

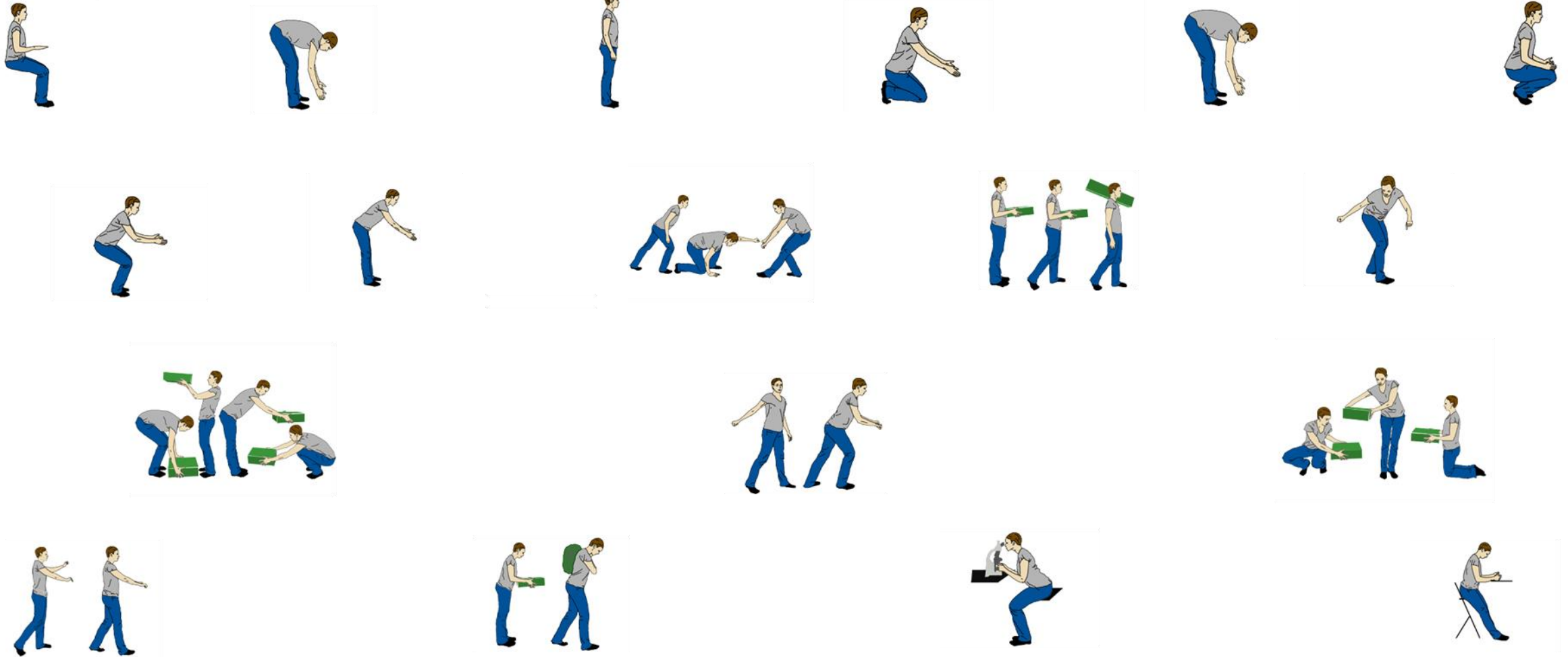
# Ergonomics Requirement Specification for External Machine Manufacturers

Our Requirements to New Machines

**Neutral Body Posture – Trunk and Back**  
Evaluation of Body Postures

# Evaluation of Body Postures

## Possible Body Postures



# Trunk Flexion / Extension

Trunk and Back Bending of the trunk			Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 Acc. to ISO 11226(2) & EN 1005-4			Optimal	Still acceptable posture	Extremely awkward posture
	Trunk Flexion (bending forwards)	+	0° to 20°	20° to 60°	> 60°
	Trunk Extension (bending to a side)	-	0°		< 0°

