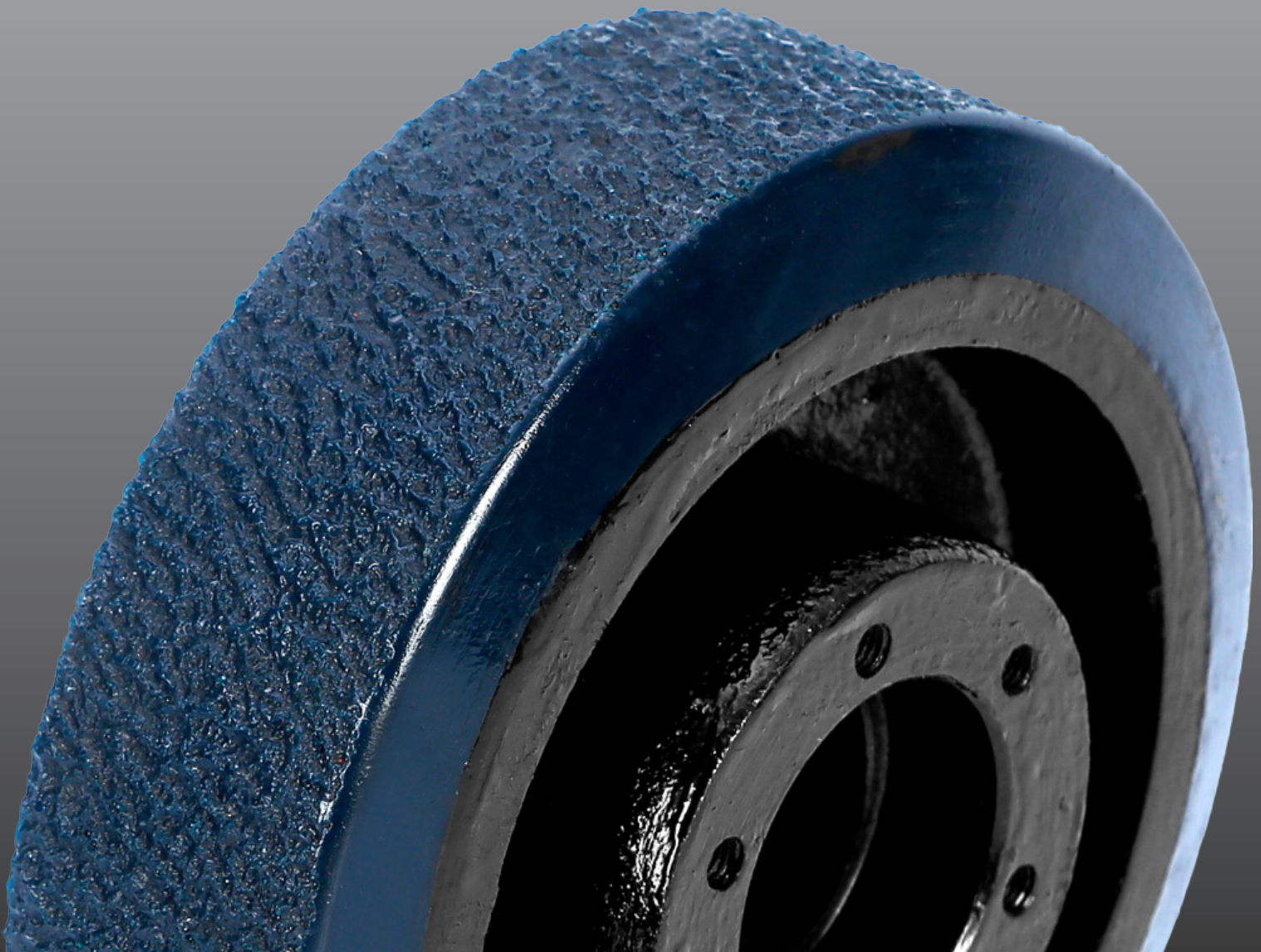
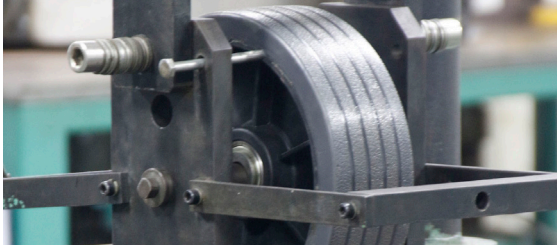


