INFORMATION

NOISE AND VIBRATION IN FITNESS

everroll®

Regupol®

Regupol
(Australia) Pty. Ltd.

INFORMATION

Assessment of Flooring and Regenerated Noise & Vibration

This information has been prepared by Acoustic Dynamics Acoustical Consultancy Services. Acoustic Dynamics has become a leading acoustical consultancy, specialising in provision of advice for DA planning and application, gym fit out, and ongoing gym management and operation. Acoustic Dynamics is a reputable independent acoustical consultancy and they do not receive any inducements for recommending Regupol's products.

The past few years have seen:

- Significant increases in gym membership
- Significant changes in typical gym usage and activities undertaken
- Gyms now commonly occupy mixed occupancy buildings
- Authorities receive more noise and vibration complaints than ever before
- Land lords and building owners/managers seeking to evict gyms tenants
- More rigorous scrutiny of development applications (DAs) for gyms
- Significant increases in litigation between authorities and gym operators
- Significant increases in costs to gym operators arising from:
    - Additional planning and consultancy costs
    - Additional fit out costs
    - Litigation costs
    - Additional retrospective acoustic mitigation treatment costs

Acoustic Criteria

For each specific gym location, a detailed review of the relevant acoustic criteria is required.

This includes a review of the following:

- State Government legislation (Acts and Regulations)
- State Government regulatory authority criteria, policies and guidelines (eg. Department of Planning, EPA, Harbour Foreshore Authority requirements including State Environmental Planning Policies etc)
- Local Council requirements (eg. LEP, DCP, Exempt & Complying DCP, Standard Conditions of Development Consent etc)
- Relevant ISO, other International and Australian Standards
- Strata By Laws and requirements
- Professional Association guidelines
- Rental lease requirements

Regupol (Australia) Pty Ltd ABN 97 094 053 399
155 Smeaton Grange Road, SMEATON GRANGE NSW 2567
Phone: 02 4624 0050 Fax: 02 4647 4403
Email: sales@regupol.com.au Website: www.regupol.com.au

INFORMATION

Acoustic Disturbance From Gyms

Acoustic disturbances from gyms typically fall within the following categories:

1. **Vibration Transmission** - where vibration generated within the gym is transmitted throughout the building structure;
2. **Regenerated Noise** - where noise is produced within the adjacent areas of the building, resulting from the transmission of vibration throughout the building structure); and
3. **Airborne Noise Transmission** - where noise within the gym is transmitted through the floor/ceiling or wall partitions into the adjacent occupancies.

The dropping of free weights or other hard and/or heavy objects onto the floor are activities most likely to generate acoustic disturbance.

Pin and plate loaded equipment produces similar disturbances, of slightly lesser magnitude. Weight lifting platforms and associated dropping of loaded bars onto these platform, typically causes the highest level of acoustic disturbance from gyms.

Location Specific Critical Factors

The degree of acoustic disturbance may differ significantly from building to building, depending upon a number of variables.

These variables include:

- The applicable legislation, criteria, standards and guidelines
- Receivers type (residential, commercial (office), retail, medical etc)
- Whether the gym is located on a slab at ground or a suspended slab
- Whether the receiver is located on a slab at ground or a suspended slab
- Whether the receiver is above or below the gym
- The column spacing within the building
- The thickness of the slab
- Whether the slab is pre or post-tensioned concrete
- Whether a suspended ceiling is within the gym or receiver occupancy
- The type of activities undertaken within the gym
- The hours that the gym operates and the activities undertaken

The above list is not exhaustive, it merely demonstrates the importance of investigating each gym on a case-by-case basis to ensure the most appropriate and feasible acoustic solution is achieved.

"After testing the various flooring products of many materials suppliers throughout Australia, Regupol has continually provided the highest quality flooring products, services and solutions for our gym clients."

Richard Hayden
Managing Director

Acoustic Dynamics Pty Ltd
T: 02 9908 1270
www.acousticdynamics.com.au

Regupol (Australia) Pty Ltd ABN 97 094 053 399
155 Smeaton Grange Road, SMEATON GRANGE NSW 2567
Phone: 02 4624 0050 Fax: 02 4647 4403
Email: sales@regupol.com.au Website: www.regupol.com.au

INFORMATION

Regupol (Australia) Pty. Ltd.

