

CATALOGUE AT-CR-2026 · WIRE ROPE ISOLATION FOR ROAD TRANSPORT

CargoRide

Engineered isolation packages that carry fragile and heavy cargo across Indian roads: 4, 6, 8 and 12 tonne, under the cargo, inside or outside the container, with end-stops for braking, acceleration and tipping.

**4 - 12 t**

ready-made packages

5 arrangementsbelow, inside, outside, side, 45°
V**R1 · R2 · R3**

Indian road classes

Report

with every selection

01 · WHAT THE ROAD DOES TO CARGO

A truck is a vibration machine with brakes

Cargo on an Indian highway sees four things at once. A steady broadband vibration from the tyres and engine. Short vertical shocks at every speed breaker, pothole and expansion joint. Long horizontal loads when the driver brakes, accelerates or takes a bend. And a rocking moment, because all of those horizontal loads act at the cargo's centre of gravity, high above the deck.

A wire rope isolator handles the first two well: it is soft enough to filter vibration and has the travel and damping to absorb a shock. The horizontal loads and the rocking moment need the mounting arrangement and the end-stops around it. CargoRide packages are designed for all four together.

Design basis used in this catalogue

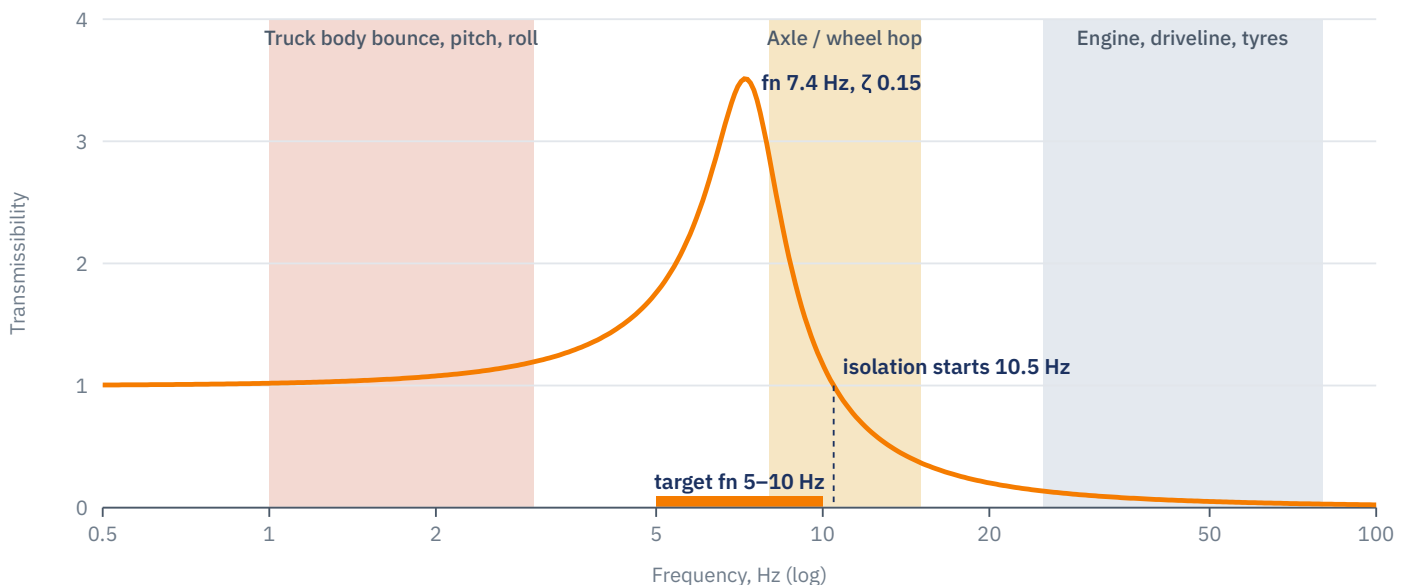
LOAD	VALUE	BASIS
Vertical, static + dynamic	1.0 g ± road input	gravity on the isolators
Forward (braking)	0.8 g	European road-securing practice (EN 12195-1, CTU Code)
Rearward (acceleration)	0.5 g	
Sideways (cornering)	0.5 g	
Sideways, tipping check	0.7 g	0.5 g plus 0.2 g for rocking, Adoni basis
Emergency stop / end-stop design	1.0 g	Adoni basis

Road classes for vertical shock

CLASS	ROAD	HALF-SINE
R1	Expressway / 4-lane NH	3 g · 20 ms
R2	State highway / city, speed breakers & potholes	5 g · 15 ms
R3	Rural, ghat, site & unmetalled roads	8 g · 15 ms

Where the customer specifies a shock (for example 20 g / 11 ms, or a JSS 55555 / MIL-STD-810H profile), that value replaces the class value.

Where the isolator must sit. A CargoRide mount is tuned to 5–10 Hz: well above the truck's body modes, and low enough that isolation has begun by the axle-hop band.



Transmissibility of a typical package (f_n 7.4 Hz, damping 0.15) against the truck's excitation bands. Below 1.0 the cargo moves less than the deck. Mounts tuned near 1–3 Hz would amplify the body bounce; mounts tuned above 15 Hz would amplify axle hop instead of cutting it.

02 · EXPERIENCE BEHIND THE PACKAGES

Two road moves that shaped CargoRide

Both jobs were sized, built and reported by Adoni Tech in 2025–26. Customer names are withheld; the engineering is as delivered.



CASE A · FLATBED, COMPRESSION

5 t process payload, road move to plant, North India

Cargo	5 000 kg skid-mounted process equipment
Arrangement	Below cargo, compression, isolators aligned with the direction of travel
Isolators	Ø28 mm rope, 8-loop heavy isolators (AWRI 286 class)
What we learned	The braking check showed the cargo would travel fore-aft beyond comfortable isolator stroke under hard braking. Elastomer end-stops were added, four at the front and four at the rear, set clear of normal running.



