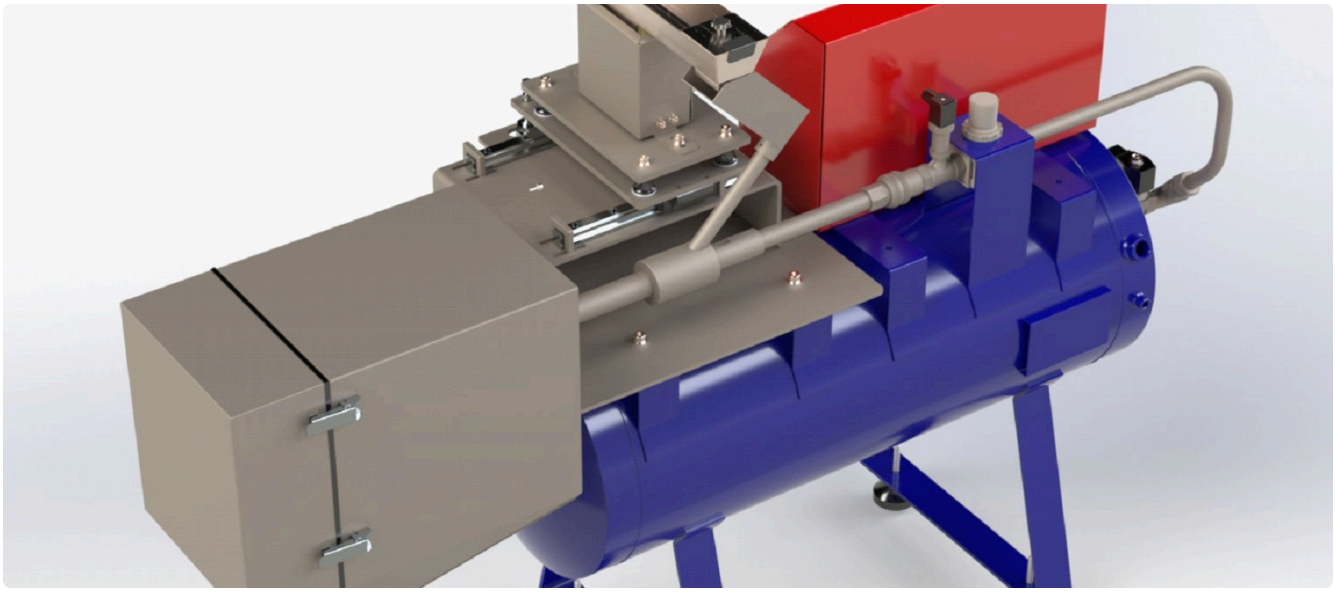
STONE IMPACT / MULTI-IMPACT TESTING

Gravelometer EQNA GR DIN-ISO-VDA

Impact stone chip tester



The Gravelometer EQNA GR DIN-ISO-VDA measures the stone-chip resistance of automotive finishes and other coatings. Compressed air projects chilled-iron grit at a coated test panel, reproducing the multiple small-stone impacts a vehicle body takes on the road.

The equipment is built to the apparatus and test requirements of ISO 20567-1 (multi-impact testing), the standard that took over the VDA 621-427 method, and of the methods derived from it.

STANDARDS

ISO 20567-1	Stone-chip resistance of coatings – multi-impact testing
VDA 621-427	Stone-chip test method (VDA)

Other standards on request

90 L	**1 / 2 bar**	**54°**	**500 g**
Pressure chamber, as specified in ISO 20567-1	Test pressure 100 or 200 kPa ±10 kPa, adjustable	Impact angle of the grit jet on the test panel	Chilled-iron grit projected in 10 ±2 s

