

GENERAL SPECIFICATION

ROTATING MACHINERY

GS EP MEC 032

Rotating Machine Package Specification Gas Engine or Electrical Motor driven Reciprocating Compressor
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1. Scope

1.1 Purpose

This specification defines the minimum design, fabrication, inspection and testing requirements for the supply of the reciprocating compressor packages. It is an exhaustive document detailing the scope of supply and the associated design rules requested by TOTAL E&P for the procurement of reciprocating compressor packages.

1.2 Application

This document applies to the design of reciprocating compressor packages driven by gas engines or electrical motors. It excludes any other type of gas compressor. This specification applies to offshore and onshore applications.

1.3 General rules

All deviations from this specification or the documents referred to herein shall be stated in writing in the Appendix 4. In the absence of such a statement, it is assumed that the requirements of the specifications are met without exception.

Failure to meet the requirements of this specification and referenced documents shall be corrected at Vendor's cost.

Exceptions and deviations to the specifications shall be part of Vendor's proposal.

Where this specification, or any other project document, allows the Vendor to propose an "option", the Vendor shall clearly state the selected option in his bid.

When outsourced equipment are provided, the Vendor shall be responsible for the coordination of the Sub-Vendors and ensure the full compatibility of all the equipment.

Outsourced equipment shall be compatible in terms of safety, environment, operability, dimensions, weight, performance, control, noise and vibration behavior.

Components not mentioned in this specification that are necessary for the operation of the equipment or required by certifying agency, regulatory bodies or by law, shall be provided by the Vendor.

The present document remains a General Specification as long as the modifiable forms are not completed. It becomes the Project Specification once these modifiable forms are completed.

Then, the Project Specification shall be attributed a Project reference number with the associated Project front page.

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If Project specificities require amendments to non modifiable parts of this specification or to the documents referred to herein, they shall be considered as deviations and stated in writing in the Appendix 4.

This specification will then be issued in two steps:

- Issued “for inquiry”
- Issued “for purchase”.

The applicable documents shall be considered in the following order:

- Local regulations or European regulations in the absence of local regulations
- Classification Society Rules (if applicable)
- Frame agreement (if applicable)
- This completed specification and associated data sheets
- Referenced General Specifications
- Referenced Project specifications
- Codes and Standards.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
API STD 618	Reciprocating Compressors for Petroleum, Chemical, and Gas Industry Services
API STD 670	Machinery Protection Systems
ASME BPVC Section VIII Div 1	ASME Boiler and Pressure Vessel Code (BPVC), Section VIII- Rules for Construction of Pressure Vessels - Division 1
Directive 1999/92/EC	Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres

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Reference	Title
Directive 2014/34/EU	Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres
IEC 60034-6	Rotating electrical machines - Part 6 Methods of cooling (IC code)
IEC 60079-10-1	Explosive atmospheres - Part 10-1 Classification of areas - Explosive gas atmospheres
ISO 10816-6	Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts - Part 6 Reciprocating machines with power ratings above 100 kW
ISO 13631	Petroleum and natural gas industries - Packaged reciprocating gas compressors
ISO 15550	Internal combustion engines - Determination and method for the measurement of engine power - General requirements
NFPA 37	Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

The following Company specifications are fully applicable to all purchased equipment as listed in paragraph 3.1 completed by the technical details reported in paragraph 4 and taken into account accepted deviations as listed in Appendix 4. The second level General Specifications mentioned in each individual specification are not applicable if they are not listed in the below tables. The standards, professional documents, regulations and codes mentioned in each General Specification are applicable.

The following list may also be complemented with other specific Project detailed specifications which would include additional requirements, as applicable or deemed necessary by Company or Contractor.

