

## دستورالعمل تامین قطعات یدکی راه اندازی و راهبری دو ساله



شرکت ملی نفت ایران  
شرکت ملی مناطق نفتخیز جنوب

شماره مدرک : E&C-QC-SP-1

صفحه : ۱ از ۶۲

نام مدرک : دستورالعمل تامین قطعات یدکی راه  
اندازی و راهبری دو ساله


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## **Contents and Attachment**

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- 2 - Definitions
- 3 – Language
- 3 - Spare parts required
- 4 - Required information
- 5 – Identification
- 6 - Packing and protection
- 7 - Special storage items

### Attachments:

- 1. Minimum Requirement for Pre-Commissioning, Commissioning, Start Up and Two Years Operation Spare
- 2. Guidelines for the compilation of Spare Parts Interchangeability Record (SPIR)
- 3. SPIR form


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## 1 - GENERAL INFORMATION

- 1.1 This document covers the minimum requirements for equipment guidance for the selection of pre commissioning, commissioning and two-year operation spare parts.
- 1.2 This instruction outline the requirements for providing original manufacture's  
Pre-commissioning, commissioning and two-year operation spare parts
- 1.3 The vendor is obliged to provide with and original equipment manufacture spare parts data package, containing full and complete spare parts information and prices for each item of equipment supplied.
- 1.4 The vendor shall be recommended those spare parts that are deemed necessary on the basis of vendor's recommendations and experience
- 1.5 The vendor shall also guarantee that spare parts for any equipment shall be available for at least 10 years after order placement.
- 1.6 Where the required quantities are mentioned as percentage (%), this means the percentages of No. of equipments.
- 1.7 Where the percentage gives the quantity consisting of a whole number plus a decimal, the next higher whole number quantity will be selected.
- 1.8 Contractor shall consider spare parts for any machinery and package during basic design and feed document preparation.

## 2 - DEFINITIONS

- 2.1 **“Pre-commissioning, Commissioning and Start-up spare parts”** are those material, equipment or component necessary during the, pre-commissioning, commissioning and start-up activities of the plant.
- 2.2 **“TWO YEARS Operating Spare Parts”** are spare parts material, equipment or components necessary for the continuous operation of the plant after commissioning completion for a period of two - year.
- 2.3 **“Equipment”** are devices, structures, machineries and any item required spare parts for Pre-commissioning, Commissioning and two-year operation.

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2.4 “**Company or Owner**” is National Iranian South Oil field Company (NISOC).

2.5 “**Contractor (s)**” who is (are) party to the EPC /PC / EP contracts with company.

2.6 “**Sub-contractor**” any party to whom any part of the work has been or will be subcontracted by the contractor.

2.7 “**Supplier**” the party having an order from the contractor for the supply of equipment, materials, service, etc.

2.8 “**Sub-supplier**” any party who will supply any items or services to the supplier

### 3- Language

The documents shall be in English, unless otherwise specified.

## 4 - SPARE PARTS REQUIRED


### 4.1 Pre-commissioning, commissioning and start-up Spare Parts

4.1.1 Contractor/ Vendor shall submit a spare parts proposal together with base quotation, which shall be included in purchase order. Such spare parts shall be packed in separate boxes and shipped together with the main equipment/ material purchased in order to be available at the site together with the base order supply.

4.1.2 Minimum required quantities/types are shown in attachments 1, therefore the contractor/vendor shall not recommended less than the minimum requirement.

### 4.2 Two-year operation spare parts

4.2.1 Contractor/ vendor shall submit a spare parts proposal together with base quotation, which shall be included in purchase order. Such spare parts shall be packed in separate boxes and shipped together with the main equipment/ material purchased in order to be available at the site together with the base order supply. Also the other parts (those not listed in this document)

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or the more quantity of the listed parts may be required if recommended by vendor.

4.2.2 Minimum required quantities/types are shown in attachment 2, therefore the contractor/vendor shall not recommended less than minimum requirement. Also the other parts (those not listed in this document) or the more quantity of the listed parts may be required if recommended by vendor.

## 5 - REQUIRED INFORMATION

5.1 Data sheets, engineering drawings, Manufacturer's catalogue and operating and maintenance manuals identifying the function of and full description of all parts associated with the equipment.

5.2 The interchangeability of spare parts shall be completely assured between all units contained on the parent equipment purchase order in SPIR form.

5.3 The Vendor shall guarantee the spare parts are in accordance with the requirements requested for the parent equipment.

5.4 The offer shall be valid for supplying either for total or partial quantities.


5.5 All spare parts list shall be filled in using the attached "SPIR form" according to the instructions attached herein.

## 6 - IDENTIFICATION

**All spare parts shall be individually identified by one of the following methods**

6-1 A stainless steel label imprinted with lettering approximately 6 mm (1/4) height and secured to the part with S.S. wire.


6-2 Inscribing with an electric spark erosion pencil.

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- 6-3 On large items inscribing with non-fading, moisture resistant marking ink. Figures /letters to be at least 25 mm (1”) height. Ink shall be Pannier 1001 Yellow Industrial or equal.
- 6.4 Items such as bearings which in actual storage will remain in their preserving packing and shall be identified with an adhesive label firmly attached to the outside of the carton.
- 6-5 Alternative methods that are standard industrial practice may be used provided SP’s approval has been obtained in writing in advance. Stamping directly into spare parts will not be allowed.
- 6-6 The following shall appear on each spare or spare part label:
- The manufacturer’s original part number.
  - Short description (one word will suffice if space is limited).
  - Tag number of equipment (if applicable)

## 7- PACKING AND PROTECTION


- 7.1 Packing, protection and marking of the packing container shall be as described in Project Packing and Marking Procedure IPS-G-GN-210. Spare parts shall be packed separately from main equipment and the packing containers shall clearly be marked pre-commissioning , commissioning, and start-up spare parts” or “two- year operating spare parts” as applicable.
- 7-2 Packing cases and other shipping containers must be capable of giving adequate protection to contents for a period of one year after dispatch  
from Vendor work-shop (i.e. cases may after receipt at the Plant Site may be stored open air before being unpacked).
- 7-3 Two-year operation spares are to be protected and packed in such a manner as to ensure a minimum shelf life of four years in an un-air conditioned warehouse sited in extremely dusty heavy industrial and coastal area with salt pollution location where the maximum shade temperature may exceed  $-14 +52^{\circ}\text{C}$ , and where relative humidity reaches 90%.

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- 7-4 All items such as bolts and nuts shall be adequately preserved to prevent corrosion.
- 7-5 Other unpackaged items shall be protected by rust preservative oil, hard drying type. If the nature of the item permits the removal of the deposited tar oilskin by means of petroleum based solvents, or the use of hot dip strippable coating.
- 7-6 Any protection for stainless steel parts shall not contain chlorides or harmful metal salts such as zinc, lead, and copper, etc. Also marking paint or ink shall not contain similar harmful component.
- 7-7 Electronic and instruments parts shall be packed in sealed clear plastic bags along with a bagged amount of desiccant.

## **8- SPECIAL STORAGE ITEMS**

- 8-1 Vendor shall advise owner of any spares that cannot be stored under the conditions stated in Para. 7.2 and which require special storage conditions
- 8-2 Special Storage Items are to be clearly labeled with storage instructions  
Such as:
- STORE IN A COOL DRY PLACE AT ° C
- STORE IN DARK PLACE
- KEEP HUMIDITY BELOW %
- Etc.