How the test works per ISO 20567-1

01
Condition
Coated panels (min. 100 × 100 mm) are conditioned for at least 16 h at 23 ±2 °C and 50 ±5 % RH.

02
Feed
The vibrating conveyor meters 500 g of chilled-iron grit into the air blast in 10 ±2 s.

03
Impact
The air blast at 100 or 200 kPa throws the grit at the panel at 54°, over an 80 × 80 mm test area.

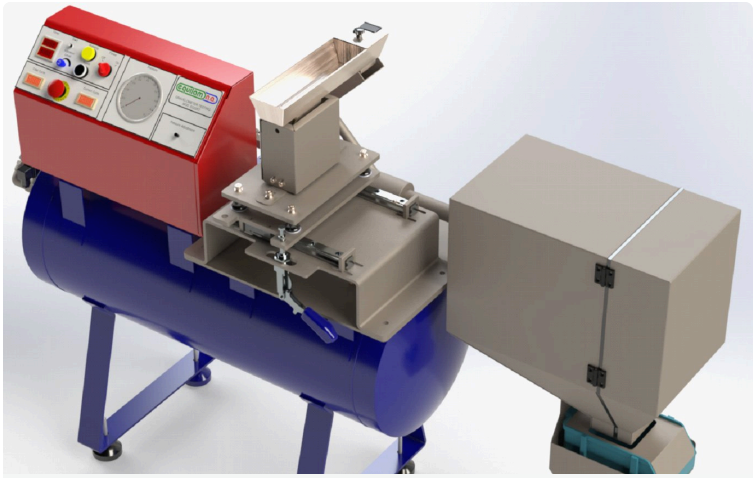
04
Rate
Loose paint is removed (brush, adhesive tape or compressed air) and the damage is rated from 0.5 to 5.0.

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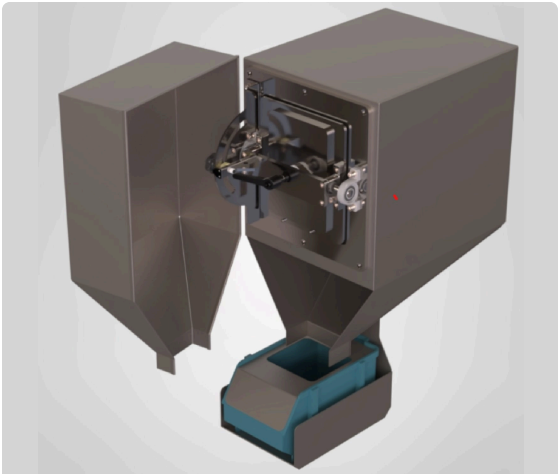
DESIGN

Built around the ISO 20567-1 test geometry

The base unit holds the 90-liter pressure chamber, the control panel and the air piping. The grit feeder, the gun and the impact chamber are sized to project the grit at the angle, distance and test area that the standard specifies.



Control panel and vibration level control. Digital timers, emergency stop and a vibration-controlled grit 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 grit.

54° impact angle

The panel holder sets the grit jet at 54° to the panel, at the distance the standard specifies.

Vibration level control

The feeder's vibration intensity is adjusted to project 500 g of grit in 10 ±2 s.

Stable air supply

The 90-liter tank holds the working pressure constant for the whole projection time.

Adjustable pressure

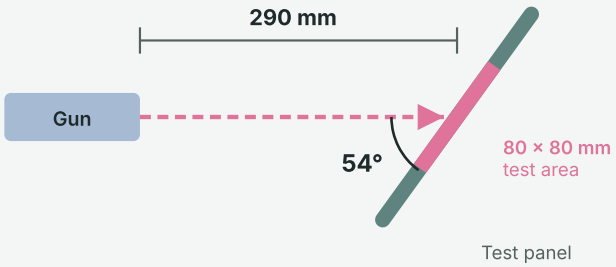
The 100 kPa or 200 kPa test pressure is set on the pressure regulating valve and read on the certified pressure gauge.

Grit life tracking

A current-cycle counter shows when the grit is due for replacement (max. 100 test runs per ISO 20567-1).

Operator safety

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



TEST GEOMETRY

Fixed by the standard

The grit jet hits the panel at **54°**, **290 mm** from the gun, over an **80 × 80 mm** test area. The gun is built to the dimensions of ISO 20567-1, so results compare with other labs using the same method.

