Product-Neutral Tender for Multifunctional Devices and Printers

Guideline for Public IT Procurement: With product specifications for environmental protection, energy efficiency, accessibility and IT security
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bitkom

Content

List of tables

Acknowledgements

1   Introduction

1.1   Using this guideline

This guideline provides an overview of the foundations and criteria for the procurement of print-ers and multifunctional devices (MFD) via public administration. This guideline is the result of a working group involving the Procurement Office of the Federal Ministry of the Interior and Bitkom e.V.. This document aims to provide public contracting entities of Germany's federal, state and local governments with a dependable and understandable tool in order to help them formulate their calls for tender for the procurement of printers and multifunctional devices in a product-neu-tral manner, i.e., without the use of trademarked names and without mentioning individual manufacturers, while taking into consideration current technological standards. While printers are mainly characterised by their printing function, multifunctional devices combine several function-alities (e.g., printing, scanning, copying, faxing) in one device (comparable to the development of mobile phones into smartphones).

The core of this guideline is formed by the list of technical criteria, which can be used to describe and compare the devices themselves as well as requirements placed on both their operational environment and other properties. Besides the technical criteria – compliance with which guaran-tees proper device functioning for the reason they were procured – the guideline also contains references to environmental protection, energy efficiency, accessibility and IT security. Moreover, aspects relating to ecological sustainability in the form of resource conservation of the materials used achieved by, e.g., longer use of the devices or a longer service life of consumables and wear materials, as well as the aspects of social sustainability in the form of compliance with ILO core labour standards, are gaining in importance. Even if statutory requirements only partly obligate procurers to observe these interests (such as supply chain law pertaining to social sustainability), they are growing increasingly relevant in public administration.

It is pointed out that the listed technical criteria and requirements are subject to continuous change, and are to be weighted differently depending on the intended area of application of the devices to be procured. The higher the requirements for the product, the higher the offer price will tend to be, and the smaller the range of products on the market will be. This is why this guideline cannot replace independent analysis and reasonable prioritisation of the relevant criteria by the procuring entity.

However, the authors of this guideline would also like to support procurers in public administra-tion by drawing their attention to sensitive criteria and requirements, i.e., those that may restrict the market, and to cost-related decisions. The symbols defined below are used to this extent:

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

1.2 Product neutrality as a legal requirement

In public procurement law, there is an obligation to treat suppliers and products on offer equally. In accordance with the legal foundations, the subject of the procurement is to be described using professional criteria free of discrimination, i.e,. in a product-neutral manner (cf. Section 97 German Act against Restraints of Competition (Gesetz gegen Wettbewerbsbeschränkungen, GWB) and Section 31 para. 6 Ordinance on the Award of Public Contracts (Verordnung über die Vergabe öffentlicher Aufträge, VgV) for tender procedures across the EU as well as Section 55 para. 1 German Federal Budget Code (Bundeshaushaltsordnung, BHO) and Section 2 para. 2 German Regulation on Sub-Threshold Procurement (Unterschwellenvergabeordnung, UVgO) for sub-threshold procurement). Certain product designations or brand names may only be used in calls for tender in justified exceptional cases if an adequately precise description using customary designations or general criteria is not possible.

This guideline specifically addresses this problem by providing a compact tool to support compliance with the legal requirements, thus ensuring fair competition. The guideline specifies and explains current technical standards to describe printers and multifunctional devices using general and pertinent characteristics. The product properties and technical requirements are concisely presented in tables. In order to ensure that the guideline is always up-to-date, it will be updated regularly taking into consideration new developments in technology while aligning the proposed criteria and requirements with the current state-of-the-art.

2 Printers and multifunctional devices as procurement objects

2.1 Trends in the procurement of printers and multifunctional devices

While printers essentially serve to offer the printing function, multifunctional devices are equipped with the standard functions of copying, printing, scanning (scan-to-email, scan-to-PC, scan-to-USB, scan-to-FTP, scan-to-network) and faxing. Current and future generations of multifunctional devices are technologically evolving to support both paper-based and digital administrative procedures, thereby enabling and advancing the processing of structured and unstructured data (e.g., in form recognition or the pre-sorting of data) with associated IT procedures and processes. MFDs are becoming smarter with device and server-based solutions, resulting in them being able to make an increasingly strong contribution to sustainable and environmentally friendly administrative work and, as an interface between digital and printed information, becoming an essential IT component for the implementation of e-government solutions in public administration.

The technical development of MFDs and printers is characterised by the trends described below:

- **Replacement of »single« functional devices (e.g., separate scanners or printers) by multifunctional devices:** Due to the diverse and simultaneous demands on IT infrastructure in the administrative sector today, multifunctional systems are increasingly replacing single functional devices (separate scanners or printers).
- **Increasing use of colour:** The use of colour printing is a growing trend, which may be due to, among other reasons, the fact that colour is used in documents to depict and thus better understand the increasing variety of information.
- **Increased use of DIN A4:** The predominant use of the DIN A4 format results in a higher demand for MFDs that are designed to support this format. The high-performance MFDs in the DIN A4 format meet all current and future office requirements.
- **High performance:** High demands are being placed on the productivity and flexibility of printers and MFDs, which is due to the rapidly increasing amount of data to be processed.
- **Easy and intuitive operation:** Along with the increasing complexity of MFDs, there are high demands on an intuitive use of the numerous functions and on the MFD to be easy and self-explanatory to navigate. The easy navigation is provided on a colourful touchscreen with symbols and texts for the respective process.
- **Greater flexibility:** Printers and multifunction devices are characterised by a high degree of flexibility. They can be adapted to users' needs by means of open standards and integrable connections.

- **Environmental standards and sustainability:** Printers and MFDs are increasingly characterised by meeting high standards both in terms of the environment and sustainability (also see Blue Angel (Blauer Engel) quality mark). In this context, the requirements for climate-neutral procurement in particular are becoming increasingly important.[1] When procuring technical equipment, there are various methodological approaches to determining and limiting greenhouse gas emissions.
- **Accessibility:** Printers and MFDs nowadays offer barrier-free accessibility. It is important to enable users with different skills and physical means to easily interact with customers, colleagues and workflows (also see chapter on accessibility)

2.2 Further individual application solutions

In contrast to printers, MFDs can adapt management processes, applications and data storage to suit the individual requirements of the user due to their multifunctionality and additionally customisable software solutions. They offer a variety of advanced software solutions nowadays that support and optimise office and administrative processes, which allows, for example, the possible uses of the devices to be expanded, time to be saved, and costs to be reduced. There are essentially two variants of extended application solutions for MFDs, namely device-based and network-based user solutions.

a) Device-based user solutions

Device-based user solutions are free or mandatory additional functions or solutions, which can be integrated into MFDs beyond standard functions. These additional functions primarily serve to provide prepared information (files) that can be processed and used in the user's environment and with applications. An example of this would be the provision of an additional OCR character recognition function that converts scanned data as grid data into so-called ASCII or Word files and then uses these for further processing in the applications, e.g., for Office applications. Other device-based user solutions serve to support the operation of the MFD, to forward generated information (e.g., scan files) to applications, or as additional security functions to increase the MFDs security.

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1   Recommendations can be found in, for example, the publication »Der Weg zur treibhausgasneutralen Verwaltung« by the German Federal Environmental Agency

b) Network and/or cloud-based user solutions

There is a large selection of implemented extended user solutions (apps) that enable the exchange of information on the market of software applications and specialist procedures. Deployment tools/platforms can also be used to quickly and easily design and create your own work and administrative processes.[2] User solutions of this nature are usually not integrated into MFDs, but can be integrated into 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 MFDs within the user's IT infrastructure, depict electronic transaction processes, or secure the use of the MFDs as well as the information generated with their assistance.

c) Applications for fleet management

In order to be able to fully guarantee the operation and administration of the device fleet, functions and services are required that can be used with the assistance of one or more applications. These tools are offered both as »on premises« solutions, i.e., the app is installed within the customer infrastructure, and as cloud-based web solutions.

Since there are some overlaps in the functions and in understanding the conceptuality, it is therefore advisable to give a detailed description of the desired functions according to your specifications. (E.g.: Automatic supply of consumables or configuration of the devices instead of fleet management.) Some common functions are described here as examples.

One area of these software applications primarily addresses the collection of data and information from the installed printers and MFDs for the purpose of timely provision of necessary consumable materials and wear materials, as well as ensuring proactive maintenance and servicing of the devices, connection to asset or other databases, and the option of automatic invoicing.

Function	Description
Consumable and wear materials	• Continuous monitoring of the installed devices for the status of the consumable and wear materials • Automated management and control of the supply chain for the consumable and wear materials • Basis to estimate the possible future requirement of consumable and wear materials
Connection to databases	Integration/connection to databases (e.g., asset database) for the purpose of collecting statistical data and processing said data into the required information

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2   Cf. in-depth information on administrative tools in the glossary

Funktion	Beschreibung
Error messages	Monitoring of error messages, as well as automatic troubleshooting processes
Billing	Provision of required data and information for the purpose of billing

Administration of devices

Printers and multifunction devices that are in the network must also be administrable, which is why manufacturers provide central applications in addition to the device's own web interface. These enable the responsible operator to simultaneously configure and secure multiple devices and to distribute firmware updates.

Cross-manufacturer applications usually cannot fully access all device settings and information. It is therefore advisable to check the required functions in advance in order to procure the appropriate applications.

Function	Description
Configuration of devices	Selecting settings for one or more device(s) (e.g., passwords, tray positions, host names, etc.)
Update firmware	Central update of the firmware on one or more device(s) via the network
Certificate management	Application and update of certificates for one or more device(s)
Grouping devices	Grouping devices, e.g., based on model or location, for clear management
Warning messages	Generate warning messages, e.g., for proactive support in the event of error messages or low consumable stocks
Reports	Creation of individual reports e.g., on the utilisation of the device fleet or on security audits
User and role management	Permission management for users

2.3 Print technologies

Printers and MFDs not only vary in the properties of the hardware, but also in the type of colouring agent used to print. Ink, toner or gel are widely used colouring agents. No conclusions can be drawn about the print quality from the colouring agents or the printing technology used. The requirements for the print quality must fundamentally be considered independently of the printing technology used. Systems can be offered as pure black and white or as colour printing devices – regardless of the colouring agents used; indelible printing can be guaranteed regardless of the printing technology used.

