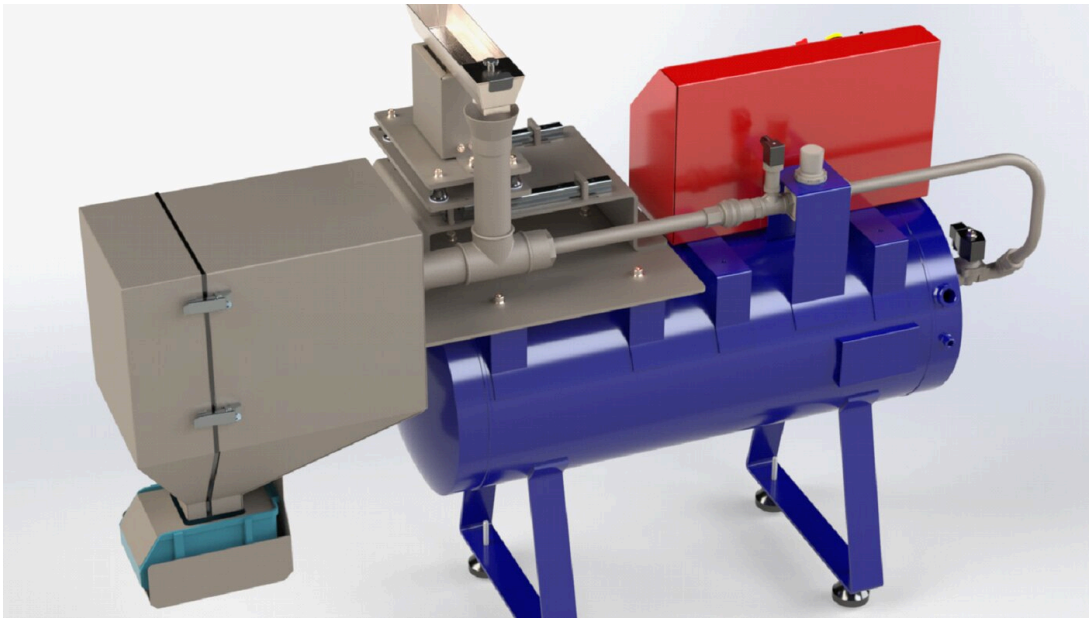
STONE IMPACT / CHIP RESISTANCE TESTING

Gravelometer EQNA GR ASTM-SAE

Interchangeable modular gravelometer



The Gravelometer EQNA GR ASTM-SAE measures how well paints and coatings resist chipping. Compressed air throws a standard abrasive at a test panel to reproduce the stone impacts that automotive bodies take on the road.

The equipment is built to the construction and test requirements of the international and national standards for stone impact testing, and to the methods derived from them.

STANDARDS

ASTM D3170	Chipping resistance of coatings
SAE J400	Chip resistance of surface coatings

Other standards on request

90 L	**70 psi**	**Adjustable**	**Modular**
Compressed air tank, hydrostatically tested	Adjustable via pressure regulating valve and gauge (4.8 bar)	Target angle inside the impact chamber	Test module with quick couplings

How the test works per ASTM D3170 / SAE J400

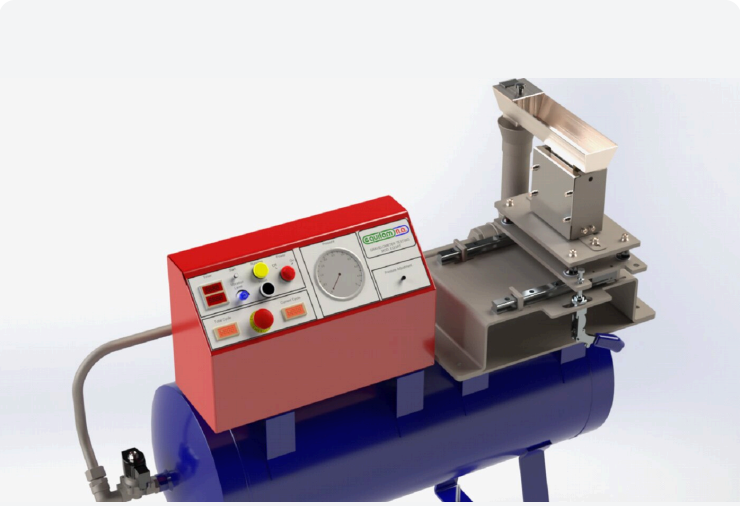
01	02	03	04
Condition	**Feed**	**Impact**	**Rate**
Coated panels, typically 4 × 12 in (102 × 305 mm), are tested at room temperature or at −29 ±3 °C (−20 ±5 °F).	The vibratory feeder meters graded gravel into the air stream: 1 pint in 7 to 10 s.	A controlled air blast at 70 ±3 psi throws the gravel at the panel held in the impact chamber.	Tape removes loose chips, and the degree of chipping is rated against the SAE chipping rating standards.

