

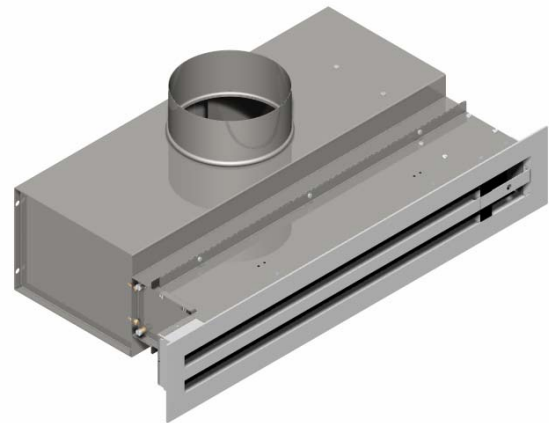
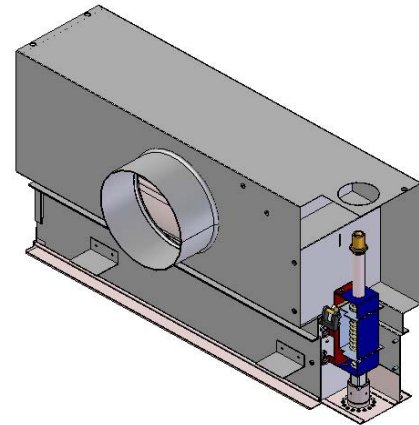
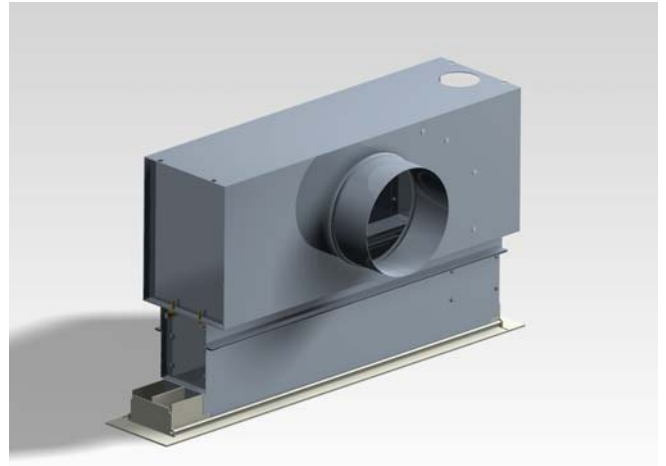
THERMALLY POWERED VARIABLE GEOMETRY VAV LINEAR CEILING DIFFUSERS

APPLICATIONS

- ◆ VAV COOLING & HEATING
- ◆ PROPORTIONAL TERMINAL REHEAT
- ◆ STAND ALONE OR BMS CONTROLS
- ◆ WITH OR WITHOUT REMOTE SETPOINT

ADVANTAGES

- ◆ ELECTRIC & PNEUMATIC ACTUATORS
- ◆ SLAVING OPTION
- ◆ AUTO Matic HEAT-COOL CHANGE-OVER
- ◆ NO REGULAR MAINTENANCE



VLN 4/5

INTRODUCTION

The **RICKARD THERMALLY POWERED VARIABLE GEOMETRY LINEAR VAV TERMINAL UNIT** (Type VLN 4/5) provides an especially ideal means of distributing conditioned air into perimeter zones of a building, where the temperature control requirements are the most demanding. The slim and attractive shape of the linear diffuser extrusions ensures that the unit blends into any ceiling design and meets almost all architectural requirements. At the same time the superior aerodynamic design ensures that air distribution without any drafts, is quiet and efficient.

SPECIAL FEATURES

The Rickard VLN boasts a few novel features not generally found on other similar products. The air flow pattern is adjustable from below the ceiling, being changeable from two-way blow to one-way blow in either direction or even to vertical down blow. A second useful option is that the VLN linear diffuser extrusions are designed to be fitted end-to-end with alignment pins such that they are perfectly straight within a ceiling, providing a continuous architecturally pleasing appearance. Under these circumstances, as the active VLN terminal units will only take up a portion of the total length of linear diffuser track, the intermediate unused sections may be utilized for return air purposes thereby alleviating the need for additional return grilles or louvers.

