华能山东石岛湾核电厂高温气冷堆核电站示范工程

The Demonstration Project of Huaneng Shidao Bay HTGR Power Plant

紧急停堆时小流量冷却系统（常规岛侧）截止阀技术规格书

Technical specification of imported globe valve in Emergency shutdown cooling system (CI)

Rev. A

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中特殊说明。

1.1.5 In the bid documents, the supplier should answer the specification item by item to declare whether they accept the requirements listed in this specification or not. Such as, if supplier do accept an item of this specification, the note "We understand the requirements of above item and promise to follow them completely" should be indicated after this item; if supplier have special suggestion, scheme, technical characteristics or deviation, please make a description and explanation under the item, but do not modify the item listed in the original tendering document, the deviation should be listed in the "deviation sheet" in Appendix 3, otherwise, the equipment would be regarded to totally meet the tendering document requirement and standards. The better item than the one in this specification provided by tenderee also should be special remarked in the tendering document.

1.1.6 投标方对截止阀的成套系统设备(含辅助系统与设备)负有全责，即包括分包(或采购)的产品。分包(或采购)的产品制造商事先征得招标方的认可。

1.1.6 The supplier is fully responsible for the complete set of globe valves, which is including subcontracted or purchased products. The products manufactures should subject to approval by classification tenderee.

1.1.7 投标产品或其技术引进方的产品必须具有在同级别及以上发电厂或相似条件下两台以上安全可靠运行两年以上的业绩，同时投标方应具备核电站常规岛相关设备的安全生产及加工制造资质。

1.1.7 The bidding products or the technique-import products must have achievements of more than two sets and reliable operation of longer than two years in power plants at the same level or above, or under the similar situation, meanwhile the supplier should have the qualifications of safety production and manufacturing the relative equipments of conventional island in nuclear power plant.

1.1.8 本工程全面采用 KKS 标识系统。投标方在中标后提供的所有技术资料(包括图纸)和设备必须有 KKS 标识。具体标识要求由设计院提出，在设计联络会上确定。

1.1.8 The KKS code is adopted in this project. The KKS code must be used in all technical documents (including drawings) and equipments provided by the tenderee after winning the bids. The specific codes should be offered by SNPDRI and be confirmed at design liaison meeting.

1.1.9 对于投标方配套的控制装置、仪表设备，投标方应考虑和提供与全厂 DCS 控制系统的接口，并负责与全厂 DCS 控制系统的协调配合，直至接口完备。

1.1.9 The supplier should consider and provide the interfaces between the control equipments, instruments supplied by the tenderee and DCS controlling system in whole plant, meanwhile they are responsible for the coordination and cooperation with the DCS controlling system of the whole plant until the interfaces are complete.

1.1.10 如本技术规格书中文与英文不一致，以中文为准。

1.1.10 If there are difference between Chinese and English description in this tendering documents, take Chinese description for criterion.

1.2 工程概况 Project general situation

华能山东石岛湾核电厂高温汽冷堆核电站示范工程位于山东省威海市所辖荣成市，地处石岛管理区宁津所街道办事处东南海滨，东侧濒临黄海，北距荣成市约 20km，西南距石岛管理区约 14km，西北距威海市区约 68km。

1. 概述 Abstract

1.1 总则 General rules

1.1.1 本技术规格书适用于华能山东石岛湾核电厂高温气冷堆核电站示范工程紧急停堆时小流量冷却系统（常规岛侧）截止阀，它提出了该设备的功能设计、结构、性能、安装和试验等方面的技术要求。

1.1.1 This technical specification is for imported globe valves in emergency shutdown cooling system （CI）. The technical requirements for equipment function design, construction, performance, installation and testing are supplied in this tendering document.

1.1.2 本技术规格书所提及的要求和供货范围都是最低限度的要求，并未对一切技术细节作出规定，也未充分地详述有关标准和规范的条文，但投标方应保证提供符合本技术规格书和工业标准的功能齐全的优质产品及其相应服务。在签订合同后，因技术规格书标准和规程发生变化，招标方有权以书面形式提出补充要求。

1.1.2 The lowest but not all of the technical requirements and applicable standards are supplied in this tendering documents, the supplier should provide a set of high quality product and service to meet the tendering document and the up-to-date related industry standards requirements. After the contract is signed, the tenderee has the right to propose supplemental requirements in written form when several changes take place in the technical specification standards and codes.

1.1.3 如果投标方没有以书面形式对本规格书的条文提出异议，则意味着投标方提供的设备完全符合本规格书的要求。如有异议，不管多么微小，都应加以详细描述，否则可由招标方确定按对招标方有利的条文执行。

1.1.3 If the supplier has no objection in writing to this specification, the supplier should comply with standards listed in this specification. In case of disagreements with this specification, no matter how tiny, the supplier should describe them in documents in detail. Otherwise, the tenderee could implement the contract in the tenderee's favor.

1.1.4 本技术规格书所使用的标准与投标方所执行的标准不一致时，按较高的标准执行，应以更有利于设备安装运行、工程质量、更有利于招标方为原则，由招标方确定，但必须满足国家有关安全、环保等强制性标准要求。

1.1.4 The supplier should comply with standards listed in this tendering document. If there is any inconsistency, the stricter standards with the principle of better benefiting the installation operation, project quality and the tenderee should be complied with. The stricter standards should be confirmed by the tenderee and meet the national mandatory requirements for safety and environmental protection.

1.1.5 投标方应在投标文件中，对于技术规格书进行逐段应答，表明是否接受和同意本技术规格书的要求，如：接受和同意招标文件某条款的要求，则在该条款后注明："理解并承诺完全响应上述条款的要求"；若针对某条款，投标方有特别的建议、方案、技术特点或差异，请在该条款下加以描述和说明，不得修改原招标文件条款，并将差异汇总（技术差异表请见附录3），否则将认为投标方提供的设备完全符合本招标技术文件和标准的要求。投标方如有优于本招标文件基本要求的条款，也须在投标文件

The demonstration project of Huaneng Shidao bay HTGR power plant is located along the southeast coast of Ningjinsuo subdistrict of Shidao administrative district, in Rongcheng City, Shandong Province. The site is near the Yellow Sea in the east, 20km away from Rocheng City in the north, 14km away from Shidao administrative district in the southwest and 68km away from Weihai City in the northwest.

本示范工程规划建设 1 台 200MW 级高温气冷堆核电机组及其相应的配套设施，采用两座球床模块式高温气冷堆带一个汽轮机组，每座反应堆的热功率为 250MW，总热功率为 500MW，电功率为 200MW。以两回 220kV 出线接入电力系统，给水回热系统为五级，由三级低压加热器、一级除氧器和一级双列高压加热器组成。给水系统配置三台容量为 100%单个反应堆蒸汽发生器额定给水流量的电动调速给水泵，高压加热器采用双列配置，低压加热器为单列配置，凝结水系统配置三台容量为 50%的电动定速凝结水泵。

The demonstration project is planned to install one unit of 200MW Class with turbine generator sets, the driving steam is provided by two sets of pebble bed modular high-temperature gas-cooled reactors. The thermal power of each reactor is 250MW, the total thermal power and electric power is 500MW and 200MW respectively. Two circuits of outgoing line of 220kV are used to switch in the electric power system and the regenerative feed water heating system is consisted of 5 stages, they are three low pressure heaters, one deaerator and one double-row high pressure heater. There are three electric feed water pumps in the feed water heating system and the flowrate of one pump is equal to the 100% flowrate of one steam generator. The double-row high pressure heater and single-row low pressure heater configurations are adopted. There are three electric condensate pumps in the condensate system and the flowrate of one pump is equal to the 50% flowrate of one steam generator.

1.3 设计和运行条件 Design and operation conditions

1.3.1 系统概况和相关设备

1.3.1 System general situations and related devices

1.3.1.1 汽机型式： 超高压、两缸两排汽、凝汽式

1.3.1.1 Turbine type: ultrahigh pressure, two cylinders and two exhaust steam, condensing turbine

1.3.1.2 辅机循环冷却水系统的形式：闭式循环冷却水和开式循环冷却水。

1.3.1.2 Type of auxiliary equipment cooling water system: closed-cycle cooling water and open-cycle cooling water.

1.3.1.3 气象条件

年平均气温:	12.0℃
极端最高气温:	36.8℃
极端最低气温:	-14.6℃
平均相对湿度:	72%
最小相对湿度:	6%
年平均降雨量:	798.7mm
一天最大降雨量:	250.2mm
平均最大风速:	28.3m/s

极端最大风速: 34m/s

厂区室外地坪海拔高度：黄海高程 7.2m。

厂区地震基本烈度为 6 度(7 度设防)。

1.3.1.3 Meteorology

Mean annual air temperature:	12.0℃
Maximum air temperature:	36.8℃
Minimum air temperature:	-14.6℃
Long term average relative humidity:	72%
Minimum relative humidity:	6%
Mean annual precipitation:	798.7mm
Maximum probable precipitation (Duration: 24 hours)	250.2mm
Maximum mean wind velocity:	28.3m/s
Maximum wind speed:	34m/s
Off-site platform above sea level:	Yellow Sea Datum 7.2m

The earthquake intensity of factory is level VI (Set up defenses at level VII).

1.3.2 设备安装位置：常规岛汽机房室内；

1.3.2 Equipments installation position: in the turbine hall

1.3.3 机组型式及运行方式

1.3.3 Unit type and operation mode

汽轮机运行方式为基本负荷，有调峰运行的能力。

The turbine is designed to be operated in base load, and also could be operated in variable load.

1.4 截止阀参数表（下述每种阀门投标方应报出单价，将来阀门的数目若有所增减，按此单价核算。）
1.4 Parameter table of the globe valves（The unit price of each type of valve should be provided by supplier. The total price should be calculated based on the unit price if the quantity of valves be changed in the future.）

截止阀参数表

Parameter Table of the Globe Valve

序号 NO.	名称及 KKS 编码 Name and KKS	规格与技术数据(压力与温度必须同时满足) Specifications and technical parameters (must satisfy both pressure and temperature)	数量 QTY.	备注 Remark
1	1#反应堆主汽对外排汽管道电动截止阀 1# Reactor main steam exhaust piping electric globe valve 11LBH90AA101 11LBH90AA102	P=15.6MPa.g t=576℃ 连接管规格：Φ168.3×18.26；材质：A335 P91 阀门与管道连接方式：焊接 Connecting tube specifications:Φ168.3×18.26; Material: A335 P91 Valves and pipe connections: Welding	2	连接管道为外径管 Connecting pipe is outer diameter pipe
2	2#反应堆主汽对外排汽管道电动截止阀 2# Reactor main steam exhaust piping electric globe valve 12LBH90AA101 12LBH90AA102	P=15.6MPa.g t=576℃ 连接管规格：Φ168.3×18.26；材质：A335 P91 阀门与管道连接方式：焊接 Connecting tube specifications:Φ168.3×18.26;	2	连接管道为外径管 Connecting pipe is outer diameter pipe

序号 NO.	名称及 KKS 编码 Name and KKS	规格与技术数据(压力与温度必须同时满足) Specifications and technical parameters (must satisfy both pressure and temperature)	数量 QTY.	备注 Remark
		Material: A335 P91 Valves and pipe connections: Welding		

注：1、阀门必须采用锻造阀体，不允许阀体上有拼焊缝，对于设计参数为 15.6MPa.g t=576℃的阀门，阀体材质为 ASME A182 F91。

1, the valves must take use of forged body. It is not allowed to put welded seam on the body. For valves with design parameters of 15.6MPa.g, t = 576 ℃, the valve body is made of ASME A182 F91 .

2、阀门必须符合 ANSI B16.34 全通径要求，所有电动阀门具有中停功能且有开度显示功能。

2, the valve must meet the full bore requirements of ANSI B16.34, all electric valves should equip with stop function and opening extent display function.

3、所使用阀门须是同行业知名品牌，在国外及国内核电行业需有长期良好使用业绩。

3. All the valves must be under well-known brands and be used in nuclear power industries for long period of time.

4、MPa.g 表示表压，阀门所有接口尺寸应满足规范书要求，管道规格单位为 mm。

4, MPa.g indicates gauge pressure, the valve port size should meet all specification requirements, piping specifications are in mm.

