Methode to calculate hight of centre of gravity h_R

Centre high of gravety over the ground for the complete vehicle (unladen, laden) including basically three parts of c.h.o.g. from chassis, body work (frame) and pay load (laden).
This methode might be useful the trailer manufacturer does not indicate the c.h.o.g.

h1	= h.o.c.o.g. from axles or axle assy. plus tyres, springs etc.	= R • 1.1
h2	= h.o.c.o.g. from frame (laden)	= (h6 + h8) • 0.5
h3	= h.o.c.o.g. from payload plus canvas, bows, racks, ramps etc.(laden)	= 0.3 • h7 + h6 [1]
h4	= h2 plus spring deflection = Δs (unladen) [2]	
h5	= h.o.c.o.g. from canvas, bows, racks, ramps etc.(unladen) plus spring deflection	= 0.5 • h7 + h6 + Δs [2]
h6	= frame height, top	
h7	= body dimensions, inside	
h8	= frame height, bottom	
P	= gross vehicle weight, laden/unladen	
R	= tyre radius	
W1	= weight of axles or axle assy. plus tyres, springs etc.	= P • 0.1 [3]
W2	= weight of chassis (frame), unladen	= (Punl. -W1) • 0.8
W3	= weight of payload plus canvas, bows, racks, ramps etc.	
W4	= weight of canvas, bows, racks, ramps etc.	= (Punl. -W1) • 0.2

[1] for unknown payload height to determine the c.h.o.g. ca. 0.3 of the inside dimensions of body can be taken.
[2] for vehicles with air suspension : remove „ plus spring deflection“
[3] for semitrailer take for unsprung mass W1 : axle assy. load P_R • 0.1

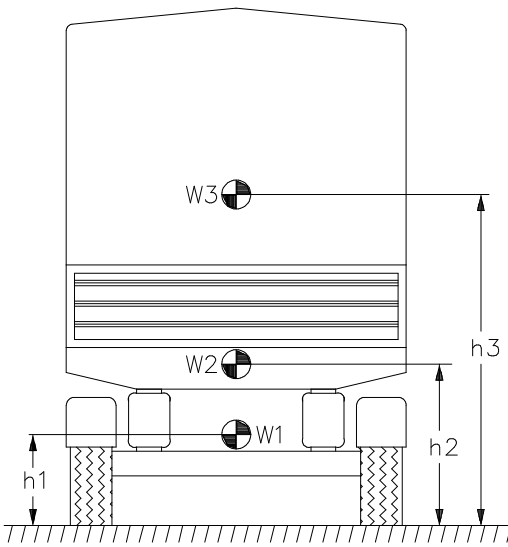
LADEN :

$$h_R = \frac{(h1 \bullet W1) + (h2 \bullet W2) + (h3 \bullet W3)}{P_{laden}}$$

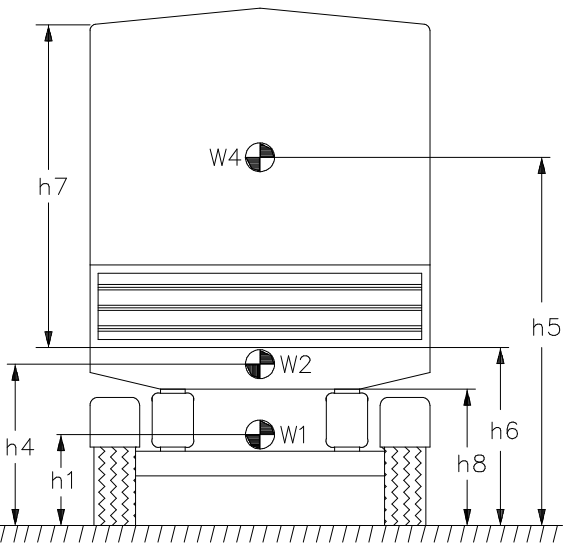
UNLADEN :

$$h_{Runl.} = \frac{(h1 \bullet W1) + (h4 \bullet W2) + (h5 \bullet W4)}{P_{unladen}}$$

LADEN :



UNLADEN :



Example:

Vehicle gross weight, laden	P	=	16000 kg
Vehicle gross weight, unladen	Punl.	=	4000 kg
Tyre radius	R	=	527 mm
Frame height, top	h6	=	900 mm
Frame height, bottom	h8	=	700 mm
Body dimensions, inside	h7	=	2300 mm
Spring deflection (laden/unladen) [2)]	Δs	=	50 mm

h1 = R • 1.1 = 527 • 1.1 = 580 mm

h2 = (h6 + h8) • 0.5 = (900 + 700) • 0.5 = 800 mm

h3 = h7 • 0.3 + h6 = 2300 • 0.3 + 900 = 1590 mm

h4 = h2 + Δs = 800 + 50 = 850 mm

h5 = (h7 • 0.5) + h6 + Δs = (2300•0.5)+900+50 = 2100 mm

W1 = P • 0.1 = 16000 • 0.1 = 1600 kg

W2 = (Punl. - W1) •0.8 = (4000 - 1600) •0.8 = 1920 kg

W3 = (P - Punl.) + (Punl. - W1) • 0.2 = (16000 - 4000) + (4000 -1600) • 0.2 = 12480 kg

W4 = (Punl. - W1) • 0.8 = (4000 - 1600) • 0.8 = 1920 kg

W5 = (Punl. - W1) • 0.2 = (4000 - 1600) • 0.2 = 480 kg

LADEN:

$$h_R = \frac{(580 \cdot 1600) + (800 \cdot 1920) + (1590 \cdot 12480)}{16000}$$

h_R = **1394 mm**

UNLADEN :

$$h_{Runl.} = \frac{(580 \cdot 1600) + (850 \cdot 1920) + (2100 \cdot 480)}{4000}$$

$h_{Runl.}$ = **892 mm**