# AGV CASTERS

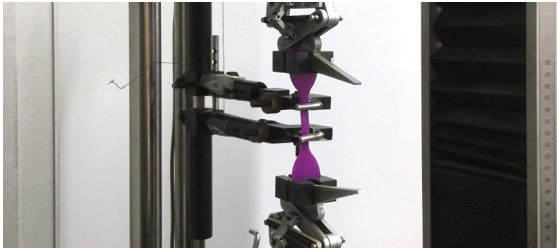
AGV stands for Automated Guided Vehicle. AGV casters are applicable to AGV and robots. Standard casters using in AGV for 24 hours running will result in the problems of durability and radius of gyration. Our AGV casters will prevent work failure and accidents of AGV.





## Breakout force test

Conduct a starting force test on the driving wheels to measure the starting energy requirement under the load capacity.



## Polyurethane physical-mechanical test

Physical property testing of PU synthetic materials



## Static pressure test

Static pressure testing on the drive wheel and agv caster to measure the deformation and safety load capacity standard.



## Anti-static test

Measure the anti-static of drive wheel and agv caster to ensure that the resistance of the polyurethane surface meets the standard.



## Caster walking test

Walking fatigue testing to ensure that the wheel surface strength meets the standards

## AGV caster application

	Light duty specification	Medium duty specification	Heavy duty specification
Load capacity(Kg)	100 kg-400 kg	400 kg-1500 kg	1500 kg-10000 kg
Wheel diameter	75-200 mm	100-300 mm	250-600 mm
Wheel width	40-80 mm	80-120 mm	80-200 mm
Speed	6-10 km/h	6-10 km/h	4-10 km/h
Fitting	Flange installation	Flange installation	-
	Keyway installation	Keyway installation	-
Material	Polyurethane + Cast steel		
	Polyurethane + Aluminum core		
Others	Grain / Anti Static	-	-
Industry	V-groove wheel for warehousing logistic	AGV/AMR system	Port logistic
	Light duty AGV/AMR Cleaning equipment	Electric towing equipment Vehicle industrial assembly line Electric pallet truck	Air cargo logistic Mining logistic OHT

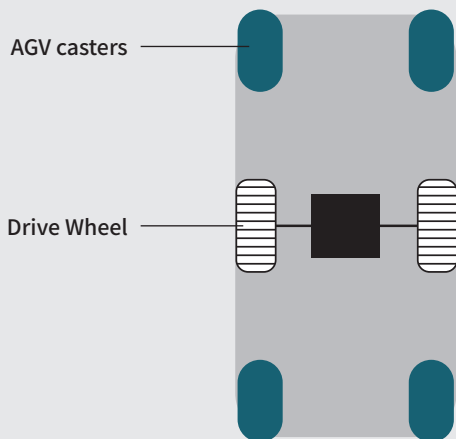
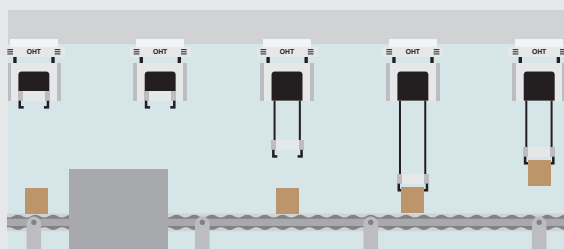