5、表中的阀门 KKS 编码、阀门接管规格及材质为暂定，最终在详细设计阶段由设计院确定。

5, the KKS, connection pipe size ande material of valves in the list are tentative. It will be confirmed by design institute in detail design phase.

2. 技术规范 Technical Specification

2.1 设计基本要求 Basic requirements

2.1.1 设备标示：本工程采用 KKS 编码，编码范围包括投标方所供系统、设备、主要部件和构筑物及图纸、文件，编码深度为元件级。投标方在设计、制造、运输、安装、试运及项目管理的各个环节使用由招标方提供的编码标识系统。

2.1.1 The equipments labeling: the KKS code is adopted in this project and the code covers a range including systems, equipments, main parts, structures, drawings and documents provided by the supplier. The depth of encode is component level. The KKS code provided by the supplier should be used in design, manufacture, transport, installation, test running and project management.

2.1.2 安全、质保和抗震分级

2.1.2 Classification of safety, quality guarantee and earthquake-proof

截止阀的安全分级为非安全级，即非核安全级（NS）；

The safety classification of globe valves is non-safety level, refers to the non-nuclear safety level;

质保分级：QA3（根据业主 Q-IP-PQA-004 物项和服务的质保分级要求）；本技术规格书所涉及的

设备定为 QA3；抗震类别应为常规抗震类。

Requirements for Assurance Classification: QA3, Accroding to owner Requirements for Quality Assurance Classification of Item and Service (Q-IP-PQA-004), the equipments are delined the earthquake-proof classification should be generally earthquake-proof level.

2.1.3 性能保证值

2.1.3 Performance guarantee values

2.1.3.1 性能数据及主要技术表：(空白的参数投标方提供，如果表中所列的任何一项物项投标方认为是不需要的，则应标记为“NIL”，不能留下空白，下同)。

2.1.3.1 Performance values and main technical specification: (the bidder should fill in all the blanks. If any item listed in this sheet is considered to be unnecessary, it could be marked as “NIL”. Please do not leave blank. Other sheets should also be filled in this way.)

注：填写主阀的设计压力、温度、接管规格（mm）、主要部件的材质、阀门最大力矩及阀门型号等必要的参数。

Note: Fill in the main valve design pressure, temperature, connection size (mm), the material of the main components, the maximum torque of the valve and valve type and other necessary parameters.

编号 1

阀门用途 Purpose of the valve		1#反应堆主汽对外排汽管道电动截止阀 1# Reactor main steam exhaust piping electric globe valve
流动介质 Fluid medium		蒸汽 Steam
数 量 Quantity		2只
执行标准 Executive standard		
阀门型式 Valve type		
阀门总重量（包括执行机构） Valve total weigh (including executive actuator)		
主阀门 Main Valve	阀门代号 Valve code name	
	公称尺寸和压力等级 Nominal dimension and pressure rating	
	KKS	11LBH90AA101 、11LBH90AA102
	设计压力/温度 Design pressure/temperature	15.6MPa.g /576℃
	连接方式 Connecting method	对焊 Butt welding
	接管尺寸 Dimension of connecting tube	
	阀盖垫片 Valve cover gasket	
	阀门泄漏等级 Valve leaking grade	MSS SP-61标准 MSS SP-61 Standard
	阀体材料 Material of valve body	
	密封面 Sealing face	
	阀盖材料 Material of valve cover	
	阀盘材料 Material of valve disc	
	阀座材料 Material of valve base	

	盘　根 Stuffing box	
	接管材料 Material of connecting tube	
	最大开度下相对压损系数 Relative pressure loss coefficient in maximum opening	
执行机构 Executive actuator	生产厂家 Manufacturer	
	型　号 Model	
	电源提供 Electric source	380VAC/50Hz
	防护等级 Protection grade	IP67
	马达额定输出功率/电流 Motor rated output power/current	
	马达转速 Motor rotational speed	
	绝缘等级 Insulation level	
	齿轮输出转速 Gear wheel output rotational speed	
	全开/全关时间（S） Time of whole-open/whole-close	
	限位开关 Limit switch	
	扭矩开关 Torque switch	
	控制电路电源 Electric source of control line	24VDC
	手轮安装位置 Hand wheel installation location	
	可编程无源触点 programmable passive contacts	
	注：要求阀门耐冲蚀，并说明抗冲蚀的措施。 Note: The valve is required to be erosion resistant and anti-erosion measures should be explained. P=15.6MPa.g　t=576℃ 连接管规格：Φ168.3 ×18.26；材质：A335 P91 阀门与管道连接方式：焊接 Connection pipe size: Φ168.3 ×18.26; Material: A335 P91	
	Valves and pipe connections: Welding Connection pipe size: Φ33.4 ×4.55; Material: A335 P91	
	Valves and pipe connections: Welding	

编号 2

阀门用途 Purpose of the valve	2#反应堆主汽对外排汽管道电动截止阀 2# Reactor main steam exhaust piping electric globe valve
流动介质 Fluid medium	蒸汽 Steam
数　量 Quantity	2只
执行标准 Executive standard	
阀门型式 Valve type	
阀门总重量（包括执行机构） Valve total weigh (including executive actuator)	

主阀门 Main Valve	公称尺寸和压力等级 Nominal dimension and pressure rating	
	KKS	12LBH90AA101 、12LBH90AA102
	设计压力/温度 Design pressure/temperature	15.6MPa.g /576℃
	连接方式 Connecting method	对焊 Butt welding
	接管尺寸 Dimension of connecting tube	
	阀盖垫片 Valve cover gasket	
	阀门泄漏等级 Valve leaking grade	MSS SP-61标准 MSS SP-61 Standard
	阀体材料 Material of valve body	
	密封面 Sealing face	
	阀盖材料 Material of valve cover	
	阀盘材料 Material of valve disc	
	阀座材料 Material of valve base	
	盘 根 Stuffing box	
	接管材料 Material of connecting tube	
	最大开度下相对压损系数 Relative pressure loss coefficient in maximum opening	
执行机构 Executive actuator	生产厂家 Manufacturer	
	型 号 Model	
	电源提供 Electric source	380VAC/50Hz
	防护等级 Protection grade	IP67
	马达额定输出功率/电流 Motor rated output power/current	
	马达转速 Motor rotational speed	
	绝缘等级 Insulation level	
	齿轮输出转速 Gear wheel output rotational speed	
	全开/全关时间（S） Time of whole-open/whole-close	
	限位开关 Limit switch	
	扭矩开关 Torque switch	
	控制电路电源 Electric source of control line	24VDC
	手轮安装位置 Hand wheel installation location	
	可编程无源触点 programmable passive contacts	

	注：要求阀门耐冲蚀，并说明抗冲蚀的措施。 Note: The valve is required to be erosion resistant and anti-erosion measures should be explained. P=15.6MPa.g t=576℃ 连接管规格：Φ168.3 ×18.26；材质：A335 P91 阀门与管道连接方式：焊接 Connection pipe size: Φ168.3 ×18.26; Material: A335 P91
	Valves and pipe connections: Welding Connection pipe size: Φ33.4 ×4.55; Material: A335 P91
	Valves and pipe connections: Welding

注：1、MPa.g 表示表压，MPa.a 表示绝对压力。

Note: 1, MPa.g indicates gauge pressure, MPa.a represent absolute pressure.

2.1.3.2 在正常维护条件下，计及腐蚀和材料寿命后，整套阀门包括传动装置及执行机构（除易损件外）使用寿命为不小于 40 年。

2.1.3.2 Under normal maintenance condition, considering corrosion and material life, the whole set of valve including driving equipments and operators (except vulnerable parts) should have a lifetime no less than 40 years.

易损件的详细列表：

A detailed list of wearing parts:

名　称 **Name**	寿　命（小时） **Lifetime（hr）**

2.1.3.3 厂区地震基本烈度为 6 度（7 度设防），设备设计时，必须满足相关设计要求。

2.1.3.3 The earthquake intensity of factory is level VI (Set up defenses at level VII). The relevant requirements must be satisfied when the equipments are designed.

2.2 阀体技术要求 Valve body Technical specifications

2.2.1 设计压力温度等级应符合阀门清单的要求。所有阀门应符合美国国家标准协会 ANSI 规定的压力、温度等级，对接焊阀门采用 ASNI B16.34，阀门性能应保证足够的强度与刚度以承受管路的最大设计压力与温度。

2.2.1 Design pressure and design temperature should meet the valve lists requirements. All the valves should

maximum design temperature.

2.2.2 阀门的结构长度应符合 ANSI B16.10。

2.2.2 The structure of the valve length should conform ANSI B16.10.

2.2.3 截止阀门阀体与阀盖应采用自密封。

2.2.3 The valve body and cover of stop valves should be self-sealing.

2.2.4 删除

2.2.4 Delete

2.2.5 阀门操作手轮上应显示开或关旋转方向，操作盘逆时针旋转方向应为阀门打开方向。

2.2.5 The rotation direction should be indicated on the hand wheel of the valves， and anti-clockwise rotation should open the valve.

2.2.6 截止阀应有柱式的阀盘，阀盘与阀杆的连接应保证阀盘自由转动，以减少开、关时的摩擦。

2.2.6 Stop valve should equip with colonnaded valve plate, valve disc and valve handle should be well-connected to ensure free rotation, so as to reduce the friction during opening and closing.

2.2.7 截止阀应当用机械方法固定好，不用专门的工具或程序，便能不拆下阀门调整或更换阀座。

2.2.7 Globe valves should be mechanically fixed, and without special tools or procedures, it should be unable to remove the valve or adjust or replace the valve base.

2.2.8 所有阀门的清理、表面处理和油漆均应符合 SSPC 的有关标准的要求；投标方应保证阀门在运输和不超过 1 年的存放过程中不受损坏。

2.2.8 The cleaning, surface treatment, and paint of all the valves should satisfy relevant SSPC requirements. And the supplier should guarantee the valves will not be damaged during the transportation and storage period which less than one year.

2.2.9 所有截止阀，规范应完全能够满足技术数据表中要求，并要求阀门尺寸小、重量轻、启闭力矩小、关闭严密、耐冲刷、检修方便。

2.2.9 All globe valves, should be able to fully meet the requirements of the technical data sheets. And it is required that the valves should be with small dimension, light weight, small torque, and that the valves should be closed tight, erosion resistant and easily repaired.

2.2.10 阀门的设计强度按机组最大设计工况时参数考虑。阀门设计应结构紧凑、动作灵活。

2.2.10 The valve should be designed based on the parameters under extreme working condition. The structure of valve should be compact and the valve should be convenient to operate.

2.2.11 所有阀门均进行噪声计算，噪声标准是距离阀体 1 米处不超过 85 分贝，截止阀保证在设计压力下达到零泄漏。

2.2.11 Noise calculation should be conducted for every valve, and the calculation results should be provided. The standard of noise is no more than 85 dB at the point 1 meter away from the valve.

2.2.12 投标方阀门的接口要与招标方的管道接口一致，若因阀门阀体材质与招标方相连接的管道不同，则投标方应提供过渡段，使其与连接的管道接口尺寸、材质一致，以避免现场异种钢焊接。

2.2.12 The bidder valve interfaces should be consistent with the tender side pipe interface. If not, the bidder should provide transition segment to make the interface with the connected pipe consisten in size and material to avoid field dissimilar steel welding.

2.2.13 阀门的密封面均具有防冲刷，投标方在投标时详细论述。

2.2.13 The sealing surface of valves should have erosion protection; detailed description should be stated during tendering.

2.2.14 所供设备有固定铭牌。铭牌不易损坏。标志应醒目、整齐、美观。

2.2.14 Permanent plate should be provided to each equipment. The plate should be endurable, obvious and regular.

2.2.15 投标方对每个电动阀的实际开关速度加以说明。

2.2.15 The bidder should illustrate the actual switching speed for each electric valve.

2.2.16 阀门介质流动为单向或双向应注明。

2.2.16 Supplier should specify whether the valve is un-directional or bi-directional.

2.2.17 电动阀操作灵活平稳无卡涩跳动，行程控制和开度指示准确。

2.2.17 The electric valves should be operated in a flexible and steady state without jam or beat, stroke control and opening instructions should be accurate.