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Reference	Title
GS EP COR 170	Materials for upstream sour service application - Specification for selection and design
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP COR 354	External protection of onshore structures and equipment by painting
GS EP DEV 001	Asset Objects Tagging
GS EP ECP 103	Process design criteria - Paragraph 6 "Vessels sizing criteria"
GS EP ELE 011	Electrical Requirements for Packaged Units
GS EP ELE 031	Design of Earthing and Bonding Systems for Offshore Installations
GS EP ELE 032	Design of Earthing and Bonding Systems and Lightning Protection for Onshore Installations
GS EP ELE 061	Minimum requirements for HV & LV cable sizing
GS EP ELE 079	Electrical Apparatus for Potentially Explosive Gas Atmospheres
GS EP ELE 121	HV Variable Speed Drive Systems
GS EP ELE 141	Power Transformers
GS EP ELE 161	Electrical Cables
GS EP EXP 217	Spare Parts requirements for EPCs, Supplier, Manufacturer and MIE Team
GS EP INS 101	Instrumentation Design
GS EP INS 103	Instrument Database Management
GS EP INS 106	Instrumentation Installation
GS EP INS 109	Instrument cabinets
GS EP INS 110	Instrumentation for package units

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Reference	Title
GS EP INS 114	Instrument Tubing and Fittings
GS EP INS 115	Instrument Earthing
GS EP INS 116	Instrument Cables
GS EP INS 120	Control Valves
GS EP INS 125	Safety Relief Valves and Rupture Discs
GS EP INS 135	Cybersecurity Requirements for Industrial Information Systems (SII)
GS EP INS 137	On/Off Valve Control Panels and Actuators
GS EP INS 158	I/O Assignment Principles
GS EP INS 900	Instrument Hook-up diagrams
GS EP MEC 240	Special Purpose Couplings for Petroleum, Chemical and Gas Industry Services according to API Standard 671
GS EP MEC 261	Packaged Reciprocating Compressors for Oil and Gas Production Services according to ISO 13631
GS EP MEC 292	Rotating Machines Packages Installation Requirements
GS EP MEC 300	Noise and Vibration of Rotating Machine Packages
GS EP MEC 541	Form-wound Squirrel-Cage Induction Motors - 500 Horsepower and Larger according to API Standard 541
GS EP MEC 546	Brushless Synchronous Machines - 500 kVA and Larger according to API Standard 546
GS EP PVV 102	Piping Hook-up Standards
GS EP PVV 112	Piping material classes
GS EP PVV 211	Design and fabrication of pressure vessels according to ASME VIII
GS EP PVV 411	Shell and tube heat exchangers

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Reference	Title
GS EP PVV 412	Plate heat exchangers
GS EP PVV 415	Design and fabrication of air cooler
GS EP PVV 610	Welding of piping and pressure containing equipment
GS EP PVV 821	Piping and Pressure vessel equipment specification for Rotating Machines Packages
GS EP SAF 050	Fire and Gas System and Fire Extinguishing System for Packaged Rotating Machinery Enclosures
GS EP STR 103	Design and fabrication of skids and equipment supporting structures

In case one of the previous General Specifications is completed with one or more Project specification(s), then these specifications (and their respective revision) shall be added to the following list.

No amendment shall be made to the GS EP MEC specifications since these documents are already amended in the paragraph 4.1.

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Project Documents (to be completed by Company or Contractor)

	Designation	Rev	Reference
1	Compression PFD (*)	[[	[[
2	Compression area layout (*)	[[	[[
3	Project specification for electrical requirements for packaged units (*)	[[	[[
4	Instrument tagging specification	[[	[[
5	Instrument list database specification	[[	[[
[[	[[	[[	[[
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Note: All the documents identified by (*) will be available along with this specification for the issue for inquiry and for purchase.

Mechanical data sheets are listed in paragraph 5.

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3. Scope of supply and exclusions

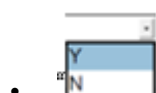
3.1 Scope of supply

The scope of supply consists in  identical Gas Engine or Motor driven Reciprocating Compressors.

The Vendor shall be responsible for the design, supply of materials, manufacture, assembly, supply of drawings and data, all Sub-Vendor co-ordination, testing, delivery and guarantees of the below components:

Note 1: The column “Required” indicates the level of requirement of each item, according to the below rule:

- “X” means that the item is a base case requirement.



-  means that the item is an optional requirement specific to the project. YES if the option is selected or NO if the option is not selected.

