

Key Indicator Method for assessing and designing physical workloads with respect to Awkward Body Postures

KIM-ABP

Overview of Key Indicator Methods:

Key Indicator Method for assessing and designing physical workloads ...

- with respect to manual Lifting, Holding and Carrying of loads (KIM-LHC)
- with respect to manual Pushing and Pulling of loads (KIM-PP)
- during Manual Handling Operations (KIM-MHO)
- with respect to Whole-Body Forces (KIM-BF)
- **with respect to Awkward Body Postures (KIM-ABP)**
- with respect to Body Movement (KIM-BM)

as well as the respective **Extended** versions in a spreadsheet program (e.g. KIM-ABP-E)



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Scope of the Key Indicator Method (KIM-ABP)

This Key Indicator Method takes into account sub-activities with awkward body postures.

Awkward body postures are all strenuous body postures which are required for the work process and held uninterrupted (one-time posture ≥ 1 minute, repeated posture ≥ 10 seconds).

This physical workload is only considered to be interrupted if

- an unfavourable posture can be interrupted by a relaxed posture such as standing upright or sitting in variable positions or
- a relaxed posture can be varied slightly

without interrupting the work process.

Awkward body postures during work may affect at the same time and independently from each other:

- the lower and upper back,
- the shoulders and upper arms including the neck as well as
- the knee joints and legs/feet.

In **each body region** (back, shoulders and upper arms, knees and legs), **several body postures** can be classified **at the same time**.

The effects on the back in a standing or sitting position or in a squatting or kneeling position, on shoulders/upper arms and on knees/legs are assessed separately. When carrying out overhead work in a standing position, for example, both the standing position and the arm posture are assessed. This prevents particularly unfavourable postures with a high physical workload from being masked by other postures with a lower physical workload and therefore giving no occasion for a redesign of work or preventative occupational medical care.

Typical activities: Tiling, steel fixing (concrete construction), manual welding, working on assembly lines, ceiling mounting, dry construction, electrics etc., cucumber picking in a lying position, long-term work at a microscope, microsurgery, working inside of vessels, tanks, shafts, ships' double bottoms.

Distinction from other Key Indicator Methods

- For awkward body postures and uniform, repetitive motion and force exerted by the forearms and hands, the KIM "Manual Handling Operations" (KIM-MHO) is also to be used in addition to the KIM-ABP.
- When handling loads > 3 kg, when pushing and pulling loads and when working with high forces, the postures of the back are to be assessed using the respective specific KIMs (KIM-LHC, KIM-PP, KIM-BF).
- If several sub-activities including posture loads are carried out per working day, they must be recorded and assessed separately (e.g. using KIM-ABP-E). The probability of physical overload can only be assessed if all physical workloads occurring during a working day are assessed.

Form including brief instructions

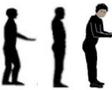
KIM for assessing and designing physical workloads with respect to Awkward Body Postures (KIM-ABP)

Workplace/sub-activity:			
Duration of the working day:	Evaluator:		
Duration of the sub-activity:	Date:		

1st step: Determination of time rating points

Total duration of this sub-activity per working day [up to ... hours]	up to 1	2	3	4	5	6	7	8	9	10
Time rating points:	1	2	3	4	5	6	7	8	9	10

2nd step: Determination of the rating points for other indicators

A		Loads on the back – body posture when working without or with low force exertion	Amount of time as part of the sub-activity				Points
			up to 1/4 occasionally	up to 1/2 frequently	up to 3/4 predominantly	> 3/4 constantly	
	1	Upright back posture in a standing, squatting or kneeling position ¹⁾ , also interrupted by walking a few steps or by body movements (trunk can be inclined forward up to 20°) e.g. sales personnel, machine operators	2	4	6	8	
	2	Torso being moderately inclined forward (> 20-60°) in a standing, squatting or kneeling position ¹⁾ or inclined backward e.g. sorting conveyors for baked goods	7	15	22	30	
	3	Torso being severely inclined forward (> 60°) in a standing, squatting or kneeling position ¹⁾ - e.g. steel fixers	10	20	30	40	
	4	Sitting in forced postures , torso being moderately to severely inclined forward, mostly looking permanently towards the work area - e.g. working at a microscope, driving cranes, endoscopy (medicine), also sitting on the floor	3	6	9	12	
	5	Sitting in a variable sitting posture e.g. office work (administration)	2	4	6	8	
		Alternation to standing / walking is not possible	0.5	1	1.5	2	
¹⁾ Please note: For hand/arm postures, also complete Part B where applicable! If the work is carried out in a squatting and kneeling position, Part C is also to be completed!							
Total of risk scores A Back:							