CASE B · OUTSIDE CONTAINER, 45° AT ISO CORNERS

12.5 t defence electronics enclosure, 40 ft trailer

Cargo	12 500 kg enclosure, 6060 × 3330 × 2600 mm, CG 1100 mm, four ISO-corner supports
Requirement	20 g / 11 ms road shock, 3 g limit on the equipment, 24 Hz enclosure mode
Selection	12 × AWRI 318-40 at 45°, three per corner
Result	2.7 g transmitted, fn 7.24 Hz (ratio 3.3 to the 24 Hz mode, 86 % attenuation), 67 of 137 mm travel used at the heaviest corner
What we learned	With CG 1210 mm on a 2259 mm corner track the enclosure tips at 0.86 g lateral. A 1.5 g side load would lift the windward rail, so the twist-locks become structural members. Tipping is now checked on every CargoRide selection.

Shock is checked on Ks, vibration on Kv.

The large-amplitude secant rate governs a pothole; the small-amplitude rate governs the ride. Using Kv for shock overstates g by about two times.

Isolators carry, end-stops limit.

Fore-aft travel under braking is set by the isolator's horizontal rate. Stops take over beyond normal running.

The CG decides the arrangement.

Tall cargo on a narrow base goes on 45° V-pairs, which are as stiff sideways as vertically.

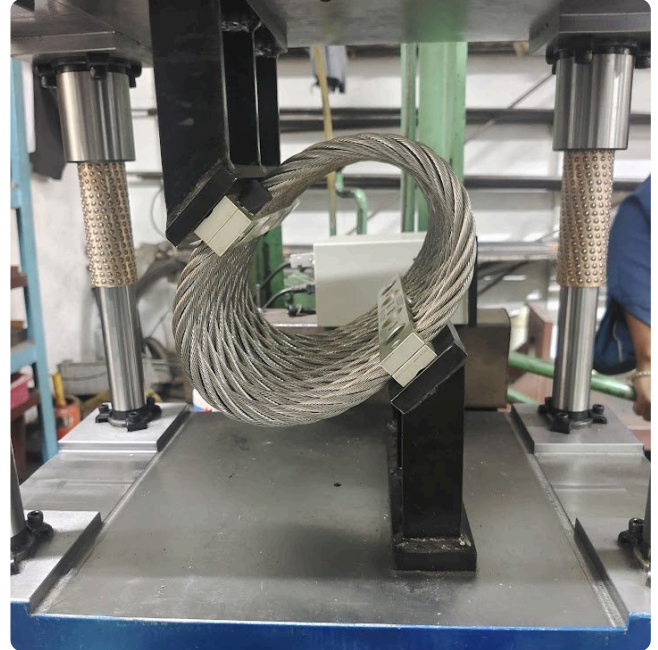
MADE AND TESTED AT KODOLI, SATARA

Real isolators, real tests

Every CargoRide isolator is wound, clamped and tested in our own works. These are production parts, photographed on the shop floor and in the test bay.



Heavy AWRI isolators on the assembly bench. Stainless rope, multi-loop winding, black-finished retainer bars clamped with socket-head screws. The heavy size class used in CargoRide packages.



45° load-line test. An isolator clamped in the 45° fixture on our press, measuring the compression/roll rate used for V-pair and ISO-corner packages.



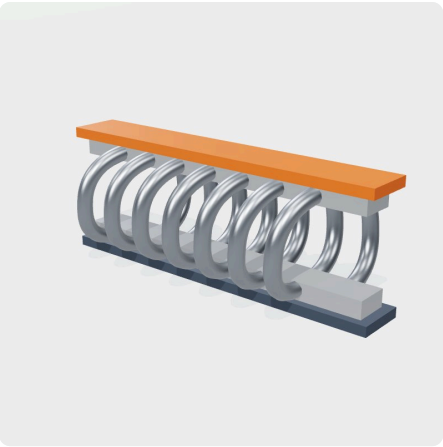
Compact isolator. Two-loop design with formed brackets, used for second-stage isolation of instruments inside an isolated shelter.

First-article test on every order. The first isolator of each production lot is load-tested in the press. Its measured stiffness replaces the catalogue value, and the selection report is reissued on the measured rate before bulk production.

03 · THREE WAYS TO LOAD A WIRE ROPE ISOLATOR

Pick the load line first

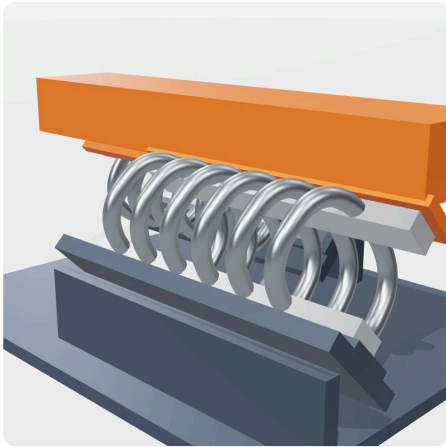
The same isolator has three load lines, each with its own rating, stiffness and stroke. The catalogue gives all three for every AWRI model (rows C, R and S).



0° Compression row C

Gravity squeezes the loops. Highest load per isolator and the stiffest vertical rate, so the fewest pieces. Horizontally it is soft: fore-aft and sideways run on the shear/roll rate.

- Low, wide cargo; CG height under half the narrow base
- Flatbed skids, container floors
- Always fit fore-aft end-stops



45° Compression / roll row R

Isolators lean at 45°, in pairs leaning opposite ways. Vertical and lateral stiffness become nearly equal, so the cargo rides as one block and rocks far less.

- Tall cargo, high CG, cabinets and shelters
- ISO-corner container kits
- The longest stroke of the three rows



90° Shear / roll row S

Base on a vertical face, gravity across the loops. Lowest rating, softest rate. Used to hang cargo from its side, and as top stabilisers that stop a tall load from swaying.

- Side-mounted cabinets and racks
- Top stabilisers to container walls
- Rated at about a quarter of row C

Example: one AWRI 318-40 in each load line (catalogue values)

LOAD LINE	MAX STATIC LOAD	MAX DEFLECTION	KV, VIBRATION	KS, SHOCK
0° compression	24.65 kN	96.5 mm	3130 N/mm	1061 N/mm
45° compression / roll	17.37 kN	137.2 mm	2158 N/mm	529 N/mm
90° shear / roll	6.50 kN	101.6 mm	655 N/mm	515 N/mm

04 · WHERE THE ISOLATORS GO

Five arrangements, one method

**C****Below cargo, on the flatbed**

The cargo's own skid sits on an upper frame carried by isolators in compression. A lower rail set bolts or twist-locks to the deck. Fore-aft end-stops and lateral snubbers are welded to the lower set with a set gap. The arrangement used for Case A.