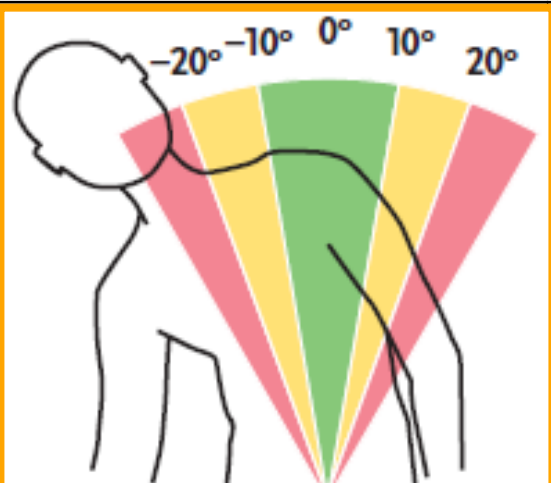
## Definition of colors

**Green:** Optimal. This posture is allowed to be adopted for a long time.

**Yellow:** Still acceptable body posture. This posture is only allowed to be adopted for a **short period of time** or to perform work-tasks with **low frequencies**.

**Red:** Extremely awkward Body Posture. **Has to be avoided!**

# Bending of the trunk to a side

Trunk and Back Bending of the trunk		Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 Acc. to ISO 11226(2)		Optimal	Still acceptable posture	Extremely awkward posture
	Bending of the trunk to the right	+ 0° to 10°	10° to 20°	> 20°
	Bending of the trunk to the left	- 0° to -10°	-10° to -20°	< -20°

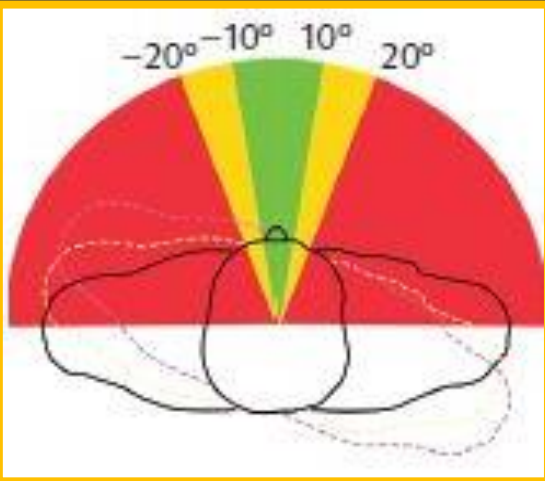
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# Torsion of the trunk

Trunk and Back Torsion of the trunk		Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 Acc. To ISO 11226(2)		Optimal	Still acceptable posture	Extremely awkward posture
	Torsion of the trunk to the right +	0° to 10°	10° to 20°	> 20°
	Torsion of the trunk to the left -	0° to -10°	-10° to -20°	< -20°

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# Ergonomics Requirement Specification for External Machine Manufacturers

## Our Requirements to New Machines

### **Neutral Joint Positions – Hands / Arms / Shoulders**

### Evaluation of Joint Positions

[Ergonomics Requirement Specification for External Machine Manufacturers - Continental AG](#)

# Shoulder Joint

## Adduction / Abduction

Shoulder Joint		Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 Acc. To DIN EN 1005-4; German A 55		Optimal	Still acceptable posture	Extremely awkward posture
<p>The diagram illustrates the range of motion for the shoulder joint. It shows a human silhouette with the shoulder joint highlighted. A circular sector is divided into three colored regions: green (0° to -20°), yellow (-20° to -60°), and red (&gt; -60°). Arrows indicate abduction (left) and adduction (right). The green region is labeled 'Optimal', the yellow region is labeled 'Still acceptable posture', and the red region is labeled 'Extremely awkward posture'.</p>	To the body = Adduction +	0°	> 0°	
	From the body = Abduction -	0° to -20°	-20° to -60°	< -60°

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# Shoulder Joint Flexion / Extension

