





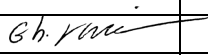






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	Spare Part Procedure						MC: 	
Owner Document Number :	OWNER Project No. 3944	Originator SZP	Discipline PL	Unit 000	Type PRC	Seq. No 0010	Rev.: 02	Page 1 of 30

Spare Part Procedure

Rev.	Date	Purpose of Issue	Prepared	Checked	Approved	AC Code
02	11-Jan-2021	Final Issue				
01	29-Dec-2020	Issued For Approval(OCI)	A.Safabakhsh	N.Janlou	Gh.Vaseei	AN
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Tabulation of Revised Pages

Page	Revision				Page	Revision				Page	Revision			
	00	01	02											
1	X	X	X											
2	X	X	X											
3	X	X	X											
4	X	X	X											
5	X		X											
6	X	X												
7	X	X												
8	X	X												
9	X	X												
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CONTRACTOR:  SAZEH CONSULTANTS Engineering & Construction  SAZEPAD TEHRAN Sazeh Engineering & Construction	300 KT POLYETHYLENE PLANT ARYA SASOL POLYMER COMPANY (ASPC)						OWNER:  شرکت پلیمر آریا ساسول ARYA SASOL POLYMER COMPANY تهران - ۱۹۸۴۱	
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1. Introduction



Arya Sasol Polymer Company (ASPC) as OWNER has planned to build Polyethylene Plant with design capacity of 300,000 Ton annually at existing ASPC complex located in Pars Special Economic Energy, Assaluyeh, Bushehr Province of the Islamic Republic of Iran.

The Plant consists of the facility to produce MDPE (Medium Density Polyethylene), HDPE (High Density Polyethylene), Metallocene Linear Low density(mLLDPE),and Metallocene Medium Density(mMDPE) as PRODUCT based on Uhde/Sazeh Basic Design and Available Detail Engineering Package,and ASPC Improvement list and industrial buildings (such as Control Building, Substation, Laboratory and Chemical Warehouse).Utilities will be provided from OSBL via Mobin Petrochemical Company.

2. Purpose

This document provides instructions to the vendors on scope of spare parts and preparation and handling of the related documents. These instructions represent the minimum requirements. The objective of this document is to ensure that the scope of spare parts and preparation and handling of the related documents are in accordance with the requirements of the above mentioned project.





3. Applicable Documents

3944-SZP-PL-000-PRC-0003 : Shipping and Packing Procedure

4. Definitions

4.1 Project Definitions

Project Title	:	300KTNEW POLYETHYLENE PLANT
PLANT	:	Means an integrated New Polyethylene Plant with Design Capacity of Product consisting of Process Unit/Units, Utilities and Offsite Facilities and interconnections.
Project	:	Means the performance of all work for implementation of the PLANT inclusive of all WORK.
OWNER	:	Arya Sasol Polymer Company (ASPC)
CONTRACT	:	Agreement Between OWNER and its CONTRACTOR
MANAGING CONTRACTING(MC)	:	NAMVARAN Consulting Engineers; Managers (NCE)
CONTRACTOR	:	Consortium of SAZEH Consultants and SAZEHPAD TEHRAN (SZP)

CONTRACTOR:  SAZEH CONSULTANTS Engineering & Construction  SAZEPAD TEHRAN SPECIAL ECONOMIC ZONE	300 KT POLYETHYLENE PLANT ARYA SASOL POLYMER COMPANY (ASPC)						OWNER:  شرکت پلیمر آریا ساسول ARYA SASOL POLYMER COMPANY تهرانتهران	
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4.2 Specific Definitions

PURCHASER	:	The party who will place order with VENDOR.
VENDOR	:	Any firm, company or organization engaged by PURCHASER for the provision of Equipment/Material to the Project
Supplier	:	all other companies/organizations which are supposed to supply materials, equipment, labor or services required for the realization of the order
Shall	:	Mandatory requirements
Should	:	Recommended or advisory requirements
May	:	Optional
SPLIR	:	Spare Part List and Interchangeability Record
MESC	:	Material and Equipment Standard Code

5. Criteria for Vendor's Recommendation

5.1 General Criteria

5.1.1 Type of Spare Parts

VENDOR is requested to recommend following spare parts:

- ◆ Erection, Pre-commissioning, Commissioning and Start-up Spare Part; and
- ◆ Two Years of Operation Spare Parts.
- ◆ Capital Spare Parts





5.1.2 Minimum Quantities

The minimum quantities of spare parts expected by OWNER as per CONTRACT are defined in Section 6 below.

VENDOR is responsible for considering at least these minimum quantities. In case of any discrepancies, the PURCHASER has to be advised in writing.

For catalysts, adsorbents, resins, lubricants, chemicals and etc, shelf time (maximum allowable period for storage) shall be specified and provided along with respective bid analysis.

VENDOR spare parts recommendations shall be completed with prices, complete parts list and sectional drawings showing interchange ability of parts, standard items (for example bearings oil seals, gaskets, packings, valves, fittings, etc) and shall be identified with manufacturers, size, catalogues or part number and description.

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5.1.3 Information Submission

The recommended spare parts per type of spare parts and for each requisition and subdivided in itemized equipment must be submitted to the PURCHASER.

