

GENERAL SPECIFICATION

ELECTRICAL

GS EP ELE 111

Induction motors

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Rev.	Date	Purpose of the revision

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1. Scope

This specification defines the minimum requirements for design, manufacture, inspection and testing of LV and HV fixed speed induction motors. It is to be read in conjunction with the corresponding Project specification and/or data sheets. The Manufacturer shall clearly identify in his technical offer any deviation to these specifications.

2. Reference documents

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

Design and engineering shall conform as a minimum requirement to the current edition of the following in order of preference:

- Applicable laws and regulations of the country in which the system will be operated. In cases where no "local" regulations exist, the French laws and regulations shall be used
- Company Particular Specifications and data sheet (if any)
- Company General Specifications
- Applicable International Electro-technical Commission (IEC) Standards
- Applicable CENELEC Standards
- Applicable recognised standards and codes (e.g. UTE-NFC, BSI, VDE, etc.) where IEC publications have not yet been issued.

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
Commission Regulation (EC) No 640/2009 of 22 July 2009	Commission Regulation implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for electric motors
IEC 60034 (Parts 1; 5; 6; 9; 12; 14; 30)	Rotating Electrical Machines - Parts 1; 5; 6; 9; 12; 14; 30
IEC 60072 (Parts 1; 2; 3)	Dimensions and output series for rotating electrical machines - Parts 1; 2; 3
IEC 60085	Electrical insulation - Thermal evaluation and designation
IEC 61000-2-4	Electromagnetic compatibility (EMC) - Part 2-4: Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances
IEC 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

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Reference	Title
IEEE 43	IEEE recommended practice for testing insulation resistance of rotating machinery (ANSI)
ISO 12944-2	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 2: classification of environments
ISO 4628-3	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting
ISO 7919-1	Mechanical vibration of non-reciprocating machines. Measurements on rotating shafts and evaluation criteria - Part 1: general guidelines

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.

Reference	Title
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP ELE 079	Electrical apparatus for potentially explosive gas atmospheres
GS EP TEC 007	Obsolescence and Lifetime Cycle Management

3. Environmental conditions

The motors shall be generally installed outdoor and shall be designed to operate in the site conditions of installation as defined in the data sheet (refer to attachments 1, 2 & 3).

4. Motors for hazardous area

Motors installed in hazardous areas shall be selected as per **GS EP ELE 079** requirements.

Motors and accessories shall bear their own marking, according to the mode of protection used.

5. Definition of the equipment

5.1 Rated output

The rated output of the motor shall be in accordance with **IEC 60072 series** for motor up to 1000 kW.

5.2 Speed

Preferred synchronous speed is 1500 rpm (50 Hz) or 1800 rpm (60 Hz).

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5.3 Service conditions

Unless otherwise specified, motors shall be designed for duty type S1: continuous running duty as defined in [IEC 60034-1](#).

5.4 Form and symmetry of voltages and currents

The motors shall be able to operate on an unbalanced system as defined in [IEC 60034-1](#) paragraph 7.2.

The performance of the equipment shall not be affected by Harmonic voltage THD up to 10% and each Individual Harmonic Distortion within the limits of class 3, tables 3 and 4 of [IEC 61000-2-4](#).

Should the limits of deformation and balance occur simultaneously in service at the rated load, this shall not lead to any deleterious temperature in the motor and the excess resulting temperature rise or temperature related to be limits specified in this standard shall be not more than approximately 10 K.

5.5 Enclosures degree of protection

Unless otherwise specified on the data sheet or project specification, motors installed outdoor shall have a degree of protection IP 55 according to [IEC 60034-5](#).

Unless otherwise specified, motors for indoor installation shall have a degree of protection IP 23 according to [IEC 60034-5](#).

When there is a risk of the ingress of particles suspended in the air, the degree of protection IP 23 W shall be specified on the data sheet.

The mechanical shock protection rating shall be at least IK 08 as per [IEC 62262](#) (or a shock energy of five joules).

5.6 Rotor

Unless otherwise specified, the Manufacturer standard shall be required for LV motor rated up to 200 kW. For LV motors rated from 200 kW and above and HV motors, copper or copper alloy cages shall be specified.

Motor with a rigid and subcritical rotor bearing shall have the first critical speed not lower than 125% of the rated speed. For motor with a flexible, overcritical rotor bearing, the first critical speed shall not be above 80% of rated speed and the second not lower than 125% of rated speed.

In corrosive atmosphere, rotor shall be protected against corrosion by an appropriate treatment.

5.7 Insulation thermal class

HV motors shall have insulation thermal class "F", as defined in [IEC 60085](#), provided by vacuum pressure Impregnation process. Insulation thermal class H is prohibited.

LV motors shall have insulation thermal class "H" or "F", according to Manufacturer standard.

Temperature rise class Temperature rise shall be class "B" when insulation thermal class is "F" and "F" when insulation thermal class is "H".

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Temperature rise at rated power must remain below the values defined by clause 6 of [IEC 60034-1](#), with no tolerance for voltage values between 0.9 and 1.1 rated voltage inclusive.

LV motors rated from 200 kW and above and HV motors shall be fitted with thermal probes mounted at the hottest points of the windings (two groups of three PT100 type probes).

5.8 Starting conditions

5.8.1 Starting current

Unless otherwise specified in the datasheet, the starting current shall be:

- $SC/FLC \leq 6.5$ for LV motors (with a tolerance of 20% according to [IEC 60034-1](#))
- $SC/FLC \leq 5$ for HV motors (tolerance of 20% already included).

5.8.2 Starting frequency

Unless otherwise specified, HV motors shall be designed for heavy duty 1000 starts/year for the mechanical system and electrical system.

