV, Section 23 (2) UVgO). These may also relate to the process or method of production or to the provision of the service or to another stage in the utilization cycle of the procured item, including the production and supply chain. This also applies if such factors are not material components of the service, provided that these features are related to the subject matter of the contract and are proportionate to its value and the procurement objectives (Section 31 (3) sentence 3 VgV, Section 23 (2) UVgO).

Other environmental features for MFD and printers include requirements that are already tested for the award of internationally recognized eco-labels ("Blue Angel" according to DE-UZ 219, ENERGY STAR®, EPEAT IEEE1680.2 2012). These are, in particular, the following environmental criteria, but which are not required in the same way for every eco-label (cf. table under 8.5):

- Recyclable design
- Return of coloured ink modules and containers
- Specification of the ink and toner yield
- Resource-saving paper handling
- Warranty, repair services, availability of spare parts
- Longevity
- Packaging (material and labelling)
- Restriction of substances in materials used in housings and housing parts
- Carrier material substances in printed circuit boards
- Substances in inks
- Substance emissions
- Statement of the content of post-consumer recycled plastic
- Minimum amount of post-consumer recycled plastic
- Noise emissions during the printing process
- Ecological life cycle assessment (LCA)/carbon footprint
- Compliance with key European legislation on substances and materials (RoHS, REACH, EU Battery Directive)
- Environmental management for production and design
- Compliance with social criteria in the manufacture of devices

The most relevant of these requirements are explained below.

8.3.1 Noise emissions

Z Various methods are available for determining the noise emissions of an MFD. The international standard procedure is based on ISO 7779. The German "Blue Angel" eco-label is based on this standard, but has introduced changes with the revision DE UZ 219 that lead to other (generally higher) results. Therefore, there may be different information in brochures and other information from manufacturers, depending on the measurement method on which the information is based.

To assess whether an MFD can be classified as particularly low-noise, only the test values from the eco-labels are currently available. If a device demonstrably complies with the test values, it is a low-noise device. The determined A-weighted guaranteed sound power level (cf. Glossary at the end of this Paragraph 8.4) is compared with a specified test value for this assessment. This test value is usually determined depending on the printing speed of the device. This means that, in regard to certification for an eco-label, a slower device is required to adhere to a lower test value than a faster one.

It is essential to ensure that the measurement method used to determine the values is specified if several devices are to be compared with each other in regard to their noise emissions. If this is not done, there is a risk of comparing "apples with oranges" and, in the worst case, drawing the wrong conclusions.

A comparison should always be based on the Guaranteed A-weighted sound power level, which is specified either in Bel (B) or decibels (dB) with one decimal place.

Criterion	Requirements	Suitable as	Remarks/explanations
Guaranteed A-weighted sound power level according to DE-UZ 219	Compliance with the test value according to Chapter 3.5 of the Basic Award Criteria DE-UZ 219	Minimum requirement	**Determination of the reference value:** **$LWA,lim = 48+14*lg(SM/F+4)dB$** With a side flow rate of SM/F ≤ 10, LWA,lim = 64 dB. SM/F: Print speed in monochrome printing or colour printing

Tabelle 22: Criterion and requirement in regard to noise emissions

The "Blue Angel" eco-label according to **DE-UZ 219** or a manufacturer's declaration and test report in accordance with ISO 7779 can be submitted as proof of compliance with a specified noise level, taking into account the requirements of **DE-UZ 219** ("Blue Angel") from a body accredited according to ISO 17025. Alternatively, a document containing the following information may be submitted:

- Name of the (external or in-house accredited) testing institute
- Proof of accreditation of the testing laboratory according to ISO 17025 for measurements according to ISO 7779
- Signature of the authorized person from the laboratory (e.g. laboratory director)
- Sound power values in decibels (dB).

The test report or document should only be requested prior to award of the contract.

Other noise levels are often mentioned in brochures and other information. These terms are explained in the following Glossary.

8.3.2 Substance emissions

Electronic devices emit volatile organic substances into the indoor air. The release (emission) of such substances is increased by use-related heating, e.g. during printing processes. Depending on the technology used, ozone may also be produced when operating printing devices. These emissions should be kept as low as possible in order to maintain good indoor air quality.

The emission rates of imaging devices are determined in accordance with the international ISO standard ISO/IEC 28360 both in a standby phase of the device and during uninterrupted printing. The measured emission values always apply to the entire system including the consumables (toner/ink) recommended by the manufacturer and the paper used. Compliance with the emission values determined by the manufacturer can no longer be guaranteed if a toner/ink other than that recommended by the manufacturer is used.

Recommended minimum technical requirements:

Requirements for electrophotographic devices

All values in mg/h		Monochrome printing	Colour printing
Standby phase	TVOC	1 (desktop devices) 2 (floor-standing devices, device volume > 250 l)	1 (desktop devices) 2 (floor-standing devices, device volume > 250 l)
Printing phase (Sum of standby + printing phase)	TVOC	10	18
	Benzene	<0.05	<0.05
	Unidentified individual substances VOC	0.9	0.9
	Styrene	1.0	1.8
	Ozone	1.5	3.0
	Dust	4.0	4.0

Tabelle 23: Requirements for electrophotographic devices

Requirements for ink (jet) devices

All values in mg/h		Monochrome printing	Colour printing
Standby phase	TVOC	1 (desktop devices) 2 (floor-standing devices, device volume>250 l)	1 (desktop devices) 2 (floor-standing devices, device volume>250 l)
Printing phase (Sum of standby + printing phase)	TVOC	10	18
	Benzene	<0.05	<0.05
	Styrene	1.0	1.8
	Unidentified individual substances VOC	0.9	0.9

Tabelle 24: Substance emissions: Requirements for ink (jet) devices

Z Devices that have been awarded the "Blue Angel" quality mark in accordance with DE-UZ 219

comply with these requirements. The following applies according to DE-UZ 219:

- the test value PER10 PW [particles/10min] of ≤ $3.0*10^{11}$ has applied since January 1, 2023.
- the test value PER10 PW [particles/10min] of ≤ $2.5*10^{11}$ has applied since January 1, 2025.

€ This means that the requirements for devices will likely become stricter moving forward.

The following documents are considered equivalent proof for this criterion:
Manufacturer's declaration and test report or a document containing the following information:

- Name of the testing laboratory (external or in-house testing institute)
- Proof of the ability to carry out particulate emission measurements in accordance with DE-UZ 219 (the ability of a test laboratory can be found in the "List of certified laboratories for DE-UZ 177, DE-UZ 205 and DE-UZ 219" Signature of the authorized person from the laboratory (e.g. laboratory director)
- Emission rates (PER) for TVOC, benzene, styrene, benzene and dust.

The test report or document should only be requested prior to award of the contract.