> (!) All printing technologies (laser, ink and gel) can print indelibly.

2.4 Commercial procurement models

Procurement can take place by means of rental, purchase, leasing or a combination thereof (e.g., renting the hardware, purchasing the consumables). The approach selected by the procurer depends not least on whether it has a one-off budget or a budget covering several years. A decision for one of these models should usually already be made as part of a cost-efficiency analysis while preparing the procurement measure. The total costs for a printer or MFD, including costs for associated wear parts and consumables, can also be calculated using the printed pages as a calculation basis (also see the calculation example in 10.2).

A significant consequence of the choice of procurement model relates to VAT. When renting, the VAT on the respective rental instalments accrues and must be paid together with the rental instalments. When purchasing, the entire VAT is incurred upon delivery (= transfer of the equipment to the client). The entire VAT is also incurred on delivery of the device if, according to the contract, ownership of the device is only to be transferred after payment of several instalments. If transfer of ownership in the case of a hire purchase depends on the exercise of an option to purchase, VAT is payable on the entire price of the equipment when the option is exercised under the contract. If rental instalments have already been paid before exercising the option, the VAT payments incurred on them must be reversed if the rental instalments are offset against the purchase price. When leasing, VAT is incurred at the time when, according to the tax regulations, the leased equipment is assigned to the client.[3] However, due to their complexity, leasing models don't play a significant role in public procurement.

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3   Cf. the statements of the tax authorities in Section 3.5 para. 5 and 6 of the German Value Added Tax Application Decree (Umsatzsteuer-Anwendungserlass, UStAE) regarding these value added tax consequences

	Commercial models			
	Purchase	**Purchase and usage (mixed model)**	**Financing (Rental/leasing)**	**Usage-based settlement**
Hardware	Purchase	Purchase	Rental or leasing	Settlement by page or cartridge (»All-In«)
Consumables and wear materials	Purchase	Settlement by page or cartridge	Settlement by page or cartridge	
Services (e.g., repairs, maintenance, software maintenance)	Commissioning	Includes service provision	Includes service provision	
Hardware ownership	Client	Client	Contractor	Contractor

Table 1: Commercial procurement models

3 Performance classes as a representation of usage scenarios

The first step of this guideline recommends determining the need for printers and MFDs on the basis of different performance classes. The performance classes primarily correspond to the usage scenarios and the users' intended use of the devices. The usage scenarios for public contracting entities do not differ significantly from the usage scenarios in companies. In this respect, a wide variety of devices sold on the free market can be selected.

Based on the usage scenarios, this guideline roughly differentiates between the following performance classes:

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

The transitions between the individual performance classes are fluid in reality. This is considered in the following table with the most important differentiation criteria of the performance classes, in particular through overlaps in the print volume.

	Workstation device	Working group device	Departmental device	Comments/explanations
Recommended print and copy volume per month	500−5,000 pages	2,000−20,000 pages	5,000−50,000 pages	
Type of construction	Generally desktop device or A4	Desktop or standing device	Generally standing device	
Paper reserve	Min. 250 sheets	Min. 1,000 sheets	Min. 1,500 sheets	
Size of working memory	256 MB	512 MB	1 GB	One cannot infer anything about the device's performance or range of functions from the size of working memory alone.
Paper output capacity	100 sheets	200 sheets	250 or more sheets	Specifications referring to grammages of 80 g/m²

Table 2: Guideline values of the performance classes

4 Criteria and requirements for all performance classes

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

Beyond the scope of the minimum requirements recommended here, additional requirements can be formulated as parts of the evaluation criteria.[4] In addition, if they are placing special requirements on the object of procurement, the contracting entity can define extra criteria and requirements in the tendering documents.

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

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4   The award criteria in this guideline that meet special functional or performance requirements are referred to as evaluation criteria. The procuring entity can always include an evaluation criterion in its performance specification if the advertised product is intended to render special services in certain areas or is intended for special purposes.

4.1 Printing

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**First page DIN A4 in output tray in ready-to-print mode**	• Max. 15 seconds	Minimum requirement	Value varies significantly based on the printing technology. Values of under 10 seconds are also possible.
2	**Print resolution**	• Min. 600 x 600 dpi physical	Minimum requirement	Optionally, higher resolutions can be requested.
3	**Duplex printing**	• Automatic	Minimum requirement	
4	**Multipurpose feeder**	• Multipurpose feeder is offered	Minimum requirement	
5	**Authenticity of documents**	• Suitability for the creation of originals, copies and certified copies of notarial deeds and other documents in accordance with Section 29 German Service Regulations for Notaries (Dienstordnung für Notare, DONot) can be demonstrated	Minimum requirement	Document authenticity can be guaranteed for laser and ink technologies. **Z** Verification is provided by means of PTS certificate or similar certificate. The device consisting of a printer, toner or ink (both black and colour), and paper is verified and certified.
6	**Printer command language**	• At least PCL 5 or PCL 6 or compatible with PostScript	Minimum requirement	

Table 3: Printing and copying – criteria and requirements

4.2 Copying and scanning (multifunction device)

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Scan resolution monochrome**	▪ Min. 600 x 600 dpi optically possible	Minimum requirement	Optionally, higher resolutions can be requested. Higher resolutions generate exponentially increased data volumes when used. The configuration of 300 x 300 dpi is recommended for operation.
2	**Scan resolution colour**	▪ Min. 300 x 300 dpi optically possible ▪ External colour depth 24 Bit, 8 Bit for grey tones	Minimum requirement	Optionally, higher resolutions can be requested. Higher resolutions generate exponentially increased data volumes when used. The configuration of 300 x 300 dpi is recommended for operation.
3	**Scanning formats**	▪ Min. PDF, JPG, TIFF	Minimum requirement	
4	**Duplex ADF scan**	▪ Automatic	Minimum requirement	
		▪ Scanning on both sides either in one go (dual scan) or by turning the page	Evaluation criterion	A duplex scan can be carried out technically with an automatic turning device (RADF) or by scanning both sides using two scanner strips (DADF). DADF is typically characterised by faster scanning speeds, but can increase costs and have a market-restricting effect. €
5	**Scanning targets**	▪ To file in client (= Scan-to-PC)	Minimum requirement	
		▪ To network folder (Folder)	Minimum requirement	
		▪ To email	Minimum requirement	
		▪ To FTP	Evaluation criterion	
		▪ To USB stick	Evaluation criterion	
		▪ To document-/content management-/archive system	Evaluation criterion	Also see Section 2.1 »Trends in the procurement of printers and multifunctional devices«
6	**Zoom in/zoom out**	▪ Min. 50-200 per cent in 1 per cent increments	Minimum requirement	Applies to multifunctional devices.
7	**Multiple copies**	▪ More than 99 copies	Evaluation criterion	Applies to multifunctional devices.

Table 4: Scanning – criteria and requirements

4.3 Media

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Print media**	• Normal paper	Minimum requirement	Acc. to DIN EN 12281
		• Recycling paper	Minimum requirement	Acc. 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 when printed**	• Multipurpose feeder • min. 70-160 g/qm	Minimum requirement	
		• Paper cartridge min. 70-90 g/qm	Minimum requirement	
4	**Grammage when scanning**	• ADF min. 70–95 g/qm	Minimum requirement	Applies to multifunctional devices.

Table 5: Media for copying, printing and scanning – criteria and requirements

4.4 Interfaces

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**USB for client**	▪ min. USB 2.0	Minimum requirement	A USB connection with a newer version generally allows for quicker transmission speeds. Nevertheless, this is not decisive for a USB connection.
2	**USB for sticks**	▪ min. USB 2.0	Minimum requirement	Different USB sticks can be used depending on the formatting of the USB stick
3	**Network connection**	▪ RJ 45 Ethernet 10/100	Minimum requirement	Also available as RJ 45 Ethernet 10/100/1000 currently and in future.
4	**Modem**	▪ RJ 11	Evaluation criterion	To be declared as minimum requirement, if fax function is desired
		▪ RJ 11 and RJ 45 separate	Minimum requirement	Separate connections increase security
5	**Wireless connections**	▪ Wi-Fi infrastructure (acc. to IEEE 802.11 n/ac/ax)	Evaluation criterion	
		▪ Direct Wi-Fi access to the MFD (acc. to IEEE 802.11 n/ac/ax)	Evaluation criterion	Safety information: It may be required to disconnect the network depending on the internal agency requirements.
		▪ Bluetooth	Evaluation criterion	Market restriction possible €
		▪ Near Field Communication NFC	Evaluation criterion	Market restriction possible €

Table 6: Interfaces – criteria and requirements

4.5 Display

Displays are available for the devices recommended under this guideline.

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	Display	▪ Colour display	Minimum requirement	There are also offers without colour display in the lower price classes.
2	Operation	▪ Touch function	Minimum requirement	Applies to multifunctional devices.
3	Language	▪ Multilingual (at least DE, EN)	Minimum requirement	

Table 7: Display – criteria and requirements

4.6 Accessibility

Procurement of accessible hardware and software is required if a company employs people with disabilities. General accessibility requirements are laid down in law in Section 4 German Disability Equality Act (Behindertengleichstellungsgesetz, BGG, see: ↗ https://www.gesetze-im-internet.de/bgg/BJNR146800002.html). In addition, there are 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). For the legal basis and for further information on accessibility, see the Annexes to this guideline.

When creating the performance specifications for the procurement of printers and MFDs – except for in duly justified exceptions – accessibility criteria for people with disabilities must be taken into consideration (Section 121 para. 2, Alt. 1 GWB). Care should be exercised here to ensure that the requirements are aligned with user needs and are both technology-neutral and open to innovation. The following example based on the use of an MFD is used as an illustration:

Visually impaired employees can also use the MFD. According to the call for tender, the MFDs should have a touchscreen for operation. Controlling the touchscreen requires visual perception. However, in order to also meet the user needs of visually impaired employees, it must also be possible to control the MFD without visual perception. The procurement office should not specify how the control is technically implemented without visual perception, since specifying a certain technology would exclude other technologies and innovations. In the present case, the user's needs could be met, for example, by controlling the device with an audio user interface or via the touchscreen with haptic controls.

