NGV
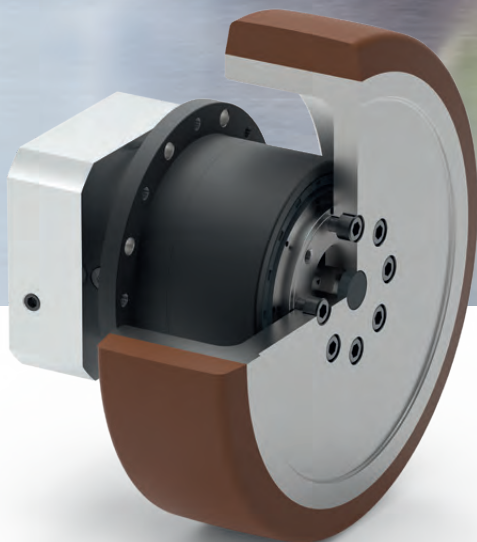
The planetary gearbox for AGVs.
Compact and highly resilient.

OUR GEARBOX
SOLUTIONS:
AS INDIVIDUAL
AS YOUR AGV.

+ Ideal for high radial loads
+ Extremely space-saving
+ Ease of installation
+ Available in single
  or multiple units
+ Best price-performance ratio

Whatever the demands that you make of your AGV drive: we can provide you with the ideal gearbox solution for your vehicle.

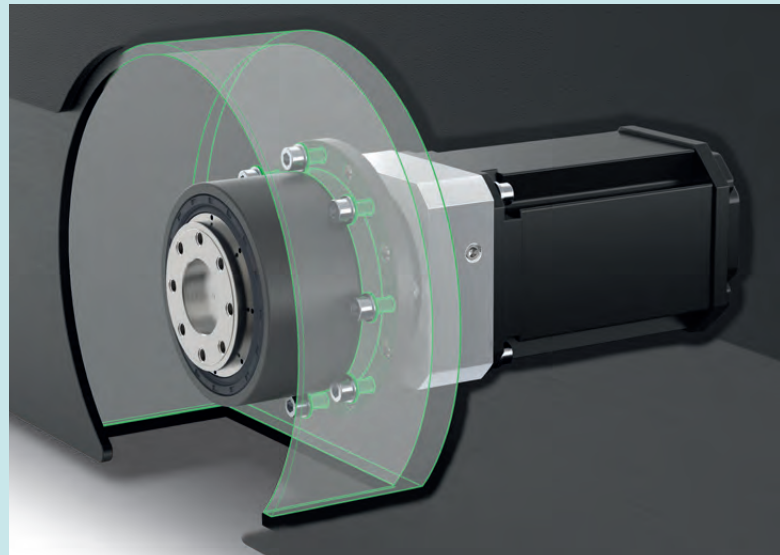## Every detail counts, so that a gearbox can fulfill application-specific requirements in an optimum way.

AGVs are designed to transport heavy loads on a continuous basis. The specific structural and mechanical demands are extremely high. However, we fulfill them in a reliable way with our NGV planetary gearboxes. Because the gearboxes impress with their compact design, efficiency and durability, and we have specifically optimized them for use in AGVs.

High efficiency is decisive as far as AGVs are concerned.
The more energy-efficiently an AGV operates, the longer its range will be. This is particularly relevant with battery-operated vehicles. And the higher the efficiency of the drive train, the smaller the energy store of the AGV can be. In this case the NGV gearbox excels thanks to its high-efficiency planetary gearbox concept.

Efficient management of heavy loads.
With AGVs the gearbox usually sits directly in the wheel. In other words, it supports the entire weight of the vehicle and the weight of the payload. When this occurs, extremely high axial loads are applied to the output bearing. In the case of the NGV bearing, it has been positioned so that it reliably withstands these loads. We also use pre-tensioned inclined roller bearings, which can withstand extremely high force levels. The advantage: the wheel does not have to be supported separately, since the bearings support the load directly.

Installation configuration of the NGV gearbox with wheel and motor

Big ideas, compact size.

From a structural point of view, AGVs do not have much room for gearboxes. It is therefore important for them to be very compact. With NGVs, specially developed wheels enclose the gearbox almost completely. In other words, the gearbox is basically outside the vehicle in the wheel, which saves space. If the structural length of the drive train is to be reduced even further, the gearbox can also be installed using so-called direct motor connection. In this case, the sun pinion is attached directly to the motor shaft, and the gearbox housing is bolted directly to the motor. The omission of the motor adapter plate means that the overall length can be reduced.

