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Gas turbines — Procurement —

Part 7: Technical information

Turbines à gaz — Spécifications pour l'acquisition —

Partie 7: Informations techniques

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 3977 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 3977-7 was prepared by Technical Committee ISO/TC 192, *Gas turbines*.

ISO 3977 consists of the following parts, under the general title *Gas turbines — Procurement*:

— *Part 1: General introduction and definitions*

— *Part 2: Standard reference conditions and ratings*

— *Part 3: Design requirements*

— *Part 4: Fuels and environment*

— *Part 5: Applications for petroleum and natural gas industries*

— *Part 7: Technical information*

— *Part 8: Inspection, testing, installation and commissioning*

— *Part 9: Reliability, availability, maintainability and safety*

Annex A of this part of ISO 3977 is for information only.

Gas turbines — Procurement —

Part 7: Technical information

1 Scope

This part of ISO 3977 specifies the information that needs to be submitted during the proposal and contract stages of a project for the entire scope of supply for which the packager will assume technical and contractual responsibility.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 3977. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 3977 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3977-1:1997, *Gas turbines — Procurement — Part 1: General and definitions*

ISO 3977-3:2002, *Gas turbines — Procurement — Part 3: Design requirements*

ISO 3977-4:2002, *Gas turbines — Procurement — Part 4: Fuels and environment*

ISO 11086:1996, *Gas turbines — Vocabulary*

3 Terms and definitions

For the purposes of this part of ISO 3977, the terms and definitions given in ISO 3977-1, ISO 3977-3, ISO 3977-4 and ISO 11086 apply.

4 Packagers' data

4.1 General

Prior to issuing the enquiry specification, the purchaser shall complete data sheets (see examples in ISO 3977-3:2002, annex A) and Packager Documentation Requirements (see an example in annex A of this part of ISO 3977).

While the data sheets in ISO 3977-3 are intended to convey the scope during the procurement stage, the data sheets within the Packager Documentation Requirements may be used to increase the level of information needed by the purchaser.

The Packager Documentation Requirements complement the data sheets in ISO 3977-3 and define what other documentation the purchaser may require during the execution of the contract. They confirm whether the requested documents, drawings or data are for review or information.

The packager shall provide the purchaser with the required specified number of copies of the proposal to the address stated in the enquiry document.

NOTE 1 The exchange of documentation by EDI (Electronic Data Interchange) may be considered as an effective alternative means of transmitting data between contracting parties.

NOTE 2 Within annex A there is a 'Document Management Specification' which clearly states the purpose and type of information that the generic headings and document codes are attempting to define.

4.2 Site-specific conditions

4.2.1 General

The proposal shall contain, as a minimum, all the data identified as category 2 and located within the proposal column in the project specific Packager Documentation Requirements derived from annex A for the project. It shall also be in compliance with the enquiry specification.

The packager shall provide sufficient detail for the purchaser to evaluate the proposal. All deviations and exceptions to the specification shall be specifically identified.

4.2.2 Coordination

Coordination data exchanged between the packager and purchaser will typically include category 2 documents identified in the Packager Documentation Requirements.

4.2.3 Performance data

The purchaser shall specify to the packager the performance data needed for the specific application to be provided by identifying the document type and category code within the Packager Documentation Requirements example in annex A.

4.2.4 Technical requirements

The packager shall furnish the purchaser with all technical data in accordance with the project-specific Packager Documentation Requirements derived from the example in annex A.

4.3 Contract documentation

4.3.1 General

Documentation required to be submitted during the contract shall similarly be identified on the Packager Documentation Requirements example in annex A and developed and agreed by the packager and purchaser prior to contract award. Each drawing, document or data sheet shall at least have, in the lower right-hand corner, a title block, with date of certification/issue, revision number, date and title. In addition, the document code, sequence number and sheet number consistent with the Packager Documentation Requirements shall be included for cross reference to the Packagers' Data Schedule (see document code A001).

Document code A001 is a dynamic document which shall be updated at regular intervals during the contract and shall be provided for information. It shall be a comprehensive list of all documents to be submitted during the contract by the packager. This list shall contain fields of data containing titles, drawing numbers and a schedule for transmission of all the documents. The Packager Documentation Requirements shall indicate which document codes are for information or review.

