

## **General Specification for Air-conditioning, Refrigeration, Ventilation and Central Monitoring & Control System Installation 2007 Edition**

The 2007 edition of the General Specification for Air-conditioning, Refrigeration, Ventilation and Central Monitoring & Control System Installation comprises considerable updating and revisions to the 2001 edition.

In line with the global consciousness for our environment, the new specification has been re-written with sustainability as the key objective.

The updating of specification is a continuous process. With the benefit of information technology, electronic version of this new 2007 edition can be kept up-to-date and may be viewed on the ArchSD Homepage.

**In view of the revisions and new additions, there will be an introductory period of 3 months whereby the General Specification for Air-conditioning, Refrigeration, Ventilation and Central Monitoring & Control System Installation 2001 Edition will still be the Contractual Document, whilst the new General Specification for Air-conditioning, Refrigeration, Ventilation and Central Monitoring & Control System Installation 2007 Edition may be viewed in parallel in preparation for full implementation by 17 December 2007.**

- **Hence, for tenders to be invited on or after 17 December 2007, General Specification for Air-conditioning, Ventilation and Central Monitoring & Control System Installation 2007 Edition shall be used.**
- **Existing contracts (including contracts using previous editions tendered before 17 December 2007) would not be affected.**

**Major Changes of the AC GS between 2001 Edition and 2007 Edition**

<b>Old Ref. No.</b>	<b>New Ref. No.</b>	<b>Major Changes</b>	<b>Overview</b>
<b>Section A0:- Preface &amp; Disclaimer</b>			
	A0	Restructure content structure (Preface & Disclaimer) to standardize format and common/general contents for all BS installations	In line with other G.S. for other BS installations
<b>Section A1:- Scope Of Specification</b>			
A1	A1	Restructure content structure (Scope of Specification) to standardize format and common/general contents for all BS installations	In line with other G...S. for other BS installations
<b>Section A2:- Statutory Obligations And Other Regulations</b>			
A2	A2	Restructure content structure (Statutory obligations and other Regulations) to standardize format and common/general contents for all BS installations	In line with other G...S. for other BS installations
<b>Section A3:- Execution Of Works</b>			
A3	A3	Restructure content structure to standardize format and common/general contents for all BS installations	In line with other G...S. for other BS installations
<b>Section A4:- Drawings And Manuals</b>			
A4	A4	Restructure and extract contents related to "installation/as-built drawing" and "O&M manual"	In line with SSG/QA's developed skeleton structure on common / general sections for all BS installations
<b>Section B1:- Air Cleaning Equipment</b>			
B1.1	B1.1	Requirement of spare filters added.	To enrich the comprehensiveness of ACGS.
B1.9	B1.14	Requirement of housing added.	To enrich the comprehensiveness of ACGS.
B1.12	B1.15	Re-titled as Activated Oxygen Air Purifier.	To avoid the use of trade brand.
B1.14	B1.17	Requirement of installation added.	To enrich the comprehensiveness of ACGS.

<b>Section B2:- Ductwork</b>			
B2.1	B2.1 General	Add clause that material should not support bacteria growth or posing fire hazard	To address comments by Hyder Consulting Limited. To enrich the general ductwork requirement.
B2.3	B2.3 Hangers and Supports	Amend clause to state clearly the standard (DW/144) to be followed for hangers and supports. Add details of drop rods for hangers.	To address comment from Hyder Consulting Limited. To enrich the general requirements on hangers.
B2.4	B2.4 Flexible Duct Joints	Update testing standard for flexible joints fire penetration time of at least 15 minutes from BS 476 Part 8 to BS 476 Part 20 to 23.	Amend according to updated edition.
B2.7	B2.7 Extract Hoods and Valances for Kitchens	Add IP rating (IP54 or better) requirement for kitchen hood lighting	To address comment from PD3 to state clearly the kitchen hood luminaire enclosure protection rating.
B2.10	B2.10 Testing	Updating names of air duct construction standards from "Low Pressure Duct Construction Standards" and "High Pressure Duct Construction Standards", SMACNA of U.S.A. to "HVAC Duct Construction Standards" and "HVAC Air Duct Leakage Test Manual" issued by the SMACNA of U.S.A. respectively.	Amend according to updated edition.
Overall		Updating of standards & adding the year of the current edition:	Amend according to updated edition and to align with international standard.

<b>Section B3:- Air Handling and Treatment Equipment</b>			
B3.1		Edition of standards was updated.	Amend according to updated edition.

<b>Section B4:-Automatic Control</b>			
B4.1.2	B4.1.2	1. Each controller shall operate as a standalone unit. 2. Local keypad and display. 3. Power failure protection (all system setpoint, control algorithm and other programmable parameter should be stored).	To strengthen the system reliability
	B4.1.7 (iv) New clause	LCD or 7-bit segment (self-illuminated) digital display of the room temperature within readable size from three meters apart at the appropriate locations inside the air-conditioned areas shall be provided. Numbers of the display units shall be in accordance with the air-conditioning layout design.  "Temperature display shall be setting up in steps not coarser than 0.5 ok." added.	To suit current standard
B4.1.8 (ii)	B4.1.8 (ii)	"Pressure Dependent Type Temperature Control" To be deleted.  "Temperature display shall be setting up in steps not coarser than 0.5 ok." added.	To suit current standard

<b>Section B5:- Central Control And Monitoring System (CCMS)</b>			
B5.1	B5.1	Capacity of UPS increased.	To strengthen the system reliability
B5.1.2 (a)	B5.1.2 (a)	"ISO/IEC 9075-1989 (ISO SQL 89)" is updated to "ISO/IEC 9075-9:2003".	To update standards specified.
B5.1.2 (c)	B5.1.2 (c)	"BACnet Standard 135-1995" is updated to " Standard 135 – 2004 A Data communication Protocol for Building Automation and Control Networks (BACnet)".	To update standards specified.
B5.1.2 (e)	B5.1.2 (e)	"EIA 232" is updated to "TIA/EIA 232". "EIA 485" is updated to "TIA/EIA 485". "EIA 568a" is updated to "TIA/EIA 568".	To update standards specified.
B5.1.2 (h)	B5.1.2 (g)	"ISO 1989" is updated to "ISO/IEC 1989:2002". "ISO 8802.3" is updated to "ISO/IEC 8802-3:2000".	To update standards specified.
B5.4.3	B5.4.3	Sufficient heat dissipation device required for enclosure.	To prevent over-heat of equipment