8.3.3 Resource conservation and recyclable design

Sustainable product design offers a wide range of options for ensuring and increasing the sustainability of the products offered. The following measures provide opportunities to safeguard and increase the sustainability of products and in doing so ensure an important contribution to resource conservation and waste avoidance in the context of the circular economy:

Product longevity: The use of stable materials (e.g. metal frames as chassis etc.) or durable components ensures the longevity of products and hence extends the service life of devices beyond the usual contract period.

These requirements are taken into account when awarding the Blue Angel or EPEAT eco-labels, so that the corresponding certificates can be used as proof.

Recycling of used products: The remanufacturing of used products in so-called reconditioning programs makes a further contribution to the sustainability of products and hence permits their continued use.

Increased use of PCR substances: To increase product sustainability, the use of recycled substances in the development and production of new products is also becoming increasingly important. The PCR value is the indicator for use of recycled substances in new products. (PCR – Post Consumer Recycle) This value is determined in accordance with the IEEE 1680.2 standard and specified in relation to the respective substance. For example, it can be used to specify the proportion of PCR plastic used in relation to total plastic.
Maintenance: Proper maintenance significantly influences the environmental properties of the devices as well. It should therefore only be carried out by trained or competent persons (e.g. as part of a service contract).

All manufacturers pay attention to durability and reparability when developing their products.

In detail, different methods are applied to achieve the goal of resource conservation.
The various options for ensuring product longevity can be investigated more thoroughly as part of a market survey.

Z The stipulations of the eco-labels listed below (in Sub-section 8.5) describe strict requirements for resource conservation and recyclable design

The exact requirements for the individual criteria are found in the Basic Award Criteria for these quality marks.

The exact requirements for the individual criteria are found in the Basic Award Criteria for these quality marks.

Devices that have been awarded the above quality marks meet these requirements. A manufacturer's declaration should also be accepted as proof.

8.3.4 Material properties and substance-related requirements

Printers and MFD consist of a large number of individual components and different substances. Input into the environment is reduced by excluding certain substances. This makes a significant contribution to environmental and health protection.

€ The requirements of the "Blue Angel" and EPEAT IEEE1680.2 2012 eco-labels (listed under 8.5) define strict requirements for substance properties and the restriction of certain substances, which go far beyond the legal requirements but may lead to increased costs in bids.

The exact requirements for the individual criteria are found in the Basic Award Criteria for these quality marks. Devices that have been awarded the above quality marks meet these requirements.

A manufacturer's declaration should also be accepted as proof.

8.3.5 Take-back systems for devices and consumables

Suppliers of electrical devices on the German market are subject to the German Electrical and Electronic Equipment Act (ElektroG), which implements the EU's Waste Electrical and Electronic Equipment Directive (WEEE). It also regulates the requirements for the return and disposal of electrical devices.

The provider should also be able to offer a free take-back system for consumables (toner, inks) and be able to provide information about the form of reuse or the downstream recycling pathway.

The take-back systems for devices and consumables should be implemented by the supplier with the primary aim of reuse.

8.4   Quality mark for verification

Today, environmental protection is one of the basic requirements for all office devices. By law, manufacturers of electronic products must fulfil mandatory requirements for environmental compatibility (e.g. environmentally friendly disposal of old devices, ban on certain constituents for products, electromagnetic compatibility). Manufacturers who do not meet these basic legal requirements are not allowed to place their products on the EU market.

Z In addition to mandatory device markings such as the CE mark (often mistakenly requested as a certificate/award), a large number of voluntary certifications and awards also exist that highlight special product features or serve as proof of compliance with particular requirements in certain usage environments. Public procuring authorities may require the submission of such evidence in order to facilitate the process of verifying conformity of the bid with the characteristics required in the performance specifications.[10] If the procuring authority requests the submission of a specific quality mark, this must be usable under public procurement law, that is, in particular suitable for proving the characteristics required in the performance specifications (Section 34 (2) VgV). Moreover, alternative quality marks with equivalent performance requirements must also be accepted.

The public procuring authority is entitled assume that testing institutes of the eco-label providers will test and evaluate compliance with the requirements (both those that are enshrined as mandatory in law and stricter ones).

It is important to distinguish between the certificate as possible proof and the actual requirements for the procurement items. In a tender, the requirements must be formulated in a binding and concrete manner, and not only environmental quality labels, but also manufacturer declarations should be recognized as proof of compliance with these criteria, provided that they can be suitably substantiated, e.g. by test and inspection reports or compliance with international standards. This is particularly important if the products offered are new or not yet on the market at the time of the tender. Performing the tests and preparing the test protocols is a lengthy process, as is applying for the quality mark. For this reason, the approval of self-declarations as proof of compliance with the relevant requirements should also be considered, potentially in conjunction with supplementary verification by independent testing institutes or eco-labels after the contract has been awarded.

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10   Cf. section 34 (1) VgV and Art. 43 (1) of Directive 2014/24/EU

€ Depending on the choice of an eco-label as proof and/or for the formulation of environmental requirements, certain devices or suppliers might be excluded from competition, which would result in a corresponding narrowing of the market.

The quality marks and their areas of application for multifunctional systems that are relevant for certain requirements are listed hereinafter. The procuring authority must make a case-by-case decision on which of these verifications are necessary in the respective area of application.

! It is important to note that in all test procedures on which a certificate is based, the respective overall system is tested, consisting of the (basic) device and the consumables (toner/ink and paper) recommended or supported by the manufacturer. The results are not transferable if the device is to be operated with consumables other than those recommended by the manufacturer.

If the procuring authority requires quality marks as proof, they must fulfil certain criteria in accordance with Section 34 VgV.

! Not all "quality marks" meet the legal requirements. Before a specific quality mark is required as proof, an assessment in accordance with Section 34 VgV must also be carried out in advance.
Many private quality marks, for example, do not meet the requirements of Section 34 (2) No. 3 VgV: Development as part of an open and transparent process in which all interested parties can participate.
The quality marks listed in the following table fulfil the requirements of Section 34 VgV.

! It is important to note that the use of original toner or ink is required for the validity of the "Blue Angel" or other certificates
(e.g. PTS), as the entire system including consumables is always assessed.