Ideal for installation.

Our engineers have also optimized the interface between the chassis and the gearbox. This means that the installation flange is so close to the chassis that the gearbox can be fitted there directly. The adapter and the additional bolted connections are not required. This also reduces the costs and the weight. For ease of installation, the gearbox is inserted directly from the inside through the chassis, and bolted on from there. The motor and the gearbox can be installed as a preassembled unit. When doing this, the diameter of the motor can also be significantly bigger than that of the gearbox itself.

Fits any motor.

Having a wide range of adapters makes it possible to attach the NGV gearbox to almost any motor. The advantage for you: you can use motors and controllers that are optimum for your application, because Neugart provides its solutions as a manufacturer that makes only gearboxes, independent of the motor and the controller, available in single or multiple units.

NGV: The perfect gearbox for AGVs.

+ Reduction of installation space

The gearbox is almost completely enclosed by the wheel. The required installation space in the vehicle is therefore reduced to a minimum.

+ Direct mounting

The mounting interface allows direct mounting of the gearbox to the vehicle. No additional adapters are required.

+ High load capacity

The preloaded, double-designed angular contact roller bearings permit very high radial forces.

+ Motor independent

By using different motor adapters it is possible to mount almost any motor. Direct mounting of the motor is also possible.

+ High efficiency and reliability

The proven gearbox type from the Neugart Economy series is characterized by a high efficiency. Thanks to its lifetime lubrication, it is also maintenance-free and extremely reliable, even in continuous operation.
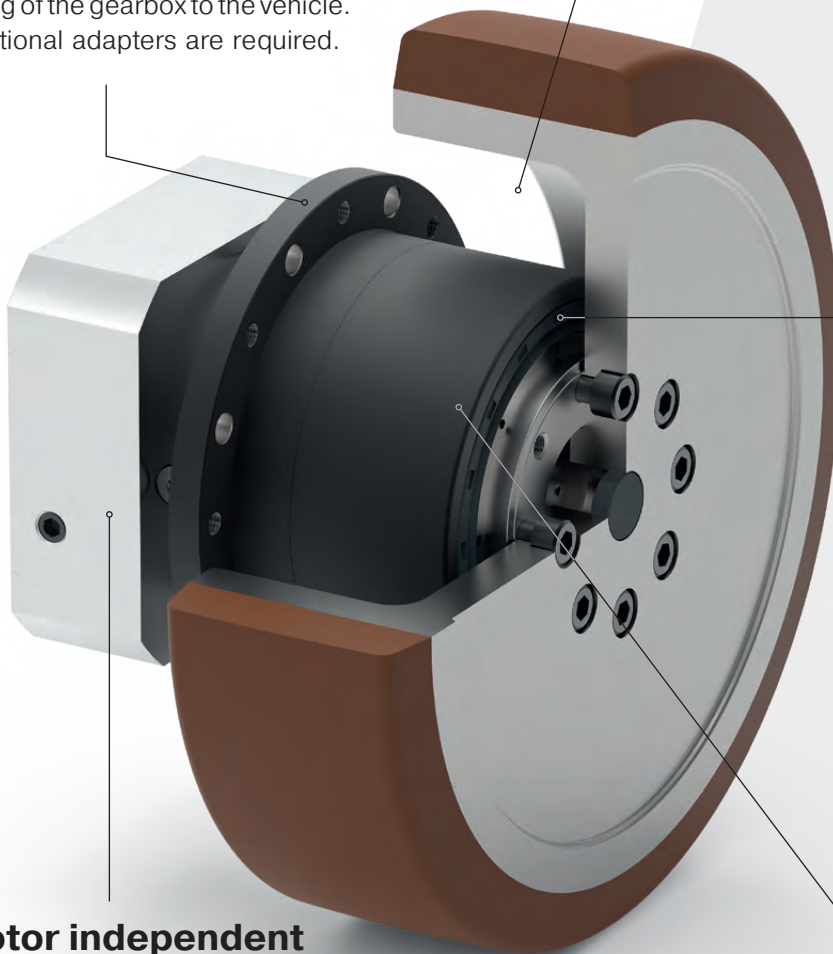
We supply the NGV gearbox in three sizes, with maximum support loads from 350 kg to 1075 kg per gearbox. For each gearbox size there is a specially developed heavy-duty wheel with a diameter of 160 mm, 200 mm or 250 mm. Maximum speeds of up to 2 m/s (7.2 km/h) are possible.