<b>Section B6:- Central Refrigeration Machine, Direct Expansion Evaporators And Heat Rejection Plant</b>			
B6	B6	Title of Section B6 revised:- Central Refrigeration "Machine" instead of "Chiller" was quoted.	Clarify the inclusion of heat pumps.
B6.1	B6.1	1. Edition of Standards was updated. 2. BS EN 378-3:2000 was added.	Update standards Align the requirements with equivalent standard.
B6.2	B6.2	BS EN 378-1 to 3:2000 was added.	Align the requirements with equivalent international standard.
B6.5.1 (e)	B6.5.1 (e)	"Refrigeration machine" instead of "chiller set" was quoted.	Clarify the inclusion of heat pumps.
B6.5.1 (f)	B6.5.1 (f)	1. "Refrigeration machine" instead of "chiller set" was quoted. 2. Details of rain shelter for control panels added.	1. Clarify the inclusion of heat pumps. 2. Provide more detailed requirements
B6.12	B6.14	"Ammonia refrigeration machine" instead of "ammonia chiller" was quoted.	Clarify the inclusion of heat pumps.
B6.12.1	B6.14.1	1. Edition of Standards was updated. 2. ANSI/IIR 2:1999 was added.	Update standards Align the requirements with equivalent standard.
B6.12.2	B6.14.2	"Ammonia refrigeration machine" instead of "ammonia chiller" was quoted.	Clarify the inclusion of heat pumps.
B6.12.3	B6.14.3	"Ammonia refrigeration machine" instead of "ammonia chiller" was quoted.	Clarify the inclusion of heat pumps.
B6.12.4	B6.14.4	1. "Ammonia refrigeration machine" instead of "ammonia chiller" was quoted. 2. ANSI/IIR 2:1999 was added.	Clarify the inclusion of heat pumps Align the requirements with equivalent standard.
B6.12.5	B6.14.5	"Ammonia refrigeration machine" instead of "ammonia chiller" was quoted.	Clarify the inclusion of heat pumps.
B6.12.6	B6.14.6	"Ammonia refrigeration machine" instead of "ammonia chiller" was quoted.	Clarify the inclusion of heat pumps.
	B6.15 New clause	Solar Heating Installation added.	Include new energy efficient equipment.

<b>Section B7:- Electric Motors And Electrical Equipment</b>			
B7.2	B7.2	The specific requirements for low voltage electric motors were transferred to and specified in Clause B9.1 of the Electrical General Specification being revised.	To include the electrical equipment specification in Electrical General Specification for consistency.

B7.4	B7.4	The specific requirements for low voltage motor switchgear, starter and control panels were transferred to and specified in Clause B9.2 of the Electrical General Specification being revised.	To include the electrical equipment specification in Electrical General Specification for consistency.
B7.6 to B7.11	B7.6	The specific requirements for high voltage electric equipment were transferred to and specified in Clause B9.3 to B9.8 of the Electrical General Specification being revised.	To include the electrical equipment specification in Electrical General Specification for consistency.

<b>Section B8:- Noise and Vibration Control</b>			
B8.3.5 to B8.3.7	B8.3.5 to B8.3.7	Change swing capability from 30° to 30-35° and add reference to clause B8.6 for application in ductwork vibration isolation.	To allow flexibility in swing capability for different products.
B8.3.8 to B8.3.9	B8.3.8 & B8.3.9 deleted	Both Types 'H' & 'T' spring hangers are deleted and requirements are same as those for Type 'F' and Type 'G'.	To simplify the types of spring hangers specified.
B8.3.10 to B8.3.14	Re-numbered to B8.3.8 to B8.3.12	Original Types 'J' to 'O' are changed to Types 'H' to 'L' as the original Types 'H' & 'T' are deleted.	To re-number the Type designations.
B8.5.1	B8.5.1	"The first two hangers adjacent to the equipment shall be of "positioning" or "precompressed" type, ...' is changed to 'The three hangers adjacent ...'	To tie in with requirement in clause B8.5.2 for horizontal pipe isolation near equipment.
B8.5.3	B8.5.3	Type 'K' is changed to Type 'I'.	To match with the Type designation in Clause 8.3.
B8.5.5	B8.5.5	BS5500:1985 is updated to PD5500.	To update standards specified.
		Type 'K' is changed to Type 'I'.	To match with the Type designation in Clause 8.3.
B8.6	B8.6	Type 'H' is changed to Type 'E' hangers with top & bottom eye bolts.	As Type 'H' in the original specification is deleted, Type 'E' with additional eye bolts shall be specified instead.
B8.7	B8.7	ASTM C916 is updated to ASTM C916-85.	To update standards specified.

<b>Section B9:- Pipe Materials, Valves, Cocks and Strainers</b>			
B9.8.6	B9.8.6	Revision of requirements for couplings:- "such as Viking Johnson" is deleted.	Not to indicate any brand name for coupling.
B9.12	B9.12	Additional requirement for contractors' submission for pipework support, expansion joints and anchor points:- "loading calculation submission" is added.	To ask contractors to justify the installation of pipework support, expansion joints and anchor points.
B9.18.6	-	Clause "BS 1724 - Bronze welding by gas (copper pipe)" deleted.	The relevant standard is withdrawn without replacement

<b>Section B10:- System Monitoring Instruction</b>			
No specific changes in this section.			

<b>Section B11:- Thermal Insulation</b>			
B11.1	B11.1	Additional organizations, IVE and CITA, added.	The thermal insulation installation courses organized by IVE and CITA were recognized.
B11.2.1	B11.2.1	Self adhesive tape was revised from 100mm to 75mm.	To suit the market availability

<b>Section B12:- Unitary Air-conditioner</b>			
B12.1.2	B12.1.2	"ISO 5151", "ISO13253", "ISO13256" have been specified to replace American Air-conditioning and Refrigeration Institute (ARI) Standards 210.	Align the requirement with international standard.
B12.2	B12.2	International standard, "ISO 13261" has been specified to replace American Air-conditioning and Refrigeration Institute (ARI) Standards 260.	Align the requirement with international standard.
B12.18	B12.18.	"installed on side walls of building" in lieu of "installed at levels", has been specified.	Avoid contravention with the Buildings Ordinance by introducing unauthorized appendages, attached to external walls of buildings.

<b>Section B13:- Water Handling Equipment</b>			
B13.1	B13.1	British Standard is updated to BS EN Standard.	To update standards specified.

<b>Section C1:- Air Cleaning Equipment</b>			
C1.1	C1.1	Requirement of Type-test certificates added.	To address comments by SPE/8 on 4.2004.
		Underlined wording in sentence "Two stages of filtration are <u>recommended</u> for building design..." replaced by "required".	To address comments by TIC – ACGS on 6.2005.
		Pre-filter efficiency specified.	To address comments by TIC – ACGS on 6.2005.
		Underlined wording in sentence “High Efficiency Particulate <u>Air</u> (HEPA) Filters” replaced by “Arrestance”.	To address comments by ASHRAE H.K. Chapter on 29.12.2006.
C1.2	C1.2	Requirement of “ANSI/ASHRAE Standard 52.2-1999” added.	To align with current standards adopted in the air cleaning industry.
		Requirement of Eurovent 4/4 & 4/5 superseded by that of European Standard BS EN 1822.	To align with current standards adopted in the air cleaning industry.
C1.3.1	C1.9	Minimum filter efficiency specified.	To avoid discrepancy on selection of filters.
		Application suitable for both CAV and VAV air flow systems addressed.	To address comments by TIC – ACGS on 6.2005.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.
C1.3.2	C1.10	Minimum filter efficiency specified.	To avoid discrepancy on selection of filters.
		Initial resistance revised.	To align with general requirements adopted in the air cleaning industry.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.
C1.4.1	C1.5	Initial resistance revised.	To align with general requirements adopted in the air cleaning industry.
		Nominal <u>width</u> of 50mm..." replaced by "thickness".	To address comments by TIC – ACGS on 6.2005.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.

