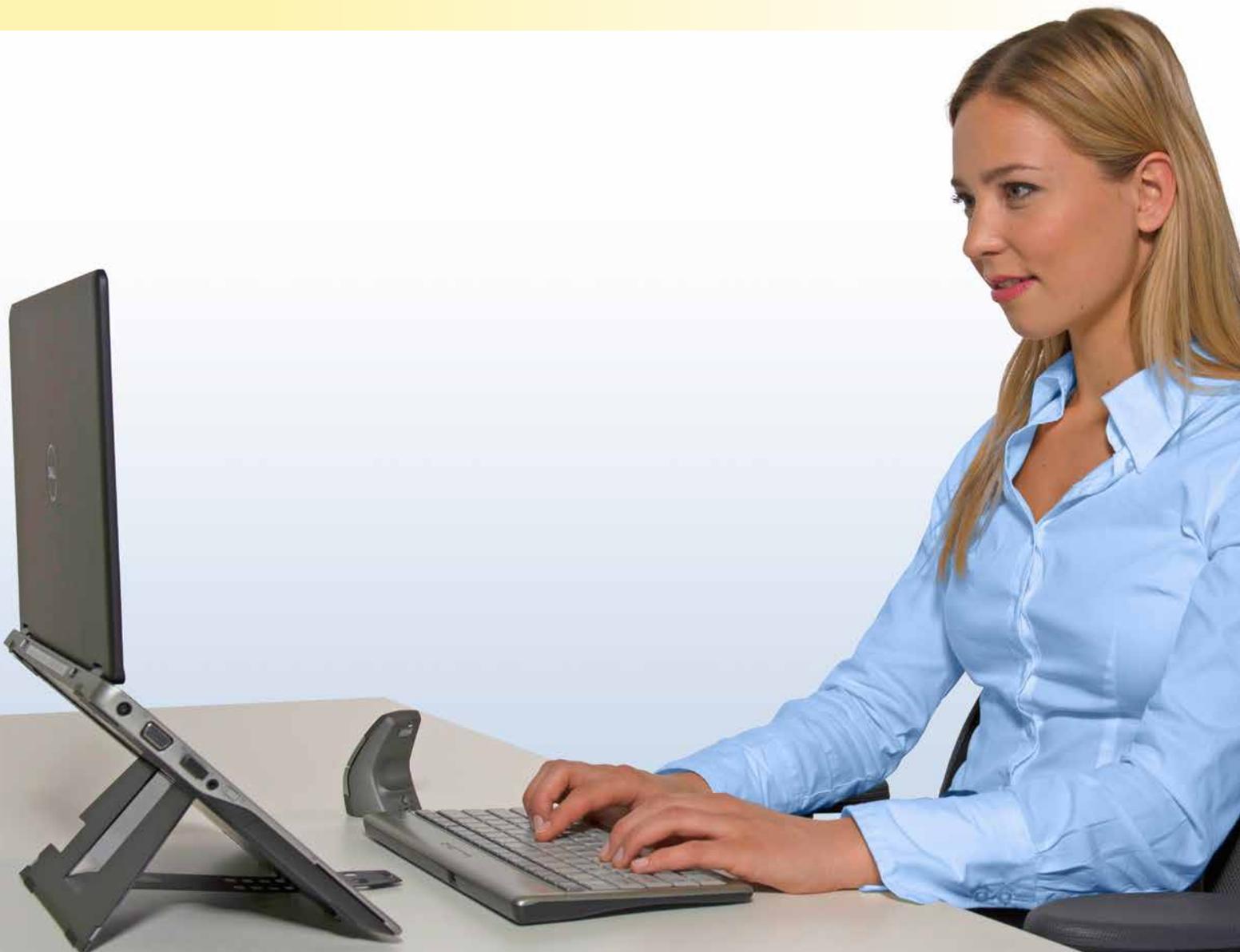


# Can you work comfortably with a laptop?

Laptops and business use - a practical summary



# Introduction



The laptop: now indispensable for office life as we know it. With work locations becoming ever more flexible, the laptop is an essential tool for working at home, at the office or on the move. According to the IT & Flexible Working Survey 2014, the laptop is even the most commonly used device among these employees. This is not surprising when considering that the portability of this device makes it so convenient. Armed with a laptop, employees can work anywhere because they have all the programs and documents they need in one device. Prolonged use of a laptop, however, has its ergonomic limitations.

On its own, the laptop is unsuited for working for more than two hours a day. Working longer on a laptop results in an uncomfortable working position with pain and discomfort at the end of a workday. Prolonged laptop use also leads to lower productivity. Adding accessories means that you can work productively and for longer periods of time on a laptop.

This whitepaper provides an introduction to safe productive ways of working with a laptop. Section 1 explains why using a laptop is not always a safe way of working. Section 2 focuses on the regulations and norms surrounding the use of laptops for work. Section 3 of this whitepaper discusses the safe use of laptops, and the last section provides a useful matrix for selecting which accessories are best suited for the various kinds of laptop use.

