暖通空调设计说明

一．设计依据

(1) 采暖通风与空气调节设计规范《GBJ45-87》;

(2) 实用供热空调设计手册；

(3) 民用建筑采暖通风设计技术措施；

(4) 高层民用建筑设计防火规范(GB 50045-95)

(5) 办公建筑设计规范《JGJ 67-89》;

(6) 业主设计任务书及有关回复意见

二.室内外设计参数

三. 暖通工种设计范围

冷热源系统

空调末端系统

机械通风系统

消防防排烟系统

节能措施

环保设计

四．冷热源系统

4-1.冷,热负荷,

本工程的空调面积为 73000m2,，总冷负荷为 12070kw，冷指标 0.121kw/m2 建筑面积。考虑到业主要求在公寓楼处设分体空调器,则集中式空调的装机容量为 7394kw(即 2100RT)。

按业主要求, 冬季办公楼及水晶石部分设热风空调,而公寓楼则采用散热片采暖,经计算,办公楼及水晶石部分的冬季空调热负荷为 7016kw,而公寓楼的冬季采暖热负荷为 4500kw。由给排水提供的生活热水需求量为 3500kw.

4-2.冷，热源设置

我们在确定负荷标准、系统划分、空调方式等方面，经过了反复讨论，比较，以选取最佳方案。该工程地区具有规划的蒸汽管网（压力 0.4Mpa），通过与业主协商，选择蒸汽型双效吸收式冷水机组 700RT 型号 3 台作为冷源，单台蒸汽消耗量为 3.542T/h,凝水回收.

公寓楼采用分体空调，室外机设于窗外，由建筑立面统一规划。

热源利用热力管网的蒸汽，为防止蒸汽压力波动对负荷侧的影响，选用半蓄热式换热器通过热交换后提供空调以及采暖的热水，空调与采暖水系统各自独立，蒸汽通过容积式换热器换热后提供生活用热水。

4.2.1 空调冷源设备

B1F 冷冻机房设置双效吸收式冷水机组 3 台（700USRT x 3 台）；配备冷冻泵 4 台（3 用一备），设置闭式膨胀水箱为系统定压和补水。膨胀水箱的补水为经过自动水处理仪的软化水。冬季的热水泵为与冷冻泵合用，到供暖季节时，通过阀门切换接入空调热水系统。

4.2.2 空调冷却水设备

冷冻机 配逆流式低噪音空调型冷却塔 12 台(标准设计条件下单台冷却量 240T/h)设于办公楼西侧，一台冷水机组对应四台冷却塔，另配冷却水泵 4 台（3 用 1 备）；

公寓楼与办公楼的热交换间均位于地下一层，但分开设置，以保持独立性及便于系统管路平衡。

五.空调末端系统

5-1 空调水系统

本楼全部水系统均为双管制, ,冷冻水 7~12℃,温差 5℃,冷却水 38~32℃, 温差 6℃,冷冻水系统根据位置分布和设计任

空调冷冻水经回水缸处的平衡阀调节并由分水缸送至各区，冷冻水系统立管同程，水平管亦主要采用同程形式。办公室空调冷冻水系统采用闭式膨胀水箱(位于 B1F 冷冻机房内)进行系统定压和补水。系统补水经全自动软水器处理后进入膨胀水箱，再进入系统，以改善水质。

空调水系统主要工作压力情况如下：

冷冻水工作压力 6kg/cm2,冷却水工作压力 6kg/cm2

空调热水经换热器后由 55℃至 60℃,温差 5℃,流量与冷冻水接近，与冷冻水合用水泵。

空调系统采用变水量方式实现自动控制，所有风机盘管回水管上均设电动二通阀；混风空调箱、新风机组回水管上均设比例式二通调节阀，分别根据空调器回风温度或新风送风温度控制通过各空调器的冷冻水量。

冷却循环水采用高频水处理器进行水质处理，在主管上设有 Y 型过滤器，并定期排污处理。

空调冷凝水接总管后就近接至地漏，排水沟。

公寓楼处蒸汽接入地下一层的换热间，经快速换热器(半蓄热性)换热，采暖用水回水为 60℃，供水为 85℃出水,温差为 25℃，散热片采用多柱钢管换热器，采暖系统在 11 层处分上下两段，为高区和低区，以保证散热器承受压力小于 0.8Mpa。高区和低区分别对应两套换热器及各自密闭式定压设备，换热器的容量按所需换热量的 1.5 倍计算。水平管分别在地下室和 11 层环绕，靠墙角设置高区及低区的立管，为便于平衡及今后增加计费系统，采暖为双管系统，散热器连接采用高阻力阀。

5-2 空调末端系统

裙房区域和塔楼会所的餐厅等区域采用低风速全空气空调系统，本设计水晶石集合部分在过渡季节可实现全新风运行，新风百叶分两部分，一部分为最小新风要求百叶，另一部分为全新风百叶，过渡季节时打开所有百叶，裙房屋顶的排风机全投入使用满足排风要求；回廊区(分层空调)采用立柜式空调和喷口送风，主要满足人员活动区的温湿度,如餐厅、会议室等采用 6~8 排管空调器。