In order to harmonise accessibility requirements in the procurement of information and communication technologies products and services by public entities in Europe, the European Commission tasked the European Standards Organisations CEN, CENELEC and ETSI with the creation of a standard (Mandate 376). The result of this assignment is European Standard EN 301549.

Due to the increasing use of web-based software applications (e.g., cloud applications), further requirements relating to accessibility must be taken into consideration. The requirements on accessibility are described here in the ↗ Web Content Accessibility Guideline (WCAG). The current version is WCAG 2.1.

This European standard was implemented with DIN EN 301549:2015-11 (»Accessibility requirements suitable for public procurement of ICT products and services in Europe; (acknowledgement of the English version EN 301549 as a German standard«)). As laid down in Section 31 para. 2 No. 1 VgV, reference can be made to DIN EN 301549:2015-11 in the performance specifications, or to equivalent standards such as the American ICT accessibility standard US Section 508, in order to appropriately take the user needs of persons with disabilities into account.

> **!** Verification should be provided by means of a contractor self-declaration. Table C.4 of the Technical Report CEN/CLC/ETSI TR 101 552 provides templates for the (self) declaration of compliance with EN 301 549.

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

The following table categorises and explains various aids for overcoming barriers or impairments:

Aids for...	
Vision	Allows a wide range of people to see, including those with visual impairments such as blindness, impaired vision, and colour blindness
Reach and energy	Enables access and reduces effort when operating a device
Language, cognitive aspect and learning	Helps users by simplifying and streamlining tasks and making user interactions more intuitive and easier to understand
Fine motor skills	Provides an easy alternative for tasks that typically require manual skills
Hearing	Helps users by means of adjustable volume and providing troubleshooting messages on the control panel

Table 8: Aids for overcoming barriers

The table below classifies the above mentioned criteria or tools and shows how configuration settings and/or optional accessories can be utilised to make devices easier to use in order to address various user impairments.

Criteria	Requirement	Suitable as	Comments/explanations
Suitable for people with disabilities	Compliant with DIN EN 301549, US Section 508 or equivalent	Minimum requirement	
Control panel with backlight	Control panel light that provides optimal visibility in poor lighting conditions	Minimum requirement	For all performance classes (relevant for LCD displays, not relevant for full colour touch-screens)
Keyboard	Touchscreen keyboard that appears on the printer control panel when input is required.	Evaluation criterion	Suitable for working group-/ departmental MFDs €
Integrated keyboard or third-party manufacturer keyboard	Physical keyboard to enter commands or BigKeys LX keyboard (TAA compliant) for larger keys and increased reach	Evaluation criterion	Only suitable for departmental MFDs €
Braille overlays	Self-adhesive Braille overlays for compartments, keyboard, USB connection, power switch	Evaluation criterion	Only suitable for working group and departmental MFDs/possibly market-restricting €
Quick settings/commands for orders	Saved settings for repeated orders	Minimum requirement	Only suitable for working group and departmental MFDs
High contrast and/or brightness mode on the control panel	Adjustable contrast and/or brightness between text and background.	Minimum requirement	Only suitable for working group and departmental MFDs
Colours are inverted on the control panel	Option to switch the colour used for the text and the background.	Evaluation criterion	Only suitable for working group and departmental MFDs €
Screen zoom on the control panel	Zooming into content on the control panel	Minimum requirement	Only suitable for working group and departmental MFDs €
Volume when you press a button	Volume adjustment with a button	Minimum requirement	Only suitable for working group and departmental MFDs
Navigation by means of gestures	Use of a device with assistance of hand gestures	Evaluation criterion	Only suitable for working group and departmental MFDs €
Visual and/or acoustic signal for ADF	Visually and acoustically signals the readiness for operation	Evaluation criterion	Only suitable for working group and departmental MFDs €

Criteria	Requirement	Suitable as	Comments/explanations
Extension handle (accessories)	Adjusting the control panel, lifting the document feeder (ADF), adjusting the feeds on the ADF, moving paper	Evaluation criterion	Only suitable for working group and departmental MFDs €
Input assist (accessories)	Voice commands (spoken instructions) and screen reader feature that reads the content on the control panel out loud	Evaluation criterion	Only suitable for working group and departmental MFDs/possibly market-restricting €
Remote control	Clients or mobile devices (e.g., smartphone, tablet) can be used to control the device	Evaluation criterion	Only suitable for working group and departmental MFDs €
Tiltable display	Display can be tilted	Evaluation criterion	Only suitable for working group and departmental MFDs €

Table 9: Accessibility – criteria and requirements

Control panel height 101.6 – 119.4 cm above the ground	Place the printer at a height that allows for the control panel to be between 101.6 and 119.4 cm above the ground. This is considered to be the ideal position for all users, including wheelchair users
Edge of a table	If the printer is placed on a table or cabinet, make sure it is no more than 30.5 cm from the edge for easy access to the control panel
Control panel angle 52˚ – 75˚	Set adjustable touchscreen control panels to an angle between 52˚ and 75˚. This is considered to be the ideal position for all users to easily see and reach the control panel

Table 10: Practical tips

4.7 Final processing of documents

MFDs can be equipped with a unit to post-process documents, which offers automated functionalities that make manual post-processing superfluous. It can take care of e.g., punching, stapling or folding. This can save considerable additional costs.

Employees must be trained accordingly in order to use these functionalities. Apart from any setting options on the device itself, particular attention should be paid to the configuration in the printer driver.

The following criteria are not part of the guideline standard. They may be considered optionally.

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Sorting**	• Determining the page sequence	Evaluation criterion	
2	**Staple**		Evaluation criterion	Market restriction possible (may be available as an internal or external accessory option, limited availability for A4 MFD). **€**
3	**Punch**	• z. B. zweifach, vierfach	Evaluation criterion	Market restriction possible (may be available as an 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 compartments	Evaluation criterion	Market restriction possible. **€**
7	**Folding**	• e. g., internal/external multifolding unit	Evaluation criterion	Only in combination with external brochure maker Letter folding is also offered for some MFD solutions for A3.

Table 11: Final processing of documents – requirements and criteria

4.8 Fax functionalities

The transmission speed is what is decisive for fax devices. Workplace, working group and departmental devices have a modem with a speed of up to 33,600 bps. If the connection quality is poor, the fax machine automatically selects a slower transmission speed that ensures secure transmission.

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Storage**	▪ Transmission and receiv-ing memory is available	Minimum requirement	
2	**PC fax**	▪ Fax on PC/network possi-ble	Evaluation criterion	
3	**Marking/versioning**	▪ Fax receipt date	Evaluation criterion	
4	**Transmission report**	▪ Transmission report can be switched on and off	Evaluation criterion	
5	**Number storage/ ad-dress book**	▪ Number storage of at least 99 numbers	Evaluation criterion	
6	**Redirecting**	▪ Redirecting to other numbers is possible	Evaluation criterion	

Table 12: Fax functionality – criteria and requirements

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

5 Special criteria and requirements for workstation devices

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

5.1 Page speed for DIN A4 devices

The output speed of MFDs is measured in ipm (images per minute) for both print and scan functions. So as to better be able to compare, the page throughput according to ISO/IEC 24734 is determined as an average ESAT value that results from one-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 listed values can be achieved by the devices offered. The page speeds specified in this guideline apply equally to monochrome (black and white) and colour prints.

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	Print	▪ Min. 20 ipm for DIN A4 acc. to ISO/IEC 24734	Minimum requirement	Generally also suitable as evaluation criteri-on. The page speed is measured in ipm accord-ing to ISO/IEC 24734 (= images per minute).
2	Scanning, (one-sided)	▪ Min. 20 ipm on ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.
3	Scanning (double-sided)	▪ Min. 20 ipm on ADF for DIN A4 (monochrome)	Evaluation criterion	The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.

Table 13: Special criteria and requirements page speed for DIN A4 devices

5.2 Page speed for DIN A3 devices

If MFDs with a DIN A3 format are required or permitted, the following parameters for the page speed must be met.

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	Print	▪ Min. 20 ipm for DIN A4 acc. to ISO/IEC 24734 Standard	Minimum requirement	Generally also suitable as evaluation criterion. The page speed is measured in ipm according to ISO/IEC 24734 (= images per minute). The page speed according to ISO/IEC 24734 is also measured as with A4 for A3 devices.
2	Scanning	▪ Min. 20 ipm on ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as evaluation criteri-on. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.

Table 14: Special criteria and requirements page speed for DIN A3 devices

5.3 Paper reserve

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	Paper reserve	▪ Min. 250 sheets DIN A3 or A4	Minimum requirement	

Table 15: Special criteria and requirements for printing and copying

6 Special criteria and requirements for working group devices

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

6.1 Page speed for DIN A4 devices

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Print**	▪ Min. 24 ipm for DINA4 acc to. ISO/IEC 24734	Minimum requirement	Generally also suitable as evaluation criterion. Requirements apply to monochrome and colour prints. The page speed is measured in ipm according to ISO/IEC 24734 (= images per minute).
2	**Scanning one-sided**	▪ Min. 25 ipm on ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers..
3	**Scanning double-sided**	▪ Min. 25 ipm on ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.

Table 16: Special criteria and requirements for working group devices: Page speed for DIN A4 devices

6.2   Page speed for DIN A3 devices

If MFDs with a DIN A3 format are required or permitted, the following parameters for the page speed must be met.

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Print**	▪ Min. 24 ipm for DINA4 acc to. ISO/IEC 24734	Minimum requirement	Generally also suitable as evaluation criterion. Requirements apply to monochrome and colour prints. The page speed is measured in ipm according to ISO/IEC 24734 (= images per minute). The page speed according to ISO/IEC 24734 is also measured as with A4 for A3 devices.
2	**Scanning one-sided**	▪ Min. 25 ipm on ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.
3	**Scanning double-sided**	▪ Min. 25 ipm on ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.