All motors must be able to withstand at least:

- 3 consecutive starts at 80% U_n with load inertia according to [IEC 60034-12](#)
- 2 hot successive starts at full load temperature
- 3 cold successive starts at maximum ambient temperature.

The interval between two sets of N attempts of starting shall not exceed one hour.

5.8.3 Re-acceleration

When required in the data sheet motors must be able to re-accelerate after a 30% - 0.5 s voltage dip.

When required in the project specification, the motor shall be able to re-accelerate after a voltage loss lower than 0.5 s. Therefore, it shall be able to withstand supply reconnection onto full motor residual voltage at total phase opposition.

5.8.4 Starting time

The Manufacturer shall liaise with the driven equipment Manufacturer to obtain all the necessary data to provide Company with driven load/motor starting time calculation.

If the locked rotor withstand time is lower than the starting time, locked rotor temperature rise curves from hot and cold states shall be provided (for both 100% and 80% of the rated voltage) and Company prior approval shall be obtained.

5.9 Noise levels

Unless otherwise specified, the noise level limit shall as defined according [IEC 60034-9](#). The Manufacturer will have to confirm if this value is easily achievable with standard equipment.

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5.10 Humidity protection

Motors shall be designed to operate properly in the environmental and climatic conditions defined in the data sheet or in the related project particular specification.

For motors rated 22 kW and above, a space heater shall be used. It shall be of a fully insulated design and suitable for 230 VAC supply, unless otherwise specified.

For HV motors, the connecting leads shall be brought out to terminals in a separate terminal box mounted on the machine frame.

5.11 Cooling

Unless otherwise specified in the data sheet, cooling method shall be as per [IEC 60034-6](#) and as following:

- IC 0A1 for IP 23
- IC 4A1A1, IC 5A1A1, IC 6A1A1, IC 6A1A6 or IC 8A1W7 for IP 55.

Motors shall preferably be air-to-air cooled. In case this cannot be possible, the cooling mode shall be defined with the Manufacturer.

In case of air-to-air exchanger, tubes shall be made of corrosion resistant material suitable for the environmental conditions.

Air-to-water cooled machines

In case of air-to-water cooling secondary coolant shall be treated water and may be either sea water or fresh water, depending on local availability.

Cooler shall be provided with a water leakage detector of piezzo type. 10% spare tubes shall be provided. The water box/header construction shall be such that leaking tubes can be readily plugged and that all tubes are accessible for cleaning.

Where seawater is circulated within the heat exchanger then double tube design shall be used. In case of fresh water, single tube design shall be used.

Tubes/water box shall be made of Cupro-Nickel for both sea or fresh water coolant provided that maximum flow speed (including turbulence effects) is lower than 2.5 m/s and the water circulation is permanent.

Tubes/water box shall be made of stainless steel 316L for fresh water coolant whenever maximum flow speed (including turbulence effects) is more than 2.5 m/s or the water circulation is not permanent.

For sea water application where maximum flow speed (including turbulence effects) is more than 2.5 m/s, tube/header/waterbox material selection shall be made on a case by case basis, depending on temperature ranges and after evaluation of crevice corrosion risks. Tubes/water box may be made of carbon steel for onshore installation without any environmental corrosion risk (H₂S) and where fresh water is available.

Whatever the coolant and operation configuration, the tube/water box material choice shall be subject to written Company approval after a complete corrosion study carried out by Contractor.

Fins, end plates and shells must be made of corrosion resistant material too.

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5.12 Bearings

5.12.1 General

Machines installed on structure subject to vibration shall be fitted with pre-load bearings.

LV motors rated from 200 kW and above and HV motors shall be fitted with a temperature probe for each bearing.

Motors rated 500 kW and above shall be equipped with measuring point for the use of an accelerometers or eddy current probes.

Unless otherwise specified, for motors rated 1000 kW and above, bearings shall be of lubricated sleeve types. They shall be either oil flooded, oil injected, or oil ring lubricated.

When oil lubricating piping is screwed (not welded) into the threaded bearing housing, the other end of the piping shall be fitted with rotating flange.

For large machines, tilting pad bearings may be used.

The type of the oil shall be the same for the all shaft line.

5.12.2 Bearing currents

For the motors rated 690 V and above, the Manufacturer shall use all possible technical and durable means to cancel out bearing currents that are liable to affect the life of the motor and of the driven machine.

For all HV motors and for LV motors fed from Variable Frequency Drives, both DE and NDE bearings shall be insulated and suitable shaft earthing brush shall be provided on the NDE side to ensure that any shaft current is safely drained to general earth. This bearing shall be adequately labelled to indicate the presence of insulation.

5.13 Mechanical vibration and balancing

When required by project specification vibration probes shall be installed on each bearing:

- Proximity probes (X,Y) for sleeve bearings
- Accelerometers for ball and roller bearings.

The motor vibration levels for induction motors will be as per the requirements of the [IEC 60034-14](#) as follows:

- HV motors will be type B vibration grade
- LV motors will be type A vibration grade, and for compression applications and for other specific applications type B will be required as well.

The limits of maximum vibration magnitude in displacement, velocity and acceleration (r.m.s.) shall be as per table 1 of [IEC 60034-14](#). For HV motors this test shall be carried out with a free-suspension mounting condition, the test bench rigidity shall correspond to the rigidity of the machine mounted "in situ".

The limit of the maximum peak to peak shaft vibrations (S_{p-p}) and maximum run-out shall be as per table 2 of [IEC 60034-14](#). The maximum relative shaft displacement shall include the run-out. The Run-out definition is as per [ISO 7919-1](#).

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These values are global unfiltered values.

On request, the Manufacturer shall specify the maximum vibration level that the machine can withstand without risk of deterioration, whatever the cause of the vibration and the installation conditions to ensure this level. Vibration of the HV motor frame shall be limited to 4.5mm/s.

