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14661

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2000-06-15

AMENDMENT 1
2002-11-01

Thermal turbines for industrial applications (steam turbines, gas expansion turbines) — General requirements —

AMENDMENT 1: Data sheets for thermal turbines for industrial applications

*Turbines thermiques pour applications industrielles (turbines à vapeur,
turbines à dilatation de gaz) — Prescriptions générales —*

*AMENDEMENT 1: Feuilles de données pour turbines thermiques pour
applications industrielles*



Reference number
ISO 14661:2000/Amd.1:2002(E)

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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 Amendment may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to International Standard ISO 14661:2000 was prepared by Technical Committee ISO/TC 208, *Thermal turbines for industrial application (steam turbines, gas expansion turbines)*.

Thermal turbines for industrial applications (steam turbines, gas expansion turbines) — General requirements

AMENDMENT 1: Data sheets for thermal turbines for industrial applications

Page v, Foreword

Replace the last sentence with the following: “Annexes A to D are for information only.”

Page 63

Add the following data sheets as annex D, before the Bibliography.

Page 72

Add the following references to the Bibliography.

- [198] ISO 8068, *Petroleum products and lubricants — Petroleum lubricating oils for turbines (categories ISO-L-TSA and ISO-L-TGA) — Specifications*
- [199] ISO 9084, *Calculation of load capacity of spur and helical gears — Application to high speed gears and gears of similar requirements*
- [200] IEC 60045-1, *Steam turbines — Part 1: Specifications*
- [201] IEC 60079-0, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements*

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D.2	Table of Contents of Annex D (<i>continued</i>)
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D.15	Continuing: Working Fluid Connections
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D.36	Plate-type Coolers (<i>continued</i>)

D.1

Data Sheet No.	
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D.39	Vapour Extractor, Vapour Separator (<i>continued</i>)
D.40	Purification System, Jacking Oil Device (<i>continued</i>)
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D.44	Control Valve(s), Electro-hydraulic Converter(s) (<i>continued</i>)
D.45	Monitoring, Limiting, and Protecting Devices: Stop Valve(s), Strainer(s)
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D.48	Overpressure Protecting Systems (<i>continued</i>)
D.49	Extent and Functions (Working Fluid System) (<i>continued</i>)
D.50	Extent and Functions (Lubricating and Control Fluid System) (<i>continued</i>)
D.51	Extent and Functions (Miscellaneous Systems) (<i>continued</i>)
D.52	Extent and Functions (Position Measurements) (<i>continued</i>)
D.53	Material Tests and Inspections: Turbine Components
D.54	Piping (<i>continued</i>)
D.55	Further Tests and Inspections: Turbine Components
D.56	Mechanical Running Test at the Shop
D.57	Miscellaneous Further Tests and Inspections
D.58	Preparation for Shipment and Storage: Paint Coating, Preservation
D.59	Packing, Storage at Site (<i>continued</i>)
D.60	(Blank data sheet without title, Title to insert, if necessary)

D.2

Annex D (informative)

Data sheets for thermal turbines for industrial applications

Typical examples of "Data sheets for thermal turbines for industrial applications" are shown in this annex, in which the title of each data sheet is abbreviated as "Data Sheets for Industrial-type Turbines".

Instructions for the use of the data sheets

The set of data sheets is conceived in such a manner that the blank forms can be used for all three steps of a project (first step: Tender; second step: Purchasing; third step: As-built documentation). The information about which step a set of data sheets is related to is to be marked on sheet D.6, line 13. The relation of the individual data sheet to the cover sheet is to be seen by means of the dates written at the foot of each individual data sheet.

For a proper functioning of the system, it is important that each step of the project begin with new originals. By doing this, it is ensured that the last revision documents the final state of the project step in concerned. This is valid for each data sheet.

The complete table of contents (data sheets D.1 and D.2) is a listing of all existing data sheets. Because of the fact that each individual data sheet is not necessary in each case, and that it may happen that one certain data sheet dealing with a certain topic offers insufficient space (e.g. more extractions than provided for on the blank), a page numbering besides the numbering of the blank forms is necessary. For this reason the tender/order related table of contents (D.4 and D.5) presents a column named "Page(s)", where the consecutive numbering of the pages used has to be written down. This numbering has to be transformed to the individual pages (found at the head of each page the right side). By doing this, the user of the data sheets always has control of the completeness of the data sheets on hand.

To ensure the topicality of the state of revision, and to enable control of this, the table of contents presents a column named "Rev" (revisions).

The state of revision of each individual data sheet has to be transferred to the table of contents.

The provisions, as described above, result in a complete survey and the possibility of control of the state of the data sheets of a project.

With respect to quality management (ISO 9001), each data sheet has to be signed by the person in charge of the project. The check of the correct selection of data sheets and of the correct contents shall be attested by a signature on the data sheets D.4 and D.5. The same is valid for the release of the data sheets.

To do his job, the supplier needs a minimum of information from the purchaser. This information is marked as a uniformly grey background on the data sheets. There are some, rather rare, cases where it is not possible to state on the blank data sheets at this early stage, whether the purchaser or the supplier should give the information. If, for a certain project, this information is to be given by the purchaser, then it has to be given to the supplier together with the starting information. The data fields concerned are marked on the data sheets by a grey shading, consisting of numerous vertical lines:



uniformly grey background;



grey shaded by vertical lines.

To obtain a general view of the data sheets concerned, look at the table of contents. In this table the data sheets concerned are marked in the column "Data Sheet No." by grey shading.

D.3

These data sheets contain a maximum of data. Nevertheless, it may happen in exceptional cases that additional data are necessary. In most of the cases only a fraction of the data listed in the data sheets is really necessary, because the purchaser may not be interested or because those data are already embodied in other documents.

Therefore the following is valid.

At the tender, only rather few data are available for the supplier, and the purchaser needs also only rather few data. Therefore it is intended that the purchaser mark the data required by him in the tender on the data sheets by putting an "X" at the place where the required data are designated, in the column "Info". The data sheets concerned should be marked in the same manner on the table of contents.

The same applies analogously to the states of purchasing and as-built documentation. It is strongly recommended that the purchaser and supplier agree upon the extent of data to be documented on the data sheets.

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Info	DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES								Rev.
	List of Data Sheets for the Tender/Order						Page:	of:	
	Purchaser:			Project:		Supplier:			
	Ref. No.			Ref. No.		Ref. No.			
	Data Sheet No.	C o n t e n t s						Page(s)	
	D.1	Table of Contents of annex D							
	D.2	Table of Contents of annex D (<i>continued</i>)							
	D.3	Instructions for Use of the Data Sheets							
	D.4	List of Data Sheets for the Tender/Order							
	D.5	List of Data Sheets for the Tender/Order (<i>continued</i>)							
	D.6	General Information							
	D.7	Operating Conditions							
	D.8	Extreme Operating Conditions							
	D.9	Special Data for Gas Expansion Turbines							
	D.10	Fundamental Arrangement of Machines / Direction of Rotation							
	D.11	Site, Climate, Installation and Erection Data							
	D.12	Utility Data							
	D.13	Utility Data (<i>continued</i>)							
	D.14	Turbine Casing(s) and Pipe Connections: Forces, Moments, Movements							
	D.15	Working Fluid Connections (<i>continued</i>)							
	D.16	Design features of turbine: General							
	D.17	Materials (<i>continued</i>)							
	D.18	Bearings and bearing housings (<i>continued</i>)							
	D.19	Shaft seals (<i>continued</i>)							
	D.20	Rotordynamics							
	D.21	Baseframe (Baseplate) and Soleplates							
	D.22	Gear units							
	D.23	Gear units (<i>continued</i>)							
	D.24	Gear units (<i>continued</i>)							
	D.25	Couplings							
	D.26	Couplings (<i>continued</i>)							
	D.27	Rotor Turning Device							
	D.28	Piping at the Limit of Supply (Except Oil Piping)							
	D.29	Table D.28 (<i>continued</i>)							
	D.30	Condensing Plant							
	D.31	Gland Steam or Gas System							
	D.32	Gland Steam or Gas Exhaust System							
	D.33	Lubricant, Control Fluid and Seal Fluid Systems: Arrangement, General Data, Pumps							
	D.34	Pumps (<i>continued</i>)							
	D.35	Filters, Accumulators (<i>continued</i>)							
	D.36	Plate-type Coolers (<i>continued</i>)							
	D.37	Tube-type Coolers (<i>continued</i>)							
	D.38	Reservoirs (<i>continued</i>)							
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	D.41	Governing system: General Data							
	D.42	Minimum Input/Output Requirements (<i>continued</i>)							
	D.43	Installation, Control Panel, Speed Setpoint Signal, Speed Sensors (<i>continued</i>)							
	D.44	Control Valve(s), Electro-hydraulic Converter(s) (<i>continued</i>)							
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									
Revision	Original	A	B	C	D	E	F	G	
Prepared									
Checked									
Proofed									
Date									

