

AIRFOIL

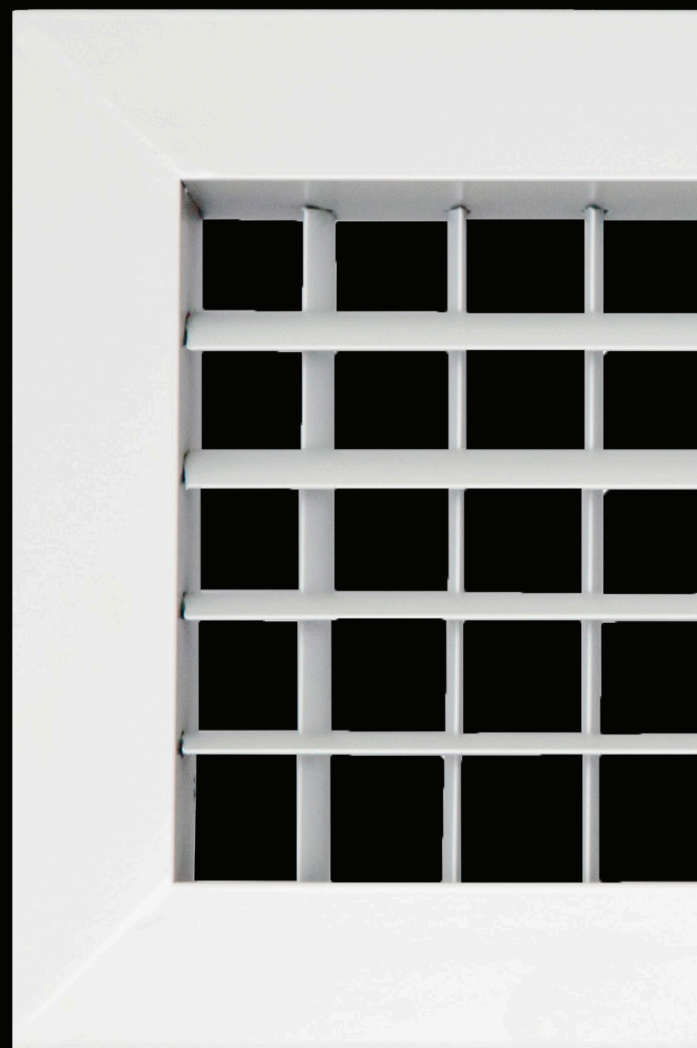


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**DOUBLE DEFLECTION REGISTER
2AR**



DOUBLE DEFLECTION REGISTER 2AR

PRODUCT DESCRIPTION AND APPLICATION

Airfoil's superior Australian Made Double Deflection Register (2AR) sets the standard for quality and performance in air distribution. Crafted from high-grade extruded aluminium, this register features a sturdy 32mm frame and two sets of individually adjusted aerofoil blades pitched at 25mm centres. The blades are securely held within the outer frame using a spring-loaded steel wire and knock-on star washer, ensuring durability and reliability. With an overall depth of 40mm, the 2AR offers both strength and versatility.

The Double Deflection Register (2AR) allows for effortless manual adjustment of both horizontal and vertical blade settings, enabling precise control over air dispersion patterns. This ensures that the angles of the aerofoil blades remain consistent under all recommended air quantities. Customisable to any size, the register can be tailored to meet specific requirements.

While the standard blade spacing is 25mm, the 2AR can also be manufactured with a blade spacing of 19mm centres to suit different applications and performance needs. Primarily designed for wall mounting, the 2AR, often referred to as a "wall register" or "universal register", is a versatile solution suitable for various environments.

Optional features include Airfoil's Opposed Blade Damper (OBD) or Stream Splitter Damper (SSD) for air balancing and commissioning purposes. These dampers are conveniently fitted to the rear of the register for easy installation. Additionally, the 2AR is available with the option of an insulated sheet metal Uni Boot (UB) with a flexible duct diameter spigot made to order. The sleek, modern design of the 2AR complements any interior environment. Available in Airfoil's powder-coated standard white range, Natural Anodised silver finish, or customisable to any specified colour upon request, the 2AR offers both aesthetic appeal and superior performance.

Ideal for both domestic and commercial use, the Double Deflection Register (2AR) is suitable for a wide range of applications including shopping centres, hospitals, airports, universities, restaurants, cinemas, car parks, and any building where precise directional air control is essential.