4.3.2 Drawings

The drawing(s) furnished shall contain sufficient information so that, when combined with the manuals covered by document code H002 (and corresponding description of content in the Document Management Specification), the purchaser may properly install, operate and maintain the ordered equipment. Details identified on the Packager Documentation Requirements example in annex A shall be provided as a minimum.

4.3.3 Technical data

Data required to be contained within the manuals supplied by the packager shall be identified by the purchaser in the column marked ‘O’ on the Packager Documentation Requirements example in annex A. The purchaser shall assemble and compile the manuals accordingly.

4.3.4 Recommended spares

The packager shall, if specified, submit a supplementary list of spare parts other than those originally included on the Packager Documentation Requirements or the packager's original proposal.

4.3.5 Manuals

All manuals in category H002, and corresponding to the descriptions of content in the Document Management Specification, shall be provided with adequate written instructions and cross-referenced list of drawings to enable the purchaser correctly to install, operate and maintain all of the equipment ordered. This shall be compiled in a manual (or manuals) with index sheets containing section titles and cross-referenced drawings with at least titles and numbers. The manual shall be specific for the installation.

Annex A
(informative)

Typical Packager Documentation Requirements

A.1 Documentation requirements

Table A.1 is intended to form the basis from which the packager and purchaser agree acceptable Packager Documentation Requirements to satisfy the requirements for the project under consideration. The table has been broadly categorized to indicate generic types of documentation. The list is typical and is neither intended to be prescriptive in detail nor in content. It recognizes that particular needs may warrant additional categories of documentation within the specific generic headings and allows the purchaser to add these as required.

It should also be recognized that the documentation content, scope and format will vary depending on several important factors, such as

— the scope of the supply,

— contract specific engineering, and

— contractual relationships, etc.

Furthermore, it should be recognized that not all packagers will reproduce documentation with the same titles as those on the Packager Documentation Requirements. The Packager Documentation Requirements lists the INFORMATION to be supplied and the TYPICAL documentation that will convey this information.

The Packager Documentation Requirements also provide the purchaser with a generic method of identifying documentation that is critical to his plant. By eliminating the requirement for non-critical (non-value-added) documentation to be submitted, the packager and purchaser benefit by reducing incurred costs.

This annex does not attempt to address the procedural issues related to the submission of agreed documentation. It is assumed that this will be covered in the commercial documentation supporting the enquiry.

Table A.1 — Typical Packager Documentation Requirements

JOB No. _____ ITEM No. _____
P.O. No. _____ DATE _____
REQUISITION No. _____ DATE _____
INQUIRY No. _____ DATE _____
REVISION _____
UNIT _____
NOT REQUIRED _____

Documents required for:
P: Proposal
C: Contract
O: Operation

Document Types
Category 1 Documentation required to be recorded by the packager
Category 2 Documentation submitted to the purchaser for information
Category 3 Documentation submitted to the purchaser for review
Category 4 Documentation to be included in the manual (as build)
Category 5 Documentation to be used for certification

Doc. code	Required for			Description	Document types				
	P	C	O		1	2	3	4	5
A	**Procurement documents**								
A001				Packagers documentation schedule					
A002				Exceptions to contract documents					
A003				Schedule of subcontracters					
A004				Quality & Inspection plan					
A005				Contract execution schedule					
A006				Packagers requirements (e.g. fuel, water, air, etc.)					
A007				Catalogues and brochures					
B	**General arrangement (GA) and layout drawings**								
B001				Equipment general arrangement drawings					
B002				Panel and instrument layouts					
B003				Termination drawings (cable, wiring, nozzles, ducting, etc.)					
B004				Flange connection loads					
B005				Sub-assembly and cross-sectional drawings					
B006				Foundation details, loadings, support					
B007				Process & Instrument Diagrams (P&IDs) & Bill of Materials					
B008									
C	**Performance data & calculations**								
C001				Performance data (i.e. turbine, generator, compressor, pump, etc.)					
C002				Foundation support calculations					
C003				Critical speed (lateral & torsional) calculations					
C004				Auxiliary characteristics					
C005									
D	**Electrical & instrument diagrams**								
D001				Electrical connection diagrams					
D002				Electrical single line diagram					
D003				Electrical termination details					
D004				Cablelling and/or wiring schedule					
D005				Cause & effect charts					
D006				Instrument termination & hook-up details, (if applicable)					
D007				Functional and design specification					
D008				Logic diagrams (if applicable)					
D009									