5.1.4 Change in Scope

In case of itemized equipment being re-engineered after purchase order placement the technical recommendation of spare parts by VENDOR also has to be updated and resubmitted for approval.

For Erection, Pre-commissioning, Commissioning, Start-up and Capital Spare Parts additional cost related to this re-engineering and update will not be accepted by PURCHASER and has to be borne by VENDOR. For Two Years of Operation Spare Parts it can be agreed between VENDOR and PURCHASER to supply the updated technical recommendation at the latest with the submission of VENDOR drawings for approval.

5.1.5 SPLIR-Format

It is mandatory that the vendor's spare parts recommendation is summarized in the SPLIR Form. The SPLIR has to be issued and shall be completed by VENDOR in the same format as supplied by PURCHASER.

5.2 Specific Criteria

5.2.1 For Erection, Pre-commissioning, Commissioning and Start-up Spare Parts





Vendor recommendation and quotation considering Section 6 of this engineering specification has to be submitted together with the main equipment quotation. The fully completed SPLIR forms and additional supporting vendor documents like drawings, catalogues and sketches also have to be supplied to clearly identify those spare parts.

Spare parts will be ordered, manufactured and delivered together with the main equipment and all conditions relevant to the main equipment purchase order will apply.





Additional cost resulting from VENDOR re-engineering and additional spare parts being necessary to comply with chapter 6 have to be borne fully by VENDOR.

Below table shows the minimum quantity of spare parts which should be recommended and reconfirmed or advised by vendors based on their experience. For others items which are not mentioned in below table, manufacturer recommendation shall be followed.





1.Furnaces	
Not applicable	
2.Exchangers, Reactors,Drums,Tanks,Vessels,Column	
Gaskets for Girth Flange, M/H& H/H	100%
Stud Bolts and Nuts for the above	5% (Min. 2 Sets)
Field Installed Trays:	
Bolts and Nuts	15% (Min. 2 Sets)
Washers (metal and asbestos)	20% (Min. 2 Sets)
Tray Clamps	10% (Min. 2 Sets)

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Asb.Rope and Tape	25% (Min. 2 Sets)
Field Installed Internals, Piping and Other Bolted Internals:	
Stud Bolts (Alloy and CS)	10% (Min. 2 Sets)
Washers and Nuts	10% (Min. 2 Sets)
Packing	
Inert Balls	15%
Raschig Rings/Slotted Rings	15%
Fan for Air Cooler:	
Gaskets Sets and O-Rings	100%
3.Steam Generator	
Not applicable	
4.Steel Structure	
Bridge Crane:	
Bolts and Washers	15%
Gashels	10%
Contactors	5%
Tension Springs	10%
Fuse Elements	10%
Gaskets	25%
Oil Seals	25%
Relays	5%
Collectors	1 Set Each Size
Contact Shoes	1 Set Each Size
Limit Switches	1 Set Each Size
5.Rotating Equipment	
Pump /Centrifugal/Rotary	
Gland Packing	200% Per Mat's/Size
Mechanical Seals	100% Per Model/Type
Carbon Teflon Rings	500% Per Model/Type
Gasket Sets and O-Rings	100%
Agitator	
Gland Packing	200% Per Mat's/Size
Mechanical Seals	100% Per Model/Type
Carbon Teflon Rings	500% Per Model/Type
Gasket Sets and O-Rings	100%
Compressor	
Gasket Sets and O-Rings	100%
Fan	
Gasket Sets and O-Rings	100%
Gland Packing	100%

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Diesel Engine	
Gaskets and Packing	100%
Filter Element for Oil/Fuel/Air	1 Set(Each Size/Material)
Electrical equipment: Instrumentation: <input type="checkbox"/> Control panel <input type="checkbox"/> Board instruments Field Instruments Field Transmitters	See item 9 See item 10 See Item 10 See item 10 See item 10 See item 10
6.HVAC	
Bolts, nuts...	5%
Rotating EQUIPMENT	See Item 5
Filter Element	1 Set (Each Size/Material)
Electrical	See Item 9
Instrumentation:	
<input type="checkbox"/> Control Panel	See Item 10
<input type="checkbox"/> Board Instruments	See Item 10
<input type="checkbox"/> Field Transmitters	See Item 10
<input type="checkbox"/> Field Instruments	See Item 10
<input type="checkbox"/> Others	5%
Piping/duct	
7.Special Equipment	
Heat Exchanger	See Item 2
Rotating EQUIPMENT	See Item 5
Filter Element	1 Set
	(Each Size/Material)
Electrical	See Item 9
Instrumentation:	
<input type="checkbox"/> Control Panel	See Item 10

