Vendor-neutral tendering of multi-function devices

Guidelines for public IT procurement
With product specifications for environmental protection,
energy efficiency, accessibility, and IT security

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Acknowledgements

1 Introduction

1.1   Application of these guidelines

These guidelines are designed to offer an overview of the basis and criteria for the procurement of print capable multi-functional devices (from now on multi-function devices or MFD) by public bodies. It was created as a result of a working group led by the Procurement Agency of the Federal Ministry of the Interior and the Federal Association for Information Technology, Telecommunications and New Media (Bitkom e. V.). This document aims to provide public contracting entities at the federal, state as well as municipal levels with a reliable and understandable resource so as to allow them to formulate their tenders for the procurement of multi-function devices in a non-proprietary manner, i. e. in a way that avoids the use of protected brand names or the reference to a specific manufacturer, while taking into account current technical standards. While these guidelines primarily focus on multi-functional devices that combine various features (printing, scanning, copying, faxing); they may also be used for devices that can perform just one of these functions (such as printers).

The core element of these guidelines is a list of technical criteria that can be used to describe and compare the devices as well as the requirements for their working environments and other characteristics. In addition to the technical criteria, compliance with which ensures the functionality of the devices for the procurement purpose, the guidelines also provide information on environmental protection, energy efficiency, accessibility, and IT security. Although compliance with these issues is only partially subject to legal requirements, they are becoming increasingly relevant in public administration.

The criteria governing the procurement of MFD are also set out in an Excel list accompanying these guidelines. The set of criteria in the Excel list are factually identical to those in these guidelines. The Excel list shall serve as a tool for experienced procurers who no longer need explanations or notes on the individual criteria and basis of vendor-neutral tenders. The guidelines, on the other hand, contain such explanations and advice.

It should be noted, however, that the listed technical criteria and requirements are subject to constant change and should be evaluated differently depending on where the equipment to be purchased is going to be used. Higher demands on the product will tend to produce a higher offer price, and accordingly, the range of products on the market will decrease. These guidelines are therefore not to be considered as a replacement for reflection and prioritising of the individual criteria by the procuring body.

Nevertheless, the authors of these guidelines would like to support procurers of the public administration insofar as they draw particular attention to sensitive criteria and requirements, that may lead to market restrictions, as well as cost-related decisions. The following symbols are used for this purpose:

Symbol	Meaning
€	Criteria with this symbol may result in cost increases or market restrictions.
!	This symbol indicates the clarification of a common misconception or highlights critical statements in the text.
Z	This symbol indicates whether certificates can be used to verify specific criteria.

1.2   Vendor-neutral product tendering as a legal requirement

Under public procurement law, the equal treatment of providers and offered products is obligatory. The legal framework foresees that the procurement object is described based on factual and non-discriminatory criteria, i. e. in a non-proprietary manner (cf. Section 97 GWB and Section 31(6) VgV for Europe-wide procurement procedures as well as Section 55(1) BHO and Section 2(2) UVgO for sub-threshold procurement). Tenders may only refer to specific product or brand names in duly substantiated exceptional cases if a description cannot be made with adequate precision using common designations or general criteria.

These guidelines address precisely this issue by providing a compact tool to support compliance with legal requirements and thus ensure fair competition. They identify and explain current technical standards that enable a description of printers and multi-function devices following general pertinent characteristics. The product features and technical requirements are presented in a compact, tabular form. The guidelines will be reviewed at regular intervals with the aim of keeping them up to date. Any revisions will consider the latest technical developments and adopt the proposed criteria and requirements to reflect the current state of the art.

2 Multi-function devices as a procurement object

2.1 Trends in the procurement of multi-function devices

Multi-functional devices (MFDs) to date distinguished themselves through the following standard functions: copying, printing, scanning (scan to email, scan to PC, scan to USB, scan to FTP, scan to network) and faxing. Present and future generations of multi-functional devices continue to evolve technologically to support both paper-based and digital administrative processes, thereby enabling and promoting the processing of structured and unstructured data (such as forms recognition or data pre-sorting) with associated IT procedures and processes. Device- and server-based solutions make MFDs smarter. As a result, they can make an increasingly significant contribution to sustainable and environmentally friendly administrative work. Furthermore, in their role as an interface between digital and printed information, they constitute an essential IT component in the implementation of eGovernment in public administration.

The following trends characterise the technical development of MFDs:

- **Replacement of single-function devices (such as separate scanners) with multi-function devices:** Given the complex and simultaneous requisites on the current IT infrastructure in administration, multi-functional systems tend to supplant single-functional devices (separate scanners or printers).

- **Increasing use of colour:** The tendency to use printers with colour capacity is steadily increasing. One reason for this may be that colour is used in documents to depict the increasing pluralism of information in a way that aids understanding.

- **Increased use of A4:** The predominant use of the A4 format in printing (according to a study by Gartner and IDC, up to 97-98% of all printed information in A4 format) creates an increased demand for MFDs that are designed for this format. Accordingly, high-performance MFDs in A4 format meet all the current and future requirements of office environments.

- **High performance:** The rapidly growing volume of data to be processed places high demands on the productivity and flexibility of MFDs.

- **Straightforward and intuitive operation:** The increasing complexity of MFDs is accompanied by high requirements for intuitive handling of the numerous functions as well as straightforward, self-explanatory navigation of the MFDs. A symbol- and text-controlled colour touch screen provides for simple navigation of the respective process.

- **Greater flexibility:** Multi-function devices feature a high degree of flexibility. Open standards and integrable connections enable the adaptation to user needs.

- **Environmental standards and sustainability:** MFDs increasingly stand out for their high environmental and sustainability standards.

- **Accessibility:** Today, MFDs often offer barrier-free access. Here it is essential to enable ease of interaction with customers, colleagues, and workflows for users with different abilities and physical capacities.

2.2   Further solutions for individual applications

Customizable software solutions for MFDs can be used to tailor administrative processes, applications, and data storage volumes to the needs of users. MFDs today offer a multitude of additional software solutions that support and streamline office as well as administrative processes. Their use expands the capabilities of the devices, saves time and reduces costs. There are mainly two types of extended application solutions for MFDs, namely device-based and network-based solutions.

a) Device-based solutions

Device-based solutions encompass free or fee-based additional functions or solutions that can be integrated into MFDs beyond standard functions. These other functions primarily serve to provide edited information (files) that can be further processed and used in the broader environment of the user with its applications. One example is the provision of additional optical character recognition (OCR) function, which converts scanned data into raster data as so-called ASCII or other text files and provides them for further processing in the applications, e.g. for office applications. Other device-based solutions serve to assist with the operation of MFDs, with the forwarding of generated information (e.g. scanned files) to applications or as additional security features to increase the device security of MFDs.

b) Network-based solutions

There exists a large variety of implemented extended solutions (apps) that enable the exchange of information in the market of available software and administrative applications. Furthermore, deployment tools/platforms provide a quick but also easy means for designing and constructing individual tasks or administrative processes. Such solutions are usually not integrated into MFDs but have their place in the surrounding IT infrastructure of the customer, as on servers or as a client program. They primarily support the management of MFDs within the IT infrastructure of the user, map electronic procedures for processing transactions or secure the use of MFDs and the information generated through their use.

Among other things, network-based software solutions are available for the management of:

- security settings,
- consumables,
- users and authentication measures as well as user-specific print rules,
- device utilisation,
- device configurations,
- firmware updates.

2.3 The competition between laser and inkjet

Not only do printers differ in hardware properties but also in the type of colourant they use. Colourants like ink, toner, or gel enjoy most widespread use. In principle, the use of certain colourants or printing technologies does not allow inference of the subsequent print quality. Accordingly, the requirements for print quality need to be considered independently of the deployed printing technology. Whichever colourant is used, there are systems available that may print only in pure black or in colour. The suitability for documentary use can be guaranteed regardless of the printing technology used.

> **(!)** **Both printing technologies (laser and inkjet) are fit for documentary use.**

2.4 Commercial models of procurement

Procurement can occur through hire, purchase, leasing, or a combination (such as rent of hard-ware, purchase of consumables). Which approach the procurer chooses depends not least on whether a budget is only available once or over several years. A decision for one of these models shall precede a procurement policy within the framework of a feasibility study. The total costs for an MFD including costs for the associated wearing parts and consumables can also be calculated from the printed pages (cf. the sample calculation in 10.2).

Of no little consequence in this regard is how the choice of the procurement model affects VAT. Hire is subject to VAT based on and payable with the respective rental rates. The purchase is subject to the entire VAT upon delivery (= transfer of the equipment to the contracting authority). VAT as a whole also arises upon delivery of the device if the contract foresees that the title to the device shall only be transferred after payment of several instalments. If the transfer of title for rent-to-own depends on the exercise of a purchase option, VAT is payable on the total unit price upon exercise of the option as stipulated by the contract. Where rental payments have already

been rendered before the option is exercised, the accumulated VAT payments are to be reversed
if the rental payments are counted towards the purchase price. Leasing is subject to VAT at the time
when the leased device is attributable to the contracting authority according to tax provisions.[1]

| | **Commercial models** | | | |
	Purchase	**Purchase and consumption (mixed model)**	**Financing (hire/leasing)**	**Consumption-based billing**
Hardware	Purchase	Purchase	Hire or leasing	Billing per page or cartridge (All-In)
Consumables and wear parts	Purchase	Billing via page or cartridge	Billing via page or cartridge	
Services (such as repair, upkeep, software maintenance)	Commissioning	Includes services	Includes services	
Ownership of hardware	Contracting authority	Contracting authority	Contractor	Contractor

Tabelle 1: Commercial models and procurement

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1 Cf. comments on these taxation-related consequences by the tax administration in Section 3.5(5) and (6)
   of the VAT Application Decree (UStAE).