Note 2: The column “Description” may offer alternative technical choices that shall be fixed prior to the issue “For inquiry” by ticking the appropriate mark box .

#	Item	Description	Required	Tag	Quantity
1	ON SKID EQUIPMENT				
1.1	Compressor including but not limited to:				
1.1.1	Reciprocating compressor	As per data sheet listed in paragraph 5 of this specification, GS EP MEC 261 paragraph 6 and GS EP COR 170 for sour application.	X		
1.1.2	Distance pieces	As per data sheet listed in paragraph 5 of this specification and GS EP MEC 261 paragraph 6.9.	X		
1.1.3	Nitrogen generator	Membrane type for distance piece purging as per GS EP MEC 261 paragraph 6.9.			
1.1.4	Crankcase lube oil system	As per data sheet listed in paragraph 5 of this specification and GS EP MEC 261 paragraph 6.11.	X		
1.1.5	Cylinder lubrication	Cylinder lubrication distribution system including separate oil reservoir as per data sheet listed in paragraph 5 of this specification, GS EP INS 114 for distribution tubing, and GS EP MEC 261 paragraphs 6.12.1 and 6.12.2.	X		
1.1.6	Oil coolers	As per data sheet listed in paragraph 5 of this specification, GS EP PVV 411 , GS EP PVV 412 , or GS EP PVV 415 and GS EP MEC 261 paragraph 9.	X		
1.1.7	Capacity control	As per data sheet listed in paragraph 5 of this specification and GS EP MEC 261 paragraph 7.	X		
1.2	Pressure vessels including but not limited to:				
1.2.1	Separators	Inlet, inter-stages and final process gas separators as per data sheet listed in paragraph 5 of this specification and GS EP ECP 103 paragraph 6 and GS EP MEC 261 paragraph 10.2.	X		

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#	Item	Description	Required	Tag	Quantity
1.2.2	Pulsation bottles	Suction and discharge pulsation suppression bottles on each stage as per data sheet listed in paragraph 5 of this specification and GS EP MEC 261 paragraph 10.3.	X		
1.2.3	On skid gas Coolers (for shell and tube type only)	Inter-stages and final process gas coolers as per data sheet listed in paragraph 5 of this specification, GS EP PVV 411 and GS EP MEC 261 paragraph 9.	X		
1.3	Driver including but not limited to:				
1.3.1	Driver	Gas engine or electrical motor as per data sheet listed in paragraph 5 of this specification. Rating per paragraph 4.3 of this specification. Electrical motor as per GS EP MEC 541 or GS EP MEC 546 .	X		
		Gas engine Electrical motor			
1.3.2	Fuel gas system	As per data sheet listed in paragraph 5 of this specification and including fuel gas separator/filter as per GS EP MEC 261 paragraph 8.2.10.	For gas engine		
1.3.3	Starting system	As per data sheet listed in paragraph 5.	For gas engine		
1.3.4	Gas engine enclosure	Including ventilation, gas detection system, fire detection system and extinguishing system as per paragraph 4.2.3.1 of this specification and as per GS EP SAF 050 .	For gas engine		
1.3.5	Enclosure fire extinguishing system	As per GS EP SAF 050 .	For gas engine		
		Water mist CO ₂			
1.3.6	Air intake system	Including filter and ductings as per data sheet listed in paragraph 5 of this specification and GS EP MEC 261 paragraph 8.2.4.	For gas engine		
1.3.7	Exhaust system	Including ductings, silencer and expansion bellow as per paragraph 4.2.3.1.4 and data sheet listed in paragraph 5 of this specification and equipped with emission measurement sampling port as per GS EP MEC 261 paragraph 8.2.7.1.	For gas engine		
1.3.8	Lube oil system	As per data sheet listed in paragraph 5 of this specification and including oil level control device as per GS EP MEC 261 paragraph 8.2.9.	For gas engine		
1.3.9	Cooling system	As per data sheet listed in paragraph 5 of this specification, GS EP PVV 411 , GS EP PVV 412 , or GS EP PVV 415 and GS EP MEC 261 paragraph 9.	For gas engine		
1.4	Power transmission including but not limited to:				
1.4.1	Coupling	As per paragraph 4.2.3.2 and data sheet listed in paragraph 5.	X		
1.4.2	Coupling Guard	As per paragraph 4.2.3.2 and data sheet listed in paragraph 5.	X		
1.5	Baseplate including but not limited to:				
1.5.1	Common baseplate	Common for all the package except coolers as per paragraph 4.2.2.1 of this specification and GS EP MEC 261 paragraph 15.	X		
1.6	Piping and valves including but not limited to:				
1.6.1	All on skid piping	As per data sheet listed in paragraph 5 and paragraph 4.2.6.1.	X		