Diagram of AGV drive wheel and caster



Application



# Finite element analysis - static pressure test

**Specification:** Hub fitting drive wheel

**Item No.:** 2WDWPU1540/F5070/6.5/73a/f/esd

**Software:** Ansys Mechanical APDL

**Testing tool:** Static pressure testing machine

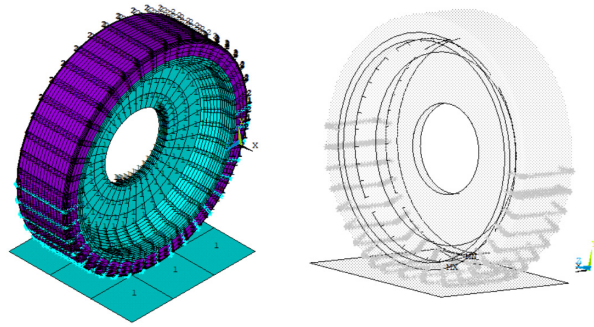
**Material:** Polyurethane 73A ; embossment pattern

**Software structural parameter**

- Wheel core material: SS41; Linear isotropic
- Polyurethane: Neo-Hookean

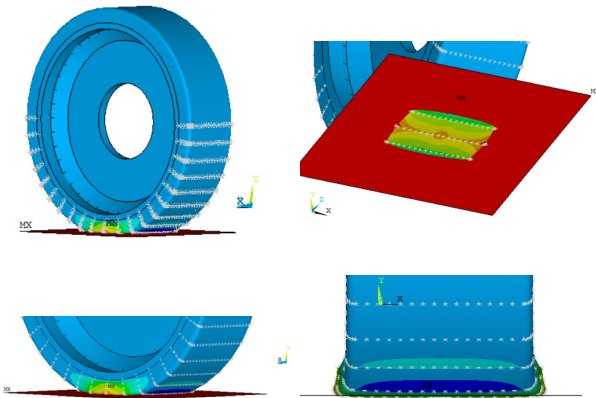
**Experimental procedure**

- Recording the experimental data by drive wheel running on the pressure testing machine.
- Finding the correct parameter.
- Recording the stress-strain curve



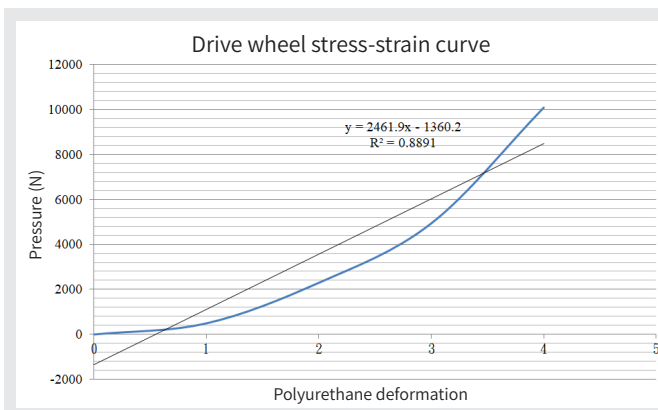
3D Model

Static pressure testing machine				
Pressure (Kg)	0	100	200	300
Time (Min.)	X	3	3	3
Deformation of wheel before pressure testing (mm)	150.62	149.55	148.875	148.36
Displacement measurement during pressure testing (mm)	X	1.07	1.745	2.26
Deformation of wheel after pressure testing(mm)	X	0.02	0.03	0.04



**Testing results**

Point of application					
	MU	Case	Static pressure (mm)	Stress point (N)	Kg
73A	2.7	1	2.26	2917.6	297.4108053
	2.7	2	1.745	1799.9	183.4760449

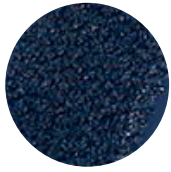


- Drive wheel deformat as the curve.
- The curve become nonlinear after the static pressure testing over 6000N.