+ High load capacity:
Angular contact roller bearing with optimized load application point.

+ Reliability:
Thanks to lifetime lubrication, the NGV gearbox is maintenance-free.

+ Efficient and effective:
The 2-stage planetary gearboxes originate from our economy model series, which has been proving itself for decades. This combines the best efficiency, a long service life and high precision of ⩽ 12 arcmin with an outstanding price/performance ratio.

+ Resistance to water and soiling:
The NGV gearbox is equipped with a special radial shaft seal, and provides IP65 protection class at the output side.

+ Ease of installation:
The gearbox can be fitted directly to the chassis of the vehicle without an adapter. This makes pre-assembly of the motor outside the vehicle possible, and the design of the motor is independently selectable.

Customer-specific AGV gearbox solutions.

Because of the comprehensive engineering and manufacturing know-how, Neugart is your competent partner for the development and manufacture of customized gearboxes. Also for your vehicle.

Example of a custom gearbox development.

NGV gearbox incl. wheel Technical data and dimensions

Characteristics (gearbox incl. wheel)			NGV064	NGV090	NGV110
Maximum dynamic load capacity[1]		kg (lb$_m$)	350 (772)	675 (1488)	1075 (2370)
Max. speed	v	m/s (in/s)	2 (78.7)		
Positioning precision		mm (in)	0.3 (0.012)	0.4 (0.016)	0.4 (0.016)
Total weight		kg (lb)	3.9 (8.6)	7.7 (17.0)	16.4 (36.2)
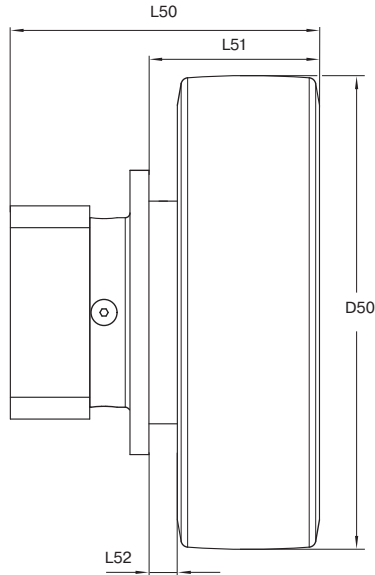
Geometry			NGV064	NGV090	NGV110
Wheel diameter	D50		160 (6.299)	200 (7.874)	250 (9.843)
Min. total length	L50	mm (in)	98.5 (3.878)	130.5 (5.138)	158.0 (6.22)
Distance between flange and outer edge	L51		58.0 (2.283)	72.0 (2.835)	94.0 (3.701)
Distance between flange and inner edge	L52		8.0 (0.315)	12.0 (0.472)	14.0 (0.551)

NGV gearbox Technical data

Gearbox characteristics			NGV064	NGV090	NGV110
Ratios	i		9; 12; 15; 16; 20; 25; 32; 40; 64		
Service life (L$_{10h}$)	t$_L$	h	30,000		
Efficiency at full load[2]	η	%	⩾ 95		
Min. operating temperature	T$_{min}$	°C	-25 (-13)		
Max. operating temperature	T$_{max}$	(°F)	90 (194)		
Protection class			IP65 (at the output side)		
Standard lubrication			Grease (lifetime lubrication)		
Food grade lubrication			Grease (lifetime lubrication)		
Low temperature lubrication[3]			Grease (lifetime lubrication)		
Installation position			any		
Standard backlash	j$_t$	arcmin	⩽ 12	⩽ 9	⩽ 9
Torsional stiffness[2]	c$_g$	Nm/arcmin (lb$_f$.in/arcmin)	7.3 - 11.5 (65 - 102)	19.5 - 38.5 (173 - 341)	52 - 95 (460 - 841)
Gearbox weight	m$_G$	kg (lb$_m$)	1.6 (3.5)	4 (8.8)	8.9 (19.6)
Standard surface			Housing: Steel – heat-treated and post-oxidized (black)		
Running noise[4]	Q$_g$	dB(A)	60	62	65
Max. bending moment based on the gearbox input flange[5]	M$_b$	Nm (lb$_f$.in)	8 (71)	16 (142)	40 (354)

[1] Max. load capacity of NGV gearbox with NGV wheel and dynamic load with nominal torque (T2N). Application-specific design with NCP required. With F$_a$=0

[2] The ratio-dependent values can be retrieved in Tec Data Finder – www.neugart.com