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# **ATTACHMENT 1**

## **MINIMUM REQUIREMENT FOR PRE-COMMISSIONING, COMMISSIONING, START UP AND TWO YEARS OPERATION SPARE PARTS**

### **MECHANICAL EQUIPMENTS**

#### **MACHINERIES**

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TABLE 1-2	ROTARY PUMPS (SCREW,GEAR,LOBE,VANE)
TABLE 1-3	ROTARY PUMPS (PCP)
TABLE 1-4	RECIPROCATING PUMPS
TABLE 1-5	COMPRESSORS (AXIAL/ROTARY/CENTRIFUGAL)
TABLE 1-6	RECIPROCATING COMPRESSORS
TABLE 1-7	GAS TURBINES
TABLE 1-8	STEAM TURBINES AND EXPANDERS (ROTARY)
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TABLE 1-15	FURNACES

#### **PACKAGES**

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#### **PIPING COMPONENTS**

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### **ELECTRICAL EQUIPMENTS**

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TABLE 2-2	SOLAR POWER SYSTEMS
TABLE 2-3	CONSERVATOR TYPE TRANSFORMERS
TABLE 2-4	DC CHARGER
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TABLE 2-6	FIXED LV SWITCHGEAR
TABLE 2-7	HIGH & MEDIUM VOLTAGE ELECTRIC MOTORS
TABLE 2-8	INDUSTRIAL UPS
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TABLE 2-10	LOAD BREAK SWITCH
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TABLE 2-13	LV SOFT START MOTOR CONTROLLER
TABLE 2-14	LV VFD SYSTEMS
TABLE 2-15	MEDIUM & HIGH VOLTAGE SWITCHGEAR
TABLE 2-16	MV&HV FIXED CAPACITOR BANK
TABLE 2-17	MV SOFT START MOTOR CONTROLLER
TABLE 2-18	MV VFD SYSTEMS
TABLE 2-19	OUTDOOR SF6 CIRCUIT BREAKERS
TABLE 2-20	POTENTIAL TRANSFORMER
TABLE 2-21	RELAY & CONTROL PANEL FOR OUTDOOR POWER CB
TABLE 2-22	REMOTE CONTROL PANEL
TABLE 2-23	RMU
TABLE 2-24	SEALED TYPE TRANSFORMERS



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TABLE 2-25  
TABLE 2-26  
TABLE 3

TRANSFORMER/RECTIFIER OF CATHODIC PROTECTION  
VACCUUM CIRCUIT BREAKER (V.C.B)  
**INSTRUMENTATION**



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**TABLE 1-1 CENTRIFUGAL PUMPS (Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation		
		1-3	4-6	more
Number of pumps using parts	Any No	1-3	4-6	more
Rotor Set	-	1	1	1
Shaft Sleeve, Wearing Rings and Throat Bushing	30%	100%	70%	60%
Gasket, Packing, O-rings	100%	100%	70%	60%
Mechanical Seal, Gaskets & Springs	100%	100%	70%	60%
Bearing	100%	100%	70%	60%
Add For Vertical Pump				
Bowls	-	-	-	1
Spiders Or Spider Bushings	30%	100%	70%	60%
Bearing Bushings	30%	100%	70%	60%
Add For High-Speed Integral Gear				
Gear box	-	1	1	1
Diffuser and cover	-	100%	70%	60%
Splined Shaft	30%	100%	70%	60%
Oil Pump, Internal	-	1	1	1
Oil Pump, External	-	1	1	1
Oil Filter	100%	100%	100%	100%



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**TABLE 1-2 ROTARY PUMPS(SCREW,GEAR,LOBE,VANE)(Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation		
		1 – 3	4 – 6	more
Number of pumps using parts	Any No	1 – 3	4 – 6	more
- Rotating Element (Rotor set)	-	1	1	1
-Bearing	100%	100%	70%	60%
- Gasket, Packing, O-rings , Gaskets & Springs, Seal ring	100%	100%	70%	60%
- Gear Wheel (Timing gear) Set (Sufficient For One Pump)	-	1	1	1
- Mechanical Seal set (Sufficient For One Pump)	100%	100%	70%	60%



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**TABLE1-3 ROTARY PUMPS(PCP) (Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation		
		1 – 3	4 – 6	more
Number of pumps using parts	Any No			
- Rotor Set	-	1	1	1
-Stator (non-metal)	200%	400%	400%	400%
-Stator (metal)	200%	400%	400%	400%
-Bearing	100%	100%	70%	60%
- Gasket, Packing, O-rings , Gaskets & Springs, Seal ring	100%	200%	200%	200%
- Mechanical Seal	100%	100%	70%	60%
- Sheath (non-metal)	30%	100%	70%	60%



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**TABLE 1-4 : RECIPROCATING PUMP(Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation		
		1-3	4-6	more
No. of Machines	Any No			
Plunger/piston & piston rod assembly	-	1 set	1 set	1 set
Piston Rings(if applicable)	100%	100%	70%	60%
Stuffing Box Packing	100%	100%	70%	60%
Plunger Packing	100%	100%	70%	60%
Suction/Discharge Valve/Valve seats	50%	100%	70%	60%
Bearing Set ,Complete	100%	100%	70%	60%
Cross Heads Bushes	100%	100%	70%	60%
Cross Heads Shoes	100%	100%	70%	60%
Crank Shaft	-	1	1	1
Unloader device parts	-	100% Each type	70% Each type	60% Each type
Lube pumps	-	1	70%	60%
Lubricators	-	1 set	70%	60%
Cross Head Pins	-	100%	70%	60%
Relief Valve Parts	-	100%	70%	60%
Filters	100%	200%	200%	200%
Belt(If Applicable)	100%	200%	200%	200%



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**TABLE 1-5 : COMPRESSORS ( AXIAL / ROTARY / CENTRIFUGAL) (Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation								
No of Machines	Any No	<u>Centrifugal</u>			<u>Axial</u>			<u>Rotary</u>		
		1-3	4-6	more	1-3	4-6	more	1-3	4-6	more
- Rotating Element	-	1		2	1		2	1		2
- Seals	100%	100%	70%	60%	100%	70%	60%	100%	70%	60%
- Radial Bearing	100%	100%	70%	60%	100%	70%	60%	100%	70%	60%
- Thrust Bearing	100%	100%	70%	60%	100%	70%	60%	100%	70%	60%
- Pads	100%	100%	70%	60%	100%	70%	60%	100%	70%	60%
- Oil & seal Filter ( Sufficient For One Compressors)	300%	10 set	10 set	10 set	10 set	10 set	10 set	10 set	10 set	10 set
- Instrument Parts		See Related Tables								
- Accumulator		Manufacture recommended								
- Bladder		Manufacture recommended								
- Labyrinths	100%	100%	70%	60 %	100%	70%	60%	100 %	70%	60%
- Gaskets	200%	200%	200 %	200 %	200%	200 %	200 %	200 %	200%	200%
- O-rings	200%	200%	200 %	200 %	200%	200 %	200 %	200 %	200%	200%
- Oil Pumps	-	1	2	30 %	1	2	30%	1	2	30%
- Stators Blades set ( Sufficient For One Compressors)	-	-	-	-	1	1	1	-	-	-
- Timing Gears sets ( Sufficient For One Compressors)	-	-		-	-	-	-	1	1	1
- Oil Cooler	-	Manufacture recommended								