Table 17: Special criteria and requirements for working group devices: Page speed for DIN A3 devices

6.3   Paper reserve

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Paper reserve**	▪ Min. 500 sheets standard cartridge ▪ Min. 500 sheets further cartridge ▪ DIN A3 and A4	Minimum requirement	

Table 18: Special criteria and requirements for working group devices: Printing and copying

7 Special criteria and requirements for 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. section 4.1 above), the following applies to workgroup devices:

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Print**	▪ Min. 30 ipm for DINA4 acc. to ISO/IEC 24734 for all devices	Minimum require-ment	Generally also suitable as evaluation criterion. The page speed is measured in ipm according to ISO/IEC 24734 (= images per minute).
2	**Scanning, one-sided**	▪ Min. 35 ipm on ADF for DIN A4 (monochrome)	Minimum require-ment	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.
3	**Scanning double-sided**	▪ Min. 35 ipm on ADF for DIN A4 (monochrome)	Minimum require-ment	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.

Table 19: Special criteria and requirements for departmental devices: Page speed for DIN A4 devices

7.2   Page speed for DIN A3 devices

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Print**	▪ Min. 30 ipm for DIN A4 (monochrome) acc. to ISO/IEC 24734	Minimum requirement	Generally also suitable as evaluation criterion. The page speed is measured in ipm according to ISO/IEC 24734 (= images per minute). The page speed according to ISO/IEC 24734 is also measured as with A4 for A3 devices.
2	**Scanning, one-sided**	▪ Min. 35 ipm on ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.
3	**Scanning, double-sided**	▪ Min. 35 ipm on ADF for DIN A4 (monochrome)	Minimum requirement	Generally also suitable as evaluation criterion. The ISO/IEC standard 17991 to measure the scanning speed is not yet consistently applied by all manufacturers.

Table 20: Special criteria and requirements for departmental devices: Page speed for DIN A3 devices

7.3   Paper reserve

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	**Paper reserve**	▪ Min. 500 sheets standard cartridge ▪ Can be upgraded later, or optionally to a total paper reserve of at least 1,500 sheets	Minimum requirement	Applies to DIN A4 and DIN A3 devices

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

8 Environmental and health protection

8.1 Legal requirements

By law, MFD manufacturers must meet strict requirements outside of public procurement law. Mandatory requirements for environmental sustainability (e.g., environmentally friendly disposal of old devices, ban on certain substances in products) result from, among others, the following laws and regulations:

- The WEEE Directive (2012/19/EU) implemented into German law by the German Electrical and Electronic Equipment Act (Elektro- und Elektronikgesetz, ElektroG), which regulates the disposal of products.
- The ROHS Directive (2011/65/EU) implemented into German law by the German Electrical and Electronic Equipment Substance Act (Elektro- und Elektronikgeräte-Stoff-Verordnung, ElektroStoffV), which regulates the pollutant content of products.
- The EU Directive 2006/66/EC implemented into German law by the German Battery Directive (Batteriegesetz, BattG).[5]
- The substance requirements defined by the REACH Chemical Directive (EC/1907/2006) and the POP Directive (EC/850/2004.

If a manufacturer does not meet these basic legal requirements for the protection of the environment and health, in addition to the legal requirements for product safety and electromagnetic tolerance, it is not permitted to place its products on the European market at all. Compliance with the mandatory legal requirements is identified, for example, by the CE mark.

> (!) The legal requirements for the protection of the environment and health apply equally to all MFDs and printers and therefore do not have to be included in the performance specification.

> (!) The manufacturer declares with the CE mark that the product meets the applicable legal requirements, as stipulated in the collective harmonisation legislation about their application.

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5   At the time of publication of the guideline, an update of the Directive was being discussed at European level.

8.2 Energy efficiency in procurement law

Public procurement law places particular importance on energy efficiency when procuring technical devices (Section 67 VgV). If the procurer sets specifications for the energy efficiency of MFDs and printers, this must be substantiated in the performance specification preferably with reference to the relevant technical standards and specifications (cf. Section 31 para. 2 VgV).

The question of how to prove fulfilment of these requirements is to be separated from the performance specification and the performance and functional requirements contained therein (see Sections 8.4 and 8.5 below).

Pursuant to Section 67 para. 2 No. 1 VgV, when purchasing MFDs in the upper threshold range, the performance specification must specify the highest level of energy efficiency. The following help to determine the highest level of energy efficiency: the requirements of the currently valid ENERGY STAR program for imaging products and the requirements of, for example, the "Blue Angel« eco-label for office equipment with printing functions in its currently valid version.

The ENERGY STAR measurement method has established itself for measuring the typical electricity consumption of a multifunctional device. The so-called »**TEC**« value is then determined. The »TEC« **method** evaluates the **typical electricity consumption** of a device in standardised operation over a representative period of time.[6] The electricity consumption for MFDs and printers is specified in **kWh per week**. The »Blue Angel« eco-label has now fully adopted this measurement method for all printing technologies and performance classes.

The »Blue Angel« eco-label also takes the following other parameters into account:
- maximum power consumption in watts while in sleep mode,
- maximum preset times for the power-saving states of the devices,
- maximum return times to ready-to-print mode from power-saving modes.

As part of the »Blue Angel« eco-label, the average power consumption in the individual operating modes is also being determined.

If the average power consumption is to be used to assess the energy efficiency of devices, the measurement method as well as the definition of the operating states must be specified by the procurer (see glossary).

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6   The exact requirements on the individual criteria can be found in the award principles on these quality marks.

ENERGY STAR® notice: The ↗ **EU ENERGY STAR** program results from an agreement between the European Community (EU) and the United States 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 started the program in the US in 1992.

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

Since the termination of the agreement, manufacturers are no longer permitted to affix the label or use it for advertisement on devices intended only for the European market. However, reference to compliance with the criteria is still possible. Using the test procedure to determine the TEC value to indicate the electricity consumption per week is also still possible.

The »Blue Angel« DE-UZ 219 label for office devices with a printing function, which was revised in 2021, enables the criteria of ENERGY STAR 3.0/3.1 to be harmonised with the criteria of the »Blue Angel«. This makes it possible to use the »Blue Angel« label to verify compliance with the energy criteria of ENERGY STAR.

Furthermore, in accordance with Section 67 para. 2 No. 1 VgV, specific information on energy consumption must be provided in the performance specification or at another suitable point in the tender documents. The public contracting authority does not have any discretion in this regard (Bundestag document No. 18/7318, p. 202). The public contracting authority must adequately consider the energy costs as an award criterion when determining the most economical offer, although it is entitled to some leeway in assessing the appropriateness of the consideration (op. cit.). In terms of the award criterion »energy costs«, the printing system costs for an entire usage cycle[7] should therefore be determined in order to be able to ascertain and evaluate the expected energy costs (more on this under 10.1 Energy consumption costs in the usage cycle).

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7   Usage during the intended contractual period

8.3 Environmental requirements in procurement law

In addition to energy efficiency, the procuring entity can include other environmental aspects in the performance specification (Section 31 para. 3 sentence 1 VgV, Section 23 para. 2 UVgO). These aspects can also relate to the process or the method of manufacture or to the provision of the service or to another stage in the life cycle of the procurement object – including the production and supply chain. This also applies if those factors are not material elements of the deliverable, provided that those features are related to the subject matter of the contract and are proportionate to its value and the procurement objectives (Section 31 para. 3 sentence 3 VgV, Section 23 para. 2 UVgO).

Other environment-related features for MFDs and printers are those requirements that are already being reviewed in the context of awarding internationally recognised environmental labels (»Blue Angel« according to DE-UZ 219, ENERGY STAR®, EPEAT IEEE1680.2 2012). In particular, these are the following environmental criteria, which, however, are not required in the same way for every eco-label (cf. table under 8.5):

- recyclable construction;
- recalling colour modules and colourant containers;
- specification of the yield of ink and toner;
- resource-saving paper handling;
- warranty, repair services, availability of spare parts;
- durability;
- packaging (material and labelling);
- restriction of substances used in housing and housing parts materials;
- substances in the carrier material of printed circuit boards;
- substances in colourants;
- material emissions;
- disclosing the content of post-consumer recycled plastic;
- minimum value 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

The particular relevance of these requirements is explained in further detail below.

8.3.1 Noise emissions

Z Various procedures are available to determine the noise emissions of an MFD. The international standard procedure is based on ISO 7779. The German eco-label »Blue Angel« is based on this standard, but made changes with the revision DE ZU 219, which lead to different (generally higher) results. There may therefore be varying information in brochures and other information from manufacturers, depending on which measurement method the particulars are based on.

Only the test values from the environmental labels are currently available to determine whether an MFD can be classified as particularly low-noise. If a device verifiably complies with the test values, it is considered a low-noise device. To carry out this assessment, the determined A-weighted guaranteed sound power level (cf. glossary at the end of this Section 8.4) is compared to a specific test value, which is usually determined depending on the printing speed of the device. This means that a slower device has to meet a lower test value than a faster device in order to receive an eco-label.

If several devices are to be compared with each other in terms of their noise emissions, the measurement method used to determine the values must be named. If the measurement method is not named, 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 either stated in Bel (B) or decibel (dB) to one decimal place.

Criteria	Requirement	Suitable as	Comments/explanations
Guaranteed A-weighted sound power level accord-ing to DE-UZ 219	Compliance with the test value according to Chapter 3.5 of the award principles DE-UZ 219	Minimum requirement	**Determining the reference value: $LWA,lim = 48+14*lg(SM/F+4)dB$** With a page throughput of SM/F ≤ 10 gilt LWA,lim = 64 dB. SM/F: Print speed in monochrome or colour printing

Table 22: Noise emissions – criteria and requirements

Z As proof that a specified noise level is complied with, the »Blue Angel« seal of approval according to DE-UZ 219 or a manufacturer's declaration and test report according to ISO 7779, taking into account the requirements of DE-UZ 219 (»Blue Angel«), can be submitted to a body accredited pursuant to ISO 17025. Alternatively, a document containing the following information can also be submitted:

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

The test report or the document should only be called for upon request before the tender is awarded.

Other noise levels are often stated in brochures and other information. The following glossary explains these terms.

8.3.2 material emissions

Electronic devices emit volatile organic compounds into indoor air, whereby the release (emission) of such substances is amplified by use-related warming e.g., during printing processes. Depending on the technology used, ozone can also be produced when printing devices are in operation. These emissions should be kept as low as possible to maintain good air quality indoors.

The emission rates of imaging devices are determined according to the international ISO standard ISO/IEC 28360 – both in ready-to-print mode and during uninterrupted printing. The determined emission values always apply to the entire system including the consumables recommended by the manufacturer (toner/ink) and the paper used. If a different toner/ink is used other than the one recommended by the manufacturer, compliance with the emission values specified by the manufacturer can no longer be guaranteed.