[illegible]

DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES										Rev.	01
General Information										Page:	of:
Info	Purchaser:			Project:			Supplier:				02
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											05
											06
											07
											08
											09
											10
											11
											12
	Ref. No.			Ref. No.			Ref. No.				
Applicable to ☐ Tender ☐ Purchase ☐ As-built											13
Space for general remarks:											14
											15
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The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.											53
Revision	Original	A	B	C	D	E	F	G		54	
Prepared										55	
Checked										56	
Proofed										57	
Date										58	

DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES										Rev.	01	
Operating Conditions										Page:	of:	02
Purchaser:			Project:			Supplier:				03		
Ref. No.			Ref. No.			Ref. No.				04		
Ref. No.			Ref. No.			Ref. No.				05		
Type of driven machine:										06		
Operating points (3.8)										07		
Guarantee point(s) (3.8.2)										08		
Power output coupling, resp. generator terminal										09		
☐ Turbine ☐ Gear ☐ Generator ^b (kW)										10		
Speed of coupling to driven machine (min ⁻¹)										11		
Prohibited speed ranges of driven machine: (min ⁻¹)										12		
Inlet mass flow ^b (t/h) ^e										13		
absolute pressure () ^c										14		
temperature (°C)										15		
Exhaust mass flow (t/h) ^e										16		
absolute pressure () ^c										17		
temperature ^d (°C)										18		
wetness ^d (%)										19		
Extraction 1 ☐ controlled ☐ uncontrolled										20		
mass flow (t/h) ^e										21		
absolute pressure () ^c										22		
temperature (°C)										23		
Extraction 2 ☐ controlled ☐ uncontrolled										24		
mass flow (t/h) ^e										25		
absolute pressure () ^c										26		
temperature (°C)										27		
Extraction 3 ☐ controlled ☐ uncontrolled										28		
mass flow (t/h) ^e										29		
absolute pressure () ^c										30		
temperature (°C)										31		
Induction 1 ^a ☐ controlled ☐ uncontrolled										32		
mass flow (t/h) ^e										33		
absolute pressure () ^c										34		
temperature (°C)										35		
Reheated fluid ^a mass flow (t/h) ^e										36		
absolute pressure () ^c										37		
temperature (°C)										38		
Heat rate (3.2.3) (kJ/kW·h)										39		
Steam rate (3.2.4) (kg/kW·h)										40		
^a For more extractions, reheatings or inductions, or for more operating points, take an additional sheet D.7. ^b Purchaser: Please specify whether the power output or the inlet mass flow only ^c Please indicate whether the unit is bar or kPa or MPa ^d For wet steam: The declaration of exhaust temperature is not necessary. Temperature and wetness only for information ^e If in an individual case (kg/s) is requested, then the users may change by hand (t/h) to (kg/s).										41		
Is reverse rotation caused by the driven machine possible: ☐ yes ☐ no ☐										42		
Provisions with respect to a possible reverse rotation:										43		
For gas expansion turbines: Operating point refers to gas composition (Gas composition, see sheet D.9) Operating point refers to gas composition Operating point refers to gas composition Operating point refers to gas composition										44		
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.										45		
Revision	Original	A	B	C	D	E	F	G		46		
Name										47		
Date										48		
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										57		
										58		

DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES										Rev.	01
Extreme Operating Conditions										Page:	of:
Purchaser:			Project:			Supplier:					02
Ref. No.			Ref. No.			Ref. No.					03
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D.8

DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES										Rev.	01
Fundamental Arrangement of Machines / Direction of Rotation								Page:	of:	02	
Purchaser:			Project:			Supplier:			03		
									04		
									05		
Ref.No.			Ref. No.			Ref.No.			06		
Fundamental arrangement of machines										07	
For the sketch of fundamental arrangement of machines, please use those symbols presented beneath										08	
									09		
									10		
									11		
									12		
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									36		
Axial turbine Single casing Single flow, without flow reversion	Axial turbine Single casing Single flow, with flow reversion	Axial turbine Single casing Double flow	Radial turbine Single casing Flow direction outwards	Radial turbine Single casing Flow direction inwards					37		
									38		
Gear unit Spur gearing Shifted shafts	Gear unit Planetary gearing Concentric shafts	Generator	Blower Compressor Pump						39		
									40		
									41		
									42		
									43		
									44		
									45		
									46		
									47		
									48		
									49		
									50		
The direction of rotation is defined by looking from the turbine coupling to the driven machine.										51	
Direction of rotation of the driven machine: ☐ clockwise ☐ counter-clockwise										52	
Direction of rotation of the turbine: 1. Casing: ☐ clockwise ☐ counter-clockwise										53	
2. Casing: ☐ clockwise ☐ counter-clockwise										54	
The purchaser shall put an X in the info-column to indicate where data are required in the supplier's tender.										55	
Revision	Original	A	B	C	D	E	F	G	56		
Name									57		
Date									58		