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<input type="checkbox"/> Board Instruments	See Item 10		
<input type="checkbox"/> Field Transmitters	See Item 10		
<input type="checkbox"/> Field Instruments	See Item 10		
8.Piping			
Gaskets, all sizes	20%		
Stud Bolts less than 1"	15%		
Stud Bolts 1" to 1 7/8"	10%		
Stud Bolts 2" and over	5%		
Coating and Wrapping	10%		
	Carbon Steel	Alloy/SS	Cast Iron
Pipe 2" and below	10%	4%	0%
Pipe 3" to 6"	5%	2%	5%
Pipe 8" and over	2%	1%	5%
Valves screwed & welded 2" and below (*)	10%	5%	0%
Flanged valves 3" to 10" (*)	2%	2%	0%
Flanged valves over 10" (*)	0%	0%	0%
Flanged flanges up to 12" (*)	5%	3%	0%
Flanged 14" and over (*)	2%	2%	0%
Fittings welded up to 2" (*)	10%	6%	0%
Fittings welded 2 1/2" to 10" (*)	5%	3%	0%
Fittings welded 12" and over (*)	3%	2%	0%
Fittings Screwed up to 2" (*)	10%	5%	0%
Fittings Screwed 3" and over (*)	5%	3%	0%
Fittings flanged all sizes (*)	5%	3%	0%
Hub and Spigot 3" to 12" (*)	0%	0%	5%
Hub and Spigot 14" and over (*)	0%	0%	3%
Note: (*) For this Parts with (*), where the percent gives the quantity consisting of a whole number plus a decimal less than 0.5, the decimal portion will be dropped; where the decimal portion is 0.5 and more, the next higher whole number quantity will be selected.			
9.Electrical Equipment			
Switchgear, Motor Control Centers MV/LV			
<input type="checkbox"/> Fuse Elements	50%		
<input type="checkbox"/> Bulb for Signal Lamps	50%		
Local Control Panels and Control Stations	50%		

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<input type="checkbox"/> Fuse Elements <input type="checkbox"/> Bulb for Signal Lamps	50%
Electric Motors <input type="checkbox"/> Grease Nipples where applicable	10%
Lighting Fixtures	1%
Flag Relay	2%
Time Relay	2%
Terminal Block	2%
Auxiliary Relays	1%
Moving Contacts	15%
Fixed Contact	10%
Coils for Contractors	10%
Bucholz Relay	1 of each type and size
Thermometer	10%
Local Control Station <ul style="list-style-type: none"> • Ammeter • Pushbutton • Selector switch 	5% 5% 5% 5%
UPS	
<ul style="list-style-type: none"> • Fuses • MCB (miniature circuit breaker) • SCR • DIOD • Transistor • Control cards • Signaling lamps • Batteries 	20% 10% 20% 10% 20% one per each type 10% 5%
Battery Charger <ul style="list-style-type: none"> • Fuse • MCB (miniature circuit breaker) • SCR • DIOD • Transistor • Control cards • Signaling lamps • Batteries 	10% 10% 10% 10% 10% one per each type 10% 5%

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Fire Alarm System	*
Telephone System	*
Paging System	*
Radio System	*
Sockets (400 V, 230 V, 110 V, 24 V)	5%
Plugs (400 V, 230 V, 110 V, 24 V)	5%
<p>Note 1 : These are the spare parts, which will be required for commissioning and start-up. VENDOR shall recommend the spares based on their experience.</p> <p>Note 2: For electrical equipment, which has not been mentioned in item 9 and needs commissioning spare parts, CONTACTOR shall be consider spare parts for them, the quantities for such spare parts then be APPROVED by OWNER.</p> <p>Note 3: All special tools, equipment and spare parts required for commissioning and start-up shall be provided</p> <p>Note 4: * These are the spare parts that VENDORS shall recommend based on their experience</p>	
10.Instrumentation	
Control Panel	
<ul style="list-style-type: none"> • Bulbs for Signal Lamps • Fuse Elements 	50% 50%
Board Instruments	
<ul style="list-style-type: none"> • Fuse Elements • Chart Paper for Recorders • Ink for or Recorders • Pens for Recorders 	50% 3 Boxes Each Type 7 Sets Each Type 50%
Field Transmitters	
<ul style="list-style-type: none"> • Gasket 	15%
Field Instruments	
<ul style="list-style-type: none"> • Air Pressure Regulators • Temperature Indicators • Pressure Gauges 	10% 10% 10%
Solenoid Valves	10% Each Type
Valve positioners	10% Each Type
Cable - Single Pair	20%
Cable-Multi Pair	15%

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Cable Glands	20%
Junction Boxes-Large	1 min
Pipe and Tube	10%
Fittings, all Type	10%
Valves	20%
Manifold Valves	10%
Cable Tray	20%
FCS (Field bus control system) <ul style="list-style-type: none"> • Bulbs for Signal Lamps • Fuse Elements • Printer Ribbon • Blank Floppy Disks/Magnetic Tape Cartridge 	50% 50% 10 Sets Each Type 10 Pieces
Gas Chromatograph Filter Elements Calibration Gas Cylinders Standard Gas Cylinders Other Gas Cylinders	10% 1 Cylinder(100 liters) Each Type 1 Cylinder(100 liters) Each Type 1 Cylinder(100 liters) Each Type
Other Analyzers <ul style="list-style-type: none"> • Filter Elements • Calibration Gas Cylinders • Standard Gas Cylinders • Other Gas Cylinders • Annunciator windows 	10% 1 Cylinder(100 liters) Each Type 1 Cylinder(100 liters) Each Type 1 Cylinder(100 liters) Each Type 20% with logic cards
11. and Insulation <ul style="list-style-type: none"> • Paint • Insulation Material • Insulation Band and Seal • Insulating Cement • Insulation Sheet Metal • Insulation Wire 	10% 10% 10% 10% 15% 10%
12. Utility Equipment	
Heat Exchanger, Vessel, Tank and Tower	See Item 2
Rotating Equipment	See Item 5
Filter Elements	1 Set Each Size/Material
Piping	0%
Electrical	See Item 9
Instrumentation:	