B		Loads on shoulders and upper arms when working without or with low force exertion ²⁾	Amount of time as part of the sub-activity				Points
			up to 1/4	up to 1/2	up to 3/4	> 3/4	
	1	Arms raised, hands above shoulder level in a standing, squatting or kneeling position e.g. dry construction, interior design, electrical installation, installation of ventilations systems, skilled manual assembly work, servicing	10	20	30	40	
	2	Arms raised, hands below shoulder level or at a distance from the body in a standing, squatting or kneeling position without the arms being supported, e.g. sorting activities at sorting conveyors	6	12	18	24	
	3	Lying on the back, arms over head , e.g. ceiling painting, assembly work, ship's bottom, tank construction Lying prone, arms in front of / below the body , e.g. harvesting equipment ("flyers"), assembly work	7	14	21	28	
Remaining time		Portion of the assessment period without posture loads of the shoulders/arms	0	0	0	0	
²⁾ Please note: If there are physical workloads of the hand/arm system, this sub-activity should also be evaluated using the KIM-MHO.							
Total of risk scores B Shoulders and upper arms:							

C		Loads on knees/legs when working without or with low force exertion	Amount of time as part of the sub-activity				Points
			up to 1/4	up to 1/2	up to 3/4	> 3/4	
	1	Constant standing , also interrupted by walking a few steps, e.g. sales personnel, machine operators	2	4	6	8	
	2	Kneeling, squatting or sitting cross-legged³⁾ , e.g. dry construction, interior design, electricians, pipe layers, manual welding, harvesting, flooring/tiling, cobbling, skilled manual assembly work and servicing	10	20	30	40	
Remaining time		Portion of the assessment period without posture loads of the knees	0	0	0	0	
³⁾ If this sub-activity involves crawling, the KIM-BM is also to be used for evaluation.							
Total of risk scores C Loads on knees / legs:							

Unfavourable working conditions (specify only where applicable)		A Back	B Shoulders/upper arms	C Knees/legs
Twisting and/or lateral inclination of the trunk identifiable	occasionally	1	0	0
	frequently to constantly	2	0	1
Head: Inclined backward and/or severely inclined forward or constantly turning	occasionally or constantly	1	1	0
Upper body cannot be supported when inclined forward - with the hands, by leaning against something, by means of tools	not possible	2	0	0
Narrow space for movement	frequently to constantly	2	2	2
TOTAL of the risk scores for additional loads for block A / B / C				

Further working conditions (specify only where applicable)	A	B	C
Restricted stability, uneven floor	1	1	1
Moisture, cold, strong draughts, drenching of clothes possible	1	1	0
Strong shocks (vibrations) resulting in physical tension ⁴⁾	1	1	0
Very high mental concentration (e.g. recognising objects)	1	1	0
TOTAL of the risk scores for special working conditions for block A / B / C			
None: there are no unfavourable working conditions	()	()	()

⁴⁾ Please note: If there are physical workloads due to vibrations, they are to be evaluated separately! See https://www.baua.de/EN/Topics/Work-design/Physical-agents-and-work-environment/Vibrations/_functions/Publications-search_Formular.html?nn=8718374

3rd step: Evaluation and assessment

		A Back	B Shoulders/upper arms	C Knees/legs		
Total of risk scores in key indicators						
Unfavourable working conditions +						
Further working conditions +						
Time rating points	X	Total of all indicator rating points				
Risk scores of body postures					Highest risk score Total risk	

The risk score calculated and the table below can be used as the basis for a rough evaluation:					
Risk	Risk range	Intensity of load ¹⁾	a) Probability of physical overload b) Possible health consequences	Measures	
	1	<20 points	low	a) Physical overload is unlikely. b) No health risk is to be expected.	None
	2	20 - <50 points	slightly increased	a) Physical overload is possible for less resilient persons. b) Fatigue, low-grade adaptation problems which can be compensated for during leisure time.	For less resilient persons, workplace redesign and other prevention measures may be helpful.
	3	50 - <100 points	substantially increased	a) Physical overload is also possible for normally resilient persons. b) Disorders (pain), possibly including dysfunctions, reversible in most cases, without morphological manifestation	Workplace redesign and other prevention measures should be considered.
	4	≥100 points	high	a) Physical overload is likely. b) More pronounced disorders and/or dysfunctions, structural damage with pathological significance	Workplace redesign measures are necessary. Other prevention measures should be considered.

¹⁾ The boundaries between the risk ranges are fluid because of the individual working techniques and performance conditions. The classification may therefore only be regarded as an orientation aid. Basically, it must be assumed that the probability of physical overload will increase as the risk scores rise.

Guideline for the Key Indicator Method for assessing and designing physical workloads with respect to Awkward Body Postures (KIM-ABP)

Objective of the Key Indicator Method: The objective of the KIMs is to document the main physical workload indicators as easily as possible, make correlations between activity and physical workload clear and assess the probability of physical overload. Possible consequences for health as well as the resulting need for action may be derived from that.