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#	Item	Description	Required	Tag	Quantity
1.6.2	Lube oil piping	Stainless steel AISI 316L downstream filter as a minimum as per GS EP MEC 261 paragraph 11.14.2 and paragraph 4.2.6.1 of this specification.	X		
1.6.3	Drain and vent piping	As per GS EP MEC 261 paragraph 11.17 and paragraphs 4.2.6.2 and 4.2.6.3 of this specification.	X		
1.6.4	Automatic, manual and relief valves	As per data sheet listed in paragraph 5 of this specification, GS EP PVV 821 , and paragraph 4.2.4 of this specification.	X		
1.6.5	Start up screen	Start up strainer as per GS EP MEC 261 paragraph 11.13.	X		
1.6.6	Process isolation valves	Suction and discharge isolation block valves, depressurization valve as per data sheets listed in paragraph 5 of this specification, GS EP PVV 821 and GS EP INS 137 .	X		
1.6.7	Pressure relief valve	As per data sheets listed in paragraph 5 of this specification and GS EP INS 125 .	X		
1.6.8	Battery limit flanges	As per GS EP PVV 112 or Project piping classes if available and equipped with blind flanges for transportation.	X		
1.6.9	Heat tracing and insulation	As per GS EP MEC 261 paragraph 11.2.			
1.7	Instrumentation including but not limited to:				
1.7.1	On skid instrumentation	As per data sheet listed in paragraph 5 and paragraph 4.2.4.	X		
1.7.2	Gas temperature control	On each compression stage discharge as per GS EP MEC 261 paragraph 6.3.	X		
1.7.3	Oil level control	Low oil level alarm for the engine and the compressor as per GS EP MEC 261 paragraph 14.3.	X		
1.7.4	Terminal junction boxes	Located at skid edge as per GS EP INS 101 , made of stainless steel AISI 316.	X		
1.7.5	Cable glands	As per GS EP INS 101 . Cable glands for departing multi-core cables, defined by Project and blinded off suitably for transport and storage. In case cable glands are supplied by other, the gland plates to be pre-drilled and blinded off.			
		As per GS EP INS 101 . For all other cables, junction boxes to be provided with cable gland plates and associated cable glands.	X		
1.7.6	Instrumentation cable trays	AISI 316L cable trays with covers between instruments and skid mounted junction boxes/ local panel and empty cable trays for the multi-core cables (supplied and installed by other) between the terminal junction box and skid edge. As per GS EP MEC 261 paragraph 12.6 and GS EP INS 101 .	X		
1.7.7	Instrumentation cables	Between Instruments and skid mounted terminal junction boxes/local panel as per GS EP ELE 161 and GS EP INS 116 .	X		
1.7.8	Local panel	As per data sheet listed in paragraph 5 of this specification and GS EP MEC 261 paragraph 13.2.	X		
1.8	Electrical including but not limited to:				
1.8.1	Electrical cables	As per paragraph 4.2.5 of this specification, GS EP ELE 061 and GS EP ELE 161 .	X		