[3] T$_{min}$ = -40°C. Optimal operating temperature max. 50°C

[4] Sound pressure level from 1 m, measured on input running at n$_1$=3000 rpm no load; i=25

[5] Max. motor weight* in kg = 0.2 x M$_b$ / motor length in m
  * with symmetrically distributed motor weight
  * with horizontal and stationary mounting

NGV gearbox — Technical data

Output torques			NGV064	NGV090	NGV110	$i^{(1)}$
Nominal output torque[2]	T_{2N}	Nm (lb_f.in)	44 (389)	130 (1151)	210 (1859)	9
			44 (389)	120 (1062)	260 (2301)	12
			44 (389)	110 (974)	230 (2036)	15
			44 (389)	120 (1062)	260 (2301)	16
			44 (389)	120 (1062)	260 (2301)	20
			40 (354)	110 (974)	230 (2036)	25
			44 (389)	120 (1062)	260 (2301)	32
			40 (354)	110 (974)	230 (2036)	40
			18 (159)	50 (443)	120 (1062)	64
Max. output torque[2]	T_{2max}	Nm (lb_f.in)	70 (620)	208 (1841)	384 (3399)	9
			70 (620)	192 (1699)	416 (3682)	12
			70 (620)	176 (1558)	368 (3257)	15
			70 (620)	192 (1699)	416 (3682)	16
			70 (620)	192 (1699)	416 (3682)	20
			64 (566)	176 (1558)	368 (3257)	25
			70 (620)	192 (1699)	416 (3682)	32
			64 (566)	176 (1558)	368 (3257)	40
			29 (257)	80 (708)	192 (1699)	64

Output torques			NGV064	NGV090	NGV110
Emergency stop torque[3][4]	T_{2Stop}	Nm (lb_f.in)	80 - 88 (708 - 779)	190 - 260 (1682 - 2301)	380 - 500 (3363 - 4425)

Input speeds			NGV064	NGV090	NGV110
Average thermal input speed at T_{2N} and S1[2]	n_{1N}	rpm	4500	4000	3300 - 3500
Max. mechanical input speed[2]	n_{1Limit}	rpm	7500	7000	6500

Output shaft loads			NGV064	NGV090	NGV110
Radial force for 20,000 h[5][6]	$F_{r\,20.000\,h}$	N (lb_f)	2300 (517)	4100 (922)	5150 (1158)
Axial force for 20,000 h[5][6]	$F_{a\,20.000\,h}$		2850 (641)	5450 (1225)	6450 (1450)
Radial force for 30,000 h[5][6]	$F_{r\,30.000\,h}$		2000 (450)	3650 (821)	4550 (1023)
Axial force for 30,000 h[5][6]	$F_{a\,30.000\,h}$		2500 (562)	4800 (1079)	5600 (1259)
Maximum radial force[6][7]	$F_{r\,Stat}$		2700 (607)	4950 (1113)	7200 (1618)
Maximum axial force[6][7]	$F_{a\,Stat}$		2850 (641)	5450 (1225)	6450 (1450)
Tilting moment for 20,000 h[5][7]	$M_{K\,20.000\,h}$	Nm (lb_f.in)	110 (25)	278 (62)	407 (91)
Tilting moment for 30,000 h[5][7]	$M_{K\,30.000\,h}$		96 (22)	248 (56)	360 (81)

Moment of inertia			NGV064	NGV090	NGV110
Mass moment of inertia[3]	J	kgcm² (lb_f.in.s²10⁻⁴)	0.066 - 0.132 (0.939 - 1.877)	0.367 - 0.667 (5.220 - 9.487)	1.416 - 2.432 (20.140 - 34.591)