办公楼主要由出租的办公区域模块组成，每一模块对应一机房，冷冻水管水平在地下室完成分配，立管设置在各对应的空调机房内，便于计费及租户独立使用,也可适应不同二次装修的需要，且减小了在走道中空调风管水管的截面和根数。新风有新风空调箱统一处理后送至各办公模块区域，新风空调箱具有中效过滤段及加湿段，可进一步提高空气品质。

其他较小的房间为风机盘管加新风系统，便于空间分割和独立控制；

4） 消防控制中心、门卫室和电梯机房等房间采用分体空调器，便于单独使用。

5-3 新风系统

a)对于水晶石处及办公楼餐厅处的回风处理空调箱，新风在机房就近引入。

b).对于出租办公模块及其他较小的房间（FCU 系统），新风经统一的机组处理后接入各末端设备处。

c.)按业主的要求，在公寓楼处设置分体空调箱，新风由外墙或窗渗入。

六.机械通风系统

6-1 对于竖向对齐的卫生间，在每层卫生间采用百页排风口，通过排风竖井由屋顶的排风机

排除。对于个别的卫生间，直接由天花排风扇由外墙排出。

6-2 主楼标准层均为办公室，有新风送入，也设机械排风，排风量为新风量的 80%,维持一定正压，另 20％由卫生间或窗缝带走。

6-3 按电气专业要求：智能化子工作间设送排风；变压器室因发热量大采用空调处理后送风，并控制送风温差防止结露。

6-4 办公楼餐厅的送排风预留电量，待二次装修配合，并预留竖井排至办公楼屋面。

6-5 地下室房间通风，通过竖井完成，送、排风竖井由建筑专业结合周围环境综合考虑。各系统的排风总管均设止回阀，以防其它系统的废气倒灌。

七.消防防排烟系统

7-1 本项目在公寓楼的楼梯间及前室采用机械防烟方式,风机设于屋顶层, 前室通过每层设置常闭多叶正压送风口，火灾时打开着火层及上下相邻层的正压送风口，联动正压送风风机进行加压送风, 对于电梯间每三层设一常开的正压送风口。

7-2 本项目其他防烟楼梯间及消防电梯前室或合用前室均采用自然排烟方式，开窗面积满足高规的要求，对于部分不具备自然排烟条件的楼梯间前室设置正压送风，风机设于屋面。其前室设计正压值为 25Pa。

7-3 本项目在办公楼的内走道及水晶石的内走道设置走道排烟系统，风机设于屋面，常闭的排烟口设于立管上，对应的防火分区火灾时，手动或通过消防中心自动打开排烟口，联动启动对应的排烟风机，排除烟气。

7-4 地下车库及地下设备用房可平时机械送排风兼作火灾时的机械排烟系统，平常排风，上部风口排除 1/3,下部风口排除 2/3,火灾时关闭下部风管对应的电动防火阀，利用上部防火风口排烟，送风机继续运行，用作排烟补风，对于变配电机房，仅有上部风口，火灾时利用该风口排烟即可。

7-5　对于水晶石内部分会议室及酒吧，大茶室设置机械排烟。详见设备表。

八.空调控制及节能措施

8-1 选用能耗低，效率高的溴化锂机组, 冷水机组具有负荷调节特性,并由 BMS 系统进行监测。

8-2 为了水泵的稳定性控制以及进一步节能，在冷冻水系统将使用压力减压旁通阀。空调设备水控制阀将采用双通调节阀,风机盘管为二通阀.

8-3 公共区域房间无人时，风机盘管将自动关掉。每层机组将由 BMS 系统监视，以减少能耗。

8-4 在空调系统将设置利用空气节能循环的焓值控制。在室外焓值低于回风时，将充分利用新风；裙房商场部分可实现过渡季节全新风运行。

8-5 根据需要部分空调机组（如餐厅等处的全空气空调箱）可采用变频装置控制。可设置对楼宇的所有机械系统和设备进行控制和监视的直接数字系统（DDC）和楼宇管理系统(BMS)。系统包括节能特性：如最佳的开/关程序、时间程序表，动力消耗限制，冷冻机的优化，送风的再设定和自动化设备程序。

九.环保设计

办公楼新风集中处理，并采用中效过滤器(比色法 55%以上)过滤,新风竖井为铁皮竖井，防止漏风和串气。在人员集中的场合如酒吧和餐厅等场合的空调箱均采用中效过滤器。

新风，排风百叶距离高差按规范并尽可能分开，以防交叉污染。

采用高效低噪的风机、水泵等声源设备。

设备及管道减振隔声，机房吸声，隔声处理，风管上按声源的声级或室内的要求，设置必要的消声器。

经除油装置处理后，三厨房废气排至办公楼屋面远离人员活动区.