2.2.18 删除。

2.2.18 Delete

2.2.19 安装调试要求

2.2.19 Installation and debugging requirements

2.2.19.1 阀门安装调试期间，投标方必须及时派员到现场进行技术服务解决安装调试中的问题。

2.2.19.1 On-site service personnel of the tenderer should be sent to the site in time to solve the problems that happen during the installation and debugging period,

2.2.19.2 设备安装调试过程中，由于制造质量造成的不符合规定的偏差，必须有文字记录，由投标方处理，费用也由投标方自负。

2.2.19.2 The differences that don't satisfy the rules due to the quality of manufacture during the installation and debugging period should be written in record. The problems should be solved by the supplier and the extra expense should be paid by the supplier.

2.2.19.3 设备安装后，投标方应派人参加现场进行的分部试运及严密性试验、验收，并帮助解决试验中暴露的问题。

2.2.19.3 After installation, supplier should send personnel to attend the on-site operation, leak test, acceptance inspection, and solve the problems during the test.

2.2.20 阀门按 ANSI B16.34 标准生产；阀门坡口按电建标准加工。

2.2.20 Valves should be manufactured in accordance with ANSI B16.34, and the bevel of the valves should be processed in accordance with electric power construction standards.

2.2.21 应考虑正常运行载荷和地震载荷的共同作用所引起的变形，不会损坏它们结构的完整性。要求阀体及阀芯应有足够的强度与刚度，其安全系数对于屈服极限不少于 3。

2.2.21 The deformation caused by the combined effect of normal operating load and earthquake load should be considered. The valve body and valve plug should have enough strength and stiffness, and the safety factor

2.2.22 Each type of valve should have a set of spare parts, including packing and sealing ring.

2.2.23 阀门出厂前应对每只阀门进行强度水压试验及严密性试验，试验结果不低于标准要求。

2.2.23 Each valve should go through the hydraulic test and leak test before delivery. The test results should above the requirements of relevant standards.

2.2.24 对流动方向有要求的，阀体必须清晰标明永久性介质流向。

2.2.24 Each valve should go through the hydraulic test and leak test before delivery. The test results should above the requirements of relevant standards.

2.2.25 电动截止阀具有中间停的功能并配置有 4-20mA 行程反馈。

2.2.25 Electric globe valve should equip with intermediate stop function and potentiometer .

2.2.26 删除

2.2.26 Delete

2.2.27 材料和焊接

2.2.27 material and welding

2.2.27.1 投标方应对设备和备件的材料选择负责，应保证所有材料适合于所输送的流体。所有承压零部件材料均应符合 ASTM 相关规范的要求，非承压材料如垫片、填料等也要满足相关规定或投标方的标准。

2.2.27.1 The bidder should take resiponsible for the selection of equipments and spare parts, and promise that all the materials are suitable for the fluid to be delivered. All the materials of load-bearing components should be in consistence with the requirements of ASTM. The non-load-bearing materials such as gasket, stuffing material and so forth should also satisfy the requirements of related specifications or the bidder's standards.

2.2.27.2 建议阀门采用以下密封面：所有的阀门都应采用不锈钢阀杆和司太立合金或类似钴铬合金堆焊的阀座（包括上密封）。ANSI 600 级及以上的钢制阀门的阀座圈和阀盘应堆焊 6 号司太立合金。只采用司太立合金堆焊阀座圈时，钢制阀盘应该用 11—13%铬钢进行表面硬化处理，阀座圈也可采用整体硬质材料代替堆焊处理。对上述要求，建议投标方可推荐长期使用成熟可靠的技术方案，供招标方选取。

2.2.27.2 It is recommended to take use of the following sealing surface: All valves should be made of stainless steel stem and Stellite cobalt-chromium alloy welding or similar seat (including the seal). The seat rings and valve disc of Steel valve of ANSI 600 level and above should be bead welding with #6 Stellite. While using only stellite to bead weld seat ring, a steel valve disc should be surface hardened with 11-13% chrome steel, seat ring can also be handled with whole integrated hard surfacing materials. To the above requirements, it is recommended that the bidder propose some long-term use, mature and credible technology solutions for the tender side to select.

2.2.27.3 所有焊接都应符合相关规范或标准的要求。所有的焊接程序和焊工资格合格性应按 ASME 第 9 章。

2.2.27.3 All the welding work should satisfy the requirements of related specification and standards. The welding process and the qualification check of welding operator should refer to ASME chapter 9.

2.2.27.4 投标方应根据介质和限定的工作条件，进行材料选用并提供给招标方确认，但不能推卸选用材料的责任。

2.2.27.4 The bidder should select materials and provide to the tenderee for confirmation based on the medium and the given working condition. The bidder is responsible for material selection.

2.2.27.5 投标方在技术协议中详述阀门的阀芯、阀座、密封、结构、材料处理、防汽水冲蚀等方面的特点。

2.2.27.5 The bidder should describe valve spool, valve seats, seals, structure, material handling, anti-erosion and other characteristics in detail in the technical agreement.

2.2.27.6 堆焊工艺及堆焊层部件的测试应符合 ASME IX标准。

2.2.27.6 Test on welding technology and welding layer components should comply with ASME IX standards.

2.2.28 截止阀在关闭状态下能够承受一侧温度 576℃，压力 15.6MPa，另一侧为 10℃，常压的情况，不影响阀门正常运行和寿命。

2.2.28 Globe valve can bear one side is 576℃, 15.6MPa and the other side is 10℃,0.1MPa , the valve will not distortion and lock, which is not effect normal operation and life of gate valve.

2.3 电动执行机构要求

2.3 Requirements on electric actuators

2.3.1 当执行机构供电电源达最低电压限值时，所选用的电动操作装置在最大不平衡压力下和规定行程时间内，应当能在开启或关闭方向上良好地操作阀门(启动、加速、运行和停止)。

2.3.1 When the electric power supply of the executive actuator reaches the lowest voltage limit, the selected electric operation device, in the maximum unbalanced pressure and within the defined time, it should be able to operate(start, acceleration, running and stopping) the valve well in the open or closed direction

2.3.2 投标方提供的电动执行机构应为智能型机电一体化产品，执行机构本体应配置手轮和就地/远方切换开关。手轮的安装布置应有利于现场人员的调试与维护。在电动操作脱开时，无论电机是转动或是静止状态，都能安全的合至手轮操作位置。

2.3.2 The bidder should provide intelligent integrated electromechanical products for the electric actuator, Actuator body should be configured with handwheel and local / remote switch. Hand wheel mounting arrangement should be conducive to on-site commissioning and maintenance personnel. While the electric operation disengages, regardless of the motor is in rotating or stationary state, it should be secured to safely move to handwheel operation position.

2.3.3 三相交流异步电动机应具有良好的伺服特性，即应具有高的启动转矩倍数，低的启动电流倍数和小的转动惯量。并应具有电机的过热保护和断相保护功能。

2.3.3 Three-phase AC induction motor should have a good servo characteristic, which should have a high starting torque multiple, low start-up current ratio and a small moment of inertia. And the motor should have functions of overheating protection and phase failure protection.

2.3.4 电动执行机构其传动部件要有足够的刚度和强度，要求操作机构全行程操作平稳无卡涩、无跳动现象，调整精度高，动作准确。

2.3.4 Electric Actuator and its transmission components should have sufficient stiffness and strength, which requires the actuator to operate smoothly without jam or jumps, and the adjustment should have high precision, the action should be accurat.

2.3.5 开度限位装置可靠，保证无过开过关现象，开度标志明显，开关无空程，并保证开度指示与阀板

开度位置一致。

2.3.5 The opening limit device should be reliable to ensure no over-open or over-closed phenomenon. The opening extent marks should be clear, and the switch should have no back play. And it should be ensured that opening direction confirm to the valve plate opening position.

2.3.6 所选用的电动执行装置，应控制安全可靠，可就地操作也可远控，并能满足上位DCS控制系统的要求。

2.3.6 The selected electric actuators should be controlled with safety and reliability, it should be controlled both on-site and remotely, as well as meet the requirements of the host DCS control system.

2.3.7 电动执行机构应具有可靠的电磁制动功能，以防止电动机惰走，投标方应详细说明采用的制动方法及性能。

2.3.7 The electric actuators should have a reliable electromagnetic brake function to prevent the motor idling, bidders should describe the braking methods and performance in detail.

2.3.8 电动执行机构应具有结构简单、性能可靠的双向过力矩保护装置，确保电动阀门的关闭严密和保护。

2.3.8 The electric actuators should have a bi-directional over-torque protection device with simple structure and reliable performance to ensure that the electric valve could close tightly with protection.

2.3.9 删除。

2.3.9 Delete.

2.3.10 在电动执行机构本体应装有防潮加热器，以防止汽水凝结。

2.3.10 In the electric actuator body, anti-sweat heater should be equipped to prevent steam from condensating.

2.3.11 所设计的驱动机构应当能在扭矩开关失灵时承受最大扭矩而不会损坏。

2.3.11 The drive mechanism should be designed to be able to withstand the torque switch failure maximum torque without damage.

2.3.12 开关型电动执行机构本体应配有开、关、停按钮，并有相应的位置指示，以实现就地开、关、停操作。

2.3.12 The switch-type electric actuator body should be equipped with open, close and stop button, as well as a corresponding position indicator to achieve the on-site open, close and stop operation.

2.3.13 所配供的电动执行机构应为一体化产品，即电动执行机构能直接接受控制系统的开、关、停指令（干接点）信号，并能将阀门状态信号全开、全关、故障、就地/远方允许信号（干接点，并至少备用2副可编程触点）直接输出至控制系统；接点容量不小于230VAC、5A或220VDC、3A。

2.3.13 The provided electric actuators should be integrated products, that can directly accept on and off, stop command (dry contact) signals from electric actuator control system, and status signals of valve fully open, fully closed , failure, local / remote enable signal (dry contact，at least 2 pairs of programmable contacts shall be reserved) output could be directly transported to the control system; and the contact capacity should be not less than 230VAC, 5A or 220VDC, 3A.

2.3.14 阀门的传动装置应具有足够的力矩与刚度以保证承受2倍的过力矩而不产生永久变形和破坏。

2.3.14 The valve drive device should have sufficient rigidity and torque to ensure that it could withstand 2 times over-torque without permanent deformation or damage.

2.3.15 电动执行机构的选择应按照所有运行工况下所需的最大力矩进行选取，并留有适当的余度（至少为 30%）。

2.3.15 The selection of electric actuators should be in accordance with the desired maximum torque of all operating conditions plus an appropriate margin (at least 30%).

2.3.16 人工操作手轮最大作用力为_____N，手轮轴的最大作用力矩为 _____N.m。

2.3.16 The maximum force of manual handwheel is N, and the maximum torque of the hand wheel is Nm.

2.3.17 电动执行机构供电电源最高_____VAC，最低为 _____VAC。

2.3.17 The highest electric actuator power supply is VAC, and the minimum is VAC.

2.3.18 阀门电动装置的电源为 380/220VAC 三相四线制，电动执行机构控制回路电源等级为 24VDC。

2.3.18 The power supply of valve electric device is 380/220VAC three-phase four-wire system, and the electric actuator control circuit power rating is 24VDC.

2.3.19 电动执行机构的安装，应能避免环境温度过高造成对执行机构内部电气元器件的损坏。必要时可配供就地箱，离开阀体安装。

2.3.19 The installation of actuator should be able to avoid damaging internal electrical components from excessive ambient temperatures. If necessary, in-place box could be equipped for off-valve installation.

2.3.20 开关型电动执行机构可输入的信号：

3 个开关量指令信号（开、关、停，均为无源接点）

2.3.20 input signals for switch-type electric actuator:

3 switch command signal (open, close, stop, both passive contact)

2.3.21 开关型电动执行机构可输出的信号：

2.3.21 output signals for switch-type electric actuator:

1 路 4～20 mA 阀位反馈信号

4 个状态反馈开关量信号（如全开、全关位置，综合故障、就地/远方控制状态等）

1 channel 4 ~ 20 mA valve position feedback signal

4 state feedback binary signals (such as fully open, fully closed position, comprehensive fault, local / remote control status, etc.)