3 Performance classes as models of usage scenarios

The recommended first step of these guidelines encompasses defining the need for multi-function devices based on different performance classes. The performance classes primarily correspond to the usage scenarios and the intended use of the devices by the end user. The usage scenarios for public contracting entities do not differ significantly from the usage scenarios in companies. This premise offers access to a wide range of devices on the open market.

Based on the usage scenarios, these guidelines broadly define the following performance classes:
- **Workstation devices,** primarily intended for individual office spaces and smaller print volumes.
- **Workgroup devices,** primarily intended for groups/departments and medium print volumes.
- **Division-owned devices,** primarily intended for entire divisions and high print volumes.

In practice, the distinction between the individual performance classes is much less evident. This aspect shall be taking into account in the following table that illustrates the most important demarcation criteria of the performance classes, with particular consideration given to overlaps in the print volume.

	Workstation device	Workgroup device	Division-owned 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	Usu. desktop device and A4	Desktop or stand-alone device	Usu. stand-alone device	
Paper supply	min. 250 sheets	min. 1,000 sheets	min. 1,500 sheets	
Memory (reference values)	256 MB	512 MB	1 GB	It is not possible to draw any conclusions about performance or functionality of the device based on the available memory alone.
Output capacity (reference values)	125 sheets	200 sheets	350 sheets	Information based on grammages of 80 g/m².

Tabelle 2: Demarcation criteria of performance classes

4 Criteria and requirements for all performance classes

The contracting authority shall describe the procurement object according to general character-istics in a way that permits a comparison between subsequent offers. These guidelines lay out various criteria that constitute suitable parameters for the description of the procurement object, presented in a tabular format. These criteria are assigned technical requirements to make these parameters assessable and comparable. An additional column indicates whether the requirements are suitable as minimum requirements. The total of all minimum require-ments produces a standard for MFDs, which can be expected according to the current state of the art and is achieved by all newly designed devices currently offered on the market, which it is necessary to avoid undershooting. The last column (comments/explanations) provides further information, as well as specifications, about the technical requirements.

In addition to the minimum requirements, recommended here, further conditions can be for-mulated within the framework of evaluation criteria.[2] Moreover, the contracting authority may define further criteria and requirements in the tender documents if particular conditions are placed on the procurement object.

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

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2   The evaluation criteria described in these guidelines concern award criteria that fulfil specific functional or performance requirements. A procuring body may include an evaluation criterion in its terms of reference if the advertised product is to render particular services in specific areas or if it is intended for particular purposes.

4.1   Printing and copying

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**First page in A4 format in the output tray from ready mode**	▪ Max. 15 seconds	Minimum requirement	Value varies considerably depending on the printing technology. Values below 10 seconds are also possible.
2	**Resolution**	▪ Min. 600 × 600 DPI (actual)	Minimum requirement	Optionally, higher resolutions can be requested.
3	**Duplex printing**	▪ Automatic	Minimum requirement	
4	**Universal feed**	▪ Universal feed is available	Minimum requirement	
5	**for documentary use**	▪ Suitability for the production of original texts, copies and certified copies of notarial deeds as well as other documents according to Section 29 of the German Service Regulations for Notaries (DONot) can be demonstrated	Minimum requirement	Laser and inkjet technologies guarantee suitability for documentary use. A certificate by the PTS [Foundation for Paper-Manufacturing Technologies] or equivalent certificate shall furnish proof. Testing and certification encompass the unit consisting of printer, toner or inkjet (each black) and paper.
6	**Zoom in/out**	▪ Min. 50 − 200% in 1% increments	Minimum requirement	
7	**Printer command language**	▪ No less than PCL 5 or PCL 6 or PostScript-compatible	Minimum requirement	
8	**Multiple copies**	▪ More than 99 copies	Evaluation criterion	

Tabelle 3: Criteria and requirements for printing and copying

4.2   Scanning

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Resolution monochrome**	• Min. 600 × 600 DPI (optical resolution available)	Minimum requirement	Optionally, higher resolutions can be requested. High resolutions generate exponentially increasing data amounts during usage. For operation a configuration of 300 × 300 DPI is recommended.
2	**Resolution colour**	• Min. 300 × 300 DPI (optical resolution available) • 24-bit colour depth, 8-bit greyscale	Minimum requirement	Optionally, higher resolutions can be requested. High resolutions generate exponentially increasing data amounts during usage. For operation a configuration of 300 × 300 DPI is recommended.
3	**Scan formats**	• Min. PDF, JPG, TIFF	Minimum requirement	
4	**Duplex scanning using ADF**	• Automatic	Minimum requirement	
		• Two-sided scanning either in a single step (Duplex scanning) or with reverse function.	Evaluation criterion	There are two ways to implement Duplex scanning technically: with a reversing automatic document feeder (RADF) or a duplexing automatic document feeder (DADF). DADFs typically scan faster but can lead to cost increases and market restrictions. **€**
5	**Scanning destinations**	• Scan to PC	Minimum requirement	
		• Scan to network folder	Minimum requirement	
		• Scan to email	Minimum requirement	
		• Scan to FTP	Evaluation criterion	
		• Scan to USB stick	Evaluation criterion	
		• Scan to document/ content management/ archive system	Evaluation criterion	See also subsection 2.1 »Trends in the procurement of multi-function devices«.

Tabelle 4: Criteria and requirements for scanning

4.3 Media for printing and scanning

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Print media**	▪ Plain paper	Minimum requirement	According to DIN EN 12281.
		▪ Recycled paper	Minimum requirement	According to DIN EN 12281.
		▪ Transparency film	Evaluation criterion	Must be suitable for the respective printing technology.
		▪ Envelopes	Evaluation criterion	
		▪ Labels	Evaluation criterion	
2	**Formats**	▪ A4 ▪ A5	Minimum requirement	
		▪ A3	Evaluation criterion	
		▪ A6 ▪ B5 ▪ C6		
3	**Grammage in printing**	▪ Universal feed minimum $70-160\,g/m^2$	Minimum requirement	
		▪ Paper feed tray minimum $70-90\,g/m^2$	Minimum requirement	
4	**Grammage in scanning**	▪ ADF at least $70-95\,g/m^2$	Minimum requirement	

Tabelle 5: Criteria and requirements for printing and scanning

4.4   Interfaces

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**USB client**	▪ Minimum USB 2.0	Minimum requirement	A USB port with a higher version number in principle enables higher data transmission rates. However, this is not a determining factor for a USB port.
2	**USB sticks**	▪ Minimum USB 2.0	Minimum requirement	Feasibility of using different USB sticks depends on the formatting of the USB stick.
3	**Network connection**	▪ RJ 45 Ethernet 10/100	Minimum requirement	
4	**Modem**	▪ RJ 11	Evaluation criterion	To be declared as a minimum requirement if fax functionality is desired.
		▪ RJ 11 and RJ 45 separated	Minimum requirement	Separate connections increase the security.
5	**Wireless connections**	▪ WLAN infrastructure (according to IEEE 802.11b/g/n)	Evaluation criterion	
		▪ Wi-Fi directly accesses the MFD (according to IEEE 802.11b/g/n)	Evaluation criterion	Safety notice: specific internal requirements might call for disconnection from the network.
		▪ Bluetooth	Evaluation criterion	Market place restrictions possible. €
		▪ Near Field Communication NFC	Evaluation criterion	Market place restrictions possible. €

Tabelle 6: Criteria and requirements for interfaces

4.5   Display

The devices recommended in these guidelines must have a display in all performance classes.

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Display**	▪ Colour display	Minimum requirement	
2	**Operation**	▪ Touch capability	Minimum requirement	
3	**Language**	▪ Multilingual (at least DE, EN)	Minimum requirement	

Tabelle 7: Criteria and requirements for displays

4.6   Accessibility

The process of drafting the terms of reference for the procurement of multi-function devices (MFDs) must take into account the accessibility criteria for people with disabilities, except for duly substantiated exceptional cases (Section 121(2), Alt. 1 GWB). Particular attention must be paid to ensuring that the requirements are geared towards user needs while at the same time remaining technology-neutral and open to innovation. The following example shall serve as an illustration:

Consideration is also given to blind employees as users of MFDs. The invitation to tender sets forth that MFDS should have touchscreen control. The control of the touch screen presupposes visual perception. However, to meet the user needs of blind employees, MFD control must also be possible without visual perception. How control without visual perception is implemented technically should not be specified by the public procurer. Prescribing the use of one specific technique would exclude other techniques and innovations. Meeting user needs in the present case might involve the implementation of an audio interface or a touchscreen with haptic controls.