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**TABLE 1-6 : RECIPROCATING COMPRESSORS(Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation			
		1	2	3	more
No. of Machines	Any No				
- Pistons	-	1 set	1 set	1 set	30%
- Cylinder Liners	-	1 set	1 set	1 set	30%
- Valves	50%	100%	100%	100%	70%
- Piston Rods	-	1 set	1 set	1 set	1 set
- Packing	100%	100%	100%	100%	100%
- Connecting Rods (each type)	-	1	1	1	1
- Cross Heads	-	100%	50%	50%	30%
- Cross Heads Shoes	-	100%	50%	50%	30%
- Bearings set	100%	100%	100%	100%	50%
- Piston Rings	100%	100%	100%	100%	50%
- Cylinders	-	-	-	-	-
- Unloader device parts	100%	1 set Each type	2 sets Each type	3 sets Each type	50%
- Lube pumps	-	1	1	1	30%
- Lubricators	-	1 set	1 set	1 set	2 set
- Cross Head Pins	-	100%	100%	100%	50%
- Relief Valve Parts	-	100%	100%	100%	50%
- Crankshafts	-	1	1	1	1



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**TABLE 1-6: RECIPROCATING COMPRESSORS (CONTINUE)**

Item	Pre-comm., comm., Start up	Two years operation			
		1	2	3	more
No. of Machines	Any No				
- Electrical	-	See Related Tables			
- Instrumentation	-	See Related Tables			
- Filters	100%	200%	200%	200%	200%
- O-Rings/Gaskets	100%	200%	200%	200%	200%
- Unloaded Assemblies Cooler Bundle for Integral Frame	-	1	1	1	1
- Mounted Intercoolers	-	1	1	1	1



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**TABLE 1-7 : GAS TURBINE(Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation	
		1-4	more
<b>No. of Machines</b>			
Air filter	100%	300%	300%
Rotor Assembly	-	1 set	1 set
Air bleed valves set ( Sufficient For One Gas Turbine )	-	1	2
Inlet guide vane assembly	-	1	2
Combustion Chamber set ( Sufficient For One Gas Turbine )	-	1	2
Liner combustors set ( Sufficient For One Gas Turbine )	-	1	2
fuel nozzles set ( Sufficient For One Gas Turbine )	-	1	2
Fuel control system	-	<b>See Related Tables</b>	
lube oil system(pump)	-	1	1
Starter	-	1	1
Bearings	100%	100%	50%
fuel/oil Filters	100%	200%	200%



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**TABLE 1-8 : STEAM TURBINES AND EXPANDERS(ROTARY)(Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation			
		Steam Turbines		Expanders (Rotary)	
Number of machines ( Sufficient For One TURBINES)		1	2	1	2
- Diaphragms	-	1 set	1 set	1 set	1 set
- Nozzles	-	1 set	1 set	-	-
- Packing & Labyrinths	200%	200%			
- Radial Bearings	100%	2 set	3 set	2 set	3 set
- Thrust Bearings	100%	100%			
-Thrust Bearings Pads	100%	100%			
- Governor	-	1 set	1 set	1 set	1 set
- Oil Filter Elements	400%	10 set	10 set	10 set	10 set
- Couplings	-	1 set	1 set	1 set	1 set
- Instrument Parts		See Related Tables			
- Gaskets	200%	2 sets	4 sets	2 sets	4 sets
<u>Trip and Throttle:</u>					
- Valve Parts	1 set	1 set	1 set	1 set	1 set
- Accumulator Bladder		1 set	2 set	1 set	2 set
- Ejector Nozzles	-	1 set	2 set	-	-
- Oil Cooler Bundle	-	1 set	1 set	1 set	1 set
- Oil Pump	-	1 set	1 set	1 set	1 set



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**TABLE 1-9 : FANS/BLOWERS(Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation		
		1-3	4-6	more
No. of Machines	Any No			
-completely dynamically balanced rotor assembly including impeller, wheel, key, shaft sleeve ( Sufficient For One Fan/Blowers)	-	1set	1set	1set
Bearing set	100%	100%	70%	60%
Packing,o-rings	200%	200%	200%	200%
Mechanical seal	100%	100%	100%	100%



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**TABLE 1-10 DIESEL ENGINES(Note a,b,c)**

Item	Pre-comm., comm., Start up	Two years operation		
		1	2	more
No Of Engines	Any No			
Filters (Fuel, Oil, Air, Water)	300%	500%	500%	300%
Gaskets/ Washers	200%	200%	200%	200%
V-Belts	200%	200%	200%	100%
Packings / Oil Seals	200%	200%	200%	200%
Piston Rings	100%	100%	100%	50%
Bearings	100%	100%	100%	50%
Electrical	-	See Related Tables		
Instrumentation	-	See Related Tables		



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**TABLE 1-11: SPECIAL PURPOSE GEAR UNITS(Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation		
		1-3	3-6	more
No. of Machines	Any No			
- Radial Bearings	100%	100%	70%	60%
- Couplings	-	1	1	1
- Quill Shafts	-	1	1	1
- Labyrinths	100%	100%	70%	60%
- Gaskets	200%	200%	200%	200%
- Instrument Parts		See Related Table		
- Thrust Bearings	100%	100%	70%	60%
- Thrust Bearing Pads	100%	100%	70%	60%



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**TABLE 1-12 : HYDRO COUPLING(Note a,c)**

Item	Pre-comm., comm., Start up	Two years operation		
		1-3	4-6	more
No. of Machines	Any No			
Feed Motor Pump	-	1	1	1
Filter Cartridge	100%	200%	200%	200%
Cooler Pump	-	1	2	30%
Instrument Parts		<b>See Related Table</b>		
Inverter	-	100%	70%	60%
Visual Oil Level	-	50%	40%	30%
Seal Kit	100%	100%	70%	60%
Bearing Kit	100%	100%	70%	60%



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**TABLE 1-13 : HEAT EXCHANGERS(Note a,c)**

ITEMS					QUANTITIES		
1) <u>Shell and Tube (U Type included)</u>							
-Tubes					Straight tubes sufficient to retube the largest bundle of each tube size and material.		
2) <u>Air Cooled Exchangers</u>							
- Plugs					Steel 1% Non- ferrous 2% (min. one number)		
- Plug Gaskets					5% (min. one number)		
- Cover plate gaskets					10%		
- Tube support boxes					10% (min. one number)		
Number of Air-fin coolers Using Part.	1	2	3	4	5	6	more
- V-Belts- Sheaves (Driven & Driver)	0	0	0	0	0	0	1
- Set of Belts	1	2	3	4	5	6	100%
- Fan shaft Bearing (Upper & Lower)	1	1	2	2	3	50% of Air Fins	
<u>Speed Reducers (Gear Box) Shaft and pinion</u>							
- Bearing Set	1	1	1	2	2	3	50% of Air Fins
- O-Rings, Seals, Lock-washers, Locknuts	200%						
- Couplings (complete sets)	100%						
- Flanges, Gaskets, seals	1	1	1	1	1	1	1
- Fan Assemblies	100%						
- Automatic Pitch Control	100%						
- Hub Assembly Parts Guide Bushing	100%						
- Fan blade positioner	50%						
- Pitch Blocks, O- Rings, Clam Gaskets	200%						
- Bolt Assembles, Fork, Pins	100%						