Acoustic Results – Site 1 – Weight Dropped from 150mm

Table 1 – Measured Contributed Regenerated Noise Levels – Receiver Room – Free Weights

Floor Sample	Weight Dropped from 150mm [kg]	Measured Contributed Regenerated Noise Level (1-500Hz)[1] [dB]	AS 2107 L_{Aeq} Noise Level Objective [dB]	Achieves Objectives?
		L_{Aeq}		
8mm Regupol everroll®	26	59	40	No
	40	61		No
8mm Regupol everroll® on 15mm Regupol® Composite	26	44		No
	40	46		No
8mm Regupol everroll® on 22mm Regupol® Composite	26	37		Yes
	40	40		Yes
8mm Regupol everroll® on 43mm Regupol® Composite	26	36		Yes
	40	37		Yes
8mm Regupol everroll® on 50mm Regupol® FX50	26	34		Yes
	40	37		Yes
8mm Regupol everroll® on 75mm Regupol® FX75	26	34		Yes
	40	36		Yes
8mm Regupol everroll® on 40mm Regupol® 4080	26	34		Yes
	40	35		Yes

Table 2 – Calculated Maximum Vibration Level (1-80Hz) & Objectives – Receiver Room – Free Weights

Floor Sample	Weight Dropped From 150mm [kg]	Survey Measurements				Criteria			Objectives Achieved?		
		Max. Peak Vibration Velocity [PVS, mm/s]		Max. Weighted r.m.s. Vibration Accel'n (1-80Hz) [mm/s²]		AS 2670 Peak Vib Vel [mm/s]	AS 2670 r.m.s. Vib Accel [mm/s²]	NSW EPA r.m.s. Vib Accel'n Pref'd [mm/s²]	AS Peak Vel.	AS r.m.s. Acel.	EPA r.m.s. Acel.
		Midspan	Column	Midspan	Column						
8mm Regupol everroll®	26	0.934	1.528	2.445	2.435	0.1	3.6	5-10	No	Yes	Yes
	40	1.585	2.932	4.197	4.517				No	No	Yes
8mm Regupol everroll® on 15mm Regupol® Composite	26	0.482	0.933	2.527	2.770				No	Yes	Yes
	40	0.660	1.258	4.037	4.307				No	No	Yes
8mm Regupol everroll® on 22mm Regupol® Composite	26	0.321	0.544	2.500	2.450				No	Yes	Yes
	40	0.293	0.511	3.010	2.747				No	Yes	Yes
8mm Regupol everroll® on 43mm Regupol® Composite	26	0.321	0.390	2.487	2.343				No	Yes	Yes
	40	0.503	0.712	4.130	3.813				No	No	Yes
8mm Regupol everroll® on 50mm Regupol® FX50	26	0.204	0.248	2.283	2.160				No	Yes	Yes
	40	0.274	0.259	3.257	2.607				No	Yes	Yes
8mm Regupol everroll® on 75mm Regupol® FX75	26	0.202	0.215	2.577	2.050				No	Yes	Yes
	40	0.248	0.274	3.127	2.603				No	Yes	Yes
8mm Regupol everroll® on 40mm Regupol® 4080	26	0.222	0.293	2.490	2.140				No	Yes	Yes
	40	0.287	0.329	3.213	2.610				No	Yes	Yes

Regupol (Australia) Pty Ltd ABN 97 094 053 399
155 Smeaton Grange Road, SMEATON GRANGE NSW 2567
Phone: 02 4624 0050 Fax: 02 4647 4403
Email: sales@regupol.com.au Website: www.regupol.com.au

INFORMATION

Regupol (Australia) Pty. Ltd.

Acoustic Results – Site 2 – Weight dropped from 250mm

Table 1 – Measured Contributed Regenerated Noise Levels – Receiver Room – Free Weights

Floor Sample	Weight Dropped from 250mm [kg]	Measured Contributed Regenerated Noise Level (1-500Hz)[1] [dB]	AS 2107 L_{Aeq} Noise Level Objective [dB]	Achieves Objectives?
		L_{Aeq}		
Bare Slab	26	54	40-45	No
	40	60		No
8mm Regupol everroll® on 1 x 40mm Regupol® 4080	26	31		Yes
	40	33		Yes
8mm Regupol everroll® on 2 x 40mm Regupol® 4080	26	30		Yes
	40	31		Yes
8mm Regupol everroll® on 50mm Regupol® FX50	26	31		Yes
	40	33		Yes
8mm Regupol everroll® on 75mm Regupol® FX75	26	28		Yes
	40	30		Yes
8mm Regupol everroll® on 100mm Regupol® FX100	26	28		Yes
	40	29		Yes

Table 2 – Calculated Maximum Vibration Level (1-80Hz) & Objectives – Receiver Room – Free Weights