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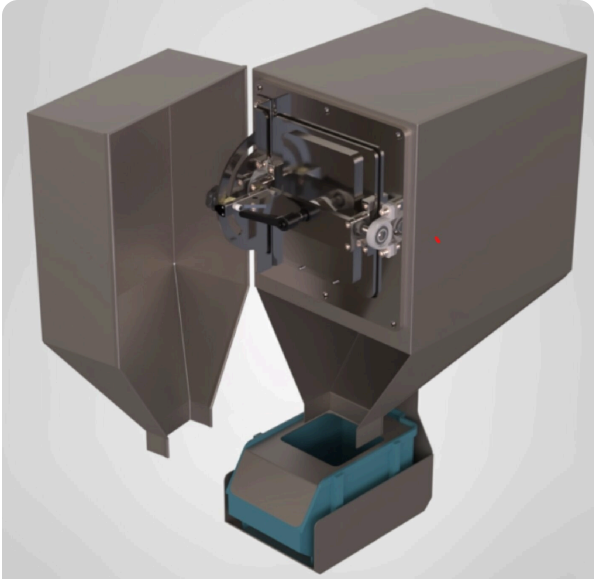
NEW DESIGN

Modular and interchangeable

The test module (feeder, accelerating pipe and impact chamber) attaches to the base unit (air tank, control panel and piping) with quick couplings. The same base can therefore be fitted with another test module.



Control panel and vibration level control. Digital timers, emergency stop and a vibration-controlled abrasive feeder sit on the 90-liter compressed air tank.



Impact chamber with adjustable-angle target. Hinged access door and a removable drawer that collects the abrasive.

Adjustable-angle target

The panel holder angle can be adjusted inside the impact chamber.

Vibration level control

The feeder's vibration intensity controls the abrasive flow required by the standards.

Stable air supply

The 90-liter tank holds the pressure and air flow needed throughout the test.

Adjustable pressure

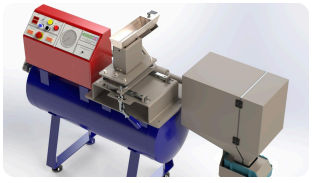
The 70 psi test pressure is adjusted through the pressure regulating valve and read on the certified pressure gauge.

Abrasive life tracking

A current-cycle counter shows when the abrasive should be replaced.

Operator safety

Automatic interlock on the sample position and abrasive drawer, with LED indication.



Changing the test module in five steps

1. Remove the target.
2. Remove the module.
   Quick coupling
3. Connect the new module.
   Quick coupling
4. Position the feed system.
   Quick clamp
5. Position the target.

Interchangeable with the EQNA DIN / EN / ISO / VDA gravelometer module (consult us).

STANDARD EQUIPMENT

Technical specifications

UTILITIES REQUIRED	
Compressed air supply	116 psi (8 bar), 1" piping
Power supply	208 Vac ±10%, 50/60 Hz
TEST PERFORMANCE	
Test pressure	70 psi (4.8 bar), adjustable through the pressure regulating valve and pressure gauge
Air flow	58 L/s (approx. 123 cfm)
Working speed	800 m/s
CONSTRUCTION	
Structure	Steel, finished with high-strength epoxy paint
Compressed air tank	90 liters, high capacity to hold pressure and air flow during the test; pressure vessel built to the ASME Code; hydrostatic test certificate
Pressure gauge	Reads in bar, kgf/cm² and psi; supplied with certificate
Mobility	Polymer casters for easy moving
Test module	Interchangeable, with quick couplings; impact chamber with adjustable-angle target
CONTROLS	
Test timer	Digital timer for the test time specified in the standard
Cycle counters	Digital counter of the current cycle, to track abrasive life; digital counter of the total cycles run by the equipment
Abrasive feed	Abrasive inlet with adjustable vibration intensity for flow control, as the standards require
"Pulse-Stop"	Prevents vibration during the test
Cleaning	Post-test cleaning system with adjusted pressure
SAFETY AND ELECTRICAL	
Emergency stop	Emergency stop button
Operator protection	Automatic safety interlock with LED indicator for the sample position and the abrasive collection drawer
Electrical components	UL / CE listed
Panel construction	Built to UL 508A / CE (certificate not included; consult us)

Specifications may change without notice.