Use for: skids, gensets, transformers, machine tools, process modules up to 12 t.

**V****45° V-pairs, below tall cargo**

Same frame set, isolators at 45° in opposed pairs. Lateral rate equals vertical rate, so a tall load does not rock on a soft base.

Use when CG height exceeds half the narrow base.

**I****Inside the container**

An isolated skid on the container floor, plus shear/roll stabilisers from the top of the cargo to the side walls. The container stays a standard box on a standard trailer.

Use for: rental moves, multimodal rail-road, shared trailers.



K

Outside the container: ISO-corner kit

An interface frame twist-locks to the trailer. At each ISO corner a cluster of two or three isolators at 45° carries an upper frame with corner castings for the container. The whole container, with its contents, rides isolated. The arrangement used for Case B.

Use for: shelters and enclosures that travel as containers; equipment that cannot be opened; repeat moves of the same box.



S

On the side of the cargo

The cargo hangs from side brackets on isolators in shear/roll, fixed to a deck-mounted frame. A base snubber and slack safety strap sit under it.

Use for: tall cabinets, racks and panels under about 1.5 t that cannot sit on their base.

Choosing the arrangement

IF THE CARGO IS...	USE
Low and wide ($h_{CG} < B/2$), on a flatbed	C
Tall ($h_{CG} \geq B/2$), or fragile sideways	V
Inside a container that must stay standard	I (C or V skid + top stabilisers)
A container or shelter moved as one box	K
Light, tall, hung from its side	S

All five use the same sizing method (pages 14–15) and the same end-stop rules (page 8). h_{CG} is the CG height above the isolator plane; B is the narrow distance between isolator lines.

05 · BRAKING, ACCELERATION, TO-AND-FRO, TIPPING

Let the isolator float, then stop it

A wire rope isolator is soft sideways on purpose. Under 0.8 g braking a 12 t skid on ten AWRI 318-40 in compression moves forward 18.3 mm, then swings back when the brakes come off. That to-and-fro is harmless within the isolator's travel. It becomes a problem on repeated hard braking, on a downhill ghat, or in a collision.

End-stops are rigid brackets with an elastomer face, welded to the lower frame and set with a clear gap to the cargo frame. In normal running they never touch. When travel exceeds the gap they pick up the load, so the isolator is never driven past its stroke.

The gap rule

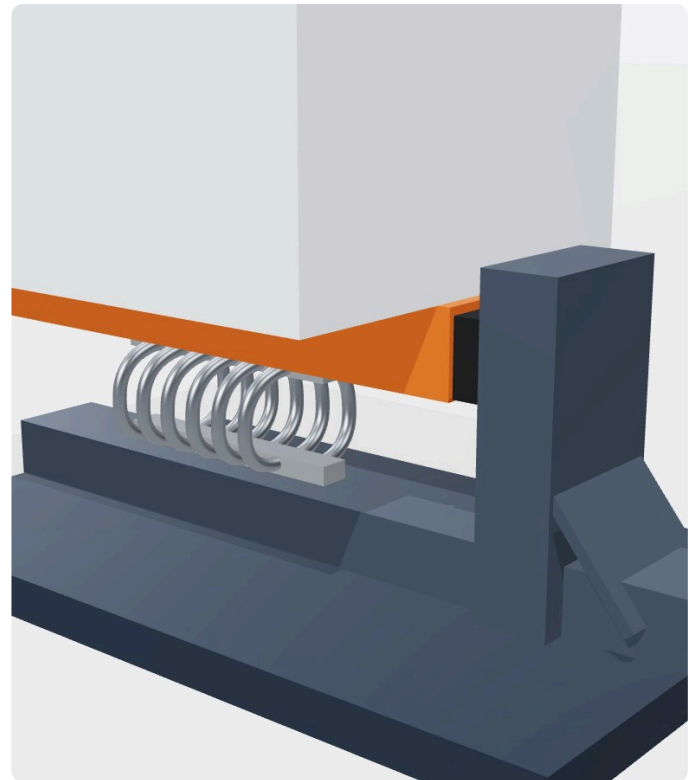
$$\text{gap} = 1.25 \times \delta_{0.5 \text{ g}} \quad \text{with} \quad \delta_a = a \cdot M \cdot g / (N \cdot K_{s,h})$$

$\delta_{0.5 \text{ g}}$ is the deflection under ordinary firm braking. $K_{s,h}$ is the isolator's large-amplitude rate in the horizontal load line (row S for compression mounts, row R for 45° mounts).

Stop design load

$$F_{\text{stop}} = 1.0 \cdot M \cdot g - N \cdot K_{s,h} \cdot \text{gap}$$

The share of a 1.0 g emergency stop the isolators cannot carry at the gap. Split over the stops on one face, then $\times 1.5$ for the stop rating.



End-stop on a compression mount: deck-welded gusseted bracket, elastomer face, running gap to the orange cargo frame.

Elastomer end-stop · AES

Natural rubber or polyurethane face on a steel bracket. Fore-aft and lateral. Standard on every package. AES-20 and AES-40 by stop rating, kN.

Hydraulic end-stop · AHS

An Adoni industrial shock absorber as the stop, for precision cargo where a rubber stop would still pass a jolt. Sized on $E = \frac{1}{2} M v^2$; 0.5 m/s closing speed gives 1 500 J for 12 t.

Top stabilisers · ATS

Small isolators in shear/roll from the top of tall cargo to the container wall or a deck frame. They add rocking stiffness without making the mount harsh.

Safety restraint

Slack chains or webbing from cargo frame to deck, never tensioned. They hold the load if anything fails, and keep road-securing rules satisfied.

