

JIS

JAPANESE INDUSTRIAL STANDARD

Sound absorbing materials

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Sound absorbing materials

A 6301-1994

1. Scope This Japanese Industrial Standard specifies the rock wool sound absorbing materials ⁽¹⁾, glass wool sound absorbing materials ⁽²⁾, flexible urethane foam for sound absorption ⁽³⁾, rock wool decorative sound absorbing boards ⁽⁴⁾, insulation fibreboards for sound absorption ⁽⁵⁾, wood-wool cement boards for sound absorption ⁽⁶⁾, perforated gypsum boards for sound absorption ⁽⁷⁾, perforated slate boards for sound absorption ⁽⁸⁾ and perforated hard fibreboards for sound absorption ⁽⁹⁾ used for the purpose of absorbing sound in buildings and the like.

- Notes**
- ⁽¹⁾ Those formed with the rock wools specified in JIS A 9504 by using binder. They are sometimes used for adhering cloths as covering.
 - ⁽²⁾ Those formed with the glass wools specified in JIS A 9505 by using binder. They are sometimes used for adhering cloths as covering.
 - ⁽³⁾ Those processed in a way to cut the porous foam products using two kinds of main materials (polyol and polyisocyanate), foaming agents and the like, or in other ways.
 - ⁽⁴⁾ Those formed by using, as main material, the rock wool specified in JIS A 9504 and the binder and admixture, and finally given such surface decoration as travertin pattern, not perforated through state, rugged state, printing, laminate and their combinations.
 - ⁽⁵⁾ Those made by cutting the insulation board of class A specified in JIS A 5905, overlaying it with coating, paper, synthetic resin film, etc. and giving perforating process.
 - ⁽⁶⁾ The wood-wool cement boards specified in JIS A 5404, and some of which are used with the surface sprayed or coated.
 - ⁽⁷⁾ The gypsum boards specified in JIS A 6901, perforated to pass through the boards.
 - ⁽⁸⁾ The flexible boards and soft boards specified in JIS A 5403, perforated to pass through the boards.
 - ⁽⁹⁾ The hard fibreboards specified in JIS A 5905, perforated to pass through the boards.

Remarks 1. The standards cited in this Standard are shown in Attached Table 1.

2. The units and numerical values given in { } in this Standard are based on the traditional unit system and appended for informative reference.

2. Definitions For the purpose of this Standard, the following definitions apply:

- (1) **sound absorbing materials** Materials used for the purpose of absorbing sound.

Informative reference: In the sound absorbing materials, the porous sound absorbing materials, porous board sound absorbing materials and perforated board sound absorbing materials are included.

Remarks 1. The porous sound absorbing materials and porous board sound absorbing materials have the sound absorbing performance by themselves, but the sound absorbing performance varies according to whether there is background air layer and the properties of surface finishing materials.

2. In the case of perforated board sound absorbing materials having scarcely the sound absorbing performance in themselves, the sound absorbing performance is brought about by composing the sound absorbing construction.

- (2) sound absorbing construction Construction composed of sound absorbing materials, sub-composing materials, air layers, etc. for the purpose of absorbing sound.
- (3) sound absorbing performance Performance of porous sound absorbing materials set up with the sound absorbing construction, or under the specific condition, to absorb the sound. The degree is expressed with sound absorption coefficient.
- (4) sound absorption coefficient Value expressing the sound absorbing performance. When taking the energy of the incident sound upon the surface of sound absorbing material as E_i , the energy of the reflecting sound from its surface as E_r and the sound absorption coefficient as α , it is defined by the following formula:

$$\alpha = 1 - \frac{E_r}{E_i}$$

- (5) normal incident sound absorption coefficient Sound absorption coefficient at the time when the incident flat sound wave comes vertically to the surface.
- (6) reverberation room method sound absorption coefficient Sound absorption coefficient measured in the reverberation room where the condition similar to the random incidence is able to be realized. The term "sound absorption coefficient" only means reverberation room method sound absorption coefficient.

Remarks: In building sound design, this value is used.

- (7) surface finishing materials Materials used for surface finishing of sound absorbing materials from the viewpoint of surface protection and decoration.
- (8) backing materials Materials stuck on the back of perforated board sound absorbing materials.
- (9) thickness of back air layer Distance of hollowness between the rear surface of sound absorbing material and the attaching surface.
- (10) rate of hole area Value calculated from the part of perforation (part excluding circumferential and belt-like part without perforation).
- (11) percentage of semi-perforated area Value calculated from the semi-perforated area (part excluding circumferential and belt-like part without perforation).

