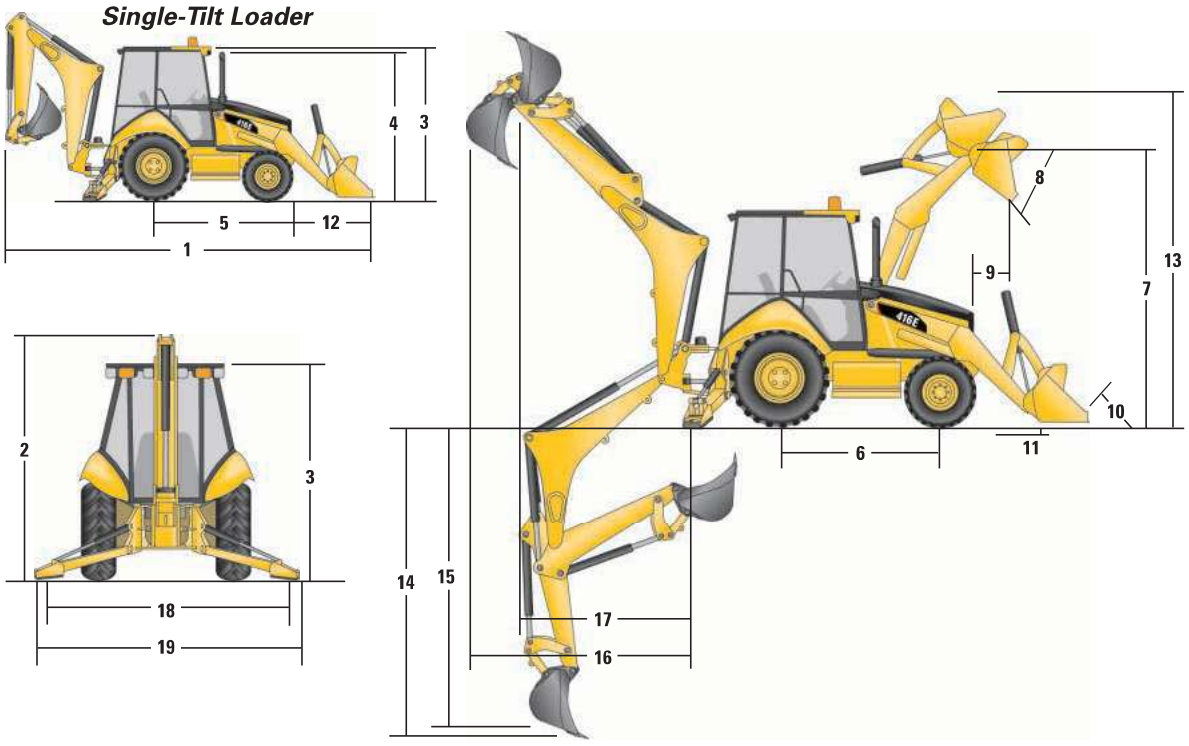
Backhoe Dimensions and Performance

		Standard Stick	Extendible Stick Retracted	Extendible Stick Extended
(14)	Digging Depth, SAE max	4360 mm/14 ft 4 in	4402 mm/14 ft 5 in	5456 mm/17 ft 11 in
(15)	Digging Depth, 2 ft flat bottom	4321 mm/14 ft 2 in	4363 mm/14 ft 4 in	5420 mm/17 ft 10 in
	Reach from rear axle centerline at ground line	6721 mm/22 ft 1 in	6760 mm/22 ft 2 in	7769 mm/25 ft 6 in
(16)	Reach from swing pivot at ground line	5618 mm/18 ft 5 in	5657 mm/18 ft 7 in	6666 mm/21 ft 10 in
	Maximum operating height	5523 mm/18 ft 1 in	5555 mm/18 ft 3 in	6302 mm/20 ft 8 in
	Loading height	3636 mm/11 ft 11 in	3577 mm/11 ft 9 in	4145 mm/13 ft 7 in
(17)	Loading reach	1768 mm/5 ft 10 in	1868 mm/6 ft 2 in	2771 mm/9 ft 1 in
	Swing arc	180°	180°	180°
	Bucket rotation	205°	205°	205°
(18)	Stabilizer spread, operating position (center)	3310 mm/10 ft 10 in	3310 mm/10 ft 10 in	3310 mm/10 ft 10 in
(19)	Stabilizer spread, operating position (outside)	3770 mm/12 ft 4 in	3770 mm/12 ft 4 in	3770 mm/12 ft 4 in
	Stabilizer spread, transport position	2322 mm/7 ft 7 in	2322 mm/7 ft 7 in	2322 mm/7 ft 7 in
	Bucket dig force	51.8 kN/11,655 lb	51.1 kN/11,491 lb	51.1 kN/11,491 lb
	Stick dig force	31.8 kN/7,151 lb	31.8 kN/7,151 lb	23.4 kN/5,250 lb

Dimensions and performance specifications shown are for machines equipped with 12.5/80-18 SGL front tires, 19.5L-24 IT525 rear tires, ROPS canopy, standard stick with 24-inch standard-duty bucket, and 1.0 yd^3 loader bucket and standard equipment unless otherwise specified.



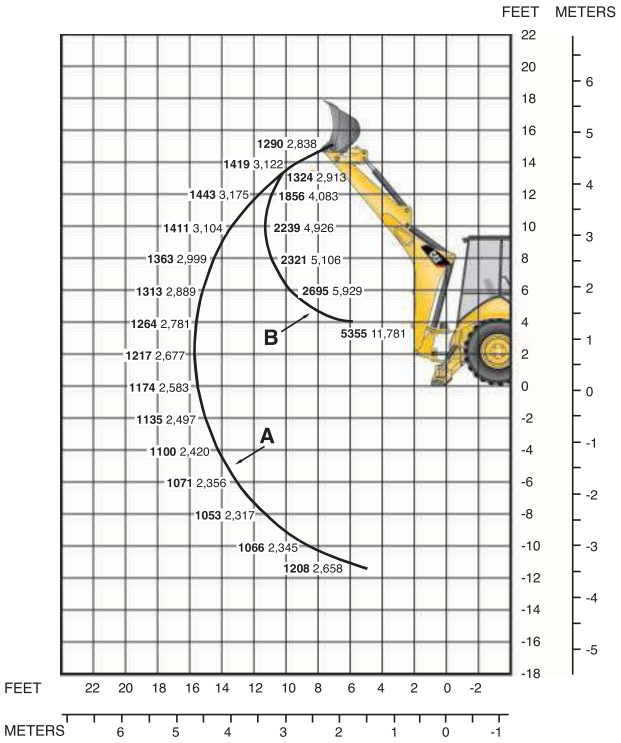
Backhoe Lift Capacity

KEY

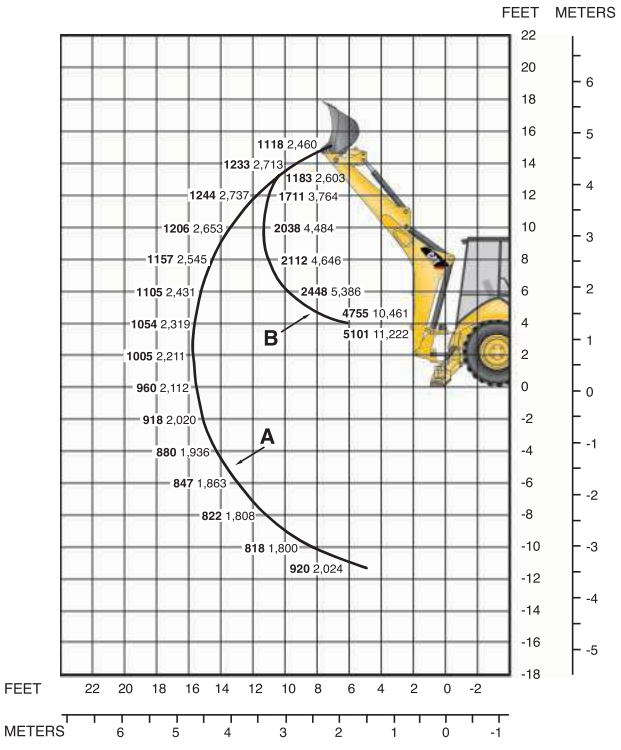
A — Boom lift **kg** lb

B — Stick lift **kg** lb

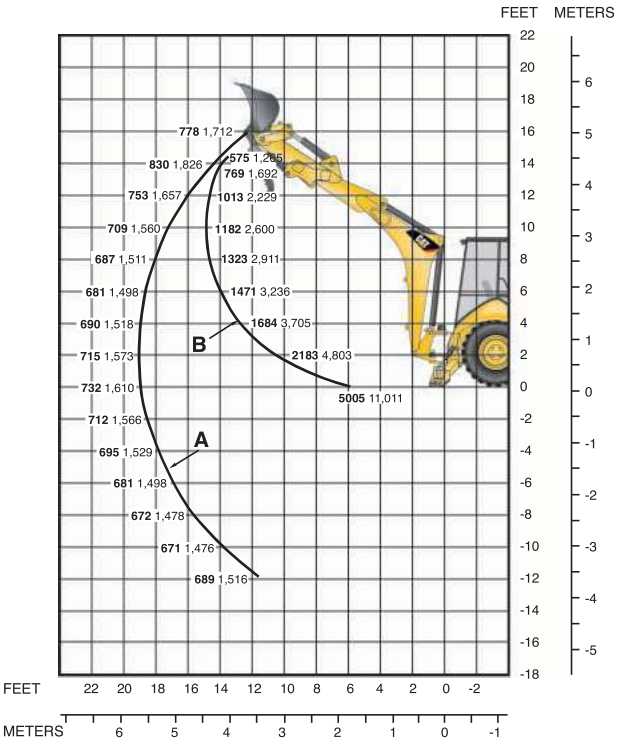
Cat 416E Standard Stick



Cat 416E Extendible Stick — Retracted



Cat 416E Extendible Stick — Extended



Lift capacities are over-end values. Machine equipped with 4WD, OROPS, 0.76 m^3 (1.0 yd^3) general purpose bucket, and 116 kg (255 lb) counterweight. Extendible stick includes 488 kg (1,075 lb) counterweight.

Standard Equipment

Standard equipment may vary. Consult your Caterpillar dealer for details.

Air cleaner
Alarm, back-up
Backhoe position foot rests
Battery, maintenance-free, 880 CCA
Boom transport lock
Brace, lift cylinder
Brake, secondary parking
Brakes, oil disc, dual pedals, interlocking
Bucket level indicator
Canopy, ROPS/FOPS
Coat hook
Coolant/Antifreeze, extended life
Counterweight, bumper
Differential lock
Dome light (cab only)
Engine, Cat 3054C DINA (Direct Injection Naturally Aspirated)
Engine enlosure
Face seals, O-ring
Fan, suction and guard
Fast reversing shuttle, all gears
Fenders, rear
Filters, spin-on: fuel, engine oil, transmission oil, water separator, hydraulic fluid
Flashing hazard/signal lights
Floor mat
Gauges
  Coolant temperature, fuel level, tachometer, hour meter, torque converter oil temperature
Ground level fuel fill
Hydraulic hose, XT™-3 ES
Hydraulic oil cooler
Indicators
  Air cleaner service, water separator service, brake on, engine coolant, hydraulic oil level sight gauge, oil pressure
Instrument panel lights
Key start/stop system
Lights, working (2 front, 2 rear)
Loader, self-leveling, return-to-dig and transmission disconnect switch
Lunch box holder
Mirror, rear view
Power receptacle, 12V, internal and external
Power steering, hydrostatic
Rubber impact strips on radiator guard
Seat belt, retractable (51 mm/2 in)
Service harness
Stabilizer shoes, grouser type
Seat, air suspension with armrest
Stabilizer controls, cable operated
Starting system, glow plugs
Stop and tail lights
Swing transport lock
Tires, see page 17
Toolbox, external, lockable
Torque converter
Throttles, hand and foot
Transmission, four speed, syncromesh
Transmission neutralizer switch
Transport tie-downs
Warning horn, electric

Optional Equipment (with approximate change in operating weight)

Optional equipment may vary. Consult your Caterpillar dealer for specifics.

	kg	lb
AccuGrade® Site Reference System for Backhoe Loaders	19	42
AccuGrade Laser Reference System for Backhoe Loaders	48	105
Attachments, backhoe		
Mechanical Quick Coupler		
D and E-Series buckets	75	165
C-Series buckets	75	165
D, E and Deere buckets	75	165
D, E and Case buckets	80	176
Hydraulic thumb	139-157	306-345
Attachments, front loader (single tilt)		
General purpose buckets		
0.76 m^3 (1.0 yd^3)	385	847
0.96 m^3 (1.25 yd^3)	452	994
Multi purpose bucket		
1.0 m^3 (1.3 yd^3)	714	1,571
1.0 m^3 (1.3 yd^3) with forks	884	1,945
Axle, front		
Four wheel drive with driveshaft guard	155	341
Backhoe controls		
Excavator pattern	0	0
Battery, additional, 880 CCA	25	55
Cab, utility	210	462
Cab, utility plus	220	484
Cab, utility plus with air conditioning	258	568
Canopy Plus, ROPS	15	33
Cat 3054 DIT (Direct Injection Turbo) Engine	5	11
Coolant, additional protection, –50° C (–58° F)	0	0
Counterweights		
255 lb	116	255
510 lb	231	510
1,075 lb	488	1,075

	kg	lb
Cutting edge, bolt-on, two piece	70	154
Fenders, 4WD, front	12	26
Fenders, rear extensions	1	2
Guards		
Stabilizer, rock	31	68
High ambient cooling package	2	4
Hydraulic valves, loader (3rd valve for MP)	27	59
Hydraulic valves, backhoe		
5th Function	5	11
6th Function	5	11
Hydraulic lines		
Combo, Standard Stick	27	59
Combo, E-Stick	27	59
One-way, E-Stick	22	48
Lights: Working, additional (2 front, 2 rear)	0	0
Product Link	4	9
Ride control	22	48
Rotating beacon		
Magnetic mount	5	11
Stabilizers, available with guards		
Street	37	81
Reversible	38	84
Sticks		
Extendible	299	658
Teeth, loader bucket	45	99
Vandalism protection		
Gauge cover	1	2
Padlocks	1	2
Hood lock	0	0

416E Backhoe Loader

For more complete information on Cat products, dealer services, and industry solutions, visit us on the web at **www.cat.com**

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Materials and specifications are subject to change without notice.
Featured machines in photos may include additional equipment.
See your Caterpillar dealer for available options.

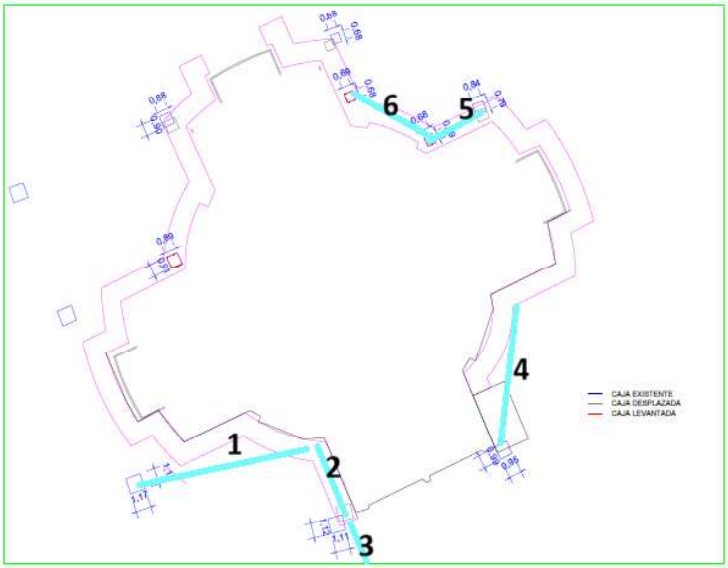
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AEHQ5684-02 (11-07)
Replaces AEHQ5684-01

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ANEXO TECNICO

NP 24: TUBERÍA SANITARIA PVC DE 3", INCLUYE ACCESORIOS, UNIONES, LIMPIEZA, PEGADO, SOPORTES, Y PUESTA EN SERVICIO



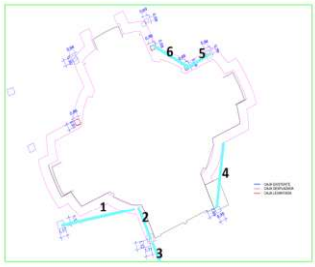
ANEXO 024

NP 24:TUBERÍA SANITARIA PVC DE 3", INCLUYE ACCESORIOS, UNIONES, LIMPIEZA, PEGADO, SOPORTES, Y PUESTA EN SERVICIO.

1= 18 ML
2 = 8 ML
3 = 17 ML
4 = 10 ML
5 =6 ML
6 = 8 ML
TOTAL = 67 ML

ÍTEM Nº	NP 24	ML
DESCRIPCIÓN ÍTEM	TUBERÍA SANITARIA PVC DE 3", INCLUYE ACCESORIOS, UNIONES, LIMPIEZA, PEGADO, SOPORTES, Y PUESTA EN SERVICIO	
CORTE Nº:		30-sep-26

PLANO DESCRIPTIVO DE LA MEMORIA



ANEXO 024

NP 24:TUBERÍA SANITARIA PVC DE 3", INCLUYE ACCESORIOS, UNIONES, LIMPIEZA, PEGADO, SOPORTES, Y PUESTA EN SERVICIO.

1= 18 ML
2 = 8 ML
3 = 17 ML
4 = 10 ML
5 =6 ML
6 = 8 ML
TOTAL = 67 ML

UBICACIÓN	DIMENSIONES UND	#	N° DE ELEMENTOS	MEDIDA TOTAL
ENTRE EJES 1 al 6// A al G	18	1	1	18
ENTRE EJES 1 al 6// A al G	8	2	1	8
ENTRE EJES 1 al 6// A al G	17	3	1	17
ENTRE EJES 1 al 6// A al G	10	4	1	10
ENTRE EJES 1 al 6// A al G	6	5	1	6
ENTRE EJES 1 al 6// A al G	8	6	1	8
			TOTAL	**67**

Hoja de especificaciones técnicas

Tuberías Sanitaria

Información general

Los tubosistemas PVC Sanitaria de Pavco Wavin son fabricados en PVC (Policloruro de Vinilo).

Estas tuberías están diseñadas para transportar agua servida, residual, doméstica, industrial, aguas lluvias, ventilación. Adicionalmente cumplen con la resolución 0501 de 2017.

Los tubosistemas PVC Sanitaria de Pavco Wavin son fabricados para ser unidos con cemento solvente. Los tubos vienen de extremo liso y los accesorios con campana.

Normatividad

Los Tubosistemas PVC Sanitaria Pavco Wavin son fabricados bajo las normas NTC 1087, Tubos de Policloruro de Vinilo (PVC) Rígido para Uso Sanitario-Aguas Lluvias y Ventilación; NTC 1341 Accesorios de Poli (Cloruro de Vinilo)(PVC) Rígido para Tubería Sanitaria-Aguas Lluvias y Ventilación y NTC 576 Cemento Solvente para Sistemas de Tubos plásticos de tubos de poli(cloruro de vinilo) (PVC).

Aplicaciones

- Instalación en Primer Piso
- Resistentes a la Corrosión
- Paredes Lisas
- Livianas
- Resistentes al Impacto
- Facilidad de Instalación
- Prefabricación
- Durabilidad
- Auto-extinguibles

Economía

Las tuberías Pavco Wavin ofrecen economías considerables bajo varios aspectos:

a. Las Tuberías y los accesorios son más económicos diámetro por diámetro que los metálicos.
b. Por su coeficiente de fricción se pueden utilizar menores diámetros que con otras tuberías para igual caudal e igual velocidad.
c. El costo de la mano de obra de la instalación es muy bien reducido debido a la facilidad y rapidez de la soldadura líquida.
d. El costo de transporte es también más bajo debido a su peso liviano y facilidad de manejo.
e. El mantenimiento es mínimo pues no es necesario pintarlas para prevenir oxidaciones.

Vida Útil

La vida estimada es de 50 años. Esta información no es garantía de producto dado que Pavco Wavin no ejerce control sobre todos los aspectos que se presentan en la instalación y que afectan directamente el desempeño y la vida útil del producto.

Resistencia química

Los resultados de su comportamiento se basan en inmersiones cortas en los compuestos descritos no diluidos. Esta información debe tomarse como una guía (ver guía resistencia química en el Manual Técnico Tubosistemas Sanitaria Pavco Wavin).

Portafolio de producto

RES 0501 NTC 1087

Diámetro nominal	Referencia	Diámetro exterior promedio		Diámetro interior promedio		Espesor de pared mínimo	Peso
Pulg.		mm.	Pulg.	mm.	mm.	Pulg.	Kg/m.
Tuberías sanitarias y aguas lluvias Presión de Prueba: 0.35 MPa - 50 PSI							
1.1/2	2900319	48.26	1.90	42.68	2.79	0.11	0.64
2	2902515	60.32	2.37	54.48	2.92	0.11	0.84
3	2902517	82.56	3.25	76.20	3.18	0.12	1.27
4	2900331	114.30	4.50	107.70	3.30	0.13	1.84
6	2900336	168.28	6.62	160.04	4.12	0.16	3.41
Tuberías ventilación							
1.1/2	2900338	48.26	1.90	45.22	1.52	0.06	0.36
2	2900341	60.32	2.37	56.76	1.78	0.07	0.53
3	2900344	82.56	3.25	79.00	1.78	0.07	0.73
4	2900347	114.30	4.50	110.08	2.11	0.08	1.20
Tuberías sanitarias Novatec La longitud normal de los tubos es de 6 mt.							
2	2900323	60.32	2.37	54.48	2.92	0.11	0.84
3	2900326	82.56	3.25	76.20	3.18	0.12	1.27
4	2900330	114.30	4.50	107.70	3.30	0.13	1.84
6	2900335	168.28	6.62	160.04	4.12	0.16	3.41

Accesorios Sanitaria



Uniones	
Diámetro nominal	Referencia
Pulg.	
1.1/2	2901690
2	2901693
3	2901696
4	2901700
6	2901703



Codos 90° 1/4 C x E

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901210
2	2901214
3	2901218
4	2901222
6	2901226



Codos 90° 1/4 C x C

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901209
2	2901213
3	2901217
4	2901221
6	2901224



Codos 45° 1/8 C x E

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901180
2	2901183
3	2901187
4	2901191
6	2901195



Codos 45° 1/8 C x C

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901179
2	2901181
3	2901185
4	2901189
6	2901193



Codos 22.5° 1/16 C x E

Diámetro nominal	Referencia
Pulg.	
2	2901163
3	2901165
4	2901168



Codos 22.5° 1/16 C x C

Diámetro nominal	Referencia
Pulg.	
2	2901162
3	2901164
4	2901167
6	2903450



Codos reventilados

Diámetro nominal	Referencia
Pulg.	
3 x 2	2901156
4 x 2	2901157



Tees sanitarias

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901558
2	2901561
3	2901563
4	2901567
6	2902870



Tees sanitarias reducidas

Diámetro nominal	Referencia
Pulg.	
2 x 1/2	2901543
3x2	2901545
4x2	2901548
4x3	2901550
6x4	2902828



Tees sanitarias dobles

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901469
2	2901471
3	2901473
4	2901476



Tees sanitarias dobles reducida

Diámetro nominal	Referencia
Pulg.	
2x1.1/2	2901460
3x2	2901462
4x2	2901464
4x3	2901466



Yees sanitarias

Diámetro nominal	Referencia
Pulg.	
2	2901748
3	2901751
4	2901755
6	2901758



Yees sanitarias reducidas

Diámetro nominal	Referencia
Pulg.	
3x2	2901738
4x2	2901741
4x3	2901743
6x4	2901716



Yees sanitarias dobles

Diámetro nominal	Referencia
Pulg.	
2	2901729
3	2901731
4	2901734



Yees sanitarias dobles reducidas

Diámetro nominal	Referencia
Pulg.	
2x3x2	2901721
2x4x2	2901724
3x4x3	2901726



Sifón 180°

Diámetro nominal	Referencia
Pulg.	
2	2901291



Sifón 135° (no incluye codo)

Diámetro nominal	Referencia
Pulg.	
3	2901281
4	2901283



Sifones con tapón C x C

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901286
2*	2901292

* El accesorio incluye tapón de limpieza. No incluye el codo de 90°.
* No amparada bajo el sello NTC 1341.



Adaptadores de limpieza

Diámetro nominal	Referencia
Pulg.	
2	2900678
3	2900680
4	2900682
6	2900686

*El accesorio incluye el tapón de limpieza y el anillo de caucho.



Bujes soldados

Diámetro nominal	Referencia
Pulg.	
2 x 1.1/2	2901021
3 x 1.1/2	2901026
3x2	2901028
4x2	2901030
4x3	2901033
6x4	2901036



Juntas de expansión

Diámetro nominal	Referencia
Pulg.	
3	2901258
4	2901260
6	2902730



Junta de expansión de dos cuerpos (unión de reparación 4)

Diámetro nominal	Referencia
Pulg.	
4	2901688



Adaptador a pared para sifón blanco

Diámetro nominal	Referencia
Pulg.	
1.1/4	2900690
1.1/2	2900688
1.1/2	2900689



Tapones machos roscados

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901347
3	2901348
4	2901350



Tapones para pruebas sanitarias

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901437
2	2901439
3	2901441
4	2901443
6	2905559

Únicamente para pruebas de estanqueidad hasta 5 pisos



Válvula Antirretorno PVC Sanitaria

Diámetro nominal	Referencia
Pulg.	
4	2903173
6	2909008

Línea sanitaria grandes diámetros

Referencia	Descripción	Diámetro	Espesor	Diámetro exterior	RDE	PS	Diámetro interior	Peso	Presentación
		Pulg.	mm.	mm.	mm.	PSI	mm.	Kg/m.	
2900420	Tubería PVC	8	5.33	219.08	41	28	208.42	5.95	Amarilla, extremo liso Tubos de 6m
2900421	Sanitaria	10	6.66	273.05	41	28	259.73	9.27	





Uniones

Referencia	Diámetro	Peso	L	A	B
	Pulg.	Kg	mm.	mm.	mm.
2909778	8	1.99	209.55	101.6	6.35
2903817	10	3.26	261.94	127	7.95





Codo sanitaria 90° CxC

Referencia	Diámetro	Peso	L
	Pulg.	Kg	mm.
2909777	8	3.55	152.40
2903802	10	10.02	158.75




Codo sanitaria 45° CxC

Referencia	Diámetro	Peso	A
	Pulg.	Kg	mm.
2909776	8	2.67	52.39
2903804	10	5.09	79.38




Codo sanitaria 22.5° CxC

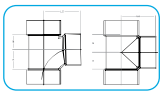
Referencia	Diámetro	Peso	L1	L3
	Pulg.	Kg	mm.	mm.
2903807	8	2.46	102.1	140.21
2903808	10	4.20	127.76	178.56




Codo sanitaria 45° CxE

Referencia	Diámetro	Peso	A	B
	Pulg.	Kg	mm.	mm.
2903805	8	2.61	52.39	153.99
2903806	10	4.93	79.38	207.14





Tees sanitarias

Referencia	Diámetro	Peso	A	B	L2
	Pulg.	Kg	mm.	mm.	mm.
2903799	8	5.03	152.4	152.4	114.05
2903800	10	8.68	158.75	158.75	158.75




Adaptador de limpieza

Referencia	Diámetro	Peso	A	B	C
	Pulg.	Kg	mm.	mm.	mm.
2905389	8	2.35			
2905390	10	4.73			




Yees sanitarias

Referencia	Diámetro	Peso	A	B	C
	Pulg.	Kg	mm.	mm.	mm.
2903794	8	6.65	358.8	60.3	298.5
2903798	10	11.06	419.1	73.0	346.1




Yees sanitarias reducida

Referencia	Diámetro	Peso	A	B	C
	Pulg.	Kg	mm.	mm.	mm.
2903792	8x8x4	5.59	266.7	25.4	293.7
2903793	8x8x6	4.66	266.7	25.4	249.3
2903795	10x10x4	10.12	363.6	33.4	396.8
2903796	10x10x6	10.32	363.6	33.4	371.0
2903797	10x10x8	9.19	363.6	33.4	329.7




Buje

Referencia	Diámetro	Peso	A	B	C
	Pulg.	Kg	mm.	mm.	mm.
2903811	8x4	1.69	130.18	41.28	15.88
2909775	8x6	1.90	117.48	41.28	
2903813	10x6	5.36	140.46	38.1	
2903814	10x8	3.43	140.46	38.1	



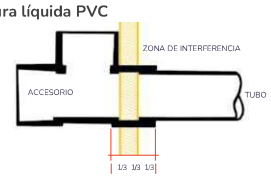

Tapón

Referencia	Diámetro	Peso	L1	L3
	Pulg.	Kg	mm.	mm.
2903809	8	1.85	157.63	101.6
2903810	10	2.82	196.85	127.0

Soldadura-Pavco Wavin Soldamax PVC

Especialmente formulada para soldar tuberías de PVC. Las uniones hechas en soldadura líquida son más resistentes que la misma tubería. (Para referencias de rendimientos consultar lo indicado en el manual técnico de la línea).

Soldadura líquida PVC



Materiales

Los Tubosistemas son fabricados con compuestos de Policloruro de vinilo rígido, Tipo II, Grado I, tal como se definen en la norma NTC 369.

Dimensiones y tolerancias

Las dimensiones y tolerancias de los Tubosistemas serán las que se señalan en las tablas siguientes.

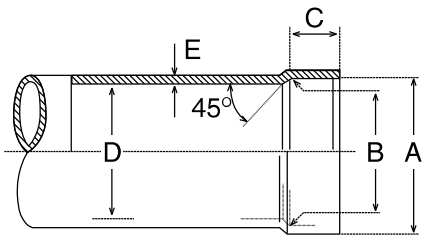
Tabla I tubería sanitaria PVC

Diámetro nominal	Diámetro exterior		Tolerancia		Redondez		Espesor de pared	
Pulg.	mm.	Pulg.	mm.	Pulg.	mm.	Pulg.	mm.	Pulg.
1.1/2	1.900	48.26	±0.009	±0.24	±0.031	±0.80	0.110	2.79
2	2.375	60.33	±0.009	±0.24	±0.031	±0.80	0.115	2.92
3	3.250	82.55	±0.011	±0.28	±0.031	±0.80	0.125	3.18
4	4.500	114.30	±0.013	±0.32	±0.047	±1.20	0.130	3.30
6	6.625	168.28	±0.014	±0.36	±0.047	±1.20	0.162	4.12

Tabla ventilación y aguas lluvias

Diámetro nominal	Diámetro exterior		Tolerancia		Redondez		Espesor de pared	
Pulg.	mm.	Pulg.	mm.	Pulg.	mm.	Pulg.	mm.	Pulg.
1.1/2	1.900	48.26	±0.006	±0.15	±0.12	±0.31	0.06	1.52
2	2.375	60.33	±0.006	±0.15	±0.12	±0.31	0.06	1.78
3	3.250	82.55	±0.008	±0.20	±0.15	±0.38	0.07	1.78
4	4.500	114.30	±0.009	±0.23	±0.20	±0.51	0.08	2.10

Tabla II Accesorios



Pulgadas

Diámetro nominal	A		B		C (min)	D (min)	E (min)
1.1/2	1.915	±0.12	1.89	±0.12	0.69	1.69	0.11
2	2.390	±0.12	2.37	±0.12	0.75	2.16	0.11
3	3.270	±0.15	3.24	±0.15	1.50	3.02	0.12
4	4.520	±0.15	4.49	±0.15	1.75	4.26	0.13
6	6.647	±0.20	6.61	±0.20	3.00	6.32	0.16

Milímetros

Diámetro nominal	A		B		C (min)	D (min)	E (min)
1.1/2	48.64	±0.12	48.13	±0.31	17.45	43.05	2.79
2	60.71	±0.12	60.20	±0.31	19.05	54.86	2.92
3	83.06	±0.15	82.42	±0.38	38.10	76.71	3.18
4	114.81	±0.15	114.17	±0.38	44.45	108.20	3.30
6	168.83	±0.20	168.02	±0.76	76.20	160.66	4.15

Calidad

Siguiendo los métodos de prueba de la norma 1087 y ASTM 2665, las especificaciones de calidad son las siguientes:

- Absorción de Agua: Los tubosistemas no aumentarán de peso en más de 0.3%
- Impacto: La mínima resistencia al impacto será de 81 J a 23°C(73°F)
- Soldadura: Las uniones de tubos y accesorios hechas con soldadura líquida no tendrán escapes, cuando sean sometidas a una presión interna de 50 psi.