2.3.22 工作环境条件

·环境温度：

电动执行机构： －20℃～＋80℃

·相对湿度：

电动执行机构： ＜90%

2.3.22 working conditions

- Ambient temperature:

Electric actuators: -20 ℃ ~ +80 ℃

- Relative humidity:

Electric actuator: <90%

2.3.23 电源

·频率： 50Hz±1%

·电源电压

三相四线：380V±10%（投标方提供的电动执行机构需要其它电压等级规格的电源时，由投标方自行解决）

2.3.23 Power

• Frequency: 50Hz ± 1%

• Power supply voltage

Three-phase four-wire: 380V ± 10% (if the electric actuators provided by the bidder side need other power supply voltage level specifications, it should be resolved by the bidder)

2.3.24 开关型电动执行机构主要技术指标：

·基本误差： ≤±1.0%

·回差： ≤±1.0%

·启动特性：电源电压降至下极限值时，执行机构能正常启动。

·绝缘电阻

所有载流部分与外壳间的绝缘电阻不低于 20MΩ

·介电试验

试验标准不低于《电站阀门电动执行机构》等相关规程规定。

2.3.24 main technical indicators for switch-type electric actuator:

• basic error: ≤ ± 1.0%

• Backlash: ≤ ± 1.0%

• Startup characteristics: while the supply voltage drops to the limit minimum value, the actuator can be started normally.

• Insulation Resistance

All current-carrying parts and the insulation resistance between the shell should be no less than 20MΩ

• dielectric test

Test standard should be no less than the requirements of "power station valve actuator" and other relevant rule.

2.3.25 外壳防护等级不低于 IP67。

2.3.25 The enclosure protection rating should be no less than IP67.

2.3.26 位置变送器：

·输出电流信号： 4～20mADC

·供电电压： 24VDCDC

·负载电阻： ≥650Ω

·线性误差： 0.5%

2.3.26 Position Transmitter:

• Output current signal: 4 ~ 20mADC

- Supply voltage: 24VDCDC
- Load resistance: ≥ 650Ω
- Linearity error: 0.5%

2.3.27 环境温度的影响

环境温度在 3.2.1 条规定范围内，每变化 10℃时输出行程变化应不大于额定行程的 0.75%。

2.3.27 Influence of ambient temperature

Ambient temperature within the provisions of Article 3.2.1, while it changes by 10 ℃, the itinerary output changes should not exceed 0.75% of the rated stroke.

2.3.28 外观

金属表面涂镀层、面板及铭牌均应光滑平整、紧固件不得松动，可动部件应灵活可靠。

2.3.28 Appearance

Metal surface coating, panels and plates should be smooth, fasteners should not be loose, and movable parts should be flexible and reliable.

3. 标准和规范 Standards and Codes

3.1 设备有关标准及规范 Relevant standards and codes of equipments

ASNT 标准	美国无损检测协会标准
ASNT Standard	Standards of American Society for Nondestructive Testing
ANSI	美国国家标准
ANSI	American national standards institute
ASTM 标准	美国材料试验协会标准
ASTM standards	Standards of American Society for Testing Materials
MSS 标准	阀门和管件工业制造商标准化协会标准
MSS standard	Industrial valves and pipe fittings manufacturer Standardization Association
MSS SP-61	钢制阀门的水压试验
MSS SP-61	Pressure Testing of Steel Valves
API598	阀门的检查与试验
API598	Valve inspection and testing
ASME B16.34	法兰、螺纹和焊连接的阀门
ASME B16.34	Valves flanged, threaded and welding end
HIS	水利协会标准
HIS	Hydraulic Institute Standards
SSPC 标准	钢结构油漆协会标准
SSPC Standards	Standard of Steel Structures Painting Association
DL/T 641-2015	《电站阀门执行机构》

"Actuators for power plant valves"

GB/T 28270-2012 《智能型阀门电动装置》

"Intelligent valve electric actuator"

GB 30439.8-2014 《工业自动化产品安全要求 第 8 部分：电动执行机构的安全要求》

"Safety requirements for industrial automation products - Part 8: Safety requirements for electrical actuator"

DL/T 5190.4-2012 《 电力建设施工技术规范第 4 部分热工仪表及控制装置》

"Technical specification for thermal power erection and construction Part 4: instrumentation and control"

GB/T 985.1-2008 《气焊、焊条电弧焊、气体保护焊和高能束焊的推荐坡口》

"Recommended joint preparation for gas welding, manual metal arc welding, gas-shield arc welding and beam welding"

DL/T 586-2008 《电力设备监造技术导则》

"The technical guide of supervision for manufacturing equipment of electric power"

3.2 设备符合相应的工业设备抗震鉴定标准。设备能承受 1.3.1.3 节中的所提供的地震数据。

3.2 The equipments should meet the earthquake proof standard of industrial equipment inspection, and could withstand the power of earthquake whose data listed in section 1.3.1.3.

3.3 上述标准和规定仅提出了基本的技术要求，投标方在投标时提供详细的阀门设计、制造、验收标准清单。

3.3 The above standards and codes only list the basic technical requirements. The bidder should provide detailed valve design, manufacture, and acceptance criteria list during the tendering.

3.4 从订货之日起至投标方开始投料之前的这段时间内，投标方应执行本技术规格书所列标准，有不一致时，按较高标准执行。如果因标准、规程发生修改或变化，招标方有权提出补充要求，投标方满足并遵守这些要求。

3.4 The supplier should follow the standard listed in the technical specification from the booking day to the batch charging day. The stricter standard should be conformed when there are some discrepancies. The tenderee has the right to raise the complementary requirements and the supplier should satisfy and obey with these requirements provided, when the standards or specifications are modified or changed.

3.5 投标方在开始投料制造之前，向招标方提供一份执行 GB/T19000 或 ISO9000 系列标准的质量管理和质量保证书以及准备正式使用的有关规范与标准的目录清单。

3.5 A quality management and guarantee of quality following series code of GB/T19000 or ISO9000 should be supplied to the tenderee, along with the inventory of relevant specification and standard to be in formal use, by the supplier before batch charging and manufacturing.

3.6 对于采用引进技术产品的设备，在采用上述标准的同时，还采用国外有关标准。但不低于相应的中国国家标准。

3.6 With regard to equipments imported, the related foreign standards are also carried out along with the above codes, and should be stricter than corresponding Chinese state codes.

3.7 合同签订后 2 个月，投标方提出合同设备的设计、制造、检验/试验、装配、安装、调试、试运、验收、试验、运行和维护等标准清单给招标方 ，供招标方确认。

3.7 The design, production, inspection/trial, assembly, installation, test running, acceptance check, testing, running and maintenance standards inventory of the contract equipments should be provided to the tenderee to

be confirmed by the supplier 2 months after the contract is signed.

4. 设备质保期 Guarantee Period of Equipments

投标方所供货的阀门质保期为 24 个月，自设备投入运行后开始计。

The guarantee period of the valves that provided by the bidder is 24 months, accounting from the operation day.

在设备质保期内，任何由于设备本身质量引起的缺陷，投标方在收到招标方的正式书面通知后，应立即安排合格的技术人员到现场处理，所有相关费用要自理。

The supplier should arrange qualified technicians to disposal the problems on field immediately right after receiving the formal written notice from the purchaser, during the guarantee period of equipments. The related fee should be paid by the supplier.

5. 供货范围和交货进度 Scope of Supply and Delivery Schedule

5.1 供货范围 Scope of supply

5.1.1 一般要求

5.1.1 General requirements

5.1.1.1 本规格书规定了合同设备的供货范围。投标方保证提供设备为全新的、先进的、成熟的、完整的和安全可靠的，且设备的技术经济性能符合本规格书的要求。

5.1.1.1 This specification defines the scope of supply of the equipments listed in the contract. The supplier guarantee to supply new, advanced, mature, complete, safe and reliable equipments, and the technical and economic performance of these equipments should meet the requirements of this specification.

5.1.1.2 投标方应提供详细供货清单，清单中依次说明型号、数量、产地、生产厂家等内容，所有外购件需得到招标方的确认。对于属于整套设备运行和施工所必需的部件，如果本合同规格书未列出和/或数量不足，投标方仍需在执行合同时补足。

5.1.1.2 The supplier should furnish the detailed supply list, showing the contents of type, amount, producing area, producing factory etc on it. All the outsourcing components should be confirmed by the tenderee. Regarding to necessary components of the facility set for operation and construction, which is not listed in this contract specification and/or not enough, the supplier should also complement it when implementing the contract.

5.1.1.3 投标方提供所有安装和检修所需专用工具和消耗材料等，并提供详细供货清单。

5.1.1.3 The supplier should furnish all the special tools and consuming materials which are necessary for the installation and maintenance, and the detailed supply list is also needed.

5.1.1.4 提供随机备品备件和三年运行所需的备品备件，并提供详细清单。

5.1.1.4 The supplier should furnish spare parts along with the equipments and for the demand of 3 years operation, also the detailed list is needed.

5.1.1.5 删除

5.1.1.5 Delete

5.1.1.6 投标方提供的技术资料清单见目录 7。

5.1.1.6 The technical data list provided from the supplier is shown in the Section 7.

5.1.1.7 设备投运后 24 个月内出现产品质量问题，投标方在接到招标方通知后 24 小时内到达现场免费修理或更换。

5.1.1.7 The supplier should arrive at the field in 24 hours for free repairing or changing after receiving the notice of the tenderee, if the products quality problems take place in 24 months after the equipments putting into operation.

5.1.1.8 对所有外购件，投标方均应提供三家的供应潜商，并提供分项报价，最高价计入合同总价，设备的最终选型由招标方确认。

5.1.1.8 The supplier should provide three potential supplier and analysis quoted price for all the outsourcing components. The highest price is counted into the total contract price. The final types of the equipments should be confirmed by the terderee.

5.1.1.9 投标方供货范围不限于： 阀门本体、电动执行机等。

5.1.1.9 The scope of supply of the bidder is not limited to: the valve body, motor-driven operator and so forth

5.1.1.10 投标方应负责本体范围内电气接线、控制接线设计。

5.1.1.10 The bidder should be responsible for the design of electrical wiring and control wiring in body scope area.

5.1.1.11 投标方配供的所有仪控设备均应能防盐雾腐蚀，其 IP 防护等级至少满足 IP67 防护等级。

5.1.1.11 All the instrumental control equipments provided by the bidder should be corrosion-proof for salt-fog. The IP prevention grade should be at least IP 67.

5.1.1.12 投标方确保供货范围完整，应满足招标方对安装、调试、运行和设备性能的要求，并提供保证设备安装、调试、投运相关的技术服务和配合。在技术规格中涉及的供货要求也作为本供货范围的补充，若在安装、调试、运行中发现缺项，投标方应补充供货。本工程共一台机组，共需要 4 台阀门。

5.1.1.12 The bidder ensures that the scope of supply is complete, and all the requirements on installation, debugging, operation and equipment properties from the tenderee are satisfied. The bidder should provide technical services and cooperate with the tenderee during equipment installation, debugging and operation. The requirements of supply referred in this specification could also be used as a supplement of the scope of supply. If there is lack of items found during installation, debugging or operation, the bidder should make up. There is one set in this project, and 4valves are needed.

