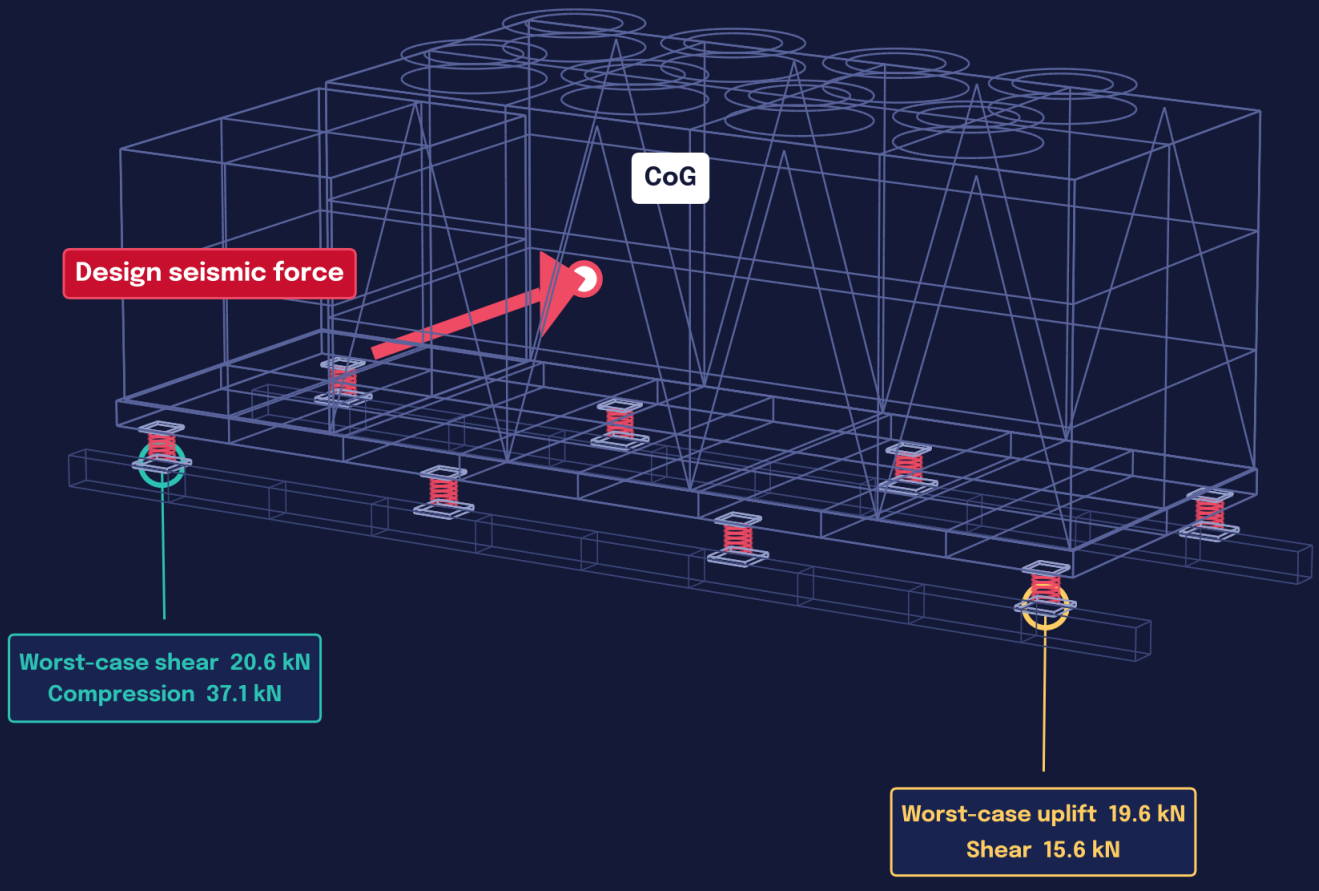
ACREFINE ENGINEERING

SAMPLE REPORT

SEISMIC CALCULATIONS FOR EQUIPMENT

Seismic Restraint of a Rooftop Chiller

A spring-isolated chiller, held in place for the design earthquake to ASCE/SEI 7-22 — results summary



Design seismic force at the centre of gravity, with the worst-case restraint forces in any direction

DOCUMENT	REVISION	DATE	STATUS
ACR-SAMPLE-SR-01	S1	30 October 2026	Summary edition

VERIFY THIS DOCUMENT

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The equipment, project and site in this report are fictitious. Not a design document; not to be relied on for any real installation.

Sample report — summary edition. The equipment, project and site are fictitious and all values are illustrative. This edition shows what an Acrefine seismic restraint assessment delivers; the calculations behind it are not reproduced. Not a design document and not to be relied on for any real installation.