To harmonise the accessibility requirements for publicly procured ICT products and services in Europe, the European Commission sent a standardisation mandate to the European Standardisation Bodies CEN, CENELEC and ETSI, called Mandate 376. The result of Mandate 376 is the European standard EN 301 549, which is currently valid in the version EN 301 549 V1.1.2 (2015-04).

This European Standard was implemented with DIN EN 301549:2015-11 (Accessibility requirements suitable for public procurement of ICT products and services in Europe) (Endorsement of the English version EN 301 549 V1.1.2 (2015-04) as German standard). Following Section 31(2) No. 1 of the VgV, this allows the specification of services to contain a reference to DIN EN 301549:2015-11, thereby ensuring that the procurement procedure duly considers the user needs of persons with disabilities.

The contractor shall be responsible for furnishing proof by providing a self-declaration. Chapter 4 of the Technical Report CEN/CLC/ETSI/TR 101 552 provides templates for the (self-) declaration of conformity with EN 301 549. Certificates may not be required as means of proof, as there is currently no such certification option in place.

Criterion	Requirements	Suitable as	Comments / Explanations
Suitability for people with disabilities	• Conformity with DIN EN 301549:2015-11	Minimum requirement	€

Tabelle 8: Criterion and requirement accessibility

4.7   Document finishing

Multi-function devices can be equipped with a unit for the subsequent processing of documents. Such units provide automated functions that eliminate the need for manual post-processing, such as punching, stapling or folding. Accordingly, they can save considerable additional effort.

Hence, the proper training of employees is crucial for the use of these features. Excluding any settings on the device itself, particular attention should be paid to the configuration of the printer driver.

According to the standard of these guidelines, a document finishing feature is not a requirement for the procurement of multi-function devices. It is optional and must be requested separately with the invitation to tender.

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Sorting**	• Determination of the sheet order	Evaluation criterion	No guidance standard! Must be requested separately.
2	**Stapling**		Evaluation criterion	No guidance standard! Must be requested separately.
3	**Punching**	• For example, 2-hole, 4-hole	Evaluation criterion	No guidance standard! Must be requested separately.
4	**Production of booklets**		Evaluation criterion	No guidance standard! Must be requested separately.
5	**Offsetting**	• Sets of copies are offset from one another in the output tray	Evaluation criterion	No guidance standard! Must be requested separately.
6	**Grouping**	• Multiple output trays	Evaluation criterion	No guidance standard! Must be requested separately.
7	**Folding**	• For example, internal/ external multi-folding unit	Evaluation criterion	No guidance standard! Must be requested separately.

Tabelle 9: Criteria and requirements for finishing

4.8   Fax functionality

Analog fax machines differ according to their data transmission rate. Workstation, workgroup, and division-owned devices have a modem capable of up to 33,600 bps. If the line quality is inferior, the fax machine automatically selects a lower transmission rate that enables a secure transmission.

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Memory**	▪ Transmit and receive memory is available	Minimum requirement	
2	**PC Fax**	▪ Fax to PC/Network possible	Evaluation criterion	
3	**Marking / Version control**	▪ Fax receive stamp	Evaluation criterion	
4	**Transmission report**	▪ Transmission report can be switched on and off	Evaluation criterion	
5	**Memory/Address book**	▪ Memory, at least 99 numbers	Evaluation criterion	
6	**Forwarding**	▪ Forwarding to other numbers possible	Evaluation criterion	

Tabelle 10: Criteria and requirements for fax functionality

Newer methods such as LAN Fax via a fax server require determining the specific needs of the end user instead.

5 Specific criteria and requirements for desktop devices

5.1 Printing and copying

In addition to the general requirements for printing and copying in all performance classes, the following applies to workstation devices:

Criterion	Requirements	Suitable as	Comments / Explanations
Paper supply	▪ Min. 250 sheets in A4	Minimum requirement	

Tabelle 11: Specific criteria and requirements for printing and copying

5.2 Page speed of A4 devices

The output speed of multi-function devices is measured in IPM (Images Per Minute) for both print and scan functions. According to ISO/IEC 24734, the average print speed is to be determined by printing a single-sided A4 document in monochrome mode resulting in the estimated saturated throughput or ESAT value. This measurement also applies to devices that can process larger document formats, such as A3. Any devices on offer must meet the stated values. The page speeds specified in these guidelines apply to monochrome (black-and-white) and colour prints in the same way.

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Printing**	▪ Min. 20 IPM for A4 following ISO/IEC 24734	Minimum requirement	Generally, also suited as evaluation criterion. Page speed is measured in Images Per Minute (IPM) according to ISO/IEC 24734.
2	**Scanning, one-sided**	▪ Min. 20 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.
3	**Scanning, two-sided**	▪ Min. 20 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Evaluation criterion	At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.

Tabelle 12: Specific criteria and requirements for the printing speed of A4 devices

5.3   Page speed of A3 devices

Where multi-function devices with A3 format are required or approved, they must fulfil
the following parameters for printing speed.

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Printing**	▪ Min. 20 IPM for A4 following ISO/IEC 24734	Minimum requirement	Generally, also suited as evaluation criterion. Page speed is measured in Images Per Minute (IPM) according to ISO/IEC 24734. The printing speed of A3 devices according to ISO/IEC 24734 is also measured based on A4.
2	**Scanning**	▪ Min. 20 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.

Tabelle 13: Specific criteria and requirements for the printing speed of A3 devices

6 Specific criteria and requirements for workgroup devices

6.1   Printing and copying

In addition to the general requirements for printing and copying in all performance classes,
the following applies to workgroup devices.

Criterion	Requirements	Suitable as	Comments / Explanations
Paper supply	• Min. 500 sheets standard tray • Min. 500 sheets additional tray	Minimum requirement	

Tabelle 14: Special criterion and requirements for workgroup devices: print and copy

6.2   Scanning

In addition to the general requirements for scanning in all performance classes
(cf. subparagraph 4.2 above), the following applies to workgroup devices.

6.3   Page speed of A4 devices

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Printing**	• Min. 24 IPM at A4 according to ISO/IEC 24734	Minimum requirement	Generally, also suited as evaluation criterion. Requirements apply to monochrome and colour prints. Page speed is measured in Images Per Minute (IPM) according to ISO/IEC 24734.
2	**Scanning, one-sided**	• Min. 25 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.
3	**Scanning, two-sided**	• Min. 25 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.

Tabelle 15: Specific criteria and requirements for workgroup devices: page speed of a A4 devices

6.4 Page speed of A3 devices

Where multi-function devices with A3 format are required or approved, they must fulfil
the following parameters for printing speed.

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Printing**	▪ Min. 24 IPM at A4 according to ISO/IEC 24734	Minimum requirement	Generally, also suited as evaluation criterion. Requirements apply to monochrome and colour prints. Page speed is measured in Images Per Minute (IPM) according to ISO/IEC 24734. The printing speed of A3 devices according to ISO/IEC 24734 is also measured based on A4.
2	**Scanning, one-sided**	▪ Min. 25 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.
3	**Scanning, two-sided**	▪ Min. 25 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.

Tabelle 16: Specific criteria and requirements for workgroup devices: page speed of A3 devices

7 Specific criteria and requirements for department devices

7.1 Printing and copying

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

Criterion	Requirements	Suitable as	Comments / Explanations
Paper supply	▪ Min. 500 sheets standard tray ▪ Min. Input paper capacity 1,500 sheets	Minimum requirement	Applies to A4 and A3 devices.

Tabelle 17: Special criterion and requirements for division-owned devices: print and copy

7.2 Scanning

In addition to the general requirements for printing and copying in all performance classes (cf. subparagraph 4.1 above), no special rules apply to workstation devices.

7.3 Page speed of A4 devices

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Printing**	▪ Min. 30 IPM for A4 following ISO/IEC 24734 for all devices	Minimum requirement	Generally, also suited as evaluation criterion. Page speed is measured in Images Per Minute (IPM) according to ISO/IEC 24734.
2	**Scanning, one-sided**	▪ Min. 35 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.
3	**Scanning, two-sided**	▪ Min. 35 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.

Tabelle 18: Specific criteria and requirements for division-owned devices: page speed of a A4 devices

7.4   Page speed of A3 devices

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	**Printing**	▪ Min. 30 IPM for A4 (monochrome) following ISO/IEC 24734	Minimum requirement	Generally, also suited as evaluation criterion. Page speed is measured in Images Per Minute (IPM) according to ISO/IEC 24734. The printing speed of A3 devices according to ISO/IEC 24734 is also measured based on A4.
2	**Scanning, one-sided**	▪ Min. 35 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.
3	**Scanning, two-sided**	▪ Min. 35 IPM from Automatic Document Feeder (ADF) for A4 (monochrome)	Minimum requirement	Generally, also suited as evaluation criterion. At present, the ISO/IEC standard 17991 for measuring scanning speed is not universally applied by all manufacturers.