Floor Sample	Weight Dropped From 250mm [kg]	Survey Measurements				Criteria			
		Max. Peak Vibration Velocity [PVS, mm/s]		Max. Weighted r.m.s. Vibration Accel'n (1-80Hz) [mm/s²]		AS 2670 Peak Vib Vel [mm/s]	AS 2670 r.m.s. Vib Accel [mm/s²]	NSW EPA r.m.s. Vib Accel'n Pref'd [mm/s²]	Objectives Achieved?
		Midspan	Column	Midspan	Column				
Bare Slab	26	1.990	1.391	22.933	6.370	0.8	14.4	20-40	No
	40	3.038	1.892	30.300	7.247				No
8mm Regupol everroll® on 1 x 40mm Regupol® 4080	26	1.568	0.434	18.433	3.110				No
	40	2.444	0.593	27.200	4.457				No
8mm Regupol everroll® on 2 x 40mm Regupol® 4080	26	1.051	0.222	12.950	2.240				No
	40	1.669	0.355	17.600	2.987				No
8mm Regupol everroll® on 50mm Regupol® FX50	26	1.282	0.345	15.853	2.743				No
	40	2.358	0.533	26.067	4.280				No
8mm Regupol everroll® on 75mm Regupol® FX75	26	1.144	0.240	14.700	2.410				No
	40	1.576	0.309	19.000	2.970				No
8mm Regupol everroll® on 100mm Regupol® FX100	26	1.293	0.226	17.233	2.333				No
	40	1.502	0.283	18.600	3.085				No

Regupol (Australia) Pty Ltd ABN 97 094 053 399
155 Smeaton Grange Road, SMEATON GRANGE NSW 2567
Phone: 02 4624 0050 Fax: 02 4647 4403
Email: sales@regupol.com.au Website: www.regupol.com.au

INFORMATION

Regupol (Australia) Pty. Ltd.

Acoustic Results – Site 3 – Weight dropped from 150mm

Table 1 – Measured Contributed Regenerated Noise Levels – Receiver Room – Free Weights

Floor Sample	Weight Dropped from 150mm [kg]	Measured Contributed Regenerated Noise Level (1-500Hz)[1] [dB]	AS 2107 L_{Aeq} Noise Level Objective [dB]	Achieves Objectives?
		L_{Aeq}		
Bare Slab	26	53	45	No
	40	57		No
8mm Regupol everroll®	26	51		No
	40	56		No
12mm Regupol everroll®	26	47		No
	40	52		No
8mm Regupol everroll® on 50mm Regupol® FX50	26	38		Yes
	40	39		Yes
8mm Regupol everroll® on 75mm Regupol® FX75	26	42		Yes
	40	40		Yes
8mm Regupol everroll® on 100mm Regupol® FX100	26	38		Yes
	40	38		Yes
8mm Regupol everroll® on 1 x 40mm Regupol® 4080	26	39		Yes
	40	39		Yes

Table 2 – Calculated Maximum Vibration Level (1-80Hz) & Objectives – Receiver Room – Free Weights

Floor Sample	Weight Dropped From 150mm [kg]	Survey Measurements				Criteria			
		Max. Peak Vibration Velocity [PVS, mm/s]		Max. Weighted r.m.s. Vibration Accel'n (1-80Hz) [mm/s²]		AS 2670 Peak Vib Vel [mm/s]	AS 2670 r.m.s. Vib Accel [mm/s²]	NSW EPA r.m.s. Vib Accel'n Pref'd [mm/s²]	Objectives Achieved?
		Midspan	Column	Midspan	Column				
Bare Slab	26	0.325	0.282	5.337	2.530	0.8	14.4	20-40	Yes
	40	0.492	0.640	7.450	3.320				Yes
8mm Regupol everroll®	26	0.367	0.189	5.670	2.660				Yes
	40	0.443	0.352	5.933	3.467				Yes
12mm Regupol everroll®	26	0.311	0.202	5.390	2.413				Yes
	40	0.388	0.352	6.767	3.467				Yes
8mm Regupol everroll® on 50mm Regupol® FX50	26	0.287	0.183	5.443	2.547				Yes
	40	0.463	0.223	9.163	3.953				Yes
8mm Regupol everroll® on 75mm Regupol® FX75	26	0.326	0.150	5.803	2.217				Yes
	40	0.486	0.212	9.207	3.627				Yes
8mm Regupol everroll® on 100mm Regupol® FX100	26	0.353	0.177	7.860	3.210				Yes
	40	0.424	0.212	8.320	3.410				Yes
8mm Regupol everroll® on 1 x 40mm Regupol® 4080	26	0.290	0.157	5.840	2.627				Yes
	40	0.456	0.254	10.257	4.600				Yes