Quality marks	Content and scope of application	Recommended area of application	Proof by
GS symbol («Geprüfte Sicherheit", tested safety)	Proof of conformity with product safety, the Product Safety Act (ProdSG) and the applicable ergonomic requirements	General	Certificate from a GS test centre recognized by the Central Office of the Federal States for Safety Engineering (ZLS)
Blue Angel DE-UZ 219	The Blue Angel is a quality mark that recognizes products that are particularly environmentally friendly. For all products that meet the criteria of the label, permission to use the environmental label for the respective product can be granted by RAL gGmbH upon application, which is then based on a label usage agreement. The Award Criteria for multifunctional devices can be found here: https://www.blauer-engel.de/de/zertifizierung/vergabekriterien The requirements cover the entire utilization cycle of the product, from environmentally friendly design and socially responsible production to the recycling of devices and consumables. All criteria must be met in order to be entitled to use the mark.	General	Blue Angel certificate or link to the database www.Blauer-Engel.de Alternatively, individual criteria can be verified via manufacturer declarations (e.g. IT EcoDeclaration) and test reports.
EPEAT:	EPEAT is a global ecolabel for the IT industry (administered by the Global Electronics Council, GEC, in the USA). Like with the Blue Angel, requirements are placed on the design of the products and even recycling. A distinction is made between mandatory and optional criteria. EPEAT distinguishes between Bronze, Silver and Gold levels, depending on how many of the optional criteria are met.	General	Link to the EPEAT database: Imaging Equipment Searching | EPEAT Registry
ENERGY STAR®	ENERGY STAR® is a voluntary program by the US Environmental Protection Agency (EPA) to evaluate the energy efficiency of a product.	General	ENERGY STAR® products are certified by independent certification bodies and listed in the ENERGY STAR® database (https://www.energystar.gov/productfinder/). The eco-label itself should no longer be required in EU tenders after expiry of the EU Energy Star program in 2018. The Blue Angel certificate can also be used to demonstrate compliance with ENERGY STAR® following harmonization of the Blue Angel criteria with those of ENERGY STAR®. Alternatively, manufacturer declarations or test reports can be used as proof of the energy efficiency criteria.

Quality marks	Content and scope of application	Recommended area of application	Proof by
Suitability for the production of originals, copies and certified copies of notarial deeds and other documents in accordance with the Service Regulations for Notaries (DONot)	Proof of document authenticity for the entire multifunctional device system	Preparation of deeds, contracts and contract-like documents	Certificate from the Paper Technology Foundation ("PTS test certificate")

Tabelle 25: Voluntary quality marks for verification

The table in the Appendix lists the criteria that are assessed for the eco-labels available in Europe. There may therefore be deviations in the measurement methodology.

8.5 Notes on the sustainable procurement of consumables

Public authorities have a variety of options when deciding which printer accessories to buy: new printer accessories from an original equipment manufacturer (OEM), remanufactured cartridges and cartridges, refilled or rebuilt printer accessories. The characteristics, performance and environmental impact of these products can vary greatly – not only between categories, but also within the same category. Public procurement officers should be aware of what they are buying and the potential impact of their purchasing decisions. The Austrian Electrical and Electronic Manufacturers' Association (FEEI) has published a white paper entitled "Guidelines for sustainable public procurement in Austria – using the example of printer accessories". The guidelines define various criteria for sustainable public procurement.[11]

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11   Cf: ↗ http://www.feei.at/aktuelles/news/white-paper-zur-nachhaltigen-offentlichen-beschaffung-in-osterreich

This includes, among other things:

- Legal criteria (CE marking, liability for material defects, etc.)
- Environmental criteria (indoor air quality, material safety data sheet (MSDS), return of ink and toner cartridges, etc.)
- Social criteria/labour criteria (ILO standards, conflict minerals, etc.)
- Participation of bidders from third countries
- Quality-oriented procurement

The Blue Angel can also demonstrate compliance with the requirements for the sustainable design of consumables. It is important to note that the DE-UZ 219 mark for office devices with a printing function also includes all requirements for the consumables recommended by the manufacturer. This includes, for example, specifications for the housing plastics used or the exclusion of hazardous substances in the toner or ink.

A special mark has been developed for remanufactured toner modules: DE-UZ 177. The toner modules must meet the same criteria as the original material in addition to special requirements for the remanufacturing process. The manufacturer of these remanufactured modules must also be able to demonstrate that the cartridges have no adverse effect on the emission characteristics of the devices for which they are intended.

> The DE-UZ 177 mark applies exclusively to remanufactured toner modules and, since July 2021, also to remanufactured ink modules (as of May 2024, however, there is not a single holder of the mark). It does not apply to replicas of original cartridges. There is currently no valid eco-label for replicas, which makes it difficult to check compliance with sustainability criteria.
> Original modules are exclusively labelled with the main DE-UZ 219 mark[12].

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12 You can find a list of all mark holders here: Blue Angel, environmentally friendly, printers, multifunctional devices, low energy consumption, low-emission and low-noise, durable | Blue Angel (blauer-engel.de)

9   IT security

Printers and MFD can be the target of cyber attacks, data theft and data misuse and not only computers and servers. Attacks of this kind jeopardize the confidentiality of the data processed with the MFD as well as the functionality of the devices themselves. Taking appropriate precautions can specifically improve network, device and data security. Modern printers and MFD can be equipped ex works with integrated security functions. The use of trustworthy firmware is therefore an important prerequisite to ensure the security of the operating system (firmware) of printers, multifunctional printers and their embedded solutions. This can be ensured by implementing various protective measures, such as firmware encryption, the use of digital signatures and other security measures. Broadly speaking, the market offers a wide range of security functions. Their activation and use are recommended, especially if personal data is processed (cf. Art. 25 and 32 of the GDPR ↗ General Data Protection Regulation). Ultimately, however, the data protection and data security of MFD can only be achieved through a combination of organizational measures, due diligence on the part of the device user and security functions inherent to the device.

There is currently no minimum standard for the IT security of scanning, printing or multifunctional systems, but there are minimum standards for communication via mobile end devices and the internet as well as corresponding interface controls.

As functions to increase IT security are not among the standard requirements of all MFD, they are generally only offered at the specific request of the procuring authority. Equipping a device with appropriate precautions also impacts the bid price. The procuring authority should therefore formulate its requirements in this area very carefully on the basis of a comprehensive analysis of the data to be processed and the corresponding protection requirements[13].

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13   Due to the high and increasingly important demands placed on the IT security of MFD and the technical complexity of the necessary measures, Bitkom's Printing Solution Services working group has prepared its own guideline on the security of printing systems. They describe in detail specific threat scenarios for the IT security of multifunctional devices, the resulting requirements and potential protective measures in regard to content and technology. This Guideline, as well as the guideline for product-neutral tenders, are published on the https://www.itk-beschaffung.de/ website.