3. Classification

3.1 Division according to classification The division of sound absorbing materials according to classifications shall be as shown in Table 1.

Table 1. Classification of sound absorbing materials

Classification and symbol		Subdivision of classification		Application	Reference
Rock wool sound absorbing materials		Division according to density		—	Porous sound absorbing materials
	Rock wool sound absorbing felt (RW-F)	—			
	Rock wool sound absorbing board (RW-B)	No. 1, No. 2 and No. 3			
	Rock wool sound absorbing blanket (RW-BL)	No. 1 and No. 2			
	Rock wool sound absorbing belt (RW-BE)				
Glass wool sound absorbing materials		Division according to thickness of fiber	Division according to density	(Reference) The fiber shall be about 12 μm or under in thickness and about 7 μm in average for No. 2 and about 20 μm or under in thickness and about 12 μm in average for No. 3.	Porous sound absorbing materials
	Glass wool sound absorbing felt (GW-F)	No. 2	10K, 12K, 16K, 20K, 24K		
	Glass wool sound absorbing board (GW-B)	No. 2	32K, 40K, 48K, 64K, 80K, 96K, 120K		
		No. 3	80K, 96K, 120K		
Flexible urethane foam for sound absorbing (PUF)		—		—	
Rock wool decorative sound absorbing boards (DR)		—		—	
Insulation fiber boards for sound absorption (IB)		Division according to state of surface	Division according to shapes of perforation	C means that the surface is coated and O means that it is overlayed by paper or synthetic resin film.	Porous board sound absorbing materials
		C, O	A, AR, G, E		
Wood-wool cement boards for sound absorption (WWCB)		Division according to blending rate or bulk specific gravity of cement to wood-wool		—	Porous board sound absorbing materials
		F, H			
Perforated gypsum boards for sound absorption (GB-P)		Division according to diameters of perforations		Random means that the holes of two or more diameters are perforated irregularly.	Perforated board sound absorbing materials
		ø6–22, ø13.4–24 and random			
Perforated slate boards for sound absorption (AC-P)		Division according to original boards	Division according to combination of hole diameters and pitches	F means flexible boards and N, soft boards.	Perforated board sound absorbing materials
		F	ø5–12, ø5–15, ø8–16, ø8–20, ø8–25		
		N	ø5–12, ø5–15, ø8–20, ø8–25		
Perforated hard fibreboards for sound absorption (HB-P)		Division according to original boards	Division according to combination of hole diameters and pitches	—	Perforated board sound absorbing materials
		S20, S25, S35, T35, T45	ø4–15, ø5–12.5, ø5–15, ø6–15, ø7.5–15, ø8–25, ø9–15		

Remarks: Felt: Those formed into a state of elastic felt.
Board: Those formed into a state of board.
Blanket: Those formed by reinforcing felt or board with the covering of wire net, metal lath specified in JIS A 5505 and the like.
Belt: Those made in a manner that felts or boards cut in a specific width are arranged lengthwise and finished by being covered with cloth and the like as casing.
Foam: Those processed by cutting into a state of board or corrugation.
Perforated: Those processed by perforating.

3.2 Division according to sound absorbing performance The division according to sound absorbing performance shall be as shown in Table 2.

Table 2. Division according to sound absorbing performance

Division according to sound absorption coefficient	Reverberation room method sound absorption coefficient
0.3	0.21 to 0.40
0.5	0.41 to 0.60
0.7	0.61 to 0.80
0.9	0.81 min.

- Remarks**
1. The standard measuring condition specified in Annex applies. When measuring in tight contact to rigid wall, add the symbol M after the division according to sound absorption coefficient and in other cases, add the symbol S.
 2. The value of reverberation room method sound absorption coefficient shall be the arithmetical mean of the values at the center frequencies of 250 Hz, 500 Hz, 1000 Hz and 2000 Hz.

4. **Quality and dimension** The quality and dimension shall conform to the requirements in (1) to (9) when tested in accordance with 5.

(1) **Rock wool sound absorbing materials** The quality and dimension of rock wool sound absorbing materials shall be as shown in Table 3.