5.14 Shafts and shaft ends

These shall be of standard dimensions.

The particular stresses (axial, radial and torsional) to which the motor shaft may be subject shall be specified on the data sheet.

5.15 Shaft lines

For large power motors, the driven machine Supplier shall draw up shaft line calculations (calculating critical torsional speed and critical deflection speed; dynamic analysis of rotor oscillation according to unbalances to be specified during the study). For this purpose, the Manufacturer shall provide the air-gap torques corresponding to 2 phase and 3 phase faults as well as starting and reacceleration.

The motors driving equipment which have a variable torque during each revolution (e.g. reciprocating compressors) shall have sufficient inertia to limit the variations in motor stator current to a value not exceeding 20% of the rated current.

5.16 Terminal boxes and connections

Unless otherwise indicated, the Manufacturer standard shall be adopted (aluminium and aluminium alloys are prohibited for offshore application).

The motors shall be provided with separate terminal boxes between power and controls and all electrical connections shall be brought to terminals.

If a terminal box of steel plate no more than 3 mm thick is used, stainless steel 316L shall be required for corrosion resistance.

HV power terminal box shall be so designed as to allow the safe release of an overpressure caused by an internal short circuit.

Power terminal box shall be sized according to connection constraints (cable type Cu or Al, cross-section, bending radius, lug size, etc.).

Furthermore, when HV motor is energized through a vacuum technology switch (CB or contactor), surge arrester or RC circuit shall be installed in motor terminal box, consequently sufficient volume shall be allocated for surge arrester or RC circuit installation in the power terminal box.

For HV motor the star point shall be brought out of the enclosure in terminal box.

For motor rated 5 MW and above, the terminal boxes for the star point and the phases shall be sized to accommodate installation of differential protection CTs.

For HV motor rated 5 MW and above, Rogowski coils shall be installed on the enclosure prior power terminal box to allow partial discharge measurements on-Site and monitor any evolution/trend compare to FAT records. For fixed speed motors, use of partial discharge

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capacitive sensors is subject to Company approval. For HV cables, clamping devices to withstand short circuit currents shall be provided within the main terminal box for cable connections, to separate and support the conductors.

Non magnetic gland plates shall be provided for single core cables.

For LV motors, the power terminal box must be adjustable for connection from any one of four directions. For the other machines the terminal box shall be located on the side, cable entering from below unless otherwise specified.

The auxiliary circuits (temperature probes, speed and vibration detector, etc.) shall be connected at terminals in one or more auxiliaries terminal boxes associated with the motor.

The stator connections shall be marked in accordance with the IEC standard.

5.17 General requirements related to EEx”p” design

An automatic leakage compensation unit shall be supplied by the motor Manufacturer and shall ensure the necessary purging cycle prior to the motor start and maintain the minimum required pressurisation during motor operation.

No external power supply shall be required. All the controls shall be performed from the Instrument Air supplied by others. The motor pressurisation system shall be equipped at the air inlet with a filter (40µm or lower) and its associated by-pass system for maintenance.

All hardware shall be preferably mounted on the motor pressure control cabinet.

Any pressure decrease under a pre-set threshold (1mbar for example) shall initiate immediate equipment shut down and shall be signaled remotely to the Process Control System.

5.18 Motor efficiency class

The Manufacturer shall state the motor efficiency class as per [IEC 60034-30](#).

For project within European Union and associated states, industrial type motors shall comply as a minimum with the efficiency class IE2 as per [Commission Regulation \(EC\) No 640/2009](#).

6. Painting

Painting system shall be suitable for the site environmental conditions. The Coating shall comply with Company General Specification [GS EP COR 350](#) requirements. The Manufacturer may submit his coating system for protection against external corrosion for Company approval.

Proposed coating must be suitable for the category of corrosion defined for the site of installation as per [ISO 12944-2](#), and shall provide a warranty of 5 years - with a rusting degree Ri = 2, as per [ISO 4628-3](#) standard.

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Atmospheric category of corrosivity of site of installation shall be defined on the data sheet:

Category	Description
C1	Very low corrosive atmosphere
C2	Low corrosive atmosphere
C3	Fairly corrosive atmosphere
C4	Highly corrosive atmosphere
C5-I	Atmosphere of very high corrosivity level (Industrial)
C5-M	Atmosphere of very high corrosivity level (marine) - Coastal, Offshore areas

Colour shall be of Manufacturer's standard, unless otherwise specified in the project specification.

7. Tests

7.1 Factory tests

7.1.1 Routine tests

These shall be carried out on all machines ordered.

A test certificate shall be supplied for each machine.

All HV motors shall be subject to:

- Polarization index test as per [IEEE 43](#)
- Partial discharge and tangent δ measurements for HV machines at both industrial frequency and 0.1 Hz
- Overspeed test
- Vibration measurement (unfiltered) from 0 to 120% of the rated speed and determination of the critical speed.

7.1.2 Full set tests

These may be performed for one or all of the machines.

When carried out for just one machine, the customer or his representative shall choose the machine.

These tests shall comply with [IEC 60034](#) and shall be listed in the data sheet.

7.2 On-site tests

Tests may be carried out on site, subject to agreement with the Manufacturer.

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8. Design Life and Obsolescence

Facilities are typically designed with an expected design life in the order of 25 years.

The obsolescence shall be managed as per **GS EP TEC 007**.

The motor design shall therefore take into account the requirement that the equipment will most probably require to be upgraded during the design life of the facilities in particular for all the electronic based components. These requirements shall be incorporated from Basic Engineering stage particularly for HV and large LV motors.

The design will include provisions to allow an upgrade of the motor to be performed with minimal disturbance.