C1.4.2	C1.6	Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.
C1.4.3	C1.7	Initial resistance revised.	To align with general requirements adopted in the air cleaning industry.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.
C1.5	C1.8	Underlined wordings in sentence "... <u>20m long for sufficient useful life...</u> " deleted.	To address comments by TIC – ACGS on 6.2005.
		Underlined wording in sentence "... <u>minimize</u> air bypass ..." replaced by "prevent".	To address comments by TIC – ACGS on 6.2005.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.
C1.6	C1.3	Initial resistance revised.	To align with general requirements adopted in the air cleaning industry.
		Discrepancy in Table C1.6-(1) and (2) clarified.	To address comments by TIC – ACGS on 6.2005.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.
C1.8	C1.4	Area for use specified.	To address comments by TIC – ACGS on 6.2005.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.

C1.9	C1.14	Requirement of FSD approved type and not being used in hazardous locations or for handling hazardous gases/mixtures added.	To enrich the comprehensiveness of ACGS.
		Compliance with requirement of EPD added.	To enrich the comprehensiveness of ACGS.
		Requirement of oil mist removal efficiency added.	To enrich the comprehensiveness of ACGS.
		Requirement of multiple steps of output voltage adjustment and two time delay safety type door interlock switches and expanded PVC hose with protective cover deleted.	To align with general requirements adopted in the air cleaning industry.
		Compliance with Testing Standard UL-867 & UL-710 (for Fire and Burnout Test only) added.	To align with current standards adopted in the air cleaning industry.
		Requirement of the interface with CCMS added.	To enrich the comprehensiveness of ACGS.
		Voltage range and safety aspects specified.	To address comments by TIC – ACGS on 6.2005.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.
C1.10	C1.11	Underlined wording in sentence “High Efficiency Particulate <u>Air</u> (HEPA) Filters” replaced by “Arrestance”.	To address comments by ASHRAE H.K. Chapter on 29.12.2006.
		Requirement of continuous sheet of filter medium folded over an aluminium separator deleted.	To align with general requirements adopted in the air cleaning industry.
		Design velocity specified.	To address comments by TIC – ACGS on 6.2005.
		Class 1 of air cleanliness by Federal Standard 209E superseded by Class 5 of air cleanliness by ISO Standard 14644-1	To align with current standards adopted in the air cleaning industry.
C1.11	C1.15	Requirement of removal capacities for impregnated alumina media and carbon media added.	To enrich the comprehensiveness of ACGS.

C1.12	C1.12	Requirement of the interface with CCMS added.	To enrich the comprehensiveness of ACGS.
		Requirement of average dust-spot efficiency by ASHRAE Standard 52.1 – 1992 superseded by that of minimum efficiency reporting value (MERV) by ASHRAE Standard 52.2 – 1999.	To align with current standards adopted in the air cleaning industry.
C1.15	C1.13	Requirement of the interface with CCMS added.	To enrich the comprehensiveness of ACGS.
		Area of application indicated.	To address comments by TIC – ACGS on 6.2005.
		Requirement of Eurovent 4/4 superseded by that of Underwriters Laboratories UL586.	To align with current standards adopted in the air cleaning industry.
C1.16	C1.16	Re-titled as Activated Oxygen Air Purifier to avoid the use of trade brand.	To address comments by TIC – ACGS on 6.2005.
		Requirement of the interface with CCMS added.	To enrich the comprehensiveness of ACGS.
		Ozone level exceeding 30 ppb, 50 ppb & 60 ppb to trigger the reduction of unit intensity to 50%, 10% & 0% specified.	To enrich the comprehensiveness of ACGS.
		Unit to be installed at exhaust air stream instead of supply air stream specified.	To align with general requirements adopted in the air cleaning industry.
		Requirement of UL listed and compliance with UL867 added.	To align with general requirements adopted in the air cleaning industry.
C1.17	C1.17	Requirement of the interface with CCMS added.	To enrich the comprehensiveness of ACGS.
		Requirement of UL listed and compliance with UL153, 1598 & 1995 added.	To enrich the comprehensiveness of ACGS.
C1.18	C1.18	Underlined wordings in sentence "resin shall be <u>Duracor 6000-6 series ...</u> " replaced by "approved by the Architect".	To align with current standards adopted in the air cleaning industry.
		Odour removal efficiency and oil mist removal efficiency added.	To enrich the comprehensiveness of ACGS.
		Requirement of FRP to be fire retardant grade to Class 1 of BS 476-7 added.	To enrich the comprehensiveness of ACGS.
		Underlined wording in sentence “scrubber section of horizontal draw-through <u>cross-flow packed tower bed type</u> ” replaced by “non-clogging venturi type for exhaust air treatment from kitchens of CFC and cross-flow packed tower bed type for exhaust air treatment from RCP or Poultry Stalls.	To enrich the comprehensiveness of ACGS.

<b>Section C2:- Ductwork and Accessories</b>			
C2.1	C2.1	Updating standard of zinc coated hot dipped galvanized flat steel sheet from "BS EN 10142" to "BS EN 10327"	Amend according to updated edition.
C2.3 (b), C2.5	C2.3 (b), C2.5	Updating standard of plastic ductwork "Specification for plastics ductwork" from DW/151 to DW/154.	Amend according to updated edition.
C2.3	C2.3	Updating of "Low Pressure Duct Construction Standards" and "High Pressure Duct Construction Standards" to "HVAC Duct Construction Standards".	Amend according to updated edition.
C2.4	C2.4 Flexible Ductwork	Updating of flexible ductwork operating temperature range standard from BS 476 Part 5 to BS 476-12. Add clause to state clearly where flexible shall be provided.	Amend according to updated edition. To address comment from Hyder Consulting Limited. To enrich the general requirements on flexible ductwork.
C2.5	C2.5	Updating obsolete uPVC ductwork /pipe standard for unplasticised PVC pipe standard ISO 3472 and ISO 3473 to relevant ISO and BS EN standards	ISO 3472 and ISO 3473 superseded & withdrawn with no immediate replacement.
C2.8	C2.8 Dampers – General	Add common standards applicable to damper: CIBSE Commissioning Code Series A and BSRIA Application Guide. Add details of damper position indicators and padlocking device.	For completeness. To address comment from Hyder Consulting Limited. To enrich the general requirements on damper.
C2.11.1	C2.11.1	Updating of fire and smoke stop damper standard from BS ISO 10294 Classification E (BS 476 Part 8) to (BS 476 Part 20 to 23).	BS476 Part 8 superseded & withdrawn with replacement of BS 476 Part 20 to 23. FSD comment on amendment of “fire rating” to “fire resistance rating” has been attended
C2.11.2	C2.11.2 Combined Fire and Smoke Stop Dampers	Amend damper release time from "within 1 second by an independent closure spring" to "The damper shall be released to the closed, or fail-safe position by a closure spring on loss of power supply, either by genuine power failure or by the zone fire signal actuated by the smoke detection system. The time for closing the damper shall meet the requirements laid down by the Fire Services Department"	Incorporate the results of a study carried out by ACSSG Group B.