OPERATION

GENERAL DESCRIPTION

Room temperature is controlled by varying the supply air volume in accordance with demand. Volume control is achieved by opening and close a set of aerodynamically designed, extrude aluminium vanes using our unique **Patented Thermally Powered** actuator mechanism, so as to vary the aperture through which the supply air passes at the point of exit from the diffuser. This provides for true "VARIABLE GEOMETRY VAV" which effectively maintains air discharge velocity throughout the range of volume control from 100% down to as little as 25%. The **Thermally Powered** actuator mechanism is available as a cooling only version (VLN 5) and as a cooling with automatic heating change over (VLN 4). Unlike all other thermally powered **Cooling/Heating** change over linear VAV terminal units, the Rickard VLN 4 provides full VAV in both cooling and heating modes. In addition room temperature setpoint adjustment can be carried out from beneath the ceiling and is done so without any disassembly of the terminal unit.

The standard VLN linear diffusion units are available with two active slots to match active terminal unit lengths of 600mm, 900mm, 1200mm and 1500mm. The linear diffusion track has been engineered for butting together with hairline precision so that an unlimited length of continuous diffuser is possible without sacrificing the attractive appearance. In this case the active VLN terminal units may be randomly placed anywhere along the length of diffusion track to suit virtually any building partition layout.

The active VLN terminal unit is constructed using corrosion resistant mill galvanized sheet steel, while the linear diffuser aluminium extrusions are epoxy powder coated in a variety of colours or natural anodized aluminium.

AIRFLOW SELECTION

A further useful feature of the RICKARD VLN is the ease with which the direction of airflow may be adjusted. Although airflow direction is not normally changed once the system is operational, it does simplify the ordering procedure. All linear air diffusion track is identical and the choice of one-way or two-way blow is easily implemented on site by simply flipping the flow directional vanes to the preferred pattern. For abnormally high ceilings, it is possible to direct air vertically downwards for better room penetration, especially when the VLN is in the heating mode.

MAINTENANCE

As with all other RICKARD AIR DIFFUSION products, the VLN requires no routine preventative maintenance.

TERMINAL SELECTION

GENERAL

The first consideration when designing a system is to calculate the required supply air volume & temperature to satisfy room conditions at maximum heat loads. It is recommended that ducting is sized using static regain design principles. Supply air velocities in branch ducts should be between 3.5 & 7.5m/s.

THROW

This is the distance from the centre of the diffuser to the point at which the supply air velocity has reduced to 0.25m/s when measured 25mm below the ceiling & the control disc in the fully open position. Coning occurs when two airstreams traveling in opposite directions meet & result in a downward moving cone of air. A similar effect is experienced should a diffuser be positioned at a distance from the wall that is less than that of its throw. The air will strike the wall & flow in a downward direction such that the point at which the air reaches a velocity of 0.25m/s, the sum of the horizontal & vertical travel of the air is equal to the diffuser throw. Throw remains essentially constant throughout the range of air flows, a feature of the variable geometry VAV diffuser concept.

NOISE LEVEL REQUIREMENTS

The published diffuser noise level must be checked to ensure it is within the project specification. Published diffuser noise levels represent only the noise generated by the diffuser & do not take into consideration any duct-borne noise.