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<input type="checkbox"/> Control Panel	See Item10
<input type="checkbox"/> Board Instruments	See Item 10
<input type="checkbox"/> Field Instruments	See Item 10
<input type="checkbox"/> Others	0%

5.2.2 For Two Years Operation Spare Parts

The SPLIR form has to be fully completed by the VENDOR and separately quoted with the main equipment quotation. The quotation for Two Years Operation Spare Parts have to be submitted together with the offer of the main equipment (or, if agreed, at the latest with the submission of vendor drawings for approval) to PURCHASER. Additional supporting vendor documents like parts lists, drawings, catalogues and sketches, etc., as defined in Section 9, have to be supplied to clearly identify those spare parts.

PURCHASER will submit these documents to OWNER and OWNER will select the "quantity to be supplied". PURCHASER will, based on OWNER's approval, update column 15 and 17 of the SPLIR form, as explained in Section 9 below, and issue the purchase order to VENDOR.

Spare Parts for Two Years Operation will be ordered, manufactured and delivered separately to the main equipment; however it is desirable to be shipped with the main equipment.

5.2.2.1 Table of Minimum Two year of Operation Spare Parts as per CONTRACT





5.2.2.1.1 General

The necessary and sufficient two years Spare Parts include those parts that are normally required to maintain the PROCESS UNITS/UNITS in a satisfactory working condition over a period of two years of continuous operation after plant start-up.

Provision of Two Years Spare Parts is VENDOR's responsibility and shall be included in to the main equipment quotation; however separately quoted.

5.2.2.1.2 Spare parts for centrifugal pumps.

Number of Pumps Using Part	1	2	3	4	5	6	More
Spare items	Qty	Qty	Qty	Qty	Qty	Qty	
Shaft, impeller, Throat Bushing	1	1	1	2	2	2	30% of No. of Pumps

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Shaft Sleeve, Bearing Set, Impellers and case Wearing Rings	1	1	2	2	3	3	50% of No. of Pumps
Gasket Sets, Packings, Mechanical Seal, Non-metallic faces, O-rings, Gaskets, Springs	1	2	3	4	5	6	100% of No. of Pumps
Mechanical Seal, Metallic Faces	1	2	3	4	5	6	100% of No. of Pumps
Mechanical Seal Assembly(No/unit)	1	1	2	2	3	3	50% of No. of Pumps

NOTES:

- The parts listed above are the principal parts only. Other parts, such as impeller special bolts etc. shall be considered for recommendation in quantities consistent with the above table.
- Spare impellers shall be ordered in the maximum diameters and will be balanced in the manufacturer's shop.
- Quantities listed above are based on one part per pump. If the pump has more than one, the number of parts shall be modified accordingly.
- For rotary pumps, provide a matching set of rotors with shaft.

5.2.2.1.3 Spare parts for steam turbines and expanders.

No. of machines	Steam Turbines		Expanders (Rotary)	
	1	2	1	2
Spare items	Qty	Qty	Qty	Qty
Diaphragms	1 set	1 set	1 set	1 set
Nozzles	1 set	1 set	-	-
Packing and Labyrinths	200%	200%	200%	200%
Radial Bearings	2 sets	3 sets	2 sets	3 sets
Thrust Bearings	100%	100%	100%	100%
Thrust Bearings Pads	100%	100%	100%	100%
Governor	1	1	1	1
Oil Filter Elements	10	10	10	10
Couplings	1	1	1	1
Instrument Parts	1 set	2 sets	1 set	1 set
Gaskets	2 sets	4 sets	2 sets	4 sets
Trip and throttle valve parts	1 set	1 set	1 set	1 set
Accumulator Bladder	1	2	1	2
Ejector nozzles	1	2	-	-

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Oil Cooler Bundle	1	1	1	1
Oil Pump	1	1	1	1
Oil Mist Elements	1	1	-	-
Transition Piece	1	1	-	-

Notes:

- (a) Quantities for washable oil filter elements can be reduced to 5.
- (b) The parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.





5.2.2.1.4 Spare parts for compressors.

No. of Machines	Centrifugal		Axial		Rotary	
	1	2	1	2	1	2
Spare Items	Qty	Qty	Qty	Qty	Qty	Qty
Seals	100 %	100 %	100 %	100 %	100 %	100 %
Radial Bearings	100 %	100 %	100 %	100 %	100 %	100 %
Thrust Bearings	100 %	100 %	100 %	100 %	100 %	100 %
Thrust Bearing Pads (Sets)	1	2	1	2	1	2
Coupling	1	1	1	1	1	1
Oil Filter Elements (a)	10	10	10	10	10	10
Instrument Parts (Sets)	1	2	1	2	2	2
Accumulator Bladder Labyrinths	100 %	100 %	100 %	100 %	100 %	100 %
Gaskets + O-rings (sets)	2	4	2	4	2	4
Oil Pumps	1	1	1	1	1	1
Timing Gears (sets)	-	-	-	-	1	1
Flushing Nozzles Oil Cooler (Sets)	1	1	-	-	-	-

NOTES:

- a) Quantities for washable oil filter elements can be reduced to 5.
- b) The Parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.