C2.14	C2.14 Access Doors and Panels to Ductwork, Cabinets, Cold Stores	Amend “seasoned teakwood frames” to “hardwood”.	To address comment from ADA to generalize the access door or panel requirement.
C2.15	C2.15	Amend ductwork flanges of roll-formed from zinc coated hot-dipped galvanized from standard of BS EN 10142 to BS EN 10327.	Amend according to updated edition.
C2.16	C2.16 Ductwork cleaning points	Add clauses to state clearly that : - ductwork cleaning point fixing shall not intrude within the ductwork and all sharp edges shall have protective finishing - when specified in the particular specification, ductwork to support weight of a person or vacuum cleaner or provisions for injecting steam or detergent cleaning devices shall be provided	To address comment from Hyder Consulting Limited. To enrich the general requirements on ductwork cleaning point.
C2.17	C2.17 Test Holes	Add common standards applicable to test holes: DW/144, CIBSE Commissioning Code Series A and BSRIA Application Guide	To address comment from Hyder Consulting Limited. To enrich the general requirements on test hole.
Overall		Updating of standards & adding the year of the current edition:	Amend according to updated edition and to align with international standard.

<b>Section C3:- Air Handling and Treatment Equipment</b>			
C3.1.1	C3.1.1	Edition of Standards was updated.	Amend according to updated edition.
C3.1.4 (b)	C3.1.4 (b)	"BS 7854-1:1996" and "ISO 10816-1:1995" were specified to replace "BS4675".	In line with international standards
C3.1.5	C3.1.5	More detailed descriptions on fire resistant cable were added.	Minimize ambiguity

C3.2.1	C3.2.1	The requirement of "type-test certificate" was specified.  The table for mechanical characteristics in accordance with EN1886 was added.	In line with ArchSD's requirements  In line with international standards
C3.2.2	C3.2.2	The thickness of double skin panel of AHU was increased from 25 to 50mm min.  The thickness of double skin panel of fresh air handling unit was specified as 70mm min.  Hygiene construction requirements were specified.	Upgrade the thickness of the double skin panels
C3.2.3	C3.2.3	"Double inlet, double width, backward curved centrifugal fan" was specified.	Specify the type of fans used for AHU
C3.2.5	C3.2.5	The original section "Component Separation" is replaced by "Access Sections".	Revise the heading only
C3.2.7	C3.2.7	"Thermal bridging factor TB2 Class EN1886" was specified.	In line with international standards
	C3.2.9 New section	A new clause "Identification Plate" was inserted.	Specify the requirements of identification plate for AHU
C3.2.9	C3.2.10	The minimum fin spacing of cooling coil of 1.3mm was specified.  "ARI Standard 410 2001" was specified for selection of coils.  The min. number of rows for PAU and AHU were changed from 8 to 6 and 6 to 4 respectively.	To suit the market availability as per comment from the industry. It is amended as "The tube thickness shall not be less than 0.45mm. Fin thickness shall not be less than 0.13mm with suitable fin spacing" – C3.2.10 (a)  In line with current standards as advised by manufacturers.
	C3.2.11 New clause	A new clause "Drain Pan" was inserted.	Highlight the requirements of drain pan.

C3.2.10	C3.2.12 (b)	Requirement of preventing galvanic corrosion effect was added. This sub-section has been re-written and to include with suitable fitting/device or methodology approved by the Architect to prevent galvanic corrosion effect of different pipe metals jointing together	Highlight the requirement of jointing to response to comment from ACRA and Trane
C3.2.11	C3.2.13	"and Steam" air heating coil was deleted from the heading.	Steam heating coil was seldom used.
	C3.2.15 New clause	The specification for built-in type humidification equipment was added.	Incorporate commonly used equipment in AHU
	C3.2.16 New clause	The specification for additional modular section for accommodation of IAQ and energy efficient equipment was added.	Highlight the requirements of additional modular sections
C3.3.7	C3.3.7	"Hot gases or vapours" were specified for the application of bifurcated type axial fans.	Specify the application
C3.4.12	C3.4.12	"Solid state" speed regulator instead of "choked type" was specified.	Upgrade the standards
C3.5.2	C3.5.2	The minimum motor brake power "7.5kW" was lower to "5kW" for the application of backward curved centrifugal fans.	Upgrade the standards
C3.6.1	C3.6.1	The requirement of type test certificate was specified. "BS4856-1:1972", "BS 4856-2:1975", "BS 4856-3:1975", "BS 4856-4:1997" were specified to replace "BS4856".	Update the requirement- Minimize ambiguity
C3.6.3	C3.6.3	"ARI Standard 410" was specified.	Clarify the standard and included as per comment from ACRA
C3.6.5		The clause for "Arrangement of units" was deleted.	Minimize ambiguity
C3.7.4	C3.7.4	The requirement of "combined temperature sensor complete with 3-speed controller" was deleted.	Only remote sensor is used for cassette type units

C3.11	C3.11	"En Tex100a Directive" was specified.	In line with international standards
C3.12.4	C3.12.4	"DP to 5A switch" was specified.	To make clear the requirement

C3.13.1	C3.13.1	<p>-Clause (b): Thickness comply with DW144 was specified.</p> <p>-Clause (d) : "R1182, ISO5667, ISOTR5658-1, ISO10295-2 &amp; 10295-3" was changed to "ISO1182, ISO/TR5658-1 &amp; ISO/AWI10295-3".</p> <p>"ISO10295-2" and " ISO 10295-3" were deleted.</p>	<p>In line with standards</p> <p>The relevant standard were withdrawn, "ISO/DIS10295-2" and "ISO/AWI10295-3"were under preparation.</p>
C3.13.2	C3.13.2	<p>Clause (e) regarding the arrangement of induction units was deleted.</p>	<p>Minimize ambiguity</p>
C3.13.4	C3.13.4	<p>- Clause (a) was added to specifying that the construction requirements of VAV units.</p> <p>- Clause (m): double skin casing for section near heating element was specified.</p> <p>-Clause (m): cut-off for overheat was specified.</p> <p>- Clause (n) was added to specified that components should be supplied by the same manufacturer of the VAV box.</p>	<p>Avoid duplication of descriptions</p> <p>Upgrade the requirements</p>
C3.15 (b)	C3.15 (b)	<p>Thermal insulation requirement for pipe, duct work, panel enclosure specified under COP of EMSD now changed to AC_GS.</p>	<p>Thermal insulation requirement in AC_GS is upgraded and inline with COP</p>
	C3.18 New clause	<p>New clause for "Heat Pipe" was added.</p>	<p>Incorporate energy efficient equipment</p>

<b>Section C4:-Automatic Control</b>			
C4.2 (c)	C4.2 (c)	Control valves smaller than 20mm diameter shall be normally closed, electrically operated, cage-guided, stainless steel trim, flanged cast-steel body.	To strengthen the system reliability
C4.2 (e)		"A manual override device together with auto/manual switch and automatic change-over relay shall be provided as the manual setting facility for the control valve opening and back-up in case of local controller outage" To be deleted.	To suit current standard
C4.2 (g)	C4.2 (g)	All valve actuators with valve size over 20mm diameter shall maintain its last position for fail-safe operation	To suit with the safety standard
C4.3.1	C4.3.1	"Control valves shall be normally closed, electrically operated, cage-guided, stainless steel trim, flanged cast-steel body" To be deleted.	To suit current standard
		All valve actuators with valve size over 20mm diameter shall maintain its last position for fail-safe operation.	To suit with the safety standard
	<b>C4.4.10 New clause</b>	For full specification of the temperature digital display, see clause B4.1.7.	
C4.4.1(b)	C4.4.1(b)	(b) Communication ports – Each controller shall be equipped with at least one RS232 and one USB communication ports and one parallel port for simultaneous operation of multiple operator I/O devices.	To suit current standard
C4.4.1(c)	C4.4.1(c)	3. Network communication The automation network shall be based on PC industry standard of Ethernet TCP/IP. The network shall be capable of operating at a communication speed of 100Mbps.  Local, keypad and LED display shall be provided for manual override on digital and analogue outputs, to allow the user to manually control the position of the end device.	To suit current standard
C4.4.1(d)	C4.4.1(d)	"Each outstanding shall be loaded up to 85% capacity only; the remaining 15% shall be for future expansion" To be deleted.	To suit current standard