Tabelle 19: Specific criteria and requirements for division-owned devices: page speed of A3 devices

8 Environmental and health protection

8.1   General legal requirements

By law, manufacturers of MFDs must also meet stringent requirements outside of public procurement law. Mandatory requirements on the environmental sustainability of products (such as environmentally sound disposal of old equipment, prohibition of certain ingredients) may arise, among other things, from the following laws and regulations:

- The WEEE Directive (2012/19/EU), adopted into German law by the Electrical and Electronic Equipment Act (ElektroG), which regulates the disposal of electrical goods.

- The ROHS Directive (2011/65/EU), adopted into German law by the Ordinance on Hazardous Substances in Electrical and Electronic Equipment (ElektroStoffV), which restricts the use of certain hazardous substances in electrical goods.

- The EU Directive (2006/66/EC) adopted into German law by the Battery Act (BattG).

- The material requirements defined by the chemicals regulation REACH (EC/1907/2006) and the POP Regulation (EC/850/2004).

Where a manufacturer fails to comply with these basic statutory requirements for protecting the health and the environment as well as the legal requirements for product safety and electromagnetic compatibility, he may not bring his products to the EU market. Certification marks like the CE marking indicate conformity with the legally binding requirements.

!	**The legal regulations on environmental and health protection apply to all MFDs equally and therefore need not be included in the terms of reference.**
!	**By affixing the CE marking to a product, the manufacturer declares that the product conforms to the applicable requirements set out in the Community harmonisation legislation.**

8.2   Energy efficiency in public procurement law

Public procurement law attaches particular importance to energy efficiency in the procurement of technical equipment (Section 67 VgV). Any requirements on the energy efficiency for MFDs by the procurer should be specified in the terms of reference, preferably with reference to technical standards and specifications (cf. Section 31(2) VgV).

The issue of how evidence of compliance with those requirements ought to be delivered requires separate consideration from the terms of reference along with the performance and functional requirements it contains (for more details, see subparagraph 8.4 and 8.5.

Z According to Section 67(2) Sentence 1 VgV, any contracts for the procurement of MFDs within the upper-value limit shall be required to include the highest performing energy efficiency class in the terms of reference. The requirements of the applicable ENERGY STAR program for imaging products as well as the requirements of, for example, the Blue Angel eco-label for office equipment with print capability as amended help to determine the highest performing energy efficiency class.

The measuring method of the ENERGY STAR program has become the standard for assessing the typical electricity consumption of a multi-function device. Accordingly, the testing produces a so-called TEC value. The underlying **T**ypical **E**lectrical **C**onsumption **(TEC) method** evaluates the typical electricity consumption of a device during standardised operation over a representative period.[3] The electricity consumption of MFDs is declared in **kWh per week**. The Blue Angel eco-label has adopted this measuring method for all printing technologies and performance classes in full.

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3 The specific requirements for the individual criteria can be found in the award conditions for these quality marks.

Moreover, the Blue Angel eco-label also considers other parameters:
- maximum power consumption in sleep mode expressed in watts,
- maximum pre-set times for the power saving modes of the devices,
- maximum recovery times to ready mode from the power saving modes.

Furthermore, the Blue Angel eco-label also determines the average power consumption of each operational mode.

> **!** **If the average power consumption is to be used for assessing the energy efficiency of devices, the procurer must specify the measuring method and the definition of the operating modes (see glossary).**

Furthermore, according to Section 67(2) No. 1 VgV, the terms of reference or another most appropriate section of the tender documents shall be required to include specific information on energy consumption. The awarding authority has no margin of discretion in that regard (Bundestag record No. 18/7318, p. 202). The awarding authority must give appropriate consideration to energy costs as an award criterion in the determination of the most economically advantageous tender while enjoying the discretion to ascertain the appropriateness of the consideration (loc. cit.). The award criterion for energy costs should, therefore, calculate the expenses for the entire utilisation cycle of a print system to capture and evaluate the expected energy costs (for more details, see 10.1 Energy consumption costs during the utilisation cycle).[4]

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4 Use during the intended contracted term

8.3   Environmental requirements in public procurement law

In addition to energy efficiency, the procuring body may also include other environmental aspects in terms of reference (Section 31(3) Sentence 1 VgV, Section 23(2) UVgO). These may also refer to the process or method of manufacture or performance of service, or to another stage in the life cycle of the procurement object, including the production and supply chain. It shall also apply if such factors are not material components of the service, in so far as these characteristics relate to the subject of the contract and are proportionate to its value and the procurement objectives (Section 31(3) Sentence 3 VgV, Section 23(2) UVgO).

Other environmental aspects that are suitable for MFDs are requirements that are already being tested for the award of internationally recognised eco-labels (such as Blue Angel according to RAL-UZ 205, EU Ecolabel, ENERGY STAR 2.0, EPEAT IEEE 1680.2-2012). It applies, in particular, to the following environmental criteria, though not every eco-label requires them equally (cf. table in 8.5):

- Recycling-compatible design
- Return of colour modules and containers for colourants
- Declaration of inkjet and toner cartridge yield
- Resource-conserving handling of paper
- Warranty, repair service, availability of spare parts
- Longevity
- Packaging (material and labelling)
- Restriction of substances found in materials of housings and housing parts
- Substances in carrier material of circuit boards
- Substances in colourants
- Substance emissions
- Indication of the post-consumer recycled plastic content
- Minimum of post-consumer recycled plastic
- Noise emissions during printing
- Ecological Life Cycle Assessment (LCA)/CO_2 footprint
- Compliance with fundamental European legislation on substances and materials (RoHS, REACH, EU battery Directive)
- Environmental management for production and design

Requirements of particular relevance are explained below.

8.3.1   Noise emissions

Z Different methods are available for determining 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 has introduced changes following the revision
RAL-UZ 205 that lead to different (generally higher) results. Therefore, brochures and
other information from manufacturers may contain different information, depending
on the measurement method used.

Currently, the low-noise performance of an MFD can only be assessed with the test values from
the eco-labels. A device that verifiably observes the test values shall be considered a low-noise
device. This assessment includes the comparison of the determined A-weighted sound power
level (cf. glossary at the end of section 8.4) with a given test value. Said test value is usually
determined based on the print speed of the device. Consequently, slower devices must fulfil
lower test values than faster devices to receive an eco-label.

Comparing the noise emissions of several devices requires the specification of the measuring
method according to which the values are to be determined. Failure to do so results in the risk
of comparing the incomparable and, in the worst case, may lead to the wrong conclusions.

The basis of comparison should always be the **guaranteed A-weighted sound power level**,
which is expressed either in bel (B) or decibels (dB) with one decimal place.

Criterion	Requirements	Suitable as	Comments / Explanations
Guaranteed A-weighted sound power level according to RAL-UZ 205	▪ Compliance with the test value according to Chapter 3.5 of the award condition RAL-UZ 205	Minimum requirement	**Determination of the reference value:** $L_{WA,\,lim} = 47 + 15 \times lg(S_{M/F} + 10)$ dB $S_{M/F}$: Print speed in monochrome or colour mode.

Tabelle 20: Criterion and requirement noise emissions

The eco-label Blue Angel according to RAL-UZ 205 or a manufacturer's declaration and test report according to ISO 7779 may be submitted to a body with ISO 17025 accreditation as proof for compliance with a given noise level, taking into account the requirements of RAL-UZ 205 (Blue Angel). Alternatively, a document containing the following information may be submitted:

- Name of the testing institute (external or internal accreditation)
- Accreditation certificate of the test laboratory according to ISO 17025 for measurements according to ISO 7779
- Signature of the authorised lab worker, e.g. lab manager
- Sound power values in decibels (dB).

The test report or document should only be demanded upon request before the contract is awarded.

Leaflets and other sources of information frequently also refer to other levels of noise. The following glossary explains these terms.

8.3.2   Substance emissions

Electronic devices emit volatile organic substances into the indoor air. The release (emission) of these substances is intensified by the warming of device components, e.g. printing. Additionally, the operation of printing devices can generate ozone depending on the technology used. These emissions shall be kept to a minimum to maintain sound indoor air quality.

The emission rates of imaging products according to the international ISO standard ISO/IEC 28360 are determined both in the pre-operating phase of the device as well as during continuous printing. The determined emission rates always apply to the entire system including the consumables recommended by the manufacturer (toner/inkjet) and the used paper. Compliance with the emission levels determined by the manufacturer can no longer be guaranteed once toner or inkjet other than those recommended by the manufacturer is used.

Recommended minimum technical requirements

All values in mg/h		Monochrome printing	Colour printing
Pre-operating phase	Total Volatile Organic Compounds (TVOCs)	1 (desktop devices) 2 (stand-alone devices, device volume > 250 l)	1 (desktop devices) 2 (stand-alone devices, device volume > 250 l)
Print phase (accumulated pre-operating and print phase)	Total Volatile Organic Compounds (TVOCs)	10	18
	Benzene	< 0,05	< 0,05
	Unidentified single substances VOC	0,9	0,9
	Styrene	1,0	1,8
	Ozone	1,5	3,0
	Dust	4,0	4,0

Tabelle 21: Requirements for electrophotographic devices

All values in mg/h		Monochrome printing	Colour printing
Pre-operating phase	Total Volatile Organic Compounds (TVOCs)	1 (desktop devices) 2 (stand-alone devices, device volume > 250 l)	1 (desktop devices) 2 (stand-alone devices, device volume > 250 l)
Print phase (accumulated pre-operating and print phase)	Total Volatile Organic Compounds (TVOCs)	10	18
	Benzene	< 0,05	< 0,05
	Styrene	1,0	1,8
	Unidentified single substances VOC	0,9	0,9

Tabelle 22: Substance emissions: requirements for inkjet printers

Z Devices that were awarded the Blue Angel quality mark according to RAL-UZ 171 or RAL-UZ 205 fulfil these requirements. RAL-UZ 205 determines that the particle emission rate PER10 PW per 10-minute print time must not exceed $3,5 \times 1011$ [particles / 10 min].