Table 3. Quality and dimension

Classification		Density kg/m ³	Thickness mm		Sound absorption coefficient	Length mm		Width mm	
				Tolerance			Tolerance		Tolerance
Rock wool sound absorbing materials	Rock wool sound absorbing felts	20 to 70	25, 30, 40	+5, -2	0.7M	910,	+30 0	455,	+10 0
						1 000,		500,	
			50, 75, 100	+5, -3	0.9M	1 100		605	
	Rock wool sound absorbing boards	No. 1	40 to 100	+5, -2	0.7M	910,	+15 -3	455,	+5 -3
			40		0.9M	1 000,		500,	
			50, 75, 100			1 210		605	
		No. 2	101 to 160	+5, -2	0.7M				
			40		0.9M				
			50, 75, 100						
		No. 3	161 to 300	+5, -2	0.7M				
			40		0.9M				
			50, 75, 100						
	Rock wool sound absorbing blankets	No. 1	40 to 100	+5, -2	0.7M	910,	+15 -3	500,	+5 -3
			40		0.9M	1 000		605,	
			50, 75, 100					910	
		No. 2	101 to 160	+5, -2	0.7M				
			40		0.9M				
			50, 75, 100						
	Rock wool sound absorbing belts	No. 1	40 to 100	+4, -2	0.5M	910,	+30 0	500,	+10 -5
			30		0.7M	1 000,		605,	
			40, 50, 75		0.9M	2 500		910	
		No. 2	101 to 160		0.5M				
			25, 30		0.7M				
			40, 50		0.9M				
			75						

Remarks 1. Length and width may be multiplied by integer respectively. The tolerance in this case shall be as shown in this Table. If the length exceeds 2000 mm, the tolerance on the length, minus side is not allowed and plus side is not specified.

2. Length and width of ordered products shall be decided in accordance with the agreement between the parties concerned. However, the tolerances on them are as given in this Table.

(2) **Glass wool sound absorbing materials** The quality and dimension of glass wool sound absorbing materials shall be as shown in Table 4.

Table 4. Quality and dimension

Classification				Density		Thickness			Sound absorption coefficient	Length		Width								
				kg/m³	Tolerance	mm	Tolerance			mm	Tolerance	mm	Tolerance							
Glass wool sound absorbing materials	Glass wool sound absorbing felts	No. 2	10K	10	± 1	50	+ 8, 0	0.7M	910, 1 000, 1 210, 1 370	Minus side is not allowed	280, 340, 430, 500, 605, 910	+20 0								
						75		0.9M												
						90		+ 9, 0												
						100		+10, 0												
						150		+15, 0												
			12K	12	50	+ 8, 0	0.7M													
					75		0.9M													
					90		+ 9, 0													
					100		+10, 0													
					150		+15, 0													
			16K	16	± 2	25	+ 5, 0	0.5M												
						40		0.7M												
						50		+ 8, 0					0.9M							
						75														
						100								+10, 0						
			20K	20	25	+ 5, 0	0.5M													
					40		0.7M													
					50		+ 8, 0	0.9M												
					75															
					100								+10, 0							
			24K	24	25, 40	+ 5, 0	0.7M													
					50, 75		+ 8, 0	0.9M												
					100								+10, 0							
					Glass wool sound absorbing boards								No. 2	32K	32	± 4	10	+ 3, 0	0.5M	+10 - 3
							25, 40	+ 3, -2									0.7M			
	50, 75, 100		0.9M																	
	40K	40	+ 4 - 3	10		+ 3, 0	0.5M													
				25, 40			+ 3, -2	0.7M												
				50				0.9M												
	48K	48	10	+ 3, 0		0.5M														
			20, 25			+ 3, -2	0.7M													
			40, 50				0.9M													
	64K	64	± 6	10		+ 3, 0	0.5M													
				15	+ 3, -2		0.7M													
				20, 25																
				40, 50				0.9M												
	80K	80	± 7	12, 15	±2	0.5M														
				20, 25		0.7M														
				40		0.9M														
	96K	96	+ 9 - 8	12, 15		0.5M														
20, 25				0.7M																
120K	120	±12	12, 15		0.5M															
			20, 25		0.7M															
No. 3	80K	80	± 7	20, 25		0.5M														
				40		0.7M														
	96K	96	+9, -8	12, 15, 20, 25		0.5M														
	120K	120	±12																	

Remarks 1. Length or width may be multiplied respectively by integer.

In addition, for 430 mm, 435 mm or 450 mm may be read. The tolerance on the multiplied shall be as given in this Table. The tolerance on the dimension of 3000 mm or more in length of one side is not allowed on the minus side.