[1] Ratios ($i=n_1/n_2$)
[2] Ratio-dependent. Application-specific speed configurations with NCP – www.neugart.com.
[3] The ratio-dependent values can be retrieved in Tec Data Finder – www.neugart.com
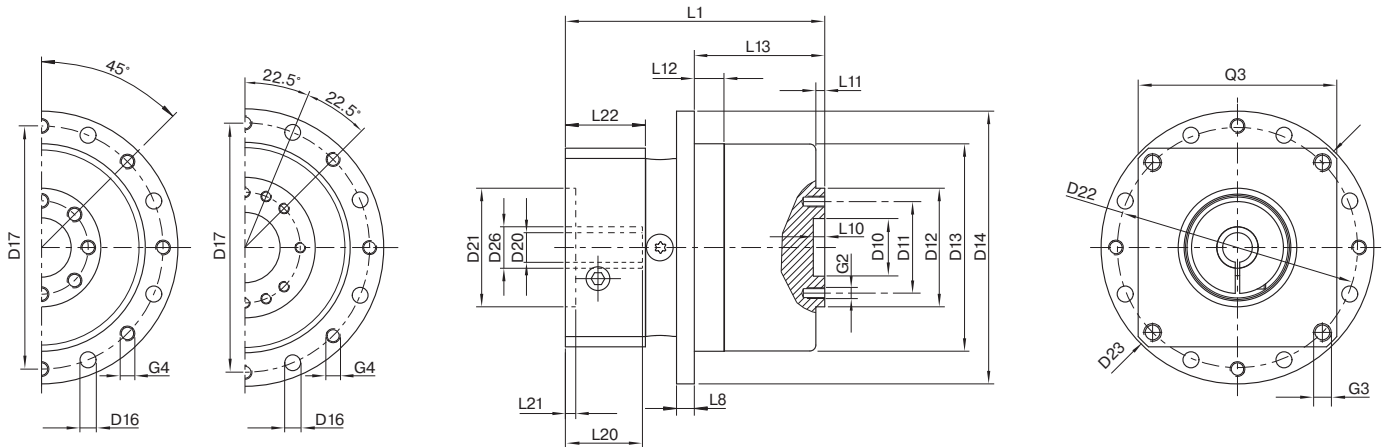[4] Permitted 1000 times
[5] These values are based on an output shaft speed of n_2=100 rpm
[6] Based on the end of the output shaft
[7] Other (sometimes higher) values following changes to T_{2N}, F_r, F_a, cycle, and service life of bearing. Application specific configuration with NCP – www.neugart.com

NGV gearbox Dimensions

NGV064
NGV090   NGV110

Geometry[1]			NGV064	NGV090	NGV110
Centering diameter output shaft	D10	H7	20 (0.787)	31.5 (1.240)	40 (1.575)
Pitch circle diameter output shaft	D11		31.5 (1.240)	50 (1.969)	63 (2.480)
Centering diameter output shaft	D12	h7	40 (1.575)	63 (2.480)	80 (3.150)
Centering diameter output flange	D13	h9	70 (2.756)	94 (3.701)	120 (4.724)
Flange diameter output	D14	h9	92 (3.622)	120 (4.724)	158 (6.220)
Mounting bore output	D16		Ø 5.4 8x45° (Ø 0.21 8x45°)	Ø 6.6 8x45° (Ø 0.26 8x45°)	Ø 9 8x45° (Ø 0.35 8x45°)
Pitch circle diameter output flange	D17		82 (3.328)	108 (4.252)	142 (5.591)
Min. total length	L1		84.5 (3.327)	118 (4.646)	144 (5.669)
Flange thickness output	L8		6 (0.236)	8 (0.315)	10 (0.394)
Centering depth output shaft	L10		4 (0.157)	6 (0.236)	6 (0.236)
	L11		3 (0.118)	6 (0.236)	6.5 (0.256)
Centering depth output flange	L12		10 (0.394)	15 (0.591)	21 (0.827)
Output flange length	L13		44 (1.732)	59.5 (2.343)	80 (3.150)
Clamping system diameter input	D26		11 (0.433)	19 (0.748)	24 (0.945)
			14 (0.551)	24 (0.945)	35 (1.378)
			19 (0.748)	-	-
Motor shaft diameter j6/k6*	D20		5 - 19 (0.197 - 0.748)	8 - 24 (0.315 - 0.945)	11 - 35 (0.433 - 1.378)
Permissible motor shaft length	L20				
Centering diameter input	D21				
Centering depth input	L21			*The dimensions vary with the motor/gearbox flange.	
Pitch circle diameter input	D22			The input flange dimensions can be retrieved for each	
Motor flange length	L22			specific motor in Tec Data Finder at www.neugart.com	
Diagonal dimension input	D23				
Mounting thread x depth	G3	4x			
Flange cross section input	Q3	■			
Number x thread x depth	G2		8 x M5x7 (8 x M5x0.27)	8 x M6x10 (8 x M6x0.39)	12 x M6x12 (8 x M6x0.47)
Number x thread x depth	G4		8 x M5	8 x M6	8 x M8