All hardware and software that may be developed by the Supplier further to the generating unit delivery, shall ensure full ascending compatibility to allow for easy replacement of equipment that became obsolete with limited reconfiguration.

At the Bid stage, the Supplier shall detail his lifecycle management strategy focusing on product obsolescence, support options and further migration alternatives. The lifecycle/obsolescence management plan and associated cost shall be part of the Bid process evaluation.

The Supplier shall complete an inventory of all provided equipment (hardware and software) matching to different lifecycles phases, including all Sub-Vendors equipment.

The Supplier shall guarantee that:

- Components (including software and hardware) shall remain in the “active products” range (i.e. supporting developments and releases) over a period of at least 5 years after the Site Acceptance Tests (SAT).
- An announcement to Customer is provided 5 years prior the end of the commercial phase.
- Components (including software and hardware) shall be fully supported and available over a period of at least 15 years after the SAT.
- Maintenance services including availability of engineering services shall be available to support the package and components during the plant life time (complete set of drawings for fabrication, etc.).

9. Documentation

As a minimum and unless defined in a project particular specification, the following drawings and documentation shall be supplied in a timely manner according to the specified schedule:

- Motor overall arrangements
- Completed Data sheet
- Load torque versus motor torque curves
- Starting curves versus locked rotor withstand curves
- Motor equivalent circuit diagrams (for starting and dynamic stability studies)
- Foundation guide details if required
- Arrangement details of auxiliary equipment

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- Layout of connection boxes
- Wiring and termination diagrams
- Operation and maintenance manuals
- Type test report if required
- FAT report
- Type examination certificates delivered by notified bodies.



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Appendix 1

Appendix 1 Data Sheet Induction Motor

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Appendix 1

Exploration & Production

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Rev. Date						
Written						
Verified						
Approved						

Appel d'offres/Call for tender ☐		Commande/Order ☐	
1			
2	Repère(s) du (des) moteur(s)		Nombre de moteurs
3	Tag of motor(s)		Quantity of motors
4			
5	CONDITIONS D'INSTALLATION		
6	SITE CONDITIONS		
7			
8	Lieu d'installation	Off-shore ☐	On-shore ☐
9	Site		
10			
11	Température ambiante	Maximum °C	Minimum °C
12	Ambient temperature		Moyenne annuelle
13			Yearly average °C
14	Altitude (si valeur > 1000 m)	m	Hygrométrie
15	Altitude (if > 1000 m above sea level)		Humidity %
16			
17	Atmosphère corrosive	Embruns salins ☐	H ₂ S ☐
18	Corrosive atmosphere	Sea spray	Autre
19			Classe de corrosion de l'environnement
20	Localisation (IEC 60079-10)	zone 1 ☐	zone 2 ☐
21	Location		hors zone
22			safe area ☐
23	Tension assignée	V ± %	Phase
24	Rated operating voltage		Régime de neutre
25			Neutral earthing
26	Fréquence	Hz ± %	
27	Frequency		
28			
29	MACHINE ENTRAÎNÉE (si données absentes, Cf spécification mécanique)		
30	DRIVEN MACHINE (if no data, see mechanical specification)		
31			
32	Type		Vitesse nominale
33	Type		Rated speed rpm
34			
35	Couple	nominal m.N	Maximum m.N
36	Torque		Au démarrage
37			Starting torque
38			
39	CARACTERISTIQUES TECHNIQUES		
40	TECHNICAL SPECIFICATION		
41	Puissance (facultatif, Cf machine entraînée)	kW	Vitesse nominale
42	Rated power (optional, see driven machine)		Rated speed rpm
43			
44	Id/In max (incluant 20 % tolérance)		Type de démarrage
45	Is/In max including 20% tolerance		Starting mode
46			
47	Service type (CEI 60034-1)	S	Nombre de démarrages minimum par an
48	Duty type (IEC 60034-1)		Minimum number of starts per year
49			
50			
51			
52			
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S REFERENCE	

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Appel d'offres/Call for tender ☐		Commande/Order ☐	
CARACTERISTIQUES TECHNIQUES (suite) TECHNICAL SPECIFICATION (cont')			
1			
2			
3			
4			
5	Moteur sûreté ☐	Groupe d'équipement (CEI 60079)	Température maximale de surface
6	safety motor	Equipment class (IEC 60079)	Maximum surface temperature
7			
8	Mode de protection	EEx"d" ☐	EEx"de" ☐
9	Type of protection	EEx"e" ☐	EEx"p" ☐
10			
11	Pour moteurs EEx"p" :		Accessoires de pressurisation à fournir ☐
12	For EEx"p" motors:		Accessories for pressurisation to supply
13			Pression du réseau d'air disponible ☐
14	Degré de protection minimum (CEI 60034-5)	IP	Nature des intempéries ☐
15	Minimum enclosure protection degree		Nature of bad weather
16			
17	Protection contre les chocs mécaniques	IK	Tropicalisation ☐
18	Mechanical shock protection rating		Tropicalization
19			
20	Enroulements stator	Cuivre ☐	Autre ☐
21	Stator windings	Copper	Other
22			Nombre de bornes sorties ☐
23	Couplage des enroulements sous la tension nominale		
24	Windings combination under rated voltage		
25			
26	Rotor	Standard constructeur ☐	Alliage de cuivre ☐
27		Manufacturer's standard	Copper alloy
28			Aluminium ☐
29	Classe d'isolation (CEI 60085)	Classe d'échauffement ☐	
30	Insulation class (IEC 60085)	Temperature rise class	
31			
32	Niveau de bruit maximum admissible conforme à la CEI 60034-9	☐	
33	Maximum permissible noise level conform to IEC 60034-9		
34			
35			
36	Sens de rotation 1 ou 2 (CEI60034-8)	Flèche ☐	
37	Direction of rotation (IEC 60034-8)		
38			
39	Position moteur	Horizontal ☐	Vertical ☐
40	Mounting	Horizontal	Vertical
41			Capot ventilateur avec tôle pare-pluie ☐
42	Mode de fixation (CEI 60034-7)	A pattes ☐	A bride ☐
43	Mounting (IEC 60034-7)	Feet	Flanged
44			A pattes et à bride ☐
45	Mode refroidissement	Auto-ventilé ☐	Moto-ventilé ☐
46	Cooling system	Self-ventilated	Motor-ventilated
47			Echangeur ☐
48	Hydroréfrigérant double tube	☐	Eau douce ☐
49	Double tube water exchanger		Fresh water
50			Eau de mer ☐
51	Température d'entrée d'eau ☐	Pression du réseau ☐	Température maxi de sortie d'eau ☐
52	Inlet water temperature	Network pressure	Maximum outlet water temperature
53			
54			
55			
56			
57			
58			
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S REFERENCE	

