NOISE CONTROL

WITH

ACOTECH

Website: www.acotech.com.my

Design Manufacturing Applications

ACOTECH DUCT ATTENUATORS

ACOTECH duct attenuators are specially made for use in situations where it is necessary to reduce the noise in "air moving" applications such as air conditioning or ventilation systems, fan and blower inlets and outlets, dust control equipment, motor cooling fans, enclosure ventilation, diesel generator sets, compressors, pump house and other industrial applications.

CONSTRUCTION

ACOTECH duct attenuators are constructed from heavy gauge galvanized sheet metal casing, containing a number of splitters filled with rock wool or fiberglass which divides the silencer into separate longitudinal airways. The standard construction of ACOTECH duct attenuator remain it integrity up to maximum pressure of 2000 Pa and continuous temperature exposure up to 260 degree C. Sound is attenuated by the acoustic infill in the splitters when the air passes through these airways. The special aerodynamic design of the splitters has the best sound attenuation and pressure drop.

For special applications, such as high face velocity system or oily environment, a special acoustically transparent lamina can be inserted in between the perforated galvanized steel sheet and acoustic infill. Depend to the application; the lamina material can be glass tissue facing or polyester film.

ACOUSTIC PERFORMANCE

The sound insertion loss performance of the ACOTECH duct silencer has been determined from measurement carried out in an independent Singapore laboratory – PSB Corporation. In Accordance with ISO 7235:1991(E) "Acoustic – measurement procedures for ducted silencers – insertion loss, flow noise and total pressure loss".

TYPES & MODEL

ACOTECH offer a range of standard duct attenuators come with combination of eight different lengths (600mm to 3000mm), two splitters size (200mm and 300mm width) and eight different airways (75mm to 300mm). Intermediate sizes are available for custom design silencer.

DETERMINE DUCT ATTENUATOR WEIGHT

For MF Series (Splitter Width 200mm)
Weight (kg) = 40 x Number of Module x Height (in meter) x Length (in meter)

For LF Series (Splitter Width 300mm)
Weight (kg) = 65 x Number of Module x Height (in meter) x Length (in meter)

* Module Width refer to table (Module width is the splitter width plus airway width)
* Number of Modules = Attenuator Width (in mm) / Module Width (in mm)

DETERMINE PRESSURE DROP

The pressure drop across the attenuators can be determined as following steps:

- Step 1 : Determine the attenuator model, width (in meter) and height (in meter)
- Step 2 : Determine the air velocity (V) approaching attenuator – m/s
- Step 3 : Determine the "K" Factor from the table
- Step 4 : Pressure Drop Calculation in Pascal (Pa) = KV^2

  Where K : "K" factor (refer to "K" factor table)
  V : Airflow (m^3/s) / cross-sectional area of the silencer (Width x Height)

FINAL SELECTION

With our sound attenuator selection software, our acoustic engineer will be able to provide more precious silencer selection for particular noise control project requirement. The followings information is required for a professional acoustic calculation:

- Noise source Sound Power Level in 1/1 Octave band (63Hz, 125Hz, 250Hz, 500Hz, 1000Hz, 2000Hz, 4000Hz, 8000Hz)
- Flow rate through attenuator
- Detail duct layout drawing
- Maximum allowable pressure drop across attenuator
- Resultant noise level design criteria

Sound Insertion Loss (dB)

The table below indicates the insertion loss figures associated with each different model:

Module Width	Model	Length In (mm)	OCTAVE BAND CENTRE FREQUENCY (Hz)								"K" Factor
			63	125	250	500	1K	2K	4K	8K	
MF Series (Splitter Width 200mm)											
300mm	AA100	600	3	3	12	26	33	26	23	18	1.83
		900	5	7	16	30	38	30	25	20	2.08
		1200	5	11	20	34	43	34	27	22	2.33
		1500	7	16	26	41	45	38	29	23	2.52
		1800	7	18	32	44	52	47	32	25	2.84
		2100	8	20	36	47	54	53	34	27	3.15
		2400	9	22	40	50	55	58	36	28	3.40
		3000	11	15	45	58	60	59	40	30	3.91
325mm	AA125	600	3	5	14	22	33	25	18	9	1.07
		900	3	9	17	28	36	27	20	15	1.25
		1200	5	13	20	34	39	29	22	21	1.45
		1500	6	15	26	38	43	35	24	25	1.64
		1800	8	17	32	47	49	39	28	28	1.83
		2100	8	19	36	52	52	45	30	29	2.00
		2400	8	20	39	56	55	50	32	30	2.21
		3000	9	23	43	60	58	54	36	33	2.26
350mm	AA150	600	3	7	11	25	29	21	12	10	0.76
		900	3	9	15	28	32	23	15	12	0.82
		1200	4	11	19	31	35	25	18	14	0.88
		1500	5	13	25	36	40	28	20	17	1.01
		1800	5	16	31	40	46	31	22	18	1.13
		2100	6	18	37	45	49	35	23	20	1.23
		2400	7	19	43	49	51	38	24	22	1.32
		3000	9	21	46	56	61	43	27	24	1.58
375mm	AA175	600	3	7	10	21	23	19	12	10	0.50
		900	3	8	14	24	27	22	15	12	0.59
		1200	4	9	18	27	31	25	18	14	0.67
		1500	5	12	24	32	36	26	19	16	0.75
		1800	5	14	28	37	41	28	20	17	0.83
		2100	6	15	32	41	46	30	22	18	0.90
		2400	7	16	36	45	50	32	24	18	0.98
		3000	8	20	37	49	55	34	29	21	1.16

* All specifications are subjected to change without notice.

Design Manufacturing Applications

ACOTECH ACOUSTIC DOORS

ACOTECH Acoustic Doors are specially made for the applications where it is necessary to separate quiet and noisy areas.

ACOTECH Acoustic Doors' design comprised a flush panel steel leaf and an acoustic infill internally provide good insulation. The door frames are made of heavy gauge galvanized steel and fitted with heavy duty ball bearing hinges to rigidly support the door leaves. These special hinges are designed and fitted to ensure long maintenance – free operation. Stainless steel still provides an attractive wear resistant finishing.

ACOTECH Acoustic Doors are fabricated in two (2) standard sizes for single leaf and double leaf doors. The standard sizes are as follows:

ACOTECH Acoustic Door – Single Leaf

- 900mm (W) x 2100mm (H) and 1200mm (W) x 2100mm(H)

ACOTECH Acoustic Door – Double Leaf

- 1800mm (W) x 2100mm (H) and 2400mm (W) x 2400mm (H)

These doors are available in thicknesses of 75mm, 100mm and 150mm.

ACOUSTIC PERFORMANCE

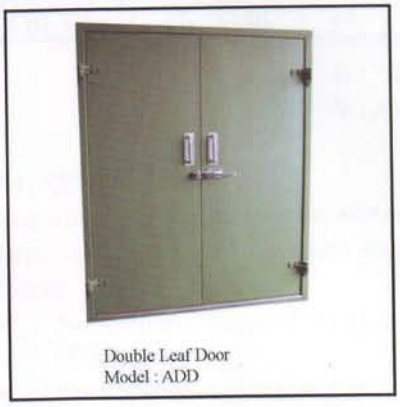
The sound transmission loss performance on the ACOTECH Acoustic Door has been determined from measurements carried out by an independent Singapore laboratory – PSB Corporation. In accordance with ASTM E90-02 : "Standard test method for laboratory measurement of airborne sound transmission loss of building partitions and elements".

Sound Transmission Loss (dB)

THICKNESS	ACOUSTIC DOOR SOUND TRANSMISSION LOSS PERFORMANCE IN dB								STC RATING
	OCTAVE BAND CENTRE FREQUENCY (Hz)								
	63	125	250	500	1K	2K	4K	8K	
75mm	17	20	29	36	39	40	40	40	36
100mm	19	29	32	37	43	45	45	45	40
150mm	22	28	34	44	46	47	49	49	45

Applications

- Generator Rooms
- Pump, Boiler and Compressor Rooms
- Testing Chamber
- HVAC – Air distribution System Rooms
- Studios



Double Leaf Door
Model : ADD

Single Leaf Door
Model : ADS

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Design Manufacturing Applications

ACOTECH EXHAUST SILENCERS

ACOTECH Exhaust Silencers are constructed from heavy gauge hot rolled cold quenched sheet steel with welded construction flanges to JIS 5K are supplied as standard. Drain plugs are fitted for easy removal of condensate. Silencers are coated with high quality heat resistant aluminum paint which can withstand an operating temperature of 600 degree C.