D.10

DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES										Rev.	01																												
Site, Climate, Installation and Erection Data								Page:	of:		02																												
Purchaser:			Project:			Supplier:				03																													
Ref. No.			Ref. No.			Ref. No.				04																													
Ref. No.			Ref. No.			Ref. No.				05																													
Site data Geographical location: Height above sea level: 												06																											
<table border="1" style="width: 100%;"> <tr> <td>Barometric pressure</td> <td>()^a</td> <td>normal</td> <td>max.</td> <td>min.</td> </tr> <tr> <td>Relative humidity</td> <td>(%)</td> <td>normal</td> <td>max.</td> <td>min.</td> </tr> <tr> <td>Ambient temperature outdoors</td> <td>(°C)</td> <td>normal</td> <td>max.</td> <td>min.</td> </tr> <tr> <td>Ambient temperature indoors</td> <td>(°C)</td> <td>normal</td> <td>max.</td> <td>min.</td> </tr> </table>											Barometric pressure	() ^a	normal	max.	min.	Relative humidity	(%)	normal	max.	min.	Ambient temperature outdoors	(°C)	normal	max.	min.	Ambient temperature indoors	(°C)	normal	max.	min.		07							
Barometric pressure	() ^a	normal	max.	min.																																			
Relative humidity	(%)	normal	max.	min.																																			
Ambient temperature outdoors	(°C)	normal	max.	min.																																			
Ambient temperature indoors	(°C)	normal	max.	min.																																			
^a Please indicate whether the unit is bar or kPa or MPa.												08																											
Earthquake-factor related to the turbine floor: horizontal: parallel to turbine axis: $\nu =$ transverse, to turbine axis: $\nu =$ vertical: $\nu =$ (The earthquake-factor is defined by $F = \nu \cdot g \cdot m$ and contains already all correction values. m = mass of the component concerned g = acceleration due to gravity (9,81 m/s ²).												09																											
Hazardous area classification according to IEC 60079-10: <table border="1" style="display: inline-table; vertical-align: top; margin-right: 20px;"> <thead> <tr> <th rowspan="2">Area</th> <th colspan="3">Class. acc. to IEC 60079-10</th> </tr> <tr> <th>Zone</th> <th>Explosion group</th> <th>Temperature class</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>											Area	Class. acc. to IEC 60079-10			Zone	Explosion group	Temperature class																						10
Area	Class. acc. to IEC 60079-10																																						
	Zone	Explosion group	Temperature class																																				
Required minimum protection against physical contact, ingress of foreign bodies and of liquid, according to IEC 60529 (IP-Code): <table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th>Area</th> <th>Minimum protection</th> </tr> </thead> <tbody> <tr><td> </td><td>IP</td></tr> <tr><td> </td><td>IP</td></tr> <tr><td> </td><td>IP</td></tr> <tr><td> </td><td>IP</td></tr> </tbody> </table>											Area	Minimum protection		IP		IP		IP		IP		11																	
Area	Minimum protection																																						
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Climate^b <table border="1" style="width: 100%;"> <tr> <td>☐ Inland</td> <td>☐ Near the sea</td> <td>☐ Desert</td> <td>☐ Tropics</td> </tr> <tr> <td>☐ Very sandy</td> <td>☐ Very dusty</td> <td> </td> <td> </td> </tr> </table>											☐ Inland	☐ Near the sea	☐ Desert	☐ Tropics	☐ Very sandy	☐ Very dusty				12																			
☐ Inland	☐ Near the sea	☐ Desert	☐ Tropics																																				
☐ Very sandy	☐ Very dusty																																						
Winterization required? ☐ yes ☐ no Tropicalization required? ☐ yes ☐ no												13																											
Corrosive atmosphere due to <table style="display: inline-table; vertical-align: top;"> <tr> <td>1.</td> <td>contents: (mg/m³)</td> </tr> <tr> <td>2.</td> <td>contents: (mg/m³)</td> </tr> <tr> <td>3.</td> <td>contents: (mg/m³)</td> </tr> </table>											1.	contents: (mg/m ³)	2.	contents: (mg/m ³)	3.	contents: (mg/m ³)		14																					
1.	contents: (mg/m ³)																																						
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Electricity										07
	Drivers 1	Drivers 2	Heating	Instrumentation/Control	Alarm / Shutdown					08
Voltage (V)										09
Frequency (Hz)										10
Phase -										11
Power up to (kW)										12
NOTE Tolerances are according to IEC.....										13
Auxiliary Steam										14
	Steam net 1			Steam net 2						15
	normal	max.	min.	normal	max.	min.				16
Live steam, absolute pressure () ^a										17
temperature (°C)										18
max. mass flow (t/h)										19
Exhaust steam, abs. pressure () ^a										20
^a Please indicate whether the unit is bar or kPa or MPa.										21
Instrument Air										22
	normal	max.	min.							23
Absolute pressure () ^a										24
Temperature (°C)										25
Dew point (°C)										26
Humidity (g/kg dry air)										27
Max. mass flow (kg/s)										28
Cooler: Fouling factor (m ² ·K/kW)										29
^a Please indicate whether the unit is bar or kPa or MPa.										30
Service Air										31
	normal	max.	min.							32
Absolute pressure () ^a										33
Temperature (°C)										34
Dew Point (°C)										35
Humidity (g/kg dry air)										36
Max. mass flow (kg/s)										37
Cooler: Fouling factor (m ² ·K/kW)										38
^a Please indicate, whether the dimension is bar or kPa or MPa										39
Nitrogen										40
	normal	max.	min.							41
Absolute pressure () ^a										42
Temperature (°C)										43
Dew Point (°C)										44
Humidity (g/kg dry air)										45
Max. mass flow (kg/s)										46
Cooler: Fouling factor (m ² ·K/kW)										47
^a Please indicate whether the unit is bar or kPa or MPa.										48
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Cooling Water											07																								
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Water quality											12																								
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	Turbine casing(s) and pipe connections: Forces, Moments, Movements										
	Purchaser:			Project:			Supplier:				
	Ref. No.			Ref. No.			Ref. No.				
	Terminal points - external forces ¹⁾ and moments ¹⁾ and thermal movements (6.3)										
		Force	Inlet 1 Moment	Thermal move- ment	Force	Inlet 2 Movement	Thermal move- ment	Force	Exhaust Moment	Thermal move- ment	
		kN	kN·m	mm	kN	kN·m	mm	kN	kN·m	mm	
	Parallel to shaft										
	Vertical										
	Horizontal 90° cross-wise shaft										
		Force	Extraction 1 Moment	Thermal move- ment	Force	Extraction 2 Movement	Thermal move- ment	Force	Extraction 3 Moment	Thermal move- ment	
		kN	kN·m	mm	kN	kN·m	mm	kN	kN·m	mm	
	Parallel to shaft										
	Vertical										
	Horizontal 90° cross-wise shaft										
		Force	Extraction 4 ^a Moment	Thermal move- ment	Force	Induction 1 Movement	Thermal move- ment	Force	Induction 2 ^a Moment	Thermal move- ment	
		kN	kN·m	mm	kN	kN·m	mm	kN	kN·m	mm	
	Parallel to shaft										
	Vertical										
	Horizontal 90° cross-wise shaft										
	^a For more extractions and inductions, take an additional sheet D.14.										
	Please indicate the coordination system used:										
	¹⁾ As agreed between turbine supplier and pipework supplier.										
	The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.										
	Revision	Original	A	B	C	D	E	F	G		
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Working Fluid Connections (continued)								Page: of:	
Purchaser:			Project:			Supplier:			
Ref. No.			Ref. No.			Ref. No.			
Working fluid connections (3.3)									
	Position ^a	Pipe connection by		Flange ^b		Flange on casing			
		flange	welding	Size	Type of	side prepared for			
				DN/PN	facing	screws	studs		
Inlet 1		☐	☐			☐	☐		
Inlet 2		☐	☐			☐	☐		
Cross-over 1		☐	☐			☐	☐		
Cross-over 2		☐	☐			☐	☐		
Exhaust		☐	☐			☐	☐		
Extraction 1		☐	☐			☐	☐		
Extraction 2		☐	☐			☐	☐		
Extraction 3		☐	☐			☐	☐		
Extraction 4		☐	☐			☐	☐		
Induction 1		☐	☐			☐	☐		
Induction 2		☐	☐			☐	☐		
Reheating		☐	☐			☐	☐		
		☐	☐			☐	☐		
		☐	☐			☐	☐		
		☐	☐			☐	☐		
		☐	☐			☐	☐		
		☐	☐			☐	☐		
^a According to the relevant drawing. ^b Material normally the same as for the casing (see sheet D.17). If not, please give handwritten information below the table.									
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									
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Rotor type: Drum ☐		with, in the low pressure part							07	
		integral wheels ☐							08	
		built-up wheels ☐							09	
		combination of both ☐							10	
Chamber ☐		with integral wheels ☐							11	
		built-up wheels ☐							12	
		combination of both ☐							13	
Numbers of stages:		Total							14	
		Related to each casing /							15	
		or to each section /							16	
Final stage:		Blade length mm							17	
		Max. tip speed m/s							18	
Bearing span:		1. Casing mm							19	
		2. Casing mm							20	
		3. Casing mm							21	
Shaft end for coupling:		Integral flange ☒		Fitted coupling ☐					22	
		Type of coupling fitting:		Cylindrical ☐					23	
				Tapered ☐					24	
				Not keyed ☐					25	
				Single keyed ☐					26	
				Double keyed ☐					27	
				Hydraulic fit ☐					28	
				Thermal fit ☐					29	
									30	
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Bearings and bearing housings (6.11) (continued)								Page:	of:	02																																																								
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Shaft seals (6.8; 6.10) (continued)							Page: of:	02																														
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Ref. No.			Ref. No.		Ref. No.			06																														
<table border="1"> <tr> <td rowspan="2">Type of sealing</td> <td colspan="2">Outer shaft seals</td> </tr> <tr> <td colspan="2"> ☐ Labyrinth ☐ Other Type: </td> </tr> <tr> <td colspan="2">Max. steam /gas leakage to atmosphere (calculated) ^a</td> <td></td> </tr> <tr> <td>1. Casing, high pressure end</td> <td></td> <td>kg/h</td> </tr> <tr> <td></td> <td>, low pressure end</td> <td>kg/h</td> </tr> <tr> <td>2. Casing, high pressure end</td> <td></td> <td>kg/h</td> </tr> <tr> <td></td> <td>, low pressure end</td> <td>kg/h</td> </tr> <tr> <td>3. Casing, high pressure end</td> <td></td> <td>kg/h</td> </tr> <tr> <td></td> <td>, low pressure end</td> <td>kg/h</td> </tr> <tr> <td colspan="3">^a Give information only if specified by the purchaser.</td> </tr> </table>									Type of sealing	Outer shaft seals		☐ Labyrinth ☐ Other Type:		Max. steam /gas leakage to atmosphere (calculated) ^a			1. Casing, high pressure end		kg/h		, low pressure end	kg/h	2. Casing, high pressure end		kg/h		, low pressure end	kg/h	3. Casing, high pressure end		kg/h		, low pressure end	kg/h	^a Give information only if specified by the purchaser.			07
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Rotordynamics (6.12.1)								Page:	of:	02																																									
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Ref. No.			Ref. No.			Ref. No.			04																																										
Ref. No.			Ref. No.			Ref. No.			05																																										
Lateral analysis (Annex A.2) (Calculated values)									06																																										
Is damped unbalanced rotor response analysis specified? no ☐ yes ☐ If "yes" is marked, the following applies:									07																																										
<table border="1"> <thead> <tr> <th></th> <th>Speed min⁻¹</th> </tr> </thead> <tbody> <tr> <td colspan="2">1. Shaft</td> </tr> <tr> <td>First rigid mode</td> <td></td> </tr> <tr> <td>Second rigid mode</td> <td></td> </tr> <tr> <td>First bending mode</td> <td></td> </tr> <tr> <td>Second bending mode</td> <td></td> </tr> <tr> <td colspan="2">2. Shaft</td> </tr> <tr> <td>First rigid mode</td> <td></td> </tr> <tr> <td>Second rigid mode</td> <td></td> </tr> <tr> <td>First bending mode</td> <td></td> </tr> <tr> <td>Second bending mode</td> <td></td> </tr> <tr> <td colspan="2">3. Shaft</td> </tr> <tr> <td>First rigid mode</td> <td></td> </tr> <tr> <td>Second rigid mode</td> <td></td> </tr> <tr> <td>First bending mode</td> <td></td> </tr> <tr> <td>Second bending mode</td> <td></td> </tr> <tr> <td colspan="2">Train ^a</td> </tr> <tr> <td>First rigid mode</td> <td></td> </tr> <tr> <td>Second rigid mode</td> <td></td> </tr> <tr> <td>First bending mode</td> <td></td> </tr> <tr> <td>Second bending mode</td> <td></td> </tr> </tbody> </table>										Speed min ⁻¹	1. Shaft		First rigid mode		Second rigid mode		First bending mode		Second bending mode		2. Shaft		First rigid mode		Second rigid mode		First bending mode		Second bending mode		3. Shaft		First rigid mode		Second rigid mode		First bending mode		Second bending mode		Train ^a		First rigid mode		Second rigid mode		First bending mode		Second bending mode		08
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^a Only if shafts are rigidly coupled.									09																																										
For the figures of the different modes, see Figure A.2.									10																																										
Torsional analysis (Annex A.3) (for the complete coupled train)									11																																										
Turbine supplier responsible for the train? no ☐ yes ☐									12																																										
First critical speed min ⁻¹ Second critical speed min ⁻¹ Third critical speed min ⁻¹ Fourth critical speed min ⁻¹									13																																										
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DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES									Rev.	01
Baseframe (Baseplate) and Soleplates (6.13)							Page:	of:	02	
Purchaser:			Project:			Supplier:			03	
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Ref. No.			Ref. No.			Ref. No.			06	
Baseframe or soleplates to be furnished by:									07	
Attachment components to be furnished by: ²⁾									08	
Extend of baseframe (baseplate):									09	
under turbine only ☐									10	
under turbine and gear unit ☐									11	
under the whole machine set ☐									12	
under									13	
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²⁾ e.g. anchor bolts, sub-soleplates.									52	
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DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES										01
Info	Gear units (7.2)						Page: of:		Rev.	02
	Purchaser:		Project:		Supplier:					
	Ref. No.		Ref. No.		Ref. No.					03
										04
										05
										06
										07
			Gear unit 1		Gear unit 2					08
	Place of installation		between		between					09
			and		and					10
										11
	Supplier									12
	Manufacturer									13
	Manufacturer's type designation									14
	Type of gear	Reducer (r) / Increaser (i)	() ^a		() ^a					15
		Single stage (1), double stage (2)	() ^a		() ^a					16
		Single helical (1), double helical (2)	() ^a		() ^a					17
		Planetary gear	yes ☐		no ☐		yes ☐		no ☐	18
		In- and output shafts offset	☐		☐		☐		☐	19
		concentric	☐		☐		☐		☐	20
	Gear to shaft: Integral (i) / shrunk on (s)		() ^a		() ^a					21
	Max. continuous oper. speed input shaft		min ⁻¹		min ⁻¹					22
	Max. allow. torque at this speed		kNm		kNm					23
	Trip speed		min ⁻¹		min ⁻¹					24
	Centre distance		mm		mm					25
	Gear ratio									26
	Direction of rotation of input shaft ^b									27
	Direction of rotation of output shaft ^{b,c}									28
	Maximum torque at input shaft ^d		kN·m		kN·m					29
	Power loss at rated power output ^e		kW		kW					30
	Teeth hardened		yes ☐		no ☐		yes ☐		no ☐	31
	Quality grade of tooth system, acc. to ISO 1328-1									32
	Application factor									33
	Safety factor against pitting ^f									34
	Safety factor for tooth bending strength ^f									35
	Mass moment of inertia related to input shaft		kg·m ²		kg·m ²					36
	Breakaway torque related to input shaft		N·m		N·m					37
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	Gear units (7.2) (continued)				Page: of:				
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For piping connections, see next page.