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#	Item	Description	Required	Tag	Quantity
1.8.2	Electrical cable glands	LV electrical cable glands as per GS EP ELE 011 . Note: Any electrical cable gland for electrical interconnection within the package to be supplied by Vendor.			
		HV electrical cable glands as per GS EP ELE 011 .			
1.8.3	Electrical cable trays	All required cables trays between all electrical consumers mounted on skid and the skid edge. As per paragraph 4.2.5 of this specification and GS EP MEC 261 paragraph 12.6. Cable trays to be heavy duty perforated type and 316L stainless steel.	X		
1.8.4	Emergency stop push buttons	Local emergency stop push buttons for each electric motor, as per GS EP ELE 011 .	X		
2	OFF SKID EQUIPMENT (shipped loose)				
2.1	Process gas coolers including but not limited to:				
2.1.1	Process gas coolers	Inter-stages and final process gas coolers as per data sheet listed in paragraph 5 of this specification, GS EP PVV 411 or GS EP PVV 415 and GS EP MEC 261 paragraph 9.	X		
		Water coolers Air coolers			
2.2	Variable speed drive system including but not limited to (for electric motor driven compressors):				
2.2.1	HV Variable speed drive	As per data sheet referenced in paragraph 5 of this specification and as per GS EP ELE 121 .	X		
2.2.2	Power transformer	As per data sheet referenced in paragraph 5 of this specification, GS EP ELE 121 paragraph 4.17 of and GS EP ELE 141 .	X		
2.2.3	Harmonic filter	If required, as per GS EP ELE 121 .	X		
2.3	Valves, instruments and piping including but not limited to:				
2.3.1	Flame arrestors	As per paragraph 4.2.6.2.	X		
2.4	Controls and instrumentation including but not limited to:				
2.4.1	UCP	UCP including PLC for control/safety and a separate one for F&G, panel mounted HMI. As per GS EP INS 110 , data sheet listed in paragraph 5 of this specification, paragraph 4.2.4 of this specification and GS EP MEC 261 paragraph 13.2. Full licenses for all software.	X		
2.4.2	ICSS interface	Communication cards, relays, signal convertors, etc. to interface with ICSS and support systems (if any).	X		
2.5	Spare parts and special tools including but not limited to:				
2.5.1	Spare parts for commissioning and start up	Detailed scope is given in the paragraph 8.1.1.	X		
2.5.2	Capital spare parts	Detailed scope is given in the paragraph 8.1.2.	X		1 set
2.5.3	Special tools	Detailed scope is given in the paragraph 8.2.	X		1 set
3	MISCELLANEOUS				
3.1	Base plate anchors and shims	As per paragraph 4.2.2.1 of this specification and GS EP MEC 261 paragraph 15.	X		
3.2	Off skid equipment anchors and shims	All anchors and shims for all off skid equipment supplied by Vendor.	X		

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#	Item	Description	Required	Tag	Quantity
3.3	Access platform, walkways, ladders and handrails	All devices required for access for operation and maintenance as per GS EP MEC 261 paragraph 15.4 and paragraph 4.2.10 of this specification.	X		
3.4	Skid lifting devices	As per paragraph 4.2.2.2 of this specification and GS EP STR 103 .	X		set(s)
3.5	Painting and coating	As per data sheet listed in paragraph 5 and paragraph 4.2.7.	X		
3.6	Personal protection and hot surface insulation	As per paragraph 4.2.8.1.	X		
3.7	Packing and preservation	As per paragraph 9.	X		
3.8	Documentation	Documentation according to Appendix 2.	X		
3.9	Earthing	Earthing design and implementation as per GS EP ELE 031 or GS EP ELE 032 and GS EP INS 115 .	X		
3.10	Maintenance laptop	Including software for UCP configuration.	X		
3.11	Backup	Complete backup hard disk with application software, PLC program, HMI and any firmware prior to shipment.	X		
3.12	Software	OEM CD/DVD for any software used with full licenses.	X		
3.13	Specific climate considerations	Tropicalization Winterization None	X		
3.14	Tagging	Tagging as per GS EP DEV 001 .	X		
4	TESTS				
4.1	Factory tests				
4.1.1	Compressor	Compressor no load mechanical running test, as per manufacturer's standard test procedure.	X		
4.1.2	Driver	Gas engine performance test as per ISO 15550 , test method 1. Electrical motor test as per GS EP MEC 541 or GS EP MEC 546	X		
4.1.3	HV variable speed drive	As per paragraph 7 of this specification of GS EP ELE 121 .	X		
4.1.4	Power transformer	As per GS EP ELE 141 paragraph 8.	X		
4.1.5	UCP	UCP integration and communication test at sub-Vendor premise. As per paragraph 7 of this specification and as per GS EP INS 110 .	X		
4.1.6	Complete unit no load test	As per paragraph 7.2.	X		
4.1.7	Noise and vibration tests	As per paragraphs 7.	X		
4.2	Site acceptance tests				
4.2.1	Complete unit test	As per paragraph 7.7.	X		
4.2.2	Fire suppression system test	As per GS EP SAF 050 .	X		