Recommended minimum technical requirements:

Requirements for electrophotographic devices

All values in mg/h		Monochrome print	Colour print
Ready-to-print mode	TVOC	1 (desktop device) 2 (standing devices, device volumes > 250 l)	1 (desktop device) 2 (standing devices, device volumes > 250 l)
Printing phase (sum of ready-to-print mode + printing phase)	TVOC	10	18
	Benzene	< 0.05	< 0.05
	Non-identified individual substances VOC	0.9	0.9
	Styrene	1.0	1.8
	Ozone	1.5	3.0
	Dust	4.0	4.0

Table 23: Requirements for electrophotographic devices

Requirements for ink(jet) devices

Alle Werte in mg/h		Monochromdruck	Farbdruck
Ready-to-print mode	TVOC	1 (desktop device) 2 (standing devices, device volumes > 250 l)	1 (desktop device) 2 (standing devices, device volumes > 250 l)
Printing phase (sum of ready-to-print mode + printing phase)	TVOC	10	18
	Benzene	< 0.05	< 0.05
	Styrene	1.0	1.8
	Non-identified individual substances VOC	0.9	0.9

Table 24: Material emissions: Requirements for ink(jet) devices

Devices that have been awarded the »Blue Angel« quality mark according to DE-UZ 219 comply with these requirements. The following applies according to DE-UZ 219.

- until 31/12/2022, the test value up to PER10 PW per 10 min printing time of $3.5*10^{11}$ [particles/10 min]
- from 01/01/2023, the test value PER10 PW [particles/10min] of $\leq 3.0*10^{11}$.
- from 01/01/2025, the test value PER10 PW [particles/10min] of $\leq 2.5*10^{11}$.

As a result, the requirements for devices will become more stringent in future.

The following documents are considered to be equivalent proof of 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);
- verification that particle emission measurements can be carried out competently in accordance with DE-UZ 219 (competence of a laboratory results from the »List of certified laboratories for DE-UZ 177, DE-UZ 205 and DE-UZ 219«)
- Signature of the authorised person from the laboratory (e.g., laboratory manager)
- Emission rates (PER) for TVOC, benzene, styrene and dust.

The test report or the document should only be called for upon request before the tender is awarded.

8.3.3 Resource conservation and recyclable design

An environmentally friendly product design helps to ensure that products have a long service life and can be recycled in an environmentally friendly manner when their service life has expired. Reusing devices should therefore always be the priority.

Competent maintenance also has an important impact on the environmental characteristics of devices, which is why maintenance should only be carried out by trained or competent persons (e.g., as part of a service contract).

In order to conserve resources, the service life of products must be taken into account when procuring them. All manufacturers take the service life and repair capacity into consideration when developing products.

More specifically, resource conservation is achieved in different ways.

Important approaches are the replacement of wear parts and groups, as well as the use and deployment of refurbished or overhauled devices. A market survey could serve to further examine these different ways of ensuring the service life of products.

The requirements of the eco-labels mentioned below (in Section 8.5) describe discerning requirements for resource conservation and a recyclable design.

The exact requirements of the individual criteria can be found in the award principles of these quality marks.

The exact requirements of the individual criteria can be found in the award principles of these quality marks.

Devices that have been awarded the mentioned seals of approval comply with these requirements. A manufacturer's declaration should also be accepted as proof.

8.3.4 Material properties and substance-related requirements

Printers and MFDs are made up of a large number of individual components and different substances. By excluding certain substances, the emission of said substances into the environment is reduced, which makes a significant contribution to environmental and health protection.

€ The requirements of the »Blue Angel« eco-label and EPEAT IEEE1680.2 2012 (listed under 8.5) are discerning requirements for material properties and the restriction of certain substances, which go far beyond the legal requirements, but can lead to cost increases in the offers.

The exact requirements of the individual criteria can be found in the award principles of these quality marks. Devices that have been awarded the mentioned seals of approval comply with these requirements.

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

8.3.5 Return systems for devices and consumables

Electronic device providers on the German market are subject to the German ElektroG, which implements the Waste Electrical and Electronic Equipment Directive (WEEE) of the European Union. It also regulates the requirements for the return and disposal of electronic devices.

Moreover, the provider should offer a free return system for consumables (toner, ink) and be able to provide information about the type of reuse or further recycling.

The return systems for devices and consumables should be implemented by the provider with the primary objective of reusing the devices.

8.4 Certifications and labels for verification purposes

Z In addition to mandatory device marks such as the CE mark (often erroneously requested as a certificate/award), there are many voluntary certifications and awards that highlight special product features or serve as proof of compliance with special requirements in certain usage environments. Public contracting entities can demand presentation of such verifications to more readily determine that the offer complies with the characteristics demanded in the performance specification.[8] If the procurer demands presentation of such a quality mark, it must be usable within the meaning of public procurement legislation, i.e. in particular, for providing suitable verification of the characteristics demanded in the performance specification (Section34 para. 2 VgV). Moreover, alternative quality marks that place similar requirements on the service must be accepted as well.

A distinction should be made between the certificate as potential verification and the actual requirements placed on the object to be procured. Requirements must be formulated in a call for tender in a binding manner. Certificates can be used to verify compliance with these requirements. Declarations of manufacturers should be recognised as evidence if their credibility can be suitably asserted, e.g., with test and inspection reports, or if they meet international standards.

Certificates and their scope of application for multifunction systems are listed in the following. They are relevant for certain requirements. The procurer must decide which of these verifications is required for the scope of use in question on a case-by-case basis.

What is important in all test procedures that result in a certificate, is that 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 generally not transferrable if the device is to be operated with consumables other than those recommended by the manufacturer.

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8   Cf. Section 34 para. 1 VgV and Art. 43 para. 1 of Directive 2014/24/EU

Certificate/award	Contents and scope	Recommended area of application	Verification by
GS mark (»Geprüfte Sicherheit« [tested safety])	Conformity certificate for product safety, product safety law and the applicable ergonomic requirements	General	Certificate from a GS test institute recognised by the Central Office for Safety Technology (ZLS)
Eco-label	Environmentally relevant properties of a product (see table 8.5)	General	Manufacturer's declaration (e.g., IT EcoDeclaration), certificates (e.g., »Blue Angel«), references to published databases
Suitability for the creation of originals, copies and certified copies of notarial deeds and other documents in ac-cordance with Sec-tion 29 of the Ger-man Service Regula-tions for Notaries (DONot)	Verification of the authenticity of documents for the entire multifunc-tional device system	Creation of certificates, contracts and contract-like documents	Certificate from the Papiertechnischen Stiftung (»PTS test certificate«)

Table 25: Certifications and labels for verification purposes

8.5   Comparability of eco-labels

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

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

If quality marks are required by the procurer as verification, they must meet certain criteria in accordance with Section 34 VgV.

> **!** Not all »quality marks« meet the statutory provisions. Before a certain quality mark is required as proof, an evaluation according to Section 34 VgV must be carried out preemptively.
>
> Many private quality marks do not meet, for example, the requirements of Section 34 para. 2 No. 3 VgV: Development within the framework of an open, transparent process in which all interested parties can participate.
>
> The quality marks listed in the table below meet the requirements of Section 34 VgV.
>
> **!** It should be noted that a prerequisite for the validity of the »Blue Angel« or other certificates (e.g., PTS) is the use of original toner or ink, since the entire system including consumables is always evaluated.

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

Criteria	Blue Angel DE-UZ 219 (DE ZU 205 is also still valid until the end of 2021)	EPEAT IEEE1680.
recyclable construction	Yes	Yes (partly mandatory, partly optional)
recalling colour modules and colourant containers	Yes	Yes
specification of the yield of ink and toner	Yes	No
Ressourcenschonendes Papierhandling	Yes	Yes
resource-saving paper handling	Yes	Yes
Warranty, repair services, availabil-ity of spare parts	Yes	Yes
durability	Yes	Yes
packaging (material and labelling)	Yes	Yes
restriction of substances used in housing and housing parts materi-als	Yes	Optional
substances in the carrier material of printed circuit boards	Yes	Yes
substances in colourants	Yes	Yes (except particle emissions)
material emissions	Yes	Yes
disclosing the content of post-consumer recycled plastic	Yes	Optional
minimum value of post-consumer recycled plastic	Yes (from UZ-219, progressive implementation)	Yes
Electricity consumption	Yes	No
noise emissions during the printing process	Yes	Yes
Product documents and user information	Yes	Yes
Compliance with key European legislation on substances and materials (RoHS, REACH, EU Bat-tery Directive)	Yes	Yes
ecological Life Cycle Assessment (LCA)/carbon footprint	No	Self-declaration: Yes
environmental management for production and design	No	Certification: optional
Social sustainability in production	Yes (from 2024)	No
Due diligence of companies when procuring raw materials	Yes (verification from 2022/certified verification from 2024)	No
Support from on-site initiatives for responsible mining	Yes	No

Table 26: Comparability of eco-labels

Special feature of EPEAT: While the principle of »all or nothing« applies to other eco-labels, where all listed criteria must be met to be allowed to use the label, EPEAT is graded into bronze, silver and gold. Certain criteria must be met to receive a bronze status. The silver status is awarded if at least 50% of the optional criteria are met; the gold status is awarded if more than 75% of the optional criteria are met. It is up to the manufacturer to decide which optional criteria must be met.

Other European eco-labels (»Nordic Swan« and »The Austrian Ecolabel« [Österreichisches Umweltzeichen]) are either not awarded in Germany, or cover the same criteria as the listed eco-labels applicable in Germany.