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	100 kPa (1 bar, 14.5 psi) or 200 kPa (2 bar, 29 psi), ±10 kPa; adjustable through the pressure regulating valve
Grit projection	500 g of chilled-iron grit in 10 ±2 s
Impact angle	54° ±1° between the grit jet and the test panel
Distance	290 ±1 mm from the gun to the panel centre
Test area	80 × 80 mm window on the test panel (min. panel size 100 × 100 mm)
Gun	Dimensioned to ISO 20567-1
CONSTRUCTION	
Structure	Steel, finished with high-strength epoxy paint
Compressed air tank	90 liters, holds the 200 kPa working pressure constant for at least 10 s; pressure vessel built to the ASME Code; hydrostatic test certificate
Pressure gauge	Range up to 400 kPa (4 bar), 100 mm dial, accuracy class 1.0; supplied with certificate
Mobility	Polymer casters for easy moving
Impact chamber	Adjustable-angle target, hinged access door and removable grit collection drawer
CONTROLS	
Test timer	Digital timer for the projection time specified in the standard
Cycle counters	Digital counter of the current cycle, to track grit life; digital counter of the total cycles run by the equipment
Grit feed	Vibrating conveyor with adjustable vibration intensity for flow control
SAFETY AND ELECTRICAL	
Emergency stop	Emergency stop button
Operator protection	Automatic safety interlock with LED indicator for the sample position and the grit collection drawer
Electrical components	UL / CE listed

Specifications may change without notice.

TEST METHODS

ISO 20567-1 methods A, B and C

The equipment runs the three multi-impact methods of the standard. The method is agreed between the interested parties.

Method	Pressure	Mass of grit	Projection time	Use
A	100 ±10 kPa	2 × 500 g	2 × (10 ±2) s	Two projections at the lower pressure
B	200 ±10 kPa	2 × 500 g	2 × (10 ±2) s	Two projections at the higher pressure
C	200 ±10 kPa	1 × 500 g	10 ±2 s	Single projection, combined with a preliminary exposure (e.g. corrosion or weathering)

Grit load 500 g (+20 / −0 g); weigh after each run and top up to keep the mass at 500 g.

CONSUMABLES

Chilled-iron grit

Chilled-iron grit to ISO 11124-2, graded to the particle size distribution of ISO 20567-1:2017. Supplied as EQOP.0081 with a traceable certificate.

Sieve (mm)	Fraction
Retained on 5.00	Discarded
4.50	20 – 25 %
4.00	35 – 45 %
3.55	30 – 40 %
Passing 3.55	Discarded

100 g contains 300 ±25 particles. Replace the grit after a maximum of 100 test runs, never during a test series.

EVALUATION

Rating the damage

After loose paint is removed, the damaged 80 × 80 mm area is compared with the reference images of the standard and given a rating from 0.5 to 5.0:

Rating	Affected area	Rating	Affected area
0.5	0.2 %	3.0	19.2 %
1.0	1.0 %	3.5	29.0 %
1.5	2.5 %	4.0	43.8 %
2.0	5.5 %	4.5	58.3 %
2.5	10.7 %	5.0	81.3 %

Evaluation can be visual or by optical imaging per ISO 21227-2. Precision: repeatability r = 0.5, reproducibility R = 1.0 on the rating scale.

Calibration (ISO 20567-1, Annex B)

A calibration panel (carbon paper over white paper under a plastics film, on a steel or aluminium panel ≥ 1.25 mm) is hit with 500 ±5 g of fresh grit at 200 kPa in 10 ±2 s. The impact pattern is compared with the reference sheet each time to confirm the apparatus repeats.

Test conditions

Testing is done at room temperature, 18 °C to 28 °C, with no condensation on the panels before or during the test. Each new test series starts with a stopwatch check of the projection time.

EVALUATION

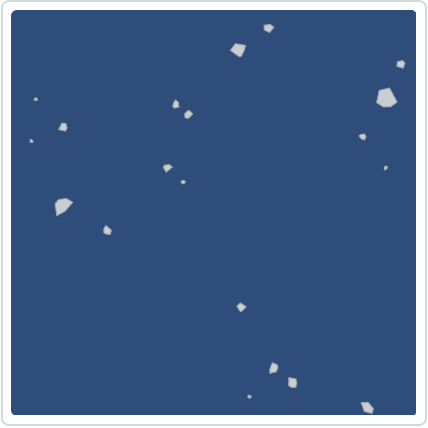
Evaluating the panel after the test

01
Remove loose paint
Press adhesive tape (120 – 150 mm) firmly over the test area and pull it off with a jerk at 60°. Brushing or compressed air may be agreed instead.