DUCT STATIC PRESSURE

Diffuser performance has been established using diffuser neck TOTAL pressure, although that which is normally known or measured is duct STATIC pressure. What happens between the duct & the diffuser depends on the length & type of flexible duct being used. For simplicity, it can be assumed that the duct STATIC pressure is approximately equal to the diffuser neck total pressure. This is a valid assumption for systems where flexible duct lengths are not excessive & can be explained briefly as follows:

The static pressure loss due to friction in the flexible duct ($\pm 10\text{Pa}$ or 0.04ins wg) would normally be about the same as the velocity pressure in the neck of the diffuser & since total pressure is the sum of static & velocity pressure, we can say that neck total pressure is approximately numerically the same as duct static pressure. Although the tables reflect diffuser performance for neck total pressures ranging from 20Pa to 100Pa, caution should be exercised when selecting diffusers outside the 40Pa to 80Pa. At lower pressures air movement & induction may be insufficient & at higher pressures draughts & excessive noise may result. Best results are obtained when diffusers are selected at pressures of between 50Pa and 70Pa. Bear in mind that all diffusers served by a common duct will all operate at the same static pressure as controlled by the pressure control damper. Therefore diffusers which are able to supply more air than is necessary will be driven partially closed by the temperature controller & hence the system becomes self-balancing.

NOTE: Avoid upstream restrictions such as manually adjusted dampers or squashed flexible ducting.

THE VLN VARIABLE GEOMETRY LINEAR VAV TERMINAL UNIT PERFORMANCE

VLN 6004/5 - NECK DIAMETER 150mm FULLY OPEN

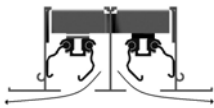
VLN 9004/5 - NECK DIAMETER 200mm FULLY OPEN

NECK TOTAL PRESSURE (Pa)	30	40	50	60	70	NECK TOTAL PRESSURE (Pa)	30	40	50	60	70
FLOW (l/s) PATTERN A	35	41	45	50	54	FLOW (l/s) PATTERN A	64	74	83	90	98
FLOW (l/s) PATTERN B	46	53	59	65	70	FLOW (l/s) PATTERN B	77	89	99	109	117
FLOW (l/s) PATTERN C	35	41	45	50	54	FLOW (l/s) PATTERN C	64	74	83	90	98
THROW (m) PATTERN A	4.5	4.8	5.1	5.4	5.6	THROW (m) PATTERN A	5.5	5.9	6.3	6.6	6.8
THROW (m) PATTERN B	3.2	3.4	3.6	3.8	3.9	THROW (m) PATTERN B	3.9	4.2	4.4	4.6	4.8
THROW (m) PATTERN C	6.4	6.9	7.3	7.6	7.9	THROW (m) PATTERN C	7.8	8.4	8.9	9.3	9.7
NOISE - NC LEVEL	30	33	35	37	39	NOISE - NC LEVEL	32	35	37	39	41

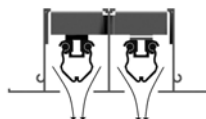
VLN 12004/5 - NECK DIAMETER 250mm FULLY OPEN

VLN 15004/5 - NECK DIAMETER 300mm FULLY OPEN

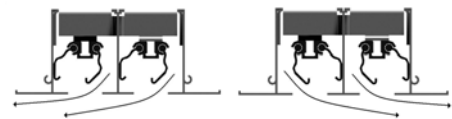
NECK TOTAL PRESSURE (Pa)	30	40	50	60	70	NECK TOTAL PRESSURE (Pa)	30	40	50	60	70
FLOW (l/s) PATTERN A	89	103	115	126	136	FLOW (l/s) PATTERN A	111	128	143	157	169
FLOW (l/s) PATTERN B	110	127	142	156	168	FLOW (l/s) PATTERN B	146	168	188	206	223
FLOW (l/s) PATTERN C	89	103	115	126	136	FLOW (l/s) PATTERN C	111	128	143	157	169
THROW (m) PATTERN A	6.4	6.9	7.3	7.6	7.9	THROW (m) PATTERN A	7.1	7.7	8.1	8.5	8.8
THROW (m) PATTERN B	4.5	4.8	5.1	5.4	5.6	THROW (m) PATTERN B	5.0	5.4	5.7	6.0	6.2
THROW (m) PATTERN C	9.0	9.7	10.3	10.7	11.2	THROW (m) PATTERN C	10	10.8	11.5	12	12.5
NOISE - NC LEVEL	33	36	38	40	42	NOISE - NC LEVEL	34	37	39	41	43



THROW PATTERN A



THROW PATTERN B



THROW PATTERNS C

Throw data is taken 25mm below the ceiling on a line through the centre of the diffuser with the control disc fully open & an air velocity is at 0.25m/s.