The following documents are considered as equivalent evidence for this criterion. Manufacturers declaration and test report or documentation containing the following:

▪ Name of the testing laboratory (external or internal testing institute)
▪ Evidence of professional qualifications, ability to perform particle emission measurements according to RAL-UZ 205 (qualification of the testing laboratory results from the list of certified RAL-UZ 171, RAL-UZ 177, and RAL-UZ 205 laboratories)
▪ Signature of the authorised lab worker, e.g. lab manager
▪ Emission rates (PER) for TVOCs, benzene, styrene, and dust

The test report or document should only be demanded upon request before the contract is awarded.

Electrophotographic devices (laser systems) can lead to fine and ultra-fine particle emissions. These can also be quantified with the help of ISO/IEC 28360.

Currently, the Blue Angel eco-label is awarded only to devices with a maximum printing speed of 40 IPM for colour and 60 IPM for monochrome devices. As of 01.01.2019, the test value for receiving the Blue Angel eco-label applies to all devices that fall within its scope.

8.3.3   Protection of resources and recycling-compatible design

Environmentally friendly product design contributes to the longevity of devices as well as their environmentally sound recycling at the end of their service time. Thus, recycling should always be the main priority.

Professional maintenance is also a crucial factor behind the environmental properties of devices. It should therefore only be performed by skilled professionals and qualified persons, as in the framework of a service contract.

Z   The requirements of the eco-labels mentioned below (in section 8.5) specify demanding requirements for the protection of resources and recycling-compatible design.

The specific requirements for the individual criteria can be found in the award conditions for these quality marks.

Devices that were awarded quality marks as mentioned above comply with these requirements. A declaration by the manufacturer should also be accepted as evidence of compliance.

8.3.4   Material characteristics and substance-related requirements

Printer and multi-function devices are comprised of a multitude of individual components and substances. The exclusion of specific substances reduces the impact on the environment. As a result, a substantial contribution to the protection of the environment and health is achieved.

€   The requirements for the Blue Angel eco-label, RAL-UZ 205, EU eco-label, ENERGY STAR 2.0, and EPEAT IEEE 1680.2-2012 (listed under 8.5) contain demanding standards for the material characteristics as well as the restriction of specific substances, which go far beyond the statutory requirements but can lead to increased tender costs.

The specific requirements for the individual criteria can be found in the award conditions for these quality marks. Devices that were awarded quality marks as mentioned above comply with these requirements.

A declaration by the manufacturer should also be accepted as evidence of compliance.

8.3.5   Systems for the return of devices and consumables

Providers of electrical devices in Germany are subject to the German Electrical and Electronic Equipment Act (ElektroG) that enforces the WEEE Directive 2002/96/EC. It also regulates the requirements for the return and disposal of electrical devices.

The provider should have a cost-free system for the return of consumables (toners, inkjet) and should be able to provide information on the re-usage or further recycling process.

The provider should implement these systems for the return of devices and consumables with the primary concern being recycling.

8.4   Certifications and awards for verification

Z   There are numerous optional certifications and awards apart from the mandatory CE Marking (which is mistakenly often requested), that highlight particular product features or serve as evidence for compliance with specific requirements in individual environments. Awarding authorities can demand to see this kind of evidence to better compare the conformity of the tender with the required terms of reference.[5] A specific quality mark must be eligible for public procurement law if the procurer demands to see it, i. e., it must comply with the required characteristics according to the terms of reference (Section 34(2) VgV). Furthermore, alternative quality marks that have similar demands towards the specifications must also be accepted.

It is essential to differentiate between the certificate as potential proof and actual the requirements for the procurement object. An invitation to tender must formulate requirements in a binding manner. Certificates can serve as verification of compliance. Manufacturer declarations should be recognised as proof, insofar as test and inspection reports verify them or they satisfy international standards.

The following lists the certificates and their areas of application for multi-functional systems that are relevant to specific requirements. The procurer decides on an individual basis what type of evidence is required for each specific area of application.

Attention must be paid that all test procedures, which form the basis of an awarded certificate, evaluate the entire system, encompassing the core system, but also the consumables recommended by the manufacturer (toner, inkjet, and paper). The results cannot be extrapolated if the device is supposed to be operated with consumables other than those recommended by the manufacturer.

5   Cf. Section 34(1) VgV as well as Section 43(1) of the RL 2014/24/EU

Certificate / Award	Content and scope of application	Recommended scope of application	Evidence
GS symbol (tested for safety)	Attestation of con-formity concerning product safety, the Product Safety Act and applicable ergonomic requirements	General	Certificate from a GS test centre recognised by the Central Bodies of the German Federal States for Safety.
Eco-label	Environmentally relevant properties of a product (see table 8.5)	General	Manufacturer declara-tion like the IT ECO Declaration, certificates like the Blue Angel, references to published databases like ENERGY STAR.
Suitability for the production of original texts, copies and certified copies of notarial deeds as well as other documents according to Section 29 of the German Service Regulations for Notaries (DONot)	Proof of permanence and durability for the entire multi-functional device	Creation of certificates, contracts, and similar documents	Certificate by the Papiertechnische Stiftung (PTS) [non-profit foundation].

Tabelle 23: Certifications and awards for verification

8.5   Comparability of eco-labels

Nowadays, the due regard for environmental considerations is one of the core requirements of all multi-function devices. Environmental sustainability, e.g., environmentally sound disposal of old devices, restrictions on the use of specific ingredients in products, as well as electromagnetic compatibility, are mandatory legal requirements that manufacturers must already meet. Manufacturers are not permitted to enter EU markets with their products if they do not meet these fundamental legal, environmental requirements.

The requirements increasingly exceed the minimum standards set by statutory regulations, in particular, concerning the energy consumption, service life, as well as noise emission. Some requirements (both mandatory and optional) are assessed and evaluated collectively by eco-labels. The use of eco-labelling in invitations to tenders should be exercised conservatively. The choice of the quality mark can exclude devices or providers from tendering and therefore cause a constriction of the market. Furthermore, not all eco-labels evaluate criteria equally according to the same standards. Thus, comparability is challenging to assess. For that reason, these guidelines recommend the definition of criteria and requirements for devices in invitations

to tender. For this, not only eco-labelling but also test protocols should be approved as verification of compliance with these criteria.

If the procurer demands eco-labelling as evidence, specific criteria following Section 34 VgV must be met.

> **!** **Not all quality marks comply with the statutory requirements. An evaluation as per Section 34 VgV must be conducted before a specific quality mark can be requested as evidence.**
>
> **For instance, several private quality marks do not meet the requirements of Section 34(2) Sentence 3 VgV: Development in the framework of an open and transparent procedure in which all int erested parties can partake.**
>
> **The following table lists quality marks that meet the requirements set out in Section 34 VgV.**
>
> **!** **It is important to consider that the use of genuine toner and inkjet constitutes a prerequisite for the validity of the Blue Angel or similar certificates, e. g., Papiertechnische Stiftung (PTS) since the evaluation always encompasses the entire system including consumables.**

The following table lists those criteria that eco-labels for MFDs in Europe employ for evaluation. Discrepancies in measurement methodologies can occur.

The EU eco-label is currently based on the requirements and measurement methods of the Blue Angel according to RAL-UZ 171 and is not expected to be further evolved for the product category »imaging products«.

Criterion	Blue Angel RAL-UZ 205	EU eco-label	ENERGY STAR 2.0	EPEAT IEEE 1680.2 2012
Recycling-compatible design	Yes	Yes	No	Yes (partly mandatory, partly optional)
Return of colour modules and containers for colourants	Yes	Yes	No	Yes
Declaration of inkjet and toner cartridge yield	Yes	No	No	No
Resource-conserving handling of paper	Yes	Yes	Yes	Yes
Warranty, repair service, availability of spare parts	Yes	Yes	No	Yes
Longevity	Yes	Yes	No	Yes
Packaging (material and labelling)	Yes	Yes	No	Yes
Restriction of substances found in materials of housings and housing parts	Yes	Yes	No	Yes
Substances in carrier material of circuit boards	Yes	Yes	No	Optional
Substances in colourants	Yes	Yes	No	Yes
Substance emissions	Yes	Yes (except particle emissions)	No	Yes (except particle emissions)
Indication of the post-consumer recycled plastic content	Yes	No	No	Yes
Minimum of post-consumer recycled plastic	No	No	No	Optional
Energy consumption	Yes	Yes	Yes	Yes
Noise emissions during printing	Yes	Yes	No	No
Product documentation and user information	Yes	Yes	Yes	Yes
Compliance with fundamental European legislation on substances and materials (RoHS, REACH, EU battery Directive)	Yes	Yes	No	Yes
Ecological Life Cycle Assessment (LCA)/CO_2 footprint	No	No	No	Yes
Environmental management for production and design	No	No	No	Declaration: yes Certification: optional

Tabelle 24: Comparability of eco-labels

EPEAT characteristics: Other eco-labels work according to the »all-or-nothing« principle whereby all criteria must be met to receive and use the mark. The EPEAT has several grades, bronze, silver, and gold. Specific criteria must be met to receive bronze status. Silver is awarded if at least 50% of the optional requirements are met, gold is granted if more than 75% of the optional provisions are fulfilled. The manufacturer decides what optional criteria are met.