C4.4.1(h)	C4.4.1(h)	(h) Battery backup Battery shall be able to support the real time clock, programme, and all volatile memory for a minimum of 72 hours.	To strengthen the system reliability
C4.4.2	C4.4.2	Temperature / humidity / pressure controllers shall have separate zero and proportional adjustments. Local display and keypad shall be provided for viewing and controlling each output. Analog output of controllers shall be available with either 0 to 10V or 0/4 to 20mA DC proportional output, two positions, or any combination.  Constant temperature controller shall be of the proportional type with integral reset action to eliminate sustained system offset. The controller capability to adjust the integral reset times.	To suit current standard
C4.4.6	C4.4.6	"Option for temperature display at 0.5oK interval in the sensor" added.	

<b>Section C5:- Central Control And Monitoring System (CCMS)</b>			
C5.2	C5.2	Operator Workstation, Advanced Application Controller, Application Specific Controller, Smart Actuator and Smart Sensor.	To suit current BACnet standard
C5.3 (a)	C5.3 (a)	"BACnet Standard 135-1995" is updated to "BACnet Standard 135 – 2004".	To update standards specified.
C5.3 (b)	C5.3 (b)	"ISO/IEC 9075-1989 (ISO SQL 89)" is updated to "ISO/IEC 9075-9:2003".	To update standards specified.
C5.3 (c)	C5.3 (c)	"Echelon Corporation LonTalk Protocol (LonTalk)" is updated to "ANSI/CEA-709.1-B Control Network Protocol Specification".	To update standards specified.
C5.3 (d)	C5.3 (d)	"EIA232" is updated to "TIA/EIA 232"	To update standards specified.

C5.3 (e)	C5.3 (e)	“EIA485” is updated to “TIA/EIA 485”	To update standards specified.
C5.3 (f)	C5.3 (f)	“EIA568a” is updated to “TIA/EIA 568”	To update standards specified.
C5.3 (i)	C5.3 (h)	“ISO 1989” is updated to “ISO 1989:2000” “ISO standard 8802.3” is updated to “ISO standard 8802.3:2000”	To update standards specified.
C5.4 (a)	C5.4 (a)	“EIA(US)RS310B” is updated to “ANSI/EIA-310-D:1992.	To update standards specified.
C5.5	C5.5	Requirement for Conformance Class deleted.	To suit current BACnet standard
		ANSI/ASHRAE Standard. 135-1995 is updated to ANSI/ASHRAE Standard. 135-2004.	To update standards specified.
		Requirement for Building Controller; Advanced Application controller; Application Specific Controller, Smart Actuators and Smart Sensor are added for reference.	To suit current BACnet standard
C5.21	C5.21	Requirement of Colour Codes for status of points changes.	Requirement in line with other building services installation.
C5.48	C5.48	add requirement for smart sensors.	To define function of smart sensors and suit requirement of BACnet standard
C5.49	C5.49	add requirement for smart actuators.	To define function of smart actuators and suit requirement of BACnet standard

<b>Section C6:- Central Refrigeration Machine, Direct Expansion Evaporators And Heat Rejection Plant</b>			
C6	C6	Title of Section C6 revised :-Central Refrigeration "Machine" instead of "Chiller" was quoted.	Clarify the inclusion of heat pumps.
C6.1	C6.1	1. Requirements of testing the capacity of the machine was clarified. 2. Requirements of noise mitigation measures was clarified. 3. Edition of Standards were updated. 4. Sound pressure level instead of sound power level was used in accordance with ARI standard 575:1994.	1. Clarify the requirements. 2. Clarify the requirements. 3. Update standards. 4. Align with the requirements of ARI standard.

	<b>C6.7 New clause</b>	Scroll compressor was added.	Cope with the products available in the market. In response to comments from ACRA, Trane and Carrier.
C6.6.4	<b>C6.6.4</b>	We have reviewed some product information from the reputable screw chiller manufacturers, capacity control ranging from 10% to 100% of chiller full load is also available ranging from standard to optional. It is agreed to provide a better market competition for chiller procurement, capacity control starting from 20% is accepted in the GS, except otherwise specified in the PS to suit the specific project design	Revised as per comment from ACRA
C6.16.3	C6.17.3	Issuing body of the test certificate was clarified.	Clarify the requirements.
C6.19.2 (c)	C6.20.2 (c)	ISO 2604 was withdrawn and replace by BS EN 10216-1:2002.	Update standards.
C6.19.3	C6.20.3	Edition of Standards was updated.	Update standards.
C6.21	C6.22	Title was updated to cover heat pump.	Clarify the inclusion of heat pumps.
C6.24	C6.25	Standard rating conditions and COP were updated to tie in with the latest AC Energy Code 2007 from EEO.	The minimum COPs of chillers have been reviewed and revised according to the latest Code of Practice on Energy Efficiency. A response to comment from ACRA.
	<b>C6.26 New section</b>	Section for Total Energy Heat Pump was added.	Include new energy efficient equipment.
	<b>C6.27 New section</b>	Section for Automatic Condenser Tube Cleaning System added.	Include new energy efficient equipment.
	<b>C6.28 New section</b>	Section for Solar Heating Installation added.	Include new energy efficient equipment.

<b>Section C7:- Electric Motors And Electrical Equipment</b>			
C7.3 to C7.6	<b>C7.3</b>	The specific requirements for low voltage electric motors; variable speed drives; motor switchgear, starter and control panels; and automatic power factor correction capacitors were transferred to and specified in Clause C5.25, C5.19, C5.18 & C5.26 and C5.22 of the Electrical General Specification respectively being revised.	To include the electrical equipment specification in Electrical General Specification for consistency.
C7.7 to C7.12	<b>C7.4</b>	The specific requirements for high voltage electric motors, motor control switchboards, auto-transformers, power factor correction capacitors and power cables were transferred to and specified in Clause C13.2, C13.3, C13.4, C13.5 and C13.6 of the Electrical General Specification respectively being revised.	To include the electrical equipment specification in Electrical General Specification for consistency.