5.2.2.1.5 Spare parts for reciprocating compressors.

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No. of Machines	1	2	3
Spare Item	Qty	Qty	Qty
Pistons	1 set	1 set	1 set
Cylinder Liners	1 set	1 set	1 set
Valves	100%	100%	100%
Valves Parts (plates, springs, etc)	3 sets	6 sets	9 sets
Piston Rods	1 set	1 set	1 set
Packings	100%	100%	200%
Connecting rods (each type)	1	1	1
Cross Heads	100 %	100 %	100 %
Cross head shoes	100%	100%	100%
Bearings	100%	100 %	100 %
Piston Rings	2 sets	4 sets	6 sets
Unloader Device Parts	1 set each type	2 sets each type	3 sets each type
Lube Pumps	1	1	1
Lubricators	1 / 2 set	1 set	1 set
Cross Head Pins	100 %	100 %	100 %
Relief Valve Parts	100 %	100 %	100 %
Spec. Bolts and Nuts	1 each type	1 each type	1 each type
Couplings	1	1	1
Instrument Parts	1	2	2
Oil Filter Refills	2	4	6
O-Rings/Gaskets	2 sets	4 sets	6 sets
Unloader Assemblies	1	1	1
Cooler bundle for integral frame mounted intercoolers	1	1	1
Notes: The parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.			

5.2.2.1.6 Spare parts for gear units.

No. of machines	1	2
Spare Item	Qty	Qty
Radial Bearings	100 %	100 %
Couplings	1	1

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Quill Shafts	1	1
Labyrinths	100 %	100 %
Gaskets	2 sets	4 sets
Instrument Parts	1 set	2 sets
Thrust Bearings	100 %	100 %
Thrust Bearing Pads	1 set	2 sets
Notes: The parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.		

5.2.2.1.7 Spare parts for jet ejectors.





Spare items	Quantities
Nozzles	1 each size
Diffusers	1 each size

5.2.2.1.8 Spare parts for electrical equipment.





Spare Item	Quantities
1) MV Switchgear and motor control meter center:	
MV Fuses	10 %
Protecting and Flag Relay	2 %
Time Relay	2 %
Lamps	10 %
Space Heaters	10 %
LV Fuses	10 %
Terminal Blocks	2 %
Auxiliary Relays	1 %
Moving / fixed contacts (each type)	15 %
Circuit Breakers	10 %
Contactors (each type)	10 %

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Spare Item	Quantities
Metering	10 %
CT	30 %
PT	30 %
2) LV Switchgear and Motor Control Center:	
LV Fuses	10 %
Time Delayed Relays	8 %
Signal Lamps and Bulbs	10 %
Space Heaters	10 %
Terminal Blocks	7 %
Auxiliary Relays	1 %
Protection Relay	10%
PTC Sensing Relay	5%
Coil Contactors (each type)	20%
Thermal overload Relays (each type)	20%
Isolators for each type	21 %
Current Setting	11 %
Motor Circuit Breakers Complete Unit for Each Type & size	10 %
Moving / fixed contacts (each type)	15 %
Metering	10 %
CT	30 %
PT	30 %
Main circuit breaker (incoming and bus tie)	one per each type
3) Transformers:	
Bucholz Relays	one per each type and size
Thermometer	10 %
Bushing (HV, LV)	50 %
Measuring and control devices	20 %
CT of neutral resistor	10 %
4) Power Material for welding socket outlet	
a) Sockets 400 V AC	10 %
b) Plugs 400 V AC	15 %
c) local control stations	5 %
5) Lighting Materials industrial and EX type	
a) Switches	10 %
b) Fuses	30 %

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Spare Item	Quantities					
	1	2	3	4	5	more
c) Sockets (230 V, 110 V, 24 V)	10 %					
d) Plugs (230 V, 110 V, 24 V)	10 %					
e) Lighting Fixtures	10 %					
f) Ballast Lamps	5 %					
g) Lamps	20 %					
6) Motors						
No. of machines	1	2	3	4	5	more
Spare item	Qty	Qty	Qty	Qty	Qty	Qty
Set of bearings (NDE & DE sides)	1	1	1	2	2	40 %
Fan, terminal blocks, space heater (MV) per type	5 %	5 %	5 %	5 %	5 %	5 %
Grease Nipples Where Applicable	10%					
RTD (for large motors)	5 %					
7) UPS & VFD systems						
Fuses	30 %					
MCB (miniature circuit breaker)	15 %					
SCR (at least one per each type)	30 %					
Signaling lamps and protection device	15 %					
DIODE (at least one per each type)	10 %					
Transistor (at least one per each type)	30 %					
Control cards	one per each type					
Batteries	5 %					
Isolator switch (make before break)	one per each type					
8) Battery charger						
Fuse	30 %					
MCB	15 %					
SCR (at least one per each type)	30 %					
DIODE (at least one per each type)	10 %					
Signaling lamps	15 %					
Control cards	one per each type					
Batteries	5 %					
10) Telephone system	(*)					
11) Paging system	(*)					
12) Radio system	(*)					
13) Fire alarm system	(*)					
14) Neutral grounding system	(*)					
15) Bus duct	(*)					
16) Closed circuit TV system	(*)					