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Appel d'offres/Call for tender ☐		Commande/Order ☐	
1 2 3 4			
ACCESSOIRES ACCESSORIES			
5	Sondes température Temperature probes	Paliers Bearings	☐ Nombre Quantity
6			Type
7			
8		Stator	☐ Nombre Quantity
9			Type
10			
11	Capteur de vitesse Speed detector	Rotor	☐ Nombre Quantity
12			Type
13			
14	Capteur de vibration Vibration detector	Paliers Bearings	☐ Nombre Quantity
15			Type
16			
17	Niveau visible Oil gauge level	Paliers Bearings	☐ Nombre Quantity
18			Type
19			
20	Graisseur Greaser	Paliers Bearing	☐ Nombre Quantity
21			Type
22			
23	Vannes de remplissage & vidange Filling and drain valves	Paliers Bearings	☐ Nombre Quantity
24			Type
25			
26	Purge eau de condensation Condensed water drain	Carcasse Frame	☐ Nombre Quantity
27			Type
28			
29	Résistance réchauffage Space heater	☐ Tension voltage	V Phase(s) Phase(s)
30			
31			
32	Visserie <12 mm, Plaques signalétiques, inox 316) Rating plate, bolting <12 mm made of stainless steel		☐ Anneaux de levage Lifting eyebolts
33			☐
34			
35	Mise à la masse Earthing	Extérieure On the motor frame	☐ Interne B.J. In the terminal box
36			☐
37			
38	Boîte à bornes puissance Main terminal box	Position Location	Avec P.E. With cable glands
39			☐ Type de P.E. Type of cable gland
40			
41	Câble puissance Power cable	Type	Tripolaire Three core cable
42			☐ Unipolaire Single core cable
43			☐
44	Section Cross section	mm ² Cuivre Copper	☐ Aluminium
45			☐ Nombre par phase Number per phase
46			☐
47	Diamètre sur Diameter on	mm	Diamètre sur armure Diameter on armour
48			mm
49			
50	Boîte(s) à bornes auxiliaire(s) Auxiliary terminal box	Nombre Quantity	Mode de protection Protection of
51			
52			
53		Avec P.E. With cable glands	☐ Nature Type
54			
55			
56	Peinture Painting	TOTAL Specification GSCOR 350 TOTAL Specification GS COR	☐ Standard constructeur Manufacturer's standard
57			☐ [1] Autre Other
58			[1]
59			
60	[1] Système de peinture à soumettre avec l'offre pour approbation, avec indication garantie. Painting system to be submitted with the bid for approval, with indication of guarantee.		
61			
62			
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S REFERENCE	

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Appendix 1

Exploration & Production

DATA SHEET	N°
Project:	
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Rev. 02 - 10/05	

Appel d'offres/Call for tender ☐		Commande/Order ☐	
ESSAIS (selon CEI 60034) TESTS (according to IEC 60034)			
5 Réception usine ☐	6 Présence d'un représentant du client ☐	7 Réception site ☐	
6 <i>Factory acceptance tests</i>	7 <i>With client's representative</i>	7 <i>Site's acceptance tests</i>	
Essais de routine (sur l'ensemble des moteurs) Routine tests (to be carried out on each motor)			
11 Essai à vide ☐	12 Essai à rotor bloqué ☐	13 Mesure de vibrations à vide ☐	
12 <i>No load test</i>	12 <i>Locked rotor test</i>	13 <i>No load vibration</i>	
14 Mesures d'isolement ☐	15 Mesures des résistances à froid ☐		
15 <i>Insulation measurements</i>	15 <i>Measurement of winding resistance</i>		
17 Essai diélectrique ☐	18 Rotation des phases ☐		
18 <i>Dielectric test</i>	18 <i>Phase sequence</i>		
Essais complets Full set tests		Sur l'ensemble des moteurs ☐ <i>On each motor</i>	Sur un moteur au choix du client ☐ <i>On one motor choosen by client</i>
24 Essais en charge ☐	Courant de démarrage et couple de démarrage à pleine tension ☐ <i>Starting current and starting torque at full voltage</i>		
25 <i>Full load test</i>			
27 Mesures du cos phi ☐	28 Calcul du rendement ☐	29 Mesure du glissement (à 4/4 - 3/4 - 1/2) ☐	
28 <i>Power factor measurement</i>	28 <i>Efficiency calculation</i>	29 <i>Slip measurement (at 4/4 - 3/4 - 1/2)</i>	
Echauffement (variation résistance des enroulements selon CEI 60279) ☐ <i>Temperature rise (variation of winding resistance as per IEC 60279)</i>			
Essais spéciaux Special tests			
36 Contrôle échauffement du rotor (avec marqueurs thermiques) ☐	Mesures niveaux de bruits (CEI 60034-9) ☐ <i>Noise level measurement (IEC 60034-9)</i>		
37 <i>Rotor temperature rise control (with templates)</i>			
39 Essai du moteur avec son système de démarrage ☐	Index de polarisation ☐ <i>Polarisation index</i>		
40 <i>Motor test with it's starting system</i>			
43 Autres ☐			
44 <i>Other</i>			
CARACTERISTIQUES A FOURNIR PAR LE CONSTRUCTEUR CHARACTERISTICS TO BE SUPPLIED BY THE MANUFACTUER			
53 Constructeur	Type	Mode de protection (CEI 60079)	
54 <i>Manufacturer</i>	<i>Type</i>	<i>Type of protection (IEC 60079)</i>	
56 Marquage CE (ATEX 94/9/CE)			
57 <i>CE marking (ATEX 94/9/EC)</i>			
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S REFERENCE	