DOUBLE DEFLECTION REGISTER **2AR**

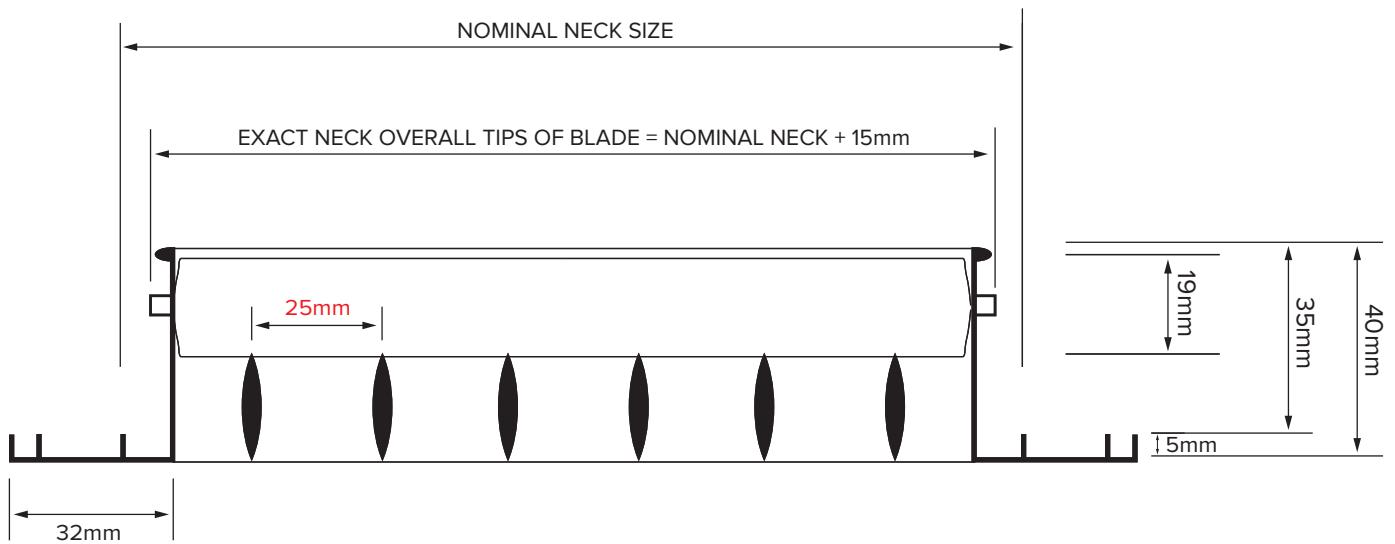
PRODUCT SPECIFICATIONS AND INFORMATION

- **Product ordering code – 2AR**
- Australian Made
- Aluminium Construction
- Manufactured to any size
- Supply Air Register
- 32mm frame
- 40mm deep frame
- 25mm blade spacing as standard
- Optional 19mm blade spacing
- 2 sets of aerofoil blade both horizontal and vertical
- Wall mounted installation
- Advantage of Individual blade manual control design for desired throw setting
- Optional Opposed Blade Damper (OBD) or Stream Splitter Damper (SSD)
- Optional sheet metal Uni Boot (UB) with flexible duct diameter
- Powder-coated standard white or Natural Anodised Silver finish
- Special powder-coating colours available upon request
- Product suitable for domestic and commercial use such as shopping centres, hospitals, airports, universities, restaurants, cinemas, car parks or in any building where directional air control is paramount
- Airfoil tested information available
- **The following metric performance data has been derived from exhaustive testing in elaborate laboratories of acoustic and vibrational engineers Louis A. Challis and Associates Proprietary Limited. Darling Street, Sydney 2000**



DOUBLE DEFLECTION REGISTER 2AR

CROSS SECTIONAL DIAGRAM



DISCLAIMER:

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DOUBLE DEFLECTION REGISTER 2AR

PERFORMANCE DATA

CORE AREAS FOR 25MM BLADE SPACING

Nominal Height (mm)	150	225	300	375	450	525	600	675	750	825	900	975	1050
Nominal Length (mm)													
150	.023												
225	.038	.051											
300	.045	.068	.090										
375	.056	.084	.113	.141									
450	.068	.101	.136	.169	.203								
525	.079	.118	.158	.197	.236	.276							
600	.090	.135	.180	.225	.270	.315	.360						
675	.101	.152	.203	.253	.304	.354	.405	.456					
750	.113	.169	.225	.281	.338	.393	.450	.506	.563				
825	.124	.186	.248	.309	.371	.433	.495	.557	.618	.681			
900	.135	.203	.270	.338	.405	.473	.540	.607	.675	.743	.810		
975	.146	.219	.293	.366	.439	.512	.585	.658	.731	.804	.878	.951	
1050	.158	.236	.315	.394	.473	.551	.630	.709	.788	.866	.945	1.024	1.100