No.	Criterion	Requirements	Suitable as	Remarks/explanations
1	**Local user authentication**	▪ Device must provide the technical requirements for authentication	Minimum requirement	Authentication on the device itself, e.g. via PIN, smart card, predefined key combinations, etc.
		▪ Adjustability of time-outs (automatic logout)	Minimum requirement	
		▪ Configurability of the timeout (when, how long)	Evaluation criterion	
		▪ Compulsion to change the factory default passwords	Evaluation criterion	The password guideline applies if the password is changed, provided they are implemented in the device.
2	**User network authentication**	▪ It must be possible to restrict network access to the MFD	Minimum requirement	Functions that are used via the network depend on authentication during network login, e.g. via password, Active Directory integration, PIN
3	**Confidential printing**	▪ Print output only when the user is present	Minimum requirement	E.g. by assigning a PIN code to print jobs or through user authentication
4	**Confidential fax receipt**	▪ Fax output not at any time and immediately	Evaluation criterion	E.g. for pull printing, timed control of fax output, forwarding to e-mail
5	**Audiovisual hints**	▪ An acoustic signal is emitted to indicate incorrect entries during authentication attempts on the printing system.	Evaluation criterion	The purpose is to warn the environment in the event of attempted misuse during authentication
6	**Job logging**	▪ It must be possible to restrict access to job logging	Minimum requirement	Users must authenticate themselves in order to view job logs
7	**Interface protection**	▪ Deactivation of individual connections/ accesses	Minimum requirement	
8	**Deactivation of network protocols**	▪ Individual deactivation of all unused network protocols	Minimum requirement	Deactivating the http or https protocol is equivalent to deactivating the built-in web server. It must then be possible to make configurations either on the device or via another network protocol.
9	**Password protection**	▪ Support for password policies	Evaluation criterion	Possibility to define certain security requirements for the creation of passwords
10	**Automatic delete function**[14]	▪ Once the print job has been completed, print data and files must be automatically deleted securely (not recoverable)	Minimum requirement	Criterion can only be applied to magnetic hard disks (HDD) (see Glossary)
11	**Data carrier encryption**	▪ Standard 256-bit encryption of data carriers	Minimum requirement	Recommendation according to AES 256 or BSI TR-02102-1
12	**Storage time of a print job**	▪ Time-controlled deletion of print jobs	Evaluation criterion	Generally relevant for workgroup and departmental devices
13	**Removability of mass storage**	▪ It must be possible to remove mass storage devices without causing their destruction	Minimum requirement	If a hard disk is installed as mass storage, it must be removable. Applies primarily to workgroup and departmental MFD with enhanced security requirements. €️

14   Further deletion recommendations published by the BSI are found here: ↗ CON.6 Delete and destroy (bund.de)

No.	Criterion	Requirements	Suitable as	Remarks/explanations
14	**Importability of security updates**	• Printer must provide the option of updating firmware • Rejection of unsigned updates	Minimum requirement	
15	**Provision of security updates**	• Short-term provision of firmware updates when security vulnerabilities become known • Manufacturer signing of updates	Minimum requirement	The period in which security updates will be provided should be contractually agreed.
16	**Authentication of authorized users**	• Limited number of failed log-in attempts	Minimum requirement	The limitation should apply to all network protocols ("log-in paths").
		• Division of user rights into administrator and user roles	Minimum requirement	Division can also be even finer
17	**Transport encryption**	• Transport encryption of the print data • Transport encryption of configuration access (e.g. web server)	Minimum requirement	

Tabelle 26: IT security criteria and requirements

(Z) To date, proof of IT security requirements in the form of certificates has not been common practice for MFD. At present, there are also no cross-vendor certification options on the market that systematically cover the special requirements of public administration for the IT security of MFD.

10　Award criteria

The contract must be awarded to the most commercially beneficial bid in accordance with Section 127 of the Act against Restraints of Competition (GWB). The most commercially beneficial bid is determined on the basis of the best price-performance ratio. In addition to price or costs, qualitative, environmental or social award criteria can also be taken into account. Energy efficiency must be given appropriate consideration as an award criterion in the case of delivery services that are relevant to energy consumption, Section 67 (5) VgV.

The performance requirements can be formulated within the framework of award criteria with minimum technical requirements or as part of evaluation criteria. It is at the discretion of the procuring authority to decide on which category individual performance characteristics should be assigned to. In general, criteria specify minimum requirements that are essential for the intended use of a device. Where this Guideline recommends minimum requirements for the devices, this is indicated in the criteria tables with "Minimum requirement". If the criteria or requirements are marked with "Evaluation criterion", the Guideline recommends using these requirements only in the context of evaluation criteria.

Using evaluation criteria to formulate the performance requirements can give competitors a particular leeway within which a nuanced consideration of the services offered is enabled within the scope of the evaluation. This allows the individual characteristics of competitors' services to be taken into account, which is beneficial for ensuring broad competition. When formulating the performance requirements, attention should be paid to the presentation of a detailed, comprehensible and objectively assessable expectation or assessment horizon.

The increased or even exclusive use of minimum technical requirements in the performance specifications comes with the risk of unintentionally restricting competition.

The Guideline recommends the use of evaluation criteria in order to promote the broadest possible competition (see also UfAB 2018[15]).

10.1　Energy consumption costs in the utilization cycle

Th expected energy costs must also be logged and evaluated to determine[16] the costs of a printing system for a complete utilization cycle. Two variants are available for this purpose:

1. Determination on the basis of the TEC value in accordance with "ENERGY STAR®" / "Blue Angel",

2. Calculation based on power consumption in different operating modes.

15　↗ CIO Federal Government – UfAB
16　Use during the intended contract period

Variant 1: Calculation according to the TEC value

The TEC value[17], which is also used as the basis for the "Blue Angel" quality mark, refers to the electricity consumption per week under comparable usage, assuming comparable use cases. Energy costs for a complete utilization cycle are calculated according to the following formula:

Electricity costs per kWh [EUR/kWh] * TEC [kWh/week] * planned service life [weeks] = energy costs for a complete utilization cycle.

> **(!)** A comparison of energy efficiency on the basis of a typical electricity consumption value should only be made when comparing devices with the same printing speed. This is based on the fact that the calculation of a TEC value is based on a daily print volume that depends on the page speed.

Difference in determining the TEC value according to ENERGY STAR 2.0 and ENERGY STAR 3.0/Blue Angel DE-UZ 219.

The method currently used by ENERGY STAR to determine the TEC value differs when calculating weekly electricity consumption. It now takes into account that the power consumption during the time when the device is not printing accounts for a significant proportion of its total power consumption. In everyday use, the devices are in energy-saving mode or sleep mode most of the time. This fact has now been considered in the calculation of the TEC value, so that with the introduction of ENERGY STAR 3.0, significantly lower TEC values are specified than before. ENERGY STAR(R) 3.2. has been released in the meantime. However, its changes do not relate to standard multifunctional devices, but to devices used in production printing. The measurement and calculation method defined in ENERGY STAR 3.0 remains valid. This means that TEC value specifications in accordance with ENERGY STAR 3.0 are also currently valid.

IMPORTANT: When comparing two TEC values, the method used to determine them should always be indicated. The values are only comparable if the same method was used.

Production printing presses represent an exception: here the TEC value is still determined using the previous method.