Tipping check. The rigid tipping threshold is $a_{\text{tip}} = (B/2) / h_{\text{CG}}$. If it is below 0.7 g, use 45° V-pairs, widen the isolator track, add top stabilisers, or lower the CG. Never let the light-side isolators go into tension at 0.7 g without a check of the retainer bolts.

06 · READY-MADE PACKAGES

Four sizes, two arrangements, off the shelf

Each package is a complete kit: isolators, lower and upper frame rails, end-stops, snubbers, fasteners, installation drawing and a selection report. Sized for the reference cargo below and valid for R1 to R3 roads.



CR-04 up to 4 t



CR-06 up to 6 t



CR-08 up to 8 t



CR-12 up to 12 t

PACKAGE	CARGO	ARRANGEMENT	ISOLATORS	WORST-CORNER LOAD	FN, HZ	R2 SHOCK, G	R3 SHOCK, G	0.8 G BRAKING, MM	STOP GAP, MM
<u>CR-04-C</u>	4 t	Compression	8 × AWRI-222-80	62 %	7.5	1.09	1.74	21.9	17.1
<u>CR-04-V</u>	4 t	45° V-pairs / ISO corner	8 × AWRI-222-40	60 %	7.8	1.14	1.83	9.7	7.6
<u>CR-06-C</u>	6 t	Compression	8 × AWRI-286-60	47 %	8.2	1.16	1.85	19.4	15.2
<u>CR-06-V</u>	6 t	45° V-pairs / ISO corner	8 × AWRI-286-40	61 %	6.9	0.94	1.50	14.4	11.2
<u>CR-08-C</u>	8 t	Compression	10 × AWRI-286-60	50 %	7.9	1.12	1.79	20.7	16.2
<u>CR-08-V</u>	8 t	45° V-pairs / ISO corner	8 × AWRI-318-40	65 %	7.4	0.92	1.48	14.8	11.6
<u>CR-12-C</u>	12 t	Compression	10 × AWRI-318-40	55 %	8.1	1.19	1.91	18.3	14.3
<u>CR-12-V</u>	12 t	45° V-pairs / ISO corner	12 × AWRI-318-40	65 %	7.4	0.92	1.48	14.8	11.6

Reference cargo for each size: CR-04 3.0 × 2.0 m footprint, CG 1.0 m; CR-06 4.0 × 2.2 m, CG 1.1 m; CR-08 5.0 × 2.3 m, CG 1.2 m; CR-12 6.0 × 2.4 m, CG 1.2 m (CG above isolator plane). Worst-corner load includes a 15 % CG-offset allowance, shown as a share of the isolator's rated static load. Transmitted shock on the cargo, damping 0.15. If your cargo differs, the selection tool resizes the package in a minute.

PACKAGE DATA SHEET

CR-04 · cargo up to 4 t

Reference cargo 3.0 × 2.0 m footprint, CG 1.0 m above the isolator plane.

Finalise online: [CR-04-C](#) → [CR-04-V](#) →

Compression CR-04-C

Isolators	8 × AWRI-222-80
Load line	0° compression (row C)
Isolator height × width	191 × 210 mm
Static load per isolator	4.91 kN of 9.16 kN
Utilisation, nominal / worst	54 % / 62 %
Natural frequency, vert. / horiz.	7.5 / 3.4 Hz
Shock R1 · R2 · R3, on cargo	0.87 · 1.09 · 1.74 g
Stroke used at R3	22 of 102.9 mm
Braking 0.8 g / side 0.5 g	21.9 / 13.7 mm
Roll at 0.7 g side	0.53°
End-stop gap / design load	17.1 mm / 11 kN per stop
Isolator mass, set	92 kg

45° V-pairs / ISO-corner kit CR-04-V

Isolators	8 × AWRI-222-40
Load line	45° compression/roll (row R)
Isolator height × width	152 × 165 mm
Static load per isolator	4.91 kN of 9.34 kN
Utilisation, nominal / worst	53 % / 60 %
Natural frequency, vert. / horiz.	7.8 / 7.8 Hz
Shock R1 · R2 · R3, on cargo	0.91 · 1.14 · 1.83 g
Stroke used at R3	21 of 96.5 mm
Braking 0.8 g / side 0.5 g	9.7 / 6.1 mm
Roll at 0.7 g side	0.49°
End-stop gap / design load	7.6 mm / 11 kN per stop
Isolator mass, set	76 kg

Kit contents

1. 8 (C) or 8 (V) AWRI isolators with retainer-bar fasteners, grade 10.9, torque per data sheet
2. Lower rail set, ISMC/RHS, drilled for the deck or twist-locks (option F)
3. Upper cargo frame rails, drilled to the customer's skid (option F)
4. 4 fore-aft end-stops AES-20, 4 lateral snubbers, shims for gap setting
5. 4 slack safety chains with shackles
6. Installation drawing (A4 house style), selection report, inspection report

PACKAGE DATA SHEET

CR-06 · cargo up to 6 t

Reference cargo 4.0 × 2.2 m footprint, CG 1.1 m above the isolator plane.

Finalise online: [CR-06-C](#) → [CR-06-V](#) →

Compression CR-06-C

Isolators	8 × AWRI-286-60
Load line	0° compression (row C)
Isolator height × width	235 × 260 mm
Static load per isolator	7.36 kN of 17.89 kN
Utilisation, nominal / worst	41 % / 47 %
Natural frequency, vert. / horiz.	8.2 / 3.6 Hz
Shock R1 · R2 · R3, on cargo	0.92 · 1.16 · 1.85 g
Stroke used at R3	21 of 119.4 mm
Braking 0.8 g / side 0.5 g	19.4 / 12.1 mm
Roll at 0.7 g side	0.43°
End-stop gap / design load	15.2 mm / 17 kN per stop
Isolator mass, set	200 kg

45° V-pairs / ISO-corner kit CR-06-V

Isolators	8 × AWRI-286-40
Load line	45° compression/roll (row R)
Isolator height × width	216 × 241 mm
Static load per isolator	7.36 kN of 13.83 kN
Utilisation, nominal / worst	53 % / 61 %
Natural frequency, vert. / horiz.	6.9 / 6.9 Hz
Shock R1 · R2 · R3, on cargo	0.75 · 0.94 · 1.50 g
Stroke used at R3	26 of 144.8 mm
Braking 0.8 g / side 0.5 g	14.4 / 9.0 mm
Roll at 0.7 g side	0.66°
End-stop gap / design load	11.2 mm / 17 kN per stop
Isolator mass, set	192 kg