Table A.1 *(continued)*

Doc. code	Required for			Description	Document types				
	P	C	O		1	2	3	4	5
E	**Certification data & test results**								
E001				Hydrostatic/Pneumatic test results					
E002				Weighing certificates					
E003				Statutory certification (pressure vessels, lifting equipment, etc.)					
E004				Nameplate markings (primary equipment, pressure vessels, etc.)					
E005				Vibration analysis data					
E006				Performance test reports/results					
E007				Inspection release certificate					
E008									
F	**Data sheets**								
F001				Gas turbine data sheets					
F002				Heat emissions					
F003				Utilities (electrical, air, fuel, cooling water, cleaning fluids, heating, ventilation, air conditioning, etc.)					
F004				Instrument data					
F005				Noise data					
F006				Weight data					
F007				Emissions (to atmosphere) data					
F008				Hazardous area equipment schedule					
F009				Equipment data sheets					
F010									
G	**Packaging, shipping, storage & preservation data**								
G001				Packing & shipping details					
G002				Storage & preservation details					
G003									
H	**Manuals**								
H001				Concessions granted post-purchase order					
H002				Technical manuals					
H003				Quality-related manual					
J	**Recommended spares lists**								
J001				Commissioning & start-up					
J002				Operating					
J003				Maintenance					
J004				Consumables					
J005				Special tools					
J006				Recommended 2 years operational spares					
J007									

A.2 Documentation philosophy

A.2.1 General

Generally only those documents that 'add value' should be submitted or provided to the purchaser. However, drawings, information and data are generated or collected by the packager for a variety of reasons which generally fall into five categories as follows.

A.2.2 Category 1: Documentation required to be recorded by the packager

This documentation is that which the packager collects during the contract to support the quality of the equipment produced, together with documents required for mandatory statutory or regulatory reasons.

The Packagers Quality Manual describes the management system and that documentation initiated by it. This compliance documentation is of little value to the purchaser after delivery and is therefore considered non-critical. However, the information should be retained by the packager for a duration of 10 years.

A.2.3 Category 2: Documentation submitted to the purchaser for information

Documentation in this category is intended to cover that which the purchaser requires for information and reference purposes only.

A.2.4 Category 3: Documentation submitted to the purchaser for review

Documentation in this category is defined as that minimum critical information that the purchaser needs to engineer, install, operate and maintain the plant.

It includes the essential interface information required by the operator, or his appointed nominee, to assist in the design process. The scope and extent of this documentation should be agreed between the packager and purchaser.

A.2.5 Category 4: Documentation to be included in the manual

Documentation in this category is intended to be included already in the manual.

A.2.6 Category 5: Documentation to be used for certification

Documentation in this category is already contained within category 1. In most circumstances a 'Certificate of Compliance' from the packager will suffice. However, it is also recognized that most packagers furnish a Quality Manual and/or Certification Data Dossier containing this information.

The packager and purchaser should jointly review the documentation requirements and submission schedule prior to contract using as a basis the afore-mentioned philosophy. The packager should confirm, by means of the Quality Plan (or similar) the total documentation generated for the contract.

A.3 Packager Documentation Requirements Specification

Table A.2 identifies what information may be required to be supplied for the generic information supplied under the specified document code. The final list should be agreed between the packager and purchaser.