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17   Corresponds to the "typical electricity consumption value" (TSV value) in Germany

Example for illustrative purposes:

MFD page speed	Print pages per day according to ENERGY STAR/"Blue Angel"	Assumed number of print jobs per day according to ENERGY STAR/"Blue Angel"	Consequent print time per day (= dwell time in print mode)
20 pages/minutes	200 pages	20	10 minutes
30 pages/minutes	450 pages	30	15 minutes
45 pages/minutes	992 pages	32	22.04 minutes
50 pages/minutes	1248 pages	32	24.96 minutes
65 pages/minutes	2112 pages	32	32.5 minutes

Table 27: Model calculation 1: Energy consumption costs in the utilization cycle

Variant 2: Calculation based on power consumption in different operating modes

An alternative method can also be used if the planned print volume deviates significantly from the print volume typified by the TEC value (cf. table above), and if devices with different print speeds are to be compared. It draws on power measurement in various operating modes in conjunction with the associated dwell times. To ensure that devices from different suppliers can be compared, the procuring authority must specify various parameters for the calculation. This would require collection of the following parameters:

- Power consumption in the different operating states in watts
- Dwell time in minutes in the respective operating states (according to the definitions in the ENERGY STAR program) according to the provider's setting (factory setting)[18]
- Print volume in pages per month (specified by the procuring authority)
- Print speed according to DIN ISO 24734
- Scope and number of print jobs per day (specified by the procuring authority)
- Specification of switch-off times (mains switch off) per week.

18   The use cases are described in the ENERGY STAR test method: ENERGY STAR Program Requirements for Imaging Equipment
     - Test Method for Determining Imaging Equipment Energy Use, Table 11.

The following example is intended to illustrate data collection and calculation in the event of a significant deviation of the actual use case from the assumed use case of the TEC method. The coloured backgrounds have the following meaning:

- Orange information must be determined or specified by the procuring authority;
- White information refers to technical characteristics of the device that must be stated by the provider;
- Blue cells blue are calculated from the information provided by the procuring authority and bidder.

	Parameters	Where does the value come from?	Example device with 4 operating modes (print mode, print standby, sleep mode, off mode)
Utilization scenario	Print volume/week per device	Procuring authority must determine and specify	500
	Print speed ipm according to ISO/IEC 24734	According to the provider	40
	Average number of pages per print job [images per job]	Procuring authority must determine and specify	5
	Number of print jobs per week	Calculation basis: [print volume/week] / [images per job]	100
	Preset time for switching to sleep mode after printing [min] = Dwell time in print standby after a print	According to the provider in the factory setting (= preset time /Default Delay time to sleep)	1
	Off (h/week)	Specified by the procuring authority: For how many hours per week is the device usually completely switched off (e.g. at weekends)	48.00
Dwell times per operating mode resulting from the information in the use case	Dwell time in operation [h/week]	calculated as [print volume] / [images per job]/60	0.21
	Dwell time in print standby [h/week]	calculated from [preset time for reaching sleep mode]*[print jobs per week]/60	1.67
	Dwell time in sleep mode [h/week]	calculated as 168 hours per week − [off hours] − [standby hours] − [operating hours]	118.13

	Parameters	Where does the value come from?	Example device with 4 operating modes (print mode, print standby, sleep mode, off mode)
Average power consumption of the device according to DE-UZ 219	Operation [W] Definition according to DE-UZ 219	According to the provider	348
	Print standby [W] Definition according to DE-UZ 219	According to the provider	59
	Sleep mode [W] Definition according to DE-UZ 219	According to the provider	1.2
	Off (hardware) [W] Definition according to DE-UZ 219	According to the provider	0.1

Table 28: Model calculation 2: Data collection and calculation in the event of significant deviation from the actual use case

> ⚠ There are devices that switch to other operating modes after print mode before they reach sleep mode. The average power consumption in these operating modes therefore ranges between the values of the power consumption in print standby and sleep mode. The longer the actual dwell times in these modes, the greater their influence on the device's total power consumption. If these operating modes should be taken into account, both the power consumption and the respective dwell time must be determined and also included in the calculation presented here. Moreover, the dwell time in the respective operating modes can be set individually according to the user's requirements, e.g. standby after 5, 30, 45, 60 minutes.

	Parameters	Where does the value come from?	Example device with 4 operating modes (print mode, print standby, sleep mode, off mode)
Expected electricity consumption for the above use case	In operation [kWh/week]	Calculated from [power consumption operation]/1000*[dwell time in operation]	0.073
	In standby mode [kWh/week]	Calculated from [power consumption standby]/1000*[dwell time in standby]	0.098
	In sleep mode [kWh/week]	Calculated from [power consumption in sleep mode]/1000*[dwell time in sleep mode]	0.142
	In off state [kWh/week]	Calculated from [power consumption off]/1000*[dwell time off]	0.005
	Total power consumption per week [kWh/week]	Calculated from the sum of the power consumption in the operating states	0.317
Cost calculation	Assumed electricity price [EUR]	Must be specified by the procuring authority	€0.20
	Term [years]	Must be specified by the procuring authority	4.000
	Electricity costs per device over the term of the contract [EUR]	Calculated from [electricity consumption/week]*52*[contract term]*[electricity price]	€13.20
	Number of devices of the same type with the same use case	Must be identified and specified by the procuring authority	500
	Costs over the term for all devices of the same type with the same use case	Calculated from [electricity costs per device over the running time]*[number of devices]	€6601.57

Table 29: Power consumption in different operating modes and cost calculation

Important: Increased costs and market restrictions must be expected as soon as measurement procedures are carried out that do not comply with the standard measurement procedures (ENERGY STAR).

10.2   Page price calculation

If the MFD is procured by purchase, the printing and copying costs (for consumables) incurred during the planned service life can be determined by means of a page price calculation. However, a cost calculation based on the price per page is only possible if hardware and consumables are tendered together. This is the only way to ensure that the bids are comparable. The evaluation price for the award then consists of the device price, the consumables for e.g. 4 years and the energy costs for 4 years. Service costs should also be taken into account. To do this, it is necessary to analyse the expected printing and copying volume in advance and to specify the planned usage period as precisely as possible.

The calculation is based on the running time and price per unit.
ISO/IEC 19752 is used as a guideline for determining the yield of consumables for monochrome laser printers, ISO/IEC 19798 for colour laser printers and ISO/IEC 24711 for ink jet printers. For monochrome printers, the test template according to ISO/IEC 19752 is used and for colour laser and ink jet printers, the standard test document according to ISO/IEC 24712 is used.

Item	Yield	Unit	Price	Factor	Price per page
Black toner	10.000	Page	50.00	1	0.005
Drum	20,000	Page	120.00	1	0.006
Residual ink container	20,000	Page	20.00	1	0.001
			Total costs per page in EUR:		**0.012**
Other costs:					
E.g. maintenance kits					

A print volume of 750 A4 pages per month over four years is estimated for the cost basis.

Cost calculation for four years		The print performance to be considered (36,000 pages minus initial equipment, e.g. 10,000 pages of toner)	Duration of use: 48 months
Toner page costs	0.005	26,000	130.00
Drum page costs	0.006	16,000	96.00
Residual ink container	0.001	16,000	16.00
		Total costs for 48 months in EUR:	**242.00**

Table 30: Model price per page calculation

11   Contractual provisions

11.1   EVB-IT

The provision of the tendered services or the delivery of the tendered products after successful completion of the award procedure is based on relevant contracts in each case. To support the awarding authorities, the Federal Ministry of the Interior and Bitkom have prepared various contracts that can be used for this purpose. The contracts are 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).