AFTER THE TEST

Rating and final report per SAE J400

01
Recover the panel
Remove the panel. Cold-tested panels return to room temperature and are wiped dry.

02
Remove loose paint
Apply filament tape and pull it straight up. Repeat in the opposite direction until no loose paint remains.

03
Select the area
Evaluate the 4 × 4 in (10.16 × 10.16 cm) square at the center of the chip pattern.

04
Rate and report
Rate the chipping with Method I or Method II, then issue the report.

Two rating methods

Method I – Exact count
REFEREE METHOD

A transparent grid of 1 in (2.54 cm) squares is placed over the area. All 16 squares are inspected, and each chip is counted and sized. Most precise; used when laboratories disagree.

Method II – Visual comparison
ROUTINE USE

The panel is compared with the SAE Chipping Rating Standards (EA-400, available from SAE International). Standards are overlaid until the combination best matches the panel. Faster; suits routine work and field surveys.

How the rating code is built

Number of chips in the 4 × 4 in area → rating number

RATING	10	9	8	7	6	5	4	3	2	1	0
CHIPS	0	1	2–4	5–9	10–24	25–49	50–74	75–99	100–149	150–250	>250

Chip size

LETTER	SIZE*
A	< 1 mm (< 0.03")
B	1 to < 3 mm (0.03 – 0.12")
C	3 to < 6 mm (0.12 – 0.25")
D	≥ 6 mm (> 0.25")

* Size = (max. diameter + min. diameter) ÷ 2

Point of failure (optional)

CODE	FAILURE LEVEL	TYPE
S/P	Substrate to primer	Adhesive
S/T	Substrate to topcoat	Adhesive
P	Primer	Cohesive
P/T	Primer to topcoat	Adhesive
T	Topcoat	Cohesive

Example
A panel shows 55 chips of size B, 15 of size A and 6 of size C, with failure in the topcoat. Sizes are listed from most to least numerous. Condensed: 76 chips in total give rating 3.

FULL RATING
4B-6A-7C (T)

CONDENSED
3 BAC (T)

Comparing results
- Three replicate panels per system are recommended.
- Rate every panel in the same way and compare the codes: a higher number means less chipping.
- Results that differ by more than one number-letter rating should be treated as suspect.

What the final report includes
- Number-letter rating of each panel
- Any test condition that deviated from the standard (pressure, temperature, media, angle)
- Panel material, thickness and surface pretreatment
- Coating type(s) and baking or processing schedule
- Film thickness of the coating system

Summary of SAE J400 (AUG2022) for reference only. Always follow the current edition of the standard and the agreement between the contractual parties.

SAE J400 RATING · AT A GLANCE

Comparing chip sizes A, B, C and D (for example)

The letter tells how big the chips are; the number tells how many there are. The strips show each size at actual scale (100% print).

A Under 1 mm
under 0.03"

Area per chip: **≈ 0.2 mm²**

Pinpoint chips, hard to see without close inspection.

B 1 to under 3 mm
0.03 – 0.12"



Area per chip: **≈ 3 mm²**

Small chips, clearly visible at normal viewing distance.

C 3 to under 6 mm
0.12 – 0.25"



Area per chip: **≈ 16 mm²**

Medium chips; the damage is evident on the panel.