Kit contents

1. 8 (C) or 8 (V) AWRI isolators with retainer-bar fasteners, grade 10.9, torque per data sheet
2. Lower rail set, ISMC/RHS, drilled for the deck or twist-locks (option F)
3. Upper cargo frame rails, drilled to the customer's skid (option F)
4. 4 fore-aft end-stops AES-20, 4 lateral snubbers, shims for gap setting
5. 4 slack safety chains with shackles
6. Installation drawing (A4 house style), selection report, inspection report

PACKAGE DATA SHEET

CR-08 · cargo up to 8 t

Reference cargo 5.0 × 2.3 m footprint, CG 1.2 m above the isolator plane.

Finalise online: [CR-08-C](#) → [CR-08-V](#) →

Compression CR-08-C

Isolators	10 × AWRI-286-60
Load line	0° compression (row C)
Isolator height × width	235 × 260 mm
Static load per isolator	7.85 kN of 17.89 kN
Utilisation, nominal / worst	44 % / 50 %
Natural frequency, vert. / horiz.	7.9 / 3.5 Hz
Shock R1 · R2 · R3, on cargo	0.89 · 1.12 · 1.79 g
Stroke used at R3	22 of 119.4 mm
Braking 0.8 g / side 0.5 g	20.7 / 13.0 mm
Roll at 0.7 g side	0.46°
End-stop gap / design load	16.2 mm / 22 kN per stop
Isolator mass, set	250 kg

45° V-pairs / ISO-corner kit CR-08-V

Isolators	8 × AWRI-318-40
Load line	45° compression/roll (row R)
Isolator height × width	216 × 248 mm
Static load per isolator	9.81 kN of 17.37 kN
Utilisation, nominal / worst	56 % / 65 %
Natural frequency, vert. / horiz.	7.4 / 7.4 Hz
Shock R1 · R2 · R3, on cargo	0.74 · 0.92 · 1.48 g
Stroke used at R3	26 of 137.2 mm
Braking 0.8 g / side 0.5 g	14.8 / 9.3 mm
Roll at 0.7 g side	0.67°
End-stop gap / design load	11.6 mm / 22 kN per stop
Isolator mass, set	216 kg

Kit contents

1. 10 (C) or 8 (V) AWRI isolators with retainer-bar fasteners, grade 10.9, torque per data sheet
2. Lower rail set, ISMC/RHS, drilled for the deck or twist-locks (option F)
3. Upper cargo frame rails, drilled to the customer's skid (option F)
4. 4 fore-aft end-stops AES-40, 4 lateral snubbers, shims for gap setting
5. 4 slack safety chains with shackles
6. Installation drawing (A4 house style), selection report, inspection report

PACKAGE DATA SHEET

CR-12 · cargo up to 12 t

Reference cargo 6.0 × 2.4 m footprint, CG 1.2 m above the isolator plane.

Finalise online: [CR-12-C](#) → [CR-12-V](#) →

Compression CR-12-C

Isolators	10 × AWRI-318-40
Load line	0° compression (row C)
Isolator height × width	216 × 248 mm
Static load per isolator	11.77 kN of 24.65 kN
Utilisation, nominal / worst	48 % / 55 %
Natural frequency, vert. / horiz.	8.1 / 3.7 Hz
Shock R1 · R2 · R3, on cargo	0.95 · 1.19 · 1.91 g
Stroke used at R3	20 of 96.5 mm
Braking 0.8 g / side 0.5 g	18.3 / 11.4 mm
Roll at 0.7 g side	0.37°
End-stop gap / design load	14.3 mm / 33 kN per stop
Isolator mass, set	270 kg

45° V-pairs / ISO-corner kit CR-12-V

Isolators	12 × AWRI-318-40
Load line	45° compression/roll (row R)
Isolator height × width	216 × 248 mm
Static load per isolator	9.81 kN of 17.37 kN
Utilisation, nominal / worst	56 % / 65 %
Natural frequency, vert. / horiz.	7.4 / 7.4 Hz
Shock R1 · R2 · R3, on cargo	0.74 · 0.92 · 1.48 g
Stroke used at R3	26 of 137.2 mm
Braking 0.8 g / side 0.5 g	14.8 / 9.3 mm
Roll at 0.7 g side	0.62°
End-stop gap / design load	11.6 mm / 33 kN per stop
Isolator mass, set	324 kg

Kit contents

1. 10 (C) or 12 (V) AWRI isolators with retainer-bar fasteners, grade 10.9, torque per data sheet
2. Lower rail set, ISMC/RHS, drilled for the deck or twist-locks (option F)
3. Upper cargo frame rails, drilled to the customer's skid (option F)
4. 4 fore-aft end-stops AES-40, 4 lateral snubbers, shims for gap setting
5. 4 slack safety chains with shackles
6. Installation drawing (A4 house style), selection report, inspection report

07 · WHAT WE SUPPLY FROM OUR EXISTING RANGE

The parts behind every package

AWRI heavy isolators used in CargoRide (rated static load per isolator, kN)

FAMILY	ROPE, MM	MODELS	ROW C	ROW R	ROW S	STROKE R, MM
AWRI 95	Ø9.5	14	0.4 – 2.1	0.4 – 1.7	0.2 – 1.3	48 – 95
AWRI 127	Ø12.7	16	1.3 – 5.1	0.9 – 3.6	0.3 – 4.1	44 – 145
AWRI 159	Ø15.9	7	3.9 – 9.0	2.8 – 6.4	1.4 – 4.9	45 – 101
AWRI 222	Ø22.2	6	5.2 – 17.2	3.0 – 12.2	1.1 – 8.6	72 – 178
AWRI 286	Ø28.6	3	17.9 – 23.6	11.1 – 16.8	3.8 – 8.8	96 – 169
AWRI 318	Ø31.8	2	24.6 – 30.3	17.4 – 21.4	6.5 – 11.7	96 – 137

Full data for all 114 AWRI and ACWRI models, with competitor cross-reference, in the AWRI selector at [awri-selector.netlify.app](#).