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**TABLE 1-13 : HEAT EXCHANGERS(Note a,c)**

- Number of Air-fin coolers Using Part.	1	2	3	4	5	6	more
- Flexible Hose, Rotary Union	1	1	1	1	1	1	30%
<u>Automatic or manual Adjustments:</u>							
- Blade Retention Clamps Pitch,	1	2	2	2	30%		
- Spring Housing Gasket, diaphragm, Blade Retainer Ring, Thrust Cover Gasket	1	1	1	1	2	2	20%
- Hub Assembly with Blades	0	0	0	0	0	0	1
<u>ITEMS</u>				<u>QUANTITIES</u>			
<b><u>3) Plate type Exchangers</u></b>							
- Plate gasket				100%			
- Flow Plate				10%			
- Nozzle Gasket				200%			
- Glue (1 Kg. Pot)				1			
- Special tools				1 for each size/ type			



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**TABLE 1-14 : PRESSURE VESSELS & TANKS(Note a,c)**

<u>ITEMS</u>	<u>QUANTITIES</u>
- Gaskets	200%
- Bolts and nuts	10% (Special, Alloy or size 2" diam or greater), minimum one set.



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**TABLE 1-15 : FURNACES(Note a,c)**

<u>ITEMS</u>	<u>QUANTITIES</u>
Gaskets for Coil	100%
- Burner Tiles	200 %
- Burner Tips	10%
- Fire Eyes	20%
- Gas valves Seat	200%
- Instrumentation	See Related Tables



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**TABLE 1-16 : OIL FREE AIR COMPRESSOR PACKAGES(Note a,b)**

Item (Sufficient For One Package )	Pre-comm., comm., Start up	Two Years Operation
Air filter Element	-	8 No
Oil filter	-	8 No
Seal , Oil	-	1 No
Ring Guide -1st stage	-	1 No
Ring pressure -1st stage	-	1 No
Ring Guide -2st stage	-	1 No
Ring pressure -2st stage	-	2 No
LP Suction Valve	-	1 No
LP Discharge Valve	-	1 No
HP Suction valve	-	1 No
HP Discharge valve	-	1 No
Ring oil wiper	-	2 No
Ring oil Scraper	-	2 No
Joints –Set	-	1 Set
O Ring – Set	-	1 Set
Diaphragm	-	2 No
First Stage Safety valve	-	1 No
Second Stage Safety valve	-	1 No
Temperature sensor	-	1 No
Pressure Sensor	-	1 No
Element for pre filter	-	4 No
Element for Dust filter	-	4 No
3 way Solenoid valve	-	1 No
Active Alumina	-	For first replacement
Electrical	-	See Related Tables
Instrumentation	-	See Related Tables



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**TABLE 1-17 : CHEMICAL INJECTION PACKAGES (Note a)**

Item (Sufficient For One Package )	Pre-Comm., Comm., Start Up	Two Years Operation
Plungers/Diaphragms Set	-	1 Set
Bearing Set	-	2 Set
Gaskets & O-rings Set	2 Set	2 Set
Seal Rings Set	-	2 Set
Safety Valve	-	1 No
Suction & Discharge Valves	-	2 Set
Electrical	-	See Related Tables
Instrumentation	-	See Related Tables



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**TABLE 1-18: VAVLES(Note a,c)**

Item	Pre-comm., comm., Start up			Two years operation
	Carbon Steel	Alloy Steel	Cast Iron /Steel	
Valves				
Valves Screwed or welded, flanged 2" and below	10%	5%	0%	5% for each size, type and material Complete units
Valves 2" to 4"	2%	2%	0%	2% (minimum 2 nos.) for each size, type And material
Valves 6" to 10"	2%	2%	0%	1 no. for each size, type and material Complete units
- Valves up to 10" Gland packing and Bonnet gasket				20%
- Valves above 10" Set of interchangeable Inner parts, bonnet gasket and Stem packing				10%
- Piping gaskets and bolts Set for each size and type				20%



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**Table 2-1: EMERGENCY DIESEL GENERATOR**

Item	PRE-COMM. & COMMISSIONING	TWO YEARS
AUTO MAIN FAILURE CONTROL MODULES	-	20
AVR	-	20
DIODE SETS (6 NOS POSITIVE & NEGATIVE)	10	20
EMERGENCY STOP SWITCH	-	20
COOLING FAN	-	20



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**TABLE 2-2: (PV) SOLAR POWER SYSTEMS**

Item	Pre-Comm. & Commissioning	Two Years
INVERTER CAPACITOR	-	1 NO. PER EACH TYPE & SIZE
INVERTER FILTER		1 NO. PER EACH TYPE & SIZE
AUXILIARY ON-BOARD POWER SUPPLY		1 NO.
SPANNER & SCREW DRIVER		1 SET
PV MODULE	30%	15%
CLEANING TOOLS	-	1 SET
DC DISCONNECT SWITCH		1 NO.
CONTACTOR & MCCB		1 NO.
CHARGE CONTROLLER		1 SET
SOLAR MOUNTING STRUCTURE PIECES (CLAMPS)		1 SET
JUNCTION COMBINER BOX		1 NO.
PV FUSE	30%	15%
DC & AC CABLING COMPONENTS	-	1 SET
SURGE PROTECTIVE DEVICE		1 NO.
COMMUNICATION EQUIPMENT (MODULE)		1 SET
OTHER FUSES	10%	15%
INVERTER PCBS (CONTROL, PROTECTION, FIRING, ...)	-	1 NO. PER EACH TYPE
LAMP SIGNAL	5%	20%
PUSH BUTTON	5%	20%
LED	5% PER EACH TYPE & COLOR	20% PER EACH TYPE & COLOR

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**TABLE 2.3 : CONSERVATOR TYPE TRANSFORMERS**

Item	Pre-Comm. & Commissioning	Two Years
BUSHINGS (HV/LV)	10%	20%
HV/LV BUSHING O-RING	20%	50%
BUCHHOLZ RELAY	-	20%
SILICA GEL BEREATHER	-	20%
PRESSURE RELIEF DEVICE (VALVE)	-	10%



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**TABLE 2-4: DC CHARGER**

Item	Pre-Comm. & Commissioning	Two Years
RECTIFIER INPUT FUSE	50%	50%
DROPPERS CONTROL BOARD		20%
CONTROL PCB OF RECTIFIER		20%
FIRING PCB OF RECTIFIER		20%
PROTECTION PCB		20%
DIODE MODULES		20%
THYRISTOR MODULES		20%
DROPPER DIODES		20%
BLOCKING DIODES		20%
CURRENT TRANSFORMER		20%
OUTPUT CURRENT SHUNT		20%
CAPACITORS		20%
CONTACTORS		20%
OTHER FUSES		20%
MCCBS/MCBS		20%
VENTILATION FAN		20%
SIGNAL LAMPS		20%
SNUBBER BOARD		20%
AC VOLTAGE RELAY		20%
DC VOLTAGE RELAY		20%
CHARGING RELAY		20%
EARTH FAULT RELAY		20%
ALARM PCB		20%



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**TABLE 2-5: FIXED LV CAPACITOR BANK**