Table A.2 — Packager Documentation Requirements Specification

Doc. Code	Generic title	Purpose/content
A Procurement documents		
A001	Packager's documentation schedule	This is a document updated at regular intervals during the course of the contract to show a complete listing, by document code and title, of all drawings to be submitted by the packager to the purchaser. A pro forma for such a document may either be furnished by the purchaser or one proposed by the packager may be used. In any event the list will cross reference between the packager's document numbering system and that of the Packager Documentation Requirements Code appended with a sequence and sheet numbers, i.e. A001/001/001, packagers document No. ABC 12345 Sheet 1, packager's document title.
A002	Exceptions to contract docs.	This is a list of deviations (which may be technical, commercial or a combination of the two) to the enquiry documentation. The purpose is to highlight the areas of nonconformance which are to be used as a basis for agreeing scope, specification and, if appropriate, commercial terms and conditions.
A003	Schedule of subcontractors	This is a document furnished by the packager which identifies the milestones within a contract when major sub-orders will be placed; this should include planned and actual order dates, delivery dates, and actual material-received dates.
A004	Quality & inspection plan	The quality plan should be contract-specific and identify the activities that should necessarily be undertaken by the packager to ensure the quality of the delivered product, and also satisfies any mandatory statutory and any regulatory requirements. It should include all hold and witness points and indicate those activities which need to be witnessed by the purchaser, any certifying authority or any third-party inspectorate. The document should cross reference all relevant weld, non-destructive examination and test procedures that will be used to ensure the quality and performance of the delivered product.
A005	Contract execution schedule	This is a schedule showing the various stages of procurement, design, manufacture, inspection, testing and delivery for all major components. It may have several different formats, the simplest being a production bar chart against which progress can be monitored.
A006	Packagers requirements (e.g. fuel, water, air, etc.)	This is a listing of ambient conditions, quality, quantity, pressure, temperature, etc. of any fuels, cooling water, injection water/steam applicable and/or available at site.
A007	Catalogues and brochures	Essentially these comprise the brochures and catalogues of major equipment which support the enquiry and contract documentation and to be used for reference purposes.
B General arrangement (GA) and layout drawings		
B001	General arrangement (GA) drawings of equipment	Documents in this category should contain views in plan, frontal and side elevations in third angle projection with sections as necessary to provide essential information for plant layout purposes. Drawings in this category should typically include the following information (see B003 and B004): — overall dimensions; — location and details of all battery limit termination points (mechanical and electrical), flange loadings, design codes & specifications and connections to the purchaser's or other's supply; — location and identification of major components and sub-assemblies; — dimensioned details of requirements for lighting; — dimensioned details of requirements for access (e.g. platform and stair system drawings), maintenance, removal or replacement; — list of sub-assemblies and associated drawings; — overall weights and dimensions and centre of gravity position; — details of spreader beam requirements, lifting points, etc. The level of detail required may not necessarily be available at first submission of the document and may require one or more sheets to avoid over complication and crowding.

Table A.2 *(continued)*

Doc. Code	Generic title	Purpose/content
B002	Panel and instrument layouts	Documents in this category are intended to cover control cabinets and instrumentation panels for the gas turbine, driven equipment and other ancillary equipment. Details should generally be as B001 and should show the relative position of component items located on the panels with descriptions where appropriate. In addition they should show: — construction details with hinging/opening of doors, restraints, locking and plinth requirements; — mimic/annunciator drawing where applicable; — internal layout showing lighting, cable entries, terminal strip locations, wiring trays, cable/voltage segregation, IS and non-IS equipment; — hydraulic/pneumatic layouts (where applicable).
B003	Termination drawings	Where it is impractical to provide termination data on documents in category B001, the packager may elect to provide cable, wiring, nozzle and ducting interface data on a separate document and make the necessary cross references apparent.
B004	Flange connection loads	Where it is impractical to provide termination data on documents in category B001, the packager may elect to provide maximum flange external loadings on a separate document and make the necessary cross references apparent.
B005	Sub-assembly & cross-sectional drawings	This category of documentation is intended to provide the purchaser with adequate detail of sub-assemblies which form part of the package which may be required for review and approval or information if detail on the General Arrangement Drawings (see B001) is insufficient.
B006	Foundation details, loadings and support data	Information required for documents in this category is intended to provide the purchaser with sufficient detail to enable the civil design associated with the contracted scope to be completed in a timely fashion prior to delivery of the equipment. The scale drawing should identify at least the following: — jacking locations; — locations of mounting points or other load bearing supports; — static and dynamic forces or moments for all operating conditions (i.e. short circuit, mal-synchronization, etc.); — fixing details (i.e. anchor bolt details, grouting requirements, etc.) showing choking and shimming requirements; — details of weld preparations (if applicable); — positions of temporary fixings (for transportation).
B007	Process & Instrumentation Diagrams (P&IDs) & Bill of Materials	P&IDs are typically intended to show some or all of the following: — equipment, equipment names and unique identification (tag) numbers; — design and operating temperatures, pressures and duties; — insulation and trace heating requirements; — vent and drain requirements; — relief requirements, pressure safety valves, sizes and set pressures; — block and bleed valve requirements; — alarm and shutdown settings of instruments; — elevation, where appropriate; — line sizes, line numbers, construction materials, pipe schedules and specifications; — slopes of lines (and vessels); — process and utility flow lines and direction of flow indicators; — switch and instruments with tag numbers and alarm and trip settings; — control signals; — emergency/fail-safe shutdown valves valve positions; — cross references with other P & IDs, etc.