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Gear units (7.2) (continued)										Page:	of:
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Couplings (7.3)							Page: of:	02	
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Rotor turning device (7.4)						Page:	of:		02
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Rotor turning device

Supplier:

Manufacturer:

Manufacturer's type designation:

Type of construction: Manually operated ☐ Electric drive ☐

Voltage:(V) Frequency: ... (Hz) Power: (kW)

Class of explosion protection ³⁾:

Certification authority:

Identification number of certificate:

Degree of protection (IP-Code) ⁴⁾:

Oil hydraulic drive ☐ Continuously working device ☐ Stroking device ☐

Oil pressure: () ⁵⁾ Oil flow: (m³/h)

Other drive ☐ Type of drive:

Location of installation:

Drive speed of device: (min⁻¹)

Turbine speed during turning device operation: (min⁻¹)

Change to turning device operation possible without standstill of the turbine shaft: yes ☐ no ☐

Automatic cut-in system: yes ☐ no ☐

Operator station: local ☐ remote ☐

Breakaway torque of the driven machine(s):		(N·m)	>	related to the point of contact between rotor turning device and shaft
Breakaway torque of the gear unit(s):		(N·m)	>	
Breakaway torque of the turbine:		(N·m)	>	
Mass moment of inertia of the driven mach.:		(kg·m ²)	>	
Mass moment of inertia of the gear unit(s):		(kg·m ²)	>	
Mass moment of inertia of the turbine:		(kg·m ²)	>	

³⁾ According to IEC 60079.