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3.2 Exclusions

The following equipment are not included in the scope of supply (supplied by other):

- Gaskets, counter flanges and bolting for connecting flanges at battery limits of Vendor's supply
- All piping outside the package
- Electric and instrument cables outside the package
- All earthing cables outside the package.

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4. Basis of design

This paragraph details the technical specificities of the Project which are not covered in the Company General Specifications nor in the Project documents.

4.1 Particular specification requirements

This paragraph addresses the open technical points that are Project specific within the Company General Specifications. The paragraphs mentioned in the following charts refer to TOTAL E&P General Specifications.

GS EP MEC 240		
Paragraph	Data Sheets	Project
5.3	X	
10.3	X	Site conditions as per paragraph 6.1 of this specification.
12.5.2	X	
12.5.3	X	
13.2.2.1		Drawings as per Appendix 2 of this specification.
A.2.5	X	Site conditions as per paragraph 6.1 of this specification.
A.4.1	X	Site conditions as per paragraph 6.1 of this specification.

GS EP MEC 261		
Paragraph	Data Sheets	Project
5.3		Drawings as per Appendix 2 of this specification.
5.4	X	Sound pressure level as per paragraph 4.2.8.2 of this specification.
5.5	X	Area classification as per paragraph 6.1 of this specification.
5.6	X	Site conditions as per paragraph 6.1 of this specification.
6.1.1	X	
6.1.2	X	
6.9.1.1	X	

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Paragraph	Data Sheets	Project
7.1	X	
7.2	X	
7.3	X	
7.4.2	X	
7.4.3	X	
7.4.4	X	
7.5.2	X	
7.5.3	X	
7.6.3	X	
7.7	X	
8.1	X	
8.2.3.2 b)	X	
8.2.3.3 b)	X	
8.2.3.3 c)	X	
8.2.6	X	
8.2.7.1	X	
8.2.7.2	X	
8.2.7.2 a)	X	
8.2.10 e)		Fuel gas heater required: ☐ Yes ☐ No
8.2.11	X	
8.3.1	X	
8.3.2	X	Motor design as per paragraph 4.3 of this specification.

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Paragraph	Data Sheets	Project
8.3.3	X	Power supply as per paragraph 6.2 of this specification.
9.3.5	X	
9.5.4		Air cooler design as per paragraph 4.2.6.1 of this specification and GS EP PVV 415 .
9.6.8	X	
9.6.9		Site conditions as per paragraph 6.1 of this specification.
10.1.1		Pressure vessels design as per paragraph 4.2.6.1 of this specification, GS EP PVV 211 and GS EP PVV 610 .
10.1.5		Piping as per project piping classes if any or per GS EP PVV 112 and paragraph 4.2.6.1 of this specification.
10.2.5	X	
11.1.4	X	Piping scope of supply as per paragraph 3.1 of this specification.
11.8		Piping as per project piping classes if any or per GS EP PVV 112 and 4.2.6.1 of this specification.
11.10	X	
11.15.1	X	
12.2		Power supply as per paragraph 6.2 of this specification.
12.5	X	Site conditions as per paragraph 6.1 of this specification. Electrical equipment design per paragraph 4.2.5 of this specification.
13.1.1	X	Utilities as per paragraph 6.2 of this specification.
13.2.3	X	
13.3.1	X	
13.3.2	X	
13.3.4	X	
13.3.6	X	

