

# **BUSINESS GUIDELINE 1 GB**

## **PUMP DOCUMENTATION**

### **COST CONSIDERATION**

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## 1. Introduction

The supply of a pump includes the provision of documentation about the delivered item, which serves as proof of the conformity of the delivery with the requirements of the order and of the specifications to be applied. The documentation covers such data as operating instructions, spares parts' lists, drawings, etc (except workshop drawings). The pump manufacturer lays down the type and extent of the documentation based on his experience, and on consideration of all requirements (e.g. legal provisions).

In this guide-line, beside the documentation, are listed other important data which are required to complete the contract.

These documents are drawn up in the manufacturer's language and a marketable foreign language and are included in the delivery price. Any further data wanted by the customer will be agreed with him in the supply contract and may lead to an increased price.

## 2. Type & extension of the documentation

### 2.1 Type of documents

Table 1 lists those documents which are usually handed over to a purchaser of a pump, (indicated by "X").

This listing is based on the results of a survey on pump deliveries following customary international usage.

### 2.2 Quantity of documents

It became apparent through an inquiry with the pump manufacturers that it is normal international custom to hand over usually two copies of a document, but at the most five may be supplied free of charge.

Hence, the documentation covers:

- Documents, which the pump supplier provides to the purchaser free of charge, up to a certain number, (but sometimes only on demand by the purchaser).
- Similar documents which the purchase demands over the number and which are specially charged.
- Other types of documents which the pump deliver hands over to the customer only for a consideration.

### 2.3 Make up of the documents

The documents can in general be made on special size drawings, or on special quality paper, or with special inscriptions, etc. At the same time, the inscription should be suitable for microfilming. The layout is generally capable of being microfilmed.

There is a strong growing tendency for Customers to request documentation in the form of Electronic Data Interchange (EDI) or INTERNET or by computer disc or CD-ROM, from CAD stations. Pump manufacturers are recommended to confirm compatibility between systems installed prior to accepting this form of documentation submittal.

### **3. Availability of documentation**

It is very important for pump manufacturers to define the availability of data for documentation and how much of such data is immediately available or needs to be specially prepared, and this depends on the production and stock position of the selected type of pump.

Accordingly, one differentiates between:

- Series production (strictly standardised, modifications excluded, in stock, available or sale): Documentation available as standard.
- Batch production (standardised units and components in stock, alternative features within predetermined limits): Documentation usually available as standard.
- Special production (stocking not possible, part manufacturer and as assembly to order): Standard documentation available only in part or not at all.

To the classification according to these features can be added a classification according to the method of distribution.

Moreover one can, in regard to the requirement of purchaser, distinguish between:

- Data, which is always normally available, and
- Data, which is prepared only in special cases at the request of the purchase and/or is translated into the required language.

### **4. Charges for documentation data**

The cost of the documentation for a pump is usually taken into account in determining the sale price, hence with series production and batch production the costs for the type and extent of the manufacturer's laid down documentation goes in the list price. With special order pumps, the costs of the documentation are normally taken into consideration in the price calculation before the contract agreement. If necessary, the price of the documentation is shown separately.

The full costs of the documentation are not always covered as a specific cost in the pump price, and hence there is at times a need to determine a special price if the purchaser demands further copies of supplementary documents not usually supplied.

The price for supplementary or additional documents is calculated on the basis of reproduction costs but if the documentation has first to be drawn up as special requirements (computed, verified, etc, including translation costs), this means that this may be underestimated by the costs of this additional work.

A cost relating to installation, operating and maintenance manuals may need to be considered. Per the E.U. „Safety Machines“ directive, manuals need to be produced in the language on the E.U. or EFTA country where the equipment will be in operation.

An additional cost associated with documentation which may need to be considered, is the method of mailing.

Customers may demand key documentation within very short timescales. Pump manufacturers may be forced to send documents by express courier service which is considerably more expensive than conventional mailing, especially if the customer is located in another country.

## 5. Information included in documents

### 5.1 Installation drawing

Definition:

Simplified representation of the pump (or pump unit) with its important accessories without reference to surrounding equipment. Information to be included is foundation requirements for the anchoring or securing of the component with data for the stressing of the foundation.

Data content:

- Arrangement of the pump or pump unit, the main accessories and the securing components for the baseplate.
- Dimensions for determining the location and outline of the connections at the limit of supply.
- Position or overall dimensions required for installation, operation and servicing, and for anchoring the pump or pump units to the foundation (size and position).
- Factory weight of pump or pump units and accessory parts.
- Identifying reference or number.