⁴⁾ According to IEC 60529.

⁵⁾ Please indicate whether the unit is bar or kPa or MPa.

The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.

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<table border="1"> <thead> <tr> <th colspan="4">Flanges</th> <th rowspan="3">Remarks / comments</th> </tr> <tr> <th colspan="2">Dimensions</th> <th colspan="2">Material</th> </tr> <tr> <th>Size DN / PN</th> <th>Type of facing</th> <th>Designation</th> <th>acc. to Standard</th> </tr> </thead> </table>										Flanges				Remarks / comments	Dimensions		Material		Size DN / PN	Type of facing	Designation	acc. to Standard	10
Flanges				Remarks / comments																			
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Info	Condensing Plant (8.4)						Page:	of:	Rev.	02
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Condenser Exhaust flow - normal / maximum (t/h) (t/h) Heat to dissipate - normal / maximum (kJ/s) (kJ/s) Condenser pressure - normal / maximum () ⁵⁾ () ⁵⁾ Cooling water temperature - Supply (°C) - Return (at rated power output) (°C)									07	
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⁵⁾ Please indicate, whether the dimension is bar or kPa or MPa

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Gland Steam or Gas System (8.5)										02																																																																																																															
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Gland steam system - without condenser ☐ - with condenser ☐ - vacuum condenser ☐ - atmospheric condenser ☐ - vacuum and atmospheric condenser ☐ System with atmospheric condenser - Drainage by pipe-loop ☐ - Drainage by a condensate pump driven by an electric motor ☐ System with vacuum or/and atmospheric condenser Condenser: - Supplier of condenser - Manufacturer of condenser - Manufacturer's type designation - Cooling water pressure and temperature, see sheet D.13 - Cooling water flow required (m³/h)⁵⁾ - Cooling water pressure drop ()⁵⁾ - Dimensions of cooling water tubes OD ⁶⁾ (mm) T ⁶⁾ (mm) <table border="1"> <thead> <tr> <th></th> <th>Material design. based on letter/figure symbols</th> <th>Material acc. to standard</th> <th>Remarks / comments (e.g. coating of components)</th> </tr> </thead> <tbody> <tr> <td>Tubes</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Tube sheets</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Shell</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Water chamber</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> Condensate pumps: <table border="1"> <thead> <tr> <th></th> <th>Pump 1</th> <th>Pump 2</th> <th>Pump 3</th> </tr> </thead> <tbody> <tr> <td>Supplier</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Manufacturer</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Manufacturer's type designation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Power absorbed (kW)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Driver: Electric motor</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Supplier</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Manufacturer</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Manufacturer's type designation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Voltage (V)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Frequency (Hz)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Rated power (kW)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Class of explosion protection ^a</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Certification authority</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Identification number of certificate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Degree of protection (IP-Code) ^b</td> <td>IP</td> <td>IP</td> <td>IP</td> </tr> </tbody> </table> ^a According to IEC 60079. ^b According to IEC 60529. ⁵⁾ Please indicate whether the unit is bar or kPa or MPa. ⁶⁾ OD = outer diameter, T = thickness of wall The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender. <table border="1"> <thead> <tr> <th>Revision</th> <th>Original</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>Name</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Date</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>											Material design. based on letter/figure symbols	Material acc. to standard	Remarks / comments (e.g. coating of components)	Tubes				Tube sheets				Shell				Water chamber					Pump 1	Pump 2	Pump 3	Supplier				Manufacturer				Manufacturer's type designation				Power absorbed (kW)				Driver: Electric motor				- Supplier				- Manufacturer				- Manufacturer's type designation				- Voltage (V)				- Frequency (Hz)				- Rated power (kW)				- Class of explosion protection ^a				- Certification authority				- Identification number of certificate				- Degree of protection (IP-Code) ^b	IP	IP	IP	Revision	Original	A	B	C	D	E	F	G	Name									Date									06
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Gland steam or gas exhaust system:

Steam-jet air ejector ☐ Fan ☐ Chimney ☐

- Supplier

- Manufacturer

- Manufacturer's type designation

- Capacity: 100 % ☐ 2 x 100 % ☐

Steam at ejector inlet					
Abs. pressure () ^a			Temperature (° C)		
norm.	min.	max.	norm.	min.	max.

^a Please indicate whether the unit is bar or kPa or MPa

Hogging ejector ☐

- Supplier

- Manufacturer

- Manufacturer's type designation

The purchaser shall put an X in the info-column to indicate where data are required in the supplier's tender.