Noise criteria levels apply to a single diffuser mounted in a room having a Sound Absorption of 10dB in octave bands having centre frequencies from 125Hz to 8000Hz (ie. the difference between Sound Pressure Level (dB re: 10⁻⁶ Pa) and Sound Pressure Level (dB re: 10⁻¹² Pa) is equal to 10dB). These levels represent only the noise generated by the diffuser and do not take into account any duct-borne noise.

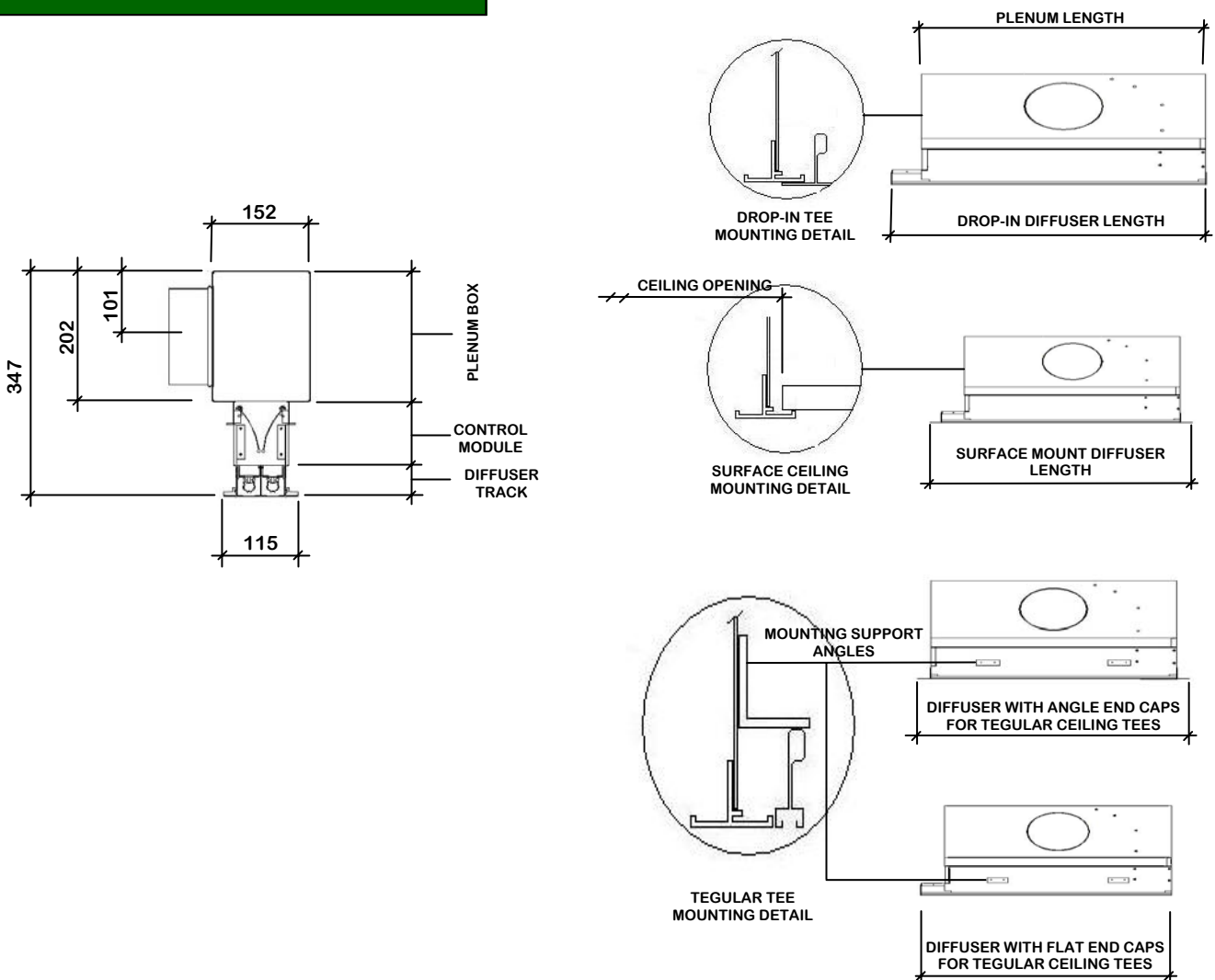
Diffusers are factory set for a minimum of 30% of the maximum flow levels reflected above. It should be noted that minimum air flow settings are approximate & may require to be reset on site to compensate for actual site system pressures.