Table A.2 *(continued)*

Doc. Code	Generic title	Purpose/content
C Performance data & calculations		
C001	Performance data	Performance data and curves should be provided, as required, for base load and part load conditions, as follows. a) For the gas turbine, including: — power output, heat rate and/or efficiency, exhaust gas flow, temperature, analysis; — variation of above parameters with ambient temperature (or compressor inlet temperature) and ambient pressure, relative humidity, inlet/exhaust system pressure losses, speed, etc. (see also ISO 2314). b) For generator drive applications — generator terminal power and heat rate and/or efficiency; — capability curve of the generator. c) For centrifugal compressor applications: — suction temperature/pressure; — discharge temperature/pressure; — absorbed power; — surge line/limitations; — polytropic or isentropic enthalpy difference (head); — efficiency vs. capacity for agreed speed range. d) For centrifugal pump applications: — enthalpy difference (head); — efficiency; — absorbed power; — minimum flow; — Net Positive Suction Head Available and Net Positive Suction Head Required vs. capacity; — system curve. Guarantee points should be clearly indicated.
C002	Foundation support calculations	These are calculations undertaken by the packager to confirm and ensure that the foundation support loads and baseplate deflections are capable of withstanding loads imposed by transportation, normal operation and under dynamic and fault conditions. The effect of baseplate deflections on shaft alignment should also be considered.
C003	Critical speed calculations	These calculations should be performed to determine that the lateral and torsional characteristics of the proposed equipment configuration are within acceptable limits to minimize the potential for operational difficulties arising therefrom. Results may be displayed diagramatically, graphically or plotted.
C004	Auxiliary equipment characteristics	These are data to indicate the torque speed relationships for the driven unit (i.e. for generator, compressor or pump) and current against speed for defined voltages and frequencies for electric motor driven equipment (i.e. starter motors, fans, pumps, fuel gas compressors, etc.).
D Electrical & instrument diagrams		
D001	Electrical connection diagrams	Diagrams in this category should display in block form the items of electrical equipment and the cables connecting them. This diagram will include a reference for each item along with the size of cable, number of conductors and whether it is to be supplied by the packager or purchaser.
D002	Electrical single line diagram	This is a representation of the overall electrical power system scope and/or control system circuits.

Table A.2 *(continued)*

Doc. Code	Generic title	Purpose/content
D003	Electrical termination details	Diagrams in this category will show each numbered cable and/or conductor terminations. Earthing, AC and DC segregation, IS and non-IS teminations (where applicable) and cable screening termination requirements with duty description and tag numbers at both ends should be suitably identified.
D004	Cablelling and/or wiring schedule	All electrical, instrument and communication cabling and/or wiring should be listed with those to be supplied by the purchaser identified as such. The schedule will typically list the following: — cable and/or wire size and type; — cable and/or wire number; — gland size and type; — conduit size and type; — to/from location; — interconnection diagram cross reference; — cable and/or wire length, etc.
D005	Cause & effect charts	Cause and effect charts for emergency shutdown valves and other safety/control functions should be furnished to assist installation, commissioning, operation and where necessary diagnostics.
D006	Instrument termination & hook-up details	Instrumentation cablelling wiring termination details should show junction box cable gland or conduit entry drilling sizes and type information. Process hook-up details should be available from documentation submitted.
D007	Loop diagrams	Mechanical, process, electrical and control system information should be available for complex loops to assist installation, commissioning, operation and where necessary diagnostics.
D008	Function and design specification	This indicates the sequence, interlock and control functions. Where applicable sub-system functions should be grouped together to clearly identify their association with each other and the overall system function.
E Certification data & test results		
E001	Hydrostatic/pneumatic test results	Documents in this category are intended to cover and record the results of inspection and testing activities defined by those documents contained within category A004.
E002	Weighing certificate	Major items of equipment may be required to be furnished with weight certificates for craneage, installation and shipping purposes.
E003	Statutory certification	Documents in this category are for certification to satisfy mandatory statutory requirements for equipment such as lifting equipment, pressure vessels, etc.
E004	Nameplate markings	Documents in this category are intended to provide details of nameplates for specified data such as major equipment, pressure vessels, etc. and contain important information and data related to safety, etc.
E005	Vibration analysis data	Data submitted under documents in this category relate to the test data acquired during testing which form the basis of acceptance of the equipment and may be used as a basis to monitor the trend of the products when in service and for preventative maintenance purposes.
E006	Performance test reports	Documents in this category will record the actual test data for equipment subjected to performance tests that have been identified in the Quality Plan, usually the gas turbine, driven unit and major ancillary equipment, i.e. fuel gas compressors, etc. (see A004).
E007	Inspection release certificate	Documents in this category will cover the necessary release certificates for major equipment as agreed by the packager and the purchaser.

