

BS ISO 29845:2011



BSI Standards Publication

# Technical product documentation — Document types

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National foreword

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# INTERNATIONAL STANDARD

BS ISO 29845:2011

**ISO**  
**29845**

First edition  
2011-09-01

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## Technical product documentation — Document types

*Documentation technique de produits — Types de document*



Reference number  
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## Contents

Page

Foreword .....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions .....	1
3.1 General .....	1
3.2 Document types.....	3
4 Forms of presentation.....	7
4.1 General .....	7
4.2 Drawing .....	9
4.3 Model .....	23
4.4 Diagram .....	29
4.5 Chart .....	37
4.6 Graph .....	39
4.7 List .....	41
4.8 Textual.....	48
Bibliography.....	59

## 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.

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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.

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ISO 29845 was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 1, *Basic conventions*.

## Introduction

The figures in this International Standard are intended only as illustrations to aid the user in understanding the practices elaborated in the text. In some cases, the figures show the level of detail needed for emphasis; in others, they are only complete enough to illustrate a concept or facet thereof. The absence of figures has no bearing on the applicability of the specified requirement or practice.



# Technical product documentation — Document types

## 1 Scope

This International Standard establishes and defines the types of documents required to be in the documentation for the specification of products, equipment and plants at all levels of complexity. It deals with the range of document types used from the conceptual phase to finished product, in all engineering fields.

The purpose of this International Standard is

- to facilitate a structure for (data modelling) product data management systems,
- to facilitate searching and retrieval of documents,
- to establish document types for the purpose of better communication and understanding between parties involved in document interchange, and
- to fulfil the requirement in ISO 7200:2004 regarding document type fields.

**NOTE** The figures in this International Standard are intended only as illustrations to aid the user in understanding the document types described by the text. Consequently, the figures are simplified in such a way that the content presented in illustrated document types may not always apply all ISO rules regarding the presentation of drawings and other types of documents.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7200:2004, *Technical product documentation — Data fields in title blocks and document headers*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1 General

#### 3.1.1

##### **document**

fixed and structured amount of information that can be managed and interchanged as a unit between users and systems

[ISO 11442:2006, 3.10]

#### 3.1.2

##### **documentation**

collection of documents related to a given subject

[IEC 82045-1, 2001]

### **3.1.3 document**

#### **type**

document defined with respect to its specified content of information, function and form of presentation

NOTE Adapted from IEC 61082-1:2006.

### **3.1.4**

#### **object**

entity treated in the process of design, engineering, realisation, operation, maintenance and demolition

[ISO 15519-1:2010, 3.3.2]

### **3.1.5**

#### **product**

intended or accomplished result of labour, or of a natural or artificial process

[IEC 82045-1:2001]

NOTE 1 A product usually has a part number, type designation, and/or a name.

NOTE 2 A technical system, building, plant or services can be considered as a product.

### **3.1.6**

#### **drawing**

technical information, given on an information carrier, graphically presented in accordance with agreed rules and usually to scale

[ISO 10209-1:1992, 2.11]

### **3.1.7**

#### **model**

three-dimensional physical or digital description of the ideal shape of an object

### **3.1.8**

#### **design model**

portion of the data set that contains model and supplemental geometry

[ISO 16792:2006, 3.10]

### **3.1.9**

#### **diagram**

technical document showing the functions of the objects composing a system and their interrelations using graphical symbols

### **3.1.10**

#### **chart**

document of information in the form of a table, graph, or diagram

### **3.1.11**

#### **graph**

diagram showing the relation between variable quantities, typically of two variables, each measured along a pair of lines at right angles

### **3.1.12**

#### **list**

document in which the information is presented in columns and rows

**3.1.13**

**sketch**

drawing prepared freehand or in a CAD system and not necessarily to scale

**3.1.14**

**textual**

presentation form using characters, for example in written instructions and descriptions

**3.1.15**

**report**

account given of a matter after investigation or consideration

**3.2 Document types**

**3.2.1**

**part drawing**

drawing depicting a single part which cannot be further disassembled and which includes all the necessary information required for the definition of the part

[ISO 10209-1:1992, 3.16]

**3.2.2**

**assembly drawing**

drawing representing the relative position and/or shape of a group of assembled parts