D 6 mm and over
over 0.25"

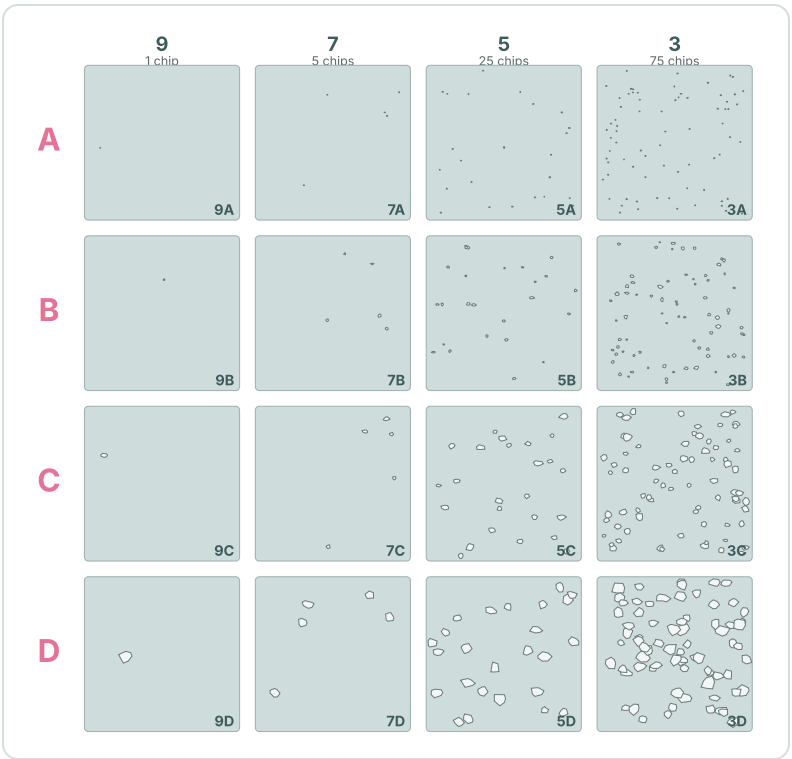


Area per chip: **≥ 28 mm²**

Large chips; the most severe size category.

Area per chip estimated as a circle at the typical size of each class (A ≈ 0.5 mm, B ≈ 2 mm, C ≈ 4.5 mm, D ≥ 6 mm). One C chip damages about 5 times the area of a B chip, and about 80 times the area of an A chip.

Size × number: how severity grows



- Each square is the 4 × 4 in evaluation area, drawn to scale.
- **Down the rows**, the chips get bigger (A → D).
- **Across the columns**, there are more chips (rating 9 → 3), using the lowest count of each rating.
- The same number does not mean the same damage: **5A** and **5D** both have 25 chips, but 5D removes far more coating.
- Always report the letter with the number. Two panels rated 5 can be very different.

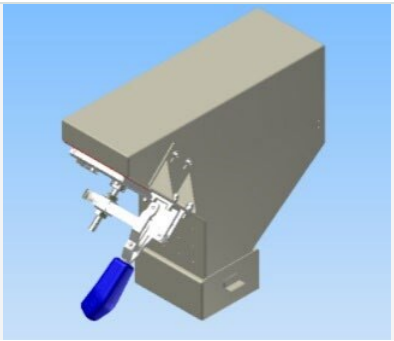
Reading the code

RATING	MEANS
6A	10–24 chips under 1 mm
6C	10–24 chips of 3–6 mm
4B	50–74 chips of 1–3 mm
3 BAC	75–99 chips in total, mostly B, then A, then C

Schematic illustration for explanation only. It is not a rating standard: rate panels with the SAE Chipping Rating Standards (EA-400) or by exact count (Method I).