5.1.2 供货清单（不限于此，投标方细化）

5.1.2 Supply list (not limited to this, the detail will be suggested by the supplier)

编号 No.	名称 Name	规格型号 Specification model	单位 Unit	数量 Qty	产地 Habitat	生产厂家 Manufacturer	备注 Remarks
1	1#反应堆主汽对外排汽管道电动截止阀 1# Reactor main steam exhaust piping electric globe valve		只	2			

编号 No.	名称 Name	规格型号 Specification model	单位 Unit	数量 Qty	产地 Habitat	生产厂家 Manufacturer	备注 Remarks
2	2#反应堆主汽对外排汽管道电动截止阀 2# Reactor main steam exhaust piping electric globe valve		只	2			
3	1#反应堆主汽对外排汽管道电动截止阀电动执行机构 Electric actuators of 1# Reactor main steam exhaust piping electric globe valve		只	2			
4	2#反应堆主汽对外排汽管道电动截止阀电动执行机构 Electric actuators of 2# Reactor main steam exhaust piping electric globe valve		只	2			

5.1.3 备品备件供货范围

5.1.4 Supply scope of spare parts and spare components

序号 Item	名称 Name	规格和型号 Specification and type	单位 Unit	数量 Quantity	产地 Manufacturing location	生产厂家 Manufactory	价格 Price	备注 Remarks
1								
2								
3								

5.1.4 运行三年用备品备件供货范围

5.1.4 Supply scope of spare parts and components for the demand of 3 years operation

序号 Item	名称 Name	规格和型号 Specification and type	单位 Unit	数量 Quantity	产地 Manufacturing location	生产厂家 Manufactory	价格 Price	备注 Remarks

5.1.5 专用工具供货范围

5.1.5 Supply scope of special utilities

序号 Item	名称 Name	规格和型号 Specification and type	单位 Unit	数量 Quantity	产地 Manufacturing location	生产厂家 Manufactory	价格 Price	备注 Remarks

5.2 交货进度 Delivery schedule

序号 Item	设备/部件名称、型号 Reference, type of equipment/component	交货时间 Delivery time	交货地点及交货方式 Delivery location and way
1	截止阀 Globe valve		交货地点：华能山东石岛湾核电厂高温气冷堆核电站示范工程施工现场。 交货方式： Delivery location: the construction field of the demonstration project of Huaneng Shidao bay HTGR power plant Delivery way:
	图纸 Drawings		
	主设备 Main equipments		

说明：

1）备品备件及专用工具随设备同时交货。

2）投标方应满足工程进度的要求，招标方根据需要经双方协商可以调整交货进度。

Note:

1) The spare parts and spare components and special utilities be delivered with the equipment simultaneously.

2) Supplier should meet the requirement of the project schedule. The tenderee could adjust the delivery schedule through negotiation of both sides if it is needed.

6. 试验、检查和验收 Test, Inspection and Acceptance

6.1 本规范书用于合同执行期间对投标方所提供的设备（包括对分包外购设备）进行检验、监造和性能验收试验，确保投标方所提供的设备符合本规格规定的要求。

6.1 This specification is for the inspection, supervision and acceptance functional test of equipments supplied by the supplier, and ensure these meet the requirements of the specification in the contract period.

6.2 投标方应在本合同生效后按招标方的要求及时提供与本合同设备有关的监造、检验、性能验收试验标准。有关标准应符合本规范的规定。

6.2 Supplier should provide supervision, inspection and acceptance functional test codes related to the contract according to requirements of purchaser timely after the contract comes into effect. The relevant standards should be in accordance with this specification.

6.3 设备监造 manufacture supervision of equipments

6.3.1 监造依据

6.3.1 Manufacture supervision conference

根据本合同和电力工业部、机械工业部文件电办（1995)37号《大型电力设备质量监造暂行规定》、

《国家电力公司电力设备监造实施办法》、DL/T 586-2008《电力设备监造技术导则》和《驻大型电力设备制造厂总代表组工作条例》的规定，以及国家有关规定。

This specification, and "*Tentative specification for quality and supervision of large power equipments*" published by Ministry of power industry and Ministry of industry (1995 document No.37), and "Implementation measures of electric equipments supervision for state electric companies", and DL/T 586-2008 "The technical guide of supervision for manufacturing equipment of electric power" and "*Action guide for representative group stationed at large power equipments manufacturer*" and relevant national specifications should be conformed.

6.3.2 监造方式

6.3.2 Manufacture supervision method

文件见证、现场见证和停工待检，即 R 点、W 点、H 点。

Report point, witness point and hold point, refer to R point, W point and H point.

R 点（文件见证点）：投标方提供检验或试验记录或报告的项目，即文件见证。

R point (report point): the project that supplier provides the inspection or test record or report, namely report point.

W 点（现场见证点）：招标方在制造现场参加的检验或试验项目，检验或试验后投标方提供检验或试验记录。如果招标方代表没有在双方规定的时间到场，投标方可以实施这一步骤。招标方代表有权事后了解、查阅、复制检查试验记录和结果。

W point (witness point): the inspection or test project which purchaser engage in the producing field, supplier should provide the inspection or test record after it. Supplier may perform this procedure if the purchaser representative is not present at the time and date specified by the two sides. The purchaser representative has the right to know, inspect and copy the inspection and test records and results.

H 点（停工待检点）：投标方在进行至该点时必须停工等待招标方参加的检验或试验项目，检验或试验后投标方提供检验或试验记录。没有招标方代表出席，投标方不得执行，不得自行转入下道工序，投标方应与招标方联系商定更改见证日期，如果更改时间后，招标方仍未按时到达，则 H 点自动转为 R 点。

H point (hold point): An inspection or test project with which supplier must stop to wait the paticipation of purchaser. Supplier provides inspection or test records after it. Supplier may not carry out or proceed with work beyond the hold point without the participation of the purchaser representative. Supplier should contact purchaser to negotiate and modify the witness date. H point will transform into R point if supplier still does not arrive on schedule after the modification.

文件见证点、现场见证点和停工待检点的检验或试验记录、报告等资料应在该项操作完成后 3 个工作日内向招标方提供。每次监造内容完成后，投标方和监造代表均须在见证表上履行签字手续。投标方复印 3 份，交监造代表 1 份。

The inspection or test record or report data of report point, witness point and hold point should be provided to purchaser within 3 working days after this operation. Both Supplier and the manufacture supervision representative should perform the signature procedure on the witness sheet. Supplier should make 3 copies, and give the manufacture supervision representative 1 copy.

投标方应在招标方实施现场见证和停工待检见证前2个月向招标方提交适用和有效的检查试验大纲和检查监督程序。

In the case of tests subject to witness and hold points for test, Supplier should submit to purchaser the applicable and effective inspection test outline and inspection surveillance procedure 2 months in advance of the tests.

W点和H点的检查和试验可依下列情况顺延：招标方收到投标方的正式通知后5天内，招标方要求该检查和试验推迟2个工作日。特殊情况下，该检查和试验可要求再推迟4个工作日。

In the case of "witness and hold points", the inspection and test may be deferred in the following cases: If within 5 days of receiving the Supplier's formal notice, the Purchaser's representative requests the inspection and test to be deferred by up to 2 working days. In exceptional circumstances the inspection and test may be deferred by up to another further 4 working days.

W或H点通知单至少包含以下信息:

(1) 项目名称

(2) 质量计划名称和编号

(3) 作业名称及在质量计划中的作业序号

(4) 采购合同/订单号

(5) 设备名称或代码

(6) 履行地点

(7) 联系人、日期和时间

The following information should be provided on the notice of witness and hold points:

(1) Project name,

(2) Quality plan name and number,

(3) Type of operation and the sequence number in the quality plan,

(4) Purchase contract /order number,

(5) Equipment identifications or codes,

(6) Place of performance,

(7) Contact, date and time

6.3.3 监造内容(投标方在投标书中补充细化，不仅限与此，具体内容由招标方确定。)

6.3.3 Manufacture supervision content (not limited to following, supplier should complement and detail it; concrete contents should be confirmed by purchaser.)

序号 Item	监造内容 Supervision content	监造方式 Supervision Method			
		H	W	R	数量 Quantity
1	阀体主体化验			√	
2	水压试验 Hydraulic test			√	

序号 Item	监造内容 Supervision content	监造方式 Supervision Method			
		H	W	R	数量 Quantity
3	密封试验 Leakage test			√	
4	整体功能试验 Integrity function test			√	

6.3.4 对投标方配合监造的要求：

6.3.4 Requirements to supplier of manufacture supervision cooperation:

投标方为招标方提供以下方便：

Supplier should provide purchaser conveniences as following:

（1）提前 10 天将设备监造项目及检验时间通知招标方监造代表和招标方，监造项目和方式由投标方、招标方监造代表、招标方三方协商确定；

(1) Supplier should inform purchaser and his representative the equipment manufacture supervision project and inspection time 30 days in advance. The manufacture supervision project and way should be confirmed by supplier, purchaser and his representative.

（2）招标方监造代表和招标方代表有权通过投标方有关部门查（借）阅合同与本合同设备有关的标准、图纸、资料、工艺及检验记录（包括之间检验记录），如招标方认为有必要复印，投标方提供方便。

(2) Purchaser and his representative have the right to consult (borrow) the contract and relevant standards, drawings datum, craft and testing records (including inter-testing records). Supplier should provide convenience if purchaser considers it necessary to copy that, all expenses involved should be for the Supplier's account.

（3）招标方人员在监造过程中如发现设备和材料缺陷或不符合规定的标准要求时，招标方有权提出意见，投标方采取相应改进措施，以保证设备质量。无论招标方是否要求和知道，投标方均主动及时向招标方提供合同设备制造过程中出现的较大的质量缺陷和问题，不得隐瞒。在招标方不知道的情况下投标方不得擅自处理。

(3) If the manufacture supervision reveals that the equipment or material has defects or does not comply with the technical specification, Purchaser or his representative should put forward their opinion, and Supplier should take all necessary corrective measures required to ensure the equipment quality. Supplier should provide the great quality defeats and problems arising in the process of contract equipment manufacture to purchaser initiatively and timely and not keep it back whether purchaser requires or knows. Supplier should not deal with it without authorization in the situation of purchaser not knowing that.

6.4 工厂检验 Factory inspection

工厂检验是质量控制的一个重要组成部分。投标方须严格进行厂内各生产环节的检验和试验。投标方提供的合同设备须签发质量证明、检验记录和测试报告，并且作为交货时质量证明文件的组成部分。

Factory inspection is an important component of the quality control. The supplier should strictly do the inspection and test in the each process of production. The supplier should provide quality certificate, inspection records and test report of contract related equipments and these will be part of the quality documents in delivery.

检验的范围包括原材料和元器件的进厂，部件的加工、组装、试验至出厂试验。

The range of the checking includes raw materials, incoming inspection of cells, and processing, assembling, testing and testing of leaving factory of components.

投标方检验的结果要满足技术规格书的要求，如有不符之处或达不到标准要求，投标方要采取措施处理直至满足要求，同时向招标方提交不一致性报告。投标方发生重大质量问题时应将情况及时通知招标方。

The test results should meet to the technical requirements of this technical specification. If there are discrepancies or something cannot reach the standard requests, suppliers should take measures to meet the demands, and submitted inconsistency report to the tenderee. When some serious quality problem occurs, the supplier should send word to the tenderee in time.

工厂检验的所有费用包括在合同总价之中。

The costs of factory inspection are included in the total contract price.

工厂检验的内容：（必须包括但不限于）

(1) 材料试验

(2) 材料检查

(3) 工厂试验

The contents of factory inspection include but are not limited to:

(1) Material test;

(2) Material check;

(3) Factory inspection.

投标方应对截止阀设备及附属设备进行必要的检查和试验，以保证整个设计、制造符合合同（含技术协议书，下同）中规定的要求，一些重要的检查和试验，招标方有权派代表参加。压力容器设备制造前投标方应提供招标方一份书面报告说明所要进行的检查项目、试验项目以及制造程序，以供招标方选择确定可能要工厂监督的检查和试验项目以及要监造的项目，招标方将在设备制造前通知投标方需工厂监督的试验项目和监造项目，投标方至少应在试验进行前十天通知招标方。

The bidder should check and test the globe valves as well as the auxiliary equipments of them, to make sure that the whole process of design and manufacturing meet the requirements of rules (including the technical specification, same way in the following). And the tenderee reserve the rights to send representatives to some important check and test activities. Before the pressure vessels are manufactured, the bidder should provide report in writing format to illustrate the checking project, the testing project and the manufacturing process, so that the tenderee could make sure the potential projects to be inspected or checked. The tenderee will inform the bidder which projects should be inspected and tested before the equipments are about to be manufactured. And the bidder should acknowledge the tenderee at least ten days beforehand.

设备制造过程中及最终检查、试验资料，投标方应在交货前提交给招标方。

The bidder should provide the files of final inspection and test of the equipment manufacturing process to the tenderee before delivery.