Table A.2 *(continued)*

Doc. Code	Generic title	Purpose/content
F Data sheets		
F001	Gas turbine data sheets	Data sheets in this category are intended to be used as a means of conveying the purchaser's requirements to the packager. They accompany the enquiry specification and should be updated during the contract as and when mutually agreed. Additional detail to complement these data sheets can be furnished by way of other documents in category F, if required.
F002	Heat emissions	Within this category, estimated heat dissipations should be provided. Essentially the purpose is to provide the purchaser with sufficient data to assist in sizing heating ventilation air conditioning systems and ventilation requirements for the building if they are not already in the scope of the packager.
F003	Utilities (electrical, air, cooling water, cleaning fluids, heating, ventilation, air conditioning, etc.)	Schedule should indicate the types, quantities, quality, pressure, temperature, voltage, kW, KVA, etc. of all utilities required to start, maintain and operate the equipment under all known conditions.
F004	Instrument data	Data sheets for all instruments used by the packager may be required to be submitted by the packager to the purchaser. When required to do so, these should be submitted to an agreed format within this category of documentation. All relevant details such as set points, materials of construction, voltage, frequency, temperature and pressure range, tag numbers, etc. should be included.
F005	Noise data	Within this category, data sheets for specific items and/or the complete scope of supply the packager should provide anticipated (and when specified guaranteed) sound power and sound pressure levels for the octave mid-band frequencies specified.
F006	Mass data	When information on mass is critical to the purchaser, data sheets should be furnished for each major item of equipment that exceeds 500 kg. These data sheets should identify information and data for the following conditions: — empty (dry, predicted and as weighed); — operating; — test (full); — shipping weight; — centre of gravity.
F007	Emissions (to atmosphere) data	In circumstances where emissions control and/or monitoring are required, the packager should furnish documentation in this category to cover the hardware, and predicted and guaranteed emission data.
F008	Hazardous area equipment schedule	When required to do so, the packager should furnish the purchaser with a comprehensive tabular list of all electrical and electrically operated instrumentation equipment. The list typically includes the following information: — equipment type (e.g. junction box, motor, transmitter, etc.); — tag number; — quantity; — manufacturer; — zone in which fitted (e.g. Zone 0, 1, 2 or safe area); — approval body (e.g. BASEEFA, PTA, INIEX,etc.); — type of protection (e.g. flameproof, intrinsically safe, etc.); — apparatus group (sometimes referred to as gas group, e.g. IIA, IIB or IIC); — temperature classification (e.g. T3, T6, etc); — hazardous area certificate No.; — expiry date of licence; — standard to which equipment is certified; — entry protection rating, (e.g. IP 21, IP 56, etc.).