# Drive wheel – Key way

※Customize wheel providing

Feature : anti-static $10^{5-9}\Omega$ , floor protection, non-slip, abrasion resistant, noise resistant



Embossment pattern

Herringbone pattern + Embossment pattern



Unit : mm

Drawing No.	Item No.	Material	Grain	Core material color	diameter	Wheel width	Axle bore	Keyway hub width	Keyway hub length	Load capacity (Kg)
1	2WDWPU1340/ K20521/ 73A/ESD	PU (Shore A73)	Embossment pattern	Cast iron Black	130	51	20	6	23	250
2	2WDWPU2040/ K16518.3/ 73A/ESD				200	45	16	5	18.3	300
3	2WPUL1250X/ P5/93A	PU (Shore A93)	Herringbone pattern + Embossment pattern	Cast iron Silver	125	50	25	8	28.3	300
4	2WPUL1550X/ P5/93A				150	50	25	8	28.3	400
5	2WPUL2050X/ P5/93A				200	50	25	8	28.3	500

# Drive wheel – Hub flange

※Customize wheel providing

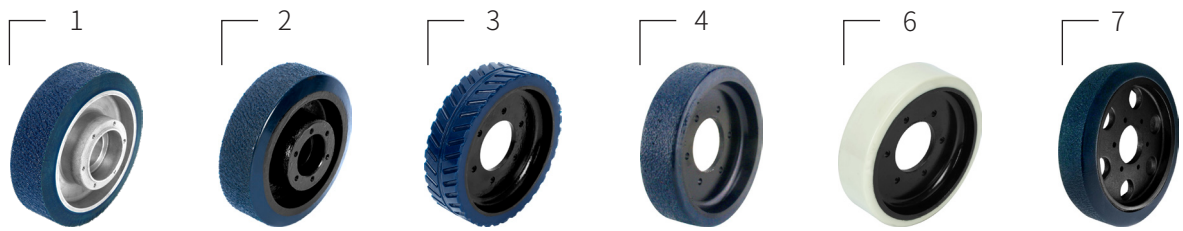
Feature : anti-static $10^{5-9}\Omega$ , floor protection, non-slip, abrasion resistant, noise resistant



Embossment pattern

Herringbone pattern

Plain

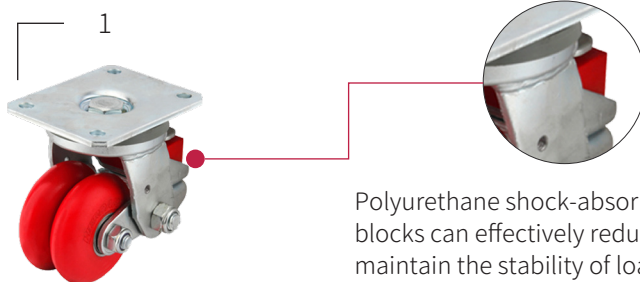


Unit : mm

Drawing No.	Item No.	Material	Grain	Core material color	diameter	Wheel width	No. of Fixing hole	Central hole	PCD	Load capacity (Kg)	
1	2WDWUA1340/ F4252/4/ 73A/ESD	PU (Shore A73)	Embossment pattern	Aluminum Silver	130	40	6 x M4	42	52	160	
2	2WDWPU1340/ F3545/5/ 73A/ESD						6 x M5	35	45		200
3	2WDWPU1540/ F5070/6.5/ 73A/ESD		Herringbone pattern		Cast iron Black		150	6 x 6.5	50	70	250
4	2WDWPU1540/ F5070/6.5/ 73A/F/ESD		Embossment pattern								
6	2WDWPU1540/ F5070/6.5/93A	PU (Shore A93)	Plain	200	280						
7	2WPUL2040 YDW50/QB	PU (Shore A73)	Embossment pattern								

# AGV caster – Shock absorbing

Features: Anti-static  $10^{5-9} \Omega$ , quiet and wear-resistant without leaving traces, adaptable to uneven ground, low center of gravity, two-wheel design, flexible rotation