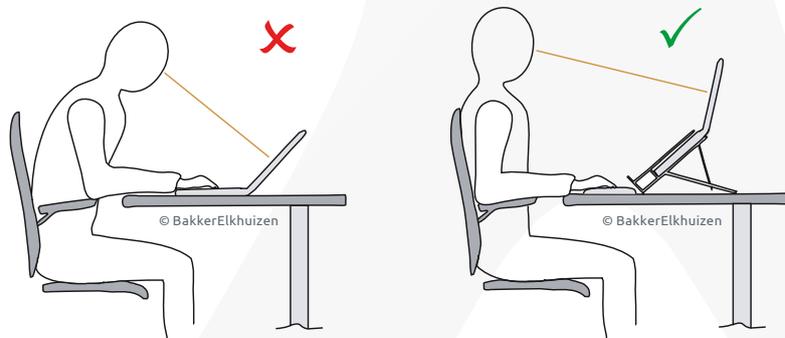
## Why is using a laptop not always safe?



*Lower typing speed  
and more typing  
errors on a laptop*

The posture that someone automatically assumes when using a laptop is the biggest problem when using this device over a long period of time. This is because the screen and keyboard are a single unit. This design of a laptop forces its user into a typical working position: hunching over with the neck bent. The size of the screen also contributes to this: the smaller the screen, the more the neck is flexed (Szeto and Lee, 2002).

As the drawings below show, it's not surprising that prolonged laptop use leads to more fatigue and discomfort in the neck and shoulder region. Several studies show an increased strain on the upper back, neck and shoulders as a result of laptop use. Laptop users also move their heads less frequently than desktop computer users (Lindblad, 2002). A safe working position is achieved only once the screen is raised.



And physical discomfort is not the only problem. Employees who use a laptop instead of a desktop computer type slower and less accurately. Again, this is related to the size of the laptop. The smaller the laptop, the slower the typing speed and the higher the number of typing errors (Szeto and Lee, 2002).

## What does legislation say?



The legal requirements that a workplace has to meet when used for computer work can be found in EU Directive 90/270/EEC which has been the basis for the national legislation drawn up in each EU member state. In the United States, the Occupational Safety and Health Administration (OSHA) has drawn up practical guidelines for working safely with computers which are in line with EU legislation.

### Screen and keyboard

According to the standards, the screen and keyboard may not be a single unit - as is the case for laptops. In addition, it should be easy to adjust the angle and height of the screen. This means that a laptop without accessories does not comply with the requirements posed for a safe computer workplace. The only way to increase the height of a laptop's screen is to use a laptop support. And, according to the legislation, also a separate keyboard is required.

*A laptop without accessories does not comply with legislation*

## Safe productive laptop use

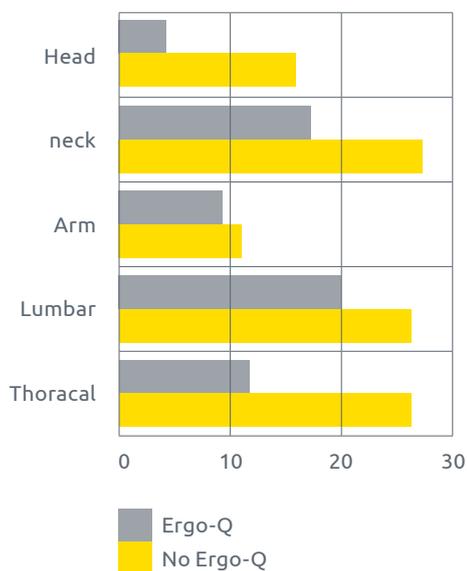
### *The solution: a laptop support and a compact keyboard*

Working with a laptop equipped with accessories has a beneficial effect on both the safety and productivity of users. To work safely and productively with a laptop, its screen has to be adjusted to eye level. This can be accomplished with an integrated laptop support. For proper posture, it is also important to use a separate keyboard and mouse. The following subsections focus on the safety and performance aspects of proper laptop use.

### Effects on safety

Three scientific studies into the effects of combining a laptop support with a separate mouse and keyboard show an improvement in both posture and comfort.

The first of these, conducted by Boersma (2002), showed a significant improvement in posture when using a laptop support that can raise the level of the screen. Using a separate keyboard means that the neck is bent less and the lower arms are in a more neutral position. This study made use of the Ergo-Q notebook stand with an integrated document holder. Figure 1 shows a reduction in physical discomfort when working with an Ergo-Q notebook stand. Respondents gave working with a laptop support a rating of 8.0 (out of 10), while working without a laptop support received a score of only 5.5.



**Figure 1**

Difference in physical discomfort between using a laptop with a laptop support and a laptop without a laptop support. Reference: Boersma and Mol, 2003.



The study by Lindblad (2002) compared the use of a laptop without any ergonomic accessories to a fully accessorized laptop: one with a laptop support and an integrated document holder, a separate keyboard and a separate mouse. This study concluded that the mechanical strain on the neck decreases by 32% while comfort increases by 21% when the laptop is equipped with all the accessories.

The most recent research (2012) that was conducted by Harvard University, confirmed these findings. In this study, Asundi, et al. showed that there is less flexing of the head and neck when using a laptop support, and that there is less physical strain as compared to using a laptop without a laptop support.