必须进行的检查和试验项目应能证明：

设备是否符合应遵循的标准。

各项技术指标是否能达到合同的规定值。

检查和试验方法及判定标准将在合同中规定，如产品质量和性能与合同规定不符，投标方负责处理。

The inspection and test projects that are compulsory should be able to prove:

Whether the equipments are in consistence with the standards;

Whether the technical data could reach the defined value in the contract;

The inspection and test methods and decision standard would be defined in the contract. If the quality and performance of the product are not in consistence with the contract, the bidder is responsible to deal with it.

6.5 性能验收试验 Acceptance functional test

性能验收试验的目的为了检验合同设备的所有性能是否符合技术规格书的要求。

The sake of the acceptance functional test is to check that all the performance of contract equipments meet the requirements of this technical specification.

性能验收试验的地点为招标方现场。

The sake of the acceptance functional test is to check that all the performance of contract equipments meet the requirements of this technical specification.

性能试验的时间:性能试验一般在机组 168 小时试运之后半年内进行，具体试验时间由招标方投标方共同确定；

The sake of the acceptance functional test is to check that all the performance of contract equipments meet the requirements of this technical specification.

性能验收试验由招标方主持，投标方参加，由招标方和投标方双方认可的有资质的测试单位完成。试验大纲由招标方提供，与投标方讨论后确定。

The acceptance functional test is presided by purchaser, with supplier participating it, and it should be accomplished by qualified testing division approved by both sides. The experiment outline is offered by purchaser, and decided by mutual agreement between both parties.

性能验收试验的内容

1）阀门设计压力、温度；

2）全开时间；

3）其他性能保证值见 2.1.3 节。

The contents of the performance acceptance test:

1) The design pressure and temperature of the valves;

2) The processing time for the valves to open;

3) Other guaranteed performance value should refer to chapter 2.1.3.

性能验收试验报告以招标方为主编写，投标方参加，共同签章确认结论。如双方对试验的结果有不一致意见，双方协商解决；如仍不能达成一致，则请有权威的第三方进行鉴定。

Report of the acceptance functional test should be edited mainly by purchaser, participated by supplier, and the conclusion be confirmed by mutual signature. If the two parties disagree about the result, they can negotiate it. If agreement still cannot be achieved, the result should be submitted to the third party with authority for coordination.

进行性能验收试验时，一方接到另一方试验通知而不派人参加试验，则被视为对验收试验结果的同意，并进行确认签盖章。

If one side does not arrange human for the test after receiving the notice of the other side in the acceptance functional test, it will be considered to accept the test result and should sign to confirm it.

6.5.1 材料试验：材料根据标准试验，提供招标方非破坏性试验资料。

6.5.1 Material test: Material should be tested according to code, and non-destruction test material is provided.

6.5.2 阀门制造前投标方提供招标方一份书面报告说明所要进行的检查项目、试验项目以及制造程序，以供招标方选择确定可能要工厂监督的检查和试验项目以及要监造的项目，招标方将在设备制造前通知投标方需工厂监督的试验项目和监造项目，投标方至少在试验进行前十天通知招标方。

6.5.2 Before the valves are manufactured, the bidder should provide a report in writing format to the tenderee to illustrate the inspection projects, test projects and manufacturing process. So that the tenderee could decide potential projects of factory inspection and test projects. The tenderee should inform the bidder test projects and inspection projects before the equipments are manufactured. The bidder should notice the tenderee ten days before the test.

6.5.3 投标方提供下列文件给招标方：

(1) 证明供应的所有设备和材料完全符合本技术协议的说明书

(2) 供需双方一致通过的验收文件

(3) 材料试验报告及材料鉴定合格证

(4) 非破坏性试验报告

(5) 水压试验结果报告

(6) 产品合格证书

6.5.3 The bidder should provide the following files to the tenderee:

(1) Instructions which prove that all equipments and materials are totally in consistence with the technical specification.

(2) Acceptance documents which are approved by both the tenderee and the bidder.

(3) Material test reports and material certificate of qualification.

(4) Non-destructive test reports.

(5) Water pressure test results report.

(6) Certificate of qualification of the products.

6.5.4 性能验收试验所需的测点、一次元件和就地仪表的装设应由投标方提供，参加方配合。投标方也要提供试验所需的技术配合和人员配合。

6.5.4 The measuring point, primary component and local panel for the performance acceptance tests should be

provided by the supplier, and cooperated by the tenderee. The supplier should provide the needed technology and personnel cooperation for the test.

6.5.5 性能验收试验的费用

6.5.5 Cost of acceptance functional test

第 6.5.4 款和投标方试验的配合等费用已在合同总价内。其它费用，如试验在现场进行，由招标方承担；在投标方工厂进行，则已包含于合同总价之中。

Cost of item 6.5.4 in this section and cooperation of supplier's test has been counted in the total contract price. Other costs, such as for test in the field, should be paid by purchaser, while in the supplier's factory, then in the total contract price.

7. 文件和技术资料 Technical Documents

7.1 一般要求 General requirements

投标方提供的技术文件及图纸能满足总体设计、设备安装、现场调试运行和维护的需要，技术文件及图纸上标注"华能山东石岛湾核电厂高温气冷堆核电站示范工程专用"。

The technical files and drawings provided by the supplier should meet the requirements of general design, installation, on-site commissioning and maintenance and be marked as "the demonstration project of Huaneng Shidao bay HTGR power plant-specific".

投标方提供的资料应使用国家法定单位制即国际单位制，语言为中文。在提供图纸的同时提供 AUTOCAD 2004 电子版文件，图形文件应按比例绘制。文字说明软件采用 Word 2003，表格清单为 Excel 2003 版格式或 Word 2003。

All documentation provided by the supplier should use the national legal system of units, i.e. international system of units and Chinese language. In the provision of drawings, AUTOCAD 2004 electronic version should also be provided and graphic files should be drawn to scale. Word 2003 is used as Text description software and Excel 2003 or Word 2003 is used for list of tables.

资料的组织结构清晰、逻辑性强。资料内容要正确、准确、一致、清晰完整，满足工程要求。

The organizational structure of the information should be clear and logical. The content should be correct, accurate, consistent, clear and complete to meet the engineering requirements.

投标方资料的提交应及时、充分，满足工程进度要求。

The supplier should provide information timely and adequate to meet the progress requirements.

投标方提供的技术资料需满足从工程设计阶段，设备监造检验，施工，调试试运、性能验收试验和运行维护等四个方面。投标方须满足以上四个方面的具体要求。

The technical information provided by the supplier should meet the engineering design stage, equipment inspection and supervision, construction, commissioning trial run, performance acceptance tests and operation and maintenance. The supplier must meet the specific requirements of the above four aspects.

对于其它工程所必需的文件和资料但未列入技术规格书技术资料清单，投标方须及时免费提供。

For other necessary documents and information which are not included in the list of technical information, the supplier should provide these promptly and free of charge.

投标方提供的技术资料(施工、调试、竣工图及运行维护手册等)为每台设备 12 套。

Technical information provided by the supplier (construction, commissioning, as-built drawings and operation and maintenance manuals, etc.) should be 12 sets for each equipment.

投标方在配合工程设计阶段每套设备应提供的技术资料为 12 套。

The supplier should provide 12 sets of technical information for each equipment during engineering design stage.

资料应注明"华能山东石岛湾核电厂高温气冷堆核电站示范工程专用"和"正式资料"字样。

Information should be annotated "the demonstration project of Huaneng Shidao bay HTGR power plant-specific" and "official information".

本工程全厂范围采用仿真机，投标提供满足本工程相关程序要求的所有资料，以满足全范围仿真机供应商提供的相关技术要求，详细的资料清单具体见 7.2 节，如发现有遗漏的数据文件，投标方应无偿提供；提交格式及进度等满足按照招标方要求，如和其他要求及资料相重复，以电厂全范围仿真机优先。投标方提供的仿真机数据列表按照高，中，低优先级进行分组。投标方负责提供数据的完整性和正确性。所有文档都应当同时以中文和英文提供，并保证中文和英文的一致性及准确性。

Simulator is plant-wide adopted in this project, the supplier should provide all the information meeting the requirements of relevant procedures to meet relevant technical requirements provided by the full-scope simulator suppliers, see7.2 for a detailed list of specific information, if there are missing data documents, they should be provided free of charge; submission format and procedure should meet the requirements of the tender, if they are duplicated with other requirements and information, full-scope simulator should be a priority. The data list of simulator provided by the supplier should be grouped in high, medium and low priority. The supplier is responsible for the integrity and correctness of data provided.

7.2 技术文件和图纸 Technical documentation and drawings

投标方提供的技术文件和图纸应满足工程的设计、施工、安装、调试和运行的要求。

Technical paper and drawings provided by the supplier should meet the requirements of engineering design, construction, installation, commissioning and operation.

7.2.1 在投标阶段提供的资料：

7.2.1 The information that the supplier should provide in the bid:

（1）设计说明书及技术数据，

（2）与报价有关的其他文件。

(1) Design instruction and technical data

（2）Other documents related to the bid.

7.2.2 配合工程设计的资料与图纸

投标方应及时提供满足工程设计的资料和图纸

7.2.2 The files and drawings cooperating with engineering design

The bidder should provide files and drawings that satisfy engineering design in time.

7.2.3 配合工程施工图设计的资料与图纸

投标方应及时提供满足工程施工图设计的资料和图纸：

7.2.3 The files and drawings cooperating with construction phase design

The bidder should provide files and drawings that satisfy construction phase design in time.

7.2.4 设备监造检验所需要的技术资料

7.2.4 Technology data needed for equipment inspection

投标方应提供满足合同设备监造检验/见证所需的全部技术资料。设备监造检验所需要的技术资料如下， 包括但不限于此：

The supplier should provide all the technical data that meet the requirements of the contract equipment inspection / witness. Technical information for the supervision and inspection of equipment includes but is not limited to the following:

（1）各部件或设备的质量合格证书；

（1）The quality certification of the component or equipment;

（2）各部件或设备主要用材的质量合格证书；

（2）The quality certification of main material of the component or equipment;

（3）设计文件、设计图纸、工艺文件、质量计划、质保大纲等。

（3）Design documents, design drawings, technology documents, quality plan, quality control scheme and so forth.

7.2.5 施工、调试、试运、机组性能试验和运行维护所需的技术资料包括但不限于：

- 提供设备安装、调试和试运说明书，以及组装、拆卸时所需用的技术资料。
- 安装、运行、维护、检修所需的详尽图纸和技术文件，包括设备总图、部件总图、分图和必要的零件图、计算资料等。
- 设备的安装、运行、维护、检修说明书，包括设备结构特点、安装程序和工艺要求、起动调试要领。运行操作规定和控制数据、定期校验和维护说明等。
- 投标方应提供备品、配件总清单和易损零件图。

7.2.5 Technical information for the construction, commissioning, trial operation, unit performance testing and operation and maintenance includes but is not limited to:

- Manuals for the equipment installation, commissioning and trial operation and technical information for the assembly and disassembly should be provided.
- Detailed drawings and technical documents for the installation, operation, maintenance and repair, which include general layout of the equipment, general layout and sub-diagrams of components, the necessary spare parts diagrams, calculations and so on.
- Manuals for the equipment installation, operation, maintenance and repair, which include structural features and installation procedures of the equipment, process requirements, starting debugger essentials, operation regulations, control data, regular checking and descriptions of maintenance, etc..
- The supplier should provide the general list of spare parts and the drawing of vulnerable parts.

7.2.6 投标方须提供的其它技术资料，包括以下但不限于：

- 检验记录、试验报告及质量合格证等出厂报告。
- 投标方提供在设计、制造、检验、验收时所遵循的标准、规范和规定等清单。
- 设备和备品管理资料文件，包括设备和备品发运和装箱的详细资料(各种清单)，设备和备品存

放与保管技术要求，运输超重和超大件的明细表和外形图。

- 详细的产品质量文件，包括材质、材质检验、焊接、热处理、加工质量、外形尺寸、水压试验和性能检验等的证明。

7.2.6 Other technical information that the supplier should provide includes but is not limited to the following:

- The factory report such as inspection records, test reports and quality certification.
- The supplier should provide the list of specification, standards and provision followed by the design and manufacture.
- Management information files of equipment and spare parts, which include shipping and packing details of equipment and spare parts (all kinds of lists), technical requirements of storage and custody of the equipment and spare parts, detailed list and outline map of overweight and oversized parts for transportation.
- Detailed product quality documents, including materials, materials testing, welding, heat treatment, processing quality, physical dimensions and the evidence of water test and performance test.