[ISO 10209-1:1992, 3.2]

**3.2.3**

**tabular drawing**

drawing listing differing variations of a specific configuration using a single, common illustration

**3.2.4**

**fabrication drawing**

part drawing of an assembly of fully specified items, permanently joined together

**3.2.5**

**installation drawing**

drawing showing the general configuration of an item and the necessary information to install the item relative to its mating structures or associated items

[ISO 10209-1:1992, 3.16]

**3.2.6**

**layout drawing**

drawing showing the location of sites, structures, buildings, spaces, elements, assemblies or components

[ISO 10209-1:1992,3.13]

**3.2.7**

**interface drawing**

drawing giving information for the assembly and matching of two parts, concerning, for example, their dimensions, configuration limitations, performance and test requirements

[ISO 10209-1:1992, 3.11]

### 3.2.8

#### **outline drawing**

drawing giving the outside peripheral envelope, overall dimensions and mass of an object

NOTE Adapted from ISO 10209-1:1992.

### 3.2.9

#### **supplier drawing**

drawing defining a part developed and owned by an external supplier

### 3.2.10

#### **illustration drawing**

drawing showing figures and sketches for any general purpose which is not covered by the more specific document types

### 3.2.11

#### **space envelope drawing**

drawing showing the maximum space which can be occupied for an intended design solution and the geometrically significant interfaces of components and assemblies which are not yet designed in detail

### 3.2.12

#### **block plan**

drawing which identifies a site and locates the outlines of construction works in relation to a town plan or similar document

[ISO 10209-1:1992, 3.3]

### 3.2.13

#### **site plan**

layout drawing giving the position of construction works in relation to the setting out points, the means of access and the general layout of a site

NOTE Adapted from ISO 10209-1:1992.

### 3.2.14

#### **part model**

model in which the product described is one single item

### 3.2.15

#### **assembly model**

model in which the product described is an assembly of two or more items

[ISO 16792:2006, 3.3]

### 3.2.16

#### **installation model**

model in which the product described is an installation, showing parts or assemblies and a partial or complete representation of the installation site

[ISO 16792:2006, 3.17]

### 3.2.17

#### **interference model**

model that shows the overall geometry and the space required as well as possible collisions

### 3.2.18

#### **space envelope model**

model showing the maximum space which can be occupied for an intended design solution and the geometrically significant interfaces of components and assemblies which are not yet designed in detail

**3.2.19**

**annotated design model**

combination of design model, annotation and attributes that describes a product

**3.2.20**

**overview diagram**

diagram providing a comprehensive view of an object with low degree of detailing

**3.2.21**

**network map**

overview diagram showing a network on a map

[ISO 14617-15:2002, 3.2]

**3.2.22**

**block diagram**

overview diagram predominantly using block symbols

[ISO 10209-4:1999, 5.15.8.1]

**3.2.23**

**network diagram**

overview diagram which shows the connections between different kinds of installations for transmitting of electricity, fluids (e.g. water, gas) or heating/cooling, sewage system, telecommunications, equipment, etc.

NOTE Adapted from ISO 10209-4:1999.

**3.2.24**

**circuit diagram**

diagram providing information about the circuitry of an object(s)

[ISO 15519-1:2010, 3.2.8]

**3.2.25**

**function diagram**

diagram providing information about the functional behaviour of a system

[ISO 15519-1:2010, 3.2.7]

**3.2.26**

**process flow diagram**

diagram illustrating the configuration of a process system or process plant by means of graphical symbols

[ISO 15519-1:2010, 3.2.6]

**3.2.27**

**pipng and instrumentation diagram**

**P&I diagram**

process flow diagram representing the technical realization of a process system by means of graphical symbols for equipment, connections and process measurement and control functions

[ISO 15519-1:2010, 3.2.9]

**3.2.28**

**angular chart**

chart showing the relation between the angular position of an object and the function

**3.2.29**

**structure diagram**

chart which shows the relation between different objects in a system or a product from different points of view presented graphically as a hierarchical tree

**3.2.30**

**graph**

diagram showing the relation between variable quantities, typically of two variables, each measured along a pair of lines at right angles

**3.2.31**

**parts list**

list of elements of an object(s)

[ISO 15519-1:2010, 3.2.11]