Recomendaciones de instalación

Tener en cuenta lo indicado en el Manual Técnico Tubosistemas Sanitaria Pavco Wavin.

orbia | Building & Infrastructure

Pavco Wavin es parte de Orbia, un colectivo de empresas que trabajan juntas para afrontar algunos de los retos más complejos del mundo. Nos une un objetivo común: mejorar la vida en todo el mundo.

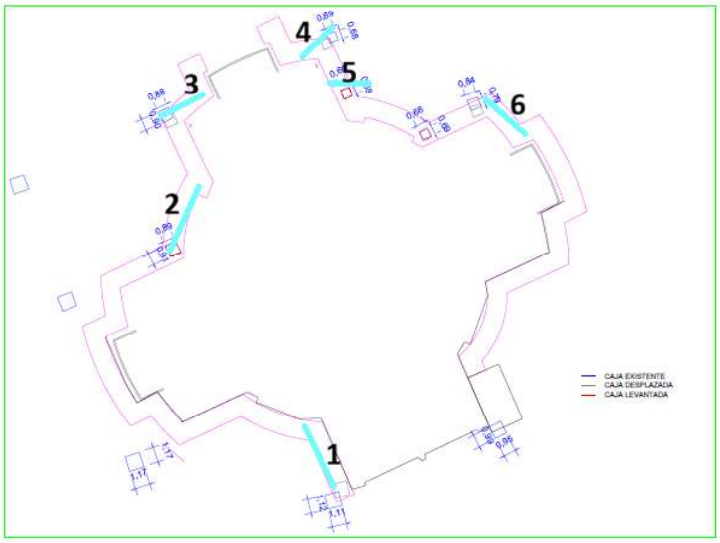
Pavco Wavin, el negocio de construcción e infraestructura de Orbia, está mejorando la vida en todo el mundo mediante la construcción de entornos saludables y sostenibles. Pavco Wavin es un innovador centrado en el agua que ofrece soluciones para un suministro de agua potable más seguro, saneamiento y resiliencia del agua urbana. La empresa también invierte en soluciones climáticas interiores.

Pavco Wavin | Autopista Sur N° 71-75, Bogotá D.C. | Conmutador: (601) 7825000 | www.pavcowavin.com.co

© 2026 **Pavco Wavin** se reserva el derecho de hacer alteraciones sin previo aviso. Debido a cambios en el desarrollo de los productos las especificaciones técnicas pueden cambiar. La instalación debe cumplir con las instrucciones de instalación.

ANEXO TECNICO

NP 25: TUBERÍA SANITARIA PVC DE 2", INCLUYE ACCESORIOS, UNIONES, LIMPIEZA, PEGADO, SOPORTES, Y PUESTA EN SERVICIO



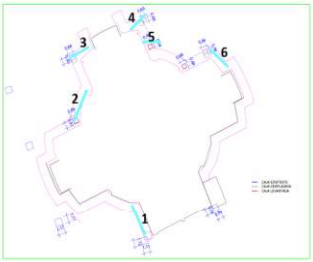
ANEXO 025

NP 25 TUBERÍA SANITARIA PVC DE 2", INCLUYE ACCESORIOS, UNIONES, LIMPIEZA, PEGADO, SOPORTES, Y PUESTA EN SERVICIO

1 = 8 ML
2=7,50 ML
3= 5,50 ML
4= 8 ML
5 = 7 ML
6= 10 ML
TOTAL = 46 ML

CONTRATISTA		UNION TEMPORAL COFAC MDM
INTERVENTOR Ó SUPERVISOR		CIVALL INGENIEROS & ARQUITECTOS CONSTRUCTORES S.A.S
ÍTEM Nº	NP 25	ML
DESCRIPCIÓN ÍTEM	TUBERÍA SANITARIA PVC DE 2", INCLUYE ACCESORIOS, UNIONES, LIMPIEZA, PEGADO, SOPORTES, Y PUESTA EN SERVICIO	
CORTE Nº:		30-sep-26

PLANO DESCRIPTIVO DE LA MEMORIA



ANEXO 025

NP 25 TUBERÍA SANITARIA PVC DE 2", INCLUYE ACCESORIOS, UNIONES, LIMPIEZA, PEGADO, SOPORTES, Y PUESTA EN SERVICIO

1 = 8 ML
2=7,50 ML
3= 5,50 ML
4= 8 ML
5 = 7 ML
6= 10 ML
TOTAL = 46 ML

UBICACIÓN	DIMENSIONES UND	#	N° DE ELEMENTOS	MEDIDA TOTAL
ENTRE EJES 1 al 6// A al G	8	1	1	8
ENTRE EJES 1 al 6// A al G	7,5	2	1	7,5
ENTRE EJES 1 al 6// A al G	5,5	3	1	5,5
ENTRE EJES 1 al 6// A al G	8	4	1	8
ENTRE EJES 1 al 6// A al G	7	5	1	7
ENTRE EJES 1 al 6// A al G	10	6	1	10
			TOTAL	**46**

Hoja de especificaciones técnicas

Tuberías Sanitaria

Información general

Los tubosistemas PVC Sanitaria de Pavco Wavin son fabricados en PVC (Policloruro de Vinilo).

Estas tuberías están diseñadas para transportar agua servida, residual, doméstica, industrial, aguas lluvias, ventilación. Adicionalmente cumplen con la resolución 0501 de 2017.

Los tubosistemas PVC Sanitaria de Pavco Wavin son fabricados para ser unidos con cemento solvente. Los tubos vienen de extremo liso y los accesorios con campana.

Normatividad

Los Tubosistemas PVC Sanitaria Pavco Wavin son fabricados bajo las normas NTC 1087, Tubos de Policloruro de Vinilo (PVC) Rígido para Uso Sanitario-Aguas Lluvias y Ventilación; NTC 1341 Accesorios de Poli (Cloruro de Vinilo)(PVC) Rígido para Tubería Sanitaria-Aguas Lluvias y Ventilación y NTC 576 Cemento Solvente para Sistemas de Tubos plásticos de tubos de poli(cloruro de vinilo) (PVC).

Aplicaciones

- Instalación en Primer Piso
- Resistentes a la Corrosión
- Paredes Lisas
- Livianas
- Resistentes al Impacto
- Facilidad de Instalación
- Prefabricación
- Durabilidad
- Auto-extinguibles

Economía

Las tuberías Pavco Wavin ofrecen economías considerables bajo varios aspectos:

a. Las Tuberías y los accesorios son más económicos diámetro por diámetro que los metálicos.
b. Por su coeficiente de fricción se pueden utilizar menores diámetros que con otras tuberías para igual caudal e igual velocidad.
c. El costo de la mano de obra de la instalación es muy bien reducido debido a la facilidad y rapidez de la soldadura líquida.
d. El costo de transporte es también más bajo debido a su peso liviano y facilidad de manejo.
e. El mantenimiento es mínimo pues no es necesario pintarlas para prevenir oxidaciones.

Vida Útil

La vida estimada es de 50 años. Esta información no es garantía de producto dado que Pavco Wavin no ejerce control sobre todos los aspectos que se presentan en la instalación y que afectan directamente el desempeño y la vida útil del producto.

Resistencia química

Los resultados de su comportamiento se basan en inmersiones cortas en los compuestos descritos no diluidos. Esta información debe tomarse como una guía (ver guía resistencia química en el Manual Técnico Tubosistemas Sanitaria Pavco Wavin).

Portafolio de producto

RES 0501 NTC 1087

Diámetro nominal	Referencia	Diámetro exterior promedio		Diámetro interior promedio		Espesor de pared mínimo	Peso
Pulg.		mm.	Pulg.	mm.	mm.	Pulg.	Kg/m.
Tuberías sanitarias y aguas lluvias Presión de Prueba: 0.35 MPa - 50 PSI							
1.1/2	2900319	48.26	1.90	42.68	2.79	0.11	0.64
2	2902515	60.32	2.37	54.48	2.92	0.11	0.84
3	2902517	82.56	3.25	76.20	3.18	0.12	1.27
4	2900331	114.30	4.50	107.70	3.30	0.13	1.84
6	2900336	168.28	6.62	160.04	4.12	0.16	3.41
Tuberías ventilación							
1.1/2	2900338	48.26	1.90	45.22	1.52	0.06	0.36
2	2900341	60.32	2.37	56.76	1.78	0.07	0.53
3	2900344	82.56	3.25	79.00	1.78	0.07	0.73
4	2900347	114.30	4.50	110.08	2.11	0.08	1.20
Tuberías sanitarias Novatec La longitud normal de los tubos es de 6 mt.							
2	2900323	60.32	2.37	54.48	2.92	0.11	0.84
3	2900326	82.56	3.25	76.20	3.18	0.12	1.27
4	2900330	114.30	4.50	107.70	3.30	0.13	1.84
6	2900335	168.28	6.62	160.04	4.12	0.16	3.41

Accesorios Sanitaria



Uniones	
Diámetro nominal	Referencia
Pulg.	
1.1/2	2901690
2	2901693
3	2901696
4	2901700
6	2901703



Codos 90° 1/4 C x E

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901210
2	2901214
3	2901218
4	2901222
6	2901226



Codos 90° 1/4 C x C

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901209
2	2901213
3	2901217
4	2901221
6	2901224



Codos 45° 1/8 C x E

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901180
2	2901183
3	2901187
4	2901191
6	2901195



Codos 45° 1/8 C x C

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901179
2	2901181
3	2901185
4	2901189
6	2901193



Codos 22.5° 1/16 C x E

Diámetro nominal	Referencia
Pulg.	
2	2901163
3	2901165
4	2901168



Codos 22.5° 1/16 C x C

Diámetro nominal	Referencia
Pulg.	
2	2901162
3	2901164
4	2901167
6	2903450



Codos reventilados

Diámetro nominal	Referencia
Pulg.	
3 x 2	2901156
4 x 2	2901157



Tees sanitarias

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901558
2	2901561
3	2901563
4	2901567
6	2902870



Tees sanitarias reducidas

Diámetro nominal	Referencia
Pulg.	
2 x 1/2	2901543
3x2	2901545
4x2	2901548
4x3	2901550
6x4	2902828



Tees sanitarias dobles

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901469
2	2901471
3	2901473
4	2901476



Tees sanitarias dobles reducida

Diámetro nominal	Referencia
Pulg.	
2x1.1/2	2901460
3x2	2901462
4x2	2901464
4x3	2901466



Yees sanitarias

Diámetro nominal	Referencia
Pulg.	
2	2901748
3	2901751
4	2901755
6	2901758



Yees sanitarias reducidas

Diámetro nominal	Referencia
Pulg.	
3x2	2901738
4x2	2901741
4x3	2901743
6x4	2901716



Yees sanitarias dobles

Diámetro nominal	Referencia
Pulg.	
2	2901729
3	2901731
4	2901734



Yees sanitarias dobles reducidas

Diámetro nominal	Referencia
Pulg.	
2x3x2	2901721
2x4x2	2901724
3x4x3	2901726



Sifón 180°

Diámetro nominal	Referencia
Pulg.	
2	2901291



Sifón 135° (no incluye codo)

Diámetro nominal	Referencia
Pulg.	
3	2901281
4	2901283



Sifones con tapón C x C

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901286
2*	2901292

* El accesorio incluye tapón de limpieza. No incluye el codo de 90°.
* No amparada bajo el sello NTC 1341.



Adaptadores de limpieza

Diámetro nominal	Referencia
Pulg.	
2	2900678
3	2900680
4	2900682
6	2900686

*El accesorio incluye el tapón de limpieza y el anillo de caucho.



Bujes soldados

Diámetro nominal	Referencia
Pulg.	
2 x 1.1/2	2901021
3 x 1.1/2	2901026
3x2	2901028
4x2	2901030
4x3	2901033
6x4	2901036



Juntas de expansión

Diámetro nominal	Referencia
Pulg.	
3	2901258
4	2901260
6	2902730



Junta de expansión de dos cuerpos (unión de reparación 4)

Diámetro nominal	Referencia
Pulg.	
4	2901688



Adaptador a pared para sifón blanco

Diámetro nominal	Referencia
Pulg.	
1.1/4	2900690
1.1/2	2900688
1.1/2	2900689



Tapones machos roscados

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901347
3	2901348
4	2901350



Tapones para pruebas sanitarias

Diámetro nominal	Referencia
Pulg.	
1.1/2	2901437
2	2901439
3	2901441
4	2901443
6	2905559

Únicamente para pruebas de estanqueidad hasta 5 pisos



Válvula Antirretorno PVC Sanitaria

Diámetro nominal	Referencia
Pulg.	
4	2903173
6	2909008

Línea sanitaria grandes diámetros

Referencia	Descripción	Diámetro	Espesor	Diámetro exterior	RDE	PS	Diámetro interior	Peso	Presentación
		Pulg.	mm.	mm.	mm.	PSI	mm.	Kg/m.	
2900420	Tubería PVC	8	5.33	219.08	41	28	208.42	5.95	Amarilla, extremo liso Tubos de 6m
2900421	Sanitaria	10	6.66	273.05	41	28	259.73	9.27	





Uniones

Referencia	Diámetro	Peso	L	A	B
	Pulg.	Kg	mm.	mm.	mm.
2909778	8	1.99	209.55	101.6	6.35
2903817	10	3.26	261.94	127	7.95





Codo sanitaria 90° CxC

Referencia	Diámetro	Peso	L
	Pulg.	Kg	mm.
2909777	8	3.55	152.40
2903802	10	10.02	158.75




Codo sanitaria 45° CxC

Referencia	Diámetro	Peso	A
	Pulg.	Kg	mm.
2909776	8	2.67	52.39
2903804	10	5.09	79.38




Codo sanitaria 22.5° CxC

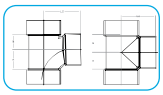
Referencia	Diámetro	Peso	L1	L3
	Pulg.	Kg	mm.	mm.
2903807	8	2.46	102.1	140.21
2903808	10	4.20	127.76	178.56




Codo sanitaria 45° CxE

Referencia	Diámetro	Peso	A	B
	Pulg.	Kg	mm.	mm.
2903805	8	2.61	52.39	153.99
2903806	10	4.93	79.38	207.14





Tees sanitarias

Referencia	Diámetro	Peso	A	B	L2
	Pulg.	Kg	mm.	mm.	mm.
2903799	8	5.03	152.4	152.4	114.05
2903800	10	8.68	158.75	158.75	158.75




Adaptador de limpieza

Referencia	Diámetro	Peso	A	B	C
	Pulg.	Kg	mm.	mm.	mm.
2905389	8	2.35			
2905390	10	4.73			




Yees sanitarias

Referencia	Diámetro	Peso	A	B	C
	Pulg.	Kg	mm.	mm.	mm.
2903794	8	6.65	358.8	60.3	298.5
2903798	10	11.06	419.1	73.0	346.1




Yees sanitarias reducida

Referencia	Diámetro	Peso	A	B	C
	Pulg.	Kg	mm.	mm.	mm.
2903792	8x8x4	5.59	266.7	25.4	293.7
2903793	8x8x6	4.66	266.7	25.4	249.3
2903795	10x10x4	10.12	363.6	33.4	396.8
2903796	10x10x6	10.32	363.6	33.4	371.0
2903797	10x10x8	9.19	363.6	33.4	329.7




Buje

Referencia	Diámetro	Peso	A	B	C
	Pulg.	Kg	mm.	mm.	mm.
2903811	8x4	1.69	130.18	41.28	15.88
2909775	8x6	1.90	117.48	41.28	
2903813	10x6	5.36	140.46	38.1	
2903814	10x8	3.43	140.46	38.1	



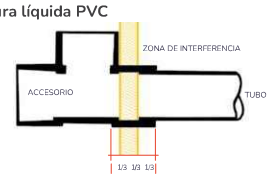

Tapón

Referencia	Diámetro	Peso	L1	L3
	Pulg.	Kg	mm.	mm.
2903809	8	1.85	157.63	101.6
2903810	10	2.82	196.85	127.0

Soldadura-Pavco Wavin Soldamax PVC

Especialmente formulada para soldar tuberías de PVC. Las uniones hechas en soldadura líquida son más resistentes que la misma tubería. (Para referencias de rendimientos consultar lo indicado en el manual técnico de la línea).

Soldadura líquida PVC



Materiales

Los Tubosistemas son fabricados con compuestos de Policloruro de vinilo rígido, Tipo II, Grado I, tal como se definen en la norma NTC 369.

Dimensiones y tolerancias

Las dimensiones y tolerancias de los Tubosistemas serán las que se señalan en las tablas siguientes.

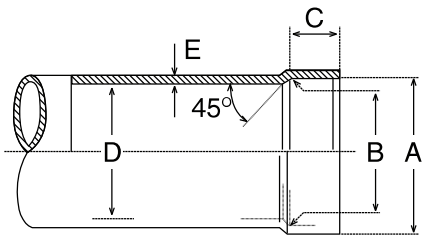
Tabla I tubería sanitaria PVC

Diámetro nominal	Diámetro exterior		Tolerancia		Redondez		Espesor de pared	
Pulg.	mm.	Pulg.	mm.	Pulg.	mm.	Pulg.	mm.	Pulg.
1.1/2	1.900	48.26	±0.009	±0.24	±0.031	±0.80	0.110	2.79
2	2.375	60.33	±0.009	±0.24	±0.031	±0.80	0.115	2.92
3	3.250	82.55	±0.011	±0.28	±0.031	±0.80	0.125	3.18
4	4.500	114.30	±0.013	±0.32	±0.047	±1.20	0.130	3.30
6	6.625	168.28	±0.014	±0.36	±0.047	±1.20	0.162	4.12

Tabla ventilación y aguas lluvias

Diámetro nominal	Diámetro exterior		Tolerancia		Redondez		Espesor de pared	
Pulg.	mm.	Pulg.	mm.	Pulg.	mm.	Pulg.	mm.	Pulg.
1.1/2	1.900	48.26	±0.006	±0.15	±0.12	±0.31	0.06	1.52
2	2.375	60.33	±0.006	±0.15	±0.12	±0.31	0.06	1.78
3	3.250	82.55	±0.008	±0.20	±0.15	±0.38	0.07	1.78
4	4.500	114.30	±0.009	±0.23	±0.20	±0.51	0.08	2.10

Tabla II Accesorios



Pulgadas

Diámetro nominal	A		B		C (min)	D (min)	E (min)
1.1/2	1.915	±0.12	1.89	±0.12	0.69	1.69	0.11
2	2.390	±0.12	2.37	±0.12	0.75	2.16	0.11
3	3.270	±0.15	3.24	±0.15	1.50	3.02	0.12
4	4.520	±0.15	4.49	±0.15	1.75	4.26	0.13
6	6.647	±0.20	6.61	±0.20	3.00	6.32	0.16

Milímetros

Diámetro nominal	A		B		C (min)	D (min)	E (min)
1.1/2	48.64	±0.12	48.13	±0.31	17.45	43.05	2.79
2	60.71	±0.12	60.20	±0.31	19.05	54.86	2.92
3	83.06	±0.15	82.42	±0.38	38.10	76.71	3.18
4	114.81	±0.15	114.17	±0.38	44.45	108.20	3.30
6	168.83	±0.20	168.02	±0.76	76.20	160.66	4.15

Calidad

Siguiendo los métodos de prueba de la norma 1087 y ASTM 2665, las especificaciones de calidad son las siguientes:

- Absorción de Agua: Los tubosistemas no aumentarán de peso en más de 0.3%
- Impacto: La mínima resistencia al impacto será de 81 J a 23°C(73°F)
- Soldadura: Las uniones de tubos y accesorios hechas con soldadura líquida no tendrán escapes, cuando sean sometidas a una presión interna de 50 psi.

Recomendaciones de instalación

Tener en cuenta lo indicado en el Manual Técnico Tubosistemas Sanitaria Pavco Wavin.

orbia | Building & Infrastructure

Pavco Wavin es parte de Orbia, un colectivo de empresas que trabajan juntas para afrontar algunos de los retos más complejos del mundo. Nos une un objetivo común: mejorar la vida en todo el mundo.

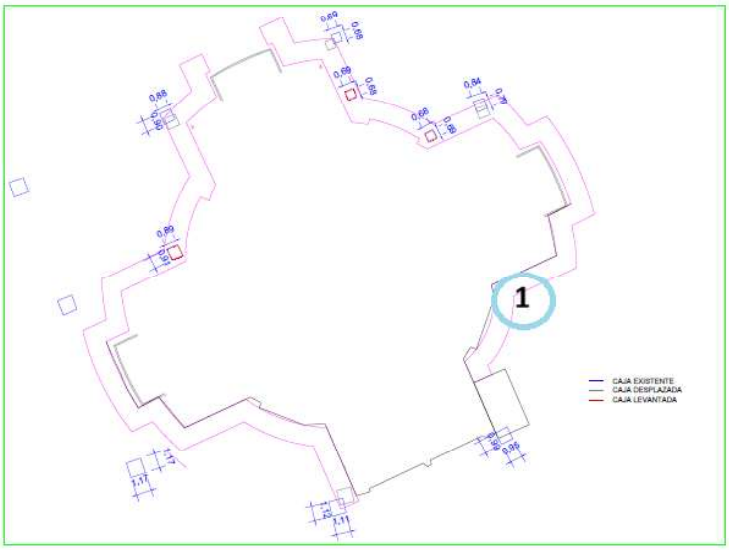
Pavco Wavin, el negocio de construcción e infraestructura de Orbia, está mejorando la vida en todo el mundo mediante la construcción de entornos saludables y sostenibles. Pavco Wavin es un innovador centrado en el agua que ofrece soluciones para un suministro de agua potable más seguro, saneamiento y resiliencia del agua urbana. La empresa también invierte en soluciones climáticas interiores.

Pavco Wavin | Autopista Sur N° 71-75, Bogotá D.C. | Conmutador: (601) 7825000 | www.pavcowavin.com.co

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ANEXO TECNICO

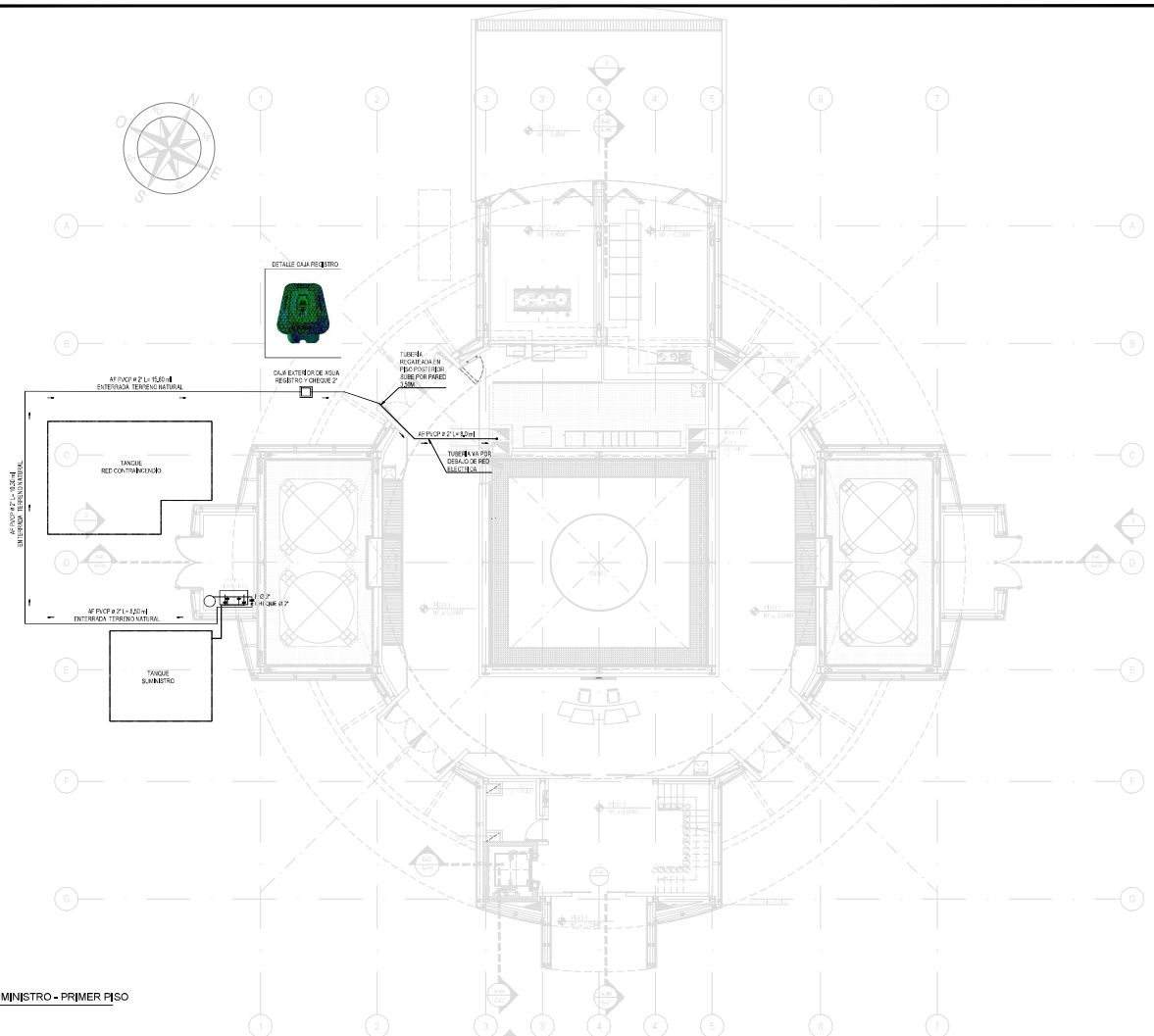
NP 26: VÁLVULA DE CHEQUE DE 2" EN BRONCE PARA TUBERÍA A PRESIÓN, INCLUYE ADAPTADORES, SELLADO, Y PUESTA EN SERVICIO



ANEXO 026

NP: VÁLVULA DE CHEQUE DE 2" EN BRONCE PARA TUBERÍA A PRESIÓN, INCLUYE ADAPTADORES, SELLADO, Y PUESTA EN SERVICIO

1



1 RED DE SUMINISTRO - PRIMER PISO
ESCALA 1:100

FUERZAS MILITARES DE COLOMBIA
FUERZA AEROESPACIAL COLOMBIANA
JEFATURA LOGÍSTICA
DIRECCIÓN DE INFRAESTRUCTURA

UNIDAD O GUARNICIÓN
MUSEO AEROESPACIAL COLOMBIANO

TOCANCIPÁ - CUNDINAMARCA

PROYECTO
CENTRO DE INSTRUCCIÓN EN CAÍDA LIBRE E INVESTIGACIÓN AERONÁUTICA PARA LA FAC

OBSERVACIONES

DISEÑO
ST. PAOLA ANDREA CONTRERAS
ING. AMBIENTAL Y SANITARIA SUTEP
MP. 172253-344438 VLL

REVISÓ
MY. GENNY RODRIGUEZ MARTINEZ
ING. AMBIENTAL Y SANITARIA SUTEP
MP. 252001597-91 CND

DIBUJÓ
T2 LUIS MIGUEL JIMENEZ A.
DELINEANTE DE ARQUITECTURA E INGENIERIA
MP T129302014-1013639688

CODIGO DEL PLIEGO
FAC2023-06

CONTIENE
H407 PL

RED DE SUMINISTRO PRIMER PISO

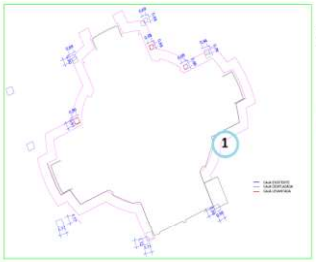
FECHA
18 DE SEPTIEMBRE DE 2026

FASE	VERSIÓN
.C.	.1.