AWRI heavy isolator as supplied: stainless rope, black-finished retainer bars, stainless fasteners. All-metal, no ageing, works from -50 to +120 °C.

PRODUCT	ROLE IN A CARGORIDE PACKAGE	RANGE
AWRI wire rope isolators	Primary isolation, rows C, R and S	Families 16 to 318, Ø1.6–31.8 mm rope
ACWRI compact isolators	Second stage: racks, PCs and instruments inside an isolated shelter	AC12 to AC48
AWRI special builds	Custom loop count, extra-soft or clamped split-bar designs for a tighter g target	Against drawing, e.g. AWR318-S
Elastomer end-stops and snubbers	Fore-aft and lateral stops, base snubbers (AES)	Bracket-mounted NR/PU; Radiaflex cylindrical mounts for light cargo
Industrial shock absorbers	Hydraulic end-stops for precision cargo (AHS)	Heavy-duty adjustable and self-compensating series
Hydraulic buffers	End-stops for very heavy skids and rail-road transfer	CraneBuffer range
Rubber anti-vibration mounts	Secondary isolation of fans, pumps and small equipment on the cargo	Moulded rubber mount families
Interface frames	Lower rails, upper cargo frames, ISO-corner kits with castings	Fabricated against the selection (option F)

08 · HOW THE SOLUTION IS STRUCTURED

One code describes the whole package



Example: **CR-08-V-R3-EF** — 8 t cargo on 45° V-pairs, rural/ghat roads, elastomer end-stops, frames supplied.

Level 1 · Solution

CargoRide package, defined by code. Comes with the selection report and the installation drawing.

Level 2 · Assemblies

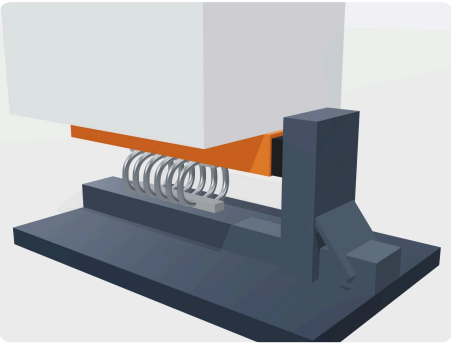
- Isolator set (AWRI, quantity and load line)
- Lower rail set or ISO-corner interface frame
- Upper cargo frame
- End-stop set, snubber set, top stabiliser set
- Safety restraint set

Level 3 · Catalogue parts

- AWRI / ACWRI isolators
- AES elastomer stops, AHS hydraulic stops
- ATS stabiliser isolators
- Fasteners grade 10.9, shims, twist-locks

Level 4 · Engineering service

- Selection report to customer standard
- First-article stiffness test, revised prediction
- Installation supervision, gap setting
- Optional road trial with accelerometers



What the customer sends, and what comes back

CUSTOMER SENDS	ADONI TECH RETURNS
Mass, footprint, CG (three coordinates), support points	Package code, isolator model and quantity, arrangement
Route or road class, any specified shock or vibration standard	Selection report: static, vibration, shock, braking, tipping
Fragility limit (g) and lowest structural mode of the cargo	Installation drawing with gaps, torques and stop positions
Trailer type, deck interface, container or not	Quotation, delivery, test certificate

09 · SIZING EXAMPLE, STEP BY STEP

7.5 t radar shelter to a hill site

Given. Shelter on its own skid, $M = 7\,500\text{ kg}$, isolator track $L \times B = 4.6 \times 2.3\text{ m}$, CG 1.35 m above the isolator plane, CG offset 150 mm forward and 80 mm sideways. Route over ghat roads to site: class R3, 8 g / 15 ms. Electronics fragility 3 g. Lowest structural mode of the shelter 30 Hz.

1 Arrangement

$h_{CG} = 1.35\text{ m} > B/2 = 1.15\text{ m}$, so the cargo is tall for its base. Rigid tipping threshold $a_{tip} = 1.15 / 1.35 = \mathbf{0.85\text{ g}}$, above the 0.7 g check but not by much. Choose **V**, 45° pairs.

3 Isolator

AWRI 318-40, row R: 17.37 kN rated. Worst-corner utilisation $10.48 / 17.37 = \mathbf{60\%}$, under the 80 % limit.

5 Shock

On K_s : $f_s = (1/2\pi) \cdot \sqrt{(8 \times 529\,000 / 7\,500)} = 3.78\text{ Hz}$. Half-sine 8 g / 15 ms solved as a damped single-degree system ($\zeta 0.15$): **1.53 g** on the cargo, under 3 g. Deflection 25 mm average, 29 mm at the worst corner, of 137.2 mm.

7 Rocking

Moment at 0.7 g: $0.7 \times 73.6 \times 1.35 = 69.5\text{ kNm}$. Roll stiffness $N \cdot K_s \cdot (B/2)^2 = 8 \times 529\,000 \times 1.15^2 = 5.60\text{ MNm/rad}$. Roll = **0.71°**, 34 mm sway at the roof. Light-side isolators stay in compression (1.6 kN each).

2 Worst-corner load

$f = (1 + e_L/a)(1 + e_T/b) = (1 + 0.15/2.3)(1 + 0.08/1.15) = \mathbf{1.139}$. Weight $W = 7\,500 \times 9.81 = 73.6\text{ kN}$. Try $N = 8$: nominal 9.20 kN, worst **10.48 kN** per isolator.

4 Vibration

$f_n = (1/2\pi) \cdot \sqrt{(N \cdot K_v / M)} = (1/2\pi) \cdot \sqrt{(8 \times 2\,158\,000 / 7\,500)} = \mathbf{7.64\text{ Hz}}$, inside 5–10 Hz. At the 30 Hz shelter mode, $T = 0.107$: **89 % attenuation**.