CORE AREAS FOR 19MM BLADE SPACING

Nominal Height (mm)	150	225	300	375	450	525	600	675	750	825	900	975	1050
Nominal Length (mm)													
150	.017												
225	.027	.042											
300	.037	.058	.079										
375	.047	.073	.100	.127									
450	.056	.089	.121	.153	.186								
525	.066	.104	.142	.180	.218	.256							
600	.076	.120	.163	.207	.250	.294	.338						
675	.086	.135	.184	.233	.283	.332	.381	.456					
750	.096	.150	.205	.260	.315	.370	.425	.506	.534				
825	.106	.166	.226	.290	.347	.408	.468	.557	.589	.650			
900	.115	.181	.248	.314	.380	.446	.512	.607	.644	.710	.776		
975	.125	.197	.269	.340	.412	.484	.555	.658	.699	.771	.842	.913	
1050	.135	.212	.290	.367	.444	.522	.699	.709	.754	.831	.908	.986	1.063

PERFORMANCE DATA FOR 25MM CENTRES

Area Factor (M ²)		0.17			0.33			0.5			0.66			1.0			1.25		
Neck Area (M ²)		0.023			0.045			0.068			0.090			0.135			0.169		
		150 X 150			225 X 200			300 X 225			300 X 300			450 X 300			450 X 375		
TYPICAL SIZES		225 X 100			300 X 150			450 X 150			400 X 225			600 X 225			675 X 250		
					450 X 100			675 X 100			600 X 150			900 X 150			750 X 225		
SPREAD ANGLE		0° 22½° 45°			0° 22½° 45°			0° 22½° 45°			0° 22½° 45°			0° 22½° 45°			0° 22½° 45°		
I/s	Throw Metres — min	3.2	2.2	2.0	2.2	1.7	1.4												
47	Throw Metres — max	5.1	3.4	2.2	3.4	2.5	2.0												
	Static Pressure — (Pa)	2.5	5.0	7.5	—	—	—												
	Throw Metres — min	6.2	4.8	3.7	4.3	3.2	2.5	3.4	2.5	2.0	3.2	2.2	1.4						
94	Throw Metres — max	9.3	7.1	5.4	6.8	4.8	3.7	5.4	4.0	2.8	4.8	3.4	2.8						
	Static Pressure — (Pa)	10	22.5	32.5	2.5	5	10	—	—	2.5	—	—	—						
	Throw Metres — min				6.5	4.5	3.7	5.4	3.7	2.8	4.5	3.4	2.2	4.0	2.5	2.0			
141	Throw Metres — max				10.3	7.3	5.7	8.2	5.9	4.5	7.3	5.1	4.0	5.7	4.3	3.2			
	Static Pressure — (Pa)				7.5	12.5	20	2.5	5	7.5	—	2.5	5	—	—	—			
	Throw Metres — min				8.4	6.2	5.1	7.1	5.1	3.7	6.2	4.8	3.4	5.1	3.7	2.5	4.5	3.4	2.4
189	Throw Metres — max				13.5	9.8	7.3	10.2	7.9	5.9	9.8	7.1	5.1	7.6	5.7	4.0	7.3	5.3	3.9
	Static Pressure — (Pa)				10	22.5	32.5	5	7.5	12.5	2.5	5	10	—	—	2.5	—	—	—
	Throw Metres — min							8.1	6.2	5.2	7.6	5.7	4.3	6.2	4.5	3.4	5.7	4.3	3.3
236	Throw Metres — max							13.5	9.8	7.3	12.4	9.0	6.5	9.6	7.1	5.4	8.7	6.8	5.1
	Static Pressure — (Pa)							7.5	12.5	20	5	10	12.5	—	2.5	5	—	—	3.5
	Throw Metres — min							10.4	7.6	5.7	9.3	6.8	4.8	7.6	5.4	4.0	7.1	4.9	3.9
283	Throw Metres — max							16.3	11.9	8.7	14.7	10.1	7.9	11.5	7.9	6.2	10.9	7.5	6.0
	Static Pressure — (Pa)							10	17.5	25	7.5	12.5	20	2.5	5	7.5	1.5	4	6
	Throw Metres — min										11.3	7.9	5.9	8.4	6.2	4.8	8.2	5.9	4.5
330	Throw Metres — max										16.9	12.4	9.3	14.1	9.8	7.2	12.7	9.0	6.8
	Static Pressure — (Pa)										10	17.5	25	5	7.5	10	3.5	60	9
	Throw Metres — min										12.4	9.3	6.8	9.6	7.1	5.1	9.3	6.8	4.8
375	Throw Metres — max										19.7	14.1	10.3	15.2	10.4	8.2	14.4	10.1	7.7
	Static Pressure — (Pa)										12.5	22.5	32.5	5	7.5	12.5	3.5	6	11
	Throw Metres — min										14.1	10.1	7.6	10.4	7.6	5.9	10.1	7.3	5.7
425	Throw Metres — max										22.3	15.2	11.9	16.9	12.4	9.3	15.8	11.3	8.7
	Static Pressure — (Pa)										15	27.5	40	5	10	15	5	8.5	12.5
	Throw Metres — min													12.4	8.7	6.5	11.3	8.2	6.2
472	Throw Metres — max													18.5	14.1	10.4	17.6	13.1	9.8
	Static Pressure — (Pa)													7.5	12.5	20	6.5	11	15
	Throw Metres — min													15.8	10.4	7.9	13.9	9.8	7.5
566	Throw Metres — max													22.6	16.9	12.2	20.8	15.8	11.9
	Static Pressure — (Pa)													10	17.5	25	8.5	14	22.5
	Throw Metres — min													16.9	12.2	9.3	16.6	11.6	8.7
660	Throw Metres — max													27.3	19.7	14.1	25.2	18.2	13.6
	Static Pressure — (Pa)													12.5	25	35	11	20	30
	Throw Metres — min																17.8	13.4	10.1
755	Throw Metres — max																29.8	21.8	15.9
	Static Pressure — (Pa)																14	25	37.5
	Throw Metres — min																		
850	Throw Metres — max																		
	Static Pressure — (Pa)																		
	Throw Metres — min																		
944	Throw Metres — max																		
	Static Pressure — (Pa)																		
	Throw Metres — min																		
1180	Throw Metres — max																		
	Static Pressure — (Pa)																		
	Throw Metres — min																		
1416	Throw Metres — max																		
	Static Pressure — (Pa)																		
	Throw Metres — min																		
1888	Throw Metres — max																		
	Static Pressure — (Pa)																		
	Throw Metres — min																		