11.2   Social sustainability

In addition to economic and ecological criteria, social aspects must also be taken into account in the award procedure (Sections 97 (3) GWB, 31 (3) VgV for awards in the upper threshold range, Sections 2 (3), 22 (2) UVgO for awards in the lower threshold range). These social aspects include, in particular, employee rights, the prohibition of child labour, employee discrimination and compliance with framework working hours by the bidder and its suppliers. The awarding authority may require each bidder in the procedure to submit a declaration on social sustainability for IT to ensure that these aspects are taken into account in award procedures for IT products and IT services. The declaration, an associated text module for drafting contracts and explanations on the scope of application (handout) are available on the website of the Procurement Office of the Federal Ministry of the Interior and at itk-beschaffung.de.[19] The Blue Angel has also incorporated social sustainability criteria into the DE-UZ 219 version.

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19   www.itk-beschaffung.de/Verpflichtungserklaerung-2019

12 Practical notes for the award procedure

12.1 Market survey

The market survey is a valuable tool for preparing an award procedure. The results can be an informative aid in the needs analysis and the formulation of the description of requirements or performance specifications in accordance with procurement law. In addition, a high level of up-to-date knowledge on the part of the procuring authority about standard market products and conditions can increase the efficiency of awarding contracts in compliance with procurement law.

Market survey is expressly permitted by law:
"Before initiating an award procedure, the public procuring authority may only carry out market investigations in preparation for the award of the contract and to inform the companies of their procurement plans and requirements." (Section 28 (1) VgV)

The provision of Section 28 VgV itself does not contain any specifications regarding the type and manner of market survey. The general principles of public procurement law, such as equal treatment and transparency, therefore apply. This Guideline provides an introduction to marker survey in the MFD sector.

12.2 Test positions

Tests are useful and recommended to review and validate the performance parameters specified by the providers. The test scenario should reflect the future deployment scenario.

13 Systems

13.1 Needs analysis and checklist

Every procurement procedure begins with a thorough determination of the procurement require-
ments, that is, the future needs-based equipment of the user. To this end, both current and
future requirements should be identified and taken into account in a current inventory. As a rule,
the first step is to analyse the current status of the print output infrastructure, including the
number and type of document-based input and output systems used (multifunctional devices,
printers, faxes and scanners) and volumes. In addition to the required MFD (hardware), the
analysis of the current quo must include the current systems, the associated consumables,
software and services as well as the indirect costs (e.g. energy costs, administration costs or costs
for required floor space). The following table is intended to support the analysis of the current
situation and requirements and does not claim to be exhaustive. To this end, it compares the
existing situation with the current and foreseeable future requirements for MFD. The principles
for avoiding conflicts of interest must be observed if an external company is commissioned with
the analysis (Section 6 VgV).

Analysis of the status quo	Available information source	Usual user situation	Future opportunities and recommendations
Which device type with which functions (printing, copying, scanning, faxing, workflow management) is available?	Inventory data of installed devices (source: inventory database), as well as existing procurement contracts	Priority use of the basic print, copy and scan functions to date No widespread use of advanced functionalities of the current MFD	In addition to using the basic functions of MFD, more extensive use of scan functions, as well as extended functionalities to support electronic transaction processing
Which software applications and software-assisted specialist procedures require which prerequisites for controlling the MFD for input and output and process support in process handling?	Currently used software applications and software-assisted specialist procedures, specifications of the internal IT strategy (ECM, e-government, use of e-files, for example)	Different software applications and specialist procedures	Mofe frequent use of MFD with their multifunctional solutions for the purpose of their increased use/integration into electronic administrative processes (e.g. e-file, electronic capture of paper-based information in the form of scanning, e.g. according to TRRESIS-CAN)
What type of print media (in terms of print format, grammages, media type and structure) are required and what proportion of the total print volume does each of them account for?	Previous procurement of print media (paper etc.), breakdown according to the respective share of print media based on the three main criteria.	Priority use of recycled/normal paper with a grammage of approx. 75-90 g/m², whereby the majority (over 90%) is printed/copied in A4 format	Needs-based selection of the respective device categories according to an analysis of the workflows in the respective department/unit
What print, copy and scan volumes have been generated with the devices installed so far?	Import of previously printed or copied pages from the device memory	Print/copy volume depending on specialist applications and processes	More needs-based selection of the respective device classes or categories or substitution of printed/copied pages with electronic workflows
What is the ratio of colour to b/w printing?	Inventory data in inventory database Existing procurement contracts for consumables (ink/toner cartridges, types of paper, etc.)	Shift from b/w printing to colour printing.	Needs-based selection of the respective device categories according to an analysis of the workflows in the respective department/unit
What IT security requirements must be observed?	Internal requirements, GDPR, BSI recommendations, Common Criteria	IT and data security requirements are increasing significantly	High IT security for public administration as a strategic goal
Demand-oriented number of installed MFD, their performance/scope, functional features and number in relation to the number of potential users?	Demand-oriented determination of the number, functional features, performance and scope of future MFD	A wide variety of situations on site	The ratio of devices and users should be determined according to requirements; this depends heavily on the overall concept
Are there any special accessibility requirements?	Needs-based determination	A wide variety of situations on site	Based on the specifications of the European standard EN 301 549

Table 31: Needs analyses and checklists

In the best case scenario, the selection and functional scope of the devices to be procured can already be derived from the inventory and definition of future require-ments. In any case, this lays the foundation for targeted research into the market and the solutions currently available on the market. The inventory and requirements analysis can also be used as the basis for an installation and usage plan and for the creation of usage guidelines for the new devices.

This needs assessment may ultimately determine that the procurement of managed print services would be preferable to operating the hardware in-house.

13.2   Glossary

a) Glossary of general terms

No.	Term	Explanation
1	ADF	Automatic document feeder
	Automatic content recognition/ACR	ACR refers to automatic text recognition or automatic character recognition within images or documents and is particularly helpful in processes in which the document requires further processing after scanning. Some manufacturers can provide this as an internal function for sporadic and low scan volumes (5–10 pages per job). For higher scanning volumes, it is advisable to tender for server-based software, which is usually much more powerful and eases the strain on the device. Both variants add considerably to the prices, so the necessity should be carefully reviewed.
	bps	Baud per second (unit for the symbol rate in telecommunications)
	ECM	Enterprise content management
	Recommended print volume	The recommended print volume is used to allocate the performance classes according to requirements and always refers to A4 pages per month.
2	Stapling	Mechanical connection of printed pages using staples
	ipm	Images per minute. Unlike ppm (pages per minute), ipm is determined using documents with a fixed resolution.