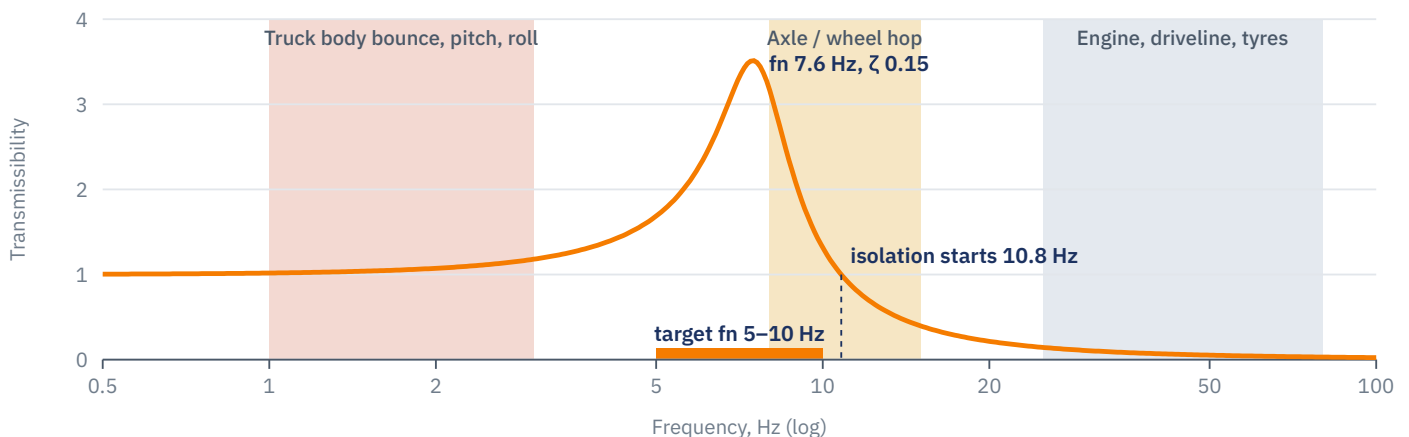
6 Braking and end-stops

Row R horizontal $K_s = 529\text{ N/mm}$. $\delta_{0.8\text{ g}} = 0.8 \times 73\,575 / (8 \times 529) = \mathbf{13.9\text{ mm}}$. $\delta_{0.5\text{ g}} = 8.7\text{ mm}$, gap = $1.25 \times 8.7 = \mathbf{10.9\text{ mm}}$. $F_{stop} = 73.6 - 8 \times 0.529 \times 10.9 = 27.6\text{ kN}$ on two stops, $\times 1.5 \rightarrow 21\text{ kN}$ each: AES-40.

8 Why not compression?

8 × AWRI 286-60 in compression passes the vertical checks (59 %, 7.3 Hz, 1.66 g) but its horizontal frequency is **3.2 Hz**, inside the truck's body-roll band, and braking travel is 24 mm. A tall shelter would sway. Rejected.

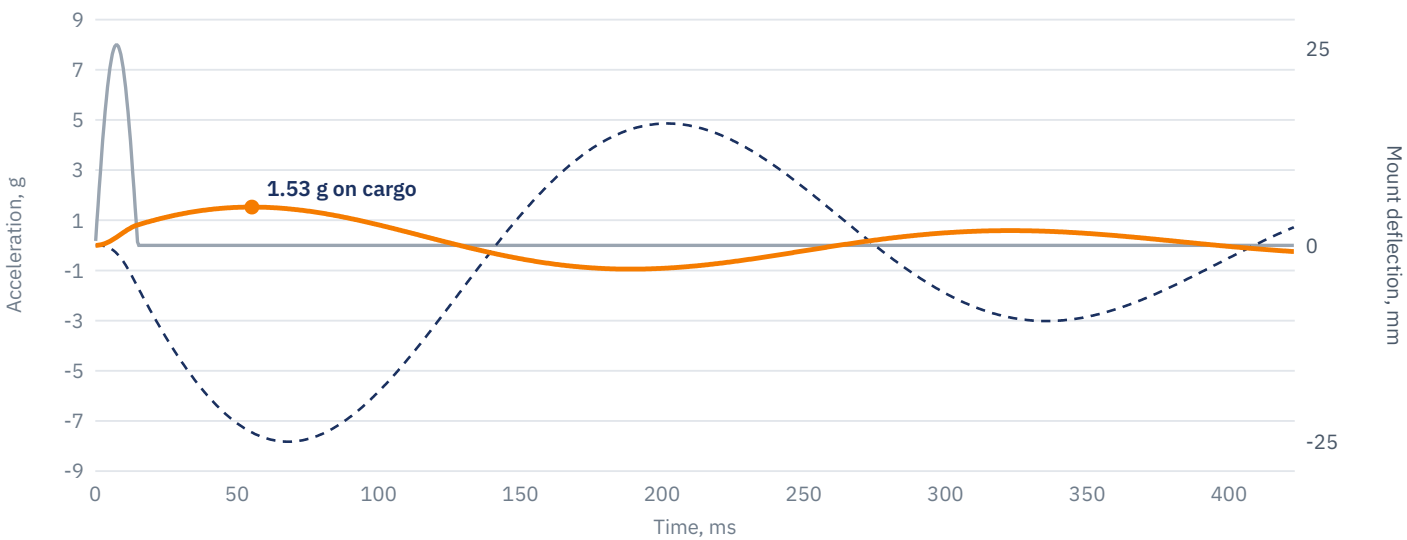
Vibration check, step 4. The selected mount against the truck's excitation bands; the shelter's own 30 Hz mode sits deep in the isolation region.



Selection: CR-08-V-R3-EF · 8 × AWRI 318-40 at 45° in four opposed pairs · AES-40 end-stops at 11 mm gap · frames supplied.

[Open this example in the online selector →](#)

Shock check, step 5. 8 g / 15 ms half-sine at the deck (grey), response of the shelter (orange) and mount deflection (dashed, right scale).



The mount stretches the 15 ms deck pulse into a slow 132 ms swing: the cargo sees 1.53 g instead of 8 g. The cost is travel, 25 mm here, which is why stroke and end-stop gaps are checked together.