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Spare Item	Quantities
17) Diesel Generator	(*)
18) PDCS system	(*)
Notes (*) These are the spare parts required for two YEARS operation. VENDOR shall recommend the spares based on their experience. The Quantities indicated are only preliminary estimation, so the firm quantities will be specified later in conjunction with recommendations of EQUIPMENT VENDORS. The quantities which shall be ordered by CONTRACTOR shall be APPROVED by OWNER. Electrical EQUIPMENT which has not been mentioned in this table and needs spare parts, CONTRACTOR shall be consider spare parts for them, the quantities for such spare parts shall then be APPROVED by OWNER.	

5.2.2.1.9 Spare parts for instruments.

Spare items	Quantities
Flow instruments	To be determined in conjunction with the EQUIPMENT VENDOR (based on VENDOR'S experience on similar type of PLANT)
Level instruments	- " -
Temperature instruments	- " -
Pressure Instruments	- " -
Analyzers	- " -
Control valves: valve bodies	None unless service is corrosive or erosive. For corrosive or erosive service, shall be determined in conjunction with the EQUIPMENT VENDOR.
Valve plugs	15 % (min 1) of each type and size
Seat rings	25 % (min 1) of each type and size
Valve stems	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.
Stem packings	20 % (min 3 boxes) of each type and size
Grease	20 % (min 3 boxes) of each type and size
Diaphragms	20 % (min 1) of each type and size
Blank orifice plates	10 % (min 1) of each type and size
Dial thermometers	- " -
Manual loading stations	- " -
Instrument air filters (regulation sets)	- " -

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Spare items	Quantities
Pressure gauges	- " -
Pressure switches	- " -
Plug-in assemblies for elect. instr.	- " -
Plug-in assemblies for pneum. instr.	- " -
Seal, condensate and vent pots	- " -
Solenoid and trip valves	- " -
Thermocouples	- " -
Thermowells	- " -
Signal lights	- " -
Valve positioners	- " -
I/P convertors	- " -
FCS/ESD/PLC	
For each system the following items:	
◆ I/O cards	5 % min 1 for each type
◆ main cards	one set
◆ power supply (AC If any)	one set
◆ power supply (DC, of any)	one set
On-line gas chromatographs:	
◆ main mother board	one set
◆ column	One per type

* PRESSURE RELIEF VALVES





- Disk, Nozzle, Spring, stem: 5% of each type minimum one
- Bellows: 10% of each type, minimum one
- Gasket: 10% of each type, minimum one

- RUPTURE DISKS





- Disks: 3 nos. for each tag.

5.2.2.1.10 Spare parts for pressure vessels, heat exchangers, towers, Reactors and Tanks.

Spare items	Quantities
1. Heat Exchangers-Shell and Tube: (U Type included)	
◆ Tubes	Straight tubes sufficient to re tube the largest bundle of, each tube size and material.

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◆ Bolts	(Special or Alloy) of each exchanger minimum one number.						
◆ Gaskets	200 %						
2. Pressure Vessels							
◆ Gaskets	200 %						
◆ Bolts	10 % (Special, Alloy or size 2" diam or greater), minimum one number.						
3. Air Cooled Exchangers							
◆ Plugs	Steel 1 %; Non-ferrous 2 % (min one number)						
◆ Plug gaskets	5 % (min one number)						
◆ Cover plate gaskets	100 %						
◆ Tube support boxes	10 % (min one number)						
4. Number of Air-fin Coolers Using Part	1	2	3	4	5	6	7 or more
Spare Item	Qty	Qty	Qty	Qty	Qty	Qty	Qty
a) V-Belts-Sheaves (Driven & Driver)	0	0	0	0	0	0	1
◆ Set of Belts	1	2	3	4	5	6	100%
b) Fan Shaft Bearing (Upper & Lower)	1	1	1	2	2	3	50% of No of Air Fins
c) Speed Reducers (Gear Box)							
◆ Shaft & pinion	1	1	1	2	2	3	30% of No of Air Fins
◆ Bearing Set O-Rings, Seals, Lockwashers, Locknuts	1	1	1	2	2	3	50% of No of Air Fins
d) Couplings - Complete Coupling, Flanges, Gaskets, Seals	1	1	1	1	1	1	1
f) Fan Assemblies Automatic Pitch Control Hub Assembly Parts-Guide Bushing, Pitch Blocks, O-Rings, Clam Gaskets	1	2	3	4	5	6	100% of No of Air Fins
g) Bolt Assemblies, Fork Pins	1	2	3	4	5	6	100% of No of Air Fins
h) Flexible Hose, Rotary Union	1	1	1	1	1	1	2
i) Automatic or Manual Adjustments: Blade Retention Clamps, Pitch, Change Forks, Puch Rod, Stub (with pilot tubes) Bearing Retainer Rings	1	1	1	2	2	2	30% of No of Air Fins
j) Spring Housing Gasket, Diaphragm, Blade Retainer Ring, Thrust cover Gasket	1	1	1	1	2	2	20% of No of Air Fins
k) Hub Assembly with Blades	0	0	0	0	0	0	1 (b)
5. Plate Type Exchanger							
Plate Gasket	100 %						
Flow Plate	10 %						
Nozzle Gasket	200 %						
Glue (1 kg Pot)	1						
Special Spanner tool	1 for each size/type						

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Notes:

- (a) Quantities shown are for each size and type of part
- (b) Twenty units or more.
- (c) The parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.