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Paragraph	Data Sheets	Project
14.1	X	
14.3	X	
14.6.3	X	
16.2		Painting as per paragraph 4.2.7 of this specification.
17.2.1	X	
17.4.2		Testing as per paragraph 7 of this specification.
17.4.4	X	
19.3	X	Preservation and packing as per paragraph 9 of this specification.
19.4.1	X	
21.1.3	X	Site conditions as per paragraph 6.1 of this specification.
21.9.3	X	

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Paragraph	Data Sheets	Project
4.1.2		Refer to paragraph 6 of this specification.
4.1.3		Refer to paragraph 5.5 of this specification.

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Paragraph	Data Sheets	Project															
4.4.1.2.2	X	Motor cooling selection: <table border="1"> <thead> <tr> <th>Common Enclosure Type</th><th>Method of cooling (IEC 60034-6)</th><th>Selection</th></tr> </thead> <tbody> <tr> <td>Totally enclosed</td><td></td><td></td></tr> <tr> <td>Fan cooled</td><td>IC411</td><td align="center">☐</td></tr> <tr> <td>Water to air cooled</td><td>IC81W^a IC86W^b</td><td align="center">☐ ☐</td></tr> <tr> <td>Air to air cooled</td><td>IC511^a IC516^b IC611^a IC616^a IC666^b</td><td align="center">☐ ☐ ☐ ☐ ☐</td></tr> </tbody> </table> ^{a)} Shaft driven secondary fan ^{b)} Auxiliary secondary fan	Common Enclosure Type	Method of cooling (IEC 60034-6)	Selection	Totally enclosed			Fan cooled	IC411	☐	Water to air cooled	IC81W ^a IC86W ^b	☐ ☐	Air to air cooled	IC511 ^a IC516 ^b IC611 ^a IC616 ^a IC666 ^b	☐ ☐ ☐ ☐ ☐
Common Enclosure Type	Method of cooling (IEC 60034-6)	Selection															
Totally enclosed																	
Fan cooled	IC411	☐															
Water to air cooled	IC81W ^a IC86W ^b	☐ ☐															
Air to air cooled	IC511 ^a IC516 ^b IC611 ^a IC616 ^a IC666 ^b	☐ ☐ ☐ ☐ ☐															
4.4.1.2.4		b) Cooler sparing philosophy 1x100%: ☐ 2x100%: ☐															
4.4.8.3	X	Supply of thermostatically controlled heating devices in the bearing housings is not requested.															
4.4.10.1.2		Refer to paragraph 6 of this specification.															
4.4.10.6.3	X	Redundant motor driven auxiliary fan is required.															

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Paragraph	Data Sheets	Project
5.1.6	X	Requirements for the main terminal box: a) Thermal insulation on the interior top side is not requested b) Space heaters in accordance with 5.4.2 are requested c) Provisions for purging Requested: ☐ Not Requested: ☐ d) Removable links Requested: ☐ Not Requested: ☐ e) Adequate space for termination of shielded cables Requested: ☐ Not Requested: ☐ f) Quick disconnect type bushings or receptacles Requested: ☐ Not Requested: ☐ g) Arresters and surge capacitors (not applicable with ASDs) Requested: ☐ Not Requested: ☐ h) Differential and phase current transformers are requested for motors rated above 5 MW only i) As per Manufacturer standard j) Voltage transformers are not requested k) Copper ground bus is requested l) Partial discharge sensors are: a. not requested for LV motors b. for HV motors: Requested: ☐ Not Requested: ☐ m) Insulated terminations and interior jumpers Requested: ☐ Not Requested: ☐
5.5.4	X	Requirements for air filters: Requested: ☐ Not Requested: ☐
5.5.5		Specified instrument to measure the pressure drop across the filter is not requested.
5.6.2.1		Supply of Surge Capacitors. Requested: ☐ Not Requested: ☐
5.6.2.2		Supply of Metal Oxide Surge Arresters. Requested: ☐ Not Requested: ☐
8.5.1 8.7.1 8.7.4		Refer to Appendix 2 of this specification.