Results at a glance

CHECK	LIMIT	RESULT	STATUS
Static, worst corner, row R	≤ 80 %	60 %	Pass
Natural frequency, vertical and lateral	5 – 10 Hz	7.64 Hz	Pass
Attenuation at the 30 Hz shelter mode	≥ 80 %	89 %	Pass
Shock on cargo, R3 8 g / 15 ms	≤ 3.0 g	1.53 g	Pass
Shock stroke at worst corner	≤ 70 % of 137.2 mm	29 mm, 21 %	Pass
Braking travel, 0.8 g, before stops	< gap at 0.5 g	13.9 mm; stop at 10.9 mm	Stops fitted
Tipping, 0.7 g side	no uplift	1.6 kN residual	Pass

The procedure on one line

Arrangement from the CG → worst-corner load → isolator and quantity from the row rating → fn on K_v → shock on K_s → braking and gaps → rocking → report.

Do it in a minute

The CargoRide selection tool runs the same eight steps for any mass, footprint, CG and road, ranks every AWRI model that passes, and writes the summary for the report.

SELECTION REPORT · SAMPLE

CargoRide selection report

Report no.	AT-CR-SR-2026-001 Rev.0
Date	06 Oct 2026
Customer	Sample customer (illustration)
Equipment	7.5 t radar-electronics shelter on skid
Package	CR-08-V-R3-EF

1 · Inputs

SYMBOL	QUANTITY	VALUE	SOURCE
M	Isolated mass	7 500 kg	customer
L × B	Isolator track, along × across travel	4.6 × 2.3 m	customer drawing
h _{CG} ; e _L , e _T	CG height; offsets	1.35 m; 150 / 80 mm	customer
—	Road shock	class R3, 8 g / 15 ms half-sine	route survey
G _{lim}	Fragility, all axes	3.0 g	customer
f _{eq}	Lowest structural mode	30 Hz	customer
ζ	Damping ratio	0.15	AWRI wire rope
a	Quasi-static road loads	0.8 / 0.5 / 0.5 g; 0.7 g tipping	catalogue p. 2

2 · Selection

8 × **AWRI 318-40** in 45° compression/roll, four opposed pairs on two rails, upper frame to the skid, AES-40 elastomer end-stops fore and aft at 11 mm, lateral snubbers at 11 mm, slack safety chains at four corners.

LOAD LINE	MAX STATIC, KN	MAX DEFL., MM	K _V , N/MM	K _S , N/MM
45° compression/roll, as installed	17.37	137.2	2158	529

3 · Static loads

Corner factor $(1 + e_L/a)(1 + e_T/b) = 1.139$. Nominal 9.20 kN, worst 10.48 kN per isolator: 53 % to 60 % of rating, Static sag 4.3 mm on K_v.

4 · Vibration

f_n = 7.64 Hz on K_v, vertical and lateral. Isolation starts at 10.8 Hz. Transmissibility at the 30 Hz mode 0.107 (89 % attenuation); frequency ratio 3.9, above the minimum of 3.

5 · Shock

ROAD	INPUT	F _S ON K _S	ON CARGO	LIMIT	TRAVEL, WORST CORNER	RESULT
R1	3 g · 20 ms	3.78 Hz	0.76 g	3 g	14 / 137 mm	Pass
R2	5 g · 15 ms	3.78 Hz	0.95 g	3 g	18 / 137 mm	Pass
R3	8 g · 15 ms	3.78 Hz	1.53 g	3 g	29 / 137 mm	Pass

6 · Braking, acceleration and end-stops

Horizontal secant rate $8 \times 529 = 4\,232$ N/mm. Travel at 0.5 g 8.7 mm, at 0.8 g 13.9 mm. Stop gap 10.9 mm (1.25×0.5 g travel). Emergency 1.0 g: stops carry 27.6 kN, 13.8 kN per face stop, rated $\times 1.5 \rightarrow$ AES-40. Rearward 0.5 g stays inside the gap.

7 · Rocking and tipping

Rigid threshold $(B/2)/h_{CG} = 0.85$ g. At 0.7 g side: roll 0.71° , roof sway 34 mm, light-side isolators keep 1.6 kN compression. No uplift; twist-locks and retainer bolts are not in tension.

8 · Compliance summary

REQUIREMENT	AS SELECTED	STATUS
Static capacity, worst corner	60 % of 17.37 kN	Pass
Decoupling from 30 Hz mode	ratio 3.9, 89 % attenuation	Pass
Shock ≤ 3 g at R3	1.53 g	Pass
Travel within stroke	29 of 137.2 mm (21 %)	Pass
Braking travel controlled	stops at 10.9 mm	Pass
Tipping at 0.7 g	no uplift	Pass

9 · Open items and installation notes

1. Confirm CG by weighing at four points before the frame is drilled.
2. Set stop gaps with shims after the cargo is lowered, isolators loaded.
3. Torque retainer-bar fasteners to the data-sheet value; recheck after the first 100 km.
4. First-article static stiffness test on one isolator; the prediction above will be revised to the measured rate.

Note. Stiffness and performance values are catalogue values and vary with installation, load direction and environment. The first measured stiffness of the production lot will be reported and this selection revised on it. For high-value cargo Adoni Tech recommends a test-piece order before bulk production. Adoni Tech accepts no liability for deviations arising from unvalidated field conditions.

	NAME	SIGNATURE	DATE
Prepared	P. Adavani		06-10-2026
Checked			
Approved	P. Adavani		06-10-2026

10 · APPLICATION DATA SHEET

Send us these, we send a selection

CARGO

Description

Mass to be isolated, kg

Footprint L × B, mm, and support points

CG: height above base, offset along and across, mm

Fragility limit, g (all axes, or per axis)

Lowest structural mode, Hz

TRANSPORT

Vehicle: flatbed, low-bed, 20/40 ft container, other

Arrangement preferred: C · V · I · K · S, or let us choose

Route / road class: R1 · R2 · R3 · specified standard

Specified shock (g, ms, shape) or vibration profile

Height budget for the isolator layer, mm

Number of moves, temperature, salt or dust exposure

CONTACT

Company, name, phone, e-mail



Or do it online in two minutes

Key in your cargo and route at **impactcal.adonitech.co/cargoride.html**. The selector sizes the package, shows the checks, and sends the request for quotation straight to our engineers.

[Open the CargoRide selector →](#)