7.2.7 投标方在投标时应提供的资料:

——阀门外形图及结构图;

——大口径阀门的基础荷载图（含地震荷载）;

——产品规范表;

——供货清单（各附件材质、规格、数量应分别列出）;

——阀门维护及使用说明书;

——阀门电气原理图、接线图;

——提供所执行的标准名称及复印件。

7.2.7 The files that should be provided by the bidder during the bidding:

(1) Outside drawings and structure drawings for valves.

(2) Basic load diagrams for large bore valves (including earthquake load).

(2) Product specification sheets.

(4) Supply sheets (accessory materials, specs, amounts should be listed seperately).

(5) Instruction book for valve maintenance and usage.

(6) Schematic drawings for valve air source piping, and electric connecting drawings.

(7) The name and copies of the following standards.

7.2.8 投标方在技术规格书签字10日内，应提供的以下正式资料:

——阀门外形图、结构图及参数表;

——大口径阀门的基础荷载图（含地震荷载）;

——产品规范表;

——供货清单（各附件材质、主要零部件、规格、数量应分别列出）;

——阀门维护及使用说明书;

——电动执行机构电气原理图、接线图;

——气动执行机构气源管路图、接线图;

——电负荷清单；

——材质性能实验报告；

——阀门水压实验结果；

——阀门特性曲线；

——检查试验报告；

——提供所执行的标准名称及复印件。

7.2.8 The bidder should provide the following formal files within 10 days after signing on technical specification:

(1) The outside drawings, structure drawings and parameter sheets of the valves.

(2) Basic load diagrams for large bore valves (including earthquake load).

(2) Product specification sheets.

(4) Supply sheets (accessory materials, specs, amounts should be listed seperately).

(5) Instruction book for valve maintenance and usage.

(6) Schematic diagram and connecting diagram of electric actuator.

(7) Air source piping diagram, connecting diagram of air-driven actuator.

(8) Electric load lists.

(9) Material performance test reports.

(10) Water pressure test results of valves.

(11) Performance curve of valves.

(12) Inspection test reports.

(13) The name and copies of the following standards.

投标方提供的以上技术资料为 12 套，设计院 6 套，招标方 6 套，电子文本 2 套（设计院 1 套，招标方 1 套）。最终资料提交后不得任意修改，设备到货后与所提资料不符所造成的一切返工和损失由投标方负责赔偿。

Technical information provided by the supplier should be 12 sets, six sets for the design institute, six sets for the tender, two sets of electronic file (one set for the design institutes, one set for the tender). Arbitrary modification is not allowed after the submission of the final information; the supplier should be responsible for all the rework and loss caused by the discrepancy of the information submitted after arrival.

8. 包装、运输和储存 Packaging, Transportation and Storage

8.1 备品备件、零部件及随机文件木箱包装。

8.1 Stand-by components, parts, and documents with equipments should be packaged with wooden case.

8.2 设备在运输过程中，由于包装不当造成的损失，全部由投标方负责。运输中发生设备损坏和丢失由投标方补足缺损件，并由投标方向承运部门交涉，办理索赔。

8.2 The bidder is responsible for the loss caused by bad packaging during shipping. The bidder should make up the components that are broken or missing during shipping, and communicate with the shipping unit to claim for loss.

8.3 投标方负责把设备运到招标方工地，投标方负责卸货，招标方组织现场验收。

8.3 The bidder is responsible to deliver the equipments to the engineering field of the tenderee and land, and the tenderee should organize inspection and acceptance at the field.

8.4 压力容器的包装应符合 GB/T13384 标准的规定，并应采取防雨、防潮、防锈、防震等措施，以免在运输过程中由于振动和碰撞引起轴承、机械密封等部件的损坏。设备发运前应将水全部放掉并吹干，当放水需要拆除塞子等时，投标方应确保这些部件在发运前重新装好。

8.4 The packaging of pressure vessels should follow the specifications of GB/T13384 standard. And rain-proof, damp-proof, rust-prevention and anti-shock measures should be adopted to avoid damaging components such as shaft bearing and mechanical sealing parts. Before shipping the equipments, the water should be drained and the equipments should be dry. If removing components such as plugs is necessary for drainage, the bidder should make sure that those components are installed back properly.

8.5 清洁 Cleaning

8.5.1 设备在出厂之前，应对设备进行清理。所有杂物，如金属碎片、铁屑、焊渣、碎布和一切其它异物都应从各部件内清除。

8.5.1 Equipment before getting out of the factory should be cleaned up. All debris, such as metal fragments, iron, welding slag, rags and all other foreign matter should be cleared from all kinds of components.

8.5.2 所有碳钢材料的内外表面均应进行机械或化学方法除锈，采用化学方法除锈时，不应使材料产生腐蚀或斑点。

The inner and outer surfaces of all carbon steel materials should be carried out with mechanically or chemically rust. While taking use of chemical methods, it should be prevented that the material produce corrosion or spots.

8.5.3 一切氧化皮、锈、油、标记笔迹或油漆标记及其它有害物质都应从所有内外表面上除掉。

The inner and outer surfaces of all carbon steel materials should be carried out with mechanically or chemically rust. While taking use of chemical methods, it should be prevented that the material produce corrosion or spots.

8.5.4 应使用不含卤化物的溶剂、砂布对不锈钢表面进行清洗。用来清洗碳钢的材料不应用来清洗不锈钢表面。

8.5.4 Halogen-free solvent, emery cloth should be used to clean the surface of the stainless steel. Those used to clean carbon steel materials should not be used to clean the stainless steel surface.

8.5.5 水压试验及清洗后应排尽设备内的积水，在装运前将压力容器及内的水排完，并保持干燥。

8.5.5 After water pressure test and cleaning, the water in the equipment should be drained, the water within pressure vessels should be drained prior to shipment, and it should be kept dry.

8.6 油漆 Paint

8.6.1 投标方选择最好的涂层涂敷方式，以防止设备在运输、储存期间不被腐蚀。

8.6.1 The bidder choose the best painting methods to prevent the equipment from corrosion during transportation and storage.

8.6.2 设备出厂前应喷涂二层底漆二层面漆，现场再加一道面漆（面漆由投标方提供）。能适应高盐雾、高湿度的环境要求。油漆颜色由招标方选定。投标方应额外提供 20%用量的底漆和面漆用于设备安装

完成后补漆。

8.6.2 Equipment before getting out of the factory should be painted with 2 layers of primer and 2 layers of topcoat， and another layer of topcoat should be painted at the field (paint provided by the bidder), to make sure that the equipment adapts to high salt spray, high humidity environmental requirements. Paint colors are selected by the tender side. The bidder should provide an additional 20% of the amount of primer and topcoat for touch-up painting after completing equipment installation.

8.6.3 投标方提供防腐的完整说明，包括清洗和涂层工艺及所用涂料的特性说明。

8.6.3 The bidder should provide a complete description of the corrosion, including the description of cleaning, painting processes and painting characteristics.

8.7 标志 Mark

8.7.1 在阀门的明显部位，装设用耐腐蚀材料制作的金属铭牌，金属铭牌至少包括下列内容：设备名称、设备制造厂名称、制造年月、制造厂产品编号、制造许可证编号、设备型号、容器类别、设计压力、设计温度、最高工作压力、设备净重、设备 KKS 编码。

8.7.1 Metal plate with corrosion-resistant materials should be installed at a distinct place of the valve. The metal plate should contain at least following contents: device name, the name of the manufacturer, date of manufacture, manufacturer product number, manufacturing license number, device model, container type, design pressure, design temperature, maximum working pressure, net weight, equipment KKS coding and so forth.

8.7.2 阀门的金属铭牌型式、尺寸、技术条件和检验规则，符合 JBB-82《产品标牌》的规定，并符合招标方的设备标牌要求。

8.7.2 The type, size, technical conditions and inspection rules of valve metal plate, should be in line with the provisions of the "Product Signage" JBB-82, and in accordance with the device signage requirements of the tender side.

8.8 装卸、运输与储存 Handling, transportation and storage

8.8.1 投标方负责设备的运输任务，承担设备在运输途中的风险，并负责办理投保、支付保险费，不涉及招标方利益。

8.8.1 The bidder is responsible for equipment transportation tasks, and bear the risk of the equipment in transit, and responsible for the insured, the payment of insurance premiums. The interest of the tenderer should not be involved.

8.8.2 设备在运输过程中，由于包装不当造成的损失，全部由投标方负责。运输中发生设备损坏和丢失由投标方补足缺损件，并由投标方向承运部门交涉，办理索赔。

8.8.2 All the loss caused by improper packaging during equipment transporting, the bidder is responsible. If it occurs damaging and lost during equipment transporting, the bidder should cover the defect parts, and the bidder is responsible to communicate with transporting department and process claims.

8.8.3 在运输条件允许的情况下，投标方保证整体供货。若确受路况运输条件限制，设备运输方案由双方共同友好协商，确定最佳方案。

8.8.3 If transport conditions allow, the bidder should ensure the overall supply. If restrained by road transport conditions, equipment transport solutions should be decided through friendly consultation by both parties, to

determine the best option.

8.9 交货 Delivery

8.9.1 投标方负责在合同约定的期限内把设备运到招标方工地并负责卸货，招标方组织现场验收。

8.9.1 The bidder is responsible to deliver the equipment to the engineering field of the tenderer and unload. The tenderer organizes the acceptance at the spot.

8.9.2 由投标方供应的所有合同设备部件出厂时，应有投标方签发的产品质量合格证书作为交货的质量证明文件。对某些主要设备还应有全套招标方代表签字的监造与检验记录和实验报告。

8.9.2 There should be certificate of quality qualification issued by the bidder while all the contract equipments supplied by the bidder are about to get out of the factory, as the quality proof documents of delivery. There should be supervision and inspection records and test reports signed by the representative of the full tender side for some of the major equipment.

8.9.3 货达目的地后，投标方在接到招标方通知后应及时赶到现场与招标方一起根据运单和装箱单组织对货物包装，外观及件数进行清点检验。如发现任何不符合之处并由双方代表确认属投标方责任后由投标方处理解决。招标方应在开箱检查前 10 天通知投标方开箱检验，投标方应派检验人员参加现场检验工作。如投标方人员未按规定赶赴现场，招标方有权自行开箱检验，检验结果和记录对双方均有效，并作为招标方向投标方索赔依据。

8.9.3 While cargo arrives at the destination, the bidder shall get to the field in time after being notified by the tender side, to organize together inventory inspection of goods packaging, appearance, and the number of the consignment note and packing list. If inconsistence is found, and representatives by both sides confirm that the duty is on bidder's side, the bidder should handle. The tender shall notify the bidder 10 days before the. The bidder should send inspectors to participate in the on-site inspection. If the bidder fails to arrive at the scene, the tender side has the right to self-unpacking inspection, the test results and records are effective for both parties, and could be used as a proof for the tenderer to claim to the bidder.

8.10 储存 Storage

8.10.1 投标方所提供设备的包装至少满足现场露天存放 6 个月的要求。

8.10.1 The equipment packaging provided by the bidder should meet the requirements of the site open storage for at least 6 months.

8.10.2 阀门及其附件的包装应采取防潮、防锈蚀等措施，保证 12 个月内不发生锈蚀和损坏。如果超过 12 个月时，应进行检查，并重新作防锈处理。

8.10.2 The valves and accessories packaging should be taken to moisture-proof, corrosion-proof and other measures to ensure that the package does not occur rust or damage within 12 months. If it's storage more than 12 months, the package should be checked and re-do anti-rust treatment.

9. 技术服务 Technical Services

9.1 现场服务 Technical services

投标方派合格的技术人员到现场服务，如果此人月数不能满足工程需要，投标方将追加人月数，且不发生费用。

The supplier should send qualified technical personnel to the site for service. If this staff and serving month number cannot meet the requirement of the engineering, The supplier should add more, and not charge for any fee.