ESCALA
1:100

PLANCHA No
08 DE 46PL

CONTRATISTA		UNION TEMPORAL COFAC MDM
INTERVENTOR Ó SUPERVISOR		CIVALL INGENIEROS & ARQUITECTOS CONSTRUCTORES S.A.S
ÍTEM Nº	NP 26	und
DESCRIPCIÓN ÍTEM	VÁLVULA DE CHEQUE DE 2" EN BRONCE PARA TUBERÍA A PRESIÓN, INCLUYE ADAPTADORES, SELLADO, Y PUESTA EN SERVICIO	
CORTE Nº:		30-sep-26



ANEXO 026
NP: VÁLVULA DE CHEQUE DE 2" EN BRONCE PARA TUBERÍA A PRESIÓN, INCLUYE ADAPTADORES, SELLADO, Y PUESTA EN SERVICIO

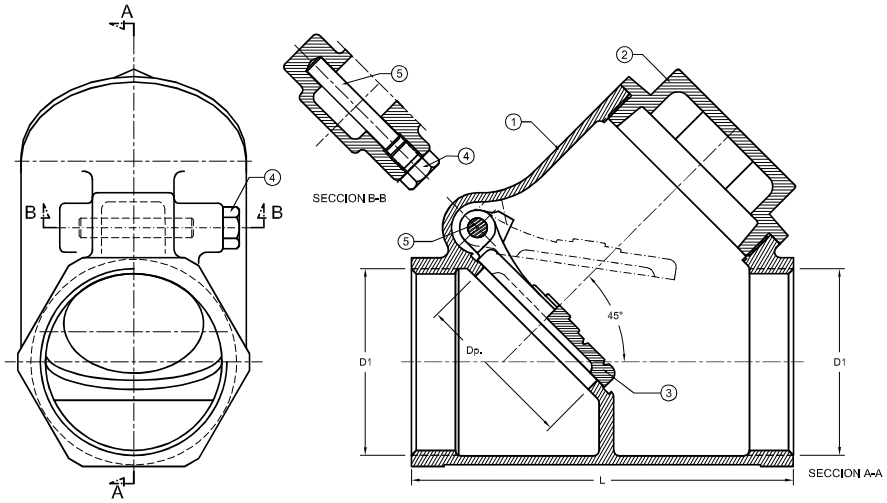
1

PLANO DESCRIPTIVO DE LA MEMORIA	UBICACIÓN	DIMENSIONES UND	#	N° DE ELEMENTOS	MEDIDA TOTAL
	ENTRE EJES 1 al 6// A al G	1	1	1	1
			TOTAL		1

HELBERT
Calidad, experiencia y tecnología

FICHA TÉCNICA

CHEQUE CORTINA SELLO METAL - METAL HICC DE 1/2" A 4" SERIE 230



No.	DESCRIPCIÓN	MATERIAL	CT.
5	PASADOR	LATÓN	1
4	TORNILLO	LATÓN	1
3	CORTINA*	BRONCE	1
2	CAPERUZA*	BRONCE	1
1	CUERPO	BRONCE	1

* NOTA: EL MATERIAL DE LA CAPERUZA (2) Y DE LA CORTINA (3) ES LATÓN EN LOS TAMAÑOS 1/2" , 3/4" Y 1"

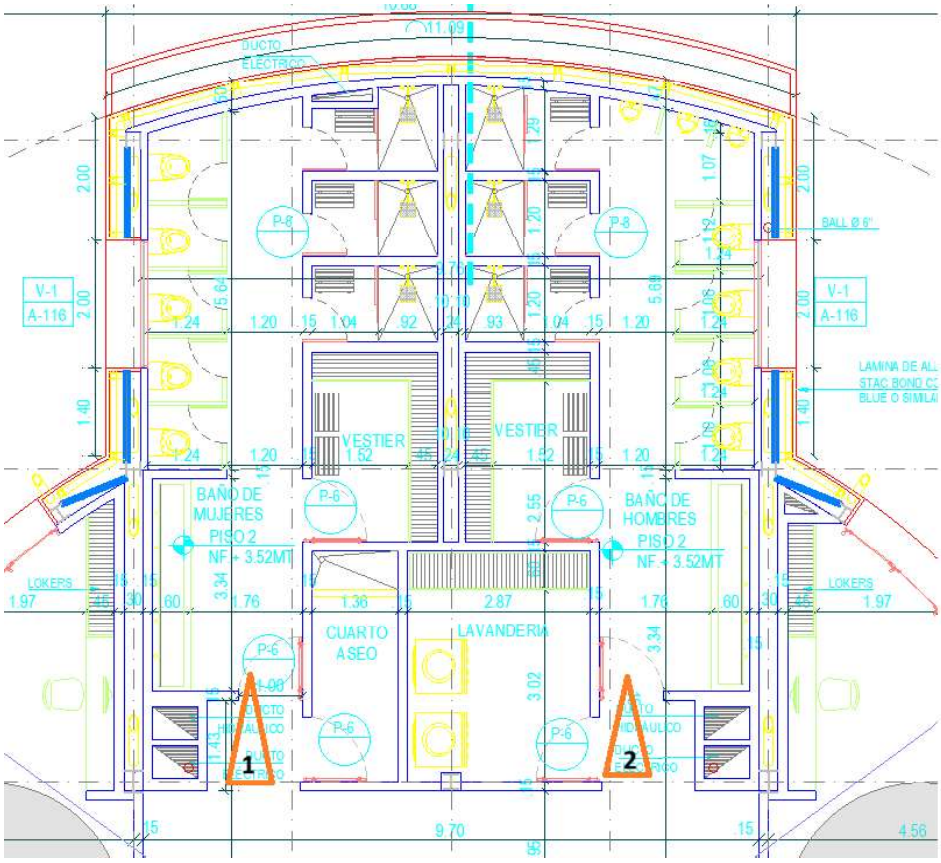
Identificacion.			Helbert, Tamaño de la Válvula, Dirección de Flujo, Presión de Trabajo.								
Presión de Prueba Hidráulica			300 Psi.	300 Psi.	300 Psi.	300 Psi.	300 Psi.	300 Psi.	300 Psi.	300 Psi.	300 Psi.
Presión de Prueba Neumática			80-100 Psi.	80-100 Psi.	80-100 Psi.	80-100 Psi.	80-100 Psi.	80-100 Psi.	80-100 Psi.	80-100 Psi.	80-100 Psi.
Presión Máxima de Trabajo Psi.			200 WOG 125 S	200 WOG 125 S	200 WOG 125 S	200 Lbs	200 Lbs	200 Lbs	200 Lbs	200 Lbs	200 Lbs
Longitud Total (L)			47 mm.	62 mm.	74 mm.	88 mm.	97 mm.	116 mm.	153 mm.	184 mm.	234 mm.
Diam. paso de agua (Dp)			12,5 mm.	17,5 mm.	22 mm.	32 mm.	38 mm.	50 mm.	56 mm.	76 mm.	98 mm.
Rosca de Conexión (D1)			1/2"x14h-NPT.	3/4"x14h-NPT.	1"x11.5h-NPT.	1-1/4"x11.5h-NPT.	1-1/2"x11.5h-NPT.	2"x11.5h-NPT.	2-1/2"x8h-NPT.	3"x8h-NPT.	4"x8h-NPT.
Peso Total.			0,22 Kg.	0,41 Kg.	0,59 Kg	0,98 Kg.	1,15 Kg.	1,9 Kg.	3,50 Kg.	6,06 Kg.	11,0 Kg.
5	PASADOR	1	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN
4	TORNILLO	1	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN	LATÓN
3	CORTINA	1	LATÓN	LATÓN	LATÓN	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE
2	CAPERUZA	1	LATÓN	LATÓN	LATÓN	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE
1	CUERPO	1	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE	BRONCE
No.	DESCRIPCIÓN	CANT.	HICC 012	HICC 019	HICC 025	HICC 032	HICC 038	HICC 050	HICC 063	HICC 075	HICC 100

CONTÁCTENOS: PBX: (57-1)3681077 • FAX: (57-1)3440120 • WWW.HELBERTYCIA.COM
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ANEXO TECNICO

NP 27: RAMPA EN CONCRETO PARA ACCESO A BAÑOS PISO 2 H PROM 15 CM



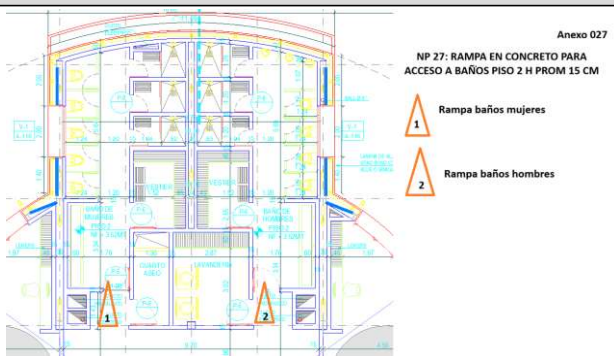
Anexo 027

NP 27: RAMPA EN CONCRETO PARA ACCESO A BAÑOS PISO 2 H PROM 15 CM

1 **Rampa baños mujeres**

2 **Rampa baños hombres**

CONTRATISTA		UNION TEMPORAL COFAC MDM
INTERVENTOR Ó SUPERVISOR		CIVALL INGENIEROS & ARQUITECTOS CONSTRUCTORES S.A.S
ÍTEM Nº	NP 27	und
DESCRIPCIÓN ÍTEM	RAMPA EN CONCRETO PARA ACCESO A BAÑOS PISO 2 H PROM 15 CM	
CORTE Nº:		30-sep-26

PLANO DESCRIPTIVO DE LA MEMORIA	UBICACIÓN	DIMENSIONES UND	#	N° DE ELEMENTOS	MEDIDA TOTAL
	ENTRE EJES 1 al 6// A al G	1	1	1	1
	ENTRE EJES 1 al 6// A al G	1	2	1	1
			TOTAL		2

Acta Consecutivo No.	009	**Lugar y Fecha**	TÚNEL DEL VIENTO TOCANCIPÁ - 19 DE AGOSTO DEL 2026
Asunto	REVISIÓN Y DEFINICIÓN DE DETALLES ARQUITECTÓNICOS DE DISEÑOS PARA EL CONTRATO No. 072-00-A-COFAC-DIFRA-2026 CUYO OBJETO ES CONTRATAR EN NOMBRE DE LA NACIÓN – MINISTERIO DE DEFENSA NACIONAL – FUERZA AEROESPACIAL COLOMBIANA, LA OBRA PÚBLICA PARA LA CONSTRUCCIÓN DE LA FASE IV DEL CENTRO DE INSTRUCCIÓN EN CAÍDA LIBRE E INVESTIGACIÓN AERONÁUTICA DE LA FAC EN LAS INSTALACIONES DEL MUSEO AEROESPACIAL EN TOCANCIPÁ – CUNDINAMARCA, INCLUYE ACTIVIDADES DE ACABADO, OBRAS DE URBANISMO, MOBILIARIO Y EQUIPOS.		
Oficina Productora	Dirección de Infraestructura		
Hora Inicio	09:00 AM	**Hora Finalización**	17:00 PM
Ausentes			

Orden del día:
Revisar y definir en sitio detalles arquitectónicos en compañía de la supervisión del contrato de interventoría, estructurador Arquitectónico del proyecto, contratista e interventoría.

Desarrollo:

El día de hoy se realiza recorrido a las instalaciones del Túnel del viento en compañía de la supervisión del contrato de interventoría la TE. Yeimy Ríos, estructurador del proyecto Arquitectónico él TE. Hermes Castillo, en representación del CONTRATISTA Unión Temporal COFAC MDM la Arquitecta Andrea Bejarano, Ing. Alberto Dávila, la Arquitecta Karol Cuevas y el Ing. Julián Uriza, en representación de la INTERVENTORÍA el Arquitecto José E. Higuera C y la Ing. Carolina Pinzón Guzmán; con el fin de aclarar las siguientes dudas por parte del TE. Hermes Castillo que se tenían para dar continuidad a la ejecución del proyecto.

Durante el recorrido se obtuvo las siguientes definiciones y aclaraciones:

1. **PLACA DE ACCESO FRENTE AL EDIFICIO ADMINISTRATIVO**

   Teniendo en cuenta el nivel de la placa existente, se determina retirar el bordillo actual con el fin de dar continuidad a la dilatación de 1,90 m y realizar el cierre mediante el bordillo demarcado en campo.

2. **ANDÉN PERIMETRAL**

   Se acuerda que, durante el vaciado del andén, este se ejecute de manera monolítica con el bordillo. En el sector crítico donde se encuentran ubicados los tanques, se recomienda disminuir el nivel del andén con el fin de facilitar el acceso y apertura de las puertas. (Verificar niveles antes de fundir para verificar la viabilidad de esta solución).
   Con respecto a las cajas de inspección que se encuentran dentro del trazado demarcado, se requiere realizar los ajustes necesarios para que estas queden correctamente incorporadas dentro del andén, garantizando su accesibilidad y el adecuado acabado de la superficie.

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3. PLACA PARA PLANTA AUXILIAR

Él TE. Castillo indica que se debe conservar la ubicación original de la placa contemplada en el proyecto. Teniendo en cuenta que la caja de aguas lluvias queda ubicada dentro del replanteo de la placa, se sugiere ejecutar, durante el vaciado, un remate o resalto alrededor de dicha caja, garantizando su acceso para futuras labores de inspección y mantenimiento.

Adicionalmente, se deben realizar los ajustes correspondientes a los niveles de la placa de acuerdo con las condiciones encontradas en campo.

4. TAPAS EXISTENTES – PRIMER PISO

Se define que la tapa existente en el primer piso debe dividirse en cuatro (4) partes iguales, con el fin de facilitar su manipulación y permitir el acceso para futuras actividades de inspección y mantenimiento.

Esta misma solución deberá implementarse en las demás tapas existentes que presenten condiciones similares. De igual manera, se requiere fabricar e instalar una puerta de 0,80 m de ancho por 1,30 m de alto, conformada por dos hojas, elaborada en lámina de acero Cold Rolled para poder acceder desde esta caja de inspección al sótano de la edificación.

5. PLACAPISO – PRIMER PISO

Teniendo en cuenta que actualmente se presenta un espesor aproximado de 12 cm, se recomienda ejecutar una placa aligerada mediante el uso de elementos de aligeramiento en poliestireno expandido (icopor) y malla electrosoldada 4mm, con el propósito de disminuir el peso de la solución y ajustar la altura del entrepiso.
La solución definitiva deberá ser revisada y validada por el profesional estructural correspondiente antes de su ejecución y por la supervisión de la FAC.

6. PAÑETE EXISTENTE FISURADO

Se revisan las condiciones del pañete existente, evidenciándose fisuras tanto en el primer como en el segundo piso. De acuerdo con la recomendación del estructurador, se deberá realizar previamente la reparación y preparación de la superficie mediante la aplicación de adhesivo cementicio tipo Pegacor, para posteriormente continuar con la aplicación de estuco y pintura. Esta actividad entra como un ítem no previsto.

La superficie deberá encontrarse adecuadamente preparada, limpia y estable antes de proceder con los acabados finales.

7. LAMA ITALIA BLANCA. (CIELORASO)

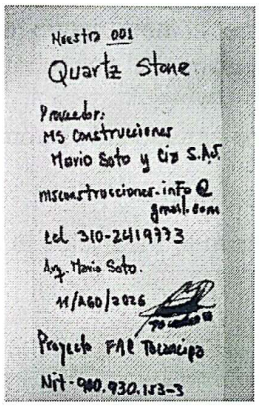
Se determina que, para las áreas correspondientes al primer, segundo y tercer piso, así como para el mezanine, se instale el cielo raso **Lama Italia Blanca 30**, de acuerdo con la especificación

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definida para los acabados del proyecto. Se enfatiza por parte del Teniente Hermes Castillo identificar el punto más alto en cada espacio para instalar el cielo raso con la mayor altura posible.

8. DEFINICIÓN QUARZTONE PARA LAVAMANOS

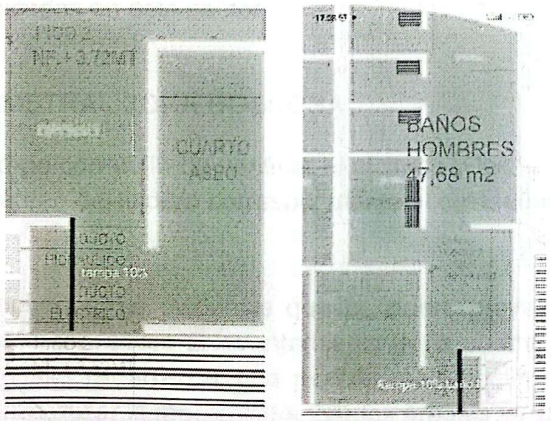
Por parte del contratista se hace entrega a la supervisión y al estructurador de las muestras de lámina **Quartzstone** propuestas para la instalación en los lavamanos. De acuerdo con las especificaciones del proyecto, la supervisión deberá seleccionar el color de la lámina. Una vez revisadas las muestras presentadas, el estructurador determina y aprueba la instalación de la referencia **001 – Quartzstone**, correspondiente a la muestra relacionada a continuación.



9. ACCESO DE BAÑOS PISO 2

Se determina que el acceso a los baños de hombres y mujeres del segundo piso se ajuste de acuerdo con los niveles establecidos en el replanteo realizado en sitio. Se contempla una diferencia de niveles de 15 cm aproximadamente, en un nivel se tienen 8 cm y, una vez considerados los acabados de los baños, se obtiene un desnivel aproximado de 20 cm respecto al nivel de acceso.

Para resolver esta diferencia de nivel, se determina ejecutar una rampa con una pendiente aproximada del 10 %, de acuerdo con las condiciones verificadas en campo.



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10. PLANOS TALLER CLOSET

Por parte del contratista solicita la entrega de los planos de taller correspondientes a los clósets, así como la aclaración de las especificaciones relacionadas con los marcos de las puertas y su respectivo color.

Teniendo en cuenta que los nuevos clósets deben mantener uniformidad con los elementos existentes, se requiere definir el color y acabado de manera que sean acordes con los clósets actualmente instalados.

Queda pendiente por parte de la supervisión la entrega de los diseños y planos de taller correspondientes, con el fin de proceder con la fabricación e instalación de los nuevos elementos.

Sin embargo, se aclara que los marcos de las puertas son en el mismo material de la hoja, es decir, melamina.

Para los closets se determina que el color será el mismo que el de los muebles instalados en la Fase III.

11. PAÑETE PUNTO FIJO

Con respecto al pañete existente que presenta afectación por humedad, se determina realizar el retiro del material deteriorado y posteriormente ejecutar un nuevo pañete con impermeabilización, garantizando previamente la adecuada preparación y tratamiento de la superficie antes de la aplicación del nuevo acabado.

12. MURO EN SUPERBOARD Y ACCESO PARA INSPECCIÓN EN DUCTOS

Para esta zona se contempla la ejecución de un muro en sistema Superboard, incorporando una puerta de acceso que permita realizar futuras actividades de inspección, mantenimiento y revisión de las instalaciones ubicadas en este sector.

13. CERRAMIENTO PERIMETRAL ZONA BOSCOSA

Se realiza visita de campo con el fin de verificar el alcance y los linderos del proyecto. Durante la visita se solicita el replanteo del lindero correspondiente al costado norte, con acompañamiento de las Fuerzas Militares.

Como resultado del replanteo, se evidencia que el lindero proyectado atraviesa el monumento existente. Adicionalmente, se realiza el levantamiento de la puerta y del cerramiento en concreto existentes, con el propósito de analizar una posible modificación o desviación del cerramiento proyectado, buscando minimizar la afectación sobre los árboles existentes en la zona.

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La situación identificada es socializada con la supervisión del contrato. Se concluye que, debido a las inconsistencias evidenciadas entre el lindero replanteado y las condiciones existentes en campo, el tema será revisado y definido en el comité programado para el día viernes.

Por lo tanto, la supervisión indica que se puede ir adelanto el cerramiento que no presenta dificultad hasta la parte donde inicia la PTAB, mientras que se define lo mencionado anteriormente.

Adicionalmente se requiere revisar el cerramiento del costado norte ya que se requiere verificar el detalle constructivo donde se tiene: diferencias de niveles entre lotes, ajuste del trazado por presencia de árbol, encuentro con canalización existente; por lo tanto, se requiere revisión por parte del estructurador ya que no se cuenta con memorias del diseño y estudio de suelos.

Actividades a Realizar		
Actividad	**Responsable**	**Fecha Entrega**
Entrega y diseños y planos de taller correspondientes, con el fin de proceder con la fabricación e instalación de los nuevos elementos.	**Entidad**	

Convocatoria Próxima Reunión			
Tema			
Fecha - Hora		**Lugar**	

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FIRMAS,

TE. Yeimy Marcela Ríos Rodríguez
Supervisor del Contrato. - DIFRA
Interventoría

TE. Hermes Raul Castillo Pinilla
Diseñador Arquitectónico del Proyecto – DIFRA

Arq. JOSÉ E. HIGUERA C.
Director de Interventoría.
CIVALL INGENIEROS Y ARQUITECTOS CONSULTORES S.A.S. BIC

Ing. Carolina Pinzón Guzmán
Residente de Interventoría.
CIVALL INGENIEROS Y ARQUITECTOS CONSULTORES S.A.S. BIC

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Arq. Andrea Paola Betarano Vargas
Residente de Obra.
Unión Temporal COFAC MDM

Arq. Karol Cuevas
Coordinadora de Obra.
Unión Temporal COFAC MDM

Ing. Julián Uriza
Coordinador de obra
Unión Temporal COFAC MDM

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ANEXO TECNICO

NP 28: INSTALACION DE EQUIPO MECANICOS UNIDADES EXTERIORES

MEMORIA DE CÁLCULO Y SUBSANACIÓN – NP-28

INSTALACIÓN DE EQUIPOS MECÁNICOS – UNIDADES EXTERIORES

UNIÓN TEMPORAL COFAC MDM | Contrato 072-00-A-COFAC-DIFRA-2026 | Fuente: anexos aportados 12/10/2026

Unidad	UND	Fecha fuente	30/09/2026		
Corte	No diligenciado	Cantidad fuente	1		

Código	Ubicación	Elemento / descripción	Cantidad por registro	N.º elementos	Cantidad calculada	Soporte	Observación
NP28-01	Entre ejes 1 al 6 / A al G	Conjunto de unidades exteriores; referencia comercial Hitachi	1	1	1	Plano anexo fuente	Verificar correspondencia con plano y APU
				TOTAL	1		

FUERZAS MILITARES DE COLOMBIA

FUERZA AEROESPACIAL COLOMBIANA

VOLAMOS, ENTRENAMOS Y COMBATIMOS PARA VENCER

JEFATURA LOGÍSTICA

DIRECCIÓN DE INFRAESTRUCTURA

MUSEO AÉROESPACIAL COLOMBIANO

TOCANCIPÁ / CUNDINAMARCA

PLANOS MECÁNICOS

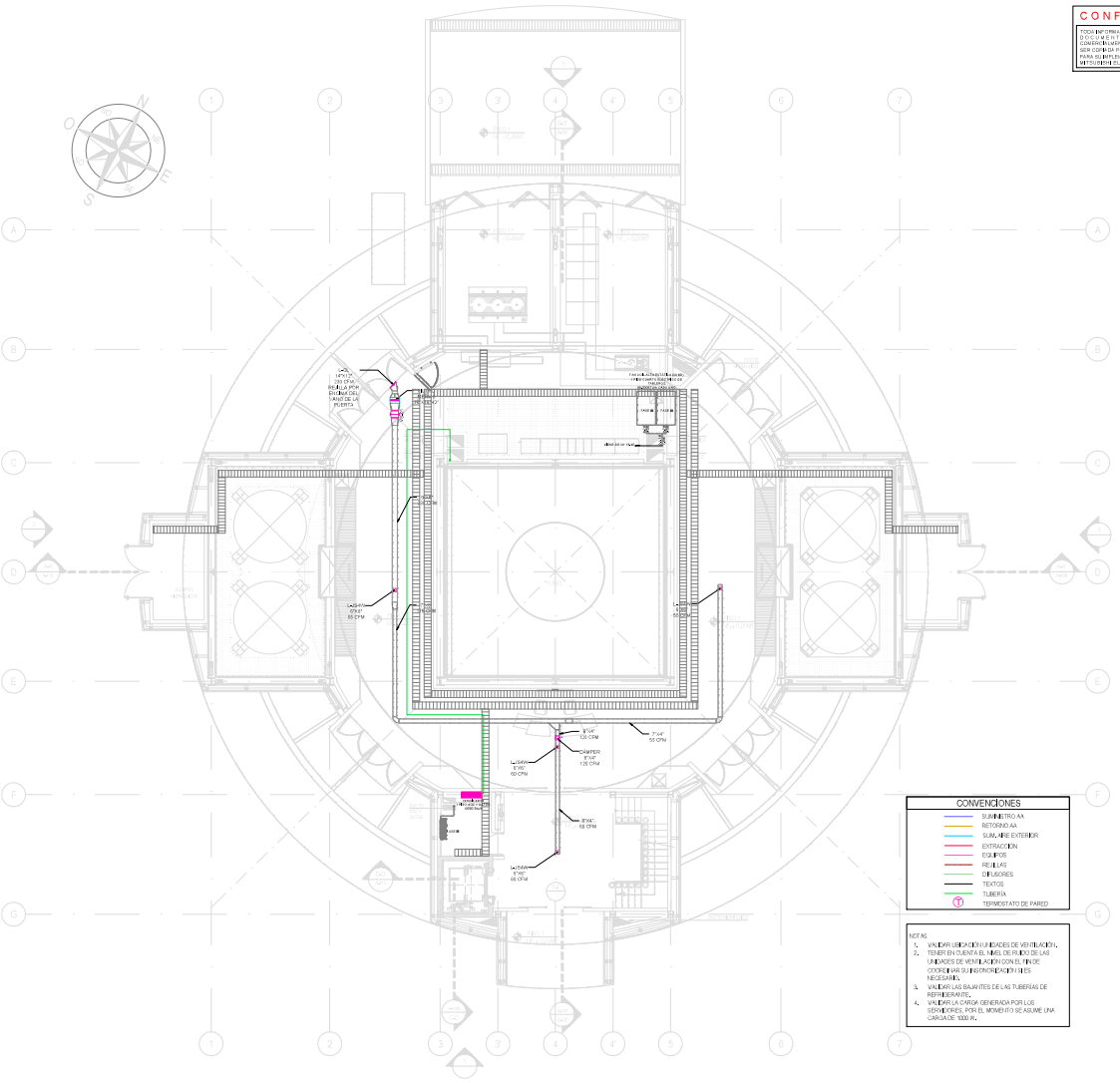
CENTRO DE INSTRUCCIÓN EN CAÍDA LIBRE E INVESTIGACIÓN AERONÁUTICA PARA LA FAC

FASE IV

FAC2025-16

FEBRERO- 2026

DA-2023-035



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NOTAS

1. VALIDAR UBICACIÓN UNIDADES DE VENTILACIÓN, TENER EN CUENTA EL NMS DE FLUJO DE LAS UNIDADES DE VENTILACIÓN CON EL FIN DE COORDINAR SU INSONORIZACIÓN SI ES NECESARIO.
2. VALIDAR LAS BAJANTES DE LAS TUBERÍAS DE REFRIGERANTE.
3. VALIDAR LA CARGA GENERADA POR LOS SERVIDORES, POR EL MOMENTO SE ASUME UNA CARGA DE 1000 W.

PROYECTO

TÚNEL DE VIENTO FAC

CIUDAD / UBICACIÓN

ZIPAQUIRA

CONVENCIONES

- DUCTO DE SUMINISTRO AIRE ACONDICIONADO
- DUCTO DE SUMINISTRO AIRE FRESCO
- DUCTO DE EXTRACCIÓN
- DUCTO DE RETORNO
- TUBERÍA DE REFRIGERANTE/GAS
- TUBERÍA DE CONTROL
- DIFUSOR 4 VÍAS
- DIFUSOR 3 VÍAS
- DIFUSOR 2 VÍAS
- REJILLA
- REJILLA VISTA EN PERFIL
- TERMOSTATO
- EVAPORADORA TIPO CASSETTE
- EVAPORADORA TIPO FAN COIL DESNUDO / DDAS
- EVAPORADORA TIPO PARED
- EVAPORADORA DE TECHO SUSPENDIDO
- EVAPORADOR A MULTIPOSICIÓN
- CONDENSADORA SERIES M&P, CITY MULTI SERIES S
- CONDENSADORA SERIE CITY MULTI
- CAJA DE DISTRIBUCIÓN
- CAJA DE VENTILACIÓN
- VENTILADOR CENTRÍFUGO
- UNIDAD RECUPERADORA DE ENERGÍA

CONTROL DE MODIFICACIONES

No.	FECHA	DESCRIPCIÓN
V1	30/08/XX	DESCRIPCIÓN / VERSIÓN

PLANO APROBADO POR EL PROPIETARIO:

FIRMA: _____ FECHA: _____

PLANO APROBADO POR ARQ. Y/O INGS.

FIRMA: _____ FECHA: _____

MITSUBISHI ELECTRIC
Changes for the Better

CONTENIDO

SISTEMA DE AIRE ACONDICIONADO Y VENTILACIÓN MECÁNICA PISO 1

PLANO APROBADO POR INELCOL

FIRMA: _____ FECHA: _____

FECHA DE ELABORACIÓN:

12/04/2023

ELABORÓ:

ANTONIO ZÚÑIGA

FIRMA: _____

REVISÓ:

JHEFERSON OCAMPO

FIRMA: _____

APROBÓ:

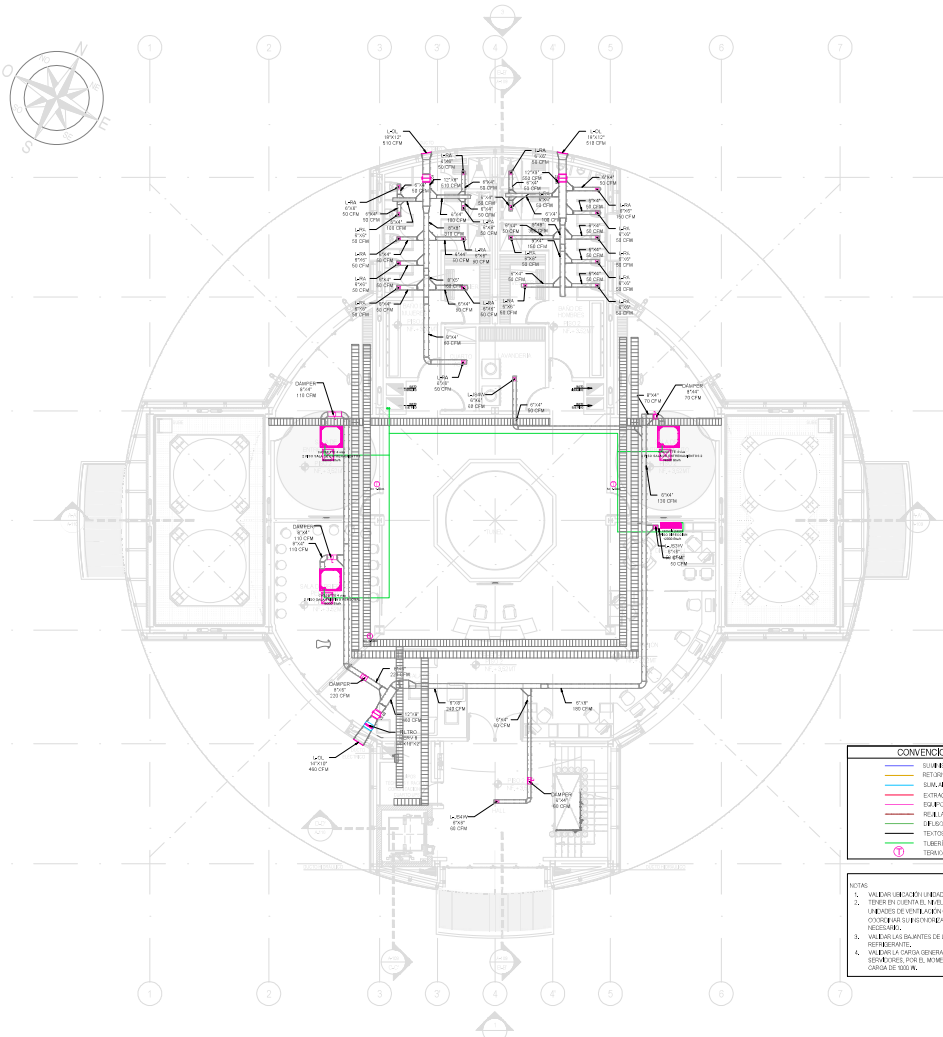
JUAN PABLO BERMUDEZ

FIRMA: _____

ESCALA:	ARCHIVO:
SCL : N/A	16-700 MECANICOS TUNEL 12-2

PLANO:	VERSIÓN:
DA-2023-035	V1
	NÚMERO DEL PLANO: 01

DA-2023-035



NOTAS

1. VALIDAR UBICACIÓN LUMINARIAS DE VENTILACIÓN.
2. TENER EN CUENTA EL NIVEL DE PISO DE LAS UNIDADES DE VENTILACIÓN CON EL FIN DE COORDINAR SU RECOMENDACIÓN (SI ES NECESARIO).
3. VALIDAR LAS BAJANTES DE LAS TUBERÍAS DE REFRIGERANTE.
4. VALIDAR LA CARGA GENERADA POR LOS SENSORES, POR EL MOMENTO SE ASUME UNA CARGA DE 1000 W.

CONFIDENCIAL

TODA INFORMACIÓN CONTEMPLADA EN ESTE DOCUMENTO ES CLASIFICADA Y CONFIDENCIALMENTE CONFIDENCIAL. NO PUEDE SER COPIADA POR NINGÚN MÉTODO UTILIZADA PARA SU IMPLEMENTACIÓN SIN EL PERMISO DE MITSUBISHI ELECTRIC DE COLOMBIA LTDA.

PROYECTO

TÚNEL DE VIENTO FAC

CIUDAD / UBICACIÓN

ZIPAQUIRA

CONVENCIONES

- DUCTO DE SUMINISTRO AIRE ACONDICIONADO
- DUCTO DE SUMINISTRO AIRE FRESCO
- DUCTO DE EXTRACCIÓN
- DUCTO DE RETORNO
- TUBERÍA DE REFRIGERANTE/GAS
- TUBERÍA DE CONTROL
- DIFUSOR 4 VÍAS
- DIFUSOR 3 VÍAS
- DIFUSOR 2 VÍAS
- REJILLA
- REJILLA TIPO PERFIL
- TERMOSTATO
- EVAPORADORA TIPO CASSETTE
- EVAPORADORA TIPO FAN COIL DESNUDO / DDAS
- EVAPORADORA TIPO PARED
- EVAPORADORA DE TECHO SUSPENDIDO
- EVAPORADORA MULTIPOSICIÓN
- CONDENSADORA SERIES M&P, CITY MULTI, SERIE S
- CONDENSADORA SERIE CITY MULTI
- CAJA DE DISTRIBUCIÓN
- CAJA DE VENTILACIÓN
- VENTILADOR CENTRÍFUGO
- UNIDAD RECUPERADORA DE ENERGÍA

CONTROL DE MODIFICACIONES

No.	FECHA	DESCRIPCIÓN
V1	30/08/XXX	DESARROLLO / REVISIÓN

PLANO APROBADO POR EL PROPIETARIO:

FIRMA: _____ FECHA: _____

PLANO APROBADO POR ARQ. Y/O INTEL.