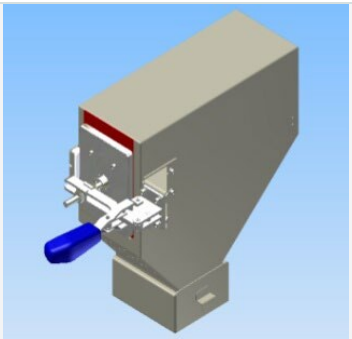
OPTIONAL ACCESSORIES

Impact chambers and accessories



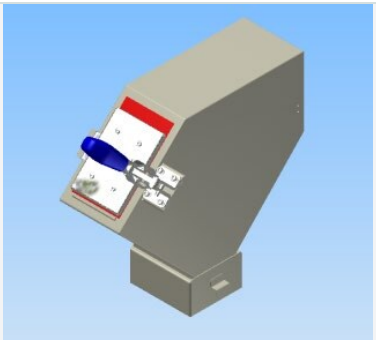
EQOP.0057

Impact chamber 45°



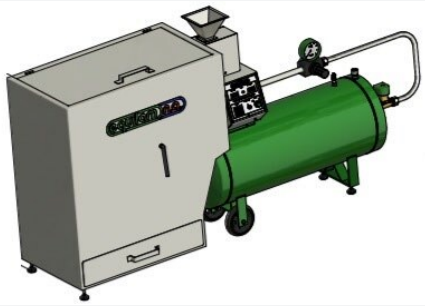
EQOP.0058

Impact chamber 90°



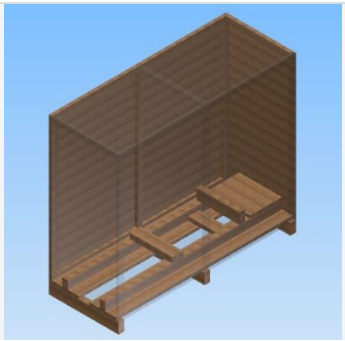
EQOP.0059

Impact chamber 135°



EQOP.0061

Impact chamber 3D



EQOP.0033

Export packing

Wooden crate with pallet

EQOP.0009

Compressed air line filter

Filter for the compressed air supply line

Certificates

EQOP.0166 **Pressure gauge certificate**

For the pressure control gauge.

EQOP.0167 **Air tank certificate**

Compressed air tank certified to ASME Code, Section VIII.

CONSUMABLES

Test abrasives

Graded media for ASTM, SAE and other stone impact methods. Each pack is supplied with a traceable certificate.



EQOP.0081

Chilled iron grit

3.55 – 4.50 mm (0.14" – 0.18")
Pack: 1.1 kg (2.42 lb)



EQOP.0082

Water-worn river gravel

9.5 – 15.9 mm (0.37" – 0.62")
Pack: 1.5 kg (3.31 lb)



EQOP.0083

Crushed granite

2.5 – 5.0 mm (0.10" – 0.20")
Pack: 1.5 kg (3.31 lb)



EQOP.0084

Crushed granite

5.0 – 13.0 mm (0.20" – 0.51")
Pack: 1.5 kg (3.31 lb)



EQOP.0085

Cast steel shot

1.7 – 2.8 mm (0.07" – 0.11")
Pack: 1.1 kg (2.42 lb)



EQOP.0163

Crushed basalt

2.4 – 4.8 mm (0.094" – 0.189")
Pack: 1.5 kg (3.31 lb)



EQOP.0168

Crushed basalt

4.8 – 8.0 mm (0.189" – 0.315")
Pack: 1.5 kg (3.31 lb)

Other media

Abrasives for other standards and customer specifications are available on request.

Note: For special projectiles, please contact us.

OPTIONAL SYSTEMS

Low-temperature testing

A cooling system (MAP) with a full enclosure around the gravelometer, with access doors for operation. Includes EQOP.0176 (cold-room upgrade). Voltage: 208–220 V, 3-phase, 60 Hz; other voltages on request.



EQOP.0157
down to −30 °C
±2 °C (−22 °F)

EQOP.0158
down to −20 °C
±2 °C (−4 °F)

DIMENSIONS (W × D × H)	MM	IN	WEIGHT
External, including MAP	2,750 × 2,200 × 1,820	108.3 × 86.6 × 71.7	–
Internal	2,190 × 965 × 1,385	86.2 × 38.0 × 54.5	–
Chamber – wooden crate	2,900 × 1,600 × 2,200	114.2 × 63.0 × 86.6	1,200 kg (2,646 lb)
MAP – wooden crate	1,900 × 1,200 × 2,300	74.8 × 47.2 × 90.6	800 kg (1,764 lb)

Dimensions are the same for both versions.