Additional European eco-labels (Nordic-Swan and Austrian eco-label) are either not awarded in Germany or do not cover the same criteria as their national counterparts.

9 IT security

Not only computers and servers but also printers and multi-function devices can be the target of cyber-attacks, data theft, and data misuse. Such attacks can threaten the confidentiality of data processed by the MFDs, as well as the functioning of the devices itself. Appropriate measures can increase network, device, and data security. The manufacturer can equip modern printers and MFDs with security functions. The market offers a wide range of security functions. It is recommended to activate and use these, in particular, if personal data is processed (cf. Sections 25, 32 of the ↗ GDPR) Data protection and security for MFDs can only be established by implementing a combination of organisational measures, due diligence of the user, as well as internal security functions of the device.

A minimum standard for IT security for scanning, printing, or multi-functional systems does not exist yet. However, there are minimum standards for communication via mobile devices and the Internet, as well as the particular ability to monitor interfaces.

Since the ability to increase IT security is not a requirement for all MFDs, manufacturers provide them only upon separate request from the procurer. The features of a device with particular precautions comes at an extra price. Thus, procurers should consider their requirements in this area carefully based on an extensive analysis of the processed data as well as their respective need for protection.

No.	Criterion	Requirements	Suitable as	Comments / Explanations
1	Local user authentication	• The device must include the technical requirements for authentication	Minimum requirement	Authentication directly on the device, e. g., via PIN, smart card, key combination, and so forth.
		• Ability to setup time-outs (automatic log off)	Minimum requirement	
		• Ability to configure the time-outs (when, how long)	Evaluation criterion	
		• Compulsory change of pre-set passwords	Evaluation criterion	Password changes apply to password policies, as far as these are implemented in the device.
2	Network authentication of users	• Network access to MFDs must have the option to be restricted	Minimum requirement	Network functions depend on authentication for network login, e. g., via password, active-directory-integration, or PIN.
3	Confidential printing	• Print only in the presence of the user	Minimum requirement	For example, via pin code allocation to the user for print jobs.
4	Confidential fax reception	• Fax output restriction (not anytime or immediately)	Evaluation criterion	For example, when pull printing, time-controlled fax output, forwarding via email.
5	Audio-visual cues	• Failed authentication attempts at the printer are distinctly audible	Evaluation criterion	Serves to warn the environment when abusive authentication attempts occur.
6	Logging of jobs	• Restricted access to the job log	Minimum requirement	The user must authenticate to review the job log.
7	Protection of user interfaces	• Ability to deactivate individual connections/access	Minimum requirement	
8	Ability to deactivate network protocols	• Ability to deactivate all unused network protocols individually	Minimum requirement	The deactivation of the HTTP/HTTPS protocol is equivalent to deactivating the web server. The configuration must then take place on the device itself or via a different network protocol.
9	Password protection	• Support for password policies	Evaluation criterion	Ability to the determine specific security requirements for password creation.
10	Automatic delete function	• After the print job is completed, print and other data must be automatically deleted and not be recoverable	Minimum requirement	
11	Data storage encryption	• Standard 256-bit data storage encryption	Minimum requirement	Recommendation according to AES 256 or BSI TR-02102-1.
12	Print job storage time	• Time-controlled deletion of print jobs	Evaluation criterion	Mostly relevant to work-groups and division-owned devices.
13	Removability of mass storage	• Mass storage must be removable	Minimum requirement	
14	Ability to apply security updates	• The printer must provide the option to update the firmware • Rejection of unsigned updates	Minimum requirement	

No.	Criterion	Requirements	Suitable as	Comments / Explanations
15	**Provision of security updates**	• The swift provision of firmware updates once security vulnerabilities are disclosed • Manufacturer signing of updates	Minimum requirement	The period in which the security updates are provided should be agreed contractually.
16	**Authentication of authorised users**	• Restriction of failed login attempts	Minimum requirement	Existing restrictions for all network protocols (login paths).
		• Division of rights for administration and user roles	Minimum requirement	Division can be even more exquisite.
17	**Transport encryption**	• Transport encryption of print data • Transport encryption of configuration access (e.g. web server)	Minimum requirement	

Tabelle 25: Criteria and requirements for IT security

Z So far, the proof concerning IT security requirements through certificates for MFDs is not customary. There are currently no cross-provider certifications on the market that consider the specific IT security requirements of the public administration for MFDs.

Due to the high and increasingly essential IT security requirements of MFDs but also because of the technical complexity of the needed specifications, the AK Printing Solution Services of Bitkom has developed guidelines for the security of print systems. These guidelines describe technical and specific threat scenarios for the IT security of multi-function devices, the resulting requirements as well as potential protective measures. These guidelines will be published on our website at ↗ https://www.itk-beschaffung.de/ once completed.

10 Award criteria

The award must be granted to the most economically advantageous tender as per Section 127 of the Legislation prohibiting restriction of competition. The determination of the most economically advantageous tender takes place following the best price-performance ratio. Apart from price or cost, this consideration can also take into account qualitative, environmental or social award criteria. Energy-relevant tender performances must also adequately account for the energy consumption of the devices as award criterion, as per Section 67(5) VgV.

The performance requirements may be expressed within the framework of award criteria with minimum technical specifications or within the framework of evaluation criteria. The procurer decides what individual performance characteristics belong to which category. Criteria tend to show minimum requirements that are essential for the operation of the device. Whenever tables of these guidelines list the minimum requirements for the devices, they label them as »minimum requirement«. The guidelines recommend to only use the requirements within the framework of the evaluation criteria if the criteria/requirements are labelled with »evaluation criterion.«

The wording of the performance requirements with the help of the evaluation criteria can provide competitors with specific leeway. This wiggle room permits a differentiated consideration of the tendered services in the evaluation. In doing so, the individual forms of services can be taken into account; this is favourable for the latitude of the competition. The wording of the performance requirements should be concise, comprehensible, and objectively appraisable.

The increased or exclusive use of minimum technical requirements in the terms of reference can result in undesired restriction of competition.

The guidelines recommend the use of evaluation criteria to promote a diverse competition.

10.1   Energy consumption during utilisation cycle

The expected energy costs must also be recorded and evaluated to determine the costs of a print system throughout its entire utilisation cycle.[6] For this, two options are available:

1. The determination based on the TEC values according to ENERGY STAR/Blue Angel.
2. The calculation based on the power consumption of various operational modes.

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6 Use during the intended contracted term

Option 1: Calculation based on the TEC value

The TEC value[7], which is also the basis for the Blue Angel Quality Label, refers to electricity consumption each week, whereby comparable usage scenarios are assumed. The calculation of energy costs for an entire utilisation cycle is as follows:

Electricity costs per kWh [EUR/kWh] × TEC [kWh/week] × planned operating life [weeks] = energy costs for an entire utilisation cycle.

> **!** **A comparison of the energy efficiency based on the TEC value should only be made if you compare multi-function devices with same print speeds. The determination of the TEC value is based on the print speed of the daily print volume.**

Sample for illustration:

MFD printing speed	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 printing time each day (includes dwell time in print mode)
20 ppm	200 pages	20	10 minutes
30 ppm	450 pages	30	15 minutes
45 ppm	992 pages	32	22.04 minutes
50 ppm	1,248 pages	32	24.96 minutes
65 ppm	2,112 pages	32	32.5 minutes

Tabelle 26: Sample calculation 1: energy consumption during utilisation cycle

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7 Corresponds to the Typical Energy Consumption (TEC) in Germany, i. e., the TEC value.

Option 2: Calculation based on the power consumption of various operational modes

An alternative procedure can be used if the planned print volume deviated significantly from the TEC value (cf. table above), and if devices with different print speeds are compared to one another. These are based on the power measurement of various operational modes in combination with corresponding dwell times. The procurer must specify different parameters for the calculation to ensure comparability of devices from different providers. The following parameters should be present:

- Power consumption in Watt for the various operating states
- Dwell time within the various operational modes (according to ENERGY STAR within the respective program) in minutes, according to the providers setting (factory setting)[8]
- Print volume each month in pages (provided by the procurer)
- Print speed according to ISO/IEC 24734
- Extent and amount of print jobs each day (provided by the procurer)
- The indication of switch-off time (mains switch) per wee.