5.2.2.1.11 Spare parts for furnaces/fans.

(To be proposed by VENDOR and to be concluded preferably with the procurement of the father EQUIPMENT.)_To be APPROVED by OWNER prior to placement of purchase order.

5.2.2.1.12 Spare parts for piping.

Spare item	Quantities
Valves up to 1½" complete units	5 % for each size, type and material
Valves from 2" to 6"	2 % (minimum 2 pieces) for each size, type and material
Valves above 6" to 10" complete units	1 piece for each size, type and material
Valves above 10"	1 only if installed valves quantity is greater than 30
Valves up to 10" gland packing and bonnet gasket	10 %
Valves from 2" to 10" set of changeable inner parts	2 for each type, size and material
Valves above 10" set interchangeable inner parts: bonnet gasket and stem packing	1 for each type, size and material
Piping gaskets and bolts set for each size, type	10%

02





5.2.2.1.13 Spare parts for reciprocating pumps.

Item	Quantities		
	1	2	3
WEAR PARTS	100%	200%	300%
OTHER PARTS	VENDOR RECOMMENDATION		

Note: For all equipment not specifically mentioned in tables here above, the VENDOR recommendation will be taken as basis for selection for OWNER'S approval.

5.2.3 For Capital Spare Parts

The capital spare part shall be supplied according to approved data sheet.

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They are constituted by the basic parts and components (or sometimes by complete items) of the equipment, the availability of which is considered advisable to avoid lengthy shutdown of the PLANTS in case of failure of the vital parent equipment.

These spares are included in the main Purchase Order and shall be shipped together with the main EQUIPMENT, separately packed and adequately marked for easy recognition and warehousing.





It is clarified that the Capital Spare Parts to be supplied to avoid a lengthy shutdown of the PLANTS in case of unforeseen failure of the vital parent equipment are as per following list.

NOTE: Capital spare parts shall cover vital Machinery without stand-by (Rotors, Seals, gears...).

Description	Quantity
Extruder	
Screws	One Set
Motors (including main, cutter, gear pump)	One set for each type
Gears of Gear pump	One Set
Gear Pump Gearbox	One set
Gear Pump Universal Joint	One set
Hydraulic oil Pump	One Set
Jacking up Pump	One Set
Die plate with fixing bolt & Die Holder	One Set
Extruder main Gear box	One Set
Cutter Head (Holder) with fixing Bolts	One Set
Cutter Blade	No. 192 (12 set, each 16)
O-Ring (Consumable) 2 Years Spare Parts	No. 2
Screen (Consumable) 2 Years Spare Parts	No. 96
Coupling for main & Gear Pump	One set per each
Dryer Rotor	One Set

Note: The Motor of Extruder (scorch Brand) & Drive ACS 1000 (ABB) is available as capital

Centrifugal compressors (C-20001, Other compressors included in packages)	
complete compressor rotor (including Impeller, pinion, etc.) with storage/shipping container	one set
Impeller	One set
Compressor Dry Gas Seal	Two sets
Barrier Seal	Two Sets

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Compressor Trust and Journal Bearings Pad for Rotating Body	Four sets
Main Motor (it's preferable to be same as existing motors)	One Set
Complete IGV & Guide Vane	One Set
Expo Panel (for Purging of Motor)	One Set

Reciprocating compressors (C 30001)	
Piston(each type) ,complete with piston ring, connecting rod and corresponding wearings	One Set
Motor(for Recycle Gas Compressor) (it's preferable to be same as existing motors)	One Set
Bearing for Each Stage	Two Sets
Cross head Shoe	One Set for each type
Mechanical Seal	One Set
Crank Shaft	One Set
Complete valve Each Type (By Pass & On-loader valve)	Two sets
Cylinder Liner(Each type)	Two sets





Blowers(C 80001 A~F) : High maintenance	
Complete rotor(Shaft) with sealing system	Three Set
Complete Set of Blower	One Set

Blowers (C 40001 A/B)	
Complete Set of Blower & Motor	One Set
Rotor	One Set

Agitators	
Mechanical Seal per each type and size	Two Sets

Screw Compressor	
Complete rotor plus one complete set sealing system for each type and size	One Set
Lube oil Pump	One Set
Gear and Pinion	One Set

THA Pump (P-10001 A/B)	
Pump	One Set
Electromotor	One Set

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Hexane Pump (P-70002 A/B/C)	
Pump	One Set

Rotary Valve (Z-40001/2/3/4 A/B)	
Complete Valve	One Set Per Each Type
Motor & Gearbox	One Set Per Each Type

Catalyst Dosing Valves 42XV 1003007 (2 Sets)	
Complete Valve	2 Sets

Catalyst Injection Valves 42XV 1003015(2 Sets)	
Complete Valve	2 Sets

Discharge Line Valve 42XV 2001002 (2 Sets)	
Complete Valve	2 Sets

Cyclone Discharge Valve 42XV 2002003 (1 Sets)	
Complete Valve	One Set

Ceramic Ball Valve 42XV1002003 (2 Sets)	
Complete Valve	2 Sets





6. Documentation Required for Spare Parts

6.1 For Erection, Pre-commissioning, Commissioning and Start-up Spare Parts

Those spare parts have to be included in vendor documents like schedules, reports and quality plans. Separate material certificates, test certificates and special storage & transportation instructions, if applicable are required.