PERFORMANCE DATA FOR 25MM CENTRES

Area Factor (M ²)		1.33			1.5			1.66			2.0			2.5			2.66		
Neck Area (M ²)		0.180			0.203			0.225			0.270			0.338			0.360		
		600 x 300			450 x 450			600 x 375			600 x 450			750 x 450			600 x 600		
TYPICAL SIZES		900 x 200			675 x 300			750 x 300			900 x 300			900 x 375			800 x 450		
		1200 x 150			900 x 225			1500 x 150			1200 x 225			1125 x 300			1200 x 300		
SPREAD ANGLE		0° 22½° 45°			0° 22½° 45°			0° 22½° 45°			0° 22½° 45°			0° 22½° 45°			0° 22½° 45°		
141	Throw Metres — max																		
	Static Pressure — (Pa)																		
189	Throw Metres — min	4.3	3.2	2.2															
	Throw Metres — max	6.8	5.0	3.8															
	Static Pressure — (Pa)	—	—	—															
	Throw Metres — min	5.4	4.0	3.2	4.3	3.2	2.5												
236	Throw Metres — max	8.7	6.2	5.2	6.8	4.8	3.7												
	Static Pressure — (Pa)	—	—	2.5	—	—	—												
	Throw Metres — min	6.5	4.5	3.7	5.9	4.3	3.2	5.3	3.8	3.0	4.8	3.7	2.8						
283	Throw Metres — max	10.4	7.3	4.8	9.3	7.1	4.8	8.4	5.8	4.5	7.9	5.4	4.3						
	Static Pressure — (Pa)	—	2.5	5	—	—	2.5	—	—	—	—	—	—						
	Throw Metres — min	7.6	5.7	4.3	6.8	4.8	3.7	6.2	4.5	3.4	5.9	4.3	3.2						
330	Throw Metres — max	11.9	8.7	6.5	10.4	7.6	5.9	9.8	6.5	5.1	9.3	7.1	4.8						
	Static Pressure — (Pa)	2.5	5	7.5	—	2.5	5	—	—	2.5	—	—	2.5						
	Throw Metres — min	9.0	6.5	4.5	8.2	5.7	4.3	7.3	5.4	4.0	6.8	4.8	3.7	6.2	4.3	3.3	5.9	4.0	3.2
375	Throw Metres — max	13.5	9.8	7.4	12.9	9.0	6.8	11.2	7.9	6.4	10.4	6.6	5.7	9.4	6.6	5.1	8.7	6.2	4.8
	Static Pressure — (Pa)	2.5	5	10	1.5	4	6	—	2.5	5	—	—	2.5	—	—	—	—	—	—
	Throw Metres — min	9.8	7.1	5.4	9.0	6.2	4.8	8.2	5.7	4.3	7.6	5.7	4.0	6.9	4.9	3.6	6.5	4.5	3.4
425	Throw Metres — max	15.2	10.8	8.4	14.1	9.8	7.3	12.9	9.0	6.8	11.9	8.7	6.5	10.8	7.7	5.8	10.4	7.1	5.4
	Static Pressure — (Pa)	5	7.5	10	2.5	5	7.5	1.5	4	6	—	2.5	5	—	—	3	—	—	2.5
	Throw Metres — min	10.8	7.9	5.9	9.8	7.1	5.4	9.0	6.5	4.9	8.4	6.2	4.5	8.0	6.2	4.5	7.6	5.1	3.7
472	Throw Metres — max	17.1	12.4	9.3	15.2	11.3	8.4	14.4	10.4	7.9	13.5	9.6	7.1	13.5	9.6	7.1	11.9	8.2	6.5
	Static Pressure — (Pa)	5	10	12.5	1.5	5	10	2.5	5	7	—	2.5	5	—	2.5	5	—	—	2.5
	Throw Metres — min	13.0	9.6	7.3	11.9	8.7	6.5	10.9	8.2	6.2	10.1	7.6	5.7	9.7	7.1	5.3	9.6	6.8	5.1