**3.2.32**

**document list**

formally built-up inventory in which all relevant documents for a specific purpose are listed

**3.2.33**

**bill-of-material**

**BOM**

presentation of the constituents in a product structure with the possibility to adopt the level of decomposition to actual need

**3.2.34**

**signal list**

list providing information about signals defined as input or output of functional units

**3.2.35**

**coordinate data list**

list providing information about certain positions on a part represented in a Cartesian coordinate system

**3.2.36**

**apparatus list**

list providing information about the constituent functional components included in a system

**3.2.37**

**connection table**

connection table lists the connections on different levels, internal and external, of the installation

**3.2.38**

**standard**

document established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines and characteristics or their results, aimed at the achievement of the optimum degree of order in a given context

[ISO/IEC Guide 2:2004, 3.2]

**3.2.39**

**technical specification**

document specifying the requirements for one specific part or for a group of parts with equal characteristics

**3.2.40**

**requirement specification**

document compiled and evaluated with the requirements from the markets (customer), authorities, and the company itself

**3.2.41**

**part definition**

text-based document that may be supplied with a drawing image of the defined part, specifying property requirements for the part described by the document

**3.2.42 calculation**

**sheet**

document providing the results of calculations regarding essential product characteristics

**3.2.43**

**process specification**

document that defines the type and sequence of steps of a process used to produce a part

**3.2.44**

**assembly instruction**

document providing information of how and in what sequence the different part shall be assembled to receive a specific end product

**3.2.45**

**test specification**

specification explaining how to perform the test activities according to the test plan

**3.2.46**

**test plan**

document describing the scope realization resources and plans for the intended test activities

**3.2.47**

**quality plan**

document defining a set of activities planned that helps achieve quality in the project being executed

**3.2.48**

**test report**

compilation of tests carried out at a new part, assembly, product or system and documentation of test results

## **4 Forms of presentation**

### **4.1 General**

The forms of presentation identified in Table 1 are the main types of documents used in the field of engineering. The table also shows where the documents are commonly used. However, the document types can also occur in other technical areas than those shown in Table 1 depending on company standards, technical discipline, etc.

**Table 1 — Presentation formats**

Presentation format	Description	Application <sup>a</sup>
1 Drawing	Graphical presentation depicting the shape, size, etc. of a physical part or assembly, usually to scale	A
2 Model	Three-dimensional physical or digital description of the ideal shape of an object.	A
3 Diagram	Graphical presentation showing the functions of the objects composing a system and their interrelations using graphical elements and symbols	A
4 Chart	Document of information in the form of a table, graph, or diagram.	B, D
5 Graph	Diagram showing the relation between variable quantities, typically of two variables, each measured along a pair of lines at right angles.	B, D
6 List	Document in which the information is presented in columns and rows	A
7 Textual	Presentation form using characters, for example in written instructions and descriptions	A
a See Table 2.		

The application code identifies the technical area in which the presentation format is used.

**Table 2 — Application codes**

Code	Technical area
A	overall technology
B	construction engineering (building construction and civil engineering)
C	mechanical engineering
D	process plant engineering

NOTE The figures in the following subclauses are typical examples of the described document types. The information in the title blocks is identical throughout this International Standard except for the document types and titles.



### 4.2.2 Assembly drawing

An assembly drawing (see Figure 2) is a drawing representing the relative position and/or shape of a group of assembled parts. It depicts the constituents of a parts list. Relevant information may be added.

The list of parts is normally provided in a separate document, i.e. a parts list, but it can be included within the drawing.