No.	Term	Explanation
3	Physical print resolution	The physical resolution of the printer used (also known as native) is always decisive. Print resolution specifications, such as enhanced, bicubic or nearest neighbour, etc., are often so-called interpolated resolutions, that is, values calculated by a computer. They are generally unsuitable for objective comparisons.
	Private cloud	A private cloud is a cloud computing environment that is exclusively reserved for and only accessible to a single customer. It combines many of the benefits of cloud computing, such as elasticity, scalability and easy service provisioning, but combined with the access control, security and resource customization of an on-premises infrastructure.
	Public cloud	The public cloud is a form of cloud computing in which third-party providers make computing resources – from ready-to-use software applications and individual virtual machines (VMs) to complete infrastructures and development platforms tailored to companies – available to users via the public internet.
	Pull printing capability	Allows users to pick up (pull) print jobs from any device that has this integrated feature. The job is usually held on the server or client until the user has authenticated themselves on an output device. The job or jobs can then be "pulled" from the client or server at the output device. Pull printing increases the security of confidential printing and eliminates uncollected documents in the tray.
	Software solutions/ administration tools	Programs that are made available in your own network and/or in the cloud, e.g. for the following tasks: 1. Device management • Manual or automated configuration of device-related settings • Central distribution of firmware to the device fleet • Management of certificates 2. Monitoring/supervision of • device utilization • Consumables • Maintenance parts • Error messages such as paper jam 3. Supplementary solutions • e.g. to integrate devices into processes/workflow design • Document management/archive systems Management of additional applications
	SSD/HDD	Data on conventional hard disk drives (HDDs) is magnetically aligned so that it can be interpreted in binary form as zeros and ones. SSDs, on the other hand, write the data electronically on pages and then combines it into blocks. A secure deletion option adapted to this technology must therefore be required, depending on the preferred storage technology. SSDs, for example, cannot be overwritten multiple times with zeros and ones. In addition, encrypted hard disks, for example, offer the advantage that the data can only be accessed in conjunction with the key generated by the device. If the hard disk is removed from the device, the key and the remaining data are irretrievably lost. This may be more practical than a time-consuming deletion process. Please take this into account when preparing the invitation to tender or when answering bidder questions.
4	Universal feeder	An integrated manual feeder that can be used to feed single or multiple sheets and media. Universal feeders are used for various media formats, in particular for non-DIN-compliant formats such as postcards, index cards, envelopes, etc. Furthermore, these feeders can also be used for media types whose grammages (measured in media weight g/m^2) are not suitable for feeding from standard trays, e.g. cardboard-thick media or other special media such as films. Other synonymous designations used by manufacturers: • Batch sheet feeder • Bypass • Multi-tray
5	Wear substances	These are replaceable components that are exposed to particular stress during work steps in the device (e.g. fuser unit, rollers)
	Automatic font recognition	ACR refers to automatic text recognition or automatic character recognition within images or documents and is particularly helpful in processes in which the document requires further processing after scanning. Some manufacturers can provide this as an internal function for sporadic and low scan volumes (5–10 pages per job). For higher scanning volumes, it is advisable to tender for server-based software, which is usually much more powerful and eases the strain on the device. Both variants add considerably to the prices, so the necessity should be carefully reviewed.

Table 32: Glossary of general terms

b) Energy consumption glossary

No.	Designation according to ENERGY STAR	Definition according to ENERGY STAR
	Power consumption	Amount of electrical energy that electrical devices require for their operation during a defined period of time
	TEC values	«Typical energy consumption", expressed in kWh per week.
1	**Standby state**	State with the lowest power consumption that cannot be switched off (influenced) by the user, which continues indefinitely as long as the product is connected to the mains and used in accordance with the manufacturer's operating instructions. Standby is the product's operating state with the lowest power consumption. For imaging devices, the standby state usually corresponds to the off state, but may also be equivalent to the ready state or sleep state. A product cannot leave the standby state and switch to an even lower power consumption state unless it is manually disconnected from the power supply.
2	**Off state**	The power consumption state that the product enters when it has been switched off manually or automatically but is still connected to the mains. This state is terminated by an input signal, e.g. by a manual mains switch or a timer, which places the device in standby state. It is often referred to as the manual off state if it is manually initiated by the user. If it is caused by an automatic or preset signal (e.g. a waiting time or timer), it is often called an automatic off state.
3	**Sleep mode**	A state of reduced power consumption that the product enters either automatically after a period of inactivity (that is, after a standard waiting period), as a result of manual intervention by the user (e.g. at a time of day set by the user, after pressing a switch or button) or as a result of external electrical pulses (e.g. mains pulses, fax calls or remote control). For products that are tested according to the TSV test procedure, sleep state permits the performance of all product functions (including mains switching), but with a possible delay in its transition to active state. For products that are tested according to the BM test procedure, sleep state permits the operation of a single active network interface and, if applicable, a fax connection, but with a possible delay in its transition to active state.
4	**Print standby**	The power consumption state in which the product does not generate any output but has reached operating conditions, has not yet switched to a power-saving state and can switch to the active state with minimum delay. In this state, all device functions can be activated and the product can switch back to the active state as a result of input signals such as external electrical impulses (e.g. mains impulses, fax calls or remote control) and direct interventions (e.g. pressing a switch or button).
5	**Operation (on state)**	The power consumption state in which the product is connected to a power source and is actively generating an output or performing other main functions.

Table 33: Energy consumption glossary

c) Noise emissions glossary

Designation according to ISO	Unit	Description
A-weighted sound power level	LwA in dB(A)	Sound power: The sound power describes the source strength of a sound generator. The sound power level can be used to determine the sound energy of a sound source. The sound power level is the corresponding logarithmic value.
Guaranteed A-weighted sound power level	LwAd in B(A) or dB(A)	The guaranteed A-weighted sound power level is determined in accordance with ISO 9296 and specified in Bel or decibels, where 1 B = 10 dB. It describes the average value over measurements on at least 3 devices or, alternatively, the value according to the formula: LwAd = LwA1+3.0 dB (LwA1= A-weighted sound power level of a single device in dB with one decimal place) It is generally stated according to the formula described above in the field of office and information technology devices.
A-weighted sound pressure level (operator position, bystander position)	LpA in dB(A)	Sound pressure p: The alternating pressure caused by sound, which is superimposed on the static air pressure. These pressure fluctuations are converted by the eardrum into movements for auditory perception. In other words, the sound pressure describes the sound energy that hits a specific point (e.g. the operator's eardrum or a workstation near the device).

Table 34: Noise emissions glossary

d) Glossary of ISO/IEC standards for indicating productivity in printing, copying and scanning

It is sensible to use standardized measurement methods to obtain the ability to compare productivity in printing and scanning. There are a large number of standards for this purpose, which are listed and described hereinafter. It is important to ensure that the appropriate ISO standard is used for the required value.

NOTE: The values specified in the measurement protocols according to ISO standards are comparable. However, it is important to note that the productivity of a printer or multifunctional device depends on many factors. For example, many settings can be optimized via the driver or the device in order to achieve better values. At the same time, the use of authentication solutions or the final processing of the paper can lead to delays.