FIRMA: _____ FECHA: _____

MITSUBISHI ELECTRIC
Changes for the Better

CONTENIDO

SISTEMA DE AIRE ACONDICIONADO Y VENTILACIÓN MECÁNICA PISO 2

PLANO APROBADO POR INTELCOL

FIRMA: _____ FECHA: _____

FECHA DE ELABORACIÓN:

12/04/2023

ELABORÓ:

ANTONIO ZAPATA

FIRMA: _____

REVISÓ:

JHEFERSON OCAMPO

FIRMA: _____

APROBÓ:

JUAN PABLO BERMUDEZ

FIRMA: _____

ESCALA: SCL : N/A

ARCHIVO: M-700 MECANICOS TUNEL 13-2

PLANO: DA-2023-035

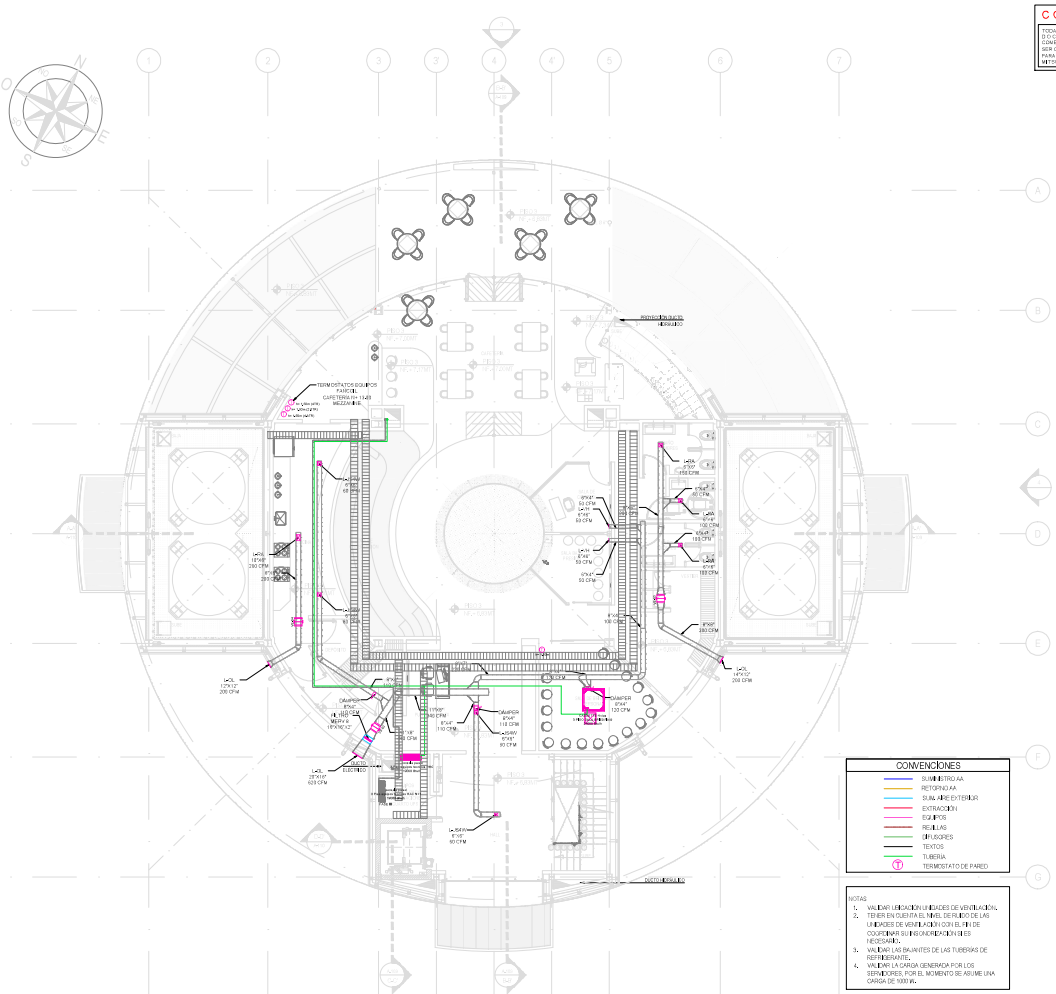
VERSIÓN: V1

NÚMERO DEL PLANO: 02

DA-2023-035

CONFIDENCIAL

TODA INFORMACIÓN CONTEMPLADA EN ESTE DOCUMENTO ES CLASIFICADA Y CONFIDENCIALMENTE CONFIDENCIAL. NO PUEDE SER COPIADA POR NINGUN MÉTODO UTILIZADA PARA SU IMPLEMENTACIÓN SIN EL PERMISO DE MITSUBISHI ELECTRIC DE COLOMBIA LTDA.



NOTAS

1. VALIDAR UBICACION UNIDADES DE VENTILACION.
2. TENER EN CUENTA EL NIVEL DE RUIDO DE LAS UNIDADES DE VENTILACION CON EL FIN DE COORDINAR SUS SONORIZACIONES NECESARIAS.
3. VALIDAR LAS BAJANTES DE LAS TUBERIAS DE REFRIGERANTE.
4. VALIDAR LA CARGA GENERADA POR LOS SERVIDORES, POR EL MOMENTO SE ASUME UNA CARGA DE 1000 W.

PROYECTO

TÚNEL DE VIENTO FAC

CIUDAD / UBICACIÓN

ZIPAQUIRA

CONVENCIONES

- DUCTO DE SUMINISTRO AIRE ACONDICIONADO
- DUCTO DE SUMINISTRO AIRE FRESCO
- DUCTO DE EXTRACCIÓN
- DUCTO DE RETORNO
- TUBERIA DE REFRIGERANTE/GAS
- TUBERIA DE CONTROL
- DIFUSOR 4 VÍAS
- DIFUSOR 3 VÍAS
- DIFUSOR 2 VÍAS
- REJILLA
- REJILLA TIPO EGGCRATE
- TERMOSTATO
- EVAPORADORA TIPO CASSETTE
- EVAPORADORA TIPO FAN COIL DESNUDO / DUCTS
- EVAPORADORA TIPO PARED
- EVAPORADORA DE TECHO SUSPENDIDO
- EVAPORADORA MULTIPOSICIÓN
- CONDENSADORA SERIES M/P CITY MULTI SERIES
- CONDENSADORA SERIES CITY MULTI
- CAJA DE DISTRIBUCIÓN
- CAJA DE VENTILACIÓN
- VENTILADOR CENTRIFUGO
- UNIDAD RECUPERADORA DE ENERGIA

CONTROL DE MODIFICACIONES

No.	FECHA	DESCRIPCIÓN
V1	30/08/XX	DESARROLLO / REVISIÓN

PLANO APROBADO POR EL PROPIETARIO

FIRMA: _____ FECHA: _____

PLANO APROBADO POR ARQ. Y/O INGS.

FIRMA: _____ FECHA: _____

MITSUBISHI ELECTRIC
Changes for the Better

CONTENIDO

SISTEMA DE AIRE ACONDICIONADO Y VENTILACIÓN MECÁNICA PISO 3

PLANO APROBADO POR INELCOL

FIRMA: _____ FECHA: _____

FECHA DE ELABORACIÓN:

12/04/2023

ELABORO:

ANTONIO ZORRO

FIRMA: _____

REVISO:

JHEFERSON OCAMPO

FIRMA: _____

APROBO:

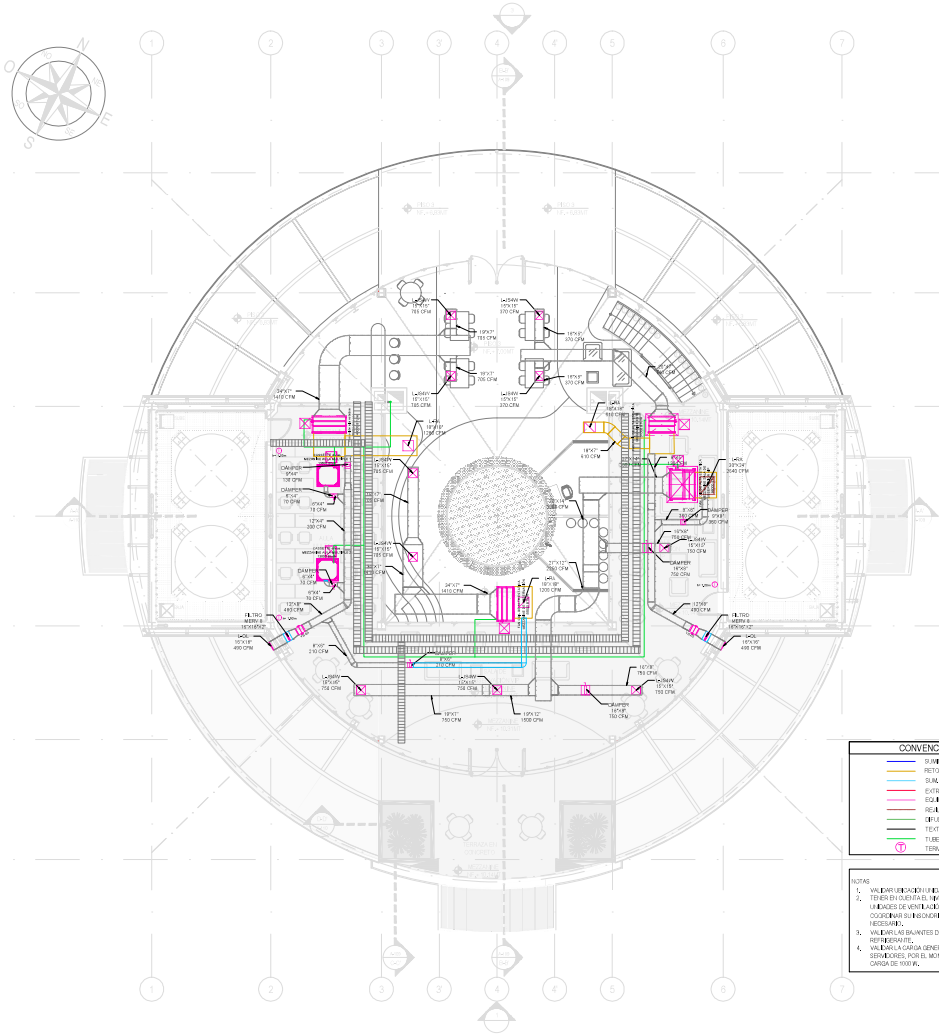
JUAN PABLO BERMUDEZ

FIRMA: _____

ESCALA:	ARCHIVO:
SCL : N/A	M-700 MECANICOS TUNEL 12-2

PLANO:	VERSIÓN:
DA-2023-035	V1
	NÚMERO DEL PLANO: 03

DA-2023-035



CONVENCIONES

- SUMINISTRO AA
- RETORNO AA
- SUM. AIRE EXTERIOR
- EXTRACCIÓN
- EQUIPOS
- REJILLAS
- DIFUSORES
- TEXTOS
- TUBERÍA
- TERMOSTATO DE PARED

NOTAS

1. VALIDAR BALANCEO UNIDADES DE VENTILACIÓN.
2. TENER EN CUENTA EL NIVEL DE RUIDO DE LAS UNIDADES DE VENTILACIÓN CON RELEVO DE COORDINAR SU ENCAMBUCACIÓN SI ES NECESARIO.
3. VALIDAR LAS BAJANTES DE LAS TUBERÍAS DE REFRIGERANTE.
4. VALIDAR LA CARGA GENERADA POR LOS SERVIDORES, POR EL MOMENTO SE ASUME UNA CARGA DE 1000 W.

CONFIDENCIAL

TODA INFORMACIÓN CONTEMPLADA EN ESTE DOCUMENTO ES CLASIFICADA Y CONFIDENCIALMENTE CONFIDENCIAL. NO PUEDE SER COPIADA POR NINGÚN MÉTODO UTILIZADA PARA SU IMPLEMENTACIÓN SIN EL PERMISO DE MITSUBISHI ELECTRIC DE COLOMBIA LTDA.

PROYECTO

TÚNEL DE VIENTO FAC

CIUDAD / UBICACIÓN

ZIPAQUIRA

CONVENCIONES

- DUCTO DE SUMINISTRO AIRE ACONDICIONADO
- DUCTO DE SUMINISTRO AIRE FRESCO
- DUCTO DE EXTRACCIÓN
- DUCTO DE RETORNO
- TUBERÍA DE REFRIGERANTE/GAS
- TUBERÍA DE CONTROL
- DIFUSOR 4 VÍAS
- DIFUSOR 3 VÍAS
- DIFUSOR 2 VÍAS
- REJILLA
- REJILLA TIPO PERFIL
- TERMOSTATO
- EVAPORADORA TIPO CASSETTE
- EVAPORADORA TIPO FAN COIL DESNUDO / DUCT
- EVAPORADORA TIPO PARED
- EVAPORADORA DE TECHO SUSPENDIDO
- EVAPORADOR A MULTIPOSICIÓN
- CONDENSADORA SERIES M&P, CITY MULTI, SERIE S
- CONDENSADORA SERIE CITY MULTI
- CAJA DE DISTRIBUCIÓN
- CAJA DE VENTILACIÓN
- VENTILADOR CENTRÍFUGO
- UNIDAD RECUPERADORA DE ENERGÍA

CONTROL DE MODIFICACIONES

No.	FECHA	DESCRIPCIÓN
V1	30/08/XXX	DESCRIPCIÓN / VERSIÓN

PLANO APROBADO POR EL PROPIETARIO

FIRMA: _____ FECHA: _____

PLANO APROBADO POR ARQ. Y/O INGS.

FIRMA: _____ FECHA: _____

MITSUBISHI ELECTRIC
Changes for the Better

CONTENIDO

SISTEMA DE AIRE ACONDICIONADO Y VENTILACIÓN MECÁNICA MEZZANINE

PLANO APROBADO POR INELCOL

FIRMA: _____ FECHA: _____

FECHA DE ELABORACIÓN:

12/04/2023

ELABORÓ:

ANTONIO ZORRO

FIRMA: _____

REVISÓ:

JHEFERSON OCAMPO

FIRMA: _____

APROBÓ:

JUAN PABLO BERMUDEZ

FIRMA: _____

ESCALA: SCL : N/A

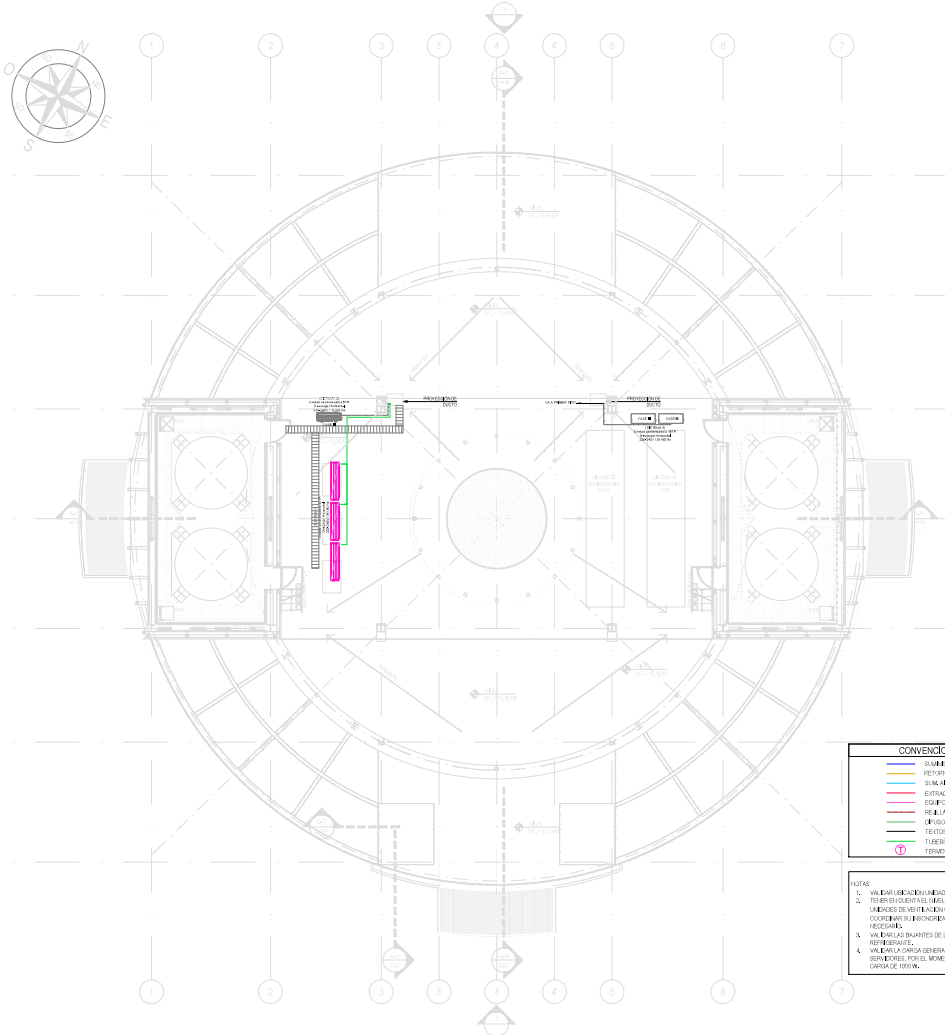
ARCHIVO: M-700 MECANICOS TUNEL 12-2

PLANO: DA-2023-035

VERSIÓN: V1

NÚMERO DEL PLANO: 04

DA-2023-035



CONVENCIONES

- SUMINISTRO AA
- RETORNO AA
- SUMINISTRO EXTERIOR
- EXTRACCIÓN
- EQUIPOS
- REJILLAS
- DIFUSORES
- TEXTOS
- TUBERÍA
- TERMOSTATO DE PARED

NOTAS

1. VALIDAR UBICACIÓN UNIDADES DE VENTILACIÓN.
2. TENER EN CUENTA EL NIVEL DE RUIDO DE LAS UNIDADES DE VENTILACIÓN CON EL FIN DE COORDINAR SU UBICACIÓN SI ES NECESARIO.
3. VALIDAR LAS BAJANTES DE LAS TUBERÍAS DE REFRIGERANTE.
4. VALIDAR LA CARGA GENERADA POR LOS SERVIDORES, POR EL MOMENTO SE ASUME UNA CARGA DE 1000 W.

CONFIDENCIAL

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PROYECTO

TÚNEL DE VIENTO FAC

CIUDAD / UBICACIÓN

ZIPAQUIRA

CONVENCIONES

- DUCTO DE SUMINISTRO AIRE ACONDICIONADO
- DUCTO DE SUMINISTRO AIRE FRESCO
- DUCTO DE EXTRACCIÓN
- DUCTO DE RETORNO
- TUBERÍA DE REFRIGERANTE/GAS
- TUBERÍA DE CONTROL
- DIFUSOR 4 VÍAS
- DIFUSOR 3 VÍAS
- DIFUSOR 2 VÍAS
- REJILLA
- REJILLA VISTA EN PERFIL
- TERMOSTATO
- EVAPORADORA TIPO CASSETTE
- EVAPORADORA TIPO FAN COIL DESNUDO / DUAS
- EVAPORADORA TIPO PARED
- EVAPORADORA DE TECHO SUSPENDIDO
- EVAPORADORA MULTIPOSICIÓN
- CONDENSADORA SERIES M&P, CITY MULTI SERIES S
- CONDENSADORA SERIE CITY MULTI
- CAJA DE DISTRIBUCIÓN
- CAJA DE VENTILACIÓN
- VENTILADOR CENTRÍFUGO
- UNIDAD RECUPERADORA DE ENERGÍA

CONTROL DE MODIFICACIONES

No.	FECHA	DESCRIPCIÓN
V1	30/08/XX	DESCRIPCIÓN VERSIÓN

PLANO APROBADO POR EL PROPIETARIO

FIRMA: _____ FECHA: _____

PLANO APROBADO POR ARQ. Y/O INGS.

FIRMA: _____ FECHA: _____

MITSUBISHI ELECTRIC
Changes for the Better

CONTENIDO

UBICACIÓN UNIDADES EXTERIORES

PLANO APROBADO POR MELCOL

FIRMA: _____ FECHA: _____

FECHA DE ELABORACIÓN:

12/04/2023

ELABORÓ:

ANTONIO ZAPATA

FIRMA: _____

REVISÓ:

JHEFERSON OCAMPO

FIRMA: _____

APROBÓ:

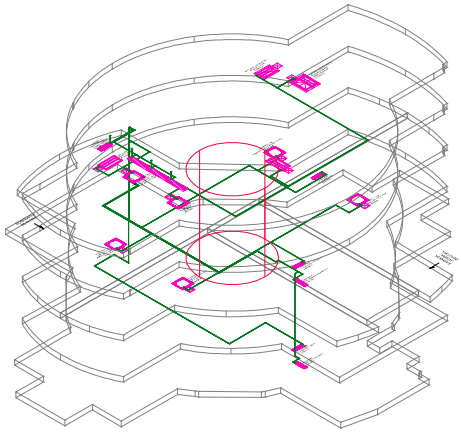
JUAN PABLO BERMUDEZ

FIRMA: _____

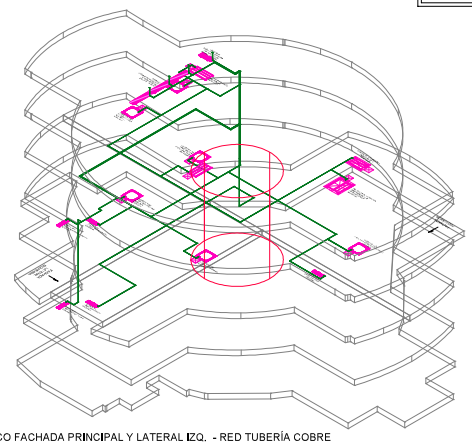
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SCL : N/A	16-700 MECANICOS TUNEL 12-2

PLANO:	VERSIÓN:
DA-2023-035	V1
	NÚMERO DEL PLANO: 05

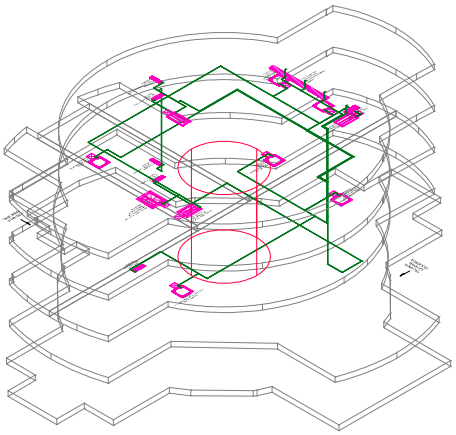
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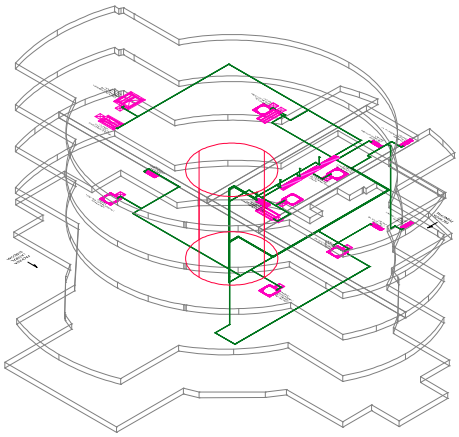
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ESCALA 1:150



3 ISOMÉTRICO FACHADA PRINCIPAL Y LATERAL IZQ. - RED TUBERÍA COBRE
ESCALA 1:150



2 ISOMÉTRICO FACHADA POSTERIOR Y LATERAL DER. -RED TUBERÍA COBRE
ESCALA 1:150



4 ALZADO FACHADA POSTERIOR Y LAT. IZQ. - RED TUBERÍA COBRE
ESCALA 1:150

CONFIDENCIAL
TODA INFORMACIÓN CONTEMPLADA EN ESTE DOCUMENTO ES CLASIFICADA Y CONFIDENCIALMENTE CONFIDENCIAL. NO PUEDE SER COPIADA POR NINGUN MÉTODO UTILIZADA PARA SU IMPLEMENTACIÓN SIN EL PERMISO DE MITSUBISHI ELECTRIC DE COLOMBIA LTDA.

PROYECTO
TÚNEL DE VIENTO FAC

CIUDAD / UBICACIÓN
ZIPAQUIRA

CONVENCIONES

	DUCTO DE SUMINISTRO AIRE ACONDICIONADO
	DUCTO DE SUMINISTRO AIRE FRESCO
	DUCTO DE EXTRACCIÓN
	DUCTO DE RETORNO
	TUBERIA DE REFRIGERANTE/GAS
	TUBERIA DE CONTROL
	DIFUSOR 4 VÍAS
	DIFUSOR 3 VÍAS
	DIFUSOR 2 VÍAS
	REJILLA
	REJILLA TIPO RANURA
	TERMOSTATO
	EVAPORADORA TIPO CASSETTE
	EVAPORADORA TIPO FAN COIL DESNUDO / DUCTS
	EVAPORADORA TIPO PARED
	EVAPORADORA DE TECHO SUSPENDIDO
	EVAPORADORA MULTIPOSICIÓN
	CONDENSADORA SERIES M/P, CITY MULTI SERIES
	CONDENSADORA SERIE CITY MULTI
	CAJA DE DISTRIBUCIÓN
	CAJA DE VENTILACIÓN
	VENTILADOR CENTRÍFUGO
	UNIDAD RECUPERADORA DE ENERGÍA

CONTROL DE MODIFICACIONES

No.	FECHA	DESCRIPCIÓN
01	30/08/XX	DESCRIPCIÓN MODIFICACIÓN

PLANO APROBADO POR EL PROPIETARIO
FIRMA: _____ FECHA: _____

PLANO APROBADO POR ARQ. Y/O INGS.
FIRMA: _____ FECHA: _____

MITSUBISHI ELECTRIC
Changes for the Better

CONTENIDO
UBICACIÓN UNIDADES EXTERIORES

PLANO APROBADO POR MELCOL
FIRMA: _____ FECHA: _____

FECHA DE ELABORACIÓN:
12/04/2023

ELABORO:
ANTONIO ZORRO
FIRMA: _____

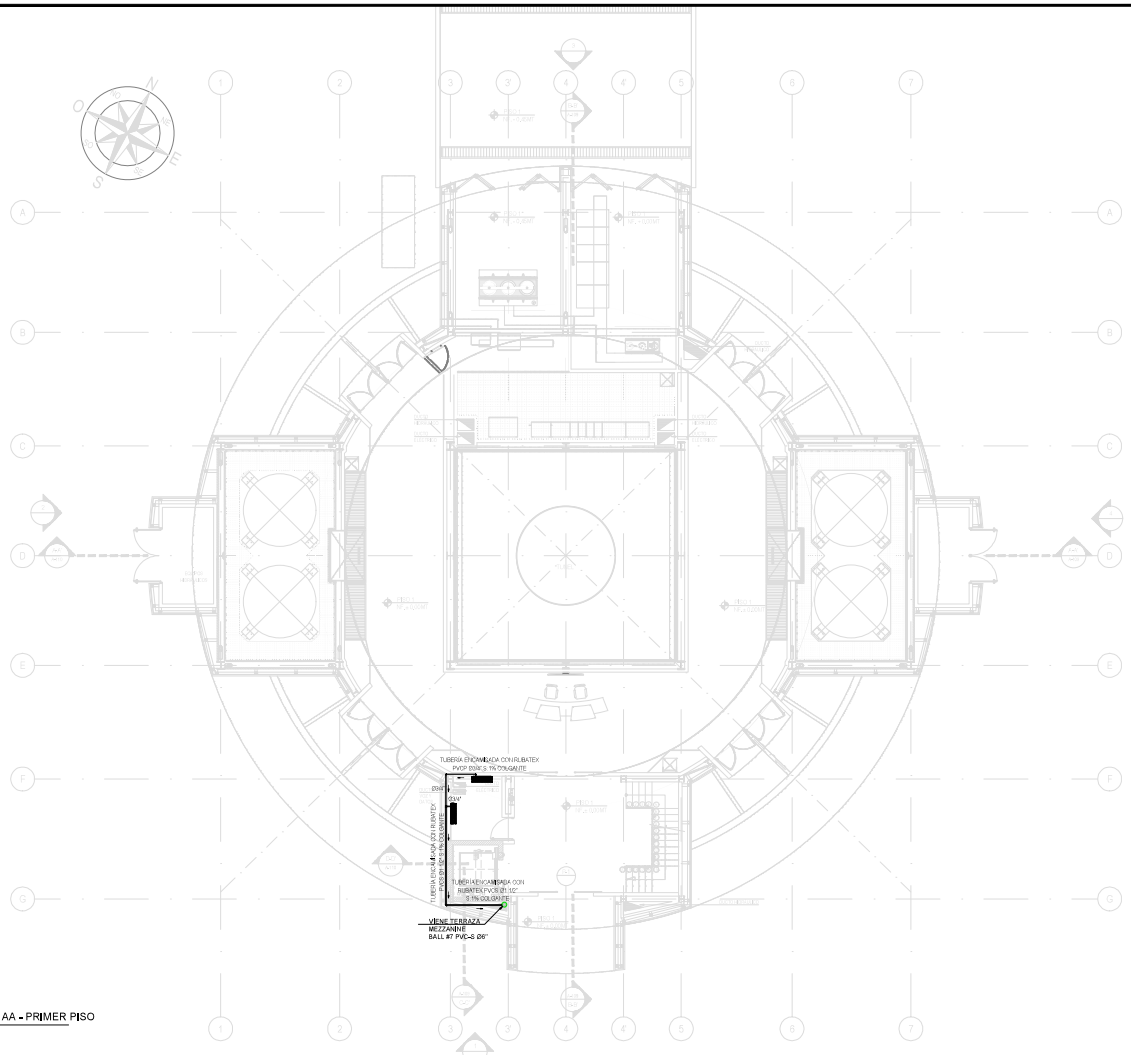
REVISO:
JHEFERSON OCAMPO
FIRMA: _____

APROBO:
JUAN PABLO BERMUDEZ
FIRMA: _____

ESCALA: SCL : N/A
ARCHIVO: 16-700 MECANICOS TUNEL 12-2

PLANO: DA-2023-035
VERSIÓN: V1
NÚMERO DEL PLANO: 05

VERSION FORMATO: 18 MAYO 2021



1 RED DE DESAGUES AA - PRIMER PISO
ESCALA 1:100

FUERZAS MILITARES DE COLOMBIA

FUERZA AÉREA COLOMBIANA

JEFATURA LOGÍSTICA
DIRECCIÓN DE INFRAESTRUCTURA

UNIDAD O GUARNICION
MUSEO AEROESPACIAL COLOMBIANO

TOCANCIPA - CUNDINAMARCA

PROYECTO:
CENTRO DE INSTRUCCIÓN EN CAÍDA LIBRE E INVESTIGACIÓN AERONÁUTICA PARA LA FAC

OBSERVACIONES:

DISEÑO:
TE. DANIELA AYALA GAMBOA
ING. AMBIENTAL Y SANITARIA SUTEP
MP 15231-415868 BYS

REVISO:
MY. GENNY RODRÍGUEZ MARTINEZ
ING. AMBIENTAL Y SANITARIA SUTEP
MP. 252015570 CND

DIBUJO:
TZ LUIS MIGUEL JIMENEZ A.
DELINEANTE DE ARQUITECTURA E INGENIERÍA
MP T129302014-1013639688

CÓDIGO DIBUJO:
FAC2023-06

CONTIENE:
H440 PL

RED DE DESAGUES
AA
PRIMER PISO

FECHA:
13 DE FEBRERO DE 2026

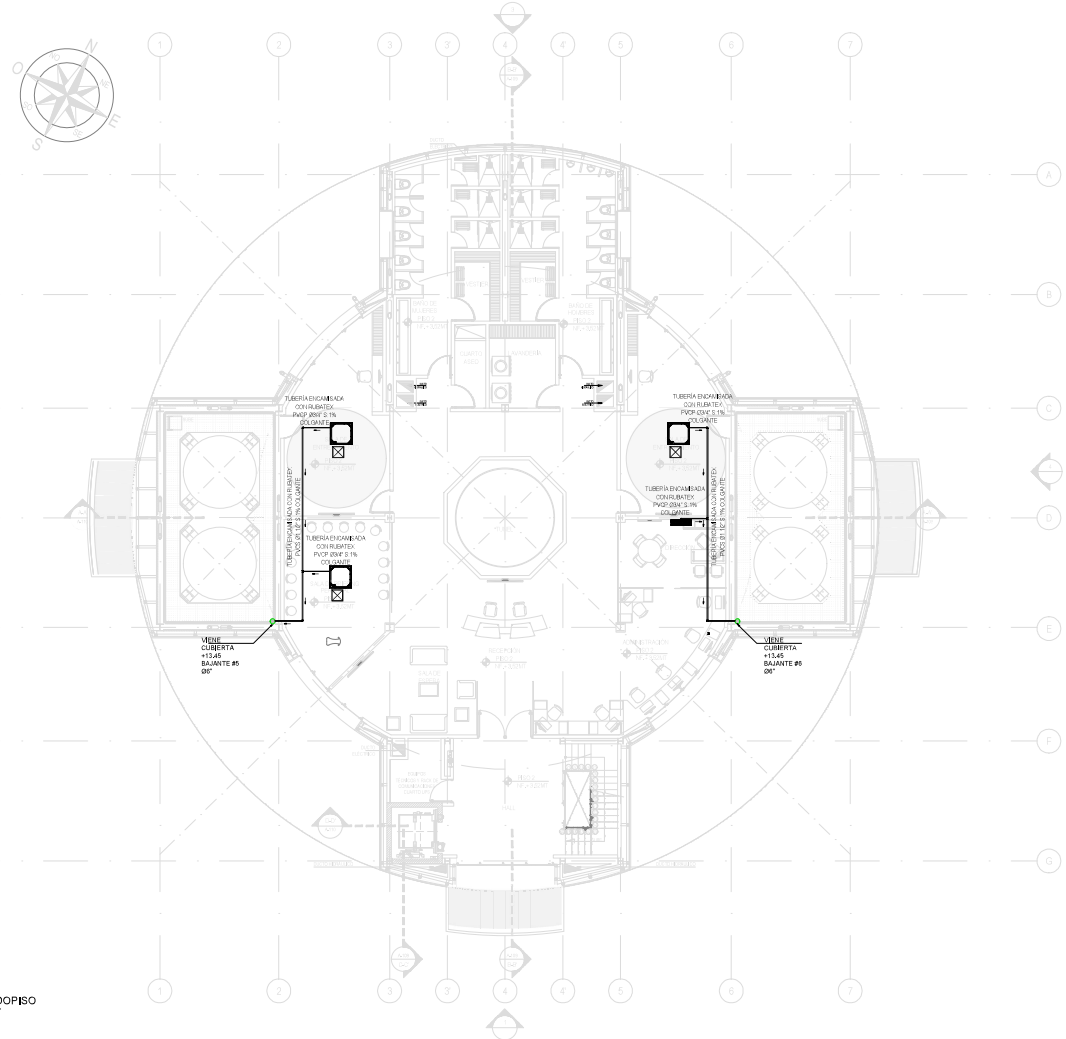
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PLANCHA No:
06 DE 09PL

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Impreso por: TZ LUIS MIGUEL JIMENEZ AGUDELO
Impreso el: 18 febrero 2026

VERSION FORMATO: 18 MAYO 2021



1 RED DE DESAGUES AA - SEGUNDOPISO
ESCALA 1:100

FUERZAS MILITARES DE COLOMBIA

FUERZA AÉREA COLOMBIANA

JEFATURA LOGÍSTICA
DIRECCIÓN DE INFRAESTRUCTURA

UNIDAD O GUARNICION
MUSEO AEROESPACIAL COLOMBIANO

TOCANCIPA - CUNDINAMARCA

PROYECTO:
CENTRO DE INSTRUCCIÓN EN CAÍDA LIBRE E INVESTIGACIÓN AERONÁUTICA PARA LA FAC

OBSERVACIONES:

DISEÑO:
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CÓDIGO DIBUJO:
FAC2023-06

CONTIENE:
H441 PL

RED DE DESAGUES
AA
SEGUNDOPISO

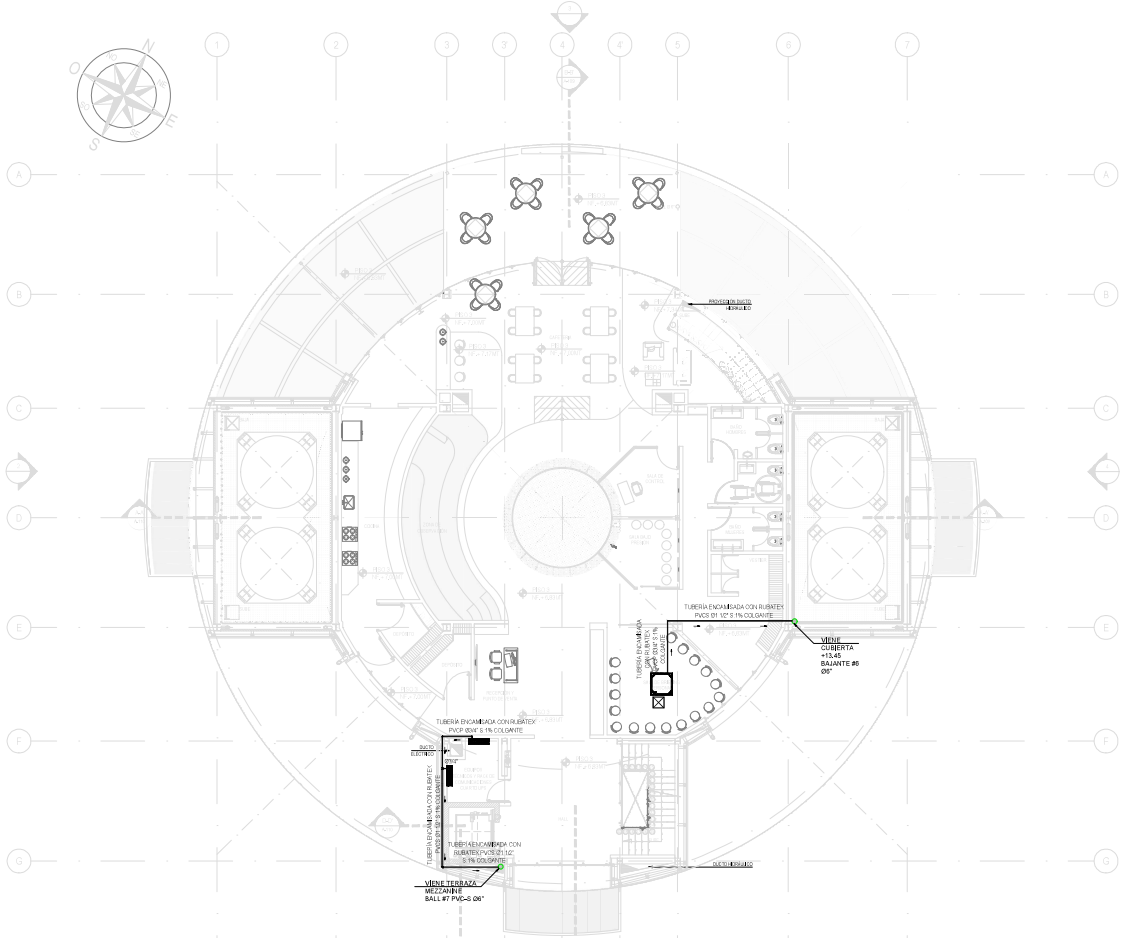
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Impreso el 18 febrero 2026



1 RED DE DESAGUES AA - TERCER PISO
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FUERZAS MILITARES DE COLOMBIA
FUERZA AÉREA COLOMBIANA
JEFATURA LOGÍSTICA
DIRECCIÓN DE INFRAESTRUCTURA

UNIDAD O GUARNICION
MUSEO AEROESPACIAL COLOMBIANO

TOCANCIPA - CUNDINAMARCA

PROYECTO:
CENTRO DE INSTRUCCIÓN EN CAÍDA LIBRE E INVESTIGACIÓN AERONÁUTICA PARA LA FAC

OBSERVACIONES:

DISEÑO:
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CÓDIGO DIBUJO:
FAC2023-06

CONTIENE:
H442 PL

RED DE DESAGUES
AA
TERCER PISO

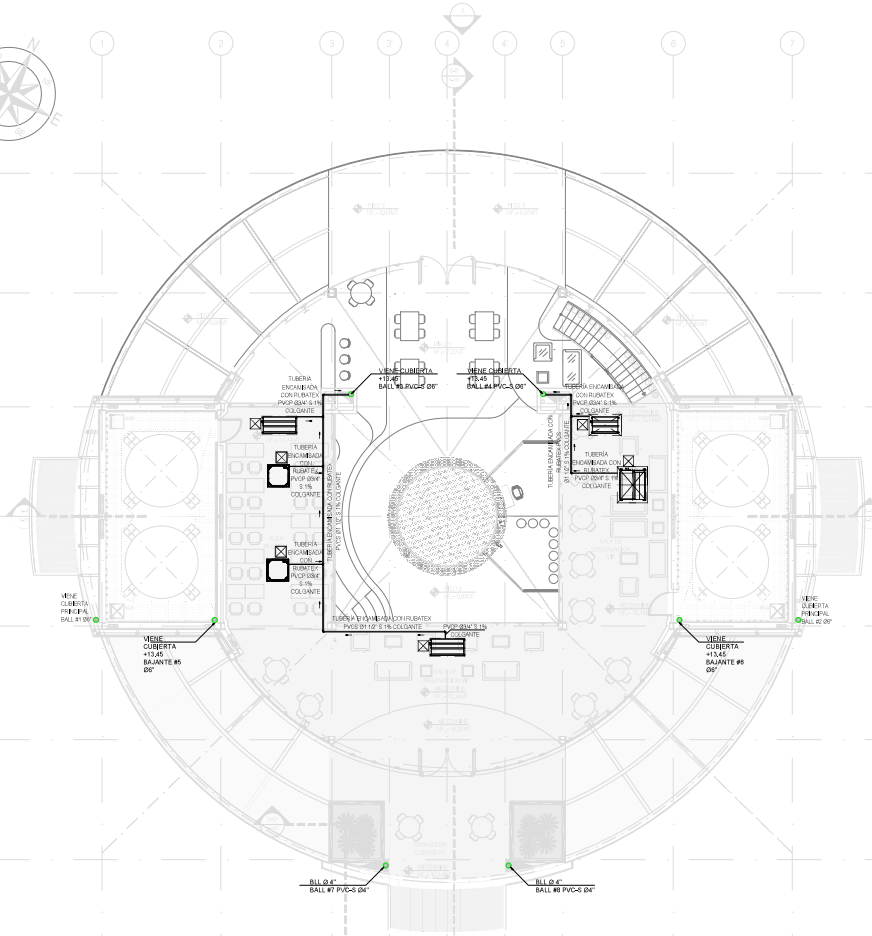
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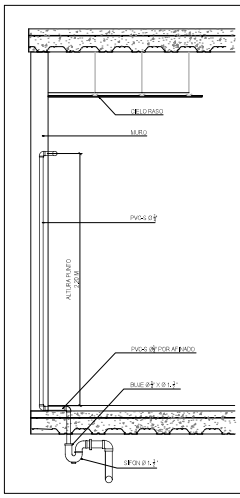
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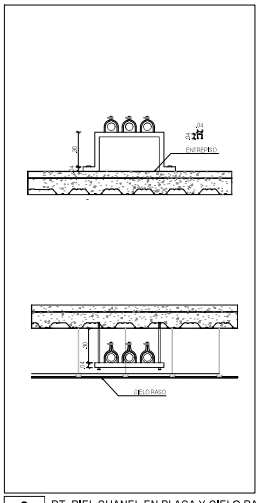
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Impreso por: TZ LUIS MIGUEL JIMENEZ AGUDELO
Impreso el: 18 febrero 2026



1 RED DE DESAGUES AA - MEZZANINE
ESCALA 1:100



2 DETALLE PUNTO MINI SPLIT
ESCALA 1:20



3 DT. RIEL CHANEL EN PLACA Y CIELO RASO
ESCALA 1:20

FUERZAS MILITARES DE COLOMBIA
FUERZA AÉREA COLOMBIANA
JEFATURA LOGÍSTICA
DIRECCIÓN DE INFRAESTRUCTURA

UNIDAD O GUARNICION
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CÓDIGO DIBUJO:
FAC2023-06

CONTIENE:
H443 PL
RED DE DESAGUES AA MEZZANINE

FECHA:
13 DE FEBRERO DE 2026

FASE: .C.
VERSION: .1.

ESCALA:
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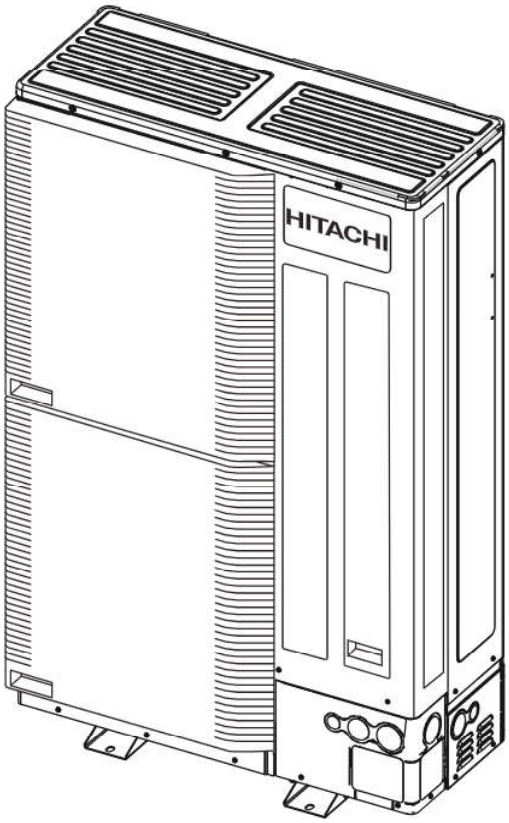
HITACHI

TECHNICAL CATALOG

INVERTER-DRIVEN MULTI-SPLIT SYSTEM AIR-COOLED HEAT PUMP AIR CONDITIONERS

SET FREE SideSmart™ MSF *E* SERIES

OUTDOOR UNITS



MODELS

<BASE UNITS>

RAS-080HNCELW TO RAS-180HNCELW
RAS-080HNCERW TO RAS-180HNCERW

EN TECHNICAL CATALOG
Original Instructions

Cooling & Heating

air

TCO-21001

Models

Applicable Models

HP	AC 3ϕ, 380 - 415 V/50 Hz AC 3ϕ, 380 V/60 Hz	AC ϕ3, 220 V/60 Hz
8HP	RAS-080HNCELW	RAS-080HNCERW
10HP	RAS-100HNCELW	RAS-100HNCERW
12HP	RAS-120HNCELW	RAS-120HNCERW
14HP	RAS-140HNCELW	RAS-140HNCERW
16HP	RAS-160HNCELW	RAS-160HNCERW
18HP	RAS-180HNCELW	RAS-180HNCERW

NOTE:

- The 18HP unit is not available for the ANZ region. (The product lineup is 8HP to 16HP.)

Unit Nomenclature

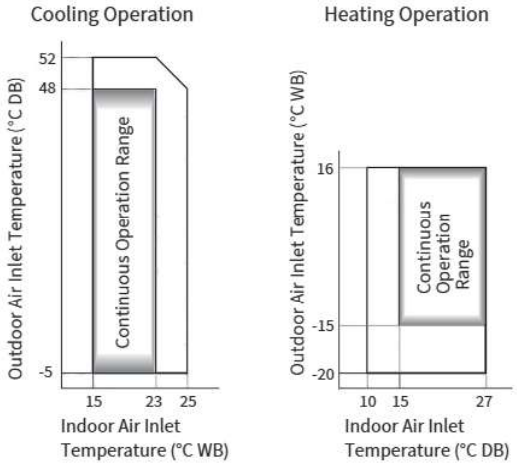
RAS -100 H N C E L W

Nomenclature Description

W	Production Location: JCH-WH
L	L: AC 3 ϕ, 380-415 V/50 Hz (4 Wires) AC 3 ϕ, 380 V/60 Hz (4 Wires) R: AC 3 ϕ, 220 V/60 Hz (3 Wires)
E	Set Free System: SideSmart™
C	C: 3rd Generation
N	Refrigerant Type: R410A
H	Air Cooling/Heat Pump
100	System Capacity (e.g. 100 = 10 HP)
RAS	Unit Type RAS: Outdoor Unit

Working Range

This air conditioner has been designed for a specific temperature range. For optimum performance and a long life, operate this unit within the range limits according to the table below.



Temperature DB: Dry Bulb, WB: Wet Bulb

	Cooling Operation		Heating Operation	
	Continuous	Intermittent	Continuous	Intermittent
Outdoor Air Inlet Temperature	-5 to 48 °C DB	48 to 52 °C DB	-15 to 16 °C WB	-20 to 15 °C WB
Indoor Air Inlet Temperature	15 to 23 °C WB	23 to 25 °C WB	15 to 27 °C DB	10 to 15 °C DB

Cooling operation at a high ambient temperature (48°C to 52°C)

- Temporary high ambient operation is allowed depending on the installation condition.
- Do not install the unit where the ambient temperature is always high.
- If an air outlet duct is attached and set in high static mode, or an optional hood such as a snow protection hood is attached, the outdoor unit operational temperature should not exceed 48 °C. If it exceeds 48 °C, protection control and intermittent cooling operation may be activated.
- When the outdoor air inlet temperature is more than 48°C during cooling operation, “intermittent operation” may be activated to prevent the unit from overloading. If the outdoor unit operates for a long time at a temperature higher than 48 °C protection control may be activated.
- If installing units in a place where the ambient temperature continuously exceeds 48 °C, the combination ratio must be lower than 100 % and the indoor units should not be operated simultaneously.
- The cooling capacity deteriorates at a high ambient temperature. Select a larger capacity outdoor unit than an outdoor unit which capacity is larger than the compatible building heat load.
- When the ambient temperature is more than 48 °C during cooling operation, the noise level to increase from 5 dBA to 7 dBA, due to an increase in fan rotation speed.

NOTES:

- The appropriate amount (100 %) of refrigerant must be charged. Excessive charging of refrigerant is forbidden.
- Units should not be installed in areas where they will be affected by direct sunlight or where a short circuit of the discharged air may occur. Installing the units in an inappropriate place may active the protection control and the alarm system. The life span of the products and part may be considerably shortened.
- Periodic maintenance (1/certain month) must be carried out on the heat exchanger fin to avoid adhesion of dirt and clogging of sand in the outdoor unit heat exchanger.
- When the cooling load is low and the outdoor air inlet temperature is 10 °C DB or lower, “thermo-OFF” may be activated to prevent frost formation on the indoor unit heat exchanger. Depending on the operating condition, the outlet air temperature of the indoor unit may be excessively low. Pay attention to the direction of the outlet air. Do not place objects near the air outlet and under the indoor unit as they may be damaged by condensates that may form if the humidity or the latent heat load is continuously high.
- When the heating load is low and the outdoor air inlet temperature is high (higher than 15 °C DB), thermo-OFF may be activated. The outdoor unit operation will stop when then outdoor inlet air temperature exceeds 26 °C DB.
- The operational range differs when connected to All Fresh Air Unit, Econofresh and other special indoor units. Refer to the technical catalog for more details.

IMPORTANT NOTICE

- Hitachi-Johnson Controls Air Conditioning pursues a policy of continuing improvement in design and performance in its products. As such, Hitachi-Johnson Controls Air Conditioning reserves the right to make changes at any time without prior notice.
- Hitachi-Johnson Controls Air Conditioning cannot anticipate every possible circumstance that might involve a potential hazard.
- This manual provides common descriptions, basic and advanced information to maintain and service this air conditioner which you operate as well for other models.
- The installer and system specialist must safeguard against refrigerant leakage in accordance with local codes. The following standards may be applicable, if local regulations are not available. International Organization for Standardization: (ISO 5149 or European Standard, EN 378). No part of this manual may be reproduced in any way without the expressed written consent of Hitachi-Johnson Controls Air Conditioning.
- This air conditioner is designed for standard air conditioning applications only. Do NOT use this unit for anything other than the purposes for which it was intended for.
- The unit is a partial unit air conditioner, complying with partial unit requirements of the International Standard, and must only be connected to other units that have been confirmed as complying with corresponding partial unit requirements of the International Standard.
- This manual should be considered as a permanent part of the air conditioner and should remain with the air conditioner.
- If you have questions, please contact your distributor or contractor.

Safety Summary

⚠ DANGER : DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING : WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION : CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE : NOTICE is used to address practices not related to personal injury.

NOTE : NOTE is useful information for operation and/or maintenance.

General Precautions

⚠ WARNING

To reduce the risk of serious injury or death, read these instructions thoroughly and follow all warnings or cautions included in all manuals that accompanied the product and are attached to the unit. Refer back to these safety instructions as needed.

- Hitachi-Johnson Controls Air Conditioning will not assume any liability for injuries or damage caused by not following steps outlined or described in this manual. Unauthorized modifications to Hitachi-Johnson Controls Air Conditioning products are prohibited as they:
  - May create hazards that could result in death, serious injury or equipment damage;
  - Will void product warranties;
  - May invalidate product regulatory certifications.
- This system should be installed by personnel certified by Hitachi-Johnson Controls Air Conditioning. Personnel must be qualified according to region and national building and safety codes and regulations. Incorrect installation could cause leaks, electric shock, fire or explosion. In areas where Seismic Performance requirements are specified, the appropriate measures should be taken during installation to guard against possible damage or injury that might occur in an earthquake if the unit is not installed correctly or due to a falling unit.
- This air conditioning system is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial use by lay persons.
- Use appropriate Personal Protective Equipment (PPE), such as gloves and protective goggles and, where appropriate, have a gas mask nearby. Also use electrical protection equipment and tools suited for electrical operation purposes. Keep a quenching cloth and a fire extinguisher nearby during brazing. Use care in handling, rigging, and setting of bulky equipment.
- Before servicing, turn off the power supply and use accepted lockout and tag out procedures at all main switches. Failure to do so can result in damage to internal components with severe or fatal electrical shock.
- This unit is a pressurized system. Never loosen threaded joints while the system is under pressure and never open pressurized system parts.
- When the air conditioner is to be repaired or transported to a new location, contact your distributor or contractor. If the repair and the installation are not completed, electric shock or fire can result.
- When transporting, be careful when picking up, moving and mounting these units. Although the unit may be packed using plastic straps, Do NOT use them for transporting the unit from one location to another. Do NOT stand on or put any material on the unit. Get a partner to help, and bend with your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut fingers, so wear protective gloves.

- Use only recommended/standardized replacement parts provided by Hitachi-Johnson Controls Air Conditioning.
- This air conditioning system can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the air conditioning system in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.
- Do NOT attempt to "clean" indoor unit components with liquid or powdered cleaning agents during maintenance. Electric shock, sparks, flame, and serious or fatal injury can occur.
- When the flat panel is opened (closed) or the air filter is attached (removed), hold them firmly. If not, it may cause falling or injury. (only for wall mounted type)
- Do NOT insert fingers or objects into air inlet/outlet. Injury can result from rotating fan blades or energized electrical components.
- Do NOT touch the main circuit board or electronic components in the controller or remote devices. Make sure that dust and/or moisture does not accumulate on the circuit board.
- Do NOT touch the wired controller with wet hands. Failure of the wired controller or an electrical shock can result.
- If you smell anything burning, shut down the unit and turn off the power at the main power supply. Contact the fire department and your installer or electrical contractor.
- Hair spray, insecticides, lacquers, and other pressurized substances should not be used within 1 m of any air conditioner. It can react with energized electrical components and cause fire.
- For safe operation, the air conditioning system shall be inspected and maintained every 6 months.

⚠CAUTION

To reduce the risk of minor or moderate injury, the following general precautions must be followed.

- About Wireless Controller
  - Pay attention to the following to use the batteries correctly. If not, it may cause liquid spill or burst.
    - Never use new and used batteries together.
    - Never use the different types of batteries (for example manganese battery and alkaline battery) together.
    - When the wireless controller is not used over a prolonged period of time (more than 2 or 3 months), remove the batteries from the wireless controller.
      - After removing the old batteries, wait five or more seconds before inserting the new ones

NOTICE

Take the following precautions to reduce the risk of property damage.

- Each model number and all matching model numbers within a system must have the same version of software.
  Follow these steps to verify that your product model numbers have the same version of software.
  - Access the main printed circuit board in each product.
  - Locate a white sticker with a P-XXXX number or
  - Connect a service checker and locate the ROM number.
- When installing the unit in a hospital or other facility where electromagnetic waves are generated from nearby medical and or electronic devices, be prepared for noise and electromagnetic interference (EMI). Do NOT install where the waves can directly radiate into the electrical box, controller cable, or controller. Inverters, appliances, high-frequency medical equipment, and radio communications equipment may cause the unit to malfunction. The operation of the unit may also adversely affect these devices. Install the unit at least 3 m away from such devices.
- If there is a source of electrical interference near the power source, install noise suppression equipment (filter).
- If the wired controller is installed in a location where electromagnetic radiation is generated, make sure that the wired controller is shielded and cables are sleeved inside conduit tubing.
- Be careful that moisture, dust, or variant refrigerant compounds not enter the refrigerant cycle during installation work. Foreign matter could damage internal components or cause blockages.

- If air filters are required on this unit, do NOT operate the unit without the air filter set in place. If the air filter is not installed, dust may accumulate and breakdown may result.
- Do NOT install the unit in any location where animals and plants can come into direct contact with the outlet air stream. Exposure could adversely affect the animals and plants.
- Be sure the condensate hose discharges water properly. If connected incorrectly, it may cause leaks.
- Do NOT install the unit with any downward slope to the side of the condensate pipe. If you do, you may have drain water flowing back which may cause leaks.
- Do NOT install the unit in any place where oil can seep into the units, such as a kitchen in restaurants, and so forth. For these locations or social venues, use specialized units with oil-resistant features built into them. In addition, use a specialized ceiling fan designed for restaurant use. These specialized oil-resistant units can be ordered for such applications. However, in places where large quantities of oil can splash onto the unit, such as a factory, even the specialized units cannot be used. These products should not be installed in such locations.
- Do NOT install this unit in any place where silicon gases can coalesce. If the silicon gas comes into contact with the surface of the heat exchanger, the finned surfaces repel water. As a result, moisture can enter from the condensate pan into the electrical box, possibly causing electrical failures.
- During the test run, check the unit's operation temperature. If the unit is used in an environment where the temperature exceeds the operation boundary, it may cause severe damage. Check the Working Range in the manual.
- The A-weighted emission sound pressure level does not exceed 70 dB (A).

Installation Precautions

⚠WARNING

To reduce the risk of serious injury or death, the following installation precautions must be followed.

- When installing the unit into:
  - A wall: Make sure the wall is strong enough to hold the unit's weight. It may be necessary to construct a strong wood or metal frame to provide added support.
  - A room: Properly insulate any refrigerant piping run inside a room to prevent "condensation" that can cause dripping and water damage to wall and floors.
  - Damp or uneven areas: Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the unit to prevent water damage and abnormal vibration.
  - An area with high winds: Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.
  - A snowy area: Install the outdoor unit on a raised platform that is higher than the average snow level. Provide the snow protection hoods.
- Do NOT install the unit in the following places. Doing so can result in an explosion, fire, deformation, corrosion, or product failure.
  - Explosive or flammable atmosphere
  - Where a fire, oil, steam or powder can directly enter the unit, such as nearby or above a kitchen stove.
  - Where oil (including machinery oil) may be present.
  - Where corrosive gases such as chlorine, bromine, or sulfide can accumulate, such as near a hot tub or a hot spring.
  - Where dense, salt-laden airflow is heavy, such as in coastal regions.
  - Where the air quality is of high acidity.
  - Where harmful gases can be generated from decomposition.
- Do NOT position the condensate pipe for the indoor unit near any sanitary sewers where corrosive gases may be present. If you do, toxic gases can seep into breathable air spaces and can cause respiratory injuries. If the condensate pipe is installed incorrectly, water leakage and damage to the ceiling, floor, furniture, or other possessions may result. If the condensate pipe becomes clogged, water may drip from the indoor unit. Do NOT install the indoor unit where such dripping can cause moisture damage or at uneven locations.
- During transportation, do NOT allow the backrest of the forklift make contact with the unit, otherwise, it may cause damage to the heat exchanger and also may cause injury when stopped or started suddenly.
- Before performing any brazing work, be sure that there are no flammable materials or open flames nearby.
- Remove gas inside the closing pipe when the brazing work is performed. If the brazing filler metal is melted with remaining gas inside, the pipes will be blown off and it may cause injury.

- Be sure to use nitrogen gas for the airtight test. If other gases such as oxygen gas, acetylene gas or fluorocarbon gas are accidentally used, it may cause an explosion or gas intoxication.
- Perform a test run to ensure normal operation. Safety guards, shields, barriers, covers, and protective devices must be in place while the compressor/unit is operating. During the test run, keep fingers and clothing away from any moving parts.
- Do NOT install the indoor unit anywhere discharge airflow can pass directly toward nearby heating equipment (space heaters). It may interfere with the combustion process in these units.
- When the indoor unit is operating with heating equipment, ventilate the room sufficiently. Any leaked refrigerant gas that happens to come into contact with any heat source can become toxic on contact and can cause suffocation in the immediate area.
- Do NOT install this system in close proximity to septic sewer lines where flammable and toxic gases can coalesce.

⚠CAUTION

To reduce the risk of minor or moderate injury, the following installation precautions must be followed.

- Proper handling of this unit requires two people. Safe handling and installation of the indoor unit requires the strength of two people. Mounting the unit alone may cause injury due to a fall of the unit. Although the unit may be girded with plastic bands, do NOT use it for transportation. Avoid contact with finned surfaces of the heat exchanger as sharp edges can cause severe injury to hands and fingers. Use appropriate work gloves for the job.

NOTICE

Take the following precautions to reduce the risk of property damage.

- The optional decorative panel can become deformed if the positioning of the indoor unit's suspension brackets are not stable or level. Condensation can accumulate in low spots as a result due to escaping air through any resulting gaps between the indoor unit and the decorative panel.
- Check to ensure that the condensate hose discharges moisture properly. If connected incorrectly, it can result in leakage and cause damage to furniture.
- Make sure to use the factory-supplied condensate hose and hose clamp. Non-factory supplied condensate hose and hose clamp
- can cause water leakage.
- Do NOT bend or twist the factory-supplied condensate hose. This could compromise the seal and result in water leakage.
- Do NOT apply excessive force to the condensate pipe connection. This can also compromise the seal properties of the connection.
- Verify that the installed unit is level with floor and ceiling surfaces. Any variance or inclination can cause moisture to back up into the condensate pan, overflow, and seepage onto ceiling or wall surfaces, and cause damage to carpeted surfaces or furniture below.
- Air circulation should be optimized to achieve the best distribution pattern and not settled into isolated pockets that can make people uncomfortable.
- Inspect the condensate pan before the onset of winter to drain away all accumulated water in the pan.
- The heat exchanger of indoor unit overheats whenever there is a slight amount of refrigerant circulating during slowdown or stoppage. As a result, water in the condensate pan evaporates and can condense on ceiling or wall surfaces.
- After the drain check is completed, insert the rubber plug again and seal the gap with a silicon sealant.
- Clean up the site when finished, remembering to check that no metal scraps or bits of wiring have been left inside the unit being installed.
- Do NOT install the decorative panel with motion sensor and radiation sensor or motion sensor kit in the following places. It may cause failure or deterioration of the sensor.
  - Ambient temperature changes drastically.
  - Where excessive force or vibration is applied to the sensor.
  - Where static electricity or electromagnetic waves may generate.
  - Where interference of infrared light such as glasses or mist are in the detecting area.
  - Where the lens for sensor is exposed to high temperature and humidity for a long time.
  - Where fluid and corrosive gas exist.