Scope of delivery: NGV wheel incl. screws and closure cap

[1] Dimensions in mm

NGV wheel Dimensions

NGV wheel 160
NGV wheel 200   NGV wheel 250
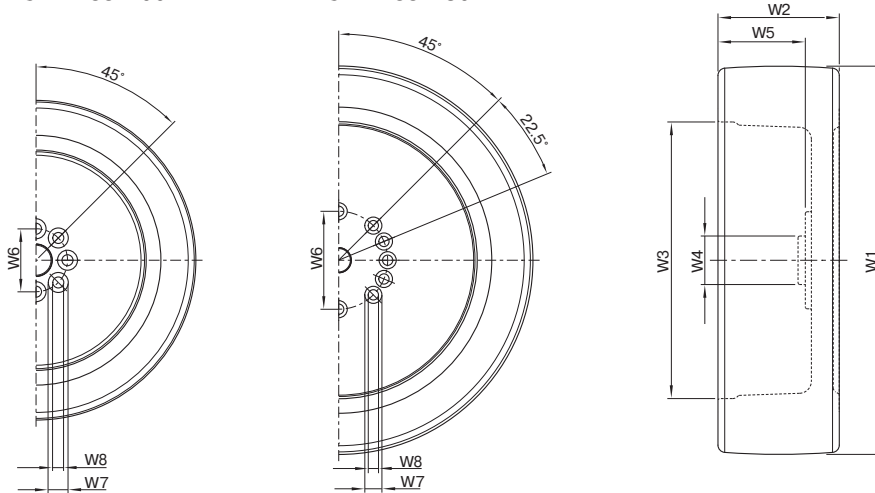
Geometry NGV wheel[1]			NGV wheel 160	NGV wheel 200	NGV wheel 250
Outer diameter of wheel	W 1		160 (6.299)	200 (7.874)	250 (9.843)
Width of wheel	W 2		50 (1.969)	60 (2.362)	80 (3.150)
Inner diameter of rim	W 3		114 (4.488)	155 (6.102)	183 (7.205)
Centering outside diameter	W 4	h7	20 (0.787)	31.5 (1.240)	40 (1.575)
Rim depth	W 5		36 (1.417)	47.5 (1.870)	66 (2.598)
Screw connection pitch circle diameter	W 6		31.5 (1.240)	50 (1.969)	63 (2.480)
Screw connection head diameter	W 7	H13	8 x Ø 10 (8 x Ø 0.394)	8 x Ø 11 (8 x Ø 0.433)	12 x Ø 11 (12 x Ø 0.472)
Screw connection diameter	W 8	H13	8 x Ø 5.5 (8 x Ø 0.217)	8 x Ø 6.6 (8 x Ø 0.260)	12 x Ø 6.6 (12 x Ø 0.260)

NGV wheel Technical data

Characteristics NGV wheel			NGV wheel 160	NGV wheel 200	NGV wheel 250
Specifications of wheel manufacturer Blickle					
Weight		kg (lb$_m$)	ca. 2.3 (5.1)	ca. 3.7 (8.2)	ca. 7.6 (16.8)
Mass inertia	J$_R$	kgcm^2 (lb$_f$.in.s^{2}10^{-4})	74 (16.636)	203 (45.636)	644 (144.777)
Roll resistance[2]		N (lb$_f$)	65 (14.6)	95 (21.4)	165 (37.1)
Friction coefficient (static friction) [3]	μ		> 0.25		
Floor protection (corresponds to surface pressure of wheel)		N/mm^2 (lb$_f$/in^2)	8 (113.786)		
Temperature range			-30°C (-22°F) to +70°C (+158°F), up to +90°C (+194°F) for short periods. The load-bearing capacity is reduced at ambient temperatures higher than +40°C (+104°F).		
Tread			Blickle Besthane®		
Tread color			Brown		
Tread hardness			92° Shore A		
Wheel unit			Gray cast iron		
Wheel unit color			Silver		
Corrosion protection			Wheel unit, painted		
Tread characteristics (according to tread manufacturer)			Low-noise operation, extremely low rolling resistance, high dynamic loading capability, floor protecting, extremely abrasion resistant, high degree of cutting and tear resistance, traceless, contact coloration-free.		

[1] Dimensions in mm
[2] Empirical values. At 4 km/h and with maximum load.
[3] Friction coefficient depending on subsurface. Specification μ=0.25 with NGV wheel on ground, dry steel rail.

![NEUGART logo]

Do you have any questions or need further information?
We are happy to advise you on all topics relating to drive technology.

You can find your personal contact at: **www.neugart.com**

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