### Size of screen

Finally, Carolyn Sommerich and her colleagues conducted a study into the effect of the size of the screen on neck and shoulder strain. The amount of strain when using a 19-inch screen is shown to be less than when using a 14-inch screen. Since most laptops are equipped with 13 to 15-inch screens, the use of a separate screen of at least 19 inches is recommended for prolonged laptop use.

*Higher productivity  
when using the  
right accessories*

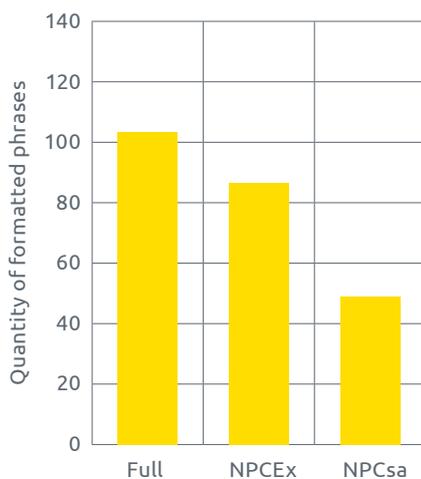


## Effects on performance

The laptop is a convenient device for quickly creating a workplace at various locations. However, because its screen and keyboard are a single unit, this results in lower productivity when typing on a laptop without accessories. The study reported by Lindblad (2002) showed a remarkably large difference in productivity during typing when measured over a 4-hour period. This was 17% higher among the group that used a laptop support with a separate keyboard and mouse. On average, employees work 4 hours a day with the computer so this increase in productivity will probably apply to practical situations.

A study by Sommerich and her colleagues (2001) supports Lindblad's findings. In Sommerich's study, productivity was measured by a task in which the subjects had to construct sentences. Both mouse and keyboard were used for this.

Figure 2 illustrates that using a laptop with a separate mouse and keyboard results in higher productivity than when using a laptop with only the mouse or without any separate data entry equipment.



**Figure 2**

Difference in productivity among 3 different laptop configurations:

Full: laptop + separate mouse and separate keyboard;

NPCEX: laptop + separate mouse;

NPCsa: laptop alone.

Reference: Sommerich, et al., 2001.

## The importance of the keyboard

A study by Boersma (2002) found no difference in productivity but this study used an unusually small mini keyboard. Afterward, the subjects indicated that they had made many more typing errors when using this very small keyboard so the beneficial effect of using the laptop support and separate mouse had probably been negated due to the very small keyboard. For this reason, it is important to use a separate compact keyboard with at least 19 mm between the keys.

# Selection matrix

Employees use laptops differently and for a variety of purposes. Some will use their laptop at only one location such as at home. Others will work on their laptop in more than one place. This selection matrix helps you find the laptop support best suited for a specific employee profile or for your own personal laptop use.

<b>Integrated portable notebook stand</b>	
The notebook stand is part of the laptop. This makes setting it up simple and keeps the user from leaving it behind so easily.	
Convenient to take along for use anywhere.	
<b>Portable notebook stand with document holder</b>	
A document holder is recommended when the user frequently works with documents or uses it to hold a smartphone.	
Convenient to take along for use anywhere.	
<b>Notebook stand for a permanent workplace</b>	
The notebook stand is especially suitable for flexible workstations that serve various employees.	
Suitable for working with a laptop at a permanent location.	
<b>Notebook stand for a permanent workplace + docking station</b>	
Being integrated with the docking station simplifies set-up. Connecting to cables is unnecessary, and the keyboard and mouse can remain at the workplace.	
Placing the laptop screen at the same height as the separate screen provides dual-screen operation.	
Suitable for using a laptop at a permanent workplace. Not suitable when various kinds of laptops are to be used at the same workplace.	

## Conclusion



Without accessories, a laptop is unsuited for prolonged use. When using a laptop for more than two hours a day, separate accessories will be needed in order to comply with legislation and accepted best practices. To use a laptop comfortably and productively, a laptop support and separate mouse and keyboard are essential.



For people who are often on the move and who often take their laptop along to various workplaces, there are accessories that are small enough to put in the laptop bag. For a permanent workplace (at home or at flex workstations serving several office employees), a separate screen measuring at least 19 inches provides extra value. Placing the laptop screen at the same height as the separate screen also allows dual-screen operation.

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BakkerElkhuizen develops excellent products for making computer use healthy and efficient. Products from BakkerElkhuizen display the perfect combination of function, ergonomics and design.

BakkerElkhuizen advises and helps companies equip their workplace, including offices that use telecommuting and flexible working, so that each workstation receives the right solution and the right accessories.

BakkerElkhuizen bases this on four workstation concepts:

- permanent workstation
- mobile workstation
- flexible workstation
- home workstation

The point of departure is that an employee must be able to perform his or her computer work comfortably, healthily and efficiently wherever he or she works. People come first in everything that BakkerElkhuizen does, whether it concerns developing new products, performing research or cooperating with suppliers, resellers and customers.

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