  - Where direct lights such as sunlight or headlights affect the sensor.
  - Where hot air from a heater, etc. affects directly to the sensor.
  - Where the air flow returns to the sensor by hitting obstacles such as a shelf, locker, etc.
  - Where the blower devices such as ceiling fan, ventilating fan, etc. affect the air flow from the indoor unit.
  - Where weather affects directly the surface of the sensor.
  - Where the lens surface may smudge or be damaged such as a dusty environment.
    Detecting function will decrease if the lens for sensor smudges.
    In this case, wipe off smudges using a cotton swab soaked with alcohol (Isopropyl alcohol is recommended.) or a soft cloth. (When wiping off smudges on the lens for sensor, do NOT apply excessive force. If excessive force is applied, the resin lens may be damaged and this may cause malfunctions such as misdetection or undetectable motion.)
- When using the remote control thermo function, consider the following points when selecting the installation location.
  - Where the average temperature of the room can be detected
  - Where there is no direct sunlight
  - Where there is no heat source nearby
  - Where hot/cold air from the outdoors, or a draft from elsewhere (such as air vents, diffusers or grilles) can affect air circulation.
- When installing the wired controller in the following locations with poor temperature distribution, install remote sensors.
  - Where the unit is exposed to direct sunshine or direct light.
  - Where the unit is in close proximity to a heat source.
  - Where hot/cold air from the outdoors, or a draft from elsewhere (such as air vents, diffusers or grilles) can affect air circulation.
  - In areas with poor air circulation and ventilation.
- When a wireless controller is used, locate at a distance of at least 3 m between the indoor unit and electric lighting. If not, the receiver part of the unit may have difficulty receiving operation commands.

Refrigerant Precautions

⚠WARNING

To reduce the risk of serious injury or death, the following refrigerant precautions must be followed.

- As originally manufactured, this unit contains refrigerant charged by Hitachi-Johnson Controls Air Conditioning. Hitachi-Johnson Controls Air Conditioning uses only refrigerants that have been approved for use in the unit's intended home country or market. Johnson Controls-Hitachi Air Conditioning distributors similarly are only authorized to provide refrigerants that have been approved for use in the countries or markets they serve. The refrigerant used in this unit is identified on the unit's faceplate and/or in the associated manuals. Any additions of refrigerant into this unit must comply with the country's requirements with regard to refrigerant use and should be obtained from Hitachi-Johnson Controls Air Conditioning distributors. Use of any non-approved refrigerant substitutes will void the warranty and will increase the potential risk of injury or death.
- To avoid the possibility of different refrigerant or refrigerant oil being introduced into the cycle, the sizes of the charging connections have been changed from R407C type and R22 type. It is necessary to prepare the following tools listed in "Necessary Tools and Instruments List for Installation" in the "Installation and Maintenance Manual" before performing the installation work. Use refrigerant pipes and joints which are approved for use with R410A.
- The refrigerant R410A is adopted. The refrigerant oil tends to be affected by foreign matters such as moisture, oxide film, (or fat). Perform the installation work with care to prevent moisture, dust, or different refrigerant from entering the refrigerant cycle. Foreign matter can be introduced into the cycle from such parts as expansion valve and the operation may be unavailable.
- The outdoor unit shall only be connected to indoor units suitable for the same refrigerant (R410A).
- The design pressure for this product is 4.15 MPa. The pressure of the refrigerant R410A is 1.4 times higher than that of the refrigerant R22. Therefore, the refrigerant piping for R410A must be thicker than that for R22. Make sure to use the specified refrigerant piping. If not, the refrigerant piping may rupture due to an excessive refrigerant pressure. Besides, pay attention to the piping thickness when using copper refrigerant piping. The thickness of copper refrigerant piping differs depending on its material.

- The maximum operating pressure is 4.15 MPa. This maximum operating pressure shall be considered when connecting the outdoor unit to correlated indoor units.
- When installing the unit, and connecting refrigerant piping, keep all piping runs as short as possible, and make sure to securely connect the refrigerant piping before the compressor starts operating. If the refrigerant piping is not connected and the compressor activates with the stop valve opened, the refrigerant cycle will become subjected to extremely high pressure, which can cause an explosion or fire.
- If installed in a small room, take measures to prevent the refrigerant from exceeding the maximum allowable concentration in the event that refrigerant gases should escape. The installation should meet the requirements in each regional regulation. If refrigerant gas leaks during the installation work, ventilate the room immediately.
- The refrigerant system may be damaged if the slope of the piping connection kit exceeds +15°.
- Tighten the flare nut with a torque wrench in the specified manner. Do NOT apply excessive force to the flare nut when tightening. If you do, the flare nut can crack and refrigerant leakage may occur.
- When maintaining, relocating, and disposing of the unit, dismantle the refrigerant piping after the compressor stops.
- When pipes are removed from under the piping cover, after the insulation work is completed, cover the gap between the piping cover and pipes using a packing material (field-supplied). If the gap is not covered, the unit may be damaged if snow, rain water or small animals enter the unit.
- Do NOT apply excessive force to the spindle valve at the end of opening. Otherwise, the spindle valve flies out due to refrigerant pressure. At the test run, fully open the gas and liquid valves. Otherwise, these devices will be damaged. (It is closed before shipment.)
- Before installation is complete, make sure that the refrigerant leak test has been performed. If refrigerant gases escape into the air, turn off the main switch, extinguish any open flames and contact your service contractor. Refrigerant (Fluorocarbon) for this unit is odorless. If the refrigerant should leak and come into contact with open flames, toxic gas could be generated. Also, because the fluorocarbons are heavier than air, they settle to the floor, which could cause asphyxiation.
- If refrigerant gas should leak, turn off all heating equipment and ventilate the room immediately. Mop down or vacuum floor areas of residual toxic particulate.
- This product contains fluorinated greenhouse gases that its functioning relies upon. Do NOT vent into the atmosphere.
  Refrigerant type: R410A
  For mass of charged refrigerant, refer to chapter 7 in the installation and maintenance manual.
  GWP*1: 2090
  *1. GWP=global warming potential

Electrical Precautions

⚠WARNING

To reduce the risk of serious injury or death, the following electrical precautions must be followed.

- This air conditioning system shall be installed in accordance with national wiring regulations.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause serious injury or death.
- Means for disconnection from the supply mains, which have a contact separation in all poles that provide full disconnection under over voltage category III conditions, must be incorporated in the fixed wiring in accordance with the wiring rules.
- Be sure to use the dedicated circuit and perform all electrical work in strict accordance with this manual and all relevant regulatory standards.
- This air conditioning system is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the air conditioning system by a person responsible for their safety.
  - Children should be supervised to ensure that they do not play with the air conditioning system.
  - If the power supply wiring is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- Do NOT open the service cover or access panel to indoor or outdoor units without turning off the main power supply. Before servicing, open and tag all disconnect switches. Never assume electrical power is disconnected. Check with a multimeter.

- Turn off all power at the main power source before performing maintenance work. Failure to do so can result in damage to internal components with severe or fatal electrical shock.
- Do NOT operate indoor units with the electrical box and switch panel open and exposed. Incidental contact with energized components can prove fatal.
- Insulate all electrical components and connections from exposure to moisture. Failure to do so can result in an electrical short circuit and fire.
- Do NOT tamper with or attempt to "repair" electrical wiring or connections. Call your installer or electrical contractor. Serious or fatal injury can occur.
- Only use electrical protection equipment and tools suited for this installation.
- The Main Fuse shall be replaced by the professional person.
- Use an exclusive power supply for the air conditioner at the unit's rated voltage.
- Use the specified cables between units.
- Be sure to install circuit breakers such as an earth leakage circuit breaker (ELB)/ground fault interrupter (GFCI), isolating switch, molded case circuit breaker and so on), with the specified capacity. Ensure that the wiring terminals are tightened securely to recommended torque specifications. If a circuit breaker or fuse is frequently activated, shut down the system and contact your service contractor.
- Shut down at the main power supply if the ELB (GFCI) activates frequently. Contact your distributor or contractor immediately. Failure to act accordingly can result in serious injury and damage to the unit.
- Clamp electrical wires securely with a cable band after all wiring is connected to the terminal block. In addition, run wires securely through the wiring access channel or the electrical conduit.
- When installing the power lines, do NOT apply tension to the cables. Secure the suspended cables at regular intervals, but not too tightly.
- Make sure that the terminals do NOT come into contact with the surface of electrical box. If the terminals are too close to the surface, it may lead to failures at the terminal connection.
- After stopping operation, be sure to wait at least five minutes before turning off the main power switch. Otherwise, water leakage or electrical breakdown may result. Disconnect the power supply completely before attempting any maintenance for electrical parts. Confirm that no residual voltage is present after disconnecting the power supply.
- Residual voltage can cause electric shock. At all times, check for residual voltage after disconnecting from the power source before starting work on the unit.
- The installation of a residual current device (RCD) having a rated residual operating current not exceeding 30 mA is advisable.
- Do NOT clean with, or pour water onto the controller as it could cause an electric shock and/or damage the unit. Do NOT use strong detergent such as a solvent. Clean with a soft cloth.
- Check that the earth (ground) wiring is securely connected. Do NOT connect ground wiring to gas piping, water piping, lightning conductor, or telephone ground wiring.
- Do NOT run the relay wiring for the motion sensor and power supply wiring in parallel. Electromagnetic Interference (EMI) may cause malfunction of the sensor. (Only for indoor unit with motion sensor)
- The polarity of the input terminals is important, so be sure to match the polarity when using contacts that have polarity.
- Before installing the controller or remote devices, ensure the indoor and outdoor unit operation has been stopped. Further, be sure to wait at least five minutes before turning off the main power switch to the indoor or outdoor units. Otherwise, water leakage or electrical breakdown may result.
- Do NOT install the wired controller in the high-temperature and humidity location.
- When connecting the controller cabling to the units, do NOT touch or adjust any safety devices inside the indoor or outdoor units. All safety features, disengagement, and interlocks must be in place and functioning correctly before the equipment is put into operation. If these devices are improperly adjusted or tampered with in any way, a serious accident can occur. Never bypass any safety device or switch.

NOTICE

Take the following precautions to reduce the risk of property damage.

- Use an exclusive power supply with the rated voltage for the controller that requires an external power supply.

- Communication cable must be shielded twist pair cable (0.75 mm^2).
  Shielded cable must be considered for applications and routing in areas of high EMI and other sources of potentially excessive electrical noise to reduce the potential for communication errors. When shielded cable is applied, proper bonding and termination of the cable shield is required as per Hitachi-Johnson Controls Air Conditioning guidelines. Plenum and riser ratings for communication cables must be considered per application and local code requirements.
- The air conditioner may not function normally in the following instances:
  - If electrical power for the air conditioner is supplied from the same transformer as a device[*1] referred to below.
  - If the power source cables for this device[*1] and the air conditioner are located in close proximity to each other.

    *1. A device can include a lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.

  Regarding the cases mentioned above, surge voltage may be inducted into the power supply cables for the air conditioner due to a rapid change in power consumption of the device and an activation of a switch. Check field regulations and standards before performing electrical work in order to protect the power supply for the air conditioner.
- Turn off and disconnect the unit from the power source when handling the service connector. Do NOT open the service cover or access panel to the indoor or outdoor units without turning off the main power supply.

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NOTE:

- The details of each indoor unit information, refer to Technical Catalog and Service Manual for each indoor unit.

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1. Features

SET FREE SideSmart™ MSF "E" Series

HITACHI proudly introduces the SET FREE SideSmart™ MSF "E" series, the highly-efficient and reliable air-conditioning system. Recently, increased numbers of buildings are requiring "Intelligent" facilities - communication networks, office automation, and a comfortable environment. Particularly, comfortable space is required all the day through the year in office buildings.
This multi-split system air conditioner, SET FREE can meet these requirements. The proven combination of the scroll compressor and the inverter provides the best air conditioning for small/medium office buildings.

SYSTEM FREE System

HITACHI has developed the SYSTEM FREE system with its customers always in mind.
This system, which is unique in the world, allows the interconnection of the same indoor units for all the HITACHI systems.

This system provides the end user with greater flexibility for installation, which means that the air-conditioning systems will integrate better with the whole of the installations that make up the building.

Wide Product Range of Outdoor Units

Space, structure and necessary functions, in line with evolution in building design, the requirements for air conditioning have also diversified.
SET FREE SideSmart™ MSF "E" series offers 6 module outdoor units, respectively.
Because the most suitable unit can be selected from a wide range of models for the SET FREE SideSmart™ MSF "E" series, you can create a custom air conditioning environment to satisfy your specific building conditions.

Series Configuration

For SEA, Brazil, MEA, India, LA and Others

Type	HP																
	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
Standard	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○
Premium	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
Economic	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○

Type	HP															
	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72
Standard	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Premium	○	○	○	○	—	—	—	—	—	—	—	—	—	—	—	—
Economic	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

For ANZ

Type	HP																
	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
Standard	●	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○
Premium	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○

Type	HP						
	42	44	46	48	50	52	54
Standard	○	○	○	○	○	○	○
Premium	○	○	○	○	—	—	—

●: Single Module
○: Combination

ALL INVERTER Compressor Model (All Models)

Cabinet

- SideSmart™ series adopts the Side Flow type cabinet. The single cabinets are available in 8 HP to 18 HP*1.
- The maximum capacity of combined single units is 72 HP.
  *1. In the case ANZ products, the single unit is up to 16 HP and the maximum combination is 54 HP.
- Bring smart installation due to width is narrow against Top Flow type outdoor units

  e.g. 12 HP Cabinet



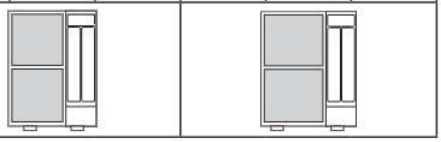
	Current VRF	SideSmart™
Cooling Capacity	33.5 kW	33.5 kW
Heating Capacity	37.5 kW	37.5 kW

Capacity Range (HP) (●: Single Module ○: Combination)

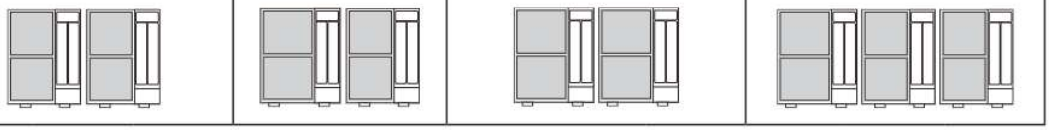
SEA, Brazil, MEA, India, LA and Others

Standard Type

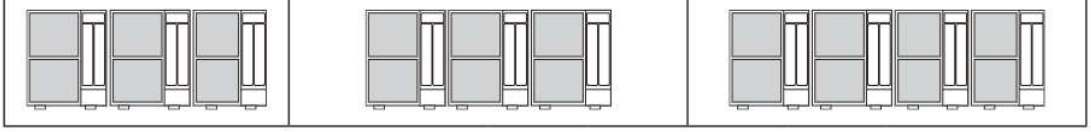
HP					
8	10	12	14	16	18
●	●	●	●	●	●



HP									
20	22	24	26	28	30	32	34	36	38
○	○	○	○	○	○	○	○	○	○



HP								
40	42	44	46	48	50	52	54	56
○	○	○	○	○	○	○	○	○

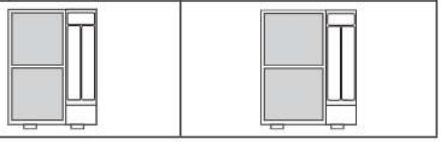


HP							
58	60	62	64	66	68	70	72
○	○	○	○	○	○	○	○

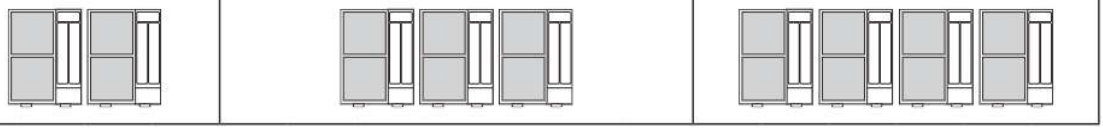


Premium Type

HP			
8	10	12	14
●	●	●	●



HP																
16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

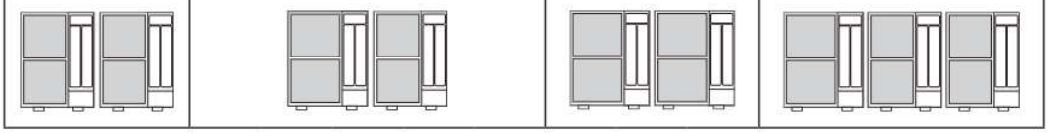


Economic Type

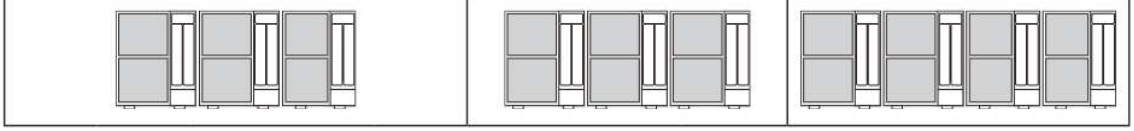
HP					
8	10	12	14	16	18
●	●	●	●	●	●



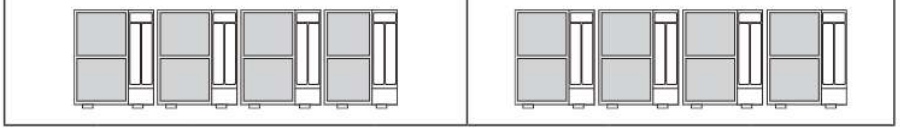
HP									
20	22	24	26	28	30	32	34	36	38
○	○	○	○	○	○	○	○	○	○



HP								
40	42	44	46	48	50	52	54	56
○	○	○	○	○	○	○	○	○



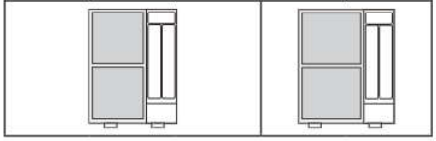
HP							
58	60	62	64	66	68	70	72
○	○	○	○	○	○	○	○



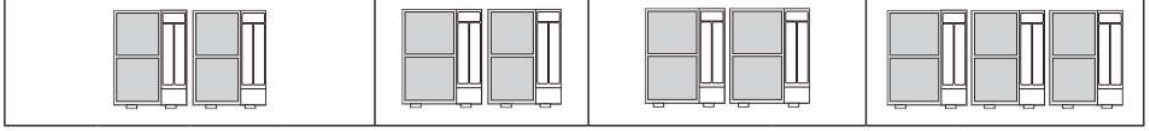
ANZ

Standard Type

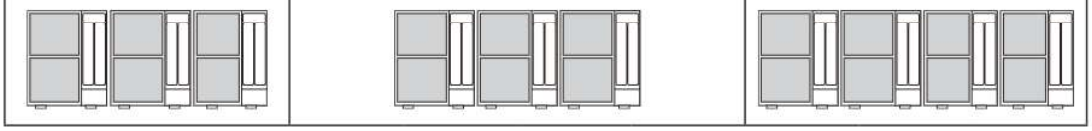
HP				
8	10	12	14	16
●	●	●	●	●



HP										
18	20	22	24	26	28	30	32	34	36	38
○	○	○	○	○	○	○	○	○	○	○



HP							
40	42	44	46	48	50	52	54
○	○	○	○	○	○	○	○

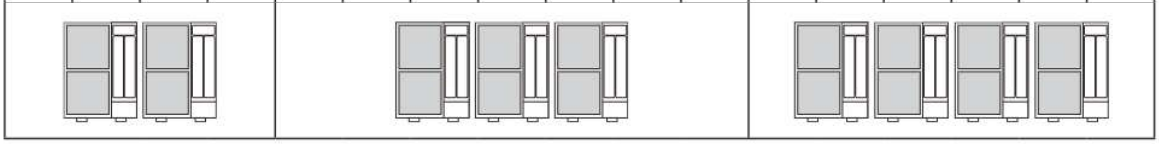


Premium Type

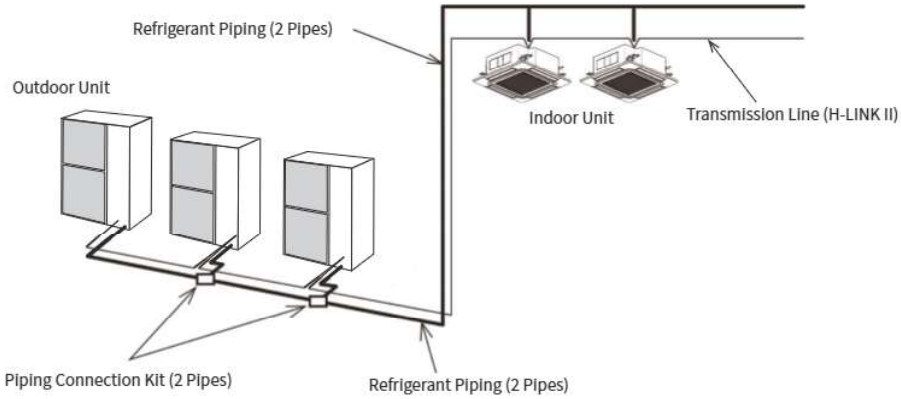
HP			
8	10	12	14
●	●	●	●



HP																
16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



System Configuration/Appearance

	Heat Pump System
System/ Appearance	
System Device	Indoor Unit + Optional Remote Control Switch + Optional Air Panel for Cassette Type + Other Optional Parts
	Outdoor Unit + Other Optional Parts (Snow Protection Hood, Drain Adapter, Air Inlet Grille, Protection Net and Air Outlet Duct-Kit, etc.)
	Outdoor Unit + Other Optional Parts (Snow Protection Hood, Drain Adapter, Air Inlet Grille, Protection Net and Air Outlet Duct-Kit, etc.)
	Piping Connection Kit For Branch Connection of Outdoor Units • SEA, Brazil, MEA, India, LA and Others ○ Standard Type 20 HP to 72 HP Outdoor Units ○ Premium Type 16 HP to 48 HP Outdoor Units ○ Economic Type 20 HP to 72 HP Outdoor Units • ANZ ○ Standard Type 18 HP to 54 HP Outdoor Units ○ Premium Type 16 HP to 48 HP Outdoor Units

: Necessary Equipments for System

: Necessary Equipments depending on Usage Purpose

Lineup

This outdoor unit series can build up to a capacity of 8 HP to 72 HP by combining maximum 4 outdoor units of 8 HP to 18 HP of base units.

Unit Nomenclature
Refer to page ii for the detail.

<Base Unit>

- AC 3 ϕ, 380 - 415 V/50 Hz (4 wires)
  AC 3 ϕ, 380 V/60 Hz (4 wires)
  Region: SEA, Brazil, MEA, India, LA, ANZ and Others

HP	8	10	12	14	16	18
Model	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-180HNCELW

- AC 3ϕ, 220 V/60 Hz (3 Wires)
  Region: Brazil and LA

HP	8	10	12	14	16	18
Model	RAS-080HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-180HNCERW

<Combination of Base Units>

This outdoor unit series provides 3 combinations of base units depending on the region: Standard combination, Premium Combination, and Economic Combination.

The last letter (S, P, or E) in the combination model stands for:

S: Standard Combination
P: Premium Combination
E: Economic Combination

NOTE:

- Any combinations not indicated in the tables are not allowed. If combinations not indicated are used, the system cannot perform correctly and may break.
- For ANZ, base units are available for up to 16 HP. Systems of 18 HP or larger are combination systems.

1. Region: SEA, Brazil, MEA, India, LA and others
   Power Supply: AC 3ϕ, 380-415 V/50 Hz (4 wires)
   AC 3ϕ, 380/60 Hz (4 wires)

Standard Combination

HP	20	22	24	26	28	30	32
Model	RAS-200HNCELWS	RAS-220HNCELWS	RAS-240HNCELWS	RAS-260HNCELWS	RAS-280HNCELWS	RAS-300HNCELWS	RAS-320HNCELWS
Combination	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW
	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW

HP	34	36	38	40	42	44	46
Model	RAS-340HNCELWS	RAS-360HNCELWS	RAS-380HNCELWS	RAS-400HNCELWS	RAS-420HNCELWS	RAS-440HNCELWS	RAS-460HNCELWS
Combination	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW
	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW
	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW

HP	48	50	52	54	56	58	60
Model	RAS-480HNCELWS	RAS-500HNCELWS	RAS-520HNCELWS	RAS-540HNCELWS	RAS-560HNCELWS	RAS-580HNCELWS	RAS-600HNCELWS
Combination	RAS-160HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW
	RAS-160HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW
	RAS-160HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW
	-	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW

HP	62	64	66	68	70	72
Model	RAS-620HNCELWS	RAS-640HNCELWS	RAS-660HNCELWS	RAS-680HNCELWS	RAS-700HNCELWS	RAS-720HNCELWS
Combination	RAS-160HNCELW	RAS-160HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-180HNCELW

Premium Combination

HP	16	18	20	22	24	26
Model	RAS-160HNCELWP	RAS-180HNCELWP	RAS-200HNCELWP	RAS-220HNCELWP	RAS-240HNCELWP	RAS-260HNCELWP
Combination	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-080HNCELW	RAS-100HNCELW
	RAS-080HNCELW	RAS-080HNCELW	RAS-080HNCELW	RAS-100HNCELW	RAS-080HNCELW	RAS-080HNCELW
	-	-	-	-	RAS-080HNCELW	RAS-080HNCELW

HP	28	30	32	34	36	38
Model	RAS-280HNCELWP	RAS-300HNCELWP	RAS-320HNCELWP	RAS-340HNCELWP	RAS-360HNCELWP	RAS-380HNCELWP
Combination	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-100HNCELW
	RAS-080HNCELW	RAS-080HNCELW	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-080HNCELW
	-	-	-	-	-	RAS-080HNCELW

HP	40	42	44	46	48
Model	RAS-400HNCELWP	RAS-420HNCELWP	RAS-440HNCELWP	RAS-460HNCELWP	RAS-480HNCELWP
Combination	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	RAS-080HNCELW	RAS-080HNCELW	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW

Economic Combination

HP	20	22	24	26	28	30	32
Model	RAS-200HNCELWE	RAS-220HNCELWE	RAS-240HNCELWE	RAS-260HNCELWE	RAS-280HNCELWE	RAS-300HNCELWE	RAS-320HNCELWE
Combination	RAS-100HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-100HNCELW	RAS-080HNCELW	RAS-100HNCELW	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-140HNCELW

HP	34	36	38	40	42	44	46
Model	RAS-340HNCELWE	RAS-360HNCELWE	RAS-380HNCELWE	RAS-400HNCELWE	RAS-420HNCELWE	RAS-440HNCELWE	RAS-460HNCELWE
Combination	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-160HNCELW	RAS-180HNCELW	RAS-100HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-180HNCELW
	-	-	RAS-100HNCELW	RAS-080HNCELW	RAS-100HNCELW	RAS-100HNCELW	RAS-100HNCELW

HP	48	50	52	54	56	58	60
Model	RAS-480HNCELWE	RAS-500HNCELWE	RAS-520HNCELWE	RAS-540HNCELWE	RAS-560HNCELWE	RAS-580HNCELWE	RAS-600HNCELWE
Combination	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-120HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-180HNCELW	RAS-100HNCELW	RAS-140HNCELW	RAS-140HNCELW
	-	-	-	-	RAS-100HNCELW	RAS-080HNCELW	RAS-100HNCELW

HP	62	64	66	68	70	72
Model	RAS-620HNCELWE	RAS-640HNCELWE	RAS-660HNCELWE	RAS-680HNCELWE	RAS-700HNCELWE	RAS-720HNCELWE
Combination	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-160HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW	RAS-180HNCELW
	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-180HNCELW

2. Region: Brazil and LA
   Power Supply: AC 3ϕ, 220 V/60 Hz (3 wires)

Standard Combination

HP	20	22	24	26	28	30	32
Model	RAS-200HNCERWS	RAS-220HNCERWS	RAS-240HNCERWS	RAS-260HNCERWS	RAS-280HNCERWS	RAS-300HNCERWS	RAS-320HNCERWS
Combination	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW
	RAS-100HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW

HP	34	36	38	40	42	44	46
Model	RAS-340HNCERWS	RAS-360HNCERWS	RAS-380HNCERWS	RAS-400HNCERWS	RAS-420HNCERWS	RAS-440HNCERWS	RAS-460HNCERWS
Combination	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW
	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW
	RAS-100HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW

HP	48	50	52	54	56	58	60
Model	RAS-480HNCERWS	RAS-500HNCERWS	RAS-520HNCERWS	RAS-540HNCERWS	RAS-560HNCERWS	RAS-580HNCERWS	RAS-600HNCERWS
Combination	RAS-160HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW
	RAS-160HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW
	RAS-160HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW
	-	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW

HP	62	64	66	68	70	72
Model	RAS-620HNCERWS	RAS-640HNCERWS	RAS-660HNCERWS	RAS-680HNCERWS	RAS-700HNCERWS	RAS-720HNCERWS
Combination	RAS-160HNCERW	RAS-160HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-180HNCERW

Premium Combination

HP	16	18	20	22	24	26
Model	RAS-160HNCERWP	RAS-180HNCERWP	RAS-200HNCERWP	RAS-220HNCERWP	RAS-240HNCERWP	RAS-260HNCERWP
Combination	RAS-080HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-080HNCERW	RAS-100HNCERW
	RAS-080HNCERW	RAS-080HNCERW	RAS-080HNCERW	RAS-100HNCERW	RAS-080HNCERW	RAS-080HNCERW
	-	-	-	-	RAS-080HNCERW	RAS-080HNCERW

HP	28	30	32	34	36	38
Model	RAS-280HNCERWP	RAS-300HNCERWP	RAS-320HNCERWP	RAS-340HNCERWP	RAS-360HNCERWP	RAS-380HNCERWP
Combination	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW
	RAS-080HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-100HNCERW
	RAS-080HNCERW	RAS-080HNCERW	RAS-080HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-080HNCERW
	-	-	-	-	-	RAS-080HNCERW

HP	40	42	44	46	48
Model	RAS-400HNCERWP	RAS-420HNCERWP	RAS-440HNCERWP	RAS-460HNCERWP	RAS-480HNCERWP
Combination	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW
	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW
	RAS-080HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW
	RAS-080HNCERW	RAS-080HNCERW	RAS-080HNCERW	RAS-100HNCERW	RAS-120HNCERW

Economic Combination

HP	20	22	24	26	28	30	32
Model	RAS-200HNCERWE	RAS-220HNCERWE	RAS-240HNCERWE	RAS-260HNCERWE	RAS-280HNCERWE	RAS-300HNCERWE	RAS-320HNCERWE
Combination	RAS-100HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-100HNCERW	RAS-080HNCERW	RAS-100HNCERW	RAS-100HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-140HNCERW

HP	34	36	38	40	42	44	46
Model	RAS-340HNCERWE	RAS-360HNCERWE	RAS-380HNCERWE	RAS-400HNCERWE	RAS-420HNCERWE	RAS-440HNCERWE	RAS-460HNCERWE
Combination	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-160HNCERW	RAS-180HNCERW	RAS-100HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-180HNCERW
	-	-	RAS-100HNCERW	RAS-080HNCERW	RAS-100HNCERW	RAS-100HNCERW	RAS-100HNCERW

HP	48	50	52	54	56	58	60
Model	RAS-480HNCERWE	RAS-500HNCERWE	RAS-520HNCERWE	RAS-540HNCERWE	RAS-560HNCERWE	RAS-580HNCERWE	RAS-600HNCERWE
Combination	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-120HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-180HNCERW	RAS-100HNCERW	RAS-140HNCERW	RAS-140HNCERW
	-	-	-	-	RAS-100HNCERW	RAS-080HNCERW	RAS-100HNCERW

HP	62	64	66	68	70	72
Model	RAS-620HNCERWE	RAS-640HNCERWE	RAS-660HNCERWE	RAS-680HNCERWE	RAS-700HNCERWE	RAS-720HNCERWE
Combination	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-160HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW	RAS-180HNCERW
	RAS-100HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-180HNCERW

3. Region: ANZ
   Power Supply: AC 3ϕ, 380-415 V/50 Hz (4 wires)

Standard Combination

HP	18	20	22	24	26	28	30
Model	RAS-180HNCELWS	RAS-200HNCELWS	RAS-220HNCELWS	RAS-240HNCELWS	RAS-260HNCELWS	RAS-280HNCELWS	RAS-300HNCELWS
Combination	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW
	RAS-080HNCELW	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW

HP	32	34	36	38	40	42	44
Model	RAS-320HNCELWS	RAS-340HNCELWS	RAS-360HNCELWS	RAS-380HNCELWS	RAS-400HNCELWS	RAS-420HNCELWS	RAS-440HNCELWS
Combination	RAS-160HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW
	RAS-160HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW
	-	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW

HP	46	48	50	52	54
Model	RAS-460HNCELWS	RAS-480HNCELWS	RAS-500HNCELWS	RAS-520HNCELWS	RAS-540HNCELWS
Combination	RAS-160HNCELW	RAS-160HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW
	RAS-160HNCELW	RAS-160HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW
	RAS-140HNCELW	RAS-160HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	-	-	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW

Premium Combination

HP	16	18	20	22	24	26
Model	RAS-160HNCELWP	RAS-180HNCELWP	RAS-200HNCELWP	RAS-220HNCELWP	RAS-240HNCELWP	RAS-260HNCELWP
Combination	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-080HNCELW	RAS-100HNCELW
	RAS-080HNCELW	RAS-080HNCELW	RAS-080HNCELW	RAS-100HNCELW	RAS-080HNCELW	RAS-080HNCELW
	-	-	-	-	RAS-080HNCELW	RAS-080HNCELW

HP	28	30	32	34	36	38
Model	RAS-280HNCELWP	RAS-300HNCELWP	RAS-320HNCELWP	RAS-340HNCELWP	RAS-360HNCELWP	RAS-380HNCELWP
Combination	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-100HNCELW
	RAS-080HNCELW	RAS-080HNCELW	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-080HNCELW
	-	-	-	-	-	RAS-080HNCELW

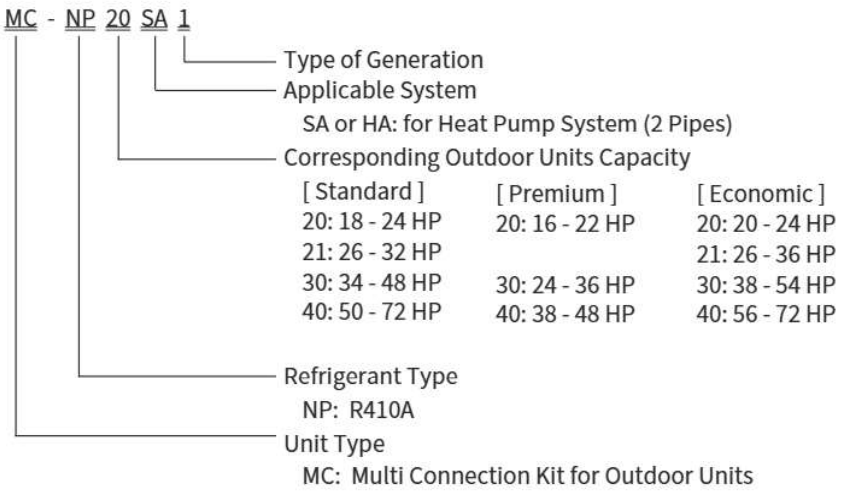
HP	40	42	44	46	48
Model	RAS-400HNCELWP	RAS-420HNCELWP	RAS-440HNCELWP	RAS-460HNCELWP	RAS-480HNCELWP
Combination	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW
	RAS-080HNCELW	RAS-080HNCELW	RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW

Unit Specifications

Items \ HP		8	10	12	14	16	18
Appearance							
Dimension (H x W x D) [mm]		1650 x 1050 x 420			1650 x 1190 x 420		
Power Supply		AC 3 ϕ, 380 - 415 V/50 Hz (4 wires) AC 3 ϕ, 380 V/60 Hz (4 wires) AC 3ϕ, 220 V/60 Hz (3 wires)					
Capacity [kW]	Cooling	22.4	28.0	33.5	40.0	45.0	50.0
	Heating	25.0	31.5	37.5	45.0	50.0	54.0
Net Weight [kg]	AC 3 ϕ, 380 - 415 V/50 Hz AC 3 ϕ, 380 V/60 Hz	185	197	203	219	225	225
	AC 3ϕ, 220 V/60 Hz	188	200	205	223	231	231
Gross Weight [kg]	AC 3 ϕ, 380 - 415 V/50 Hz AC 3 ϕ, 380 V/60 Hz	207	219	225	243	249	249
	AC 3ϕ, 220 V/60 Hz	210	222	227	247	255	255
Air Flow (m^3/min)		160	185	200	250	258	258
Maximum Current [A]	AC 3 ϕ, 380 - 415 V/50 Hz AC 3 ϕ, 380 V/60 Hz	18	21	27	32	36	40
	AC 3ϕ, 220 V/60 Hz	31	39	49	53	60	66
Color (Munsell Code)		Natural Gray(1.0Y 8.5/0.5)					
Noise [dBA]	PWL (Cooling/Heating)	78/79	80/82	80/83	81/82	83/85	83/85
	SPL *1 (Cooling/Heating)	55/56	59/60	60/62	60/61	62/64	62/64
Refrigerant [kg]		R410A					
	Initial Charge	6.0	7.7	7.7	8.3	9.6	9.6
Refrigerant oil		FVC68D					
Piping diameter [mm^2]	Gas	19.05	22.2	25.4	25.4	28.58	28.58
	Liquid	9.52	9.52	12.7	12.7	12.7	15.88

*1. SPL is measured by anechoic room.

- Piping Connection Kit



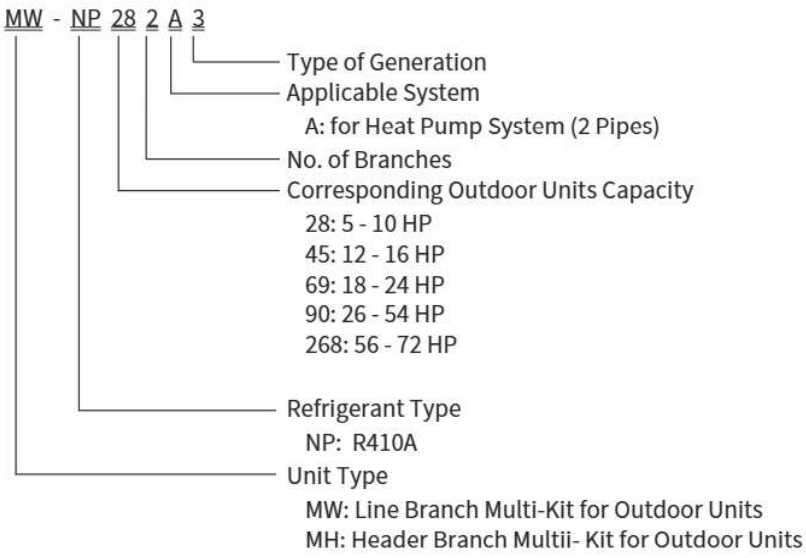
- Piping Connection Kit (Optional Parts) for SEA, Brazil, MEA, India, LA and Others

Item	Applicable Outdoor Unit			Connectivity Number	Model	Remarks
	HP					
	Standard Combination	Premium Combination	Economic Combination			
Piping Connection Kit	20 - 24	16 - 22	20 - 24	2	MC-NP20HA	for Gas: 1 for Liquid: 1
	26 - 32	-	26 - 36	2	MC-NP21SA1	for Gas: 1 for Liquid: 1
	34 - 48	24 - 36	38 - 54	3	MC-NP30HA	for Gas: 2 for Liquid: 2
	50 - 72	38 - 48	56 - 72	4	MC-NP40HA	for Gas: 3 for Liquid: 3

- Piping Connection Kit (Optional Parts) for ANZ

Item	Applicable Outdoor Unit		Connectivity Number	Model	Remarks
	HP				
	Standard Combination	Premium Combination			
Piping Connection Kit	18 - 24	16 - 22	2	MC-NP20HA	for Gas: 1 for Liquid: 1
	26 - 32	-	2	MC-NP21SA1	for Gas: 1 for Liquid: 1
	34 - 48	24 - 36	3	MC-NP30HA	for Gas: 2 for Liquid: 2
	50 - 54	38 - 48	4	MC-NP40HA	for Gas: 3 for Liquid: 3

- Multi-Kit



1. Line Branch

   First Branch

Outdoor Unit HP	Model
5 - 10	MW-NP282A3
12 - 16	MW-NP452A3
18 - 24	MW-NP692A3
26 - 54	MW-NP902A3
56 - 72	MW-NP2682A3

2. Multi-Kit after First Branch

Total Indoor Unit HP	Diameter (ϕ mm)		Model
	Gas Pipe	Liquid Pipe	
< 6	15.88	9.52	MW-NP282A3
6 - 8.99	19.05	9.52	
9 - 11.99	22.2	9.52	
12 - 15.99	25.4	12.7	MW-NP452A3
16 - 17.99	28.58	12.7	
18 - 25.99	28.58	15.88	MW-NP692A3
26 - 35.99	31.75	19.05	MW-NP902A3
36 - 55.99	38.1	19.05	
56 - 67.99	44.45	19.05	MW-NP2682A3
68 - 72	44.45	22.2	
74 - 88	50.8	22.2	
≥ 90	50.8	25.4	

3. Header Branch

Total Indoor Unit HP	No. of Header Branches	Model
5 - 8	4	MH-NP224A
5 - 10	8	MH-NP288A

Various Indoor Units and Combinations

The line-up of new SET FREE SideSmart™ series indoor units has been extended up to 9 types of indoor units to meet various building requirements. (0.8 HP through 10 HP) 0.6 HP units cannot be connected.

Indoor Unit Type List

HP / IDU Type	Model	0.8	1.0	1.3	1.5	1.6	1.8	2.0	2.3	2.5	3.0	3.3	4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0
1-way Cassette	RCS-FSN/FSR	○	○		○			○	○	○	○									
2-way Cassette	RCD-FSN3/FSR	○	○		○			○		○	○		○	○	○					
4-way Cassette	RCI-FSN3/FSRP		○		○			○		○	○		○	○	○					
High Static Ducted	RPI-FSR							○		○	○		○	○	○					
Medium Static Ducted	RPIM-FSR	○	○		○			○		○	○		○	○	○					
Ceiling Suspended	RPC-FSN3/FSR				○			○		○	○		○	○	○					
4-way Cassette	RCI-FSKDNQ		○		○			○		○	○		○	○	○					
Compact Ducted	RPIZ-HNATNQ/ HNDTSQ	○	○	○	○		○	○	○	○										
Low Static Ducted	RPIL-HNAUNQ	○	○	○	○		○	○	○	○	○	○	○	○	○					
Medium Static Ducted	RPIM-HNAUN(B)Q	○	○	○	○		○	○	○	○						○	○			
High Static Ducted	RPIH-HNAUN(B)Q										○	○	○	○	○	○	○			
High Static Ducted for ANZ only	RPIH-FSN2SQ										○		○	○	○	○ (7HP)				
Floor Ceiling	RPFC-FSNQ						○	○	○	○	○	○	○	○						
Floor Concealed	RPFI-FSNQ		○		○			○		○										
High Wall	RPK-FSNQS	○	○	○			○	○	○											
Fresh Air (DOAS)	RPI-KFNQ/QL/ QH/QLF/QHF													○		○	○	○	○	○
4-way Compact Cassette	RCIM-FSN4	○	○		○			○		○										
Floor Exposed	RPFI-FSN2E		○		○			○		○										
Floor Concealed	RPF-FSN2E		○		○			○		○										
In the ceiling	RPI-FSNK							○		○	○		○	○		○	○			
Wall Mounted	RPK-FSNK1/2		○		○			○		○										
Wall Mounted	RPK-FSN4M	○	○		○			○		○	○		○							
Wall Mounted	RPK-FSNH4M	○	○		○															

Model Type		20	30	40	50	65	80	100	125	150	200	250	300	400	500
Total Exchanger	KPI-H-A/E-GQ	○	○	○	○	○	○	○	○	○	○	○	○	○	○

NOTES:

- The number of indoor units connectable to SideSmart™ series outdoor unit is as follows. Comply with the following conditions when installing the unit.
- A maximum total capacity of 130 % and a minimum total capacity of 50 % of the nominal outdoor unit capacity can be obtained by a combination of the indoor units.

Outdoor Unit	Min. Capacity at Individual Operation	Max. Number of Connectable I.U.	Recommended Number of Connectable I.U.	Range of Combination Capacity	Total Length between Each I.U. and Expansion Valve Kit *2
RAS-080HNCEL(R)W	0.8HP (2.2kW)	13	8	50 to 130% *1	40m
RAS-100HNCEL(R)W		16	10		
RAS-120HNCEL(R)W		19	10		60m
RAS-140HNCEL(R)W		23	16		70m
RAS-160HNCEL(R)W		26	16		80m
RAS-180HNCEL(R)W		26	16		
RAS-200HNCEL(R)W		33	18		120m
RAS-220HNCEL(R)W		36	20		
RAS-240HNCEL(R)W		40	26		
RAS-260HNCEL(R)W		43	26		150m
RAS-280HNCEL(R)W		47	32		
RAS-300HNCEL(R)W		50	32		
RAS-320HNCEL(R)W		53	32		180m
RAS-340HNCEL(R)W		56	32		
RAS-360HNCEL(R)W		59	32		
RAS-380HNCEL(R)W		64	38		200m
RAS-400HNCEL(R)W					
RAS-420HNCEL(R)W					
RAS-440HNCEL(R)W					
RAS-460HNCEL(R)W					
RAS-480HNCEL(R)W					
RAS-500HNCEL(R)W					
RAS-520HNCEL(R)W					
RAS-540HNCEL(R)W					
RAS-560HNCEL(R)W					
RAS-580HNCEL(R)W					
RAS-600HNCEL(R)W					
RAS-620HNCEL(R)W					
RAS-640HNCEL(R)W					
RAS-660HNCEL(R)W					
RAS-680HNCEL(R)W					
RAS-700HNCEL(R)W					
RAS-720HNCEL(R)W					

*1. If the total capacity of the indoor units exceeds 100 % of the connectable indoor unit capacity ratio, the capacity of the system may be reduced.

*2. Total Length between Each IDU and Expansion Valve Kit: This is the summation of the piping length between each wall mounted type without expansion valve (RPK-FSNH4M Series) and expansion valve kit in the refrigerant system.

NOTES:

- The connectable indoor unit capacity ratio can be calculated as follows.
  Connectable Indoor Unit Capacity Ratio = Total Indoor Unit Capacity/Total Outdoor Unit Capacity
- For the system under which all the indoor units are supposed to operate simultaneously, the total indoor unit capacity should be less than outdoor unit capacity. Otherwise, it may cause a decrease of operating performance and operating limit during overload operation.
- For the system under which all the indoor units are not supposed to operate simultaneously, the total indoor unit capacity is available for up to 130 % of the outdoor unit capacity.
- Maximum number of connectable indoor units differs depending on the model, capacity, environment and installation place of connected indoor units.
- When operating the outdoor unit in cold areas at a temperature of -10 °C, or under high heating load conditions, it is recommended that the total indoor unit capacity is less than 100 % of the outdoor unit capacity and the total piping length is less than 300 m.
- The air flow volume for indoor units of 0.8 to 1.0 HP is set higher than that for indoor units of 1.5 HP or more. Make sure to select appropriate indoor units when installing indoor units where cold draft may occur during heating operation. If installing indoor units in such places, refer to the recommended number of connectable indoor units.
- If the load capacity per hour or the possibility of all indoor units simultaneous operation is unknown at the design stage, the total capacity of combined indoor units should not exceed 100 % of the outdoor unit capacity.

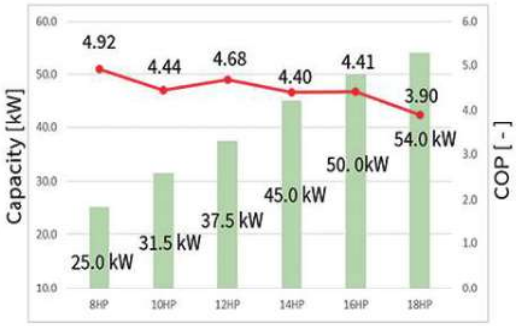
High Efficiency and Energy Saving

1. The new SET FREE
   a. SEA, Brazil, MEA, India, LA and Others

Cooling



Heating

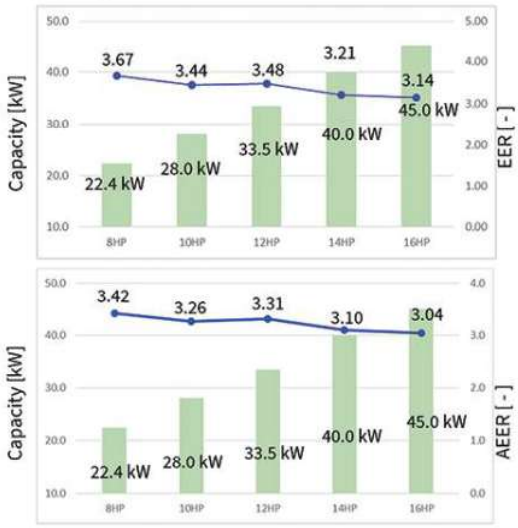


NOTES:

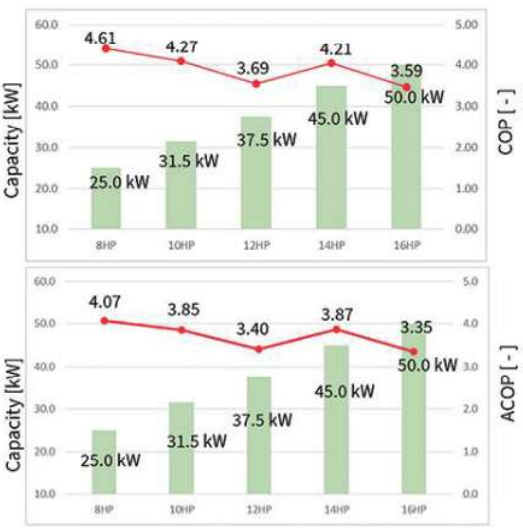
- EER and COP do not include Indoor unit power consumption.
- This performance is presented by 4-way cassette combination. For details of the indoor unit specifications, please refer to the technical catalog for each indoor unit.

   b. ANZ

Cooling



Heating



NOTES:

- The above values indicate the EER/COP per outdoor unit when it is combined with specified indoor units.
- This performance is presented by 4-way cassette combination.

2. Nominal Capacity and Efficiency (EER/COP)
   a. SEA, Brazil, MEA, India, LA and Others

Standard Type

	HP	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Cooling	Capacity (kW)	22.4	28.0	33.5	40.0	45.0	50.0	56.0	61.5	67.0	73.5	80.0	85.0	90.0	96.0	101.5
	EER	4.51	4.26	4.27	3.85	3.79	3.54	4.26	4.26	4.27	4.03	3.85	3.82	3.79	4.08	4.09
Heating	Capacity (kW)	25.0	31.5	37.5	45.0	50.0	54.0	63.0	69.0	75.0	82.5	90.0	95.0	100.0	108.0	114.0
	COP	4.92	4.44	4.68	4.40	4.41	3.90	4.44	4.57	4.68	4.52	4.40	4.40	4.41	4.42	4.50

	HP	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
Cooling	Capacity (kW)	107.0	113.5	120.0	125.0	130.0	135.0	141.5	147.0	152.0	157.0	163.5	170.0	175.0	180.0	185.0
	EER	4.10	3.97	3.85	3.83	3.81	3.79	4.02	4.03	4.00	3.98	3.90	3.82	3.81	3.79	3.72
Heating	Capacity (kW)	120.0	127.5	135.0	140.0	145.0	150.0	159.0	165.0	170.0	175.0	182.5	190.0	195.0	200.0	204.0
	COP	4.57	4.48	4.40	4.40	4.40	4.41	4.47	4.52	4.52	4.52	4.46	4.40	4.40	4.41	4.26

	HP	68	70	72
Cooling	Capacity (kW)	190.0	195.0	200.0
	EER	3.66	3.60	3.54
Heating	Capacity (kW)	208.0	212.0	216.0
	COP	4.13	4.01	3.90

Premium Type

	HP	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Cooling	Capacity (kW)	22.4	28.0	33.5	40.0	44.8	50.4	55.9	61.5	67.2	72.8	78.3	83.9	89.4	95.0	100.5
	EER	4.51	4.26	4.27	3.85	4.51	4.37	4.36	4.26	4.51	4.41	4.41	4.33	4.33	4.26	4.27
Heating	Capacity (kW)	25.0	31.5	37.5	45.0	50.0	56.5	62.5	69.0	75.0	81.5	87.5	94.0	100.0	106.5	112.5
	COP	4.92	4.44	4.68	4.40	4.92	4.64	4.77	4.57	4.92	4.72	4.81	4.66	4.74	4.61	4.68

	HP	38	40	42	44	46	48
Cooling	Capacity (kW)	106.3	111.8	117.4	122.9	128.5	134.0
	EER	4.37	4.36	4.31	4.31	4.26	4.27
Heating	Capacity (kW)	119.0	125.0	131.5	137.5	144.0	150.0
	COP	4.71	4.77	4.67	4.73	4.63	4.68

Economic Type

	HP	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Cooling	Capacity (kW)	22.4	28.0	33.5	40.0	45.0	50.0	56.0	62.4	68.0	73.0	78.0	83.5	90.0	95.0	100.0
	EER	4.51	4.26	4.27	3.85	3.79	3.54	4.26	4.07	4.01	3.96	3.77	3.80	3.67	3.66	3.54
Heating	Capacity (kW)	25.0	31.5	37.5	45.0	50.0	54.0	63.0	70.0	76.5	81.5	85.5	91.5	99.0	104.0	108.0
	COP	4.92	4.44	4.68	4.40	4.41	3.90	4.44	4.57	4.42	4.42	4.08	4.19	4.11	4.13	3.90

	HP	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
Cooling	Capacity (kW)	106.0	112.4	118.0	123.0	128.0	133.5	140.0	145.0	150.0	156.0	162.4	168.0	173.0	178.0	183.5
	EER	3.89	3.82	3.80	3.78	3.68	3.70	3.63	3.62	3.54	3.77	3.73	3.72	3.71	3.64	3.66
Heating	Capacity (kW)	117.0	124.0	130.5	135.5	139.5	145.5	153.0	158.0	162.0	171.0	178.0	184.5	189.5	193.5	199.5
	COP	4.17	4.25	4.19	4.20	4.01	4.07	4.03	4.05	3.90	4.08	4.14	4.10	4.11	3.98	4.02

	HP	68	70	72
Cooling	Capacity (kW)	190.0	195.0	200.0
	EER	3.60	3.60	3.54
Heating	Capacity (kW)	207.0	212.0	216.0
	COP	4.00	4.01	3.90

NOTE:

- The above values indicate the EER/COP per outdoor unit when it combined with specified number of 4-way cassette indoor unit.

b. ANZ

Standard Type

	HP	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Cooling	Capacity (kW)	22.4	28.0	33.5	40.0	45.0	50.4	56.0	61.5	67.0	73.5	80.0	85.0	90.0	96.0	101.5
	EER	3.67	3.44	3.48	3.21	3.14	3.54	3.44	3.46	3.48	3.33	3.21	3.18	3.14	3.34	3.36
Heating	Capacity (kW)	25.0	31.5	37.5	45.0	50.0	56.5	63.0	69.0	75.0	82.5	90.0	95.0	100.0	108.0	114.0
	COP	4.40	4.09	3.55	4.04	3.46	4.22	4.09	3.78	3.55	3.80	4.04	3.71	3.46	4.07	3.88

	HP	38	40	42	44	46	48	50	52	54
Cooling	Capacity (kW)	107.0	113.5	120.0	125.0	130.0	135.0	141.5	147.0	152.0
	EER	3.37	3.29	3.21	3.19	3.16	3.14	3.32	3.33	3.30
Heating	Capacity (kW)	120.0	127.5	135.0	140.0	145.0	150.0	159.0	165.0	170.0
	COP	3.72	3.88	4.04	3.81	3.62	3.46	3.92	3.80	3.64

Premium Type

	HP	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Cooling	Capacity (kW)	22.4	28.0	33.5	40.0	44.8	50.4	55.9	61.5	67.2	72.8	78.3	83.9	89.4	95.0	100.5
	EER	3.67	3.44	3.48	3.21	3.67	3.54	3.55	3.46	3.67	3.58	3.58	3.51	3.52	3.47	3.48
Heating	Capacity (kW)	25.0	31.5	37.5	45.0	50.0	56.5	62.5	69.0	75.0	81.5	87.5	94.0	100.0	106.5	112.5
	COP	4.40	4.09	3.55	4.04	4.40	4.22	3.85	3.78	4.40	4.28	3.99	3.93	3.73	3.70	3.55

	HP	38	40	42	44	46	48
Cooling	Capacity (kW)	106.3	111.8	117.4	122.9	128.5	134.0
	EER	3.54	3.55	3.50	3.51	3.47	3.48
Heating	Capacity (kW)	119.0	125.0	131.5	137.5	144.0	150.0
	COP	4.02	3.85	3.81	3.68	3.66	3.55

NOTE:
The above values indicate the EER/COP per outdoor unit when it combined with specified number of 4-way cassette indoor unit.

NOTES:

- The cooling and heating performances are the values when combined with our specified indoor units.

			Cooling Operation Conditions	Heating Operation Conditions
Air Inlet Temperature	Indoor	DB	27 °C DB (80 °F DB)	20 °C DB (68 °F DB)
		WB	19.0 °C WB (66.2 °F WB)	—
	Outdoor	DB	35 °C DB (95 °F DB)	7 °C DB (45 °F DB)
		WB	—	6 °C WB (43 °F DB)

Piping Length: Refer to each General Specifications for details.
Piping Lift: 0 m

- The above values indicate the EER/COP per outdoor unit when it is combined with specified indoor units.

3. Energy Saving and Compact Design Technology
   a. New Cabinet
      - SideSmart™ series adopts the Side Flow type cabinet. The single cabinets are available in 8HP to 18 HP*1.
        The maximum capacity of combined single units is 72 HP as maximum.

        *1. In the case ANZ products, the single unit is up to 16 HP and the maximum combination is 54 HP.

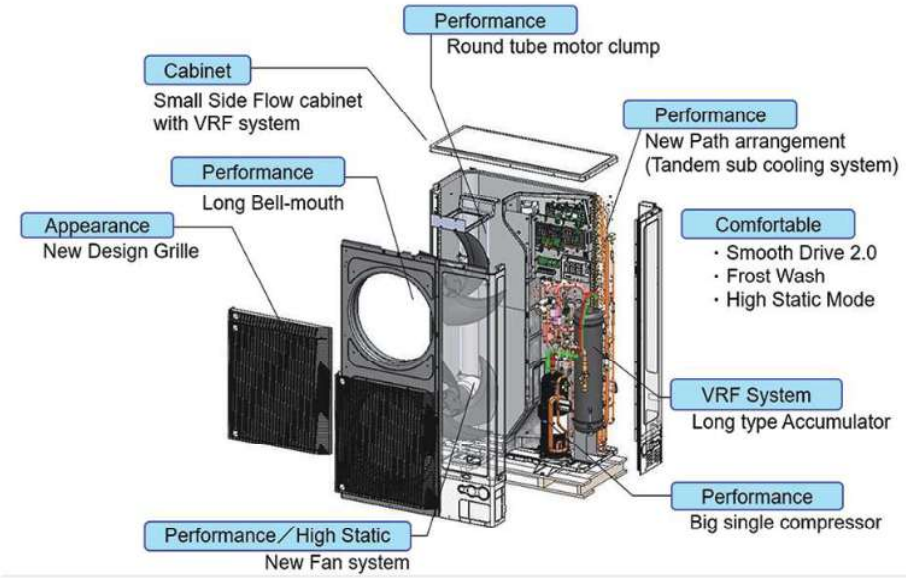
      - Bring smart installation due to width is narrow against Top Flow type outdoor units

        E.g.: 12 HP Cabinet



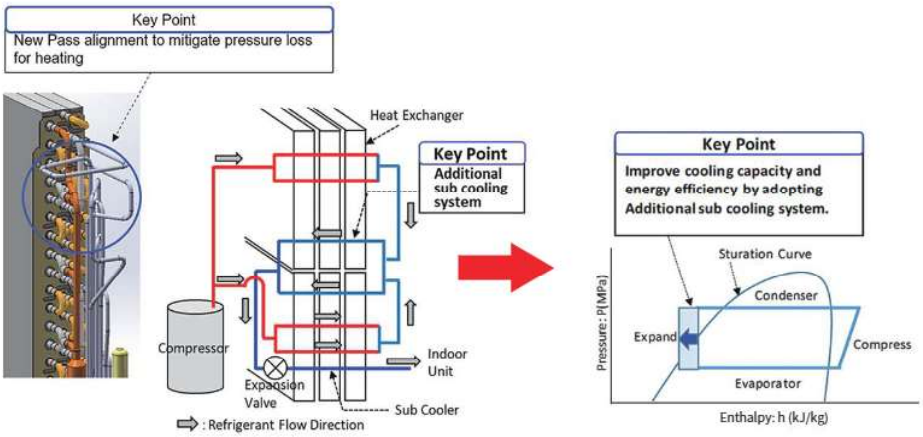
	Current VRF	SideSmart™
Cooling Capacity	33.5 kW	33.5 kW
Heating Capacity	37.5 kW	37.5 kW

   b. New Technology



c. New Heat Exchanger and New Air Flow System
Bring high performance by New HEX pass alignment and Air Flow System.

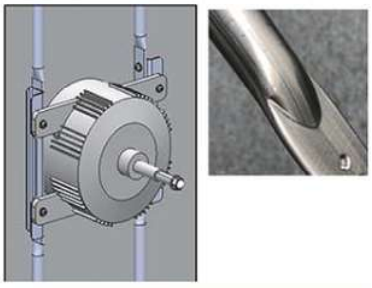
- New Heat Exchanger



- New Air Flow System



■Round Shape Motor Clamp



Key Point
Mitigate ventilation resistance by low resistance structure which is round shape.

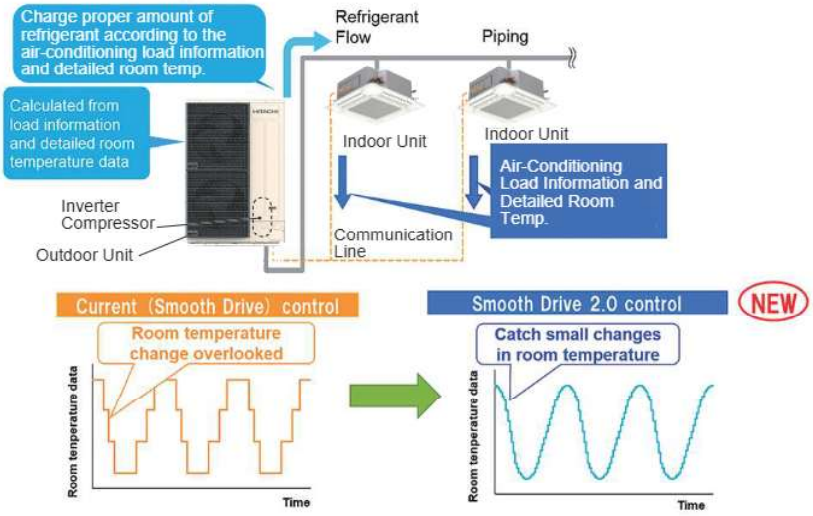
■Long Blade Propeller Fan
■Long Bell-mouth



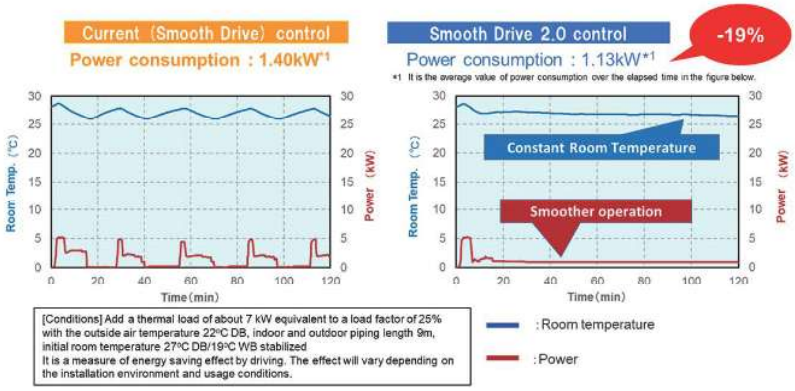
Key Point
Suppress leakage and effectivity operate in wide range.