8.6 Information on the sustainable procurement of consumables

Public bodies have a variety of options when it comes to deciding on purchasing printer supplies: new printer supplies from an original manufacturer (OEM), refurbished cartridges, refilled or replicated printer supplies. There are big differences between the properties, performance and environmental impact of these products – not only between categories, but also within one and the same category. Public procurement officials should know what they are buying and the potential impact of their purchasing decision. The Association of the Austrian Electrical and Electronics Industry (Fachverband der Elektro- und Elektronikindustrie Österreich, FEEI) has published a white paper »Recommendation for sustainable public procurement in Austria – guidelines for purchasing printing supplies«. This guideline specifies various criteria for sustainable public procurement.[9] Among others, this includes:

- legal criteria (CE mark, liability for material defects, etc.);
- environmental criteria (indoor air quality, MSDS safety data sheet, return of ink cartridges or toner cartridges, etc.);
- social criteria/work criteria (ILO standards, conflict minerals, etc.);
- participation of bidders from third countries;
- quality-oriented procurement

The Blue Angel also verifies compliance with the requirements for the sustainable design of consumables. It should be noted that the DE-UZ 205 and DE-UZ 219 labels for office devices with a printer function also include all the requirements for the consumables as recommended by the manufacturer. These include, for example, provisions for the housing plastics used or the exclusion of hazardous substances in toner or ink.

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

A special label was created for processed toner modules: namely DE-UZ 177. In addition to special requirements for the refurbishing process, the toner modules must also meet the same criteria as the original material. The manufacturer of these refurbished cartridges must also be able to demonstrate that the cartridges do not have an adverse effect on the emission properties of the devices for which the cartridges are intended.

> **!** The DE-UZ 177 label exclusively applies to refurbished toner modules and, since July 2021, also to refurbished ink modules. It does not apply to replicas of original cartridges. There is currently no valid eco-label for replicas, which makes checking compliance with sustainability criteria difficult.
>
> Original modules are only marked with the main label DE-UZ 205 (until 31/12/2021) or DE-UZ 219 (from 01/01/2022).

9   IT security

Not only can computers and servers become the target of cyber-attacks, data theft, and data misuse, but so can printers and MFDs. Attacks of this nature risk the confidentiality of the data processed with the MFDs as well as the functionality of the devices themselves. Network, device and data security can be significantly increased by taking appropriate precautionary measures. Modern printers and MFDs can have security features integrated at the factory. The market offers extensive security features. Activating and using these security features is recommended, especially when personal data are processed (cf. Art. 25 and 32 of the ↗ General Data Protection Regulation). Data protection and data security for MFDs can however ultimately only be established through a combination of organisational measures, due diligence on the part of the device user and security functions inherent in the device.

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

Since features to increase IT security are not part of the standard requirements for all MFDs, these features are usually only offered at the request of the procurer. Equipping the device with appropriate precautionary measures has an impact on the bid price, which is why the procurer should formulate their requirements in this regard very carefully, based on a comprehensive analysis of the data to be processed and the corresponding security requirements.

No.	Criteria	Requirements	Suitable as	Comments/explanations
1	Local user authentication	• Device must meet the technical requirements for authentication	Minimum requirement	Authentication on the device itself e.g., by means of a PIN, Smartcard, prescribed key combination, etc.
		• Must be possible to set timeouts (log out automat-ically)	Minimum requirement	
		• Must be possible to configure timeouts (when, how long)	Evaluation criterion	
		• Mandatory to change the factory default passwords	Evaluation criterion	The password guideline applies when changing one's password, insofar as such is implemented in the device.
2	Authentication of the user's network	• Network access to MFDs must be restrictable	Minimum requirement	Functions that are used via the network depend on authentication when logging on to the network, e.g., via password, Active Directory Integration, PIN
3	Confidential printing	• Print output only when the user is present	Minimum requirement	e.g., via PIN code assignment to print jobs or by user authentication
4	Confidential fax reception	• Fax output not at all times and immediately	Evaluation criterion	e.g., pull printing, time control of the fax output, forwarding to email
5	Audiovisual information	• Incorrect entries during authentication attempts on the printing system are signalled audibly.	Evaluation criterion	Serves as a warning signal to the environment about attempts of misuse during authentication
6	Job logging	• Access restriction to job logs	Minimum requirement	User must authenticate themselves to be able to see the job logs
7	Protection of interfaces	• Must be possible to deactivate individual connections/accesses	Minimum requirement	
8	Must be possible to deactivate network protocols	• It must be possible to deactivate individual network protocols not in use	Minimum requirement	Disabling the http or https log is equivalent to disabling the built-in web server. It must then be possible to carry out configurations either on the device or via another network protocol.
9	Password protection	• Support of password policies	Evaluation criterion	Option to regulate security requirements for the formation of passwords
10	Automatic delete function	• Once the print job has been completed, print data and files must be deleted automatically and securely (irrecoverably)	Minimum requirement	Criterion only applies to magnetic hard disk drives (HDD).
11	Data carrier encryption	• Standard 256-bit encryption for 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 working group and departmental devices
13	Must be possible to remove mass memory	• Must be possible to remove mass memory non-destructively	Minimum requirement	If a hard disk is installed as mass memory, it must be possible to remove it. Primarily applies to working group and departmental MFDs.
14	Must be possible to install security updates	• Printer must offer option to update firmware • Rejection of unsigned updates	Minimum requirement	

No.	Criteria	Requirements	Suitable as	Comments/explanations
15	**Provision of security updates**	▪ Swift provision of firmware updates when security gaps become known ▪ Manufacturer signing of updates	Minimum requirement	The period for which security updates are to be provided should be contractually agreed.
16	**Authentication of authorised users**	▪ Limited number of failed login attempts	Minimum requirement	Restrictions should apply to all network protocols (»log-in path«).
		▪ Division of user rights into administrator and user roles	Minimum requirement	Division can be even more discerning
17	**Transport encryption**	▪ Transport encryption of print data ▪ Transport encryption of configuration access (e.g., web server)	Minimum requirement	

Table 27: IT security – criteria and requirements

Z Up until now, proof of IT security requirements through certificates is not common practice for MFDs. There are currently also no cross-provider certification options on the market that systematically cover the special requirements of public administration for the IT security of MFDs.

Due to the high and increasingly important requirements placed on the IT security of MFDs, and due to the technical complexity of the required measures, AK Printing Solution Services at Bitkom has developed its own guideline for the security of printing systems, which describes – in terms of content and technology – detailed threat scenarios for the IT security of multifunction devices, the resulting requirements, as well as possible protective measures. This guideline, like the Guideline for Product-Neutral Calls for Tender, can be found on the website ↗ hhttps://www.itk-befertigung.de/.

10   Award criteria

Following Section 127 of the German Act Against Restraints of Competition (GWB), the award must go to the most cost-efficient offer. The most economical tender is determined on the basis of the best price-performance ratio. In addition to price or costs, qualitative, environmental or social award criteria may also be taken into account. In the case of supply services relevant to energy consumption, energy efficiency must be given due consideration as an award criterion, Section 67 (5) VgV.

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

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

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

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

10.1   Energy consumption costs in the usage cycle

To determine the costs of a printing system for an entire usage cycle[10], the expected energy costs must also be recorded and evaluated. There are two options available for this:

1. Determination based on the TEC value according to »ENERGY STAR®«/»Blauer Engel«,

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

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10   Usage during the intended contractual period

Option 1: Calculating according to the TEC value

The TEC value[11], which is also what the »Blue Angel« label is based on, relates to the electricity consumption per week under comparable usage, with comparable usage scenarios being assumed. The following formula is used to calculate the energy costs for an entire usage cycle:

Electricity costs per kWh [EUR/kWh] * TEC [kWh/week] * planned duration of use [weeks] = energy costs for an entire usage cycle.

> **!** A comparison of energy efficiency based on a TEC value should only be made when comparing devices with the same printing speed. The reason for this is that the TEC value is determined based on a daily print volume that is dependent on the page speed.

Difference in the TEC value determination according to ENERGY STAR 2.0/Blue Angel DE-UZ 205 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 the weekly electricity consumption. Thus, it has been considered in the meantime that the electricity consumption during the time when the device is not printing has a decisive share in the total electricity consumption of the device. In day-to-day use, the devices are in power-saving or sleep mode for a majority of the time. This was newly considered when calculating the TEC value, so that with the introduction of ENERGY STAR 3.0, significantly lower TEC values are stipulated than before.

IMPORTANT: When comparing two TEC values, it should always be stated which method was used to determine these values. The values can only be compared with one another if the same method was used.

Exception for production presses: the TEC value is still determined using the older method.

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11   Corresponds to the »typical electricity consumption value« (TSV value) in Germany

Example as an illustration:

Page speed MFD	Based on printed pages per day according to ENERGY STAR/"Blue Angel"	Based on number of print jobs per day according to ENERGY STAR/"Blue Angel"	Resulting print time per day (= delay time in print mode)
20 pages/min.	200 pages	20	10 minutes
30 pages/min.		30	15 minutes
45 pages/min.	992 pages	32	22.04 minutes
50 pages/min.	1,248 pages	32	24.96 minutes
65 pages/min.	2,112 pages	32	32.5 minutes

Table 28: Example calculation 1: Energy consumption costs in the usage cycle

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

If the planned print volume deviates significantly from the standardised print volume on which the TEC value is based (cf. table above), and devices are to be compared that have different print speeds, an alternative method can also be used. This is based on the performance measurement in various operating modes in connection with the associated delay times. In order to ensure that devices from different providers can be compared, the procurer must specify various parameters for the calculation. To do so, the following parameters would have to be collected:

- power consumption in watts in the different operating states;
- time spent in each operating state (according to the ENERGY STAR program) in minutes as set by the provider (factory setting);[12]
- print volume in pages per month (specified by the procurer);
- printing speed according to DIN ISO 24734;
- scope and number of print jobs per day (specified by the procurer);
- specification of switch-off times (mains switch off) per week.

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12   The usage scenarios are described in the ENERGY STAR test methodology: ENERGY STAR Program Requirements for Imaging Equipment – Test Method for Determining Imaging Equipment Energy Use, Table 11

The following example is intended to illustrate the data collection and calculation when the actual usage scenario deviates significantly from the assumed usage scenario of the TEC method. The coloured backgrounds have the following meaning:

- information coloured in orange is to be determined or specified by the procurer;
- information that is coloured white relates to technical properties of the device, to be specified by the provider;
- cells that are coloured in blue are the result of calculations based on the information provided by the procurer and the provider.