### 5.2 Dimensional Drawing

Definition:

Simplified unscaled drawing of a pump or pump unit or accessory part with the leading dimensions.

Data content:

- Simplified layout with over all dimensions.
- Dimensions to major connections.
- Identifying reference or number.

### 5.3 Sectional Arrangement Drawing

Definition:

Diagrammatic section of the pump or subassembly showing position of components, if necessary using itemised parts' lists. The sectional drawings need not be to scale.

Data content:

- Position and description of accessories and component parts.
- Identifying reference or number.

Note:

- Details of the shaft seal general arrangement may be shown separately from, but related to, the general arrangement drawing of the pump.
- With multi-stage pumps, details are not required for each identical stage.
- The sectional arrangement drawing can be used as information in combination with the spare parts' lists.

## 5.5 Parts' list

Definition:

List of components shown in the sectional arrangement drawing. The parts' list can also be shown on the sectional arrangement drawing.

Data contents:

- Position and description of parts and accessories.
- Typical designation including material designation if appropriate.

## 5.6 Instrumentation lists

Definition:

Lists of all the instruments for measurement, control and regulation which are included and shown in the instrumentation circuit diagram.

Data content:

- Typical designation of instruments.
- Number of quantity.
- Typical operating data as for example, pressure, temperature, system control and material.
- Typical installation data as, for example, material, type of protection.

## 5.7 Instrumentation circuit diagram

Definition:

Schematic diagram of the connections between the pump and its accessories and instruments. The diagram should use graphic symbols to show the pump, pipe parts and measuring equipment. The lines indicate interconnecting wires, piping or conductors, flows or signals, for measurement or control purposes.

Data content:

- Functional inter-action of all elements including driver and installed stand-by arrangement.
- Limits and conditions of supply.
- Direction of flow of fluid, energy and signals.
- Typical descriptions of machines, equipment, instruments and pipelines.
- Details of insulation.
- Specification of measurement, control and regulation.

## 5.8 Auxiliary equipment diagram (pipeline plan)

Definition:

Schematic diagram showing the location, with dimensions of pipelines which are supplied with the pump. The description need not be to scale.

Data content:

- Dimension to which the pipeline is connected.
- Dimensions to which the pipe parts, valves, measuring equipment and pipe mounting are connected.
- Direction of flow.
- Drainage and ventilation system requirements.
- Dimensions, location and shape of connections.
- Insulation and heating requirements.
- Cross-reference to connection points, connections drawing and, if necessary, pipeline parts' list.

Note:

The pipeline plan can be integrated in the installation drawing, as long as the clarity of the installation drawing is not impaired.

### 5.9 Electrical circuit diagram

Definition:

Description of cable runs for the electrical supply to the pump unit.

Data content:

- Cable connection on the pump unit.
- Course of the cable mounted on the pump unit.
- Specification of the cable and connections.
- Indications of the beginning and end points of cable connections.
- Dimensions of the location and form of cable routing.

### 5.10 Terminal Connections

Definition:

Schematic layout of the electrical connections and power supply terminals.

Data content:

- Diagrammatic designation of the electrical connections.
- Bridging connections from terminals.
- Specification of the terminals and cables.

### 5.11 Characteristic Curves

Definition:

Description of functional relationships of characteristic quantities of a pump.

Data content:

- Relationship of delivered head, power input and the NPSH to the rate of flow at constant speed at design operating conditions.
- Operating speed.
- Typical pump data as, for example, pump type and size, work number symbol.

Note:

If a test curve is required to complete delivery, then this must be by agreement.

### 5.12 Starting torque characteristic

Definition:

Description of the relationship between pump torque and speed during start-up.

Data content:

- Pump torque change in relation to the normal run-up speed in loaded or unloaded condition as appropriate.
- Moment of inertia of the pump moving parts.
- Identifying reference or number.

### 5.13 Operating instructions

Definition:

Written information for user of a pump or pump unit or accessory, giving details of the machine and accessories, its intended application, transportation requirements, erections connection, operation and maintenance.

Data content:

- Main installation and performance data (see data sheet).
- Operation of the pump.
- Main requirements for transport and storage.
- Special tools and equipment for installation and maintenance.
- Requirements at the installation site as, for example, construction of the foundation and permissible environmental effects.
- Type, order and requirements for carrying out of main commissioning and test procedures.
- Operating sequence of starting and running.
- Necessary maintenance routines.
- Possible causes of breakdown with their recognition and elimination.
- Instructions on how to exchange the main spare parts.
- Identifying reference or number.

