KIM for assessing and designing physical workloads with respect to Whole-Body Forces (KIM-BF)

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

1st step: Determination of time rating points

Total duration[1] [up to … minutes] and/or repetitiveness[2] of the sub-activity per working day:	up to 1	> 1 - 5	> 5 - 10	> 10 - 20	> 20 - 30	> 30 - 45	> 45 - 60	> 60 - 100	> 100 - 150	> 150 - 210	> 210 - 270	> 270 - 360	> 360 - 480
Time rating points	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

[1] *For continuous sub-activities,* [2] *for discontinuous sub-activities. For explanations in this respect: See guideline.*
Please note: If finger-hand forces are applied predominantly, the sub-activity must also be evaluated using the KIM-MHO!

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

Force exertion within a standard minute for continuous sub-activities and/or per sub-activity for discontinuous sub-activities		**Holding**[3] average holding time [seconds]			**Moving** average movement frequencies [number]			
Level	**typical examples as classification aid for orientation purposes**	31 - 45[3]	16 - 30	≤ 15	< 5	5 - 15	16 - 30	31 – 45[5]
low	**Low forces** Whole-Body Forces with low forces cannot occur by definition. Where applicable, these sub-activities must be assessed using the KIM-MHO.	-	-	-	-	-	-	-
	Moderate forces (up to 30 % $F_{max}M$) Work with hand-guided tools, such as angle grinders, small chainsaws, hedge trimmers or impact drills < 3 kg / moving loads on roller tracks < 20 kg	**18**	**12**	**6**	**1.5**	**6**	**12**	**18**
	High forces (up to 50 % $F_{max}M$) Work with heavy hand-guided tools, such as angle grinders, large chainsaws, hammer drills3-8 kg / operating high-pressure cleaners or sandblasters/shovelling loads < 4 kg / moving loads on roller tracks 20-50 kg / throwing loads < 3 kg up to max. 5 metres	**25**	**17**	**8**	**2**	**8**	**17**	**25**
	Very high forces (up to 80 % $F_{max}M$) Work with heavy hand-guided tools, such as pneumatic hammers (≥ 8 kg) / shovelling loads 4-8 kg / moving loads on roller tracks > 50-100 kg / throwing loads < 3 kg up to max. 10 metres or 3-5 kg max. 5 metres	**100**	**32**	**15**	**4**	**15**	**32**	**100**
high	**Peak forces**[4] (more than 80 % $F_{max}M$) Pulsed exertion of force such as when working with crowbars, sledgehammers / tipping heavy drums (> 200 kg), transporting heavy pieces of furniture / shovelling loads > 8 kg / moving loads on roller tracks > 100 kg / throwing loads < 3 kg more than 10 metres or ≥ 3 kg more than 5 metres	**100**		**25**	**6**	**25**	**50**	**100**
The sub-activity must be observed and the rating points for the force categories marked. The sum represents the total force rating point.		**Total force rating point:**						
		For women x 1.5:						

[3] *The amount of time of holding work is only considered as such in the assessment if one arm is held continuously statically for at least 4 seconds!*
[4] *These forces might not be exerted at all or might no longer be exerted reliably. This applies to women in particular.*
[5] *In case of even higher frequencies/holding times, the resulting risk score must be extrapolated linearly or the E version (KIM-BF-E) must be applied.*

Symmetry of the application of force	**Rating points**
Force is applied with both hands and symmetrically	**0** x
Force is applied temporarily with one hand and/or asymmetrically: uneven force distribution between the two hands	**2**
Force is applied predominantly with one hand, uneven distribution or direction of forces of both hands	**4**

Body posture[6]		**Rating points**
	- Standing upright up to a position with the trunk being slightly inclined forward (< 20°) - No twisting	**0** x
	- Standing, trunk being more severely inclined forward (20-60°) - Occasional twisting and/or lateral inclination of the trunk identifiable - - Hands occasionally above shoulder level / at a distance from the body	**3**
	- Standing, trunk being severely inclined forward (> 60°) or backward - Frequent twisting and/or lateral inclination of the trunk identifiable - Hands frequently above shoulder level / at a distance from the body - Work in a lying position with hands above/below the body	**6**
	- Combination of more severe forward or backward inclination and lateral inclination/torsion - Constant twisting and/or lateral inclination of the trunk identifiable - Work in a squatting or kneeling position - Hands constantly above shoulder level / at a distance from the body	**9**[7]

[6] *Typical body postures are to be taken into account. Rare deviations can be ignored.*
[7] *Please note: If this category was chosen, it is recommended to evaluate this sub-activity also using the KIM-ABP!*

Unfavourable working conditions (specify only where applicable) Note: Here, additional points (intermediate rating points) can be assigned for unfavourable working conditions.		Intermediate rating points (IRP)	∑ IRP
Hand/arm position and movement: 	occasionally at the limit of the movement ranges	1	
	frequently/constantly at the limit of the movement ranges	2	
Force transfer/application restricted working objects/tools difficult to grip / greater holding forces required / no shaped grips		1	
Force transfer/application considerably hindered working objects/tools hardly possible to grip / slippery, soft, sharp edges / no or unsuitable grips		2	
Adverse ambient conditions: exposure to heat, cold and/or vibration[8)]		1	
Ambient conditions unfavourable: Exposure to extreme heat, cold and/or vibration[8)]		2	
Increased effort caused by restricted spatial conditions Restricted stability and/or restricted space for movement, e.g. height too low or work area of less than 1.5 m² / floor a little bit slippery, slight inclination (up to 5°), obstacles in the work area		1	◊
Significantly increased effort caused by unfavourable spatial conditions Significantly restricted stability and/or freedom of movement, e.g. when working in very confined spaces / floor is very slippery/uneven, stronger inclination (> 5°)		2	
Clothes: additional physical workload due to restrictive and heavy protective clothes/equipment (PPE) (e.g. heat protection suits, chemical protection suits, heavy respiratory protective equipment (group 3))		2	
None: there are no unfavourable working conditions		0	

Indicators not mentioned in the tables are to be taken into account accordingly. Rare deviations can be ignored.
[8)] Please note: If there are physical workloads due to vibrations, they are to be evaluated separately! See http://www.baua.de/vibration/

Work organisation / temporal distribution	Rating points
Good: frequent variation of the physical workload situation due to other activities (including other types of physical workload) / without a tight sequence of higher physical workloads within one type of physical workload during a single working day.	0 x
Restricted: rare variation of the physical workload situation due to other activities (including other types of physical workload) / occasional tight sequence of higher physical workloads within one type of physical workload during a single working day.	2
Unfavourable: no/hardly any variation of the physical workload situation due to other activities (including other types of physical workload) / frequent tight sequence of higher physical workloads within one type of physical workload during a single working day with concurrent high load peaks.	4

3rd step: Evaluation and assessment

		M	W
Force exertion			
Symmetry of the application of force	+		
Body posture	+		
Unfavourable working conditions (∑ IRP)	+		
Work organisation / temporal distribution	+		

Results

Time rating points	x	**Total of indicator rating points:**	M	W	=	M	W

The risk score calculated and the table below can be used as the basis for a rough evaluation:

Risk		Risk range	Intensity of load*)	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.

**) 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.*