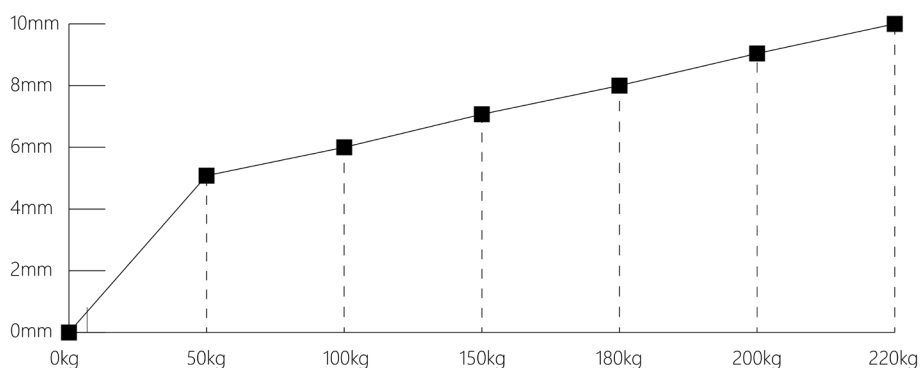


Polyurethane shock-absorbing damping blocks can effectively reduce vibration and maintain the stability of loaded items.

Unit : mm

Drawing No.	Item No.	Material	Core material	diameter	Wheel width	Height	Swivel Radius
1	C415S-1.5-HEUA3100C/R	PU (Shore A93)	Aluminum	76	24 x 2	116-107	65

Initial shock absorption weight(Kg)	Maximum shock absorption weight(Kg)	Height deformation	Load Capacity (Kg)	Plate size	Plate hole distance	Plate aperture
50	160	10	220	110 x 85	86 x 60	9

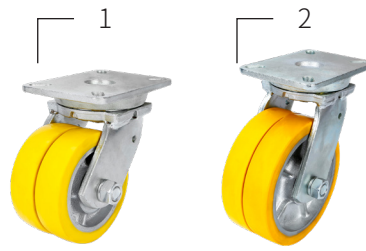


Compression curve graph

Testing items			Measurement (Original height is 116.2mm)	
Equipment	Static pressure testing machine	Load Capacity(Kg)	Spring elasticity constant (mm)	Height (mm)
Purpose	Testing deformation capacity	50	5.1	111.1
Condition	1. Set up the caster on the testing machine. 2. Recording the capacity deformation ratio. 3. Lab temperature: 23° C	100	6.2	110.0
Testing method	Set up the caster on the testing machine then exerting the pressure.	150	7.3	108.9
Standard	After 3 minutes of overload static pressure, the wheel surface has no cracks, the outer diameter deformation is less than 3mm, the rebound is good. The bearing rotates normally is qualified.	180	8.3	107.9
Result	The static pressure load of this wheel is 0-220kg. When the load reaches 220kg, the spring compression of the wheel set is 9.3mm. After the pressure is released, the outer diameter deformation of the single wheel is 0.06. The rebound effect of the wheel set is good. The bearing rotates flexibly, without jamming or loosening.	200	8.9	107.3
		220	9.3	106.9

# AGV caster – Heavy duty

Features: Anti-static  $10^{5-9} \Omega$ , quiet and wear-resistant without leaving traces, adaptable to uneven ground, low center of gravity, two-wheel design, flexible rotation



Unit : mm

Drawing No.	Item No.	Material	Core material	diameter	Wheel width	Height	Eccentricity	Plate size	Plate hole distance	Plate aperture	Load Capacity (Kg)
1	C910S-PRH1541YA-TWIN	PU (Shore D55)	Cast iron	150	40 x 2	204	60	185 x 134	155 / 132 X 105 / 85	14	1000
2	C910S-PRH2041YA-TWIN			200		269					1500



# AGV caster – Medium duty

Features: Anti-static  $10^{5-9}\Omega$ , quiet and wear-resistant without leaving traces, adaptable to uneven ground, low center of gravity, two-wheel design, flexible rotation