566	Throw Metres — max	20.2	15.2	11.3	18.5	13.5	9.9	17.2	12.1	9.1	15.8	11.3	8.4	14.7	10.6	8.1	14.1	10.1	7.8
	Static Pressure — (Pa)	7.5	12.5	20	5	7.5	12.5	2.5	5	10	2.5	5	7.5	1.5	4	6	—	2.5	5
	Throw Metres — min	16.3	11.3	8.4	14.1	9.8	7.3	13.8	9.6	7.1	13.5	9.6	6.9	11.7	8.4	6.6	10.6	7.9	6.2
660	Throw Metres — max	23.7	17.4	13.0	21.3	15.2	11.9	20.8	15.0	11.6	20.2	14.8	11.3	18.0	13.2	10.1	16.9	12.1	9.3
	Static Pressure — (Pa)	10	17.5	25	5	10	15	5	7.5	12.5	5	7.5	10	3.5	6	9	2.5	5	7.5
	Throw Metres — min	17.4	13.0	9.6	15.2	11.9	8.2	14.1	10.1	7.7	13.5	9.6	7.3	12.8	9.4	6.9	12.4	8.9	6.8
755	Throw Metres — max	28.4	19.7	15.2	24.9	18.0	13.5	22.2	16.3	12.1	20.8	15.2	11.3	20.2	14.6	10.6	19.7	14.1	10.1
	Static Pressure — (Pa)	12.5	22.5	32.5	7.5	12.5	20	5	10	15	5	7.5	12.5	3.5	6	11	2.5	5	7.5
	Throw Metres — min	19.7	14.7	10.6	17.4	13.0	9.6	16.0	12.1	8.7	15.2	10.8	8.2	14.7	10.4	7.7	14.1	10.1	7.4
850	Throw Metres — max	30.4	22.6	16.9	28.9	19.7	14.7	25.5	17.7	13.8	23.7	16.9	13.0	23.1	16.1	12.4	22.6	15.6	11.7
	Static Pressure — (Pa)	15	27.5	40	10	17.5	25	7.5	12.5	20	7.5	10	15	5	8.5	12.5	5	7.5	10
	Throw Metres — min				19.7	14.1	10.8	18.0	13.0	9.9	16.9	11.9	9.0	15.9	11.3	8.7	15.4	11.0	8.4
944	Throw Metres — max				31.3	22.6	16.7	27.9	20.4	15.2	26.1	18.5	14.1	25.1	16.8	13.6	24.5	16.9	13.3
	Static Pressure — (Pa)				12.5	22.5	32.5	10	17.5	25	17.5	12.5	20	6.5	11	15	5	7.5	12.5
	Throw Metres — min							21.4	15.8	11.9	20.8	15.2	11.3	20.1	14.6	11.0	18.4	13.9	10.7
1180	Throw Metres — max							32.6	25.2	19.5	31.5	23.7	18.1	30.5	22.9	16.9	29.8	22.6	16.3
	Static Pressure — (Pa)							12.5	22.5	32.5	10	20	30	8.5	14	22.5	7.5	12.5	20
	Throw Metres — min										24.7	18.4	13.4	23.4	17.2	13.1	22.6	16.6	12.5
1416	Throw Metres — max										38.2	28.2	20.8	35.2	26.8	19.5	33.7	26.1	18.7
	Static Pressure — (Pa)										15	27.5	40	12.5	22.5	32.5	10	17.5	25
	Throw Metres — min																29.9	17.8	13.4
1888	Throw Metres — max																42.9	31.7	25.4
	Static Pressure — (Pa)																15	27.5	40
	Throw Metres — min																		
2360	Throw Metres — max																		
	Static Pressure — (Pa)																		