<b>Section C8:- Noise and Vibration Control</b>			
C8.2.2	C8.2.2	"Steel members" changed to "hot dipped galvanized steel members".	The type of steel material quoted shall be more specific.
C8.3.5	C8.3.5	Change swing capability from 30° to 30-35°.	To allow flexibility in swing capability for different products.
C8.3.8 & C8.3.9	C8.3.8 & C8.3.9 deleted	Both Types 'H' & 'T' spring hangers are deleted and requirements are same as those for Type 'F' and Type 'G'.	To simplify the types of spring hangers specified.
C8.3.10 to C8.3.14	Re-numbered to C8.3.8 to C8.3.12	Original Types 'J' to 'O' are changed to Types 'H' to 'L' as the original Types 'H' & 'T' are deleted.	To re-number the Type designations.
C8.4.2	C8.4.2	Chapter for "Sound and Vibration Control" is added for reference.	To indicate the name of chapter in which Table 42 is shown.
C8.5.2	C8.5.2	BS5500:1985 is updated to PD5500.	To update standards specified.
		BS EN10095 Type X8CrNi25-21 is added to replace BS1449 Part 2. BS21 (BSP) is changed to ISO 7-1. BS 4504 NP Standard is replaced by BS EN 1092-1:2002.	To update standards specified.
C8.7	C8.7	ASTM C1071 is updated to ASTM C1071-05.	To update standards specified.
		ASTM E84 is updated to ASTM E84-07 and BS476 Part 4 to BS476-4.	To update standards specified.
		ASTM C423 is updated to ASTM C423-07.	To update standards specified.
C8.8	C8.8	ASTM E90 is updated to ASTM E90-04.	To update standards specified.
C8.9	C8.9	"ASHRAE Guide" is changed to "Sub-section C2.3".	To be more specific for the requirement.
		ASTM E84 is updated to ASTM E84-07 and BS476 Part 4 to BS476-4.	To update standards specified.
C8.10	C8.10	ASTM E90 is updated to ASTM E90-04 and BS476 Part 20-22 to BS476-20 to -22.	To update standards specified.
C8.12.2	C8.12.2	BS476 Part 20-22 is updated to BS476-20 to -22.	To update standards specified.
C8.12.5	C8.12.5	ASTM E90 is updated to ASTM E90-04 and ASTM C423 to ASTM C423-02a.	To update standards specified.

C8.13.1	C8.13.1	C8.13.1(b) is deleted.	The requirement for installation method of plant room wall lining is already mentioned in Clause B8.13.
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<b>Section C9:- Pipe Materials, Valves, Cocks and Strainers</b>			
C9.3.2	C9.3.2	Groove ends butterfly valves "completed with full-lug" is added.	Additional material specification.
C9.5	C9.5	Delete "All ferrous pipework shall comply with ISO 5730 and ISO R831."	Ferrous pipework was not recommended to used for chilled water, condensate drainage, condensing water and make up water systems.
C9.5 – Table 9.5-(5)	C9.5 – Table 9.5-(5)	Update British Standard for cold bitumen coating of DI pipe:- BS3416 is updated to ISO8179.	To update standards specified.

<b>Section C10:- System Monitoring Instruction</b>			
No specific changes in this section			

<b>Section C11:- Thermal Insulation</b>			
C11.1.2 (a)	C11.1.2 (a)	"Ignition Source A" was specified.	To avoid ambiguity
C11.2.1 (d)	C11.2.1 (d)	"ISO 8302" was added.	To include an international standard
C11.2.2	<b>C11.2.2</b>	Minimum width of tape was revised from 100mm to 75mm.	To suit the market availability
C11.2.8 (a)	C11.2.8 (a)	Aluminium Alloy 8079 was revised to Aluminium Alloy ISO 8079.	Typo amendment.
C11.2.5	C11.2.5	To delete the sentence "polystyrene insulation shall be of the required thickness to meet with the thermal insulation values stated in Clause C11.5 – table 'X' and 'Y' or as stated in the Particular Specification".	To avoid redundancy. It is understood that insulation thickness requirements for all types of thermal insulation should follow Clause C11.5.
C11.4.3	<b>C11.4.3</b>	Minimum width of tape was revised from 100mm to 75mm.	To suit the market availability

Table C11.5-(1)	Table C11.5.1-(1)	Minimum Thickness of Insulation (mm) for Chilled Water installation (Internal Condition) revised.	To align the same content as EMSD-COP
	Table C11.5.1-(2)	Minimum Thickness of Insulation (mm) for Chilled Water installation (External Condition) revised.	
	Table C11.5.2-(1) C11.5.2-(2) C11.5.2-(3)	Minimum Insulation Thickness for Indoor Refrigerant Pipe added.	To align with EMSD-COP
Table C11.5-(2)	Table C11.5.3-(1)	Minimum Thickness of Insulation (mm) on Ductwork and/or Plant Equipment Carrying Warmed or Chilled Air revised.	To align with EMSD-COP

<b>Section C12:- Unitary Air-conditioner</b>			
C12.1	C12.1.	International standard, "ISO5151", "ISO13253", "ISO13256-1" "ISO13256-2" have been specified to replace American Air-conditioning and Refrigeration (ARI) Standards 210.	Align the requirement with international standard.
- -	C12.3	The clause of specific de-rating factor applying to Unitary Air-Conditioners of 60 Hz has been deleted.	Align the requirement with other air-conditioning equipment
C12.8	C12.9	Reference to GS Clause C1 is quoted.	Avoid replicate of filter performance requirement in Clause C1.
C12.19	<b>C12.20</b>	<p>Minimum COPs for Air-cooled Unitary Air-Conditioners have been specified at  "cooling mode: 2.4 (&gt;10 and &lt;40kW); 2.4 (40 to 200kW); 2.6 (&gt;200kW)" and  "VRV cooling mode: 3.0 (&gt;10 and &lt;40kW); 2.9 (40 to 200kW); 2.9 (&gt;200kW)" and  "heating pump heating mode: 2.7 (&gt;10 and &lt;40kW); 2.8 (40 to 200kW); 2.9 (&gt;200kW)"</p> <p>Minimum COP for Water-cooled Unitary Air-Conditioner has been specified at  "cooling mode: 3.0 (all ratings)"</p>	Align the requirement with minimum COPs for both the Air-cooled Type and Water-cooled Type of Unitary Air-Conditioners quoted by the Code of Practice for Energy Efficiency of Air Conditioning Installations 2007 Edition published by EMSD.

<b>Section C13:- Water Handling Equipment</b>			
C13.1.3	C13.1.3	British Standard is updated to BS EN Standard.	To update standards specified.
C13.2.3	C13.2.3	Standards for impellers and sleeves are updated.	To update standards specified.
C13.11	C13.11	Flanged connection should comply with BS EN 1092 and BS EN 1515-1.	Additional material specification.
C13.13	C13.13	BS970 is updated to BS EN 10095:1999, BS EN 10084:1998 and BS EN 10087:1999.	Additional material specification.

<b>Part D:- Indoor Air Quality (IAQ)</b>			
A5.1	D.1	- "Ventilation for Scheduled Premises By laws, under the Public Health and Municipal Services Ordinance, CAP 132" changed to "Ventilation of Scheduled Premises Regulation, under the Public health and Municipal Services Ordinance, CAP 132".	- To match the latest edition ASHRAE 62-2001. - To match with the latest edition September 2003 "Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places".
Table A5.2	Table D.2	- Pollutants "Sulphur Dioxide" and "Lead" deleted.  - "3 months average time" deleted.	- To match with the latest edition September 2003 "Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places".  - ditto.
Table A5.3	Table D.3	the Table deleted	to address the comments by HKIFM on 28 December 2006
Table A5.4	Table D.4	"Germicidal Ultraviolet Sterilizer" changed to "Germicidal Ultraviolet Air Sterilizer".	To match D.5.6.
Table A5.4	Table D.4	"high efficiency filtering" added for Respirable Suspended Particulate	to address the comments by HKIFM on 28 December 2006
A5.4.1	D4.1	"high efficiency particulate air (HEPA)" changed to "high efficiency arrestance (HEPA)"	to address the comments by ASHRAE Hong Kong Chapter on 29 December 200
A5.4.3	D.4.3	"Germicidal Ultraviolet Sterilizer" changed to "Germicidal Ultraviolet Air Sterilizer".	To match D.5.6.
A6.4	D.5.1	Clause A6.4 "Dehumidifier" relocated to Part D.	Part D - the only one part with content relating to the content stated in A6.4
A6.4.1, (d), (v)	D5.1.1, (d), (v)	"ASHRAE 84-78" changed to "ASHRAE 84-1991"	to address the comments by ASHRAE Hong Kong Chapter on 29 December 2006