	Paramter	Where does the value come from?	Example device with 4 operating modes (in operation, ready-to-print, sleep mode, off mode)
Use case	Print volume/week per device	Procurer must determine and specify	500
	Print speed ipm according to ISO/IEC 24734	According to information from the provider	40
	Average number of pages per print job [images per job]	Procurer must determine and specify	5
	Number of print jobs per week	Is calculated: [print volume/week]/[images per job]	100
	Preset time to reach sleep mode after printing [min] = delay time in ready-to-print mode after a print	According to the provider in the factory settings (= preset time/ default delay time to sleep)	1
	Off (h/week)	Is specified by procurer: How many hours per week is the device usually switched off completely (e.g., on weekends)	48.00
Delay times for each operating mode, resulting from the specifications in the use scenario	Delay time in operation [h/week]	Is calculated: [print volume/week]/[images per job]/60	0.21
	Delay time in ready-to-print mode [h/week]	Is calculated: [preset time for reaching sleep mode]*[print jobs per week]/60	1.67
	Delay time in sleep mode [h/week]	Is calculated: 168 weekly hours - [off hours] - [ready-to-print hours] - [operating hours]	118.13

	Paramter	Where does the value come from?	Example device with 4 operating modes (in operation, ready-to-print, sleep mode, off mode)
Average electricity consumption of the device according to DE-UZ 219	Operation [W] definition according to DE-UZ 219	According to information from the provider	348
	Ready-to-print mode [W] definition according to DE-UZ 219	According to information from the provider	59
	Sleep mode [W] definition according to DE-UZ 219	According to information from the provider	1.2
	Switched off (hardware) [W] definition according to DE-UZ 219	According to information from the provider	0.1

Table 29: Example calculation 2: Data collection and calculation in the event of significant deviation from the actual usage scenario

There are devices that switch to other operating modes after printing, before going into sleep mode. The average power consumption in these operating modes moves between the values of power consumption in ready-to-print mode and in sleep mode. The longer the actual times are delayed in these modes, the greater their impact on the overall electricity consumption of the device. If these operating modes are to be taken into account, both the power consumption and the respective delay time must be determined, and subsequently included in the calculation presented here. In addition, the delay time in the respective operating modes can be set individually according to the user's needs, e.g., standby after 5, 30, 45, 60 minutes.

	Paramter	Woher kommt der Wert?	Beispielgerät mit 4 Betriebsmodi (Druckbetrieb, Druckbereitschaft, Ruhemodus, Aus-Modus)
Estimated electricity consumption for the above scenario	In operation [kWh/week]	Is calculated: [operating power consump-tion]/ 1000*[operating delay time]	0.073
	In ready-to-print mode [kWh/week]	Is calculated: [ready-to-print power consump-tion]/1000*[ready-to-print mode delay time]	0.098
	In sleep mode [kWh/week]	Is calculated: [sleep mode power consump-tion]/1000*[sleep mode delay time]	0.142
	In off mode [kWh/week]	Is calculated: [switched off power consump-tio-n]/1000*[switched off delay time]	0.005
	Total electricity con-sumption per week [kWh/week]	Is calculated from the sum of the electricity consumption in the operating states	0.317

	Paramter	Woher kommt der Wert?	Beispielgerät mit 4 Betriebsmodi
Cost calculation	Assumed electricity price [EUR]	Procurer must specify	€0.20
	Term [years]	Procurer must specify	4,000
	Electricity costs per device over the contrac-tual term [EUR]	Is calculated: [electricity consump-tion/week]* 52*[contractual term]*[electricity price]	€13.20
	Number of same devices with the same usage scenario	Procurer must determine and specify	500
	Costs over term for all same devices with the same usage scenario	Is calculated: [electricity costs per device over the contractual term]* [number of devices]	€6,601.57

Table 30: Electricity consumption of different operating modes and cost calculation

Important: If measurement methods are carried out that do not correspond to the standard measurement methods (ENERGY STAR), one must expect increased costs and market restrictions.

10.2   Calculation of cost per page

When an MFD is procured through a purchase, the printing and copying costs (for consumables) that arise during the planned service life can be determined by means of a cost per page calculation. However, a cost per page calculation is only possible if both the hardware and the consumables are tendered together. This is the only way to make the offers comparable. The valuation price for the award is then made up 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 so, it is necessary to preemptively analyse the expected printing and copying volume, and to specify the planned service life as precisely as possible.

The calculation is based on specifications relating to operational performance and price per unit.

ISO/IEC 19752 is used as a guideline for determining the range of consumables for monochrome laser printers, ISO/IEC 19798 for colour laser printers, and ISO/IEC 24711 for inkjet printers. The ISO/IEC 19752 test template is used for monochrome printers and the ISO/IEC 24712 standard test document is used for colour laser and inkjet printers.

Item	Reach	Unit	Price	Factor	Price per page
Toner black	10,000	Page	50,00	1	0.005
Drum	20,000	Page	120,00	1	0.006
Residual dye container	20,000	Page	20,00	1	0.001
			Total costs per page in EUR:		**0.012**
Other costs:					
e.g., maintenance kits					

Cost basis: estimated print volume of 750 A4 pages per month over four years.

Cost calculation for four years		Print output to be considered (36,000 pages minus initial stocking, e.g., 10,000 pages toner)	Service life: 48 months
Cost per page toner	0.005	26,000	130.00
Cost per page drum		16,000	96.00
Residual dye container	0.006	16,000	16.00
	Total cost for 48 months in EUR:		**242.00**

Table 31: Example calculation of cost per page

11 Contractual provisions

11.1 EVB-IT (supplementary terms of contract for the procurement of I.T.)

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

11.2 Social sustainability

Besides economic and ecological criteria, social aspects should be considered in tender procedures (Section 97 para. 3 GWB, 31 para. 3 VgV for the upper-threshold procurement, Section 2 para. 3, 22 para. 2 UVgO for lower-threshold procurements). Such social aspects include, in particular, the rights of employees, the prohibition of child labour and employee discrimination, and compliance with the working hours framework at both the tenderer and their suppliers. To make sure these aspects are taken into consideration in the tender procedure for IT products and IT services, the awarding party can require each bidder in the tender procedure to submit a declaration of social sustainability for IT. This declaration, one of the so-called text components for contract design and elaborations on the scope of application (handout), can be retrieved from the website of the German Ministry of the Interior's Procurement Office and on itk-beschaffung.de.[13] With the DE-UZ 219 version, the Blue Angel also includes criteria for social sustainability.

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13   ↗ www.itk-beschaffung.de/Verpflichtungserklaerung-2019

12 Practical suggestions for the tender procedure

12.1 Market research

Market research is a helpful tool when it comes to preparing for a tender procedure. The results can be very helpful in carrying out a needs analysis and formulating the requirements or performance specification in a manner compliant with procurement law. If the public contracting entity is well informed on common market products and requirements, this might also increase the efficiency of legally compliant procurement tendering.

Market research is expressly permitted by the law:

»Before launching a procurement procedure, the public contracting entity may conduct market research to prepare for the procurement and to inform undertakings of its procurement plans and requirements«. (Section 28 para. 1 VgV)

Section 28 VgV does not specify in detail the way in which market research should be conducted. Consequently, this ensures compliance with general principles under procurement law such as equal treatment and transparency. This guideline provides an introduction to MFD market research.

12.2 Testing

Proofs of concept are expedient and recommended for checking and validating the performance parameters specified by the providers. The test scenario should represent the future usage scenario.

13   Annexes

13.1   Needs analysis and check list

A thorough determination of the procurement requirements is carried out at the beginning of every tender procedure, i.e., the future needs-based equipment of the consumer. For this purpose, both current and future requirements should be identified and taken into account in an up-to-date inventory. Generally, in the first step, the actual state and volume of the print output infrastructure is analysed, among other things, in regard to the number and type of document-based input and output systems used (multifunction devices, printers, faxes and scanners). The actual state analysis must include, in addition the required MFDs (hardware), the existing systems, the associated consumables, software and services, as well as the indirect costs (e.g., energy costs, administration costs or costs for the required floor space). The following table is intended to support the inventory and needs analysis, and does not claim to be complete. The table compares the actual situation with the current and foreseeable future requirements for MFDs. If an external company is commissioned with the analysis, the principles for avoiding conflicts of interest must be observed (Section 6 VgV).

Actual state analysis	Available sources of information	Generally existing situa-tions of the user	Future possibilities and recommendations
Which device type with which functions (printing, copying, scanning, faxing, workflow manage-ment) is available?	Inventory data of the installed devices (source inventory data-base), as well as existing procure-ment contracts	Primary use of the basic functions of printing, copying and scanning up until now. No extensive use of ad-vanced functionalities of the current MFD.	In addition to using the basic functions of the MFD, a more extensive use of scan functions, as well as advanced functionaliti es to support electronic process handling.
Which software applications and software-based specialist proce-dures require which prerequisites for controlling the MFD for input and output and process support in process handling?	Currently used software applica-tions and software-ased specialist procedures, specifica-tins for the internal IT strategy (ECM, e-govern-ment, use of e.g., e-files)	Different software applica-tions and specialist proce-dures	Increased use of MFDs with their multifunctional solutions for the purpose of increased use/incorpo-ration into electronic administra-tive processes (e.g., e-files, elec-tronic recording of paperbased information in the form of scan-ning, e.g., according to TRRESIS-CAN)
What type of print media (accord-ing to print format, grammage, media type and structure) is required and what is the respective proportion of the total print volume?	Previous procurement of print media (paper, etc.), classification according to the respective proportion of print media based on the three key criteria.	Primary use of recy-cled/plain paper with a grammage of approx. 75-90 g/m², with the majority (over 90%) being printed/copied in A4 format	Needs-based selection of the re-spective device categories with the aid of an analysis of the work processes of the respective department/unit
Which print, copy and scan volumes have been generated with the current devices in use?	Using the device memory to see the printed or copied pages up until now	Print/copy volume depends on specialist applications or processes	Needs-based selection of the respective device classes or categories, or substitution of the printed/copied pages with elec-tronic workflows
What is the ratio of colour and black and white printing?	Inventory data in inven-tory database, existing procurement contracts for consumables (ink/ toner cartridges, types of paper, etc.)	Very high proportion of black and white printing, colour printing often only accounts for less than 10% of the total print volume.	Needs-based selection of the respective device categories with the aid of an analysis of the work processes of the respective department/unit
Which IT security requirements must be observed?	Internal provisions, GDPR, BSI recommendations, Common Criteria	IT and data security requirements are increasing significantly	High IT security for public adminis-tration as a strategic goal
Needs-based number of installed MFDs, their performance/scope, functional equipment and amount in relation to the number of potential users?	Needs-based determination in regard to amount, functional equipment, performance and scope of future MFDs	Different situations onsite	The ratio of devices and users should be determined based to needs; it depends heavily on the overall concept
Are there special requirements in terms of accessibility?	Needs-based determina-tion	Different situations onsite	Based on the specifications of the European Standard EN 301 549

Table 32: Needs analysis and check lists

In the best-case scenario, the selection and range of functions of the devices to be procured can be derived from the inventory and definition of future requirements. In any case, however, this lays the foundation for targeted research of the market and the solutions currently available on the market. Further, the inventory and needs analysis can be used as a basis for an installation and usage plan, and for creating usage guidelines for the new devices.