As stated in clause 4, above, manuals must be provided in the language of the E.U. or EFTA country in which the equipment is to operate.

### 5.14 Spare parts' list (manufacturer)

Definition:

Compilation of spare parts recommended by the manufacturer for the pump and their accessories.

Data content:

- Reference number of the spare parts.
- Identification and description of spare parts.
- Relationship of spare parts of the sectional arrangements drawing.
- Instruction for use.
- Quantity of recommended spare parts.
- Reference number of accompanying drawing.

### 5.15 Spare parts' list (customers' request)

Definition:

Compilation of spare parts requested by the customer

Data content:

- In general like 5.14 but inclusion of additional parts agreed between manufacturer and customer

### 5.16 Interchangeability list for spare parts

On multi-item projects, supply of interchangeability lists for spare parts is extremely valuable to the customer. Completion of such lists can be costly and time consuming. A typical Spare Parts Interchangeability Records form (SPIR) is attached for reference. (Appendix 1)

### 5.17 Data sheet

Statement of technical data for pumps, pump units or accessories and their installation requirements. The data sheets serve the buyer for enquiry, order and planning, the supplier for proposal and fulfilment.

Data content:

- Specification about working and operating condition, performance, principal materials, testing, condition at installation site, application of the pump and type of drive.
- Typical designations.

Note:

Example for a centrifugal pump data sheet see ISO 5199.

### 5.22 Material test list

Definition:

List of material test requested.

Data content:

- Place of test.
- Item covered.
- Type of material test.
- Types of certificates.
- Inspecting authority.
- Surveillance and test location.
- Typical designations.

### 5.23 Material test certificate

Definition:

Certificate on which results of material proving, especially in manufacture, are stated.

- Type of certificate.
- Type of proof.
- Item covered.
- Test method.
- Test results.
- Analysis of test results.
- Inspecting authority.
- Identifying reference or number.

### 5.24 List of manufacturing test certificates

Definition:

List of manufacturing test certificates.

Data content:

- Place of test.
- Item covered.
- Type of certificate.
- Inspecting authority.
- Identifying reference or number.

### 5.25 Manufacturing test certification

Definition:

Certificate on which manufacturing test on components, pumps or pump unit and accessories are confirmed.

Data content:

- Place of test.
- Item covered.
- Type of proof and test method.
- Analysis of test results.
- Identifying reference or number.
- Inspection authority.
- Identifying reference or number.

**TABLE 1 – TYPE OF DOCUMENTS (Explanations See Item 5)**

Document	Series production (Standard Documentation)	Batch production (Usually Standard Documentation)	Special Production (Usually Individual Documentation)
5.1* Installation drawing	X	X	X
5.2 Dimensional drawing	-	X	X
5.3 Sectional arrangement drawing	X	X	X
5.4 Section arrangement drawing for shaft sealing <sup>1)</sup>	X	X	X
5.5 Parts list <sup>1)</sup>	X	X	X
5.6* Instrumentation lists	-	X	X
5.7* Instrumentation circuit diagram	-	X	X
5.8 Auxiliary equipment diagram (pipeline plan)	-	X	X
5.9 Electrical circuit diagram	-	X	X
5.10 Terminal connections	-	X	X
5.11 Characteristic curve	X	X	X
5.12 Starting torque characteristic	X	X	X
5.13 Operating instructions	X	X	X
5.14 Spare parts list (manufacturer)	-	X	X
5.15 Spare Parts´ list (at customers request <sup>2)</sup>	-	X	X
5.16 Interchangeability list of spare parts <sup>2)</sup>	-	X	X
5.17 Data sheet (manufacture)	-	X	X
5.18 Data sheet (customer)	-	X	X
5.19 Design calculations <sup>2)</sup>	-	X	X
5.20* Production schedule	-	X	X
5.21* Network plan <sup>2)</sup>	-	-	X
5.22 Material test list	-	X	X
5.23 Material test certifications	-	X	X
5.24 List of manufacturing test certificates	-	X	X
5.25 Acceptance test certificate	-	X	X
5.26 Hydraulic test certificate <sup>2)</sup>	-	X	X
5.27 Manufacturing test certificates <sup>2)</sup>	-	X	X
5.28 Final inspection documents prior to despatch	-	X	X
5.29 Despatch date	-	X	X

<sup>1)</sup> Partly included in sectional arrangement drawing.

<sup>2)</sup> The documentation should generally only be provided on demand.

\* The documents required to complete the contract giving dates and costs.