A6.4.1, (e), (ii)	D5.1.1, (e), (ii)	“ASHRAE 52-76 standard” changed to “ASHRAE Standard 52.2-1999”	to address the comments by ASHRAE Hong Kong Chapter on 29 December 2006
A5.5.3	D.5.4	"Gravimetric and Dust-Spot procedures for Testing Air-Cleaning Devices used in General Ventilation for Removing Particulate Matter" added for ASHRAE 52.1-92.	to supplement information.
A5.5.4	D.5.5	"The electronic air cleaner shall not generate ozone in excess of the safety standards specified by the Occupational Safety and Health (OSHA), USA and Food & Drug Authority (FDA)." changed to "The electronic air cleaner shall not generate ozone in excess 0.05 part per million by volume(ppmv) of air circulating through the air cleaner according to the standards specified by the Food & Drug Authority (FDA) of USA."	for less ambiguity in safety standard.
A5.5.4	D.5.5	“The electronic air cleaner shall not generate ozone in excess of 0.01 ppm.” Changed to “The electronic air cleaner shall not generate ozone in excess of 0.05 part per million by volume (ppmv) of air circulating through the air cleaner.”	to match with the standard above
A5.5.5	D.5.6	<p>"To prevent eye and skin injuries, sources of UV light must be conspicuously labelled with a warning attached to the housing of the source. The warning sign should state:" added.</p> <p style="text-align: center;"><b>WARNING</b></p> <p style="text-align: center;">DO NOT EXPOSE EYES AND SKIN TO ULTRA-VIOLET LIGHT  RAYS ARE HARMFUL TO UNPROTECTED EYES AND SKIN</p> <p style="text-align: center;">警告</p> <p style="text-align: center;">切勿讓眼睛及皮膚暴露於紫外光之下, 可引致損害</p>	for enhancement in safety awareness.

A.5.5	D.5.6	"UV air sterilizer shall not generate ozone. Notwithstanding, the ozone level inside the plant area shall be less than 0.05ppm. Background ozone level shall be in compliance with ASHRAE, OSHA standards." changed to "The generated ozone from the air sterilizer shall be at a level less than 0.05 ppmv of air circulating through the air sterilizer according to the standards specified by the Food & Drug Authority (FDA).".	for less ambiguity in safety standard.
A5.5.6	D.5.7	<p>"(viii) A detail design report on the offered water scrubber system shall be submitted for agreement with Architect. Full technical details shall be provided including at least the followings:</p> <p>I) Certificates and documentary evidence of excellent chemical resistance of all material, component an equipments adopted for the operation with the selected chemicals and specified application.</p> <p>II) Detail information and calculations on:</p> <ul style="list-style-type: none"> <li>• chemical reaction formulation and design criteria;</li> <li>• selection of the type and depth of packing, mist eliminators, nozzles, etc. with manufacture test data or recognised standards;" added for water scrubbers.</li> </ul>	for completeness.
Table A5.5.6	Table D.5.7	"Each probe shall be supplied with analyser and level alarm at the local and remote control panels and they shall be actuated when the chemical levels at chemical tanks are lower than the present values.".	for completeness.
A5.5.6, (a), (vii)	D.5.7 (a)	"The pump casing, impeller shall be of rigid PVC and the impeller shaft shall be of stainless steel approved by the Architect." changed to "The pump casing, impeller shall be of rigid PVC and the impeller shaft shall be of stainless steel all to be approved by the Architect."	to address AD(A)'s comments on 9 February 2007

A5.5.6, (d), (v)	D.5.7 (d), (v)	“Fan shafts shall be carbon steel and oversized to run below critical speed.” changed to “Fan shafts shall be carbon steel and oversized to run above critical speed.”	to address AD(A)’s comments on 9 February 2007
A5.6	D.6	“Upon satisfactory completion of all the tests, a certificate of IAQ compliance level of building according to the format and detailed requirements as specified in the Particular Specification shall be issued to the Architect.” Changed to “Upon satisfactory completion of all the tests, a certificate of IAQ compliance level of building according to the format and detailed requirements as specified in the Particular Specification shall be submitted to the Architect for approval.”	to address AD(A)’s comments on 9 February 2007
A5.7	D.7	“The contractor shall provide recommendation to improve the indoor air quality condition for the approval of the Architect should any 1 of the 3 assessments fail to meet the requirement.” Added.	to address the comments by HKIFM on 28 December 2006
A5.8.4	D.8.4	"Heating coils", "Boiler and humidifier" added.	for completeness.
A5.9	D.9	“Contractors who are familiar with building systems in general and with the features of the building in particular are important resources in preventing and resolving indoor air quality problems in the Maintenance Period.” changed to “Contractors are required to familiarize with building systems in general and with the features of the building in particular which are important resources in preventing and resolving indoor air quality problems in the Maintenance Period.”	to address the comments by HKIFM on 28 December 2006
A5.9.5	D.9.5	"Change in occupancy/space function." added.	for completeness.
A5.9.7	D.9.7	- "Humidification equipment and controls" changed to "Humidification and dehumidification equipment and controls".  - "Exhaust fans" changed to "Exhausts, exhaust fans and pressure relief fans".	- for completeness.  - for completeness.

<b>Part E:- Energy Efficiency And Energy Conservation</b>			
A6.4	E.4	Thermal insulation requirement chilled water pipes, refrigerant pipes, air ductworks and air handling units specified under COP of EMSD now changed to AC_GS.	Thermal insulation requirement in AC_GS is upgraded and inline with COP
	E.8 New section	Automatic Condenser Tube Cleaning System	Incorporate energy efficient equipment
	E.9 New section	Heat Pipe Installation	Incorporate energy efficient equipment
	E.10 New section	Solar Heating Installation	Incorporate energy efficient equipment
	E.11 New section	Dehumidifier	Incorporate energy efficient equipment
	E.12 New section	Fresh Air Pre-Conditioner	Incorporate energy efficient equipment

<b>Part F:- ACMV System Water Treatment</b>			
A7.1	F.1	The Code of Practice for Water-cooled Air Conditioning Systems issued by the Electrical & Mechanical Services Department and the Code of Practice for Prevention of Legionnaires Disease compiled by the Prevention of Legionnaires Disease Committee are included/stipulated in Section F.1.	To suit current standards and requirements.
A7.2	F.2	Clause: " (including costs for the sampling exercises and laboratory tests required)" inserted in paragraph 5.  Contractor reminded to include costs for water sampling tests including laboratory charge during the 12 months Contract Maintenance Period.	To avoid variation claims for water sampling and laboratory tests during the Contract Maintenance Period.