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DATA SHEET	N°
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Appel d'offres/Call for tender ☐		Commande/Order ☐	
CARACTERISTIQUES A FOURNIR PAR LE CONSTRUCTEUR (suite) CHARACTERISTICS TO BE SUPPLIED BY THE MANUFACTURER (Cont')			
1			
2			
3			
4			
5	Puissance nominale	kW	A température °C
6	Rated power		Intensité nominale A
7			Rated current
8	Vitesse nominale	rpm	Id/In tolérance incluse
9	Rated speed		SC/FLC including
10			
11	Couple nominal	m.N	Couple maximal m.N
12	Full load torque		Couple mini au démarrage Cd/Cn
13			Pull up Torque ST/FLT
14	Facteur de puissance au démarrage		
15	Power factor at starting time		
16			
17	Facteur de puissance à	4/4	3/4
18	Power Factor at		1/2
19			
20	Vitesse (tr/min) à	4/4	3/4
21	Speed (rpm) at		1/2
22			
23	Rendement en % à	4/4	3/4
24	Efficiency at		1/2
25			
26	Constante de temps thermique du stator :	A l'échauffement s	Au refroidissement s
27	Stator thermal time constant	Temperature rise	Cool down
28			
29	Inertie du rotor	kg.m ²	Impédance de court-circuit R/X
30	Moment of inertia		R/X Ratio
31			
32	Temps de démarrage	A vide s	En charge s
33	Starting time	No load	On load
34			
35	Nombre maxi. de démarrages	A froid	A chaud
36	Maximum number of consecutive starts:	From cold	From hot
37			Nb maxi de démarrages par heure
38	Classe d'isolation (CEI 60085)		Classe d'échauffement
39	Insulation class (IEC 60085)		Temperature rise class
40			Niveau de bruit & tolérance dB
41			Noise level & tolerance
42	Pour moteur EEx"e" ou EEx"nA" seulement / for motors EEx"e" or EEx"nA" only		
43	Temps max admissible rotor bloqué TE :	à froid s	à chaud s
44	Max operating time with locked rotor TE	cold	hot
45	si TE < temps de démarrage, fournir les courbes caractéristiques d'échauffement rotor bloqué à partir des états chaud et froid		
46	if TE < starting time, curves of temperature rise of locked rotor from hot and cold states must be provided		
47			
48			
49	Système refroidissement (CEI 60034-6)	IC	Mode de fixation CEI 60034-7 IM
50	Cooling system (IEC 60034-6)		Mounting (IEC 60034-7)
51			
52	Carcasse :	Fonte ☐	Acier soudé ☐
53	Frame:	Cast iron	Steel
54			Alpax ☐
55			Autre
56	Rotor :	Aluminium coulé ☐	Cuivre brasé ☐
57		Cast aluminium	Brazed brass
58	Paliers :	Roulements précontraints ☐	Roulements ☐
59	Bearings	Pre-load bearings	Ball bearings
60			Coussinets ☐
61			Sleeve b. ☐
			Isolés CA ☐
			Insulated DE ☐
			COA ☐
			NDE ☐
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S REFERENCE	

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DATA SHEET	N°
Project:	
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Appel d'offres/Call for tender ☐		Commande/Order ☐	
CHARACTERISTIQUES A FOURNIR PAR LE CONSTRUCTEUR (suite) CHARACTERISTICS TO BE SUPPLIED BY THE MANUFACTURER (cont.)			
Pour moteur à surpression interne seulement / For pressurised EEX"p" motor only			
Pression Pa	Débit Nm ³ /h	Temps balayage mn	A débit (Nm ³ /h)
Pressostat ☐	Seuil d'alarme Pa	Seuil déclenchement Pa	Type
Electrovanne ☐	Tension V		Type
Vanne manuelle ☐	Nombre		Type
Caractéristiques du lubrifiant Lubricant characteristics			
Huile	Viscosité	Débit l/min	
Graisse	Quantité	Fréquence de graissage	
Vibrations vitesse moyenne quadratique mm/s		Classe d'équilibrage	
Moteur sans butée	Effort axial maximum N	Pour un déplacement axial de mm	
Moteur équipé de butées		Effort axial maximum admissible N	
Type de paliers :	Côté accouplement (CA)	Côté opposé (COA)	
Type de roulements :	Côté accouplement (CA)	Côté opposé (COA)	
Eau de refroidissement :	Débit m ³ /h	Echauffement à P nominale Δt °C	
Résistance de réchauffage :	Puissance W	Tension V	Phase(s)
Masses :	Totale kg	Rotor kg	Stator kg
Divergences par rapport à la spécification Deviations from job specification			
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S REFERENCE	



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Appendix 2

Appendix 2 Data Sheet

Small Induction Motor P < 22 kW

Induction motors

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Appendix 2

Exploration & Production

DATA SHEET	N°
Project:	
DS EP ELE 112	Small induction motor P < 22 kW
Rev. 01 - 10/05	