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Lubricant, control fluid, and seal fluid systems							Page:	of:	02																																																																																																																																																									
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Fundamental arrangement of systems - Combined lubricant and control fluid system ☐ - Combined lubricant, control fluid, and seal fluid system ☐ - Separate systems for - lubricant ☐ - control fluid ☐ - seal fluid ☐ General data <table border="1"> <thead> <tr> <th></th> <th>Eff. pressure of supply ()^a</th> <th>Temperature of supply (°C)</th> <th>Heat to dissipate (kW)</th> <th>Steady flow (m³/h)</th> <th>Transient flow (m³/h)</th> <th>Pressure set safety valve(s) ()^a</th> <th>Fluid type acc. to ISO^b</th> <th>Cleanliness acc. to ISO 4406</th> </tr> </thead> <tbody> <tr><td>Turbine(s) bearings</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Turbine control</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Driven machine(s) bearings</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Driven machine(s) control</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Gear unit(s)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Coupling(s)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Shaft seal(s)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Total</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> ^a Please indicate whether the unit is bar or kPa or MPa. ^b For petroleum lubricating oils ISO 8068 is valid. - Are oil tank heating devices necessary? yes ☐ no ☐ (see sheet D.38) Pumps (9.4) Pump equipment of plant: <table border="1"> <thead> <tr> <th>Designations of pumps (9.4.2)^a</th> <th>Quantity of pumps installed</th> <th>Type of pump^b</th> </tr> </thead> <tbody> <tr><td>Main pump</td><td>()</td><td>()</td></tr> <tr><td>Stand-by pump</td><td>()</td><td>()</td></tr> <tr><td>Auxiliary pump</td><td>()</td><td>()</td></tr> <tr><td>Emergency pump</td><td>()</td><td>()</td></tr> <tr><td></td><td>()</td><td>()</td></tr> <tr><td></td><td>()</td><td>()</td></tr> <tr><td></td><td>()</td><td>()</td></tr> <tr><td></td><td>()</td><td>()</td></tr> </tbody> </table> ^a Please complete the listing if necessary. ^b Please use the abbreviations as indicated at the side of the table. G = Gear type pump S = Screw type pump C = Centrifugal pump The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender. <table border="1"> <thead> <tr> <th>Revision</th> <th>Original</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> </tr> </thead> <tbody> <tr><td>Name</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Date</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>										Eff. pressure of supply () ^a	Temperature of supply (°C)	Heat to dissipate (kW)	Steady flow (m³/h)	Transient flow (m³/h)	Pressure set safety valve(s) () ^a	Fluid type acc. to ISO ^b	Cleanliness acc. to ISO 4406	Turbine(s) bearings									Turbine control									Driven machine(s) bearings									Driven machine(s) control									Gear unit(s)									Coupling(s)									Shaft seal(s)																											Total									Designations of pumps (9.4.2) ^a	Quantity of pumps installed	Type of pump ^b	Main pump	()	()	Stand-by pump	()	()	Auxiliary pump	()	()	Emergency pump	()	()		()	()		()	()		()	()		()	()	Revision	Original	A	B	C	D	E	F	G	Name									Date									06
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Shaft seal(s)																																																																																																																																																																		
Total																																																																																																																																																																		
Designations of pumps (9.4.2) ^a	Quantity of pumps installed	Type of pump ^b																																																																																																																																																																
Main pump	()	()																																																																																																																																																																
Stand-by pump	()	()																																																																																																																																																																
Auxiliary pump	()	()																																																																																																																																																																
Emergency pump	()	()																																																																																																																																																																
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DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES									Rev.	
Continuing: Lubricant, control fluid and seal fluid systems									Page:	of:
Purchaser:			Project:			Supplier:				
Ref. No.			Ref. No.			Ref. No.				
Pumps										
			Main pump ^a	Stand-by pump ^a	Auxiliary pump ^a	Emergency pump ^a				
Supplier										
Manufacturer										
Manufacturer's type designation										
Flow (m ³ /h)										
Discharge pressure ^b ()										
Minimum suction head at pump inlet ^b ()										
Power absorbed (kW)										
Driver: Elec. motor (e), turbine (t), direct (d)			() ^c	() ^c	() ^c	() ^c				
- Supplier										
- Manufacturer										
- Manufacturer's type designation										
- For electric motor:										
- - Voltage (V)										
- - Frequency (Hz)										
- - Maximum power (kW)										
- - Class of explosion protection ^d										
- - Certification authority										
- - Identification number of certificate										
- - Degree of protection (IP-Code) ^e			IP	IP	IP	IP				
- For turbine drive:										
- - Steam conditions at inlet (see sheet D.12)										
- - - Steam mass flow (t/h)										
- - - abs. pressure: normal ^b ()										
- - - minimum ^b ()										
- - - maximum ^b ()										
- - - temperature normal (°C)										
- - - minimum (°C)										
- - - maximum (°C)										
- - Steam conditions at outlet (see sheet D.12)										
- - - abs. pressure: normal ^b ()										
- - - minimum ^b ()										
- - - maximum ^b ()										
- - Mass flow of auxiliary steam at worst steam conditions ^f (t/h)										
- - Power at worst steam conditions ^f (kW)										
^a For more pumps take an additional sheet D.34. ^b Please indicate whether the unit is bar or kPa or MPa. ^c Please use the abbreviations as indicated. ^d According to IEC 60079. ^e According to IEC 60529. Worst steam conditions means: Specified minimum inlet steam pressure and temperature and specified maximum exhaust pressure.										
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.										
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DATA SHEETS FOR INDUSTRIAL-TYPE TURBINES									01
Info	Lubricant, control fluid, and seal fluid systems (continued)						Page: of:	02	
Purchaser:	Project:			Supplier:				03	
Ref. No.	Ref. No.			Ref. No.				04	
Filters (9.5)									05
				Lubricant	Filter used for				06
					Control fluid				07
Supplier									08
Manufacturer									09
Manufacturer's type designation									10
Single filter (s) or double filter (d)				() ^a	() ^a	() ^a	() ^a	11	
Normal operation pressure drop ^b () ^c									12
Max. permissible pressure drop () ^c									13
Max. permissible inlet pressure () ^c									14
Normal filtration rate acc. to ISO 4572									15
Material of filter element ^d									16
Material of casing ^d									17
Material of changeover valves ^d									18
Eff. hydraulic test pressure () ^c									19
^a Please use the abbreviations as indicated. ^b For pressure values see 9.5. ^c Please indicate whether the unit is bar or kPa or MPa. ^d Please specify material designation and the standard on which it is based.									20
Accumulators (9.7)									21
				Accumulator used for					22
Supplier									23
Manufacturer									24
Manufacturer's type designation									25
Type of construction: bladder-type (b), diaphragm-type (d), piston-type (p)				() ^a	() ^a	() ^a	() ^a		26
Number of accumulators									27
Effective volume per accumulator (dm ³)									28
Material of casing ^b									29
Connections for accumulated medium									30
- for flange connections DN/PN				/	/	/	/		31
- for screwed connections				G	G	G	G		32
Eff. hydraulic test pressure () ^c									33
^a Please use the abbreviations as indicated. ^b Please specify the material designation and the standard on which it is based. ^c Please indicate whether the unit is bar or kPa or MPa.									34
Accessories to the accumulators:									35
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The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									55
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Purchaser:			Project:			Supplier:				03
										04
										05
Ref. No.			Ref. No.			Ref. No.				06
Plate-type coolers (9.6; 9.6.1; 9.6.2)										07
										08
										09
										10
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										12
										13
										14
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^a Please indicate whether the unit is bar or kPa or MPa. ^b Please specify material designation and the standard on which it is based.										39
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The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.										55
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Ref. No.			Ref. No.		Ref. No.			04	
Ref. No.			Ref. No.		Ref. No.			05	
06									
07									
Tube-type coolers (9.6; 9.6.1; 9.6.3)									