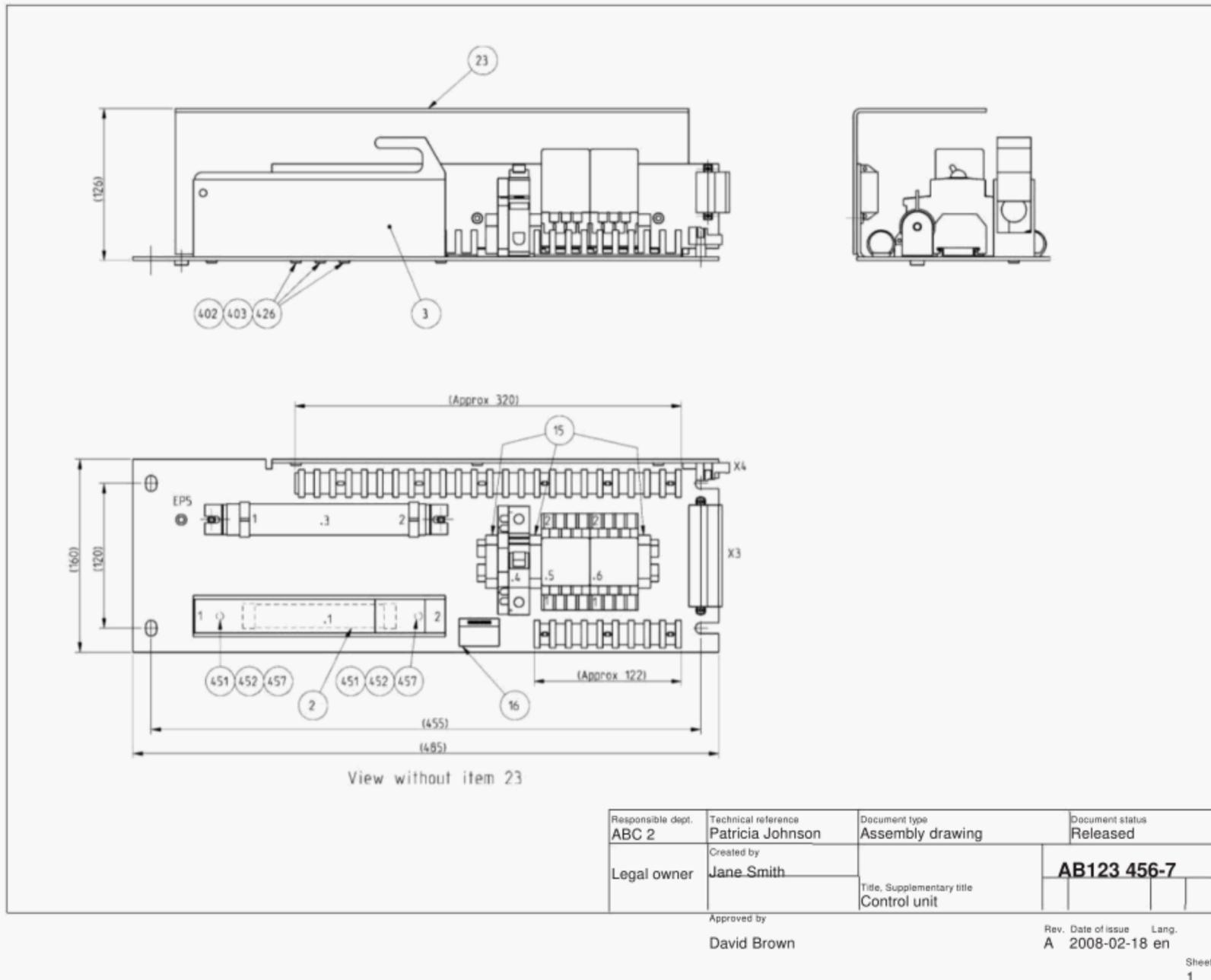


Figure 2 — Assembly drawing

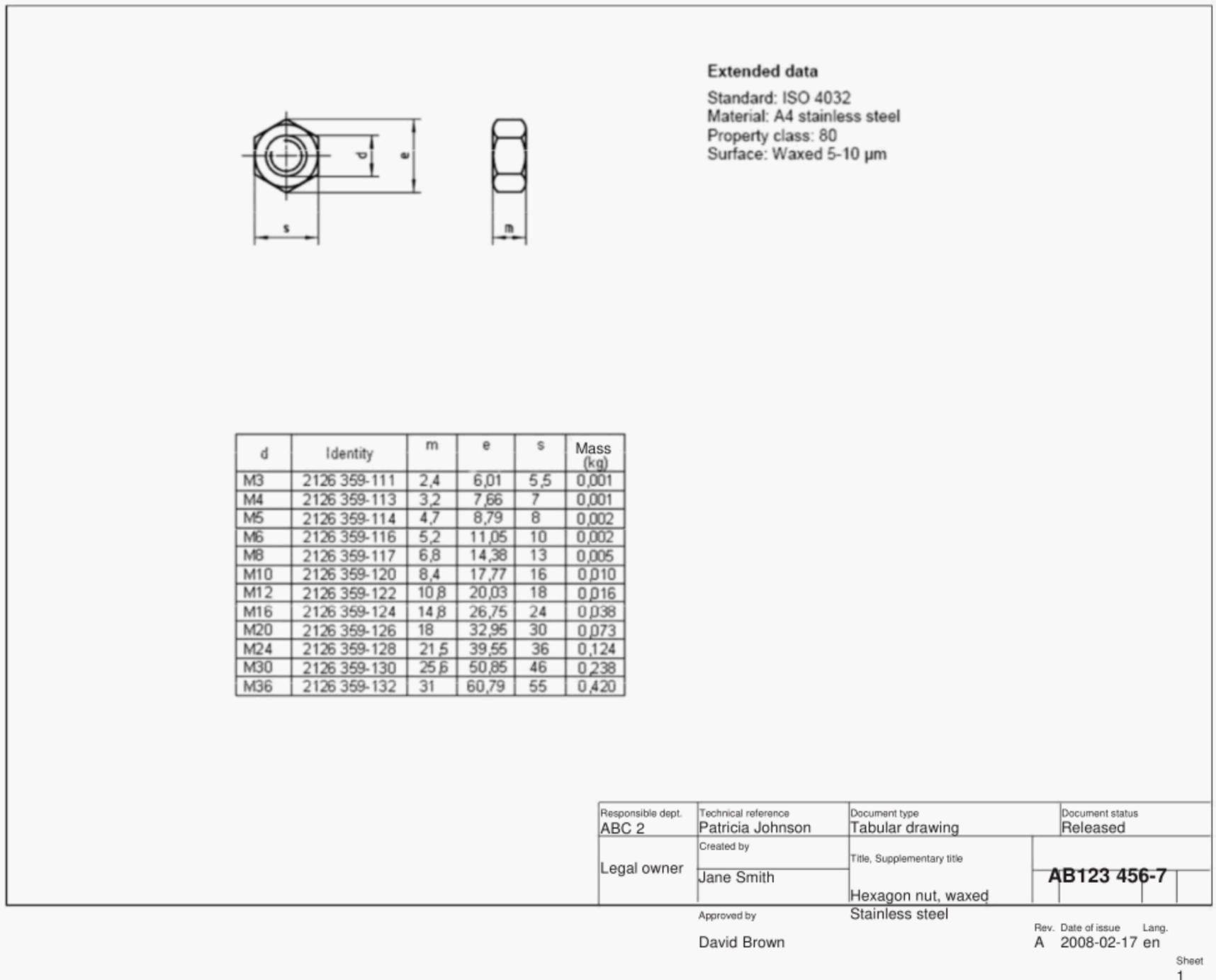
Examples of assembly drawings from the construction field include the following:

- a **general arrangement drawing** (showing an entire building or a technical system within a building, such as the structural system or the ventilation system);
- an **assembly drawing** (showing a more limited assembly, such as a kitchen);
- a **dimensional drawing** (specifying dimensions necessary for construction or production, sometimes used for separating dimensions from the drawing that specifies identities/types of parts, especially for architectural and structural drawings).



### 4.2.3 Tabular drawing

A tabular drawing (see Figure 3) uses a method of dimensioning that enables a series of variable common features of a part or assembly to be presented in a tabular form.



**Figure 3 — Tabular drawing**

An example of a tabular drawing from the construction field is a **component schedule**. This often covers a number of variants that have a general type in common, but differ both in geometrical specification and other features. For example, a door schedule may cover all steel doors, both single- and double-swing variants. Some subtypes are given below:

- a door schedule;
- a window schedule;
- a bar schedule.



4.2.4 Fabrication drawing

A fabrication drawing (see Figure 4) is a part drawing of an assembly of items permanently joined together, e.g. by welding, soldering or adhesive. The constituents shall be fully specified.