Scope: This method serves to assess activities involving awkward body postures for orientation purposes. When determining the time rating points and awarding points for the key indicators, sound knowledge of the sub-activity being assessed is nevertheless an absolute prerequisite. Rough estimates or assumptions lead to false results.

When does the body posture at work turn into an “awkward body posture”?

Whether a body posture is considered an awkward body posture depends on

- how much it deviates from relaxed “neutral” body postures of the back, the shoulders/arms and the knees/legs,
- how long it needs to be held (one-time posture ≥ 1 minute, repeated posture ≥ 10 seconds) and
- whether it can be interrupted by changing the posture.

Changes in posture which do not return to a relaxed “neutral” posture are not considered to interrupt the awkward postures.

Time rating points:

The duration of a physical workload is the most important criterion of acceptable physical workloads with respect to body postures. The following rating points are determined:

- the total duration of the sub-activity to which this assessment applies within a working day = assessment period (see 1st step)
- the proportion of awkward body postures in the assessment period.

Increased posture loads:

- Increased posture loads of the back in a standing, sitting or kneeling position occur when the upper body is held in a position in which it is inclined/bent forward or inclined backward. The lack of support and fixed postures increase the physical workload.
- Increased posture loads of upper arms, shoulders, neck are caused by holding the arms in a standing, sitting or lying position.
- Increased posture loads of the lower extremities (knees and feet in particular) have a quite independent effect.

Additional loads are continuously uninterrupted postures, twisting and lateral inclinations of the body, postures in which the head is inclined backward or forward, lack of arm support when the body is inclined/bent forward, narrow space for movement.

Working conditions increase the physical workload (restricted stability and uneven floor, climatic impacts particularly due to moisture and cold, strong shocks caused by vibration, very high mental strain etc.).

Structuring the working day:

The assessment can be carried out for the whole working day or only for selected sub-activities provided that the other sub-activities within the working day do not act as physical workloads for awkward body postures. For a summarised assessment of substantially different posture loads, the KIM-ABP-E, for example, can be used. It is generally allowed to form useful intermediate steps (interpolation) when determining the rating points. **Time rating points < 1 may not be assigned, as the time rating point is always at least 1!** Accordingly, the respective amount of time of the body postures in block A, B and C must always also be related to at least one hour in the paper version (this form). In case of overlaps with other types of physical workload, it is to be examined whether other KIMs must also be used as an alternative.

Carrying out the documentation and evaluation/assessment

1st step: Determination of time rating points: The time rating points are determined on the basis of the table. The total duration of the sub-activity to be assessed is to be considered.

2nd step: Rating points for the key indicators “Postures in 3 body regions”, “Unfavourable working conditions” and “Further working conditions”: For each of the 3 body regions, it is determined

- whether one of the body postures has to be assumed as one-time posture ≥ 1 minute or repeated posture ≥ 10 seconds without longer interruptions and
- the portion of postures occurring during of the assessment period (“up to $\frac{1}{4}$ / up to $\frac{1}{2}$, up to $\frac{3}{4}$ or more than $\frac{3}{4}$ of the sub-activity”).

In each body region (back, shoulders/upper arms, knees/legs), several body postures can be classified at the same time. The risk scores of each body region are totalled and the additional loads as well as the working conditions assessed.

3rd step: Evaluation:

- The sub-activity is evaluated separately for each body region (totals of the indicator rating points including the working conditions and multiplication by the time rating points).
- The highest risk score (A, B or C) determines the classification of the whole sub-activity (=total risk score). A substantially increased risk in one body region cannot be compensated for by a low risk in another body region!
- The risk scores can be assigned to a risk range relating to this sub-activity. Based on this, the probability of physical overload, possible consequences for health as well as the need for action resulting from that can be derived.

4th step: Workplace redesign and precautions

In addition to the prevention measures derived on the basis of the risk assessment, the following applies:

- From risk range 3 “substantially increased”, workplace redesign measures as well as further collective and individual prevention measures are usually necessary. In Germany, preventative occupational medical care in accordance with *ArbMedVV* [German Ordinance on Occupational Health Care] is to be offered^{*)}.
- Workplace redesign and prevention measures for groups of particularly vulnerable employees (e.g. young people or people with altered performance) must be considered irrespective of the intensity of load and on a case-by-case basis where appropriate, e.g. if employees demand preventive occupational medical care.
- By examining the highest risk scores of the key indicators, the causes of increased physical workloads can be identified and changes initiated. The need for a redesign should also be considered if individual indicators reach the maximum rating points. Where appropriate, indications to restrictions of the feasibility with respect to the rating points for individual indicators must be considered.

^{*)} based on *ArbMedVV* [German Ordinance on Occupational Health Care], as of June 2019