Unit : mm

Drawing No.	Item No.	Material	Core material	diameter	Wheel width	Height	Eccentricity	Plate size	Plate hole distance	Plate aperture	Load Capacity (Kg)
1	C220-1S/ HUA5714	PU (Shore A93)	Aluminum	57	14 x 2	80	22	67 x 49	52 x 35	8.4	100
2	C331S/ HUA5020C/R			50	20 x 2	82	20	111 x 80	87 / 77 x 60	8.7	150
3	C331S/ HUA5520C/P1			55	20 x 2	79	20	84 x 84	64 / 59 x 64 / 59	8.5	200
4	C331S/ HUA6524C/R			65	24 x 2	87	20	111 x 80	87 / 77 x 60	8.7	200
5	C410S/ HEUA3100C/V			76	24 x 2	107	20	104 x 82	82 x 60	8.7	150
6	C410S/ HEUA3100C/R	PU (Shore A93)	Aluminum	76	24 x 2	107	20	104 x 82	82 x 60	8.7	200
7	C412S/ HEUA3140C/R			76	30 x 2	107	22	116 x 100	92 / 76 x 76 / 67	11	350
8	C415S/ HPU8035C/ TWIN		#45 Steel	80	35 x 2	110	21	116 x 100	78 x 78	8.5	500
9	C415S/ HEUA3100C/R		Aluminum	76	24 x 2	107	20	110 x 85	86 x 60	9	200
10	C415S/ HEUA3100C/V	PU (Shore A73)	Aluminum	76	24 x 2	107	20	110 x 85	86 x 60	9	150
11	C415S/ HEUA310R Tv/tw/T1225			76	24 x 2	107	20	Ø88	Bolt	M12 x P1.75	150

# AGV caster – Shock absorbing GDSA series

Features: Die-cast steel plate and hardened double ball bearings in the wheel frame chassis which can rotate smoothly. Ivory aluminum frame with special rubber (A65) has good shock absorption function. Extremely small eccentricity can enhance stability and smooth rolling which is a shock-absorbing caster suitable for AGV / AMR.



Unit : mm

Temperature : -10~+90°C

Swivel Item No.	Wheel material	Surface Treatment	diameter	Wheel width	Height	Eccentricity	Plate size	Plate hole distance	Plate aperture	Load Capacity (Kg)
GDSA-50-ASF-EUS	PU (Shore A80)	Zinc plated	50	23	87-7	23~25	55 x 55	42 x 42	6.5	30
GDSA-65-ASF-EUS			64		102-7	23~26	55 x 55	42 x 42	6.5	40



Unit : mm

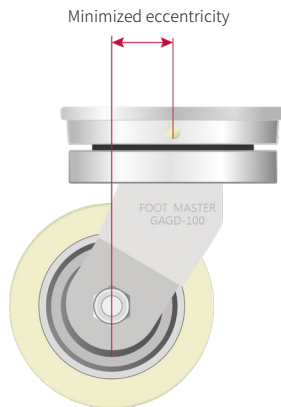
Temperature : -10~+90°C

Swivel Item No.	Wheel material	Surface Treatment	diameter	Wheel width	Height	Eccentricity	螺牙尺寸	Leveling Extent	Load Capacity (Kg)
GDSA-50-ASS-EUS	PU (Shore A80)	Zinc plated	50	23	87-7	23~25	M8 x P1.25	10	30
GDSA-65-ASS-EUS			64		102-7	23~26			40



AGVs with high loads are difficult to change directions. When the AGV turns, it will turn around the wheels.

Therefore, when turning, the AGV casters will shake due to the size of the eccentricity. The higher the load, the more obvious the shaking phenomenon, so the AGV will deviate from the normal driving path. The GAGD series can withstand high loads. In order to prevent the AGV from suddenly stopping when turning, an excellent solution with a smaller eccentricity than ordinary casters is provided.



In order to improve steering smoothness under high load conditions, the GAGD series uses 2 types of bearing structures. It can ensure the durability of AGV for long-term operation under high load conditions.

As the load increases, the AGV operation will become more and more sluggish, so in order to be able to move forward, backward, and turn softly with minimal force, a twin-wheel structure is necessary. The high-performance and high-elastic polyurethane wheels used in the GAGD series can meet the above conditions.