In addition a separate marking/labeling of the spare parts is required and export documents as defined in the "Shipping Instructions" to be supplied with the Purchase Order.

6.2 For Two Years Operation Spare Parts

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Separate vendor documents like fabrication schedule, material status report and quality plan will be required. Separate material certificates, test certificates and special storage instructions, if applicable are required.

In addition a separate marking/labeling of the spare parts is required and export documents as defined in the "Shipping Instructions" to be supplied with the purchase order.

6.3 Final Documentation

Besides the main equipment documentation, spare parts according to 6.1 and 6.2 will have a separate, common vendor documentation including SPLIR-forms, certificates, lists and all attachments required for proper identification of the respective Parts.

7. Delivery Conditions of Spare Parts

For shipment the spare parts must be protected and properly covered to avoid damage and corrosion. Machined or blank surfaces and flange faces shall be coated with heavy rust preventive varnish. Spare parts must be covered with a suitable preservative and wrapped with greaseproof paper and sealed.

Vendor is responsible for appropriate packing and corrosion protection according to the rules described in the Packing and Marking Procedure.

In addition to data given in the Shipping Instruction spare parts need to be packed in separate cases with following additional identification:

- ◆ Erection, Pre-commissioning, Commissioning and Start-up Spare Part; and
- ◆ Two Years of Operation Spare Parts.
- ◆ Capital Spare Parts

Erection/commissioning/start-up spares have to be delivered together with the main equipment delivery.

Spare parts for Two Years of operation and Capital Spare parts will most probably be delivered separately to the main equipment delivery; however, it is desirable to be shipped with the main equipment.

8. Procedure for Preparation and Completion of SPLIR Form





8.1 SPLIR Form

A sample SPLIR Form on paper is attached to this engineering procedure and the electronic format is available from PURCHASER on CD-ROM.

The SPLIR Form applies to construction /pre-commissioning/commissioning spares, as well as operating spares.

The SPLIR Form shall be supported by the following documents:

Complete manufacturer's parts list.

CONTRACTOR:  	300 KT POLYETHYLENE PLANT ARYA SASOL POLYMER COMPANY (ASPC)						OWNER: 	
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Relevant drawings, catalogues, pamphlets and bulletins of the main equipment.

Relevant part lists, drawings, sketches and pamphlets of sub-suppliers of auxiliary equipment.

The SPLIR form shall be completed in English language as per the guidelines given in 9.2 below.

8.2 Guide Lines for Completion of SPLIR Form

8.2.1 The MANUFACTURER/SUPPLIER shall complete the following parts of the SPIR form As per listed sequence and in the English language

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

Line 2: Model, 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

Column 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.

Column 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.

Column 9: Drawing number/part number as per supplier's parts list or drawing.

Column 10: Part identification number showing interchange ability within equipment manufacturer's organization.

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

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

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.





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

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

Column 14: Recommended spare parts for the commissioning period.

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

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

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8.2.2 THE CONTRACTOR shall complete the following part of the SPIR form:

Column 22: This column has to be filled out for the respective spare parts purchase order-item reference. This number should be tagged to the respective material for easy identification upon receipt at site.

Column 19: Total price (up to 2 decimals) of the spare parts for 2 years operation and the commissioning period based upon the quantities approved by the OWNER'S Project Engineer (see column 15).

Column 13: CONTRACTOR recommended spare parts for 2 years operation.

Column 15: Final quantity to be ordered and Approved by the OWNER'S Project Engineer.

Line 21: This column has to be used to indicate the equipment class.

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 and stoking 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.

8.2.3 OWNER should complete the following part of the SPIR form

Column 16: For allocation of the final MESC number.

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

C - for: Parts wearing out or deteriorating during normal operations, thus shown a fairly regular consumption.





Q - for: Parts not normal stocked, but ordered on request only.

I - for: Insurance items.

O - for: Temporary code number.

9. Attachments

9.1 Attachment # 1: SPLIR FORM (1 Sheet)

CONTRACTOR:  SAZEH CONSULTANTS Engineering & Construction  SAZEPAD TEHRAN ENGINEERING & CONSTRUCTION	300 KT POLYETHYLENE PLANT ARYA SASOL POLYMER COMPANY (ASPC)						OWNER:  شرکت پلیمر آریا ساسول ARYA SASOL POLYMER COMPANY تهران ۱۳۵۸۳۱۳۱۳۱۳	
	Spare Part Procedure						MC: 	
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Attachment # 1
SPLIR FORM
(1 Sheet)