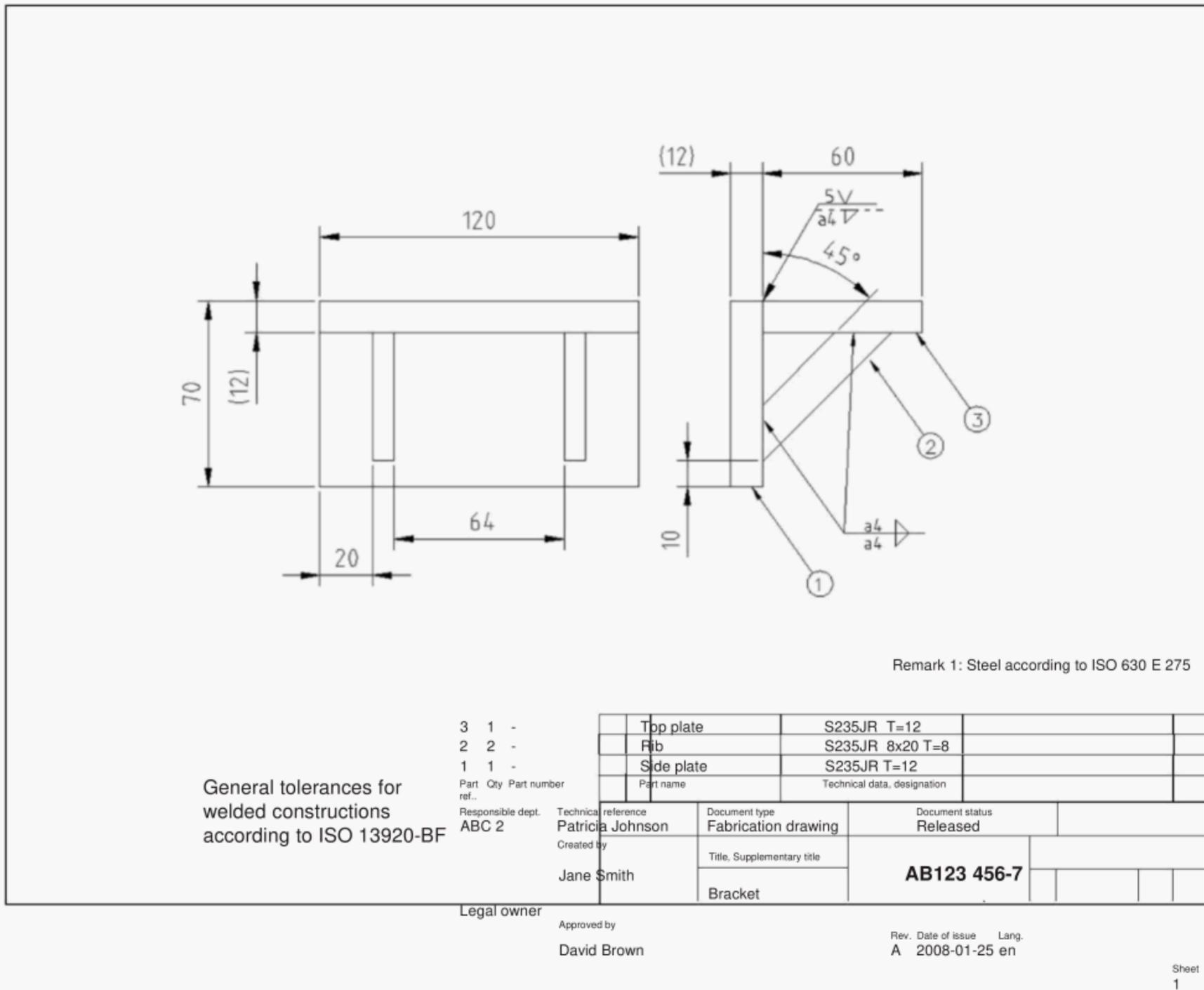


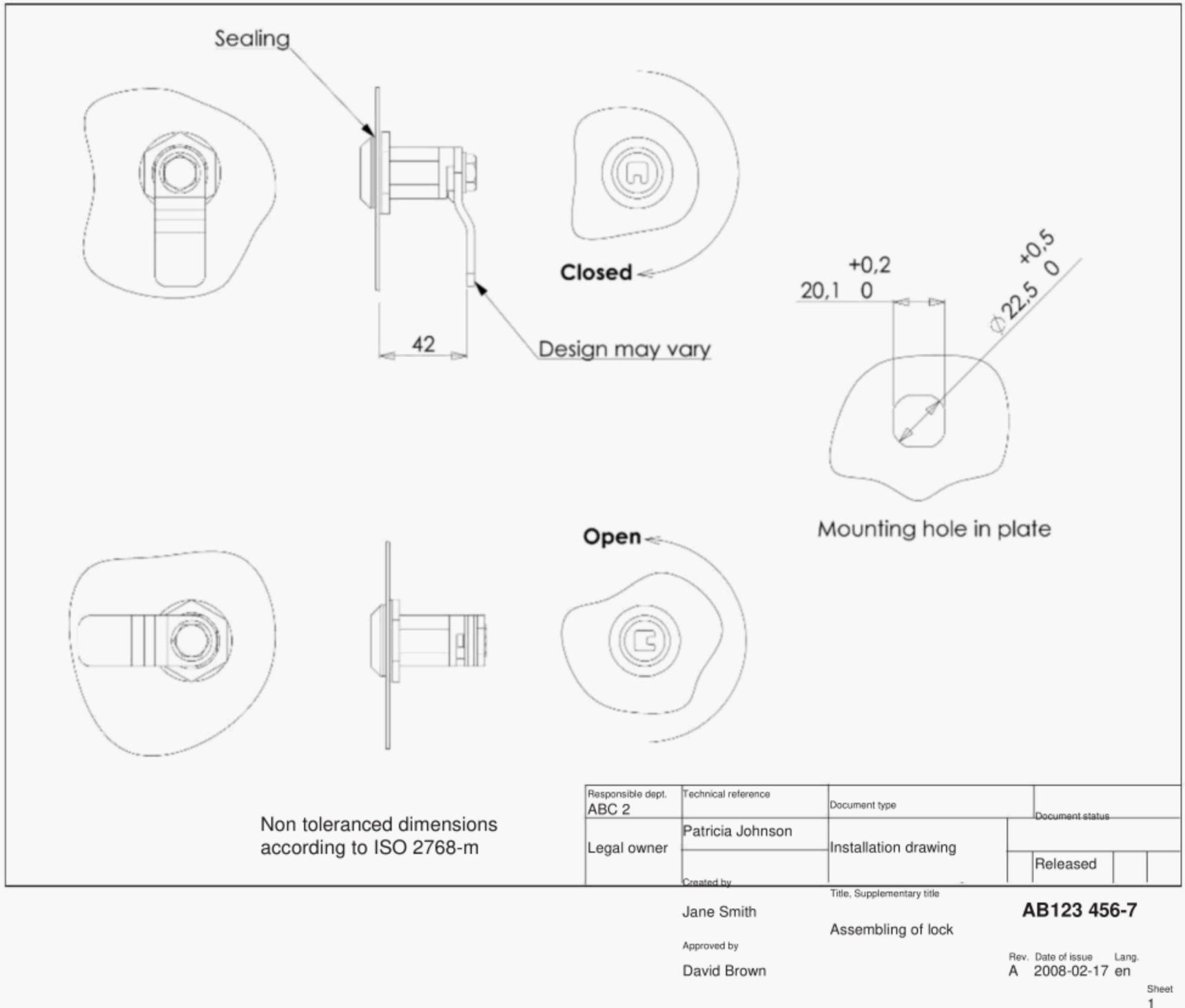
Figure 4 — Fabrication drawing

An example of a fabrication drawing from the construction field is a **manufacturing drawing** for welded components such as banisters or railings. The subdivision of manufacturing drawings normally just depends on which manufacturer supplies the part or assembly, not on the method of fabrication, such as whether items are permanently joined together.



#### 4.2.5 Installation drawing

An installation drawing (see Figure 5) shows the general configuration of an item and the necessary information to install the item relative to its mating structures or associated items.



**Figure 5 — Installation drawing**

An example of an installation drawing from the construction field is a **detail drawing**. This can show the appearance and properties of a part as well as its relation to and mounting with other parts, cf. 4.2.1.



4.2.6 Layout drawing

A layout drawing (see Figure 6) shows the location of sites, structures, buildings, spaces, elements, assemblies or components. It may also show the important parts of a design and their technical and functional interrelation.