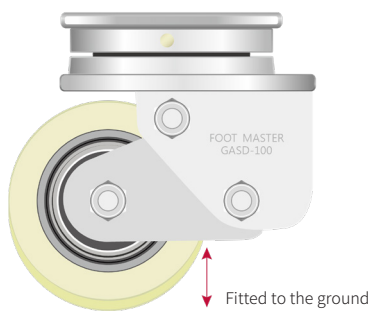
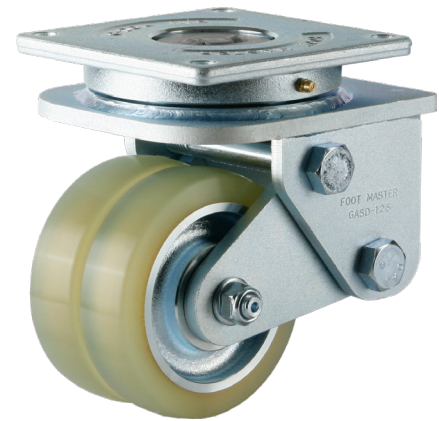
Unit : mm

Temperature : -10~+90°C

Swivel Item No.	Wheel material	Surface Treatment	diameter	Wheel width	Height	Eccentricity	Plate size	Plate hole distance	Plate aperture	Load Capacity (Kg)
GAGD-75-ASF-HUD	PU (Shore A95)	Powder Coating	75	30 x 2	123	30	112 x 112	92 x 92	9	250
GAGD-100-ASF-HUD			100	30 x 2	150	30	112 x 112	92 x 92	9	310
GAGD-125-ASF-HUD			125	35 x 2	175	33	145 x 145	120 x 120	11	440
GAGD-150-ASF-HUD			150	40 x 2	200	35	145 x 145	120 x 120	11	630



What appears to be flat ground may not actually be flat. AGVs are generally equipped with 4 casters, but it often happens that one of the casters becomes separated from the uneven ground. During steering, the casters separate from the ground and then suddenly contact the ground, which will be inconsistent with the way the AGV travels, resulting in loss of balance. Therefore, the AGV will deviate from its normal driving position and stop instantly. **The GASD series provides a solution to this phenomenon.**



The advantage of the GASD series with shock-absorbing function is that the special rubber used in the series is different from ordinary steel springs and **can absorb repeated subtle vibrations** when moving on uneven ground.

The GASD series uses special rubber to **provide 10mm of shock-absorbing compression space**. Under the 10mm shock-absorbing compression space, the AGV can always run close to the ground, thus significantly reducing the possibility of the AGV stopping instantaneously due to vibration when changing directions.

Unit : mm

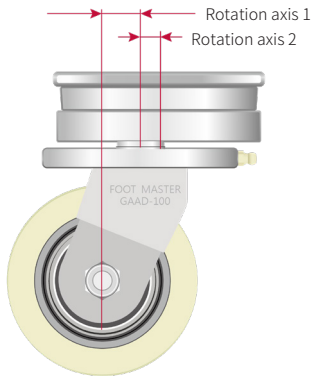
Temperature : -10~+90°C

Swivel Item No.	Wheel material	Surface Treatment	diameter	Wheel width	Height	Eccentricity	Plate size	Plate hole distance	Plate aperture	Load Capacity (Kg)
GASD-75-ASF-HUD	PU (Shore A95)	Powder Coating	75	30 x 2	130-10	30	112 x 112	92 x 92	9	250
GASD-100-ASF-HUD			100	30 x 2	160-10	30	112 x 112	92 x 92	9	310
GASD-125-ASF-HUD			125	35 x 2	185-10	33	145 x 145	120 x 120	11	440
GASD-150-ASF-HUD			150	40 x 2	220-10	35	145 x 145	120 x 120	11	630



The AGV driven wheel of the GAAD series uses two rotation axes with different rotation radii during forward and reverse operation. The rotation axis will be automatically adjusted according to the moving direction to achieve a structure that adjusts to the minimum rotation radius.