Item	Pre-Comm. & Commissioning	Two Years
Power Factor Regulator	-	20%
Auxiliary Relays With Base (DC & AC)	-	20%
Ammeter	-	20%
Voltmeter	-	20%
Selector Switch	-	20%
Current Transformer	-	20%
Isolating Transformer	-	20%
LV Contactor	-	20%
M.C.B	-	20%
LV Fuse (Knife Blade Cartridge Fuse)	15%	30%
Cylindrical Fuse	10%	30%
Space Heater	-	20%
Thermostat	-	20%
Signal Lamp	5%	35%
Push Button	-	20%
Fluorescent Lamp	-	25%
Door Limit Switch	-	25%
Capacitor	5% PEREACH TYPE	20% PEREACH TYPE



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**TABLE 2-6: FIXED LV SWITCHGEAR**

Item	Pre-Comm. & Commissioning	Two Years
Auxiliary Relay With Base (DC & AC)	5%	20%
Ammeter	-	20%
Voltmeter	-	20%
Selector Switch	-	20%
Current Transformer	-	20%
Isolating Transformer	-	20%
LV Contactor	-	20%
M.C.B	-	20%
LV Fuse (Knife Blade Cartridge Fuse)	15%	30%
Cylindrical Fuse	10%	30%
Earth Leakage Relay With Core Balance	-	20%
Thermal overload relay	-	20%
Motor Protection Relay (MPR)	-	20%
Under Voltage Relay	-	20%
Space Heater	-	20%
Thermostat	-	20%
Signal Lamp	5%	30%
Push Button	-	20%
Fluorescent Lamp	-	25%
Door Limit Switch	-	25%



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**TABLE 2-7: HIGH & MEDIUM VOLTAGE ELECTRIC MOTORS**

Item	Pre-Comm. & Commissioning	Two Years
WINDING RTD	10%	20%
COOLING FAN	-	20%
DRIVE END BEARING	-	50%
NON DRIVE END BEARING	-	50%
THRUST BEARING FOR VERTICAL MOTOR	-	50%



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**TABLE 2-8: INDUSTRIAL UPS**

Item	Pre-Comm. & Commissioning	Two Years
RECTIFIER INPUT FUSE	50%	50%
INVERTER OUTPUT FUSE	50%	50%
OTHER FUSES	25%	25%
CONTROL PCB OF RECTIFIER	-	20%
FIRING PCB OF INVERTER		20%
FIRING PCB OF RECTIFIER		20%
PROTECTION & ALARM PCBs		20%
DIODE MODULES		20%
THYRISTOR MODULES		20%
IGBT MODULES		20%
BLOCKING DIODES		20%
POWER SUPPLY OF INVERTER AND STATIC SWITCH		20%
POWER SUPPLY OF RECTIFIER		20%
INPUT AND OUTPUT TRANSFORMER		20
ISOLATING TRANSFORMER		20%
CURRENT TRANSFORMER		20%
CONTACTORS		20%
MCCB/MCB		20%
VENTILATION FAN		1
SIGNAL LAMPS	20%	20%
CONTROL PCB OF INVERTER & STATIC SWITCH	-	1 NO.
OTHER PCBs		20%
ISOLATING SWITCH (MAKE BEFORE BREAK)		20%



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**TABLE 2-9: LIGHTING DISTRIBUTION BOARD**

Item	Pre-Comm. & Commissioning	Two Tears
M.C.C.B	-	20%
M.C.B / R.C.B.O	-	20%
LV FUSE (KNIFE BLADE CARTRIDGE FUSE)	20%	50%
EARTH LEAKAGE RELAY WITH CORE BALANCE	-	20%
SIGNAL LAMP	20%	20%



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**TABLE 2-10: LOAD BREAK SWITCH**

Item	Quantity	
	Pre-Comm. & Commissioning	Two Years
MECHANICAL LOW-GAS INTER LOCK	-	15%
MECHANICAL LOCK-OUT RING	-	20%
VOLTAGE SENSOR (P.T.)	-	15%
CURRENT TRANSFORMER	-	15%
ON BOARD ELECTRONICS	-	20%
SURGE ARRESTER	-	20%
MOTOR PACK	-	15%
CLOSING COIL	-	20%
OPENING COIL	-	20%
MULTI FUNCTION OPERATION RELAY	-	20%



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**TABLE 2-11. LOW VOLTAGE ELECTRIC MOTORS**

Item	Pre-Comm. & Commissioning	Two Years
COOLING FAN	-	20%
NON-DRIVE END BEARING	-	50%
DIRVE END BEARING	-	50%
THRUST BEARING FOR VERTICAL MOTORS	-	50%



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**TABLE 2-12: LOW VOLTAGE SWITCHGEAR**

Item	Pre-Comm. & Commissioning	Two Years
TRIP COIL FOR AIR CIRCUIT BREAKER	-	20%
CLOSING COIL FOR AIR CIRCUIT BREAKER	-	20%
ACB CHARGING MOTOR	-	20%
VOLTAGE & CURRENT PROTECTION RELAY (FOR INCOMINGS & BUS TIES)	-	20%
AUXILIARY RELAY WITH BASE (DC & AC)	-	20%
ISOLATING TRANSFORMER	-	20%
LV CONTACTOR	-	20%
M.C.B	-	20%
LV FUSE (KNIFE BLADE CARTRIDGE FUSE)	20%	20%
CYLINDRICAL FUSE	20%	20%
EARTH LEAKAGE RELAY WITH CORE BALANCE	-	20%
LOCK OUT RELAY	-	20%
THERMAL OVERLOAD RELAY	-	20%
MOTOR PROTECTION RELAY (MPR)	-	20%
UNDER VOLTAGE RELAY	-	20%
SIGNAL LAMP	20%	20%
PUSH BUTTON	-	20%
POSITION MICRO SWITCHE	-	20%
FLUORESCENT LAMP	-	25%



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**TABLE 2-13: LV SOFT START MOTOR CONTROLLER**

Item	Pre-Comm. & Commissioning	Two Years
COOLING FAN (INTERNAL)	-	1 NO.
SEMICONDUCTOR FUSE & HOLDER	10%	20%
FUSE (CONTROL CIRCUIT)	10%	20%
SIGNAL LAMP	-	20%
LINE FUSE (CB)	10%	20%
AUXILIARY RELAY	-	10%
BY-PASS RELAY	-	1 NO.
PRINTED CIRCUIT BOARD	-	1 NO. PER EACH TYPE
THYRISTOR (MODULE)	-	20%
KIT FOR CHANGING THYRISTOR	-	10%
CURRENT TRANSFORMER	-	10%
LED	-	20% PER EACH TYPE & COLOR
EXTERNAL FAN	-	1 NO.