PERFORMANCE DATA FOR 25MM CENTRES

Area Factor (M ²)		3.0			4.0			5.0			6.0			8.15		
Neck Area (M ²)		0.405			0.540			0.675			0.810			1.10		
		675 x 600			900 x 600			900 x 750			900 x 900			1050 x 1050		
TYPICAL SIZES		900 x 450			1200 x 450			1500 x 450			1350 x 600					
					1800 x 300						1800 x 450					
SPREAD ANGLE		0° 22½° 45°			0° 22½° 45°			0° 22½° 45°			0° 22½° 45°			0° 22½° 45°		
189	Throw Metres — max															
	Static Pressure — (Pa)															
236	Throw Metres — min															
	Throw Metres — max															
283	Static Pressure — (Pa)															
	Throw Metres — min															
330	Throw Metres — max															
	Static Pressure — (Pa)															
375	Throw Metres — min															
	Throw Metres — max															
425	Static Pressure — (Pa)															
	Throw Metres — min	6.2	4.3	3.4												
472	Throw Metres — max	9.8	6.8	5.1												
	Static Pressure — (Pa)	—	—	—												
566	Throw Metres — min	7.1	4.8	3.4												
	Throw Metres — max	10.6	7.6	5.9												
660	Static Pressure — (Pa)	—	—	—												
	Throw Metres — min	8.2	6.2	4.5	6.8	4.8	3.7									
755	Throw Metres — max	13.0	9.3	7.1	10.4	7.6	5.7									
	Static Pressure — (Pa)	—	—	2.5	—	—	—									
850	Throw Metres — min	9.8	7.1	5.1	7.6	5.7	4.3									
	Throw Metres — max	15.2	11.3	8.4	12.4	8.7	6.5									
944	Static Pressure — (Pa)	—	2.5	5	—	—	2.5									
	Throw Metres — min	11.3	8.2	6.2	8.7	6.5	4.8									
1180	Throw Metres — max	17.4	13.0	9.6	14.1	9.8	7.6									
	Static Pressure — (Pa)	—	2.5	5	—	—	2.5									
1416	Throw Metres — min	13.0	9.0	6.8	10.1	7.3	5.7	8.9	6.8	5.1	8.4	6.2	4.0			
	Throw Metres — max	19.7	14.1	10.4	15.2	11.3	8.5	14.1	10.4	8.2	13.5	9.8	7.6			
1888	Static Pressure — (Pa)	2.5	5	7.5	—	2.5	5	—	—	2.5	—	—	—			
	Throw Metres — min	14.1	10.1	7.3	11.9	7.9	5.9	10.6	7.5	5.7	9.8	7.1	5.4			
2360	Throw Metres — max	21.1	15.8	11.9	16.9	12.4	9.3	15.7	11.5	8.9	15.2	10.9	8.4			
	Static Pressure — (Pa)	2.5	5	10	—	2.5	5	—	—	2.5	—	—	—			
2830	Throw Metres — min	17.4	12.6	9.6	14.1	9.8	7.6	13.1	9.6	7.3	12.4	9.2	7.1	10.1	7.1	5.4
	Throw Metres — max	27.1	19.7	14.7	21.7	15.2	11.9	20.1	14.3	10.9	18.4	13.4	10.4	15.2	10.1	8.1
3300	Static Pressure — (Pa)	5	10	12.5	2.5	5	7.5	—	2.5	5	—	—	2.5	—	—	—
	Throw Metres — min	20.2	15.5	13.3	16.9	11.9	9.0	15.9	11.2	8.4	14.7	10.6	8.2	11.9	8.4	6.5
3750	Throw Metres — max	31.5	23.7	17.4	24.3	19.3	14.1	23.5	17.7	13.5	22.6	16.9	13.0	18.5	13.5	9.8
	Static Pressure — (Pa)	7.5	12.5	20	5	10	12.5	2.5	5	7.5	—	2.5	5	—	—	2.5
4250	Throw Metres — min	28.2	17.4	12.7	23.0	15.8	11.9	20.2	14.9	11.0	18.5	14.1	10.6	15.6	11.3	8.4
	Throw Metres — max	40.8	30.4	23.7	34.1	24.8	18.5	32.2	22.9	17.7	30.4	21.1	16.9	24.5	18.0	14.5
4720	Static Pressure — (Pa)	12.5	22.5	32.5	9.5	12.5	20	5	7.5	12.5	2.5	5	7.5	—	2.5	5
	Throw Metres — min				28.2	17.8	15.2	27.0	17.4	14.6	26.1	16.8	14.1	19.7	14.1	10.6
5180	Throw Metres — max				42.6	30.6	23.2	38.8	28.7	21.4	34.8	28.2	20.2	30.4	22.6	16.9
	Static Pressure — (Pa)				12.5	22.5	32.5	7.5	12.5	20	5	10	12.5	2.5	5	7.5