				Cooler used for				08	
Supplier								09	
Manufacturer								10	
Manufacturer's type designation								11	
Arrangement vertical (v) or horizontal (h)				() ^a		() ^a		12	
Number of coolers								13	
Number of passes per cooler								14	
Surface per cooler (m ²)								15	
Coolant								16	
- normal inlet temperature (°C)								17	
- max. inlet temperature (°C)								18	
- max. permissible temperature rise (°C)								19	
- eff. max. inlet pressure () ^b								20	
- max. permissible pressure drop () ^b								21	
- through flow (m ³ /h)								22	
- fouling resistance on water side (m ² ·K/kW)								23	
Medium to cool								24	
- inlet temperature (°C)								25	
- temperature drop (°C)								26	
- eff. max. inlet pressure () ^b								27	
- through flow (m ³ /h)								28	
Transferable heat flow under worst conditions (kW)								29	
Tubes: outside diameter (mm)								30	
- wall thickness (mm)								31	
- number of tubes per pass								32	
- effective length (mm)								33	
Shell: outside diameter (mm)								34	
- wall thickness (mm)								35	
Materials: tubes ^{c)}								36	
- tube sheets ^{c)}								37	
- shell ^{c)}								38	
- water boxes ^{c)}								39	
Surface protection: inside of water boxes								40	
Connections for coolant: - number								41	
- DN/PN				/		/		42	
Connections for medium to cool: - number								43	
- DN/PN				/		/		44	
Test pressure tubes / water boxes () ^b								45	
- shell () ^b								46	
^a Please use the abbreviations as indicated.								47	
^b Please indicate whether the unit is bar or kPa or MPa.								48	
^c Please specify material designation and the standard on which it is based.								49	
								50	
								51	
								52	
								53	
								54	
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									
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										05
Ref. No.	Ref. No.			Ref. No.						06
Reservoirs (9.3)										07
		Main reservoir	Overhead reservoir							08
Location										09
- separate (s), base frame (f), bearing housing (b), gear unit casing (g)										10
		() ^a	() ^a	() ^a	() ^a	() ^a	() ^a	() ^a		11
Supplier										12
Manufacturer										13
Capacity (m ³)										14
Filling volume ^b (m ³)			---							15
Capacity between max. and min. operating level (m ³)										16
Rundown capacity ^c (m ³)			---							17
Retention time during operation of the machine set (min)										18
Free surface of oil (m ²)										19
Slope of bottom (mm/m)										20
Flange of drainage valve DN/PN		/	/	/	/	/	/	/		21
Type of steel: walls and bottom covering										22
Internal corrosion protection: yes (y), no (n)		() ^a	() ^a	() ^a	() ^a	() ^a	() ^a	() ^a		23
Type of corrosion protection										24
Height above (+) or under (-) turb. axis (m)										25
Heating (see sheet D.33): yes (y), no (n)		() ^a	() ^a	() ^a	() ^a	() ^a	() ^a	() ^a		26
- supplier										27
- manufacturer										28
- electric (e), steam (s)		() ^a	() ^a	() ^a	() ^a	() ^a	() ^a	() ^a		29
- direct (d), heat transfer medium (htm)		() ^a	() ^a	() ^a	() ^a	() ^a	() ^a	() ^a		30
Insulation: yes (y), no (n)		() ^a	() ^a	() ^a	() ^a	() ^a	() ^a	() ^a		31
- supplier										32
Supplier of supporting structure										33
^a Please use the abbreviations as indicated. ^b The filling volume also comprises the volumes which remain normally at standstill within the system. ^c The rundown capacity shall be large enough to accommodate all the volumes running back to the reservoir normally at shut down and additionally the volume of an overhead reservoir.										34
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The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.										55
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Purchaser:			Project:			Supplier:				03
Ref. No.			Ref. No.			Ref. No.				04
										05
										06
Vapour extractor										07
					Vapour extractor used for					08
Supplier										09
Manufacturer										10
Manufacturer's type designation										11
Design type: blower (b), ejector (e)					() ^a () ^a () ^a () ^a					12
Discharge volume (m ³ /h)										13
Differential pressure () ^b										14
Driver for blower: electric motor										15
- Supplier										16
- Manufacturer										17
- Manufacturer's type designation										18
- Voltage (V)										19
- Frequency (Hz)										20
- Maximum power (kW)										21
- Class of explosion protection ^c										22
- Certification authority										23
- Identification number of certificate										24
- Degree of protection (IP-Code) ^d										25
Driver for ejector: medium										26
- Inlet pressure / temperature () ^e / (°C)					/ / / /					27
- Mass flow (kg/s)										28
^a Please use the abbreviations as indicated. ^b Please indicate whether the dimension is mbar or kPa. ^c According to IEC 60079. ^d According to IEC 60529. ^e Please indicate whether the unit is bar or kPa.										29
										30
										31
										32
Vapour separator										33
					Vapour separator used for					34
Type of separator										35
Supplier										36
Manufacturer										37
Manufacturer's type designation										38
Number of separators										39
Volume per separator (dm ³)										40
Admission per separator (dm ³ /d)										41
Allowable operating pressure () ^b										42
Allowable operating temperature (°C)										43
Max. allowable pressure drop () ^c										44
Drainage: automatic (a), manual (m)					() ^a () ^a () ^a () ^a					45
Degassing: electric (e), steam (s)					() ^a () ^a () ^a () ^a					46
- temperature (°C)										47
Eff. hydraulic test pressure () ^b										48
Material in contact with oil										49
^a Please use the abbreviations as indicated. ^b Please indicate whether the unit is bar or kPa or MPa. ^c Please indicate whether the unit is mbar or Pa or kPa.										50
										51
										52
										53
										54
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.										55
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Purchaser:		Project:		Supplier:					03
Ref. No.		Ref. No.		Ref. No.					04
									05
									06
Purification system									07
				System used for					08
Type of purifier									09
Supplier									10
Manufacturer									11
Manufacturer's type designation									12
Through flow (m ³ /h)									13
Working temperature (°C)									14
Capacity of dirt trap (kg)									15
Water removal rate (dm ³ /h)									16
Equipment stationary (s) or movable (mov)				() ^a					17
Electric motor:									18
- Supplier									19
- Manufacturer									20
- Manufacturer's type designation									21
- Voltage (V)									22
- Frequency (Hz)									23
- Maximum power (W)									24
- Class of explosion protection ^b									25
- Certification authority									26
- Identification number of certificate									27
- Degree of protection (IP-Code) ^c				IP		IP			28
NOTE Usually, the purification system is in parallel to the lube circuit.									29
^a Please use the abbreviations as indicated.									30
^b According to IEC 60079.									31
^c According to IEC 60529.									32
Jacking oil device (9.4.5)									33
Does jacking oil device exist:				yes ☐ no ☐					34
Which of the machines shall be jacked?									35
Supplier:									36
Pump:									37
- Manufacturer:									38
- Manufacturer's type designation:									39
- Max. oil pressure to lift the rotor: () ⁵⁾									40
- Max. oil flow to keep the rotor lifted: (m ³ /h)									41
Electric drive:									42
Voltage: (V) Frequency: (Hz) Power: (kW)									43
- Class of explosion protection ³⁾ :									44
- Certification authority: Ident. No. of certificate:									45
- Degree of protection (IP-Code) ⁴⁾ :									46
³⁾ According to IEC 60079.									47
⁴⁾ According to IEC 60529.									48
⁵⁾ Please indicate whether the unit is bar or kPa or MPa.									49
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									50
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Governing System: General data (10.1 - 10.4)								Page:	of:
Purchaser:		Project:		Supplier:					
Ref. No.		Ref. No.		Ref. No.					
Governor Type: mechanical ☐ hydraulic / mechanical ☐ pneumatic / mechanical ☐ electronic ☐ digital ☐ analog ☐ simplex ☐ redundant (multiprocessor) ☐									
Classification (10.2): class 1 ☐ class 2 ☐ class 3 ☐ class 4 ☐									
Supplier:									
Manufacturer: Manufacturer's type designation:									
Voltage: (V) $\pm$ (V) Frequency: (Hz) Power: (W)									
Class of explosion protection ³⁾ :									
Certification authority: Identification number of certificate:									
Degree of protection (IP-Code) ⁴⁾ : IP									
Setpoint adjusting: manual ☐ electric ☐ pneumatic ☐									
Range of speed change Minimum speed: (min ⁻¹) Maximum speed: (min ⁻¹)									
Turbine type Single valve, single stage ☐ Multivalve, single stage ☐ Single valve, multistage ☐ Multivalve, multistage ☐									
Driven equipment type Compressor: centrifugal ☐ axial ☐ Pump: centrifugal ☐ axial ☐ Fan: ☐ Generator: synchronous ☐ induction ☐ Operating in parallel to the public grid/other generators: yes ☐ no ☐ Other:									
Controlled variable(s) Steady-state speed ☐ Inlet pressure ☐ Extraction pressure 1 ☐ Frequency ☐ Backpressure ☐ Extraction pressure 2 ☐ Effective load ☐ Compr./pump outlet pressure ☐ Extraction flow 1 ☐ Power import/export ☐ Compr./pump flow ☐ Extraction flow 2 ☐ Auto voltage regulation ☐ Compr./pump inlet pressure ☐ Induction pressure ☐ Induction flow ☐ Other:									
Further requirement(s) Automatic synchronization ☐ Solenoid valve for load shedding (generator drives) ☐ - Voltage (V) Frequency: (Hz) - Degree of protection (IP-Code) ⁴⁾ : IP - Normally energized principle ☐ Normally de-energized principle ☐ Automatic start-up ☐ - Please specify the conditions / requirements for automatic start-up procedure:									