Table A.2 *(continued)*

Doc. Code	Generic title	Purpose/content
F009	Equipment data sheets	When required to do so the packager should furnish the purchaser with a comprehensive list of data sheets for major items of equipment.
G Packaging, shipping, storage & preservation data		
G001	Packing & shipping details	Documentation within this category defines how the packager proposes to despatch and prepare equipment for shipment to the nominated site by the means proposed. Documents in this list typically include packing procedures, packing lists, estimated masses and dimensions, shipping instructions, sea freight, road transport, markings, etc.
G002	Storage & preservation details	Detailed storage and preservation details, including special precautions, recommended inspection periods, materials and equipment required, etc. should be contained within documentation in this category.
H Manuals		
H001	Concessions granted post-purchase order	This is the index of concession requests lodged throughout the contract and should list those approved by the purchaser, those pending approval, and those not accepted.
H002	Technical manuals	The packager should furnish all manuals in a format to be agreed between the packager and purchaser. It is recognized that packagers adopt their own standard way of providing information which is broadly categorized by the manuals (and contents listed below). Typically these include the following. a) Installation and commissioning manual (may be separate): — brief description of equipment; — operating parameters; — dimensions, tolerances, mass, lifting requirements, center of gravity, etc.; — power and any other utility requirements; — installation requirements, dimension, access, etc. with outline drawings; — preservation status or inhibition with measures to be taken to preserve/store equipment prior to start up; storage modes to be identified, i.e. open yard, heated stores, etc.; — unpacking, handling, lifting transportation, repackaging for rectification, storage, etc.; — method of installation, alignment testing, mounting, supports, connection details, etc.; — remedial techniques required to ensure compliance with certification of electrical equipment in hazardous areas, etc.; — spare parts, special tools, support equipment, etc.; — preparation for operation, as applicable, including cleaning and drying out procedures, initial lubrication, introduction of cooling media, etc.; — pre-commissioning checks and run-up data; — recommissioning checks and test procedures following major inspections and/or overhaul.

Table A.2 *(continued)*

Doc. Code	Generic title	Purpose/content
		b) Operating manual (may be separate or combined with maintenance manual at packagers' discretion): — functional description of the equipment with basic principles of operation, including safety features; — method of operating controls, with cause and effects; — operating procedures for various modes, manual/auto-remote, as applicable covering start-up, standby, steady-state running, shutdown, emergency and fault correcting; procedures should include operational limitations and precautions; — block diagrams, functional diagrams, schematics and layout diagrams, to identify operator controls and adjustments; — full software listing (where applicable); — requirements for start-up, shutdown and equipment protection; — trouble shooting checklists/tables. c) Maintenance manual: — maintenance schedules (minimum and maximum periods for implementation of routine tests, checks and preventative maintenance); these should include statutory re-certification requirement schedules; — routine maintenance and test procedures; — corrective maintenance procedures, including removal, dismantling, overhaul, assembly, repair, test and calibration; all should be supported by diagrams, drawings, narrative descriptions, etc; — specified cleaning methods, fluids and materials; — fits, clearances and tolerances (baseline and maximum); — details of access/lifting requirements; — list of standard and special tools required for maintenance, repair and overhaul; — equipment record cards/sheet, etc. d) Spare Parts Manuals (may be included in O or M manuals): — illustrated parts breakdown; — details should include component identification data and part numbers to assist re-ordering; — exploded view diagrams where necessary, etc.
H003	Quality-related manual	Data dossier (Quality/Certification data): Submission of such a document is not a mandatory requirement as it is the packager's responsibility to retain this data for a period of 10 years. Purchasers may elect to receive a 'Certificate of Compliance'. Such a document should typically contain: — materials certificates; — hydrostatic/pneumatic test records; — performance test reports and records; — build records (tolerances, etc.); — hazardous area equipment certificates.

Table A.2 *(continued)*

Doc. Code	Generic title	Purpose/content
J Recommended spares lists		
J001	Commissioning & start up	This list should indicate spare parts and special maintenance/handling tools recommended by the packager. These may include wearing parts such as bushings, seals, gaskets, etc. which need replacement after start-up, test and shut-down prior to commercial operation.
J002	Operating	Schedule should indicate the type and grade of lubricants and other consumables required for all equipment supplied in an agreed format. For each category, first-fill capacities, rate of consumption and frequency of change should be indicated.
J003	Maintenance	Spares listed in this category are intended to be grouped according to the major maintenance activities defined by the packager and typically cover major inspections and overhauls, either time based or elapsed operational hours.
J004	Consumables	Spares in this list are intended to cover those minor consumable spares such as fuses, bulbs, gaskets, wash fluids, etc. that are required for normal operation of the plant.
J005	Special tools	This list should contain a list of all standard and special tools that the purchaser will need to effectively carry out all the maintenance and overhaul procedures necessary to operate and maintain the plant in accordance with the packager's recommendations.
J006	Recommended 2 years operational spares	List should indicate parts recommended by the packager with adequate cross references to drawings and parts lists. Format, content and presentation of data should be agreed.

Bibliography

[1] ISO 2314:1989, *Gas turbines — Acceptance tests*

[2] ISO 3977-2:1997, *Gas turbines — Procurement — Part 2: Standard reference conditions and ratings*

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