AT A GLANCE

A 6.2-tonne chiller on spring isolators on a data centre roof was checked for the design earthquake. Without restraints it would tip over at well under half the design force. With them it holds with margin, provided their clearance stays within 6 mm.

119 kN	**39%**	**6** mm	**0.83**
Seismic design force About twice the chiller's weight	**Tips over unrestrained at** this share of the design force	**Maximum restraint clearance** The code limit for this design	**Governing utilisation** Restraint shear, heavy end

DOCUMENT CONTROL

Rev	Date	Description	Prepared	Checked	Approved
S1	30/10/2026	Sample issue — summary edition	[Engineer]	[Checker]	[Engineering Director]

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SAMPLE

01 The equipment and the question

What holds a spring-mounted chiller in place when the building shakes?

An air-cooled screw chiller sits on eight restrained spring isolators, on a steel supporting frame on the roof of a data centre. The springs keep its vibration out of the building, but in an earthquake they do nothing to hold it. The restraints around them must. The compressor end carries more than twice the load of the far end, which decides where the worst case sits.

6,200 kg	8	Roof	1,050 mm
Operating mass	Restrained spring isolators	Of a 15 m data centre	Centre of gravity above the rail

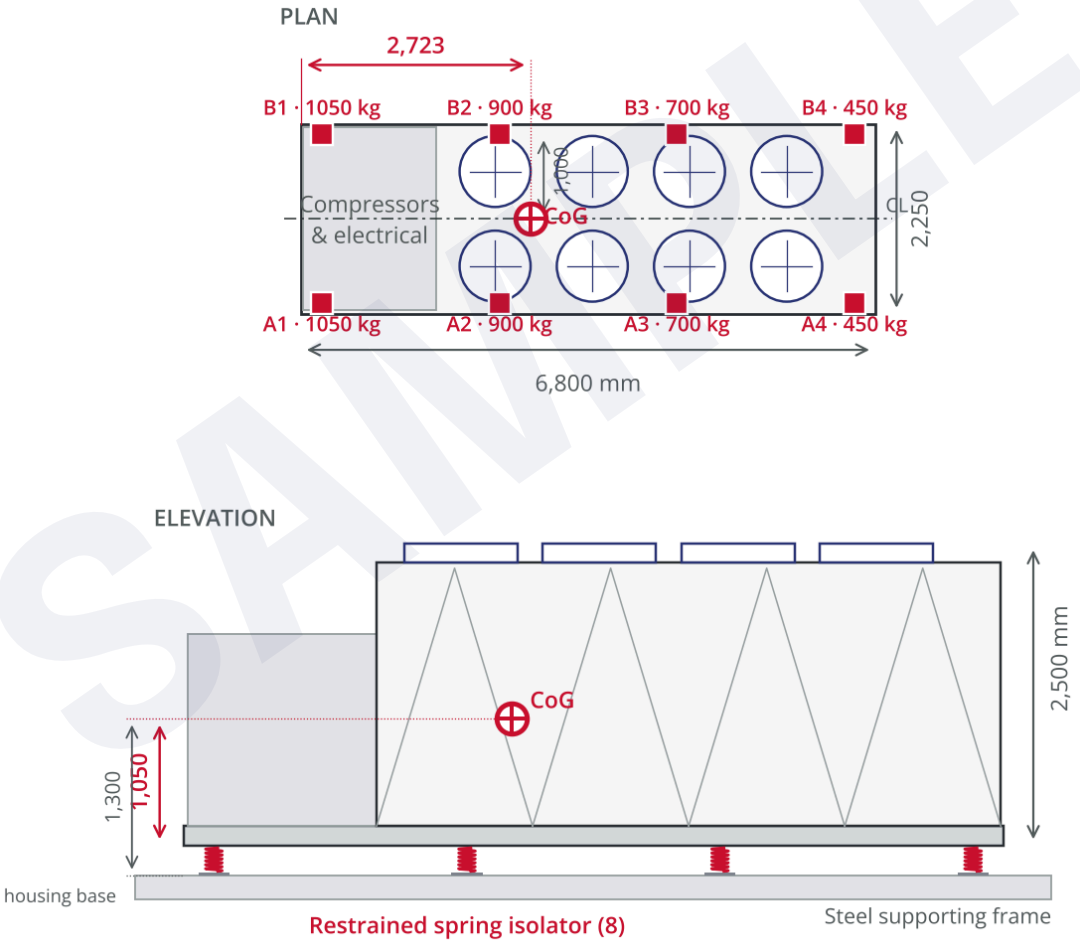


Figure 1 The chiller in plan and elevation, with the load at each of its eight mounting points. Fictitious equipment.

SAMPLE

02 How we assess it

Every Acrefine seismic restraint assessment follows the same six steps, from the equipment's loads to the bolts that hold each restraint, and ends in a clear verdict.