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**TABLE 2-14. LV VFD SYSTEMS**

Item	Pre-Comm. & Commissioning	Two Years
FUSE (CONTROL CIRCUIT)	20%	20%
SIGNAL LAMP	20% PER EACH TYPE & COLOR	20% PER EACH TYPE & COLOR
LINE FUSE (CB)	10%	20%
AUXILIARY RELAY	-	10%
MAIN COOLING FAN		10%
COOLING FAN (INTERNAL)		10%
DC TO AC MODULES		PER EACH TYPE 10%
AC TO DC MODULES		PER EACH TYPE 10%
BATTERIES ON BOARDS		20% PER EACH TYPE & SIZE
FAN FILTERS		10%
LED		20% PER EACH TYPE & COLOR



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**TABLE 2-15. MEDIUM & HIGH VOLTAGE SWITCHGEAR**

Item	Pre-Comm. & Commissioning	Two Years
TRIP COIL FOR AIR CIRCUIT BREAKER	-	20%
CLOSING COIL FOR AIR CIRCUIT BREAKER	-	20%
ACB CHARGING MOTOR	-	20%
ANTI-PUMPING RELAY	-	20%
VOLTAGE & CURRENT PROTECTION RELAY (FOR INCOMINGS & BUS TIES)	-	20%
AUXILIARY RELAY WITH BASE (DC & AC)	-	20%
HV FUSES FOR MOTOR/TRANSFORMER	-	30%
HV FUSE FOR PT	-	20%
M.C.B	-	20%
LV FUSES (KNIFE BLADE CARTRIDGE FUSE)	20%	20%
CYLINDRICAL FUSE	20%	20%
LOCK OUT RELAY	-	20%
SIGNAL LAMP	20%	20%



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**TABLE 2-16. MV & HV FIXED CAPACITOR BANK**

Item	Pre-Comm. & Commissioning	Two Years
TRIP COIL FOR VACUUM CIRCUIT BREAKERS/CONTACTOR	-	20%
CLOSING COIL FOR VACUUM CIRCUIT BREAKERS/CONTACTOR	-	20%
VACUUM CIRCUIT BREAKER/CONTACTOR CHARGING MOTOR	-	20%
POWER FACTOR REGULATOR	-	20%
AUXILIARY RELAY WITH BASE (DC & AC)	-	20%
ISOLATING TRANSFORMER	-	20%
LV CONTACTOR	-	20%
M.C.B	-	20%
LV FUSE (KNIFE BLADE CARTRIDGE FUSE)	15%	30%
CYLINDRICAL FUSE	10%	30%
SIGNAL LAMP	20%	35%
FLUORESCENT LAMP	-	25%



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**TABLE 2-17. MV SOFT START MOTOR CONTROLLER**

Item	Pre-Comm. & Commissioning	Two Years
CURRENT TRANSFORMER	-	20%
GATE DRIVE TRANSFORMER	-	20%
TEMPERATURE & CURRENT BOARD	-	20%
GATE DRIVE BOARD	-	20%
MOV BOARD	-	20%
dv/dt BOARD	-	20%
MV FUSES	-	20%
RTD BOARD	-	10%
GROUND FAULT BOARD	-	10%
CONTROL BOARD	-	10%
MAIN BOARD/CPU BOARD & DIGITAL CONTROLLER	-	10%
SIGNAL LAMP	20% PER EACH TYPE & COLOR	20% PER EACH TYPE & COLOR
LED	-	20% PER EACH TYPE & COLOR
OTHER FUSE (CONTROL,...)	20% PER EACH TYPE & SIZE	20% PER EACH TYPE & SIZE



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**TABLE 2-18. MV VFD SYSTEMS**

Item	Pre-Comm. & Commissioning	Two Years
POWER FUSES	10% PER EACH TYPE & SIZE	20% PER EACH TYPE & SIZE
POWER MODULES	-	10% (CELLS, SGCT OR IGCT)
LED		20% PER EACH TYPE & COLOR
CONTROL RELAY		10% PER EACH TYPE
AIR FILTERS		10% PER EACH TYPE
PCB CONTROL BOARD		10%
LINE REACTOR		10% PER EACH APPLICATION
HIGH SPEED FUSES	20%	20%
BRAKING RESISTORS	-	20%
EMI FILTER		10% PER EACH APPLICATION
OTHER FUSES	20%	20%
SIGNAL LAMP	-	20% PER EACH TYPE & COLOR
MAIN COOLING FAN	-	10%



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**TABLE 2-19. OUTDOO SF6 CIRCUIT BREAKERS**

Item	Pre-Comm. & Commissioning	Two Years
COMPLETE POLE		10%
SPRING CHARGING GEARED MOTOR		20%
OPERATING MECHANISM AUXILIARY CONTACT		20%
ADDITIONAL TRANSMITTED CONTACT		20%
UNDER – VOLTAGE RELEASE		10%
INDICATING LAMP	20%	50%
CONTROL RELAY		10% (FOR EACH TYPE)
CT (FOR INTERNAL PROTECTION)		10%
SF6 GAS CYLINDER	-	50%
CONTROL FUSE	20%	50%



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**TABLE 2-20. POTENTIAL TRANSFORMER (P.T)**

Item	Pre-Comm. & Commissioning	Two Years
H.V FUSE	20%	50%
L.V FUSE	20%	50%



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**TABLE 2-21. RELAY & CONTROL PANEL FOR OUTDOOR POWER CB**

Item	Pre-Comm. & Commissioning	Two Years
METERING INSTRUMENT (AMMETER, VOLTMETER, MW METER, MVARMETER)	-	10% (FOR EACH TYPE)
LIGHTING LAMP	20%	20%
CONTROL AND RELAY BOARD	AUXILIARY RELAY	20%
	TIME DELAY RELAY	20%
	DC SUPERVISION RELAY	20%
SPACE HEATER	-	10%
FUSES AND LINK	50%	50%
INDICATING LAMP	20%	50%
CONTROL SWITCH	-	20%
SELECTOR SWITCH AND CHANGEOVER SWITCH	-	20%
PUSH BUTTON SWITCH	-	30%
TEST BLOCK	-	10%
ANNUNCIATION SYSTEM AND ALARM UNIT	-	10%
PROTECTION RELAYS	-	20%(FOR EACH TYPE)



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**TABLE 2-22. REMOTE CONTROL PANEL**

Item	Pre-Comm. & Commissioning	Two Years
LIGHTING LAMP	20%	20%
SPACE HEATER	-	10%
FUSE AND LINK	50%	50%
INDICATING LAMP	50%	50%
CONTROL SWITCH	-	20%
SELECTOR SWITCH	-	20%
PUSH BUTTON SWITCH	-	20%
ANNUNCIATION SYSTEM AND ALARM UNIT	-	20%
AUXILIARY RELAY	10% (FOR EACH TYPE)	20% (FOR EACH TYPE)



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**TABLE 2-23. RMU**

Item	Pre-Comm. & Commissioning	Two Years
POWER FUSE	10%	50%



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**TABLE 2-24. SEALED TYPE TRANSFORMERS**

Item	Pre-Comm. & Commissioning	Two Years
BUSHING (HV/LV)	10%	20%
HV/LV BUSHING O-RING & WASHER	20%	50%
SUDDEN PRESSURE RELAY WITH CHANGEOVER CONTACTS	-	20%
PRESSURE RELIEF DEVICE	-	10%



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**TABLE 2-25. TRANSFORMER/RECTIFIER OF CATHODIC PROTECTION**

Item	Pre-Comm. & Commissioning	Two Years
AC VOLTMETER	-	20%
ROTARY SELECTOR SWITCH	-	20%
MCCB OR SWITCH FUSE	-	20%
DC VOLTMETER	-	20%
DC AMMETER	-	20%
DC/AC FUSE (EACH)	10%	50%
DIAL TYPE THERMOMETER	-	20%
DIODE MODULE	20%	50%
CONTACTOR	10%	20%
TIMER	-	20%
SURGE ARRESTER	-	20%
CONTROL FUSE	10%	50%



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**TABLE 2-26. VACCUM CIRCUIT BREAKER(V.C.B)**