Cold-room installation

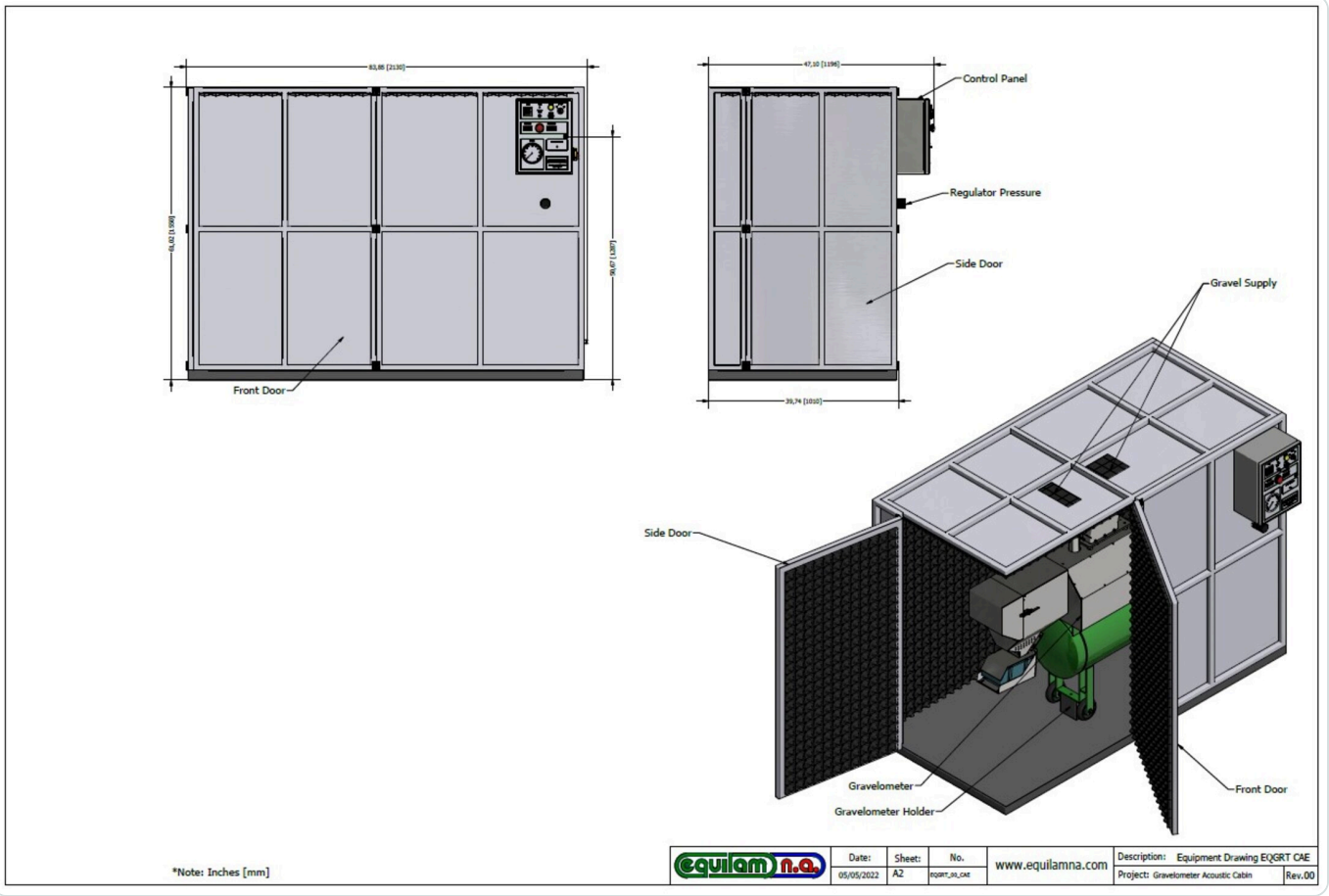
EQOP.0176
Cold-room upgrade
Lets the gravelometer work inside a cold room with up to 5 m (197") between the unit and the lab at room temperature. Contact us for details.

EQOP.0172
Acoustic cabinet
Noise below 85 dB at 1 m. See page 9 for the drawing and dimensions.

OPTIONAL ACCESSORY · EQOP.0172

Acoustic cabinet

Encloses the gravelometer to keep the noise level below 85 dB during the test, measured 1 m away at 90°. The test control panel is mounted on the outside of the cabinet.



Drawing dimensions in inches [mm].

Features

- Front and side doors lined with acoustic foam
- Gravel supply openings on the top panel
- External control panel and pressure regulator
- Internal holder that positions the gravelometer

DIMENSIONS (W × D × H)	MM	IN
External	2,130 × 1,196 × 1,287	83.9 × 47.1 × 50.7
Wooden crate	2,400 × 1,300 × 1,500	94.5 × 51.2 × 59.1
Gross weight	approx. 295 kg (650 lb)	

Request a quote

Ask us about other standards, voltages and custom configurations.

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