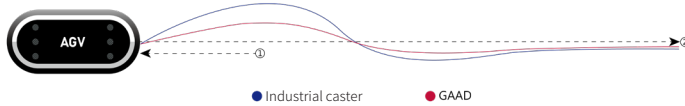
Two rotation axes with different rotation radii



The running stability of the AGV is greatly affected by the eccentricity of the casters. If the eccentricity is too large, the AGV will shake too much, causing it to deviate from the prescribed travel route; if the eccentricity is too small, the AGV's motor will be overloaded.

For AGVs that need to move forward and backward, the GAAD series is the most suitable solution.

Movement path difference Industrial caster v.s. GAAD



Unit : mm

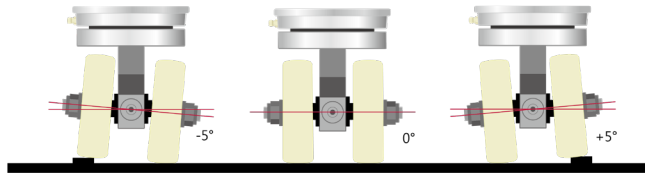
Temperature : -10~+90°C

Swivel Item No.	Wheel material	Surface Treatment	diameter	Wheel width	Height	Eccentricity	Plate size	Plate hole distance	Plate aperture	Load Capacity (Kg)
GAAD-75-ASF-HUD	PU (Shore A95)	Powder Coating	75	30 x 2	130	10~30	112 x 112	92 x 92	9	250
GAAD-100-ASF-HUD			100	30 x 2	160	10~30	112 x 112	92 x 92	9	310
GAAD-125-ASF-HUD			125	35 x 2	185	15~33	145 x 145	120 x 120	11	440
GAAD-150-ASF-HUD			150	40 x 2	220	15~33	145 x 145	120 x 120	11	630



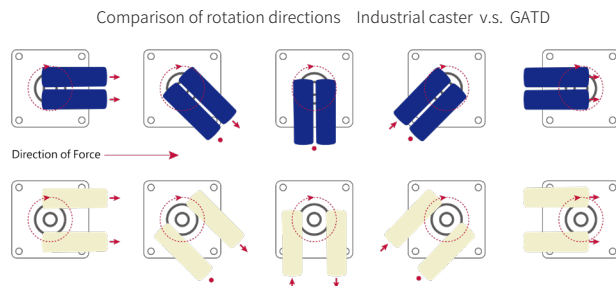


The GATD series has a balanceable structure. The wheel axle can tilt freely according to the flatness of the ground within a range of  $\pm 5^\circ$  from the central axis. The freedom of the wheel axle allows the casters to remain close to the ground, thereby reducing the shaking caused by the AGV turning, maintaining stable operation, and protecting the loaded transport items.



Different from the general two-wheel structure, the GATD series has a structure with a large distance between the two wheels. When the two wheels rotate in the direction of the AGV, the two wheels will rotate in opposite directions within a certain range. After reaching a specific orientation, they will start to rotate in the same direction. Reducing the eccentric distance is called the self-compensation effect.

The GATD series has a better self-compensation effect than ordinary two-wheelers, which can prevent the AGV from leaving the driving path.



Unit : mm

Temperature : -10~+90°C

Swivel Item No.	Wheel material	Surface Treatment	diameter	Wheel width	Height	Eccentricity	Plate size	Plate hole distance	Plate aperture	Load Capacity (Kg)
GATD-75-ASF-HUD	PU (Shore A95)	Powder Coating	75	30 x 2	123	30	112 x 112	92 x 92	9	250
GATD-100-ASF-HUD			100	30 x 2	150	30	112 x 112	92 x 92	9	310
GATD-125-ASF-HUD			125	35 x 2	175	33	145 x 145	120 x 120	11	440
GATD-150-ASF-HUD			150	40 x 2	200	35	145 x 145	120 x 120	11	630