KIM for assessing and designing physical workloads with respect to manual Pushing and Pulling of loads (KIM-PP)

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

1st step: Determination of time rating points (distance, duration of the PP)

Distance[1] up to …m[2]	40	200	400	800	1200	1800	2500	4200	6300	8400	11000	15000	20000
Duration[1] up to …min[2]	≤ 1	≤ 5	≤ 10	≤ 20	≤ 30	≤ 45	≤ 60	≤ 100	≤ 150	≤ 210	≤ 270	≤ 360	≤ 480
Time rating points	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

[1] An approximate walking speed of 0.7 m/s (2.5 km/h) when pushing and pulling loads is assumed. [2] Per sub-activity and working day.

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

Load weight to be moved including transport device [kg]	**Transport device**								**Overhead conveyors**	**Overhead cranes**
	Barrows[3][4]			Carriages						
				only swivel castors		with fixed castors or lockable swivel castors		pedestrian-controlled		
			5)		5)						
up to 50	**3**	**2**	**2.5**	**2.5**	**3**	**1**	**1**	**1**	**1**	**2**
> 50 up to 100	**5**	**3**	**4**	**3**	**4**	**1**	**1**	**1**	**1**	**2.5**
> 100 up to 200	**10**	**6**	**7**	**4**	**6**	**2**	**1.5**	**1.5**	**1.5**	**3.5**
> 200 up to 300	**50**	**12**	**50**	**5**	**8**	**3**	**2**	**2**	**2**	**4.5**
> 300 up to 400	**100**	**50**	**100**	**7**	**12**	**4**	**3**	**2.5**	**2.5**	**6**
> 400 up to 600		**100**		**12**	**50**	**6**	**5**	**4**	**4**	**10**
> 600 up to 800				**50**	**100**	**10**	**8**	**7**	**7**	**15**
> 800 up to 1000				**100**		**15**	**12**	**10**	**10**	**50**
> 1000 up to 1300						**50**	**50**	**50**	**20**	**100**
> 1300						**100**	**100**	**100**	**50**	

[3] In addition to the propelling force, the load rating points also consider lifting, tilting, balancing and lowering forces. [4] Barrows with support wheels, stair climbing carts and other special designs cannot be differentiated using the KIM-PP. [5] E.g. waste containers in outdoor areas with simple wheel bearings, which might be exposed to the weather. Grey fields: These load weights can no longer be moved reliably.

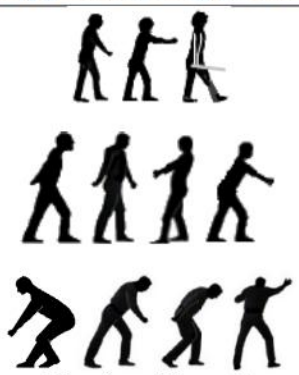
Driveway conditions	**Rating points**	Carriages
Driveway completely level, smooth, solid, dry, without inclinations	**0**	**0**
Driveway mostly smooth and level, with small damaged spots/faults, without inclinations	**0**	**1**
Mixture of cobbles, concrete, asphalt, slight inclinations[6], dropped kerb	**0**	**1**	**2**
Mixture of roughly cobbled, hard sand, slight inclinations[6], small edges/sills	**1**	**2**	**3**
Earth or roughly cobbled driveway, potholes, heavy soiling, slight inclinations, landings, sills	**3**	**5**	**6**

Additional points in case of significant inclinations or stairs	Inclinations of 2 up to 4° (4 up to 8%)	**5**	Rating points + additional points = Total	+ =
	Inclinations of 5 up to 10° (9 up to 18%)	**10**		
	Stairs[7], inclinations > 10° (18%)	**25**		

[6] Slight inclination: up to 2° (4%) [7] only for using stair climbing carts

Unfavourable working conditions (specify only where applicable)	**Intermediate rating points IRP**	**Total IRP** (max. 4)
Regularly significantly increased starting forces, because transport devices sink into the ground or get wedged	**3**	
Frequent stops with braking / without braking	**3 / 1**	
Many changes of direction or curves, frequent manoeuvring	**3**	
Load must be positioned precisely and stopped, driveway must be adhered to precisely	**1**	
Increased movement speed (approx. 1.0 up to 1.3 m/s)	**2**	
None: there are no unfavourable working conditions	**0**	

Unfavourable properties of the transport device/overhead conveyor/overhead crane	Intermediate rating points IRP	Total IRP (max. 4)
No suitable handles or construction parts for applying force	2	
No brake when driving on inclinations > 2° (> 3%)	3	
Unadjusted castors (e.g. too small on soft or uneven floor)	2	
Defective castors (worn-out, rubbing, stiff, air pressure too low)	2	
None: there are no unfavourable properties of the transport devices	0	

Body posture / body movement [8]		Rating points
 Direction of force →	• Trunk upright or slightly inclined forward, no twisting • Force application height can be selected freely • No hindrance for the legs	3
	• Body inclined towards the direction of movement or slight twisting when pulling the load on one side • Fixed force application height ranging from 0.9 – 1.2 m • No or only slight hindrance for the legs • Predominantly pulling	5
	• Awkward body postures caused by - Fixed force application height < 0.9 or > 1.2 m - Lateral force application on one side - Significantly obstructed view • Significant hindrance for the legs • Frequent/constant twisting and/or lateral inclination of the trunk identifiable	8

[8] *The typical body posture is to be taken into account. If the trunk is inclined to a greater extent when starting, braking and manoeuvring, this is taken into account under unfavourable working conditions.*

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

Load weight / transport device			
Driveway conditions	+		
Unfavourable working conditions (∑ IRP)	+		
Properties of transport device (∑ IRP)	+		
Body posture	+		
Work organisation / temporal distribution	+		In case of female employees:
Total of indicator rating points:	=		x 1.3 = M: V: **Result**
Pushing and Pulling in pairs:		x 0.7	M per twee: V per twee:

Time rating points x

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.*