Item	Pre-Comm. & Commissioning	Two Years
VACUUM INTERRUPTER BOTTLE	-	20%
TRIPPING COIL	10%	30%
CLOSING COIL	10%	30%
SPRING CHARGING MOTOR	-	20%
SET OF SPRING CHARGING LIMIT SWITCHES	-	20%
SET OF GASKETS COMPLETE FOR ONE CIRCUIT BREAKER	-	20%



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TABLE 3 SPARE PARTS FOR INSTRUMENTS		
ITEMS	PRE-COMM. & COMMISSIONING	TWO YEARS
1-TRANSMITTER (FLOW,TEMP.,PRESS., LEVEL & ETC.)	N.A	20% OF COMPLETE UNIT PER TYPE AND RANGE (MIN 1 NO)
2-FLOW METERS	N.A	20% OF EACH TYPE & SIZE
3-SAFETY BARRIERS (GALVANIC ISOLATOR, ZENER BARRIER.)	25%	25% OF EACH TYPE (MIN 1 NO.)
4-CONTROL VALVE	N.A	
4-1 VALVE PLUG	N.A	15% OF EACH SIZE (MIN 1 NO.)
4-2 SEAT RING	N.A	25% OF EACH SIZE (MIN 1 NO.)
4-3 VALVE STEM	N.A	1 OF EACH DIAMETER.THESE VARY IN LENGTH DEPENDING ON VALVE SIZE PURCHASE THE LONGEST OF EACH DIA. THESE CAN BE CUT TO THE CORRECT SIZE.
4-4 STEM PACKING	10% (MIN 1 BOX)	3 BOXES OF EACH SIZE USED (MIN. 20%)
4-5DIAPHRAGM	10%	20% (MIN ONE OF EACH TYPE)
4-6 VALVE POSITIONER	10%	20% (MIN 1 NO.)
5-BLANK ORIFICE PLATES	N.A	FOR ALL ITEMS: 10% OF COMPLETE UNIT PER TYPE AND RANGE (MIN . ONE NO.)
6- ELECTRONIC/ DIGITAL INDICATORS	N.A	
7-PROXIMITY / LIMIT SWITCH	5%	
8-SIGNAL LAMP/LED INDICATOR	10%	
9-INSTRUMENT AIR FILTER REGULATOR	10%	25% (MIN 1 NO.)
10-GAUGE (PRESS., DIFF . PRESS. , FLOW , LEVEL, TEMP, ETC)	5%	10% OF EACH TYPE & RANGE(MIN 1 NO)
11- SWITEH (PRESS, DIFFPRESS ETO FLOW, LEVEL, TEMP,ETC)	5%	20% OF EACH TYPE.TYPE (MIN 1 NO.)
12-SOLENOID VALVE	10%	25% (MIN 1 NO.)
13-THERMOCOUPLE AND RTD	N.A	25% (MIN 1 NO.)
14-VALVE POSITIONOR	10	20% (MIN 1 NO.)
15-I/P & P/I CONVERTOR	5%	10%(MIN 1 NO.)
16-FLAME SCANNER (TURBINE, BMS, ETC)		
16-1- SENSOR	5%	20% (MIN 1 NO.)
16-2- CARD	5%	10% (MIN 1 NO.)


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TABLE 3: SPARE PARTS FOR INSTRUMENTS

ITEMS	PRE-COMM.& COMMISSIONING	TWO YEARS
17-DCS/ ESD PLC /PLC (THE FOLLOWING ITEMS FOR EACH SYSTEM)		
17-1-I/O CARD	10%	20% FOR EACH TYPE (MIN 1 FOR EACH TYPE)
17-2-COMMUNICATION INTERFACE MODULE	5%	10% FOR EACH TYPE (MIN 1 FOR EACH TYPE)
17-3-CPU	N.A	10% FOR EACH TYPE (MIN 1 FOR EACH TYPE)
17-4-POWER SUPPLY MODULE	10%	20% FOR EACH TYPE (MIN 1 FOR EACH TYPE)
17-5-FLASH MEMORY	ONE SET FOR EACH CPU.	-
17-6-MONITOR (TOUCH PANEL)	N.A	1 NO FOR EACH TYPE
18- FIELDBUS CONTROL SYSTEM (FCS)		
18-1-I/O CARD	10%	20% FOR EACH TYPE (MIN 1 FOR EACH TYPE)
18-2-COMMUNICATION INTERFACE MODULE	5%	10% FOR EACH TYPE (MIN 1 FOR EACH TYPE)
18-3-CPU	N.A	10% FOR EACH TYPE (MIN 1 FOR EACH TYPE)
18-4-POWER SUPPLY MODULE	10%	20% FOR EACH TYPE (MIN 1 FOR EACH TYPE)
18-5-FLASH MEMORY	ONE SET FOR EACH CPU.	-
18-6-MONITOR (TOUCH PANEL)	N.A	1 NO FOR EACH TYPE
18-7- H1 CARD	5%	20% (MIN. 1 NO)
19-VIBRATION AND ONLINE CONDITION MONITORING SYSTEM		
19-1-VIBRATION SENSORS ACCELEROMETER /VELOCITY	5% (MIN 1 NO. FOR EACH TYPE)	20% FOR EACH TYPE (MIN 1 NO)
19-2-RADIAL/ TRUST DISPLACEMENT VIBRATION SENSORS	5% (MIN 1 NO. FOR EACH TYPE)	20% FOR EACH TYPE (MIN 1 NO)
19-3- POWER SUPPLY	5% (MIN 1 NO. FOR EACH TYPE)	10% FOR EACH TYPE (MIN 1 NO)
19-4-KEY PHASOR PROXIMITY VIBRATION SENSOR	5% (MIN 1 NO. FOR EACH TYPE)	10% FOR EACH TYPE (MIN 1 NO)
19-5-VIBRATION (PROXIMATOR)	5% (MIN 1 NO. FOR EACH TYPE)	20% FOR EACH TYPE (MIN 1 NO)
19-6-VIBRATION PROBE EXTENSION CABLE	5% (MIN 1 NO. FOR EACH TYPE)	20% FOR EACH TYPE (MIN 1 NO)
19-7- COMMUNICATION MODULE	5% (MIN 1 NO. FOR EACH TYPE)	10% FOR EACH TYPE (MIN 1 NO)



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TABLE 3 : SPARE PARTS FOR INSTRUMENTS		
ITEMS	PRE-COMM. & COMMISSIONING	TWO YEARS
19-8-VIBRATION /CONDITION MONITORING CARDS	5% FOR EACH TYPE (MIN 1 NO.)	20%FOR EACH TYPE (MIN 1 NO)
20-OVERSPEED PROTECTION SYSTEM		
20-1-SPEED PICK UP SENSOR	5%	20% FOR EACH TYPE (MIN 1 NO)
20-2-POWER SUPPLY	5%	20% FOR EACH TYPE (MIN 1 NO)
20-3 I/O CARD (ANALOUGE, DIGITAL, RELAY CARD)	5%	20% FOR EACH TYPE (MIN 1 NO)
21-ANALYZERS		
21-1-SAMPLE FILTER	NA	10% (MIN ONE SET)
21-2-PRESSURE REGULATOR	NA	10% (MIN ONE SET)
21-3- GAUGES	N.A	10% (MIN ONE SET)
21-4-FLOW NETER	N.A	10% (MIN ONE SET)
21-5- SENSORS	N.A	10% (MIN ONE SET)
22- Hydraulic Actuator& PILOT For SSV		
22-1- REPAIR KIT FOR ACTUATOR ASSEMBLY	5% FOR EACH TYPE (MIN 1 SET)	20% FOR EACH TYPE (MIN 1 SET)
22-2- PILOTS (B,D,M,L)	N.A	10% FOR EACH TYPE (MIN 1 SET)