- Those of 40 mm or more in thickness may be a lamination of two or more boards.
- Of the materials not more than 32 K, for those to be packaged compressively, the thickness shall be determined considering previously the amount of compression and on the thickness within four hours after unpacking, the tolerance on the minus side shall not be allowed.
- The length and width of the ordered products shall be decided in accordance with the agreement between the parties concerned. The tolerance in this case, however, shall be as given in this Table.

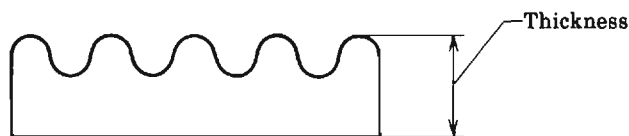
- (3) Flexible urethane foam for sound absorption The quality and dimension of flexible urethane foam for sound absorption shall be as shown in Table 5.

Table 5. Quality and dimension

Classification	Density kg/m ³	Thickness ⁽¹⁰⁾		Sound absorption coefficient ⁽¹¹⁾	Length		Width	
		mm	Tolerance		mm	Tolerance	mm	Tolerance
Flexible urethane foam for sound absorption	20 or over up to and excluding 100	20	+4, -2	0.5M (0.3M)	1 820	+30, -20	910	+28, -12
					2 000		1 000	
		30	+5, -2	0.7M (0.5M)	1 820		910	
					2 000		1 000	
					1 820		910	
					2 000		1 000	
		40			1 820		910	
					2 000		1 000	
		50			1 820		910	
					2 000		1 000	
		75	+7, -3	0.9M (0.9M)	1 820		910	
					2 000		1 000	
		100			1 820		910	
					2 000		1 000	

Notes ⁽¹⁰⁾ The thickness of corrugated workpieces shall be as shown in Fig. 1.

Fig. 1. Thickness of corrugated workpiece



- ⁽¹¹⁾ Normal incident angle sound absorption coefficient can be used according to the agreement between the parties concerned. In this case, the value given in () in the column of sound absorption coefficient shall be taken.

Remarks: The length and width of the ordered products shall be determined by the agreement between the parties concerned. The tolerances on them, however, shall be as shown in this Table.

- (4) Rock wool decorative sound absorbing boards The quality and dimension of the rock wool decorative sound absorbing boards shall be as shown in Table 6.

Table 6. Quality and dimension

Classification	Density	Thickness		Sound absorption coefficient	Length		Width		Perpendicularity	Breaking load by bending N {kgf}	Heat resistance m ² ·K/W {m ² ·h·°C/kcal}	In-com-bustibility	Water content
	kg/m ³	mm	Tolerance		mm	Tolerance	mm	Tolerance					
Rock wool decorative sound absorbing boards	500 max.	9	a is ±0.5	0.3M	600	a is ±0.5	300	a is ±0.5	1 1 000 or less Limited to the case where side surface is finished	40 min. { 4.1 }	0.14 min. { 0.16 }	Grade 1 incombustibility	3.0 max.
					1 500								
			b is ±1.0	0.5M	606	375							
					12		c is ±1.0	0.7M					
		600											
		1 500											
		606											
		303											
		1 500											
		375											
		15	600	300		90 min. { 9.2 }				0.23 min. { 0.27 }			
			1 500	303									
			606		375								
			1 500										
		19		600	300	130 min. { 13.3 }	0.28 min. { 0.32 }						
				1 500	303								
606	375												
1 500													

Remarks 1. The division of (a) to (c) is given in accordance with the methods for side surface processing ⁽¹²⁾. (a): finishing process, (b): rough-cutting process, (c): rough-cutting and finishing-combined process.

2. The thickness shall be that of backing material without including the thickness of the part decorated by inorganic powders and the like in a protrusive surface state and the thickness of laminating materials.

Besides, the original thickness shall be taken when the patterned in a caved state.

3. The length and width of the ordered products shall be determined in accordance with the agreement between the parties concerned. The tolerance on them, however, shall be as given in this Table.

Note ⁽¹²⁾ Finishing process is to cut the boards by saw and the like and give side surface processing to make finally the board of specific dimension. Rough-cutting process is to cut the board by saw and the like to give a specific dimension to the board. Rough-cutting and finishing-combined process is to rough-cut the board in two longitudinal sides and finish in two transverse sides to make the board of specific dimension.