Selection of supply registers

The following metric performance data has been derived from an exhaustive testing in elaborate laboratories of acoustic and vibrational engineers Louis A. Challis and associates Proprietary Limited, 246–248 Darling Street King's Cross Sydney 2000.

To select the diffuser appropriate to use and situation, two sets of data should be considered:

1. The specific room-use characteristics and the structure components of that room, and,
2. The performance characteristics of the actual ceiling diffuser.

Four important aspects evolve from these two sets of data:

1. The air pattern requirements -drop.
2. The throw requirements.
3. The air quality.
4. The desired noise levels

1. The air pattern requirements - Drop

At any constant air quantity (litres per second), the vertical distance the air will drop increases as the neck area of the grill increases. This increased drop is due to the inverse relationship of air velocity at the face of the grille to the neck area of that grille.

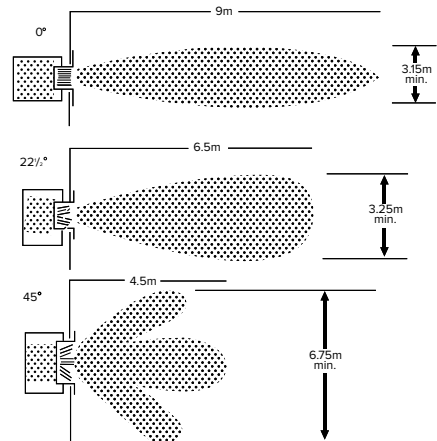
Assuming the spread angle of the aerofoil blades is maintained at a constant setting the length of throw will increase as the litres per second is increased. This increased length of throw will be accompanied by an increased air drop.

Adjusting the spread angles of the grille is the easiest source of altering the performance of the supply register.

Testing has shown that the general rules that have been applied to estimate spread are valid ;–

1. At a 45° setting the spread of air is approximately 1.5 times the throw
2. At a 22.5° setting the spread of air is approximately 0.5 times the throw and cook,
3. At a 0° setting the spread of air is approximately 0.35 times the throw

Example – An Air Quantity of 375 litres per second disbursed through a 600mm x 300mm double deflection register.



2. The throw requirement

Consideration of the throw metres of air from a supplier register under varying air quantities is vital to ensure that the two extremes of conditioning are not encountered ;–

1. inadequate conditioning which fails to adequately cover the total area, and
2. excessive air quantities relative to the neck area and spread of the angle register, thereby creating drafts.

Throw requirement is generally the distance from the outlet to the nearest enclosing wall or the distance from the register to the intersection of its air stream with that being delivered from another register.

The throw of air from the register selected should be limited to ensure the drop of the air stream does not fall below a reasonable working level within the room being conditioned i.e. around 1500 mm

3. The air quantity

Measured in litres per second, the air quantity to be delivered to each space is determined by the overall system design.

The number of registers supplying a given space determines the litres per second being transmitted through each outlet.