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<b>TABLE 3: SPARE PARTS FOR INSTRUMENTS</b>		
<b>ITEMS</b>	<b>PRE-COMM.&amp; COMMISSIONING</b>	<b>TWO YEARS</b>
<b>23- LBV ACTUATOR &amp; CONTROL SYSTEM</b>		
23-1-MAINTENANCE KIT	20%	20%
23-2-PILOTS	N.A	20% FOR EACH TYPE
<b>24-MOTOR OPERATED ACTUATOR</b>		
24-1-COMPREHENSIVE MAINTENANCE KIT	5% FOR EACH TYPE (MIN 1 SET)	20% OF EACH TYPE (MIN ONE SET.)
24-2-COMPREHENSIVE ELECTRONICS ASSEMBLY	5% FOR EACH TYPE (MIN 1 SET)	20% OF EACH TYPE (MIN ONE SET.)
<b>25- ANNUNCIATOR</b>		
25-1- SIGNAL LAMP/LED	10%	50% (MIN 1 NO.)
25-2- FLASHER CARD	5%	10% (MIN 1 NO.)
25-3- SIGNAL CARD	5%	20% (MIN 1 NO.)
25-4-HORN	N.A	10% (MIN 1 NO.)
25-5-PUSH BUTTON	N.A	10% (MIN 1 NO.)
25-6-MAIN BOARD	N.A	1 NO
<b>26- CONSUMABLE ITEMS</b>		
26-1-PRINTER PAPER	30 BOX	20 BOX
26-2- PRINTER INK CARTRIDGE	20%	10%
26-3-PRINTER TONER	20%	10%
26-4-RECORDER CHART (STRIP)	5 ROLL	200 ROLL
26-5-RECORDER CHART (CIRCULAR)	2 BOX	20 BOX
26-6-FILTER OF REGULATOR	50%	50%
26-7-FUSE (ALL TYPE)	50%	50%
26-8-GLASS OF MANUAL CALL POINT (MCP)	30%	15%
26-9- RECORDER PEN	5 NO. OF EACH TYPE	200 NO. OF EACH TYPE
26-10- TERMINAL	20%	10%
<b>27- F&amp;G SYSTEM</b>		
27-1-ELECTRONIC CARDS (CPU , POWER SUPPLY, COMMUNICATION MODULE, I/O & ETC)	5%	20% OF EACH CARD (MIN 1 NO.)
27-2- DETECTORS (SMOKE, HEAT, FLAME, GAS)	N.A	20% OF EACH TYPE (MIN 1 NO.)
27-3- HORN /SOUNDER /BELL	N.A	10% OF EACH TYPE (MIN 1 NO.)
27-4-RESETABLE PUSH BUTTON	N.A	10% OF EACH TYPE (MIN 1 NO.)
27-5- FLASHER BEACON	N.A	10% OF EACH TYPE (MIN 1 NO.)
27-6-MANUAL CALL POINTS	5% OF EACH TYPE (MIN 1 NO.)	20% OF EACH TYPE (MIN 1 NO.)
<b>28- ON/ OFF VALVE (XV, ESD VALVE, BDV, ETC.)</b>		
28-1-MAINTENANCE KIT	5% OF EACH TYPE (MIN 1 NO.)	20% OF EACH TYPE (MIN 1 NO.)

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28-2-SOLENOID VALVE	5% OF EACH TYPE (MIN 1 NO.)	20% OF EACH TYPE (MIN 1 NO.)
28-3-REGULATOR	5% OF EACH TYPE (MIN 1 NO.)	20% OF EACH TYPE (MIN 1 NO.)
28-4-LIMIT SWITCH	5% OF EACH TYPE (MIN 1 NO.)	20% OF EACH TYPE (MIN 1 NO.)

### Notes:

- (a) The listed parts are the principal parts only. Other parts, shall be considered if recommended by vendors.
- (b) Consumable parts for two years of operation shall be considered and supplied by contractor
- (c) (%) means the percentage of total number of parts are used .

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	<p>شماره مدرک : E&amp;C-QC-SP-1</p>
	<p>صفحه : ۶۰ از ۶۲</p>
	<p>ویرایش : نهایی</p>

ATTACHMENT 2  
GUIDELINES FOR THE COMPILATION OF SPARE PARTS  
INTERCHANGEABILITY RECORD (SPIR)

The manufacturer / supplier shall complete the following parts of the SPIR form as per listed sequence and in the English language:

Line 1: PLANT registration/ item number or tag number of equipment/ instruments, etc. as stated on requisitions and / or Purchase Orders.

Line 2: Mode, type or other identification of equipment / instruments, etc. ordered.

Line 3: Serial number of each equipment/ instruments, etc. ordered.

Line 6: Purchase Order number reference of equipment/ instruments, etc.

Line 6a: Unit of measure, i.e. No., set, pair, kg, roll, etc.

Line 4: Number of identical equipment, etc. of particular model or type being supplied against Purchase Order number mentioned under line 6.


Line 8: Parts description of all component parts considered by supplier as being required for maintenance of equipment, etc. listed in lines 1, 2 and 3. However, all items specified in the appropriate equipment list shall be shown separately.

Col 9: Drawing number / part number as per supplier's parts list of drawing.

Col 10: Part identification number shoeing interchangeability within equipment manufacturer's organization.

Note: Identical parts, regardless of whether they have the same part number of drawing number , should be shown only once (see also line 5)

Col. 11: Material specification of parts listed in column 8.

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Line 5: Enter in appropriate square the number of parts ( listed in column) fitted in each applicable unit. For groups of identical units, denote quantity per unit below quantity shown in line 4.

Col. 7: Total number of identical parts listed in column 8 for all equipment, etc. For identical units multiply quantity in 5 by number in same column in line 4 and enter overall total of each line in column 7.

Col. 12: Total spare parts recommended for 2 years operation and commissioning period.

Col. 18: Unit price (up to two decimals) for recommended spare parts of column 12.

Col. 20: Original identification number for all items for third party manufacture (bought-out items) such as : ball/ - roller bearings, mechanical seals, couplings, bearing lock nuts, bearing lock washers, V-bells, bolts/nuts, gaskets, O-rings, and the like. These items should be fully identified by manufacturers' numbers, types, sizes, etc.

V-for: Vital equipment, a breakdown of which would mean an immediate and serious interruption of vital operations in field or plant and with which no risk in the ordering and stocking of spare parts can be justified.

E-for: Essential equipment, engaged in primary operations, but with which a calculated risk can be taken in ordering an stocking of spare parts.


A-for: Auxiliary, general purpose and stand-by equipment, for secondary operations, the temporary lack of spare parts would not have a serious effect.

Under this heading also comes the equipment of which there is a large number of units in used, thus ensuring a sufficient degree of protection in case of failure of one or more units.

The Owner MESC project team should complete the following part of the SPIR form

Col.16: For allocation of the final MESC number.

Col.17: For the classification of spare parts, i.e.:

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	<p>صفحه : ۶۲ از ۶۲</p>	<p>ویرایش : نهایی</p>