Regupol (Australia) Pty Ltd ABN 97 094 053 399
155 Smeaton Grange Road, SMEATON GRANGE NSW 2567
Phone: 02 4624 0050 Fax: 02 4647 4403
Email: sales@regupol.com.au Website: www.regupol.com.au

Acoustic Results – Site 4 – Weight dropped from 150mm

Table 5.2 – Measured Contributed Regenerated Noise Levels – Kinesthesiology Clinic & Diagnostics Room – Free Weights

Floor Sample	Weight Dropped from 150mm [kg]	Measured Contributed Regenerated Level (1-500Hz)[1] [dB] Kinesthesiology Clinic	Measured Contributed Regenerated Level (1-500Hz)[1] [dB] Diagnostics Room	AS 2107 L_{Aeq} Noise Level Objective [dB]	Achieves Objectives?	
		L_{Aeq}	L_{Aeq}		KC	DR
8mm Regupol everroll®	26	59	57	40	No	No
	40	61	55		No	No
8mm Regupol everroll® on 15mm Regupol® Composite	26	44	38		No	Yes
	40	46	42		No	No
8mm Regupol everroll® on 22mm Regupol® Composite	26	36	36		Yes	Yes
	40	37	36		Yes	Yes
8mm Regupol everroll® on 43mm Regupol® Composite	26	37	36		Yes	Yes
	40	40	36		Yes	Yes
8mm Regupol everroll® on 50mm Regupol® FX50	26	34	36		Yes	Yes
	40	37	35		Yes	Yes
8mm Regupol everroll® on 75mm Regupol® FX75	26	36	34		Yes	Yes
	40	37	36		Yes	Yes
8mm Regupol everroll® on 40mm Regupol® Composite	26	35	38		Yes	Yes
	40	35	39		Yes	Yes

Table 5.2 – Calculated Maximum Vibration Level (1-80Hz) & Objectives – Receiver Room – Free Weights

Floor Sample	Weight Dropped From 150mm [kg]	Survey Measurements				Criteria			Objectives Achieved?		
		Max. Peak Vibration Velocity [PVS, mm/s]		Max. Weighted r.m.s. Vibration Accel'n (1-80Hz) [mm/s²]		AS 2670 Peak Vib Vel [mm/s]	AS 2670 r.m.s. Vib Accel [mm/s²]	NSW EPA r.m.s. Vib Accel'n Pref'd [mm/s²]	AS Peak Vel.	AS r.m.s Acel.	EPA r.m.s Acel.
		Midspan	Column	Midspan	Column						
8mm Regupol everroll®	26	0.934	1.528	2.445	2.435	0.1	3.6	5-10	No	Yes	Yes
	40	1.585	2.932	4.197	4.517				No	No	Yes
8mm Regupol everroll® on 15mm Regupol® everroll Composite	26	0.482	0.933	2.527	2.770				No	Yes	Yes
	40	0.660	1.258	4.037	4.307				No	No	Yes
8mm Regupol everroll® on 22mm Regupol® everroll Composite	26	0.321	0.544	2.500	2.450				No	Yes	Yes
	40	0.293	0.511	3.010	2.747				No	Yes	Yes
8mm Regupol everroll® on 43mm Regupol® everroll® Composite	26	0.321	0.390	2.487	2.343				No	Yes	Yes
	40	0.503	0.712	4.130	3.813				No	No	Yes
8mm Regupol everroll® on 50mm Regupol® FX50	26	0.204	0.248	2.283	2.160				No	Yes	Yes
	40	0.274	0.259	3.257	2.607				No	Yes	Yes
8mm Regupol everroll® on 75mm Regupol® FX75	26	0.202	0.215	2.577	2.050				No	Yes	Yes
	40	0.248	0.274	3.127	2.603				No	Yes	Yes
8mm Regupol everroll® on 40mm Regupol® Composite	26	0.222	0.293	2.490	2.140				No	Yes	Yes
	40	0.287	0.329	3.213	2.610				No	Yes	Yes

Regupol (Australia) Pty Ltd ABN 97 094 053 399
155 Smeaton Grange Road, SMEATON GRANGE NSW 2567
Phone: 02 4624 0050 Fax: 02 4647 4403
Email: sales@regupol.com.au Website: www.regupol.com.au