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

The following example shall illustrate the data collection and calculation for substantial devia-
tion of the actual usage scenario from the hypothetical usage scenario of the TEC procedure.
The colours have the following meaning:

- orange fields represent information that must be provided or specified by the procurer,
- white fields relate to technical specifications of the device that must be indicated by
  the provider,
- blue fields represent the sum of information provided by the procurer and provider.

	Parameters	Where does this value come from?	Example device with four operational modes (printing operation, ready mode, sleep mode, and off mode)
Usage scenario	Print volume each week per device	Must be determined and specified by procurers	500
	Print speed in IPM according to ISO/IEC 24734	According to provider information	40
	Average number of pages printed each print job, images per job	Must be determined and specified by procurers	5
	Number of print jobs per week	Calculates as follows: [print volume per week] / [images per job]	100
	The pre-set time before entering sleep mode after printing (in minutes) = dwell time in ready mode after printing.	Specification provided by the manufacturer (pre-set time or default delay time to sleep).	1
	Off (hours/week)	Provided by the procurer: how many hours per week is the device switched off entirely (e.g. weekends)	48.00

	Parameters	Where does this value come from?	Example device with four operational modes (printing operation, ready mode, sleep mode, and off mode)
Dwell time for each operational mode that arises from the information in the usage scenario.	Dwell time in operation [hours/week]	Calculates as follows: [print volume] / [images per job] / 60	0.21
	Dwell time in ready mode [hours/week]	Calculates as follows: [pre-set time to reach the standby mode] / [print jobs per week] / 60	1.67
	Dwell time in sleep mode [hours/week]	Calculates as follows, based on a 168-hour week: [off hours]-[pre-operating hours]-[operating hours]	118.13
The average power consumption of the device following ENERGY STAR 2.0 and Blue Angel RAL-UZ 205	Operation [W] Definition according to ENERGY STAR 2.0 and Blue Angel RAL-UZ 205	According to provider information	348
	Ready mode [W] Definition according to ENERGY STAR 2.0 and Blue Angel RAL-UZ 205	According to provider information	59
	Sleep mode [W] Definition according to ENERGY STAR 2.0 and Blue Angel RAL-UZ 205	According to provider information	1.2
	Off (hardware) [W] Definition according to ENERGY STAR 2.0 (standby) and Blue Angel RAL-UZ 205	According to provider information	0.1

Tabelle 27: Sample calculation 2: data collection and calculation for substantial deviation of the actual usage scenario

> **Some devices switch to other operational modes after printing before they enter sleep mode. The average power consumption in these operational modes ranges between the values for ready mode and sleep mode. Longer actual dwell times in these modes have a more significant influence on the overall electricity consumption of the device. The power consumption, as well as the respective dwell times, must be established if these operational modes are to be included in the calculation. The dwell time can be set up in the individual operational modes, for example, standby after 5, 30, 45, or 60 minutes.**

	Parameters	Where does this value come from?	Example device with four operational modes (printing operation, ready mode, sleep mode, and off mode)
The expected electricity consumption for the above scenario	On state [kWh/week]	Calculates as follows: [power consumption operation] / 1,000 × [dwell time operation]	0.073
	Ready mode [kWh/week]	Calculates as follows: [power consumption readiness] / 1,000 × [dwell time readiness]	0.098
	Sleep mode [kWh/week]	Calculates as follows: [power consumption sleep mode] / 1,000 × [dwell time sleep mode]	0.142
	Off state [kWh/week]	Calculates as follows: [power consumption off] / 1,000 × [dwell time off]	0.005
	Overall electricity consumption per week [kWh/week]	Calculation based on the combined power consumption of each operating states	0.317
Cost calculation	Assumed electricity price (EUR)	Must be provided by the procurer	0.20 €
	Duration (years)	Must be provided by the procurer	4.000
	Electricity costs for each device over the contract duration (EUR)	Calculates as follows: [electricity consumption / week] × 52 × [contract duration] × [electricity price]	13.20 €
	Number of identical devices with the same usage scenario	Must be determined and specified by procurers	500
	Cost for all identical devices with the same usage scenario for the contract duration	Calculates as follows: [electricity costs per each device for the contract duration] × [number of devices]	6,601.57 €

Tabelle 28: The electricity consumption of different operational modes and cost calculation

Market restrictions must be expected if measurement methods are implemented that are not standardised by ENERGY STAR.

10.2   Per page price calculation

Costs for copying and printing incurred during the intended period of use can be calculated with
a per page price calculation if the multifunction device is purchased. A cost calculation per page
is only possible if hardware and consumables are tendered together. Only this permits compara-
bility of the various offers. The gross price for the surcharge is calculated based on the unit price
and, for example, the combined cost of consumables and energy consumption for four years.
The costs for service should also be considered. Thus, it is essential to analyse the expected print
and copy volume in advance and specify the planned operating life as accurately as possible.

The foundation for this calculation is information concerning the service life and price of
each unit. The guideline for calculating the yield of consumables is based on ISO/IEC 19752 for
laser printers, ISO/IEC 19798 for colour laser printers, and ISO/IEC 24711 for inkjet printers.
Monochrome printers rely on ISO/IEC 19752, colour laser printers and colour inkjet printers
refer to ISO/IEC 24712.

Product	Yield	Unit	Price	Factor	Price per page
Toner black	10,000	Seite	50.00	1	0.005
Drum	20,000	Seite	120.00	1	0.006
Refuse container for colouring matter	20,000	Seite	20.00	1	0.001
			Total costs per page in EUR:		**0.012**

Other costs:

Such as maintenance kits

The cost basis is determined by a print volume of **750** A4 pages per month for four years.

Cost calculation for four years		Print performance to be considered (36,000 pages minus initial stocking, e.g. toner for 10,000 pages)	Service life: 48 months
Price per page, toner	0.005	26,000	130.00
Price per page, drum	0.006	16,000	96.00
Refuse container for colouring matter	0.001	16,000	16.00
	Total costs for 48 months in EUR:		242.00

Tabelle 29: Sample per page price calculation

11 Contractual provisions

11.1　Supplementary terms of contract for the procurement of IT supplies/services

Relevant contracts govern the provision of the advertised services or delivery of the advertised products after the successful completion of the procurement procedures. The Federal Ministry of the Interior and Bitkom have developed several contracts that can be used to support the awarding bodies. The contracts 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

The procurement procedures must consider the economic and ecological criteria as well as social aspects (Section 97(3) GWB, Section 31(3) VgV on the award of contracts within the upper-value limit, Sections 2(3), 22(2) UVgO on the award of contracts within the lower-value limit). Such social aspects include, in particular, labour rights, the ban on child labour, discrimination against employees, but also the observance of bandwidth working hours by the tenderer as well as its suppliers. The awarding office can ask each bidder to provide a statement concerning the social IT sustainability to ensure that the aspects of the procurement procedures for IT products and services are guaranteed. The declaration, a corresponding text block for the contract design, and scope of application explanation can be found on the website of the Procurement Agency of the Federal Ministry of the Interior.

12 Practical tips for the procurement procedure

12.1 Market survey

The exploration of the market is a valuable tool for the preparation of a procurement procedure. If carried out correctly, the results can significantly aid the needs assessment and wording of the requirements or terms of reference in line with public procurement law. Furthermore, above average knowledge by the awarding authority on commercially available products as well as conditions can increase the procurement effectiveness.

The legislation expressly permits the exploration of the market:

»Before the procurement procedure, the awarding authority is only permitted to explore the market to prepare the contract award process and inform the companies on its procurement procedures and requirements.« Section 28(1) VgV.

The provisions of Section 28 VgV itself contain no rules concerning the type of market exploration. The general principles concerning procurement laws, equal treatment, and transparency apply. These guidelines offer an entry into market exploration for MFDs

12.2 Testing

Tests can be useful for the verification and validation of parameters specified by the providers. A test scenario should reflect the prospective deployment scenario.

13 Facilities

13.1   Needs assessment and checklist

Every procurement procedure starts with the thorough evaluation of procurement requirements, namely, the needs-based configuration of the end user. For this, the present inventory as well as the current but also prospective requirements should be considered. The first step encompasses the analysis of the current state of the print-output-structure, amongst others, concerning the number and type of document based in and output systems (multi-function devices, printer, faxes, and scanner) by volume. The situation analysis and required MFDs (hardware), as well as the related consumables, software, and services (including indirect costs for energy, administration, or floor space) are to be included. The following table shall assist the needs assessment and does not claim to be exhaustive. It compares the existing situation with the expected future MFD requirements. According to Section 6 VgV, conflicts of interest must be avoided when hiring an external company for the analysis.