Volume flow rates quoted above are the actual quantities of air entering the air conditioned space. In addition, air is required to be induced from the room so that the thermal room sensing element may accurately sense room air temperature. For this purpose, a small additional amount of supply air is required to be bled-off into the ceiling void. Please refer to the following table, on page 5-4 to quantify the total additional supply air required.

ADDITIONAL SUPPLY AIR

NECK TOTAL PRESSURE (Pa)	INDUCTION BLEED-OFF AIR (l/s)
30	6.0
40	7.0
50	8.0
60	9.0
70	9.5

DIMENSIONAL DATA



NOMINAL LENGTH	PLENUM LENGTH	EQUIVALENT INLET DIAMETER	FITTED SINGLE DIFFUSER LENGTH (mm)		SURFACE MOUNT CEILING OPENING LENGTH (mm)
			DROP-IN	SURFACE MOUNTED	
600	536	150	594	650	602
900	840	200	1194	950	902
1200	1146	250	1194	1250	1202
1500	1450	300	1494	1550	502

SAMPLE SPECIFICATIONS**THERMALLY POWERED VARIABLE GEOMETRY VLN LINEAR VAV AIR DIFFUSION UNITS****(COOLING/ HEATING WITH AUTO Matic CHANGE OVER)**

Supply and install Rickard VLN Variable Geometry Linear VAV thermally powered Air Diffusion Units where indicated on the project drawings. Each unit shall be fitted with a system powered thermal actuator with automatic Cooling/Heating Change Over and provide full VAV in both the cooling and heating modes. The VAV air control assembly shall terminate with extruded aluminium twin slot linear supply air diffusion units. Each air diffusion slot shall incorporate air direction vanes manually adjustable, from within the air conditioned space below the ceiling, to provide either two slot one way horizontal blow, two slot two way horizontal blow, one slot horizontal & one slot horizontal blow or two slot vertical blow. Room temperature set point adjustment shall be by means of a screwdriver inserted through a small aperture in face of the centre member of the aluminium linear air diffusion track.

The VLN control housing shall be manufactured from mill galvanized sheet steel of welded construction, while the linear air diffusion units shall be of extruded aluminium epoxy powder coated with a chip resistant fused epoxy powder.

(COOLING ONLY)

Supply and install Rickard VLN Variable Geometry Linear VAV thermally powered Air Diffusion Units where indicated on the project drawings. Each unit shall be fitted with a system powered thermal actuator. The VAV air control assembly shall terminate with extruded aluminium twin slot linear supply air diffusion units. Each air diffusion slot shall incorporate air direction vanes manually adjustable, from within the air conditioned space below the ceiling, to provide either two slot one way horizontal blow, two slot two way horizontal blow, one slot horizontal & one slot horizontal blow or two slot vertical blow. Room temperature set point adjustment shall be by means of a screwdriver inserted through a small aperture in face of the centre member of the aluminium linear air diffusion track.

The VLN control housing shall be manufactured from mill galvanized sheet steel of welded construction, while the linear air diffusion units shall be of extruded aluminium epoxy powder coated with a chip resistant fused epoxy powder.