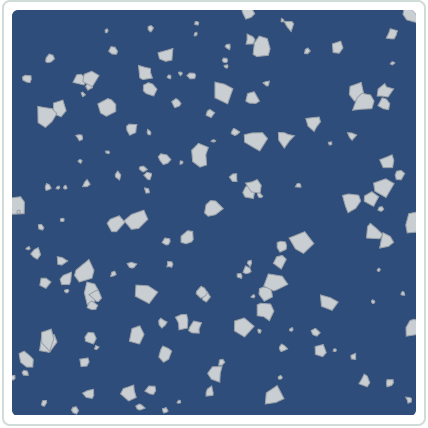
02
Compare
Place the 80 × 80 mm test area next to the ISO 20567-1 reference images under good light, or measure it by optical imaging (ISO 21227-2).

03
Rate
Give the rating of the closest reference image, from 0.5 to 5.0 in steps of 0.5. Intermediate values may be estimated.

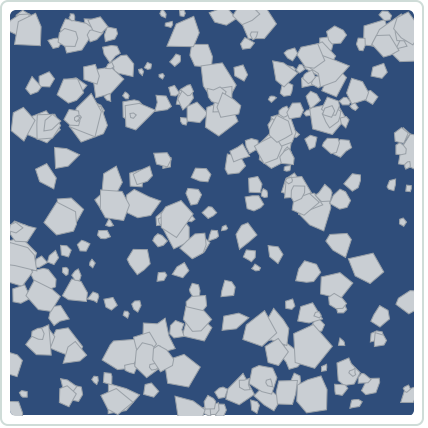
04
Locate the failure
Note the layers between which adhesion was lost, e.g. clearcoat / basecoat or primer / substrate. Marks without paint loss are not rated.



Rating 1.0 · about 1.0 % affected



Rating 2.5 · about 10.7 % affected



Rating 4.0 · about 43.8 % affected

Simulated panels for illustration only. Ratings must be given against the reference images of ISO 20567-1.

WORKED EXAMPLE

Method B on a 4-layer automotive finish

Test	Method B: 200 kPa, 2 × 500 g, 2 × 10 s
Loose paint removal	Adhesive tape, pulled at 60°
Damaged area measured	about 11 % of the test area
Closest reference	2.5 (10.7 %)
Failure location	Mainly between primer and basecoat
Result	**Rating 2.5, primer / basecoat**

TEST REPORT

What to record

- Product identification and reference to ISO 20567-1
- Substrate, coating method, number of layers and dry-film thickness
- Panel conditioning and any previous ageing
- Method used (A, B or C; for C, the exposure conditions)
- Ambient temperature during the test
- Grit details: manufacturer, trade name, batch and particle size
- Method used to remove loose paint
- Rating, failure location, deviations and anything unusual
- Date of test and name of the operator

OPTIONAL CONSUMABLES

Test projectiles

Graded projectiles (grit, shot and stone) for stone impact testing. Chilled-iron grit EQOP.0081 is the projectile specified by ISO 20567-1; the other projectiles cover customer and OEM test methods. Each pack is supplied with a traceable certificate.



ISO 20567-1

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 projectiles
Projectiles 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. For customer and OEM specifications that call for testing below room temperature.



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	Weight
External, incl. MAP	2,750 × 2,200 × 1,820	–
Internal	2,190 × 965 × 1,385	–
Chamber – wooden crate	2,900 × 1,600 × 2,200	1,200 kg
MAP – wooden crate	1,900 × 1,200 × 2,300	800 kg

Dimensions are the same for both versions.