3 Types of ACOTECH Exhaust Silencers listed below:

1- MULTI CHAMBER REACTIVE

Model: AEPS (Side Inlet End Outlet)
AEPE (End Inlet End Outlet)

Multi Chamber Reactive Silencers generally consists of several pipe segments and provided good pressure drop characteristic and provides good attenuation at low and mid frequency.

Available with side entry (AEPS) and end entry (AEPE) and they can be installed horizontally, vertically or at an inclined position without affecting performance.

These silencers can provide overall noise attenuation of 30dB.

2 – STRAIGHT THROUGH ABSORPTIVE

Model: AESE (End Inlet End Outlet)

Straight Through Absorptive Silencers contains fibrous or porous sound absorbing materials and attenuate noise by converting sound energy propagating in the passage into heat by friction in the silencer bore between gas particles and sound absorbing material held in position by the use of perforated metal liner. Absorptive silencer have noise reduction characteristics at high frequency, and they can be installed in any orientation without loss of acoustic performance.

These silencers can provide overall noise attenuation of 20dB.

3 – SUPERCRITICAL OR COMBINATION TYPE

Model: AECS (Side Inlet End Outlet)
AECE (End Inlet End Outlet)

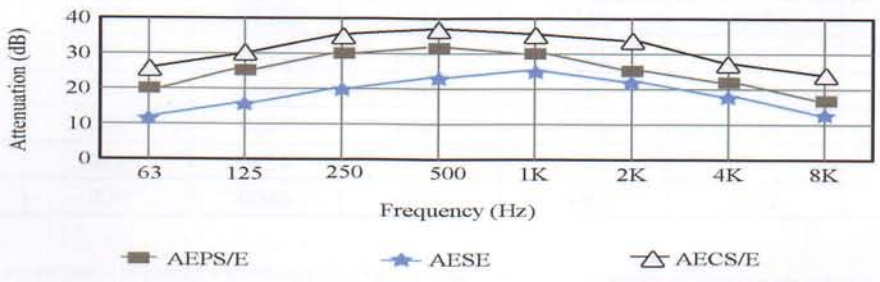
Supercritical Exhaust Silencers are compact combination of MULTI CHAMBER REACTIVE and STRAIGHT THROUGH ABSORPTIVE type. It suitable to install where space is a constraint and noise criteria is not too stringent. Available with side entry (AEPS) and end entry (AEPE) and can be installed in any orientation without loss of acoustic performance.

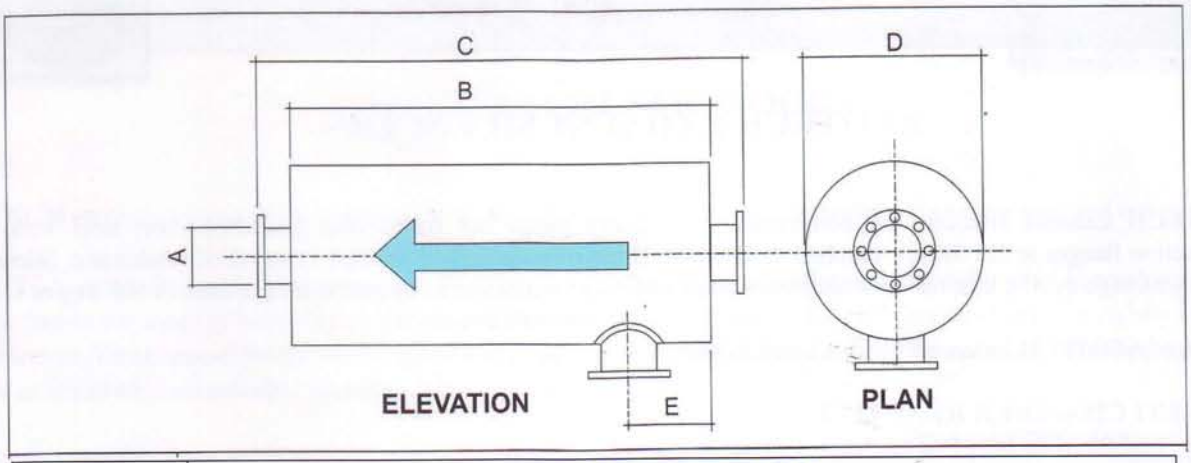
These silencers can provide overall noise attenuation of 35 dB.