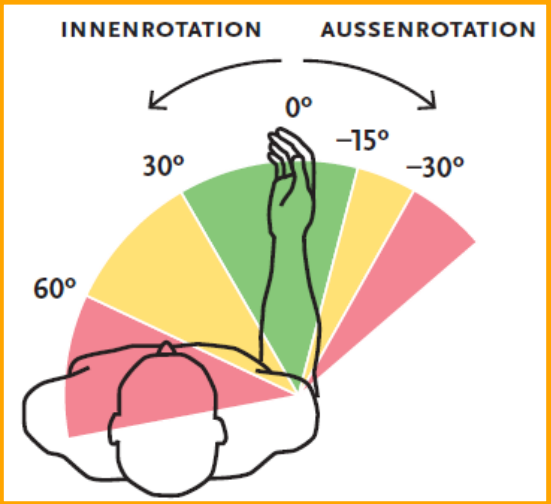
Shoulder Joint			Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 Acc. To DIN EN 1005-4; German A 55			Optimal	Still acceptable posture	Extremely awkward posture
	Forwards (Flexion)	+	0° to 20°	20° to 60°	> 60°
	Backwards (Extension)	-			< 0°

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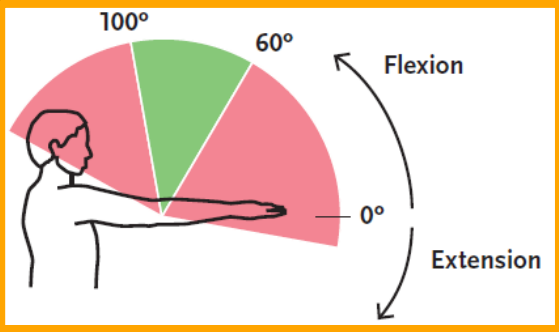
# Shoulder Joint Pronation / Supination

Shoulder Joint		Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 German A 55		Optimal	Still acceptable posture	Extremely awkward posture
 <p>The diagram illustrates shoulder joint rotation. It shows a top-down view of a person's head and shoulders. A vertical line represents the neutral position (0°). To the left, 'INNENROTATION' (pronation) is indicated with a curved arrow. To the right, 'AUSSENROTATION' (supination) is indicated with a curved arrow. The rotation is divided into colored segments: 0° to 30° (green), 30° to 60° (yellow), and 60° to 90° (red). For pronation, the segments are 0° to 30°, 30° to 15° (yellow), and 15° to 30° (red). For supination, the segments are 0° to 15° (green), 15° to 30° (yellow), and 30° to 60° (red).</p>	Pronation (to the body) +	0° to 30°	30° to 60°	> 60°
	Supination (from the body) -	0° to -15°	-15° to -30°	< -30°

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# Cubital Joint Flexion / Extension

<b>Cubital Joint</b>			<b>Neutral (natural) Body Posture</b>	<b>Awkward Body Posture</b>	
Source: German BGIA-Report 2/2007 Acc. To DIN EN 1005-4; German A 55			<b>Optimal</b>	<b>Still acceptable posture</b>	<b>Extremely awkward posture</b>
	Flexion	+	<b>60° to 100°</b>		<b>&gt; 100°</b>
	Extension	-	<b>60° to 100°</b>		<b>&lt; 60°</b>

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# Lower Arm Pronation / Supination

<b>Lower Arm</b>			<b>Neutral (natural) Body Posture</b>	<b>Awkward Body Posture</b>	
Source: German BGIA-Report 2/2007 German A 55			<b>Optimal</b>	<b>Still acceptable posture</b>	<b>Extremely awkward posture</b>
	Pronation	+	<b>0° to 20°</b>	<b>20° to 40°</b>	<b>&gt; 40°</b>
	Supination	-	<b>0° to -30°</b>	<b>-30° to -55°</b>	<b>&lt; -55°</b>

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# Wrist Flexion / Extension

Wrist			Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 / German A 55			Optimal	Still acceptable posture	Extremely awkward posture
	Extension	-	0° to -25°	-25° to -50°	< -50°
	Flexion	+	0° to 20°	20° to 45°	> 45°