A7.4.4	F.4.4	<p>Clause: "Where the use of the biocide manufacturer's container is considered by the Architect as inappropriate for the purpose" is deleted.</p> <p>Unnecessary Clause deleted.</p>	It is unrealistic for the Architect to check the manufacturer's technical details during the tendering exercise. Tenderers should simply be requested to comply with the Specifications.
A7.4.10	F.4.10	<p>Clause: "mixing tanks becomes empty" replaced by " chemical solution drops below a preset low level".</p> <p>Audio &amp; visual alarm should be energized before the solution tank is found empty.</p>	The audio and visual alarm should actuate at a preset solution level so that the operator has time to refill the tank and avoid system shut down.
A7.5.1(d)	F.5.1(d)	<p>"It is the responsibility of the Contractor to ensure that discharge to the building drainage system and public sewer are in full compliance with the requirements of the Drainage Services Department and the Environmental Protection Department. If pre-treatment is required, Clause F.10 shall be referred." is inserted to paragraph 2 of the section.</p> <p>Responsibility of the Contractor for discharging polluted water into the drainage system is defined.</p>	<p>It is the Contractor's responsibility to ensure the proper discharge of waste water from the pre-cleaning &amp; flushing out processes.</p> <p>Remark: It is not uncommon to find illegal discharge of such waste water to the storm water system.</p>
A7.6.2	F.6.2	<p>More specific requirements in the 2<sup>nd</sup> &amp; 6<sup>th</sup> paragraphs.</p> <p>Timer control is replaced by programmable direct digital real time control.</p> <p>Unless otherwise specified in the Particular Specifications, stainless steel to SS316L is specified for all system components in contact with ozonated water.</p>	To ensure proper control and system durability.
A7.10	F.10	<p>Stipulation of the Waste Disposal (Chemical Waste) (General) Regulation and the requirement of chemical waste collection by a licensed Chemical Waste Collector as per EPD's comments.</p>	To suit current standards and requirements of EPD.

<b>Part G:- Painting, Finishing and Protective Treatment</b>			
A8	Part G	Using with low VOC content paint.	In line with General Specification for Building

<b>Part H:- Inspection, Commissioning and Testing</b>			
A9.5.1	T&C Procedure No.1_3.6.1(c) New section	'Cleaning procedure for refrigerant system' added.	To cover field installed refrigerant piping system
A9.4	T&C Procedure No.1_3.5	Content restructured	
A9.5	T&C 3.6	Content restructured	
A9.6	H.4	Content restructured	
A9.6.4	H.4.4	Example of starter "Auto transformer" added.	More specific on a particular starter.
A9.7	H.5	Content restructured	
A9.7.2	H.5.2	Cross reference re-arranged -A9.5.1 changed to T&C Procedure No.1_3.6.1 -A9.13 changed to T&C Procedure No.1_4.1.5.5 -A9.14 changed to T&C Procedure No.1_4.1.5.7	To tie in with the re-arrangement of para.
	T&C 4.1.3 New section	Procedure for "Inspection for brazing joint" added	Inspection needs
A9.8	H.6	Content restructured	To tie in with the new structure of GS
A9.9	T&C Procedure No.1_4.1.3	Content restructured	To tie in with the new structure of GS
A9.9.1	T&C Procedure No.1_4.1.3	Table content amended - 'R113' & 'R114' deleted; - 'Others' added	To tie in with the availability in the current refrigerant market.
A9.9.2	T&C Procedure No.1_4.1.3	Cross reference changed	To tie in with the re-arrangement of para.
A9.14.5	T&C Procedure No.1_4.1.5.7	Cross reference changed	To tie in with the re-arrangement of para.

A9.14.6	T&C Procedure No.1_4.1.5.7	Cross reference changed	To tie in with the re-arrangement of para.
A9.10	T&C Procedure No.1_4.1.4	Content restructured	To tie in with the new structure of GS
A9.11	T&C Procedure No.1_4.3.6	Content restructured	To tie in with the new structure of GS
A9.11.2(a) (i)	T&C Procedure No.1_4.3.6.2 (a)	"Voltage" changed to "characteristic such as voltage & frequency".	Frequency is as important as voltage to be verified on the equipment name plate.
A9.12	T&C 4.1.7 & 4.1.8	Content restructured	To tie in with the new structure of GS
A9.12.3.	T&C Procedure No.1_4.1.8.3	"With permanent marking" added.	To suit operation need
A9.13	T&C Procedure No.1_4.1.5.5	Content restructured	To tie in with the new structure of GS
A9.14	T&C Procedure No.1_4.1.5.7	Content restructured	To tie in with the new structure of GS
A9.15	T&C Procedure No.1_4.2.1.7	Content restructured	To tie in with the new structure of GS
A9.16	T&C Procedure No.1_4.3.3.1	Content restructured	To tie in with the new structure of GS
A9.17	T&C Procedure No.1_4.2.4	Content restructured	To tie in with the new structure of GS
A9.18	T&C Procedure No.1_4.3.7	Content restructured	To tie in with the new structure of GS
A9.19	T&C Procedure No.1_4.2.5	Content restructured	To tie in with the new structure of GS
A9.19.3 (b)	T&C Procedure No.1_4.2.5.3(b)	"UV lighting and BOG (Air purifier)" added.	The equipment are widely used in current project.
A9.20	H.7	Content restructured	To tie in with the new structure of GS

A9.20.3	H.7.3	"setting of all sensors is to be indicated" is added.	To facilitate on site follow up maintenance. Requirement is added
A9.20.4	H.7.4	"setting of all sensors is to be indicated" is added.	To facilitate on site follow up maintenance. Requirement is added
---	H.8	A new section 'Testing and Commissioning Procedure' added	To tie in with the new structure of GS

<b>Part I:- Operation And Maintenance Requirements</b>			
A10.2.1	I.2.1	Suggest amending "... prior to installation for completion..." to ... prior to completion of installation..."	To address comments by ADA.
A10.2.1 (a)(i)	I.2.1.(a)(i)	Para. : "Besides, equipment portfolio for Air-Conditioning, Refrigeration, Ventilation and Central Control and Monitoring System offered shall be submitted together with the training proposal. The equipment portfolio shall include quantity of equipment, equipment cost, recommended serviceable life by the manufacturer and cycle of major overhaul." is inserted.	To ensure proper maintenance requirement of each equipment could be obtained.
A10.2.1(b) (vi)	I.2.1.(b)(vi)	Clause: "Preventive and corrective maintenance requirements to ensure proper operation of a system or equipment under the maintenance programme." is inserted.	To ensure proper maintenance requirement of each equipment could be obtained.
	I 2.2 (i)	Clause : "Annual inspection and submission of maintenance certificate During the end of the Maintenance Period, the contractor shall carry out and submit the annual inspection and submission of maintenance certificate for the ventilation system as required under Building (Ventilation Systems) Regulations to the Director of Fire Services of the completed installation." is added.	To address comments by FSD.
A10.3.3 (a) (i)	I 3.3 (a) (i)	"Not more than 30 minutes" is added.	To address comments by PD3.
A10.3.4	I.3.4	Para. : "The maintenance programme should include Monthly Routine Service, Half-Yearly Service and Annual Maintenance." is inserted.	To ensure proper maintenance requirement of each equipment could be obtained.
	I.4	Clause for "Spare Parts and Special Tools" added.	In line with other G.S. for other BS installations