ATTENUATION

MODEL	EXHAUST SILENCER ATTENUATION IN dB OCTAVE BAND CENTRE FREQUENCY (Hz)							
	63	125	250	500	1K	2K	4K	8K
AEPS / AEPE	20	25	30	31	30	26	21	18
AESE	11	16	20	22	24	22	18	13
AECS / AECE	25	30	35	37	35	32	26	22

PERFORMANCE CURVE





PIPE DIAMETER (A)	DIMENSION IN MM					
	DIAMETER (D)	LENGTH (C) END	LENGTH (C) SIDE	LENGTH (B)	LENGTH (E)	WEIGHT (KG)
AEPS / AEPE						
50	254	1050	975	900	180	31
75	350	1200	1125	1050	200	43
100	400	1290	1215	1140	230	55
125	450	1550	1475	1400	230	80
150	550	1675	1600	1525	250	125
200	660	2005	1920	1830	300	190
250	760	2515	2430	2340	350	320
300	915	2920	2830	2740	400	465
350	1020	3475	3390	3300	450	640
400	1170	4035	3950	3860	500	910
450	1270	4470	4370	4270	550	1140
500	1350	4800	4700	4600	900	1580
AESE						
50	150	925		825		5
75	200	1075		975		15
100	225	1225		1125		27
125	225	1225		125		35
150	380	1700		1500		60
200	450	1700		1500		80
250	550	2000		1800		115
300	650	2350		2100		180
350	750	2500		2400		245
400	850	2930		2680		295
450	990	3175		2925		350
500	1100	3400		3150		440
AECS / AECE						
50	254	1050	975	900	180	38
75	350	1200	1125	1050	200	53
100	450	1290	1215	1140	230	70
125	500	1550	1475	1400	230	95
150	600	1675	1600	1525	250	140
200	750	2005	1920	1830	300	215
250	850	2515	2430	2340	350	365
300	1020	2920	2830	2740	400	530
350	1120	3475	3390	3300	450	715
400	1270	4035	3950	3860	500	995
450	1470	4470	4370	4270	550	1250
500	1550	4800	4700	4600	900	1794

Design Manufacturing Applications

ACOTECH ACOUSTIC ENCLOSURE

Kinds of product

Sound-proofing Room

In constructing sound-proofing facilities in a building, sound-absorbing and insulating materials should be applied to the wall. Room noise is then remarkably reduced, and the noise to leak out is minimized, thus almost completely preventing neighboring buildings from receiving noise pollution. Sound-proofing is possible without revising the existing frames, while a good appearance is ensured as well as superior heat insulation, the sound-absorbing material is nonflammable owing to inorganic property.

Sound-proofing Box

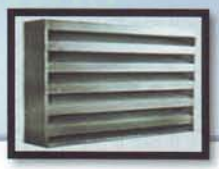
Being used for treating the source of noise, sound proofing box reduces the sound transmission. By reducing the noise in the interior side of the box as well as noise from exterior side, the product improves working environment. With a smart structure, it use sound-absorbing, sound-insulating materials having good effects of water-proof, heat-insulating and moisture-proofness.

Usage

- Compressor
- Generator
- High Speed Press Machine
- Lab, Offices in Factory
- Semiconduct Industry, Electronic Industry
- Product line Sound Cutting-off Room

* All specifications are subjected to change without notice

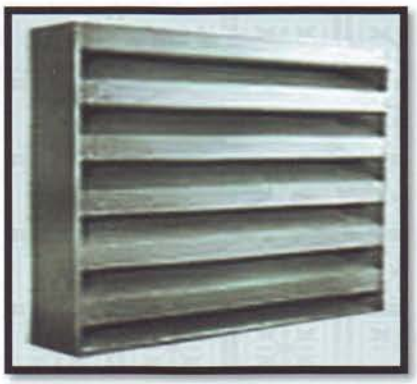
Design Manufacturing Applications



ACOTECH ACOUSTIC LOUVRES

ACOTECH acoustic louvers can be used in almost any situation which must permit the flow of the air but control noise. Typical applications include diesel generator rooms, plant room ventilations, fresh air intake, cooling towers and exhaust plenum chambers.

ACOTECH acoustic louvers are constructed by fabricated metal louvre blades with acoustic infill, alternated with air gaps and fitted into a four-sided metal case. The acoustic infill of the louvre blades is inert and non-combustible and is retained so that practical fatigue or corrosion does not occur.