Rev. Date						
Written						
Verified						
Approved						

Appel d'offres/Call for tender ☐		Commande/Order ☐	
1			
2	Repère(s) du (des) moteur(s)	Nombre de moteurs	
3	Tag of motor(s)	Quantity of motor	
4			
5	CONDITIONS D'INSTALLATION		
6	SITE CONDITIONS		
7			
8	Lieu d'installation	Off-shore ☐	On-shore ☐
9	Site		
10			
11	Température ambiante	Maximum	°C
12	Ambient temperature	Minimum	°C
13			Moyenne annuelle
14			Yearly average
15	Altitude (si valeur > 1000 m)		Hygrométrie
16	Altitude (if > 1000 m above sea level)	m	Humidity
17	Atmosphère corrosive:	Embruns salins	H ₂ S
18	Corrosive atmosphere:	Sea spray	Other
19			Classe de corrosion de l'environnement
20	Localisation (IEC 60079-10)	zone 1	zone 2
21	Location	safe area	Pollution
22			
23	Tension assignée	V ± %	Fréquence
24	Rated operating voltage	Hz ± %	Nombre de Phases
25			Régime de neutre
26	MACHINE ENTRAÎNÉE (si données absentes, Cf spécification mécanique)		
27	DRIVEN MACHINE (if no data, see mechanical specification)		
28			
29	Type	Puissance machine entraînée	Vitesse nominale
30		Rated power driven machine	Rated speed
31			
32	CARACTERISTIQUES TECHNIQUES		
33	TECHNICAL SPECIFICATION		
34			
35	Service type (CEI 60034-1)	S	Vitesse nominale
36	Duty type (IEC 60034-1)		Rated speed
37			
38	Moteur	Groupe d'équipement (CEI 60079)	Température maximale de surface
39	Safety motor	Equipment class (IEC 60079)	Maximum surface temperature
40			
41	Mode de protection	EEx"d"	EEx"de"
42	Type of protection	EEx"e"	EEx"nA"
43			
44	Degré de protection minimum (CEI 60034-5)	IP	Protection contre les chocs mécaniques
45	Minimum enclosure protection degree		Mechanical shock protection rating
46			
47	Enroulements stator:	Cuivre	Autre
48	Stator windings:	Copper	Other
49			Nombre de bornes sorties
50	Couplage des enroulements sous la tension nominale		Tropicalisation
51	Windings combination under rated voltage		Tropicalization
52			
53	Rotor:	Standard constructeur	Alliage de cuivre
54		Manufacturer's standard	Copper alloy
55			Aluminium
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S reference	

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Appendix 2

TOTAL
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DATA SHEET	N°
Project:	
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Appel d'offres/Call for tender ☐		Commande/Order ☐	
CARACTERISTIQUES TECHNIQUES (suite) TECHNICAL SPECIFICATION (cont')			
1			
2			
3			
4	Classe d'isolation (CEI 60085)		Classe d'échauffement
5	Insulation class (IEC 60085)		Temperature rise class
6			
7	Sens de rotation (CEI 60034-8) :	Horaire ☐	Anti horaire ☐
8	Direction of rotation (IEC 60034-8):	Clockwise	Counter-clockwise
9			
10	Position moteur	Horizontal ☐	Vertical ☐
11	Mounting arrangement	Horizontal	Vertical
12			
13	Mode de fixation (CEI 60034-7):	A pattes ☐	A bride ☐
14	Type of construction (IEC 60034-7):	Feet mounted	Flanged
15			
16	ACCESSOIRES ACCESSORIES		
17			
18			
19	Purge eau de condensation carcasse :		Visserie <12 mm, Plaques signalétiques, inox 316
20	Condensed water drain holes on frame:		Rating plate, bolting <12 mm made of stainless steel grade 316
21			
22	Borne de masse :	Sur le moteur ☐	Interne B.J. ☐
23	Earthing boss:	On the motor frame	In the terminal box
24			
25	Boîte à bornes :	Nature ☐	Orientable ☐
26	Terminal box:	Type	Adjustable
27			
28	Câble puissance	Type ☐	Section ☐ mm²
29	Power cable		Cross section
30			
31	Peinture: Standard constructeur	☐	Autres ☐
32	Painting: Manufacturer's standard	[1]	Other [1]
33			
34	[1] Système de peinture à soumettre avec l'offre pour approbation, avec indication garantie.		
35	Painting system to be submitted with the bid for approval, with indication of guarantee.		
36			
37	ESSAIS (selon CEI 60034) TESTS (according to IEC 60034)		
38			
39			
40	Tests de routine	☐	Fourniture du rapport de test du moteur en usine ☐
41	Routine tests		Factory acceptance test report to furnish
42			
43	CARACTERISTIQUES A FOURNIR PAR LE CONSTRUCTEUR CHARACTERISTICS TO BE SUPPLIED BY THE MANUFACTURER		
44			
45			
46	Constructeur		Type de moteur ☐
47	Manufacturer		Motor Type
48			
49	Marquage CE (ATEX 94/9/CE)		Masse ☐ kg
50	CE marking (ATEX 94/9/EC)		Weight
51			
52	Puissance nominale	☐ kW	Intensité nominale ☐ A
53	Rated power		Rated current
54			
55	Vitesse nominale	☐ rpm	Classe d'isolation (CEI 60085) ☐
56	Rated speed		Insulation class (IEC 60085)
57			
58	Carcasse :		Rotor : Aluminium coulé ☐
59	Frame:		Cast aluminium
60			
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S reference	