New Operation Control

1. Addition of Smooth Drive 2.0 Control System
   In Smooth Drive 2.0, detailed room temperature information is added to the current Smooth Drive control, and further, smooth operation is achieved while suppressing ON/OFF of the compressor during low load operation to save energy.
   NOTE:
   - For the indoor units that are compatible with Smooth Drive 2.0 control, refer to the local catalog of our products. If other indoor units are connected to the same refrigerant system, or if the temperature is controlled by the thermistor of a wired controller, the current Smooth Drive control is used.
2. Image of "Smooth Drive 2.0" control



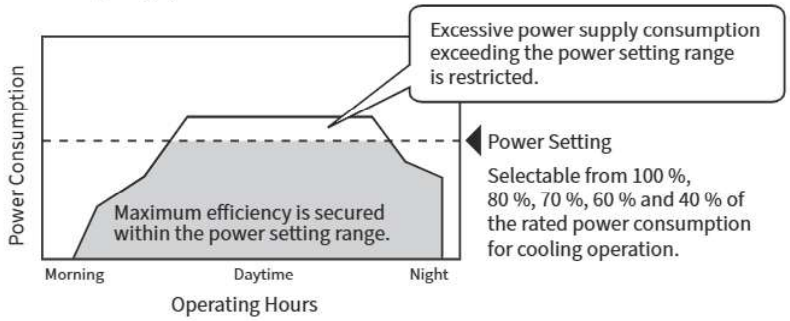
3. Verification example of energy saving effect of "Smooth Drive 2.0" control
   Compared with the Current Smooth Drive control, the power consumption can be reduced by about 19 % from the test when the cooling load factor is 25 %, which is a frequent occurrence.



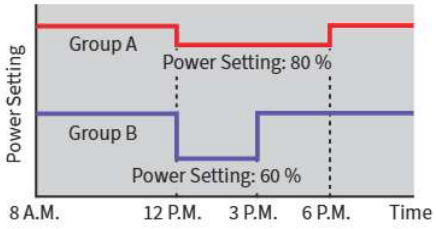
Improvement of Energy-Saving by Schedule Setting of "Self-Demand Function" from Central Station Mini, EX, DX and NT

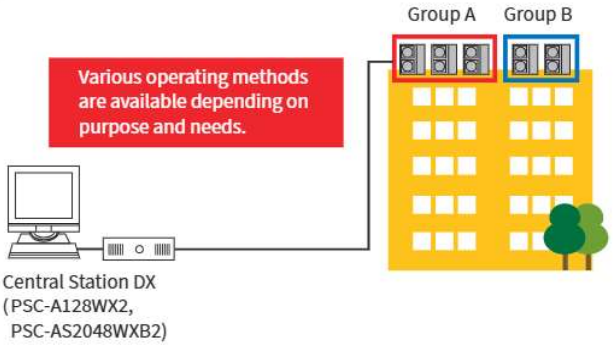
"Self-Demand Function*" can be set per outdoor unit from Central Station Mini (PSC-A32MN), DX (PSC-A128WX2 + PSC-AS2048WXB2) and NT (PSC-A128WEB3).
For small and medium buildings, it facilitates the power saving.
The energy-saving operation can be adjusted according to an operating environment and individual needs.
*It saves the capacity to prevent from exceeding the demand current control according to the electric power information which the air conditioner detects.

1. Self-Demand Function (Image)



2. Setting e.g. Schedule Setting for Each Group by Central Station DX





The specific outdoor unit and the period of time can be set from Central Station DX.

NOTES:

- The demand current control (%) is indicated by approximate values. The value in this control which is calculated by the current is different precision from the value in the wattmeter.
- If it is required that the maximum power consumption is managed precisely, a field-supplied demand controller should be used.
- The range may temporarily be higher than the power setting range (%) depending on the operating control condition such as protection control.
- When the above self-demand control is set, the performance is restricted because the rotation frequency of compressor is forcibly decreased.

3. High Static Mode

For installation spaces such as balcony or a floor where and external static pressure such as a louver or a duct is required to secure, the 2 step static pressure can be selected (30 Pa or 60 Pa) by the dip switch setting (DSW8).

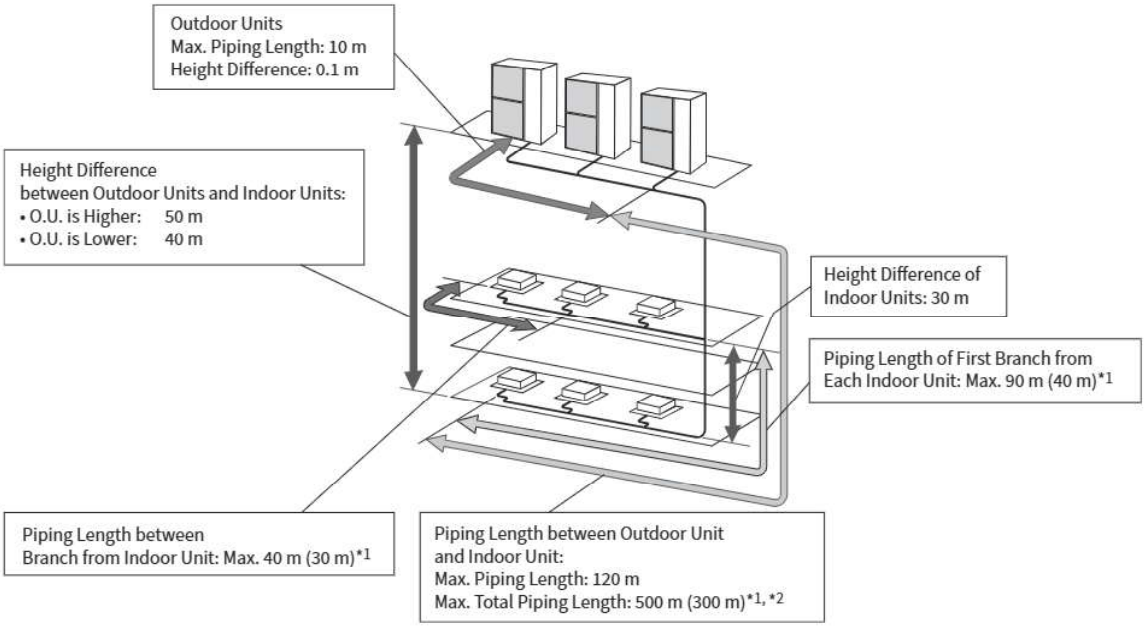
NOTE:

- Pay attention to the design of the outdoor unit(s) installation. If the outlet air intakes by short-circuit, the operation range is limited due to increasing high pressure in the cooling operation or decreasing low pressure in the heating operation so that may cause failure of unit.

Flexibility of Facility Design

1. Improvement of Piping Installation
   Height difference between the outdoor units and indoor units and height difference between the indoor units have been changed as shown below.

Item		Heat Pump System
		HNCEL(R)W
Height Difference between Outdoor Units and Indoor Units	Outdoor Unit is Higher	≤ 50 m
	Outdoor Unit is Lower	≤ 40 m
Height Difference between Indoor Units		≤ 30 m



1. If the piping length exceeds figure in ( ), the connectable indoor units number should be less than recommended number.

*2. When the total piping length is over 300 m, the maximum additional refrigerant charge is restricted. The maximum additional refrigerant charge (table below) should not exceed the total field additional charge (refrigerant pipe + indoor unit).

HP	Combination	8-12	14	16, 18	20, 22	24, 26	28, 30	32	34, 36	38, 40	42-48	50-54	56, 58	60-66	68-72
Max. Additional Refrigerant Charge (kg)	Standard	15.5	17.0	17.0*3	31.0	31.0	34.0	34.0	48.0	48.0	51.0	63.0	63.0	68.0	68.0
	Premium	15.5	17.0	31.0	31.0	46.0	46.0	46.0	46.0	62.0	62.0	-	-	-	-
	Economic	15.5	17.0	17.0	31.0	31.0	31.0	34.0	34.0	48.0	48.0	51.0	63.0	63.0	68.0

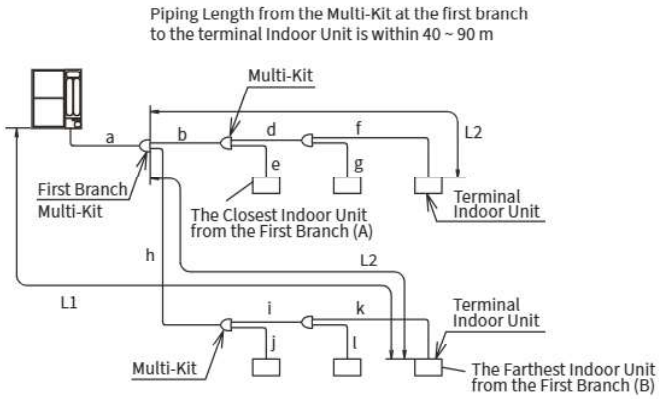
*3. For the ANZ region, the maximum additional refrigerant charge for 18 HP standard combination is 31.0 kg.

2. Piping Branch Restrictions

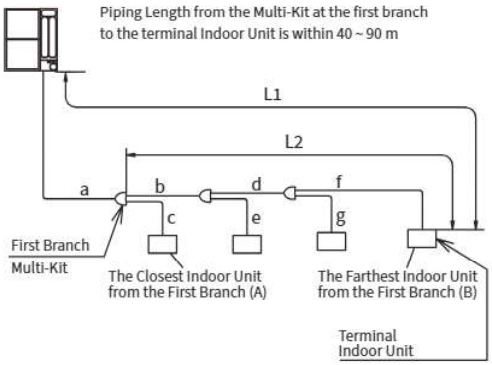
There are two types of branching pipes.

- Case 1: Installation with a main piping branch
- Case 2: Installation without a main piping branch

Case 1: Installation with main piping branch



Case 2: Installation without main piping branch



Follow the restrictions when performing the field-supplied piping work.

- Restriction 1: The piping length L2 is 40 m or more.
- Restriction 2: The total piping length between the indoor units (A) and (B) is 60 m or less.

Restriction 1: In the case that the piping length L2 is more than 40 m, the size of gas lines should be one size up with reducers.

NOTES:

- For Case 1, L1 refers to the total piping length of (a) and the longer L2.
- For Case 2, L1 refers to the total piping length of (a) and L2.

Case 1: "b and d" or "h and i"
Case 2: "b and d"

If (a) < (b, h) after increasing the size:

○ In case of length L1 < 100 m

(i) Increase the size of (a) by one size.

(ii) If (a) < (b, h) even after increasing the (a) size, keep the original diameter (b) and (h), and (a) should be the same as (b, h).
Also, if (a) < (d, i), keep the original diameter of (d, i), and (a) should be the same as (d, i).

○ In case of length L1 ≥ 100 m

The pipe (a) should be increased by one size due to L1 ≥ 100 m. Other restrictions are the same as (II).

NOTE:

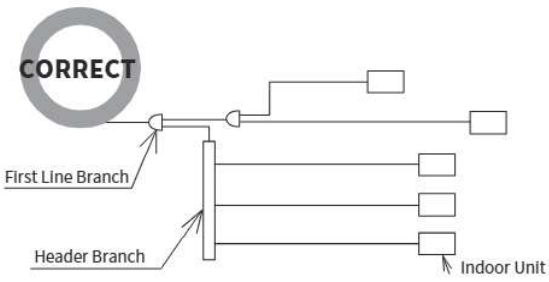
- If L2 > 40 m line and L2 ≤ 40 m line are mixed in one system, only L2 > 40 m line will be one size up.

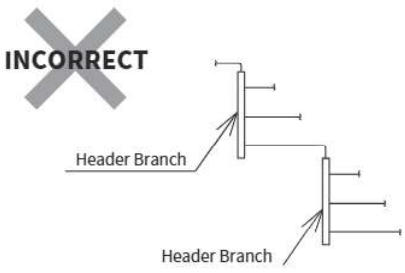
Restriction 2: The piping length between indoor unit (A) and indoor unit (B) should be less than 60 m.

Definition of Piping Length:

Case 1: Piping length for unit (B): (h + i + k)/Piping length for unit (A): (b + e)
Case 2: Piping length for unit (B): (b + d + f)/Piping length for unit (A): c

A header branch can be used with a line branch. A header branch can also be used after the second branch.
A header branch cannot be used after another header branch.





3. Wide Range of Indoor Unit Connection
The number of connectable indoor unit with SideSmart™ series outdoor unit is as follows.
Comply with the condition as follows when installation.

Maximum Number of Connectable Indoor Units and Range of Combination Capacity

Outdoor Unit Capacity (HP)	8	10	12	14	16, 18	20	22	24	26	28	30	32	34	36	38 - 54	56 - 72
Range of Combination Capacity	50 to 130 %															
Number of Connectable Indoor Units	13	16	19	23	26	33	36	40	43	47	50	53	56	59	64	64
Number of Recommended Connectable Indoor Units	8	10		16		18	20	26		32					38	38

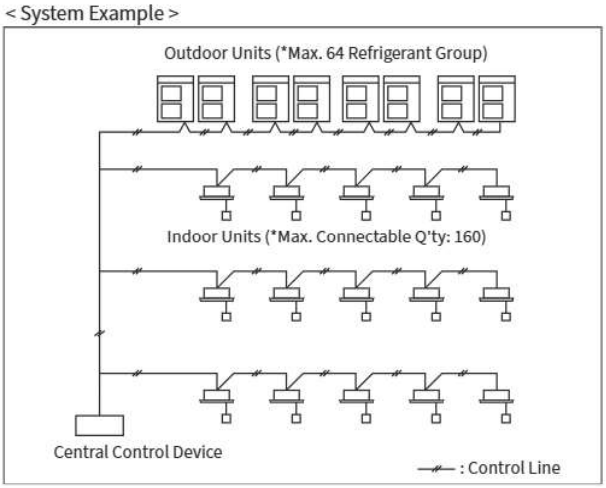
NOTES:

- The connectable indoor unit capacity ratio can be calculated as follows.
  Connectable Indoor Unit Capacity Ratio = Total Indoor Unit Capacity/Total Outdoor Unit Capacity
- For the system under which all the indoor units are supposed to operate simultaneously, the total indoor unit capacity should be less than outdoor unit capacity. Otherwise, it may cause a decrease of operating performance and operating limit during overload operation.
- For the system under which all the indoor units are not supposed to operate simultaneously, the total indoor unit capacity is available for up to 130 % of the outdoor unit capacity.
- When operating the outdoor unit in cold areas at a temperature of -10 ˚C, or under high heating load conditions, it is recommended that the total indoor unit capacity is less than 100 % of the outdoor unit capacity and the total piping length is less than 300 m.
- The air flow volume for indoor units of 0.8 to 1.0 HP is set higher than that for indoor units of 1.5 HP or more. Make sure to select appropriate indoor units when installing indoor units where cold draft may occur during heating operation. If installing indoor units in such places, refer to the recommended number of connectable indoor units.
- For connecting Air Processing Air Conditioner (DOAS), the number of the indoor units should be within recommended connectable indoor units number.
- If the total capacity of the indoor units exceeds 100 % of the connectable indoor unit capacity ratio, the capacity of the system may be reduced. If combination capacity exceeds 130 %, contact your distributer or dealer.

Corresponding to H-LINK II System

This SET FREE HNCELW/HNCERW series outdoor units corresponds to the H-LINK II transmission system. Maximum 64 refrigerant systems and maximum 160 indoor units can be controlled by only one central control device when the equipments (central control device, indoor units, wired controller) in the same transmission system all correspond to H-LINK II

< System Example >



Item	H-LINK II
Number of Max. Ref. Group/System	64
Address Setting Range of Indoor Units/Ref. Group	0 to 63
Number of Max. Indoor Unit/System	160
Total Q'ty of Central Control Devices in the same H-LINK	200
Maximum Wiring Length	Total 1,000 m (5,000 m*1)

*1. In case 4 (four) units of PSC-5HR is used.

H-LINK II System

The H-LINK II wiring system requires only two transmission wires to connect each indoor unit and outdoor unit for up to 64 refrigerant cycles, and to connect wires for all indoor units and outdoor units.

Specifications

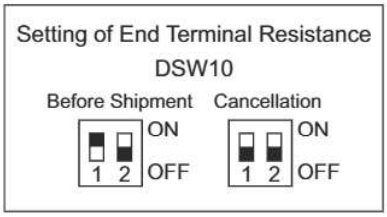
- Transmission Wire: 2-Wire
- Polarity of Transmission Wire: Non-Polar Wire
- Maximum Outdoor Units to be Connected: 64 Units per System
- Maximum Indoor Units to be Connected: 160 Units per H-LINK II System
- Maximum Wiring Length: Total 1,000 m (including CS-NET)
- Recommended Cable: Twist-Pair Cable with Shield, over 0.75 mm^2 (Equivalent to KPEV-S)
- Voltage: DC 5 V

NOTE:

- In case of applying H-LINK II system, the setting of DIP switch for outdoor unit and indoor unit is required. If the DIP switches are not set or set incorrectly, the alarm may occur due to a transmission failure.

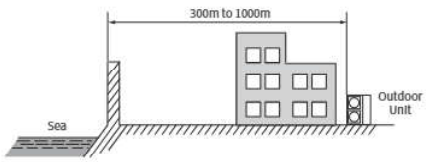
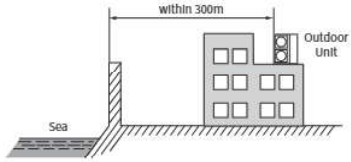
Setting of End Terminal Resistance

Before shipment, No. 1 pin of DSW10 is in the “ON” position.
In the case that the number of outdoor units in the same H-LINK is 2 or more, set No.1 pin of DSW10 at “OFF” from the 2nd unit. If only one outdoor unit is used, no setting is required.



Anti-Corrosion Type (Order Product)

Installation Place

	Anti-Corrosion Type	Heavy Anti-Corrosion Type
Installation Place	The place where a salt air does not blow onto the outdoor unit directly. (However, a salt particles are contained in an ambient air.) 	The place is affected by the salt air. (However, a salt water does not spatter on the outdoor unit directly.) 
Condition of Installation Place	The place where the outdoor unit is washed by rain. The place where a salt air is not blown onto the outdoor unit directly. The place where the distance between seacoast and the outdoor unit is 300 m to 1000 m. The place where the outdoor unit is installed behind a building as shown in the figure.	The place where rain is scarce. The place where a salt air blow onto the outdoor unit directly. The place where the distance between seacoast and the outdoor unit is within 300 m. The place where the outdoor unit faces to the seacoast.

Rough Standard of Distance from Installation Place to Seacoast
(The conditions may be changed depending on the installation environments.)

Place where Salt Air Blows Directly

	Rough Standard of Distance from Installation Place		
	300m	500m	1000m
Area Faces to Landlocked Bay	Heavy Anti-Corrosion	Anti-Corrosion	—
Area Faces to Broad Ocean	Heavy Anti-Corrosion		Anti-Corrosion
Isolated Island	Heavy Anti-Corrosion		

Place where Salt Air does Not Blow Directly

	Rough Standard of Distance from Installation Place		
	300m	500m	1000m
Area Faces to Landlocked Bay	Anti-Corrosion		—
Area Faces to Broad Ocean	Heavy Anti-Corrosion		Anti-Corrosion
Isolated Island	Heavy Anti-Corrosion		Anti-Corrosion

Notice for Installation and Maintenance

The using materials and coating thickness for the anti-corrosion type and heavy anti-corrosion type are strengthened. However, it is somewhat less than perfect against corrosion. Therefore, perform the following installation plan and maintenance work to increase the effect of anti-corrosion.

1. Do not install the outdoor units in a place where salt air or mist is directly blown to the units.
   Select an installing place such as behind a building.
   When the outdoor unit is faced to the seacoast, install a windbreak board to avoid direct salt air blowing.
2. Do not cover the outdoor unit with sunshades, etc. so as not to decrease the cleaning effect by rain for the salt particles adhere to the outer covers of the outdoor unit.
3. Install the outdoor unit horizontally for smooth draining. Because remained drain water on the bottom base worsens a corrosion severely.
4. Periodically perform maintenance work by clean water to remove salt particles, etc. on the surface of the outdoor unit's outer covers.
5. Install the unit where the drainage is smooth. Especially provide the drainage around foundation smoothly.
6. Repair scratches which occurred during installation and maintenance work.
7. Periodically check outdoor unit. If needed, provide again the anti-corrosion treatment or replace it with service parts.

Note for Maintenance

1. Perform the maintenance work sufficiently for the outdoor unit. (Coat the outer covers of the outdoor unit by the resin or wax that sheds water when applying anti-corrosive coating and every three months.)
2. If the outdoor unit has not been operated for a long period such as off-season, take countermeasures to cover the unit, etc.
3. Do not install the outdoor unit where there is a high level of oil mist, flammable gases, salty air or harmful gases such as sulphur and an acidic or alkaline environment.

SPECIFICATIONS OF STANDARD COATING TREATMENT

No	Component	Material and Specification	Specifications		
		Standard Corrosion	Standard Corrosion	Anti-Corrosion	Heavy Anti-Corrosion
1	Outer Plates	Alloy Processing Zinc Steel	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 130 μm
2	Bottom Base	Alloy Processing Zinc Steel	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 130 μm
3	Foot	Alloy Processing Zinc Steel	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 130 μm
4	Separating plate	Alloy Processing Zinc Steel	-	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm
5	Electrical Box (Front Side)	Alloy Processing Zinc Steel	-	-	-
6	Electrical Box (Back Side)/ Valve base	Alloy Processing Zinc Steel	-	-	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 60 μm
7	Motor Clamp	Alloy Processing Zinc Steel and Carbon Steel Pipe	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 50 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 50 μm	Baked with Polyester Type Resin Coating over Whole Surface Total Thickness: ≥ 50 μm
8	Heat Exchanger Fin	Aluminum with Epoxy Type Resin Coating Treatment	Thin Blue	Thin Blue	Deep Blue
9	Heat Exchanger Side Plate	Alloy Processing Zinc Steel	-	-	-
10	Refrigeration Piping	Copper	-	-	-
11	Motor	Aluminum Die-Casting and Polyester Resin	-	-	-
12	Air Outlet Grille	PP Resin	-	-	-
13	Fan Blade	AS-G Resin	-	-	-
14	Accumulator	Carbon Steel Pipe	Baked with Epoxy Type Resin Coating over Outer Surface Total Thickness ≥ 60 μm	Baked with Epoxy Type Resin Coating over Outer Surface Total Thickness ≥ 60 μm	Baked with Epoxy Type Resin Coating over Outer Surface Total Thickness ≥ 60 μm
15	Oil Separator	Copper	-	-	-
16	Fixing Screw for Outer Panel	Stainless Steel	-	-	-
17	PCBA		-	Coating	Coating

NOTES:

- The coating thickness of the part where a screw, hole, cut end or corner laps on a steel plate, which is not directly exposed to the atmosphere, is thinner than the above specifications. Also, the coating thickness of a panel which is not directly exposed to outdoor rain water is thinner than the above specifications.
- In order to improve our products, the specifications are subject to change without notice.

2. General Data

2.1 Outdoor Units

2.1.1 SEA, Brazil, MEA, India, LA and Others

Base Unit

Model	AC 3φ, 380 - 415 V/50 Hz, 380 V/60 Hz		RAS-080HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-180HNCELW
	AC 3φ, 220 V/50 Hz		RAS-080HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-180HNCERW
Dimension (H x D x W)		mm	1650 x 1050 x 420			1650 x 1190 x 420		
Power Supply		-	AC 3φ, 380 - 415 V/50 Hz, 380 V/60 Hz, (HNCELW Type) AC 3φ, 220 V/60 Hz (HNCERW Type)					
Capacity	Cooling	kW	22.4	28.0	33.5	40.0	45.0	50.0
	Heating	kW	25.0	31.5	37.5	45.0	50.0	54.0
Performance	EER	-	4.51	4.26	4.27	3.85	3.79	3.54
	COP	-	4.92	4.44	4.68	4.40	4.41	3.90
Net Weight	AC 3φ, 380 - 415 V/50 Hz, 380 V/60 Hz	kg	185	197	203	219	225	225
	AC 3φ, 220 V/50 Hz	kg	188	200	205	223	231	231
Gross Weight	AC 3φ, 380 - 415 V/50 Hz, 380 V/60 Hz	kg	195	207	213	231	237	237
	AC 3φ, 220 V/50 Hz	kg	198	210	215	235	243	243
Air Flow		m^3/min	160	185	200	250	258	258
Maximum	AC 3φ, 380 - 415 V/50 Hz, 380 V/60 Hz	A	18.0	21.0	27.0	32.0	36.0	40
Current	AC 3φ, 220 V/50 Hz	A	31.0	39.0	49.0	53.0	60.0	66
Color (Munsell Code)		-	Natural Gray (1.0Y 8.5/0.5)					
Noise	SPL(Cooling / Heating)	dBA	55/56	59/60	60/62	60/61	62/64	62/64
	PWL(Cooling / Heating)	dBA	78/79	80/82	80/83	81/82	83/85	83/85
Refrigerant		-	R410A					
	Initial Charge	kg	6.0	7.7	7.7	8.3	9.6	9.6
Oil		-	FV68H					
Piping	Gas	mm	19.05	22.20	25.40	25.40	28.58	28.58
	Liquid	mm	9.52	9.52	12.70	12.70	12.70	15.88
Connectable IDU	Recommended	Q'ty	8	10	10	16	16	16
	Maximum	Q'ty	13	16	19	23	26	26
Connectable IDU ratio		%	50 - 130					
Working Range	Cooling	-	-5 °C to 48 °C DB					
	Heating	-	-15 °C WB to 16 °C WB					
Piping Length	Maximum piping length	m	120					
	Total Piping Length	m	500					
	1st branch to IDU	m	90/40					
	branch to each IDU	m	40/30					
Height Different	ODU is upper side	m	50					
	ODI is lower side	m	40/30					
	Between IDU	m	30					
	Between ODU	m	0.1					
Available External Static Pressure		Pa	0/30/60					

Standard Combination

Model (380-415 V/50 Hz, 380 V/60 Hz)			RAS-200HNCELWS	RAS-220HNCELWS	RAS-240HNCELWS	RAS-260HNCELWS	RAS-280HNCELWS	RAS-300HNCELWS	RAS-320HNCELWS
Combination	Cabinet A	-	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW
	Cabinet B	-	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW
Model (220 V/60 Hz)			RAS-200HNCERWS	RAS-220HNCERWS	RAS-240HNCERWS	RAS-260HNCERWS	RAS-280HNCERWS	RAS-300HNCERWS	RAS-320HNCERWS
Combination	Cabinet A	-	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW
	Cabinet B	-	RAS-100HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW
Dimension	Height	mm	1,650	1,650	1,650	1,650	1,650	1,650	1,650
	Depth	mm	2,200	2,200	2,200	2,340	2,480	2,480	2,480
	Width	mm	420	420	420	420	420	420	420
Power Supply		-	AC 3φ, 380 - 415 V/50 Hz, 380 V/60 Hz, (HNCELWS Type) AC 3φ, 220 V/ 60 Hz (HNCERWS Type)						
Capacity	Cooling	kW	56.0	61.5	67.0	73.5	80.0	85.0	90.0
	Heating	kW	63.0	69.0	75.0	82.5	90.0	95.0	100.0
Performance	EER	-	4.26	4.26	4.27	4.03	3.85	3.82	3.79
	COP	-	4.44	4.57	4.68	4.52	4.40	4.40	4.41
Main Pipe Size	Gas	mm	28.58	28.58	28.58	31.75	31.75	31.75	31.75
	Liquid	mm	15.88	15.88	15.88	19.05	19.05	19.05	19.05
Connectable IDU	Recommended	Qty	18	20	26	26	32	32	32
	Maximum	Qty	33	36	40	43	47	50	53
Connectable IDU Ratio		%	50 - 130						

Model (380-415 V/50 Hz, 380 V/60 Hz)			RAS-340HNCELWS	RAS-360HNCELWS	RAS-380HNCELWS	RAS-400HNCELWS	RAS-420HNCELWS	RAS-440HNCELWS	RAS-460HNCELWS
Combination	Cabinet A	-	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW
	Cabinet B	-	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW
	Cabinet C	-	RAS-100HNCELW	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW
Model (220 V/60 Hz)			RAS-340HNCERWS	RAS-360HNCERWS	RAS-380HNCERWS	RAS-400HNCERWS	RAS-420HNCERWS	RAS-440HNCERWS	RAS-460HNCERWS
Combination	Cabinet A	-	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW
	Cabinet B	-	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW
	Cabinet C	-	RAS-100HNCERW	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW
Dimension	Height	mm	1,650	1,650	1,650	1,650	1,650	1,650	1,650
	Depth	mm	3,490	3,490	3,490	3,630	3,770	3,770	3,770
	Width	mm	420	420	420	420	420	420	420
Power Supply		-	AC 3φ, 380 - 415 V/50 Hz, 380 V/60 Hz, (HNCELWS Type) AC 3φ, 220 V/ 60 Hz (HNCERWS Type)						
Capacity	Cooling	kW	96.0	101.5	107.0	113.5	120.0	125.0	130.0
	Heating	kW	108.0	114.0	120.0	127.5	135.0	140.0	145.0
Performance	EER	-	4.08	4.09	4.10	3.97	3.85	3.83	3.81
	COP	-	4.42	4.50	4.57	4.48	4.40	4.40	4.40
Main Pipe Size	Gas	mm	31.75	38.1	38.1	38.1	38.1	38.1	38.1
	Liquid	mm	19.05	19.05	19.05	19.05	19.05	19.05	19.05
Connectable IDU	Recommended	Qty	32	32	38	38	38	38	38
	Maximum	Qty	56	59	64	64	64	64	64
Connectable IDU Ratio		%	50 - 130						

Model (380-415 V/50 Hz, 380 V/60 Hz)			RAS-480HNCELWS	RAS-500HNCELWS	RAS-520HNCELWS	RAS-540HNCELWS	RAS-560HNCELWS	RAS-580HNCELWS	RAS-600HNCELWS
Combination	Cabinet A	-	RAS-160HNCELW	RAS-160HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW
	Cabinet B	-	RAS-160HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-140HNCELW	RAS-160HNCELW	RAS-160HNCELW	RAS-160HNCELW
	Cabinet C	-	RAS-160HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW	RAS-140HNCELW
	Cabinet D	-	-	RAS-100HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-120HNCELW	RAS-140HNCELW
Model (220 V/60 Hz)			RAS-480HNCERWS	RAS-500HNCERWS	RAS-520HNCERWS	RAS-540HNCERWS	RAS-560HNCERWS	RAS-580HNCERWS	RAS-600HNCERWS
Combination	Cabinet A	-	RAS-160HNCERW	RAS-160HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW
	Cabinet B	-	RAS-160HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-140HNCERW	RAS-160HNCERW	RAS-160HNCERW	RAS-160HNCERW
	Cabinet C	-	RAS-160HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW	RAS-140HNCERW
	Cabinet D	-	-	RAS-100HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-120HNCERW	RAS-140HNCERW
Dimension	Height	mm	1,650	1,650	1,650	1,650	1,650	1,650	1,650
	Depth	mm	3,770	4,780	4,780	4,780	4,780	4,920	5,060
	Width	mm	420	420	420	420	420	420	420
Power Supply		-	AC 3φ, 380 - 415 V/50 Hz, 380 V/60 Hz, (HNCELWS Type) AC 3φ, 220 V/ 60 Hz (HNCERWS Type)						
Capacity	Cooling	kW	135.0	141.5	147.0	152.0	157.0	163.5	170.0
	Heating	kW	150.0	159.0	165.0	170.0	175.0	182.5	190.0
Performance	EER	-	3.79	4.02	4.03	4.00	3.98	3.90	3.82
	COP	-	4.41	4.47	4.52	4.52	4.52	4.46	4.40
Main Pipe Size	Gas	mm	38.1	38.1	38.1	38.1	44.45	44.45	44.45
	Liquid	mm	19.05	19.05	19.05	19.05	19.05	19.05	19.05
Connectable IDU	Recommended	Qty	38	38	38	38	38	38	38
	Maximum	Qty	64	64	64	64	64	64	64
Connectable IDU Ratio		%	50 - 130						