4. The noise level requirement

The maximum permissible noise levels (NR) from each supply register relate directly to the quantity of air being transmitted through the register to the neck size and louvre blade spread angle of the register.

Given a constant air quantity the noise level (NR) increases as the core area of the register decreases.

Similarly, given a constant air quantity, the noise level (NR) increases as the angle of the spread (blade adjustment) closes from 0° through to 90°.

The following table maybe used as a guide to generally acceptable noise levels for various, new situations.

NR LEVELS	TYPICAL APPLICATIONS
20-25	Radio, TV studios, Churches
25-30	Theatres, Opera Houses, Concert halls, Board Rooms.
30-35	Conference Rooms, Movie Theatres, Lecture Rooms, Private offices.
35-40	Libraries, general offices, toilets, restaurants.
40-45	Holes, cafeterias.
45-50	Storerooms, large department stores and supermarkets.
Over 50	Manufacturing areas.

Scope of performance data

The Airfoil supply register range was tested in the reverberation chambers of the laboratory of Louis A. Challis and associates Proprietary Limited, 246–248 Darling Street King's Cross Sydney 2000. The laboratory utilises two groups of fans capable of supplying air flows up to 10,000 litres per second with silenced discharge and extended duct system leading to the reverberation chamber.

1.(a) Sound pressure level measurements

Sound pressure level in the chamber were measured using the following equipment

Microphone – Bruel & Kjaer 4144
 Preamplifier - Bruel & Kjaer 2619
 Power supply - Bruel & Kjaer 2807
 Rotating boom – (1m radius, 1 min. cycle)
 Precision Laboratory sound level meter HP8052A
 Precision Octave Filter Set– H P8055A
 Integrating voltmeter– Nebula type 1
 Sound Power calibrator– Challis/Torin type 1

The microphone was mounted on a rotating boom which was used to provide space average in the chamber while the integrating voltmeter provided a time average of the sound pressure level. Averaging time ranging between 10 seconds and 100 seconds were used. This system was referenced level checked before and after each series of measurements using a reference source, Bruel & Kjaer type 4230, and system drift did not exceed 0.3 dB.

Equipment was calibrated in the Challis laboratory which currently holds N.A.T.A. certificates for compliance with AS1259 and ASZ41.

The volume of the reverberation is such as to allow measurements to be made with a high accuracy down to the 63Hz octave band. The accuracy claimed for the measurements of sound pressure level is +/-2 dB at 63Hz, +/- 1.5dB at 125Hz; and +/- 1.0dB in octave bands from 250Hz to 8kHz.

The background noise levels due to external noise and system noise were measured at each test air flow and where necessary, corrections for background noise have been applied to the measured sound pressure levels.

In some cases, at the lowest airflows, the measured levels in the high-frequency bands were indistinguishable from the background noise level, and in these cases the sound power and sound pressure level at 1.5 m have been quoted as “Less than” the minimum measurable value.

The background and their system noise level in the chamber was typically as follows:-

Sound Pressure Levels in dB (re 2x10⁻⁵ Pascals)

Octave Band Centre Frequency (Hz)	63	125	250	500	1K	2K	4K	8K
Typical Air System Noise	50	36	26	17	11	8	8	8

The system allowed accurate measurements for the determination of NR figures down to NR 16.

1.(b) Sound Power Computations

The sound power figures for each test were used as a basis for determining the sound pressure level at a distance of approximately 1.5 m from the register in a room with room constants as follows:

Octave Band Centre Frequency (Hz)	63	125	250	500	1K	2K	4K	8K
Room Constant (dB)	5	6	7	8	8	8	8	8

2. Static pressure drop measurements

The static pressure drop across the test grille was measured using an inclined Manometer from a tapping point of approximately 450 mm upstream of the test unit.

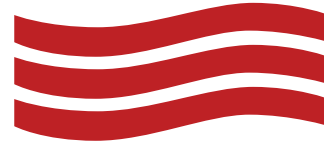
3. Air throw measurements

Each test sample was typically tested at 3 air flows. The desired air volumes were measured by means of an ASTM triple nozzle system, installed in a lined box incorporating an air straightening grid. The nozzle box was installed in a 600 mm x 600 mm duct leading to the chamber. The system provided air flows to an accuracy of +/-5%.

4. Air velocity measurements

Measurements of face velocity were carried out using the Wallace Thermo-anemometer (as described above). The average of nine readings taken across the face of the test units provided air velocity measurements to precision of +/-5%.

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