## Definition of colors

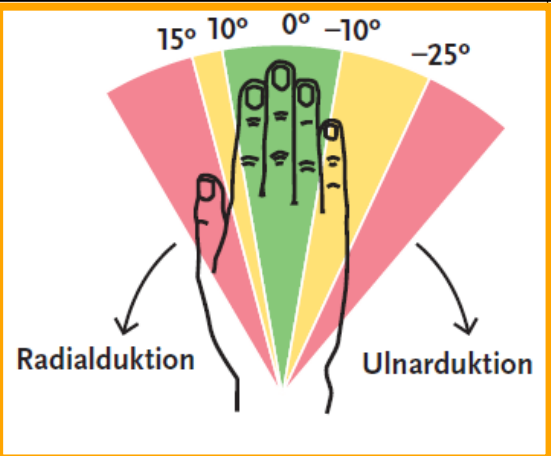
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# Wrist

## Radial Abduction / Ulnar Abduction

<b>Wrist</b>			<b>Neutral (natural) Body Posture</b>	<b>Awkward Body Posture</b>	
Source: German BGIA-Report 2/2007 German A 55			<b>Optimal</b>	<b>Still acceptable posture</b>	<b>Extremely awkward posture</b>
	Radial Abduction	+	<b>0° to 10°</b>	<b>10° to 15°</b>	<b>&gt; 15°</b>
	Ulnar Abduction	-	<b>0° to -10°</b>	<b>-10° to -25°</b>	<b>&lt; -25°</b>

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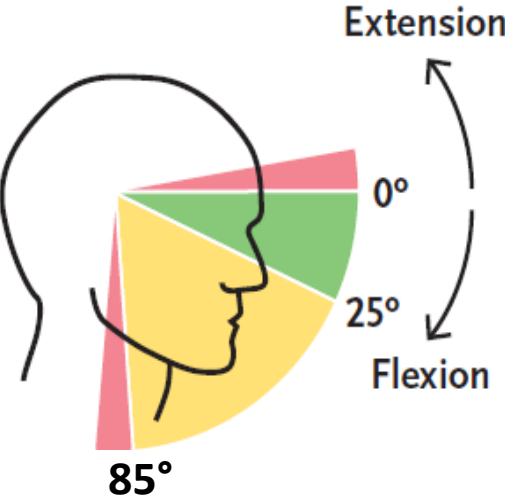
# Ergonomics Requirement Specification for External Machine Manufacturers

Our Requirements to New Machines

**Neutral Joint Positions – Head and Neck**  
Evaluation of Head and Neck Positions

[Ergonomics Requirement Specification for External Machine Manufacturers - Continental AG](#)

# Bending of the head: Flexion (forwards) / Extension (backwards)

Head and Neck Bending of the head		Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 Acc. to ISO 11226(2)		Optimal	Still acceptable posture	Extremely awkward posture
 <p>Extension</p> <p>0°</p> <p>25°</p> <p>Flexion</p> <p>85°</p>	-	0°		< 0°
	+	0° to 25°	25° to 85°	> 85°

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# Bending of the head to a side

Head and Neck Bending of the head to a side			Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 Acc. To DIN EN 1005-4 (3)			Optimal	Still acceptable posture	Extremely awkward posture
	To the right	+	0° to 10°		> 10°
	To the left	-	0° to -10°		< -10°

## Definition of colors

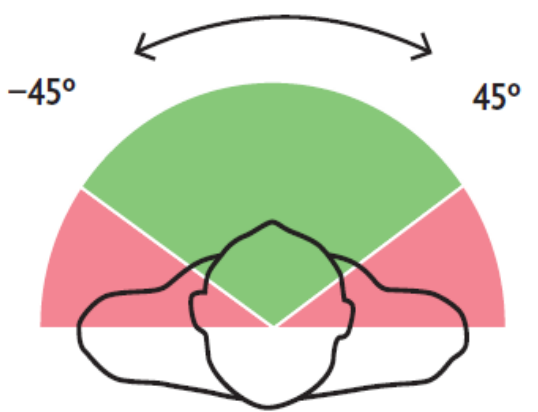
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# Torsion of the head

Head and Neck Torsion of the head			Neutral (natural) Body Posture	Awkward Body Posture	
Source: German BGIA-Report 2/2007 Acc. To DIN EN 1005-4 (3)			Optimal	Still acceptable posture	Extremely awkward posture
	To the right	+	0° to 45°		> 45°
	To the left	-	0° to -45°		< -45°

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