01
Equipment and loads
Mass, centre of gravity and the load at every mounting point

→

02
Seismic demand
Design force for the equipment, where it sits in the building

→

03
Overturning
Uplift, compression and shear at the worst-case isolator

→

04
Restraint checks
The worst-case restraint housing against its certified capacity

→

05
Connections
The bolts into the support steel and into the equipment frame

→

06
Verdict and fixes
Results summarised, with practical installation recommendations

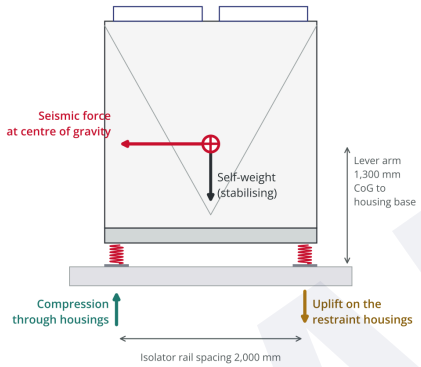


Figure 2 The seismic force at the centre of gravity lifts one rail and presses down on the other.

The design force acts at the chiller's centre of gravity, 1,050 mm above its base rail and higher still above the restraints. That lever arm turns a sideways force into uplift on one rail and extra compression on the other.

The calculation is made at the worst-case isolator for each action: uplift where the chiller is lightest, compression and shear where it is heaviest.

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03 What the analysis shows

The light end lifts most, because it has the least weight holding it down. The heavy end takes the most compression, more than its spring alone can carry, so the restraint housing carries the rest.

The heavy end also takes the most shear. The chiller's weight sits towards its compressors, so a sideways shake twists it as well as pushing it, and the restraints furthest from the centre resist that twist.

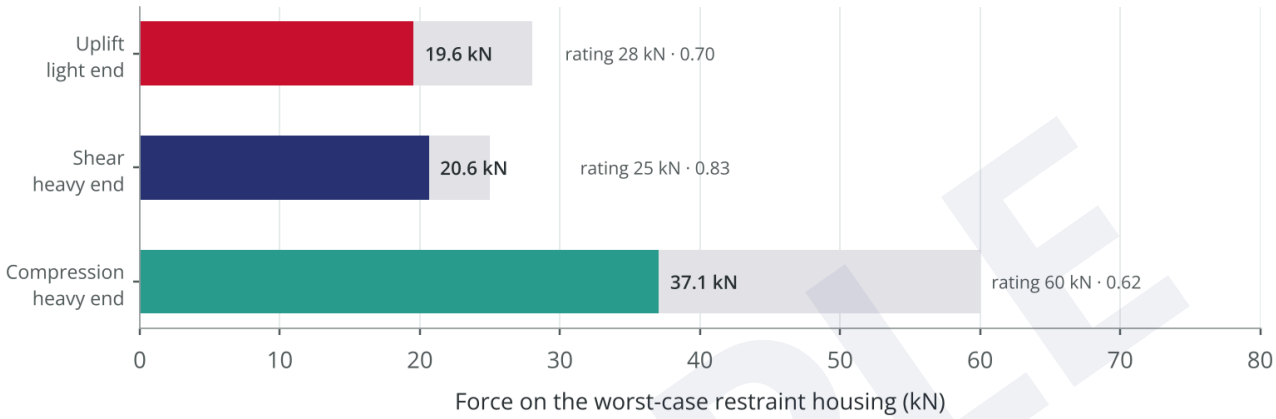


Figure 3 Design forces on the worst-case restraint housing for each action, against the housing ratings.

The worst-case housing stays within its ratings, the highest at 0.83 of its shear capacity. The bolts into the supporting frame and into the chiller's base rails have more margin still.

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04 Verdict and recommendations

The chiller is acceptable: resiliently mounted yet seismically restrained, provided the measures below are put in place.

Check	Result	Status
Restraint housings	0.83 utilisation, shear governs	PASS
Bolted connections	0.46 utilisation	PASS
Restraint clearance	To be set and recorded at commissioning	OPEN

01 Specify restraint housings by certified capacity in uplift, shear and compression, at the values the full report sets.

02 Set the restraint clearance up to 6 mm in every direction once the chiller is filled and running, with no contact in normal operation and the manufacturer's setting kept, and record it in the commissioning sheet.

03 Bolt each housing to the supporting frame and the chiller to each isolator as the full report details.

04 Check at commissioning that pipe and cable connections can take the restraint clearance without strain.

The full report goes further

A project assessment carries every step in full, signed by the preparing, checking and approving engineers:

- Seismic design force for the equipment and its location
- Overturning at the worst-case isolator
- Restraint housing and bolt checks
- Commissioning notes, with the calculation appendix

Wind loading on exposed equipment is assessed on request. Vibration isolation, including isolator selection, is a separate Acrefine assessment.

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Ask for the full sample, or tell us about your project. Every message is read by an engineer.