投标方现场服务人员了解合同设备的设计，熟悉其结构，有相同或相近机组的现场工作经验，能正确的进行现场指导。

The service staff sent by the bidder should understand the design of the contract equipment, be familiar with its structure, have on-site working experiences of the same or similar unit, and be able to offer the right guidance.

安装调试前，投标方现场服务人员向招标方技术交底，讲解和示范将要进行的程序和方法。对重要工序，投标方技术人员要对施工情况进行确认和签证，否则招标方不能进行下道工序。经投标方服务人员确认和签证的工序如因指导错误而发生问题，投标方负全部责任。

Before installation and debugging, the on-site service staff should communicate the technology to the tenderee and its representative, and interpret and demonstrate the coming procedure and method. For important procedures, the technical personnel of the supplier should confirm and sign the construction condition; otherwise the tenderee cannot go through the next procedure. If problems occur in the procedure confirmed and signed by the technical personnel of the supplier as a result of wrong direction, the supplier should be liable for all losses.

投标方现场服务人员有权全权处理现场出现的一切技术和商务问题。如现场发生质量问题，技术服务人员要在招标方规定的时间内处理解决。如投标方技术服务人员委托招标方进行处理，则须出具委托书并承担相应的经济责任。

The on-site service personnel of the supplier have full authority to deal with all the technical and commercial issues on site. If quality problems occur on site, the technical service personnel should solve them within the time specified by the tenderee. If the technical service personnel of the supplier commit the tenderee to manage it, he should submit a letter of appointment and take relevant economic responsibility.

投标方对其派出现场服务人员的一切行为负全部责任。

The supplier is full responsible for all the actions of its on-site service personnel.

投标方现场服务人员的正常来去和更换应事先与招标方协商。

Normal displacement and replacement of on-site service personnel of the supplier should be consulted with the tenderee in advance.

9.2 培训 Training

培训分为工厂培训和现场培训。工厂培训指在承包商设备制造厂、同类型运行电厂、正在施工的建设工地对招标方维护、运行人员的培训和在同类型电厂的仿真机对招标方运行人员的培训；现场培训指在招标方建设现场的培训。培训的目的是：通过讲授投标方所供设备的主要运行原理、制造工艺、运行性能及设备构造技术特点、QA、QC 管理使招标方技术人员掌握设备投运后的管理维护方法，以及使招标方的运行人员能够独立操作合同设备。投标方应提交详细的培训计划。工厂培训和现场培训应着重于主要设备的维护和运行。培训内容与工程进度相一致。

Training is divided into factory training and on-site training. Factory training is the one towards the tenderee maintenance and operating personnel at contractor's equipment producing factory, running power

plants of the same type and building site under construction and the one towards the tenderee running personnel in the emulational set of the same power plant type; while on-site training is the one carried out at the tenderee construction site. The purpose of the training is to make the tenderee technical personnel master the management and maintenance method of equipments after operation, and to make the tenderee operating personnel be capable of operating contract equipments independently through teaching of the main running principles, manufacturing craft, running performance and technical features of the equipment structure provided by bidder, and QA, QC management. Bidder shall submit a detailed training program. Maintenance and operation of the major equipments should be focused on for the factory and on-site training. Training should be consistent with the project schedule.

投标方培训计划（见下表）

The training program (as the following table)

序号 Number	培训内容 Training contents	计划人月数 Plan number of person-months	培训教师构成 Composition of the training teachers		地点 location	备注 Remarks
			职称 Positional title	人数 Number of people		
1						
2						
3						
4						
5						

培训时间、人数、地点等具体内容需征得招标方的认可。

Specific contents of the training such as the time, the number of people, the location etc should be confirmed by the tenderee.

投标方应为招标方培训人员提供场地、设备、资料等培训条件，并提供食宿和交通方便。

The tender should offer the tenderee trainers training conditions such as sites, equipments, documents etc, and provide accommodation and transportation convenience.

9.3 设计联络 Design contact

9.3.1. 为保证合同有效顺利的实施，买卖双方应召开设计联络会，以协调合同设备在设计、制造等阶段的问题。

9.3.1 For the effective and smooth implementation of the contract, supplier and purchaser should hold design liaison meetings to coordinate the contract equipment problems in the design, manufacturing, and other stages.

9.3.2 每次设计联络会均需签署会议纪要，该纪要将成为合同的正式组成部分，双方必须遵守。

9.3.2 It is required for the summary to be signed for each design liaison meeting. The summary will be an official part of the contract, and both sides must obey.

9.3.3 如果设计联络会在投标方（或投标方技术支持方）进行，所有费用（培训设备、场地、资料）由投标方承担。投标方为招标方人员提供食宿交通方便。

9.3.3 If the design liaison meeting is held at the place of the supplier (or the technical supporter of the supplier), the supplier should offer all the costs (like training equipment, space, information), and provide accommodation and transportation convenient for the tenderee personnel.

9.3.4 设计联络会的总费用包含在合同价中。

9.3.4 The total cost of design liaison meeting is included in the contract price.

9.3.5 设计联络会的次数、时间、人数、地点等具体内容合同生效后由买卖双方商定。

9.3.5 The frequency, time, number of people, location and other specific contents of Design liaison meeting will be consulted by both supplier and purchaser after the contract becomes effective.

9.3.6 设计联络计划表格式：

9.3.6 Table format of design liaison program

序号 Number	次数 frequency	内　　容 Contents	时间 date	地点 location	人数 Number of people

附录 1：分包与外购 Subcontracting and Outsourcing

1. 总则 General rules

为确保投标方所提供的设备、材料质量符合国家、行业标准和招标方的要求，当投标方对设备的设计、部件的加工/制造或试验、以及原材料的采购或服务难以满足招标方的要求时，可以采用分包、外购或外协的形式，但不允许出现二次分包现象。参考招标方有关设备供应分包商资格的管理程序，投标方必须对分包方的生产能力、技术工艺水平、质保能力、商业信誉、近期经营状况等影响供货质量、交货期及价格的因素进行全面公正的考察评审，并将评审材料送交招标方认可。

The supplier should guarantee that the qualities of equipments and materials provided meet the national, industry standards and the requirements. If the design of equipments, the manufacturing or testing of components, the procurement of raw materials and the related services could not meet the requirements of the tenderee, the subcontracting and outsourcing could be adopted, but secondary subcontracting is forbidden. The supplier should carry out a full and fair assessment and inspection of the subcontractor for the influence factors of supply qualities, supply schedule and price, such as the production capacity, technical skills, quality assurance capability, business reputation, and the recent business conditions and so on with reference to the management procedure of related equipment subcontractor. The documents of assessment and inspection should be approved by the tenderee.

投标方在投标文件中应列出其推荐或指定的分包商清单信息供招标方参考，一个分包项目所对应的分包商推荐列出三家，并分别报价，以最高价记入总价。列入该清单的分包商应视为投标方的推荐方案，并不意味着列入该清单中的分包商的资质已被招标方批准，投标方在合同执行过程中仍须按招标方有关设备供应分包商资格的管理程序的要求报批分包商。对清单的任何变动（增加或删除），投标方应提供相关资料报招标方认可。

The supplier should list the recommended or nominated sub-contractor inventory information in the tendering documents for reference to the tenderee. Corresponding to a sub-project, three recommended sub-contractors should be listed, and each quotation, the highest price recorded in total. The sub-contractors Included in the list should be considered as the recommendation of the tender program, but does not mean that qualified sub-contractors included in the list has been approved by the tenderee, the supplier will still follow the management procedures requirements of equipment providing subcontractors qualification of the supplier in the course of execution of the contract report to subcontractors. Any changes to the list (adding or removing), the supplier should provide the relevant documents to get the approval of the tenderee.

投标方需要采购的材料、设备和服务应当从有能力满足工程和质量系统要求的被批准的分包商那里采购。所有分包商都必须报招标方批准，投标方不得与未得到招标方批准的分包商签订分包合同。对不符合招标方要求的分包方，招标方有权否定其供货资格。

Materials, equipments and services should be purchased by the supplier from the approved subcontractors who have the ability to meet the requirements of engineering and quality systems. All of the subcontractors must be approved by the tenderee, and the supplier should not sign any contract with the

subcontractors who have not been approved by the tenderee. The purchaser has the right to deny the supplier qualification of the subcontractors who could not meet the requirements.

分包商的最终选择应由招标方从分包商清单中指定。招标方指定分包商并不排除投标方对设备性能和质量保证的责任，投标方仍负全责。

The selection of subcontractors should be determined by the supplier from the subcontractors list. The subcontractors designated by the supplier do not take the responsibility of the equipments performance and the quality assurance. The supplier still takes the full responsibility.

总体上来说，虽然选择设备或部件的分包商的过程是与招标方协商进行的，但不能够减轻投标方提供优质供应，包括考虑设备先进设计、材料坚固、安全可靠，制造质量和按时交货的责任。投标方还应特别注意尽可能减少分包商的数量以及将整个电站功能类似的设备做成标准采购包，比如管道、阀门、连接件、支架、就地仪器仪表和装置以及用于维修作业的消耗品和备品备件的采购，以便于维修活动和采购备件。

Generally speaking, although the selection of equipments and subcontractors are carried out in consultation with the supplier, it cannot diminish responsibility of the supplier for providing high quality supplies which includes the consideration of advanced equipment design, firm materials, safety and reliability, manufacturing, quality and timely delivery. In order to facilitate maintenance activities and purchase the spare parts, the supplier should also pay particular attention to minimize the number of subcontractors as well as to the standard procurement packages of the similar functional equipments, such as the procurement of piping, valves, connectors, brackets, instruments and devices on spot, as well as consumables and spare parts for maintenance work.

2. 分包商的评价和选择 Evaluation and selection of subcontractors

对分包商评价的总的原则如下：

The general evaluation principles of subcontractors are as follows:

投标方负责在他的供应范围内采购材料和设备。投标方必须建立程序来确保采购的材料和服务符合特定的要求，订货的材料和服务必须来源于已经通过投标方评估并得到招标方认可的能够为工程提供质量安全合格的产品的分包商。

The supplier is responsible for the procurement of materials and equipment in his scope of supply. The supplier must establish procedures to ensure that the procurement of materials and services to meet the specific requirements, the materials ordered and services must be provided by the subcontractors assessed and approved by the tenderee and be able to provide qualified and safe products.

估应包括潜在分包商的设计、制造、质量和商业评价。

Estimates should include the design, manufacture, quality and commercial evaluation of potential subcontractors.

分包商负责执行产品质量的必要验证和负责提供要求的质量文件。需要时他们的质量效果由评估和监查活动来控制，包括有选择地监查质量系统、检查产品可接受性、见证点检查和试验、检验质量文件。

Subcontractor is responsible for the necessary verification of quality products and providing the required quality documentation. If necessary, the quality of their results, which including the selective audit quality

systems, inspection product acceptability, inspection and testing witness points, testing the quality file, is controlled by the assessment and audit activities.

3. 分包商的批准 Authorization of subcontractors

所有分包商都必须报招标方批准。分包商的最终选择将由招标方确定。对于招标方审查结果为"不可接受"的分包商，投标方不得从其处采购物项。

All subcontractors must be approved by the supplier . The subcontractors should be determined by the supplier. For the checked "unacceptable" subcontractors, the supplier should not purchase products from them.

投标只能从经过评估的，在技术上有能力、富有经验并且能够满足质量要求，而且已获得招标方批准的分包商处采购材料、设备和服务。

The supplier could only purchase materials, equipment and services from the qualified subcontractors, who are technically capable, experienced and able to meet the quality requirements, and has received permission from the tenderee.

4. 分包商清单 Subcontractors list

投标方需填写分包商清单，包括且不限于分包商名称、所属国家及拟分包的相应设备。该清单应包括除了如标准或目录产品等设备小部件以外的所有其他设备。

The supplier must fill out the list of subcontractors, including but not limited to subcontractor name, country and proposed the corresponding equipment. The list should also include all the equipments, besides the equipment small parts such as standard products and catalog products.

序号 Number	分包项目名称 Sub-project name	规格型号 Specifications Model	单位 Units	数量 Amount	分包商名称/地址 Subcontractors name / address	备注 Remarks