³⁾ According to IEC 60079. ⁴⁾ According to IEC 60529.									
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									
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Governing system (continued)										Page:	of:
Purchaser:			Project:			Supplier:					02
Ref. No.			Ref. No.			Ref. No.					03
											04
											05
											06
Minimum input / output requirements											07
Binary inputs:											08
- Start or reset	☐	Binary outputs:								09	
- Normal stop	☐	- Common shutdown								10	
- Emergency trip	☐	- Common alarm								11	
- Raise / lower speed	☐	- Speed sensor alarm								12	
- Enable/disable remote speed setpoint	☐	-								13	
- Ramp to min. contin. operating speed	☐	-								14	
- Enable overspeed test	☐	-								15	
- Enable pressure control	☐	-								16	
- Enable alarm clear / acknowledge	☐	-								17	
- Enable automatic synchronization	☐	-								18	
- Raise / lower cascade	☐	-								19	
-	☐	-								20	
-	☐	-								21	
-	☐	-								22	
Analog inputs (4 mA to 20 mA):											23
- Remote speed set point	☐	Analog outputs (4 mA to 20 mA):								24	
- Effective load	☐	- Speed								25	
- Power import / export	☐	- Speed setpoint								26	
- Inlet pressure	☐	- Remote speed setpoint								27	
- Back pressure	☐	- Effective load								28	
- Compressor/pump outlet pressure	☐	- Power import / export								29	
- Compressor/pump flow	☐	- Inlet pressure, actual value								30	
- Compressor/pump inlet pressure	☐	- Backpressure, setpoint								31	
- Extraction pressure 1	☐	- Compr./pump outlet press., actual value								32	
- Extraction pressure 2	☐	- Compressor/pump flow, setpoint								33	
- Extraction flow 1	☐	- Compr./pump inlet press., actual value								34	
- Extraction flow 2	☐	- Extraction pressure 1, setpoint								35	
- Induction pressure	☐	- Extraction pressure 2, actual value								36	
- Induction flow	☐	- Extraction flow 1, setpoint								37	
-	☐	- Extraction flow 2, actual value								38	
-	☐	- Induction pressure, setpoint								39	
-	☐	- Induction flow, actual value								40	
Other analog inputs:											41
- Frequency	☐	- Actuator position								42	
-	☐	-								43	
-	☐	-								44	
-	☐	-								45	
-	☐	-								46	
-	☐	-								47	
-	☐	-								48	
-	☐	-								49	
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The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.											51
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Purchaser:		Project:		Supplier:					03
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									05
Ref. No.		Ref. No.		Ref. No.					06
Governor installation									07
Location:		local, at turbine	☐	Mounting:		flush-mounted in panel	☐		08
		remote, at control room	☐			surface-mounted on panel	☐		09
		other:	☐			rack-mounted	☐		10
Governor control panel									11
Local governor control panel at turbine		required	☐	not required		☐			12
Remote governor control panel at control room:		required	☐	not required		☐			13
at other location:		required	☐	not required		☐			14
Outputs from panel to governor:									15
- Start or reset		☐	Inputs from governor to panel:		☐				16
- Normal stop		☐	- Common alarm trip		☐				17
- Emergency trip		☐	- Trip signal		☐				18
- Raise / lower speed		☐	- - Lamp		☐				19
- Overspeed test		☐	- - Horn		☐				20
- Ramp to min. cont. operating speed		☐	- - Other:		☐				21
- Enable / disable remote setpoint		☐	- Remote setpoint enabled lamp		☐				22
-		☐	- Speed setpoint indicator		☐				23
-		☐	-		☐				24
-		☐	-		☐				25
-		☐	-		☐				26
-		☐	-		☐				27
Loss of remote speed setpoint signal									28
Governor action on loss of remote signal:									29
- Freeze-in last value		☐							30
- Goes to minimum continuous operating speed		☐							31
- Goes to maximum continuous operating speed		☐							32
- Other:		☐							33
Speed sensors for electronic governor (10.4)									34
- Supplier									35
- Manufacturer									36
- Manufacturer's type designation									37
- Number of speed sensors									38
- Class of explosion protection ³⁾									39
- Certification authority									40
- Identification number of certificate									41
- Voting logic: 1 out of 2 ☐ 2 out of 3 ☐									42
Other:									43
- Number of teeth on toothed wheel for speed sensing:									44
³⁾ According to IEC 60079.									45
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									46
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Purchaser:		Project:		Supplier:					03
Ref. No.		Ref. No.		Ref. No.					04
Ref. No.		Ref. No.		Ref. No.					05
Control valve(s) ⁷⁾									06
		Inlet	Induction	behind		Extract. 1	Extract. 2		07
Supplier									08
Manufacturer									09
Manufacturer's type designation									10
Number of valves									11
Connection to the steam line									12
- Flange	Size DN/PN								13
	Facing								14
- Welding	Outer diameter (mm)								15
	Wall thickness (mm)								16
	Material designation								17
	acc. to	ISO	ISO	ISO	ISO	ISO	ISO		18
Electro-hydraulic converter(s) ⁷⁾									19
		Converter related to valve(s)							20
		Inlet	Induction	behind		Extract. 1	Extract. 2		21
Supplier									22
Manufacturer									23
Manufacturer's type designation									24
Voltage	(V)	±	±	±	±	±	±		25
Frequency	(Hz)								26
Power	(W)								27
Class of explosion protection ^a									28
Certification authority									29
Identification number of certificate									30
Degree of protection (IP-Code) ^b		IP	IP	IP	IP	IP	IP		31
Design simplex (s) or redundant (r)		() ^c	() ^c	() ^c	() ^c	() ^c	() ^c		32
^a According to IEC 60079.									33
^b According to IEC 60529.									34
^c Please use the abbreviations as indicated.									35
⁷⁾ For more control valves and converters, take an additional sheet D.44.									36
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									37
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Purchaser:			Project:			Supplier:				03
Ref.No.			Ref. No.			Ref.No.				04
										05
										06
Stop valve(s) and strainer(s) ⁸⁾ Stop valve(s) (10.5.2.1):										07
										08
										09
										10
										11
										12
										13
										14
										15
										16
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										22
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										24
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										28
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										30
										31
Strainer(s) (8.2):										32
										33
										34
										35
										36
										37
										38
										39
										40
										41
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The purchaser shall put an X in the info-column to indicate where data are required in the supplier's tender.										55
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Purchaser:			Project:			Supplier:			
Ref. No.			Ref. No.			Ref. No.			
Devices against backflow									
Non-return valves:									
	Exhaust	Extraction No.	Extraction No.	Extraction No.	Extraction No.	Extraction No.	Extraction No.		
Valve: - controlled	☐	☐	☐	☐	☐	☐	☐		
- uncontrolled	☐	☐	☐	☐	☐	☐	☐		
- semi-controlled	☐	☐	☐	☐	☐	☐	☐		
Valve: - single	☐	☐	☐	☐	☐	☐	☐		
- duplex, in line	☐	☐	☐	☐	☐	☐	☐		
Supplier									
Manufacturer									
Manufacturer's type designation									
Connection to the steam line									
- Flange Size DN/PN									
Facing									
- Welding Outer diameter (mm)									
Wall thickness (mm)									
Material designation									
acc.to									
Pressure drop at normal operating point () ^b									
NOTE An uncontrolled valve is a valve that is opened or closed mainly by the flow. A controlled valve is a valve that is closed and blocked in closed position by an external generated force, if the stop valves are closed. Usually the stop valves and the controlled non-return valves are closed by spring action as a consequence of a pressure decay in the trip oil system.									
^a For more extractions, take an additional sheet D.46.									
^b Please indicate whether the unit is bar or kPa or MPa.									
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									
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Purchaser:		Project:		Supplier:					
Ref. No.		Ref. No.		Ref. No.					
Overpressure protecting systems (10.5.1; 10.5.3)									
Safety valves, blow-off-valves, lifting (bursting) disks:									
	Overpressure systems Safety valves ^a			Vacuum systems					
	Exhaust	Extract.1	Extract.2	Blow-off valves	Lifting (burst- ing) disks				
Supplier									
Manufacturer									
Type designation									
Setpoint eff. () ^b									
Total capacity (kg/h)									
Number of valves									
Flanges DN/PN	/	/	/	/	/				
Flange facing									
^a For more safety devices, take an additional sheet D.48. ^b Please indicate whether the unit is bar or kPa or MPa.									
Pressure switches									
	Exhaust	Extract.1	Extract.2				^a		
Supplier									
Manufacturer									
Type designation									
Setpoint eff. () ^b									
Class of expl. protect									
Certificat. authority									
Ident. No. of certificat.									
Degr. of prot. (IP-Code)									
Normally energized (e) or de-energized (d)	() ^c	() ^c	() ^c	() ^c	() ^c	() ^c	() ^c		
Connecting thread for impulse line									
^a For more safety devices, take an additional sheet D.48. ^b Please indicate whether the unit is bar or kPa or MPa. ^c Please use the abbreviations as indicated.									
The purchaser shall put an X in the Info column to indicate where data are required in the supplier's tender.									
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Date									