Analysis current state	Available information source	Typical operator situation	Future possibilities and recommendations
What type of device with which kind of functions is available, e. g., printing, copying, scanning, faxing, workflow-management?	Inventory data of the installed devices (source inventory database), as well as any existing procurement contracts.	Priority usage of basic functions like printing, copying, and scanning up to now. No extensive use of advanced features of current MFDs.	Use of MFDs basic and advanced functions like scanning, but also the support of electronic process handling.
Which software and administrative applications require what requirements to control the switching on and off of the MFD as well as the process support for process handling.	Currently used software and administrative applications, guidelines by the internal IT strategy (ECM, eGovernment, use of electronic files, for example).	Different software and administrative applications.	Increased application of MFDs with multi-functional solutions concerning their increased use/integration into electronic administrative processes, e. g., electronic files, the automatic collection of hard copies (scanning) like TR-RESISCAN.
What types of print media (according to print format, grammage, form and structure of the media) is required and how high is the respective proportion to the overall volume.	Kind of print media (e. g., paper, and so forth) procurement up to now. Breakdown of the respective print media amount according to three essential criteria.	The predominant use of recycling/regular paper with a grammage of approximately 75−90 g/m², in which the majority (90%) is printed/copied in A4 format.	Needs-based selection of the respective device categories based on a workflow analysis of the individual department.
Which print, copy, scan volume was generated with the devices to date?	Reading the device memory for previously printed/copied pages.	The print/copy volume of business and administrative applications.	Needs-based selection of device classes/categories or substitution of printed/copied pages through electronic workflows.
What is the proportion of colour to black and white printing?	Inventory data in inventory database existing procurement contracts for consumables (inkjet and toner cartridges, paper types, and so forth).	High margin of black and white printing, colour printing often less than 10% of the overall volume.	Needs-based selection of the respective device categories based on a workflow analysis of the individual department.
What IT security requirements must be observed?	Internal specifications, General Data Protection Regulation (GDPR), Federal Office for Information Security (BSI), and common criteria.	The requirements for IT and data security increase significantly.	High IT security for the public administration as a strategic goal, General Data Protection Regulation (GDPR) takes effect as of May 2018.
Needs-based number of installed MFDs, their operational performance/features, equipped functions, and number in proportion to potential users?	Needs-based evaluation of the equipped functions and performance/features of future MFDs.	A wide variety of situations on-site.	The ratio between devices and users must be needs-based and relates closely to the overall concept.
Are there any specific requirements concerning the accessibility?	Needs-based evaluation.	A wide variety of situations on-site.	Alignment with the provisions of the European standard EN 301549.

Tabelle 30: Needs assessments and checklists

In the best-case scenario, stocktakes and the determination of future requirements can help to derive as well as choose functionality of the devices to be purchased. In any case, this creates the foundation for targeted market research as well as insight into the currently offered solutions. The inventory and needs assessment can serve as a basis to plan installation and usage but also help the creation of usage guidelines for new devices.

The needs assessment might also reveal that the procurement of hardware is preferential to managed print services.

13.2   Glossary

a) Glossary of general terms

No.	Term	Explanation
1	**ADF**	Automatic Document Feeder.
	ECM	Enterprise Content Management.
	Recommended print volume	The recommended print volume serves as a needs-based classification of performance classes and always refers to the A4 pages per month.
2	**Stapling**	The mechanical connection of printed pages with staples.
	IPM	Images per minute. The IPM specification determines a specific document resolution, unlike Pages Per Minute (PPM).
3	**Physical print resolution**	The decisive factor is the physical resolution of the used printer (also referred to as native resolution). Often, the specifications of the print-resolution (e.g., enhanced, bicubic, or nearest neighbour, and so forth) are so-called interpolated resolutions, which are computer calculated values. They tend to be unsuitable for objective comparisons.
	Pull printing abilities	Allows users to pick up print-jobs at any compatible device. For this, a job is saved to the server or client until the user has identified himself on the output device. The issuing printer can then »pull« the job from the server or client. Pull printing increases security in cases of confidential prints and eliminates unclaimed documents at the issuing device.
4	**Universal feed**	An integrated manual feeder, which allows the feeding of an individual file but also multiple pages and media. Universal feeders allow the use of several file formats, especially those that do not conform to the ISO standard, which includes postcards, index cards, envelopes, and so forth. Furthermore, they allow feeding of media that is unsuitable for standard trays because of their grammage (measured in g/m²), strength, or other characteristics, e. g. foils. Other equivalent descriptions from manufacturers: ▪ Stacked sheet feeder ▪ Bypass ▪ Multi-tray
5	**Wear materials**	Components that are particularly stressed and can be replaced, for example, fixation unit, or track rollers.

Tabelle 31: Glossary of general terms

b) Glossary of energy consumption

No.	ENERGY STAR labelling	ENERGY STAR definition
	Power consumption	The amount of electrical energy that the device requires to be operated for a specific amount of time.
	TEC values	»Typical Energy Consumption« expressed in kWh per week.
1	Standby mode	The power mode with the lowest power consumption. The user is unable to switch off or affect this mode, which continuous endlessly as long as the product is connected to the mains and the product is used as intended by the manufacturer. The standby mode is the device's state with the lowest power consumption. For imaging products, the standby mode tends to be equivalent to the off state but can also be the ready or resting state. A product is unable to leave the standby mode and change into a mode with even less power consumption unless the user manually disconnects the device from the mains.
2	Off state	The product changes the power consumption state when switched off manually or automatically but is still connected to the mains. This state ends if an input signal is provided, e. g. by pressing a power switch or auto-timer, which causes the device to change to a ready state. The state is often referred to as »manual off state« if the user causes this state. The state tends to be referred to as »automatic off state« if an automatic signal (e. g. a power switch or auto-timer) causes this state.
3	Sleep mode	This state reduces the power consumption. The product changes to this state either automatically after a (standard) time of inactivity, caused by the user (for example at a user-defined time, or after activation of a switch or a button), or after an electric impulse, e. g., electrical, incoming fax, or remote control. Products tested according to the TEC approach can utilise all product functions in sleep mode (including the preservation of power functions). However, this function might come with a slight delay when changing into an active mode. Product tested according to OM test procedure can utilise some individual active network interface functions in sleep mode and if required a fax connection. However, this function might come with a slight delay when changing into an active mode.
4	Ready mode	The power consumption state in which the product generates no output but has reached the print ready condition, before entering a low power mode that allows a change in an active state with minimal delay. This state allows the activation of all device functions; the product can also change into an active state by receiving an electric impulse like network interface functions, e. g., incoming fax or remote control as well as direct control, for example, by pressing a switch or a button.
5	On state (operational)	The power consumption state in which the product is connected to a main and actively generates output or another primary function.

Tabelle 32: Glossary of energy consumption

c) Glossary of noise emissions

ISO description	Unit	Description
A-weighted sound power level	L_{WA} **in dB(A)**	Sound power: Describes the source strength of a noise producer. The sound power level can be used to determine the sound energy of a noise source. The sound power level is the corresponding logarithmic size.
Guaranteed A-weighted sound power level	L_{WAd} **in B(A) or dB(A)**	The A-weighted guaranteed sound power level is determined according to ISO 9296 and specified in either Bel or Decibel, where 1 B equals 10 dB. The value describes the average of at least three devices measurements, or rather, the below formula: $L_{Wad} = L_{WA1} + 3,0$ dB (LWA1 = A-weighted sound power level of an individual device in dB with one decimal). In the area of office and information technology devices, specifications tend to be calculated based on the above formula.
A-weighted sound pressure level (operator location, bystander location)	L_{pA} **in dB(A)**	Sound pressure p: Alternating pressure caused by sound in which static air pressure is superimposed. The eardrum transforms these pressure fluctuations into movement, which in turn causes an auditory sensation. In other words, sound pressure describes the sound energy at a specific location, e.g. eardrum of the operator or the workplace nearby the device.

Tabelle 33: Glossary of noise emissions

13.3   Legal provisions

The providers, as well as the procuring bodies, must observe public procurement law and other legal foundations. The following overview (not conclusive) will cover the most important legal provisions concerning Multi-functional Devices (MFDs). The list also serves to identify the legal abbreviations in the guidelines.

BattG

Act Governing the Sale, Return and Environmentally Sound Disposal of Batteries and Accumulators (national implementation of Directive 2006/66/EC on batteries and accumulators as well as waste batteries and accumulators).

BHO

Federal budgetary regulations.

ElektroG

Act Governing the Sale, Return and Environmentally Sound Disposal of Electrical and Electronic Equipment (national implementation of Directive 2012/19/EU on waste electrical and electronic equipment (**WEEE**)).

ElektroStoffV

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

EMVG

Legislation concerning the electromagnetic compatibility of equipment (national implementation of Directive 2014/30/EU on the harmonisation of the laws of the Member States relating to electromagnetic compatibility).

DSGVO

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

GWB

Legislation prohibiting restriction of competition.

POP-VO

Regulation (EC) No. 850/2004 on **p**ersistent **o**rganic **p**ollutants.

ProdSG

The Product Safety Act serves to protect the fundamental health and safety requirements.

REACH-VO

C1 Regulation (EC) No. 1907/2006 concerning the **R**egistration, **E**valuation, **A**uthorisation, and Restriction of **Ch**emicals.

UVgO

Regulation of supply and service contracts below a threshold: Regulation on the award of public supply and service contracts below the EU thresholds; it must be enforced through Federal and State Legislations for the respective territory. Some Federal States restrict the application or recommend the sole use of the UVgO for its regional authorities, state corporations, and federal state authorities.

VgV

Directive on the award of public contracts. Regulation on the award of EU-wide public supply and service contracts.

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