TYPICAL PERSPECTIVE VIEW OF ACOTECH ACOUSTIC LOUVRE
Not To Scale

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NOISE REDUCTION								
MODEL	OCTAVE BAND CENTRE FREQUENCY (Hz)							
	63	125	250	500	1K	2K	4K	8K
AL 100/300	7	9	10	15	18	22	23	20
AL 100/600	7	10	13	22	32	42	43	39

MODEL : AL100 / 600
Not To Scale

MODEL : AL100 / 300
Not To Scale

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Design Manufacturing Applications

ACOTECH CIRCULARS SILENCERS

ACOTECH Circular Silencers are specially made for use in situations where it is necessary to reduce the noise in "air moving" applications such as axial fan, centrifugal fan and blower inlets and outlets, dust control equipment, motor cooling fans, enclosure ventilation, diesel generator sets, compressors, pump house and other industrial applications.

CONSTRUCTION

ACOTECH Circular Silencers are constructed from heavy gauge galvanized sheet metal casing with or without centre pod and internally filled with rockwool or fiberglass to provide high sound absorption. The standard construction of ACOTECH Circular Silencers remain it integrity up to a maximum pressure of 2000 Pa and continuous temperature exposure up to 260 degree C. Sound is attenuated by the acoustic infill in the silencer when the air passes through.

For special applications, such as high face velocity system or oily environment, a special acoustically transparent lamina can be inserted in between the perforated galvanized steel sheet and acoustic infill. Depend to the application; the lamina material can be glass tissue facing or polyester film.

TYPES & MODEL

They come in range of sizes from 300mm diameter upwards and flange for direct attachment to axial or centrifugal fans.

There are 2 different models for the ACOTECH Circular Silencer:

(1) ACS – without centre pod
Is a straight through circular silencers provide good acoustic performance with negligible pressure drop through the silencer.

(2) ACSP – with centre pod
Is designed with a centre pod and provides higher attenuation with reasonable pressure drop.

Each model comes in 2 different lengths

- 1D – 1 x diameter
- 2D – 2 x diameter

DETERMINE CIRCULAR SILENCER WEIGHT

For ACS – without centre pod
Weight (kg) = 80 x Diameter x Length (in meter)

For ACSP – with centre pod
Weight (kg) = 120 x Diameter x Length (in meter)

DETERMINE PRESSURE DROP

To determine the ACOTECH Circular Silencer ACSP (with centre pod) pressure drop, there are 4 steps have to be considered

1 – Determine the airflow across the circular silencer (m^3/s)
2 – Determine the circular silencer model, flange diameter and length
3 – Determine the "K" factor
4 – Pressure drop calculation in Pascal (Pa) = $0.6KV^2$

Where K : "K" factor (refer to "K" factor table)
V : Airflow (m^3/s) / Cross-sectional area of the silencer