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Appendix 3

Appendix 3 Data Sheet DC Motor

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Appendix 3

TOTAL
Exploration & Production
DATA SHEET
N°
Project:
DS EP ELE 117

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DC motor

Rev. Date						
Written						
Verified						
Approved						

Appel d'offres/Call for tender ☐		Commande/Order ☐	
1			
2	Repère(s) du (des) moteur(s)		Nombre de moteurs
3	Tag of motor(s)		Quantity of motor
4			
5	CONDITIONS D'INSTALLATION		
6	SITE CONDITIONS		
7			
8	Lieu d'installation		Off-shore ☐ On-shore ☐
9	Site		
10			
11	Température ambiante	Maximum	°C
12	Ambient temperature	Minimum	°C
13			Moyenne annuelle
14			Yearly average
15	Altitude (si valeur > 1000 m)		Hygrométrie
16	Altitude (if > 1000 m above sea level)		Humidity
17	Atmosphère corrosive:	Embruns salins	
18	Corrosive atmosphere:	Sea spray	
19			Classe de corrosion de l'environnement
20			Environ. class of corrosion (ISO 12944-2)
21	Localisation (IEC 60079-10)	zone 1	
22	Location	zone 2	
23			
24	MACHINE ENTRAÎNÉE (si données absentes, Cf spécification mécanique)		
25	DRIVEN MACHINE (if no data, see mechanical specification)		
26	Type	Puissance machine entraînée	
27		driven machine rated output	
28			
29	Plage de vitesse		Courbe couple / vitesse
30	Speed range		Torque versus speed characteristic
31			
32	CARACTERISTIQUES TECHNIQUES		
33	TECHNICAL SPECIFICATION		
34			
35	Tension induit		Mini
36	Armature rated voltage		Maxi
37			
38	Tension excitation		Alimentation par variateur
39	Field rated voltage		Supply by variator
40			
41	Démarrage direct		Démarrage progressif
42	Direct starting		Soft starter
43			
44	Moteur de sûreté	Groupe d'équipement (CEI 60079)	Température maximale de surface
45	Safety motor	Equipment class (IEC 60079)	Maximum surface temperature
46			
47	Mode de protection	EEEx"d"	Service type
48	Type of protection	EEEx"de"	Service type
49			
50	Degré de protection minimum (CEI 60034-5)	IP	Protection contre les chocs mécaniques
51	Minimum enclosure protection degree		Mechanical shock protection rating
52			
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S reference	

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Appendix 3

TOTAL
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DATA SHEET	N°
Project:	
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Appel d'offres/Call for tender ☐		Commande/Order ☐	
CARACTERISTIQUES TECHNIQUES (suite) TECHNICAL SPECIFICATION (cont')			
1			
2			
3			
4	Classe d'isolation (CEI 60085)		Classe d'échauffement
5	Insulation class (IEC 60085)		Temperature rise class
6			
7	Sens de rotation (CEI 60034-8) :	Horaire ☐	Anti horaire ☐
8	Direction of rotation (IEC 60034-8):	Clockwise ☐	Counter-clockwise ☐
9			
10	Position moteur	Horizontal ☐	Vertical ☐
11	Mounting arrangement	Horizontal ☐	Vertical ☐
12	Capot ventilateur avec tôle pare-pluie ☐		
13	Mode de fixation (CEI 60034-7):	A pattes ☐	A bride ☐
14	Type of construction (IEC 60034-7):	Feet mounted ☐	Flanged ☐
15	Autre		
16	ACCESSOIRES		
17	ACCESSORIES		
18			
19	Purge eau de condensation carcasse :	☐	Visserie <12 mm, Plaques signalétiques, inox 316) ☐
20	Condensed water drain holes on frame:		Rating plate, bolting <12 mm made of stainless steel grade 316
21			
22	Borne de masse :	Sur le moteur ☐	Interne B.J. ☐
23	Earthing boss:	On the motor frame ☐	In the terminal box ☐
24	Anneaux de levage ☐		
25	Boîte à bornes induit :	Nature	Avec presse étoupe ☐
26	Armature Terminal box:	Type	With cable glands ☐
27	Type de presse étoupe		
28	Boîte à bornes inducteur :	Nature	Avec presse étoupe ☐
29	Field terminal box:	Type	With cable glands ☐
30	Type de presse étoupe		
31	PT 100 bobinages	☐	Résistance de réchauffage ☐
32	Painting:	Standard constructeur ☐	Autres
33	Painting:	Manufacturer's standard ☐	Other
34	[1] Système de peinture à soumettre avec l'offre pour approbation, avec indication de la garantie / Painting system to be submitted with the bid for approval, with indication of guarantee.		
35			
36			
37	ESSAIS (selon CEI 60034)		
38	TESTS (according to IEC 60034)		
39			
40	Tests de routine	☐	Fourniture du rapport de test du moteur en usine ☐
41	Routine tests		Factory acceptance test report to furnish
42			
43	CARACTERISTIQUES A FOURNIR PAR LE CONSTRUCTEUR		
44	CHARACTERISTICS TO BE SUPPLIED BY THE MANUFACTURER		
45			
46	Constructeur	Type de moteur	Mode de protection (CEI 60079)
47	Manufacturer	Motor Type	Type of protection (IEC 60079)
48			
49	Marquage CE (ATEX 94/9/CE)	Masse	Dimensions
50	CE marking (ATEX 94/9/CE)	Weight	Sizes
51			
52	Puissance nominale	Inertie	Diamètre du bout d'arbre
53	Rated power	Inertia	Shaft diameter for coupling
54			
55	Tension induit	Courant	Resistance (Ohm à 20°C)
56	Armature rated voltage	Current	Resistance (Ohm at 20°C)
57			Inductance
58	Tension d'excitation :	Courant	Resistance (Ohm à 20°C)
59	Field rated voltage:	Current	Resistance (Ohm at 20°C)
60			
Référence FABRICANT/MANUFACTURER'S reference		Référence FOURNISSEUR/SUPPLIER'S reference	