ISO/IEC standard	Content of the measurement
ISO/IEC 17629 Measures the time for printing the first page "First Print Out Time (FPOT)" in seconds	• All print device and driver settings have been returned to factory settings. • Letter and A4 paper formats are measured • If available, the values are measured separately for the monochrome and colour modes. The measurement is carried out both in sleep and standby mode for simplex and duplex printing. The warm-up time is also logged. • The applications are used in the current version at the time of measurement. • Adobe Reader • Word • Excel • The final value is calculated based on the average values for printing the various file formats in both simplex and duplex mode.

ISO/IEC standard	Content of the measurement
ISO/IEC 17991 Scanning productivity	▪ Sub-section 4.1 of ISO standard 17991:2021 (page 4) states that the settings must be adjusted to the manufacturer's default settings. This means that the manufacturers of multifunctional printers base their measurements on their own standard values for scan resolution. ▪ Letter and A4 paper formats are measured in both colour and monochrome ▪ The performance is measured both when scanning from the automatic document feeder (ADF) and when scanning to a network folder ▪ The scan format used is PDF 1.4 ▪ The final value is calculated from the mean values of various measurements in simplex and duplex mode
ISO/IEC 24734 Measures the print productivity "First Set Out Time (FSOT)" in seconds and "Estimated Saturated Throughput, (ESAT)" in images per minute (ipm)	▪ All print device and driver settings have been returned to factory settings. ▪ If available, the values are measured separately for the monochrome and colour modes. ▪ Letter and A4 paper formats are measured ▪ In addition, the performance is measured in A5 format. ▪ The speeds in simplex and duplex printing are measured for the respective data format and average values are determined for several cycles. ▪ Client operating systems are used in the version as amended at the time of measurement. ▪ Windows ▪ The applications are used in the current version at the time of measurement. ▪ Adobe Reader ▪ Word ▪ Excel ▪ The hard disk of the connected PC is the storage location of the files for printing
ISO/IEC 24735 Copy Productivity – First Set Out Time (FSOT) in seconds and Estimated Saturated Throughput (ESAT) in ipm	▪ All print device and driver settings have been returned to factory settings. ▪ Letter and A4 paper formats are measured ▪ The final value for a copy in colour and monochrome is calculated from the mean values of various measurements ▪ Copy of one page ▪ Duplicate copy of one page ▪ Copy of two pages
ISO/IEC 29183 Measures the time for the first copy "First Copy Out Time (FCOT)" in seconds	▪ All print device and driver settings have been returned to factory settings. ▪ Letter and A4 paper formats are measured ▪ The final value for a copy in colour and monochrome is calculated from the mean values of different measurements of a single copy

Table 35: Glossary of ISO/IEC standards for specifying productivity in printing, copying and scanning

e) Glossary with further information on procurement models

Turnover tax is one quite significant consequence of the choice of procurement model. In the case of rentals, turnover tax is charged on the respective rental instalments and must be paid together with the rental instalments. In the case of purchase, the full turnover tax is due upon delivery (= transfer of the device to the procuring authority). The total turnover tax is also incurred upon delivery of the device if, according to the contract, ownership of the device will only be transferred after several instalments have been paid. If the transfer of ownership in an instalment plan depends on the exercise of a purchase option, turnover tax is payable on the entire price of the device if the option is exercised in accordance with the contract. If rental instalments have already been paid before the option is exercised, the turnover tax payments incurred on these must be reversed if the rental instalments are offset against the purchase price. In the case of leasing, turnover tax is incurred at the time at which the leased device is attributable to the procuring authority in accordance with tax regulations.[20]

20 Cf. explanations by the tax authorities on these turnover tax consequences in Section 3.5 (5) and (6) of the German Turnover Tax Application Decree (UStAE)

f) Eco-label comparability glossary

Criterion	Blue Angel DE-UZ 219 (DE ZU 205 is also still valid until the end of 2021)	EPEAT IEEE1680.
Recyclable design	Yes	Yes (partly mandatory, partly optional)
Return of coloured ink modules and containers	Yes	Yes
Specification of the ink and toner yield	Yes	No
Resource-saving paper handling	Yes	Yes
Warranty, repair services, availability of spare parts	Yes	Yes
Longevity	Yes	Yes
Packaging (material and labelling)	Yes	Yes
Restriction of substances in materials used in housings and housing parts	Yes	Yes
Carrier material substance in printed circuit boards	Yes	Optional
Substances in inks	Yes	Yes
Substance emissions	Yes	Yes (except particulate emissions)
Designation of the content of post-consumer recycled plastic	Yes	Yes
Minimum amount of post-consumer recycled plastic	Yes (from IP-219, gradual introduction)	Optional
Power consumption	Yes	Yes
Noise emissions during the printing process	Yes	No
Product documentation and user information	Yes	Yes
Compliance with key European legislation on substances and materials (RoHS, REACH, EU Battery Directive)	Yes	Yes
Ecological life cycle assessment (LCA)/carbon footprint	No	Yes
Environmental management for production and design	No	Self-declaration: Yes Certification: optional

Criterion	Blue Angel DE-UZ 219 (DE ZU 205 is also still valid until the end of 2021)	EPEAT IEEE1680.
Social sustainability in production	Yes (from 2024)	No
Corporate due diligence obligations in the extraction of raw substances	Yes (proof from 2022/certified proof from 2024)	No
Support for local initiatives to encourage responsible mining	Yes	No

Table 36: Eco-label comparability glossary

13.3   Legal basis

In addition to public procurement law, other legal principles must be observed by both suppliers and procuring authorities. The following (non-exhaustive) overview lists some of the most important of these legal bases for MFD. The list also serves to identify the abbreviations used in the Guideline for legal references.

BattG
Act on the placing on the market, return and environmentally sound disposal of batteries and accumulators (national implementation of Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators)

BHO
Federal Budget Code

ElektroG
Act on the placing on the market, taking back and environmentally sound disposal of electrical and electronic equipment (national implementation of Directive 2012/19/EU on waste electrical and electronic equipment - WEEE Directive) **WEEE DIRECTIVE**)

ElektroStoffV
Ordinance on the Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment (national implementation of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment – RoHS Directive) **RoHS Directive**)

EMVG

Act on the Electromagnetic Compatibility of Equipment (national implementation of Directive 2014/30/EU on the harmonization of the laws of the Member States relating to electromagnetic compatibility)

GDPR

Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

ARC

Act against Restraints of Competition

POP REGULATION

Regulation (EC) No 850/2004 on persistent organic pollutants (**P**persistent **O**rganic **P**ollutants)

ProdSG

Product Safety Act, serves to ensure basic health and safety requirements

REACH REGULATION

Chemicals Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (Regulation concerning the **R**egistration, **E**valuation, **A**uthorization and **R**estriction of **C**hemicals)

UVgO

Sub-threshold procurement regulations: Rules of procedure for the award of public supply and service contracts below the EU thresholds.

It must be enforced by corresponding federal and state legislation for the respective area. Many federal states restrict the application or only recommend the application of the UVgO for their regional authorities, state enterprises and state authorities.

VgV

Regulation on the award of public contracts: Rules of procedure for the award of EU-wide public supply and service contracts

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