EQOP.0176

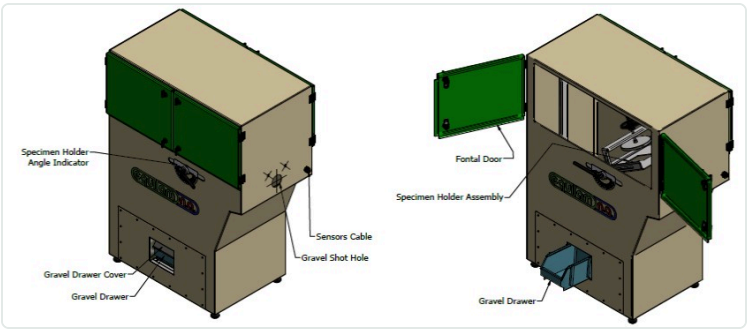
Cold-room upgrade

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.

OPTIONAL ACCESSORY · EQOP.0061

Impact chamber 3D with specimen holder

A larger impact chamber for testing three-dimensional parts and components instead of flat panels. The specimen holder assembly positions the part in the grit jet, and its angle indicator shows the impact angle.



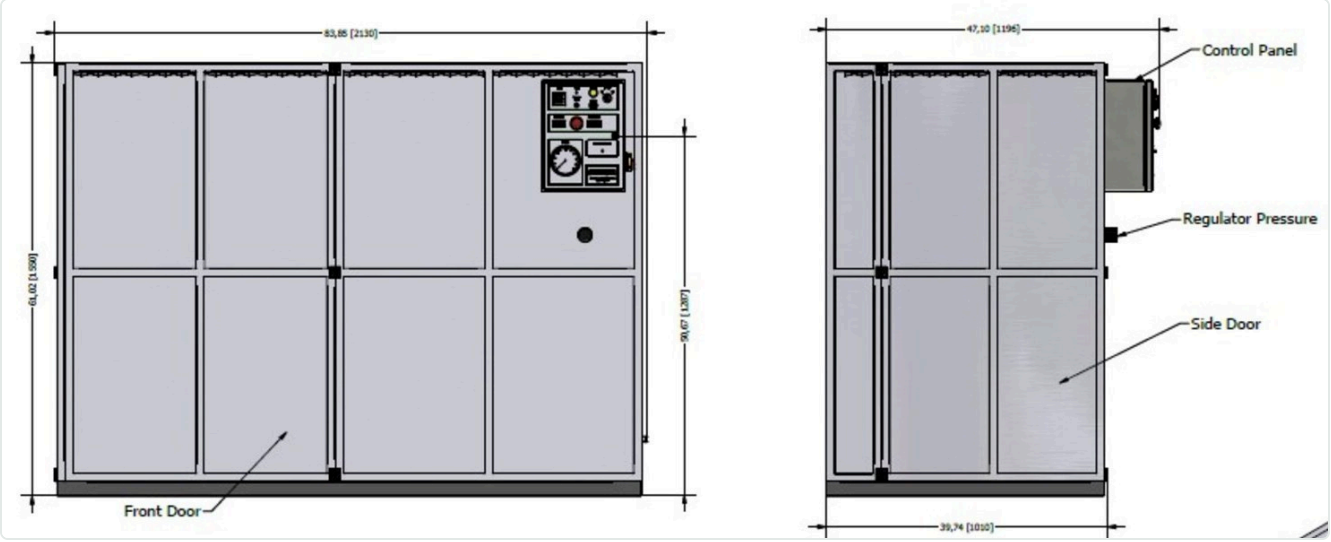
- Fits 3D specimens up to 300 × 300 × 300 mm (11.8 × 11.8 × 11.8 in)
- Specimen holder assembly with angle indicator
- Front door with door locks; access from two sides
- Removable drawer that collects the grit

Dimensions (W × D × H)	mm
Chamber	649 × 797 × 1,200
Max. specimen	300 × 300 × 300

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.



Front and side views. Dimensions in inches [mm].

Dimensions (W × D × H)	mm
External	2,130 × 1,196 × 1,287
Wooden crate	2,400 × 1,300 × 1,500
Gross weight	approx. 295 kg (650 lb)

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

Request a quote

Ask us about other standards, voltages and custom configurations.

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