At the end of this needs assessment, the result could also be that the procurement of managed print services is preferable to operating the hardware oneself.

13.2 Glossary

a) Glossary general terms

No.	Term	Explanation
1	ADF	Automatic Document Feeder
	bps	Baud per second (unit for the symbol rate in telecommunications technology)
	ECM	Enterprise Content Management
	Recommended print volume	The recommended print volume helps to assign performance classes as required and always refers to DIN A4 pages per month.
2	Staple	Mechanical joining of printed pages using staples
	ipm	Images per minute In contrast to the specification ppm (pages per minute), the specification ipm is determined based on documents with a fixed resolution.
3	Physical print resolution	The physical resolution of the printer used (also called native) is always decisive. Often, the information pertaining to the print resolution, e.g., enhanced, bicubic or nearest neighbour etc., is so-caled interpolated resolution, i.e., values that the computer can calculate. They are generally not suitable for objective comparisons.
	Pull-printing-capable	Allows users to pick up (pull) print jobs at any solution-enabled device. The job is usually kept on the server or client until the user has authenticated themselves at an output device. The job(s) can then be »pulled« from the client or server at the output device. Pullprinting increases the security of confidential printing and eliminates uncollected documents in the output.
	Administration tools/ software solutions	Programs that are offered in the company network and/or in the cloud, for example for the following tasks: 1. Device management • Manual or automatic configuration of devicerelated settings • Central distribution of firmware to the device fleet • Certificate management 2. Monitoring of • Device utilisation • Consumables • Wear parts • Error messages e.g., paper jam 3. Supplementary solutions • e.g., in order to incorporate devices into processes/workflow design • Document management/archive system Management of additional applications

No.	Term	Explanation
4	Multipurpose feeder	An integrated manual feeder, with which individual or multiple sheets and media can be fed into the device. Multi-purpose feeders serve as a solution to use different media formats, especially non-DIN-compliant formats such as e.g., postal and index cards, envelopes, etc. Moreover, these feeds can be used for types of media whose grammages (measured in media weight g/m²) are not suitable for feeding from standard trays, e.g., thick cardboard or other special media such as foils. Other manufacturer terms that have the same meaning: ▪ Bypass tray ▪ Bypass ▪ Multi-tray
5	Wear materials	Components that are particularly under strain in the device during operating steps and that can be replaced (e.g., fixing unit, rollers)

Table 33: Glossary

a) Glossary energy consumption

No.	Description according to ENERGY STAR	Definition according to ENERGY STAR
	Power consumption	The amount of electrical energy that electrical devices need to operate during a defined period of time
	TEC values	»Typical energy consumption« = typical electricity consumption, stated in kWh per week.
1	Standby mode	The mode with the lowest power consumption that cannot be switched off (influenced) by the user. The device stays in this mode indefinitely as long as the product is connected to the main power switch and is used in accordance with the manufacturer's operating instructions. Standby mode is the operating mode of the product with the lowest power consumption. For imaging devices, standby mode typically corresponds to the device being off, but may also correspond to the ready-to-print or the sleep mode. A product cannot leave standby mode and enter an even lower power consumption mode, unless it is manually disconnected from the electricity supply.
2	Off mode	The power consumption mode that the product goes into when it has been manually or automatically switched off but is still connected to the power supply. This state is ended with an input signal, e.g., by a manual power switch or a timer, which enables the device to be placed into ready mode. If a user manually activates this mode, it is often referred to as manual off mode. If it is due to an automatic or preset signal (e.g., waiting time or a timer) it is often called an automatic off mode.
3	Sleep mode	A reduced-power consumption mode which the product goes into either automatically after a period of inactivity (i.e., after a default wait time), as a result of manual user intervention (e.g., at a user-set time of day, after pressing a switch or button), or as a result of external electrical impulses (e.g., mains impulses, fax calls or remote control). For products that are tested in line with the TSV test procedure, the sleep mode allows all product functions to be performed (includ-ing maintaining mains circuitry), but with a possible delay in the transition to the active mode. For products that are tested in line with the BM test procedure, the sleep mode allows the operation of a single active network interface and, if applicable, a fax line, but with a possible delay in the transition to the active mode.
4	Ready-to-print mode	The power consumption mode in which the product is not producing any output, but has reached the operating conditions to not yet enter into a low-power mode, and can enter the active mode with minimal delay. In this mode, all device functions can be activated and the product can return to its active mode by means of input signals, such as external electrical impulses (e.g., mains impulses, fax calls or remote control), and direct action (e.g., pressing a switch or button).
5	In operation (on)	The power consumption mode in which the product is connected to a power source and is actively producing output or carrying out other primary functions.

Table 34: Glossary energy consumption

c) Glossary noise emissions

Designation according to ISO	Unit	Description
A-weighted sound power	LWA in dB(A)	Sound power: Sound power refers to the source strength of a sound generator. The sound energy of a sound source can be determined via the sound power level. The sound power level is the associated logarithmic quantity.
Guaranteed A-weighted sound power level	LWAd in B(A) or dB(A)	The A-weighted guaranteed sound power level is determined based on ISO 9296, and stated in bels or decibels, where 1 B = 10 dB. It describes the average value of 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) For office and information technology devices, the details are generally specified according to the formula described above.
A-weighted sound pres-sure level (operator posi-tion, bystander position)	LpA in dB(A)	Sound pressure p: The alternating pressure caused by sound, which is superimposed on static air pressure. The eardrum converts these pressure fluctuations into movements for auditory perception. In other words, sound pressure describes sound energy that hits a certain spot (e.g., the operator's eardrum or a workplace near the device).

Table 35: Glossary noise emissions

13.3 Legal bases

Beyond public procurement law, other legal bases must be observed by both the providers and the procuring bodies. The following overview (not exhaustive) lists some of the most important legal bases for MFDs. This list also serves to identify the abbreviations used in this guideline for legal reference.

BattG

German act pertaining to batteries being placed on the market, as well as the return and environmentally friendly disposal of batteries and accumulators (national implementation of Directive 2006/66/EC on batteries and accumulators as well as old batteries and old accumulators)

BHO

German Federal Budget Regulation

ElektroG

German act pertaining to electrical devices and electronic equipment being placed on the market, as well as the return and environmentally friendly disposal (national implementation of Directive 2012/19/EU on old electrical devices and electronic equipment – **WEEE Directive**)

ElektroStoffV

German ordinance on the restriction of the use of hazardous substances in electrical devices and electronic equipment (national implementation of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical devices and electronic equipment – **RoHS Directive**)

EMVG

German act on the electromagnetic compatibility of equipment (national implementation of Directive 2014/30/EU on the harmonisation of the legislation of the member states on electromagnetic compatibility)

DSGVO

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

GWB

German Restriction of Competition Act

POP Directive

Directive (EC) No. 850/2004 on **P**ersistent **O**rganic **P**ollutants

ProdSG

German Product Safety Act, which serves to ensure basic requirements for health protection and safety

REACH Regulation

Chemicals Ordinance (EC) 1907/2006 on the registration, evaluation, authorisation and restriction of chemical substances (regulation concerning the **R**egistration, **E**valuation, **A**uthorisation and **r**estriction of **C**hemicals)

UVgO

German regulation on sub-threshold procurement: Code of procedure for the award of public supply and service contracts below the EU thresholds.
It must be implemented through appropriate federal and state legislation for the respective territory. Many federal states restrict the application or only recommend the application of the UVgO for their local authorities, state companies and state authorities.

VgV

German Ordinance on the Award of Public Contracts: Code of procedure for the award of EU-wide public supply and service contracts

10.3   Information on accessibility

Below is a summary of information on general and basic accessibility requirements for various technical devices (supplemental to Chapter 4.6).

10.3.1 Definition of accessibility

»Information processing systems are [...] defined as accessible [...] if people with disabilities

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

assistance in general. The use of special tools for disabilities is allowed.« (Section 4 BGG)
Tools are devices such as special keyboards, alternative pointing devices, screen readers and screen magnifiers.

10.3.2   Relevant standards and regulation

When creating the performance specification for the procurement of MFDs and printers, accessibility criteria must be considered, except for in justified exceptions:

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

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

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

Verification should be provided by means of a contractor self-declaration.
Currently, there is no relevant certification option available, which is why certificates cannot be demanded as verification.

10.3.3   Standards on accessibility features

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

10.3.4   Management system standards for access

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

10.3.5   Outlook

An updated version of the standard is already available as EN 301 549 (2021-03,-,↗ https://www. etsi.org/deliver/etsi_en/301500_301599/301549/03.02.01_60/en_301549v030201p.pdf). Its publication in the Official Journal of the EU, as well as its implementation as DIN EN 301549, is expected in 2021.

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

»a) consumer general purpose computer hardware systems and operating systems for those hardware systems; [...]

c) consumer terminal equipment with interactive computing capability, used for electronic communications services;

d) consumer terminal equipment with interactive computing capability, used for accessing audiovisual media services; [...]«

In addition, the following services are also covered in Article 2 (2):

»a) electronic communications services with the exception of transmission services used for the provision of machine-to-machine services;

b) services providing access to audiovisual media services; [...]

f) e-commerce services [...]«

The EAA envisages accessibility to be part of the self-declaration as part of the CE marking process. The EAA is essentially implemented one-to-one in Germany through the Accessibility Enhancement Act (Barrierefreiheitsstärkungsgesetz, BFSG), which is expected to be passed before the end of summer 2021. For the additional accessibility requirements in the EAA, an extension of EN 301 549 is planned as a standardisation mandate.

10.3.6   International self-declaration

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

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

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