冷却塔(采用高效低噪飘水少的型号)设于办公楼西侧，用绿化带将其与人员活动区隔离。付：

外文翻译

电火花加工法对加工超韧性的导电材料（如新的太空合金）特别有价值。这些金属很难用常规方法加工，用常规的切削刀具不可能加工极其复杂的形状，电火花加工使之变得相对简单了。在金属切削工业中，这种加工方法正不断寻找新的应用领域。塑料工业已广泛使用这种方法，如在钢制模具上加工几乎是任何形状的模腔。

电火花加工法是一种受控制的金属切削技术，它使用电火花切除（侵蚀）工件上的多余金属，工件在切削后的形状与刀具（电极）相反。切削刀具用导电材料（通常是碳）制造。电极形状与所需型腔想匹配。工件与电极都浸在不导电的液体里，这种液体通常是轻润滑油。它应当是点的不良导体或绝缘体。 用伺服机构是电极和工件间的保持 0.0005~0.001 英寸（0.01~0.02mm）的间隙，以阻止他们相互接触。频率为 20000Hz 左右的低电压大电流的直

流电加到电极上，这些电脉冲引起火花，跳过电极与工件的见的不导电的液体间隙。在火花冲击的局部区域，产生了大量的热量，金属融化了，从工件表面喷出融化金属的小粒子。不断循环着的不导电的液体，将侵蚀下来的金属粒子带走，同时也有助于驱散火花产生的热量。

在最近几年，电火花加工的主要进步是降低了它加工后的表面粗糙度。用低的金属切除率时，表面粗糙度可达 2—4vin.(0.05—0.10vin)。用高的金属切除率[如高达 15in3/h(245.8cm3/h)]时，表面粗糙度为 1000vin.(25vm)。

Electrical discharge machining

Electrical discharge machining has proved especially valuable in the machining of super-tough, electrically conductive materials such as the new space-age alloys. These metals would have been difficult to machine by conventional methods, but EDM has made it relatively simple to machine intricate shapes that would be impossible to produce with conventional cutting tools. This machining process is continually finding further applications in the metal-cutting industry. It is being used extensively in the plastic industry to produce cavities of almost any shape in the steel molds.

Electrical discharge machining is a controlled metal removal technique whereby an electric spark is used to cut (erode) the workpiece, which takes a shape opposite to that of the cutting tool or electrode. The cutting tool (electrode) is made from electrically conductive material, usually carbon. The electrode, made to the shape of the cavity required, and the workpiece are both submerged in a dielectric fluid, which is generally a light lubricating oil. This dielectric fluid should be a nonconductor (or poor conductor) of electricity. A servo mechanism maintains a gap of about 0.0005 to 0.001 in. (0.01 to 0.02 mm) between the electrode and the work, preventing them from coming into contact with each other. A direct current of low voltage and high amperage is delivered to the electrode at the rate of approximately 20 000 hertz (Hz). These electrical energy impulses become sparks which jump the dielectric fluid. Intense heat is created in the localized area of the park impact, the metal melts and a small particle of molten metal is expelled from the surface of the workpiece . The dielectric fluid, which is constantly being circulated, carries away the eroded particles of metal and also assists in dissipating the heat caused by the spark.

In the last few years, major advances have been made with regard to the surface finishes that can be produced. With the low metal removal rates, surface finishes of 2 to 4 um. (0.05 to 0.10um) are possible. With high metal removal rates finishes of 1 000uin. (25um) are produced.

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在最近几年，电火花加工的主要进步是降低了它加工后的表面粗糙度。用低的金属切除率时，表面粗糙度可达 2—4vin.(0.05—0.10vin)。用高的金属切除率[如高达15in3/h(245.8cm3/h)]时，表面粗糙度为 1000vin.(25vm)。

Electrical discharge machining

Electrical discharge machining has proved especially valuable in the machining of super-tough, electrically conductive materials such as the new space-age alloys. These metals would have been difficult to machine by conventional methods, but EDM has made it relatively simple to machine intricate shapes that would be impossible to produce with conventional cutting tools. This machining process is continually finding further applications in the metal-cutting industry. It is being used extensively in the plastic industry to produce cavities of almost any shape in the steel molds.

Electrical discharge machining is a controlled metal removal technique whereby an electric spark is used to cut (erode) the workpiece, which takes a shape opposite to that of the cutting tool or electrode. The cutting tool (electrode) is made from electrically conductive material, usually carbon. The electrode, made to the shape of the cavity required, and the workpiece are both submerged in a dielectric fluid, which is generally a light lubricating oil. This dielectric fluid should be a nonconductor (or poor conductor) of electricity. A servo mechanism maintains a gap of about 0.0005 to 0.001 in. (0.01 to 0.02 mm) between the electrode and the work, preventing them from coming into contact with each other. A direct current of low voltage and high amperage is delivered to the electrode at the rate of approximately 20 000 hertz (Hz). These electrical energy impulses become sparks which jump the dielectric fluid. Intense heat is created in the localized area of the park impact, the metal melts and a small particle of molten metal is expelled from the surface of the workpiece . The dielectric fluid, which is constantly being circulated, carries away the eroded particles of metal and also assists in dissipating the heat caused by the spark.

In the last few years, major advances have been made with regard to the surface finishes that can be produced. With the low metal removal rates, surface finishes of 2 to 4 um. (0.05 to 0.10um) are possible. With high metal removal rates finishes of 1 000uin. (25um) are produced.

付：外文翻译

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