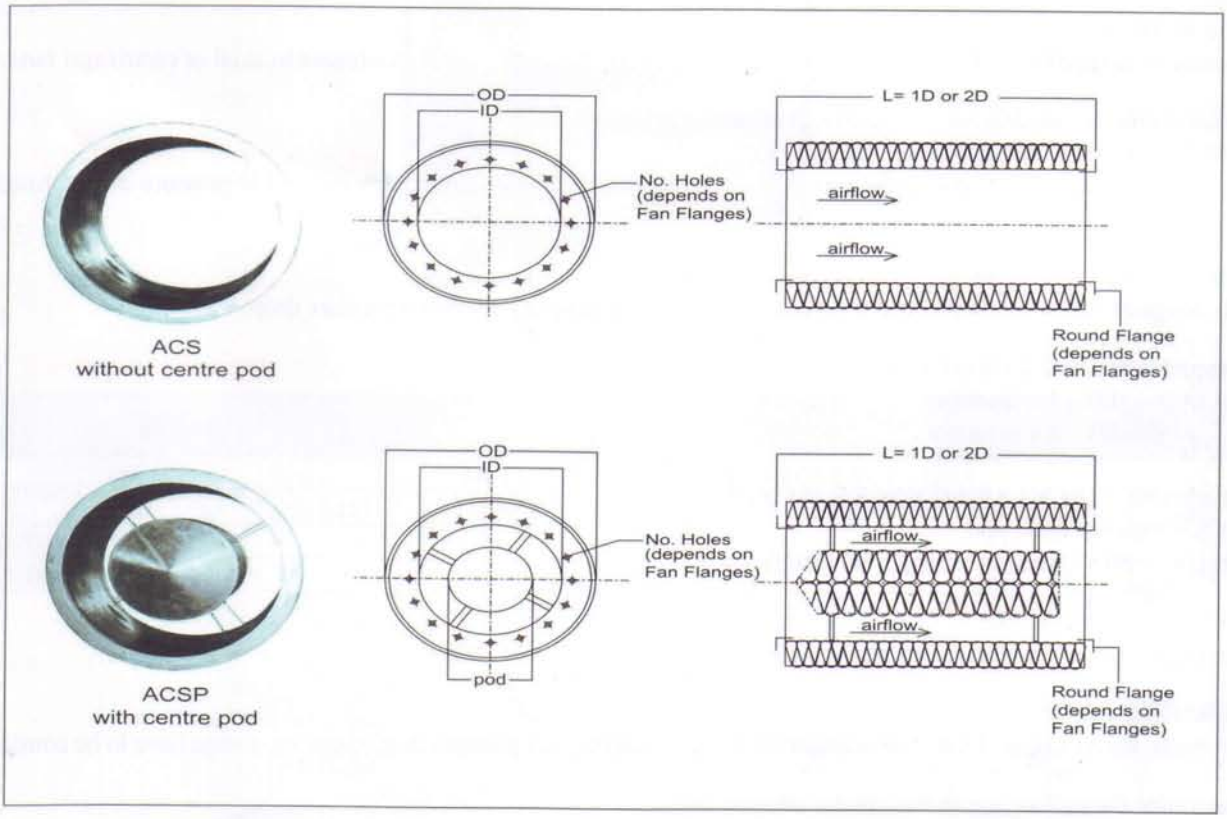
FINAL SELECTION

With our sound attenuator selection software, our acoustic engineer will be able to provide more precious silencer selection for particular noise control project requirement. The followings information is required for a professional acoustic calculation:

- Noise source Sound Power Level in 1/1 Octave band (63Hz, 125Hz, 250Hz, 500Hz, 1000Hz, 2000Hz, 4000Hz, 8000Hz)
- Flow rate through attenuator
- Detail duct layout drawing
- Maximum allowable pressure drop across attenuator
- Resultant noise level design criteria

Silencer Dimensional Data

Flange ID mm (depends on	*Casing OD*	*Shell Thickness*	*Length ID (Flange to*	*Length 2D (Flange to*	*Pod dia.*
305	455	75	305	610	150
315	465	75	315	630	150
400	550	75	400	800	250
450	600	75	450	900	250
500	650	75	500	1000	300
560	710	75	560	1120	350
630	780	75	630	1220	350
710	860	75	710	1420	400
800	1000	100	800	1600	450
900	1100	100	900	1800	500
1000	1200	100	1000	2000	550
1120	1320	100	1120	2240	600
1250	1450	100	1250	2240	750
1400	1600	100	1400	2800	800



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Sound Insertion Loss (dB) Data and 'k' Factor

flange dia. mm	*Model*	*Octave Band Centre Frequency (Hz)*								
		63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*'k' Factor*
305	ACS-1D	2	4	8	10	15	11	7	8	
to	ACSP-1D	4	6	8	13	20	22	19	16	0.46
560										
305	ACS-2D	4	6	12	16	22	18	14	12	
to	ACSP-2D	8	10	15	24	31	36	29	26	0.63
560										
630	ACS-1D	3	5	8	14	15	9	8	8	
to	ACSP-1D	4	6	10	16	21	22	19	13	0.46
800										
630	ACS-2D	5	8	13	21	24	17	13	11	
to	ACSP-2D	8	12	17	30	38	36	32	23	0.63
800										
900	ACS-1D	3	5	10	16	15	10	9	8	
to	ACSP-1D	4	6	11	19	22	16	15	13	0.46
1400										
900	ACS-2D	6	8	14	21	20	16	14	12	
to	ACSP-2D	8	12	19	30	35	30	23	17	0.63
1400										
1600	ACS-1D	4	5	10	16	13	9	8	7	
to	ACSP-1D	5	7	11	22	21	16	13	10	0.46
2000										
1600	ACS-2D	8	10	14	23	22	14	12	10	
to	ACSP-2D	9	13	22	26	28	27	18	15	0.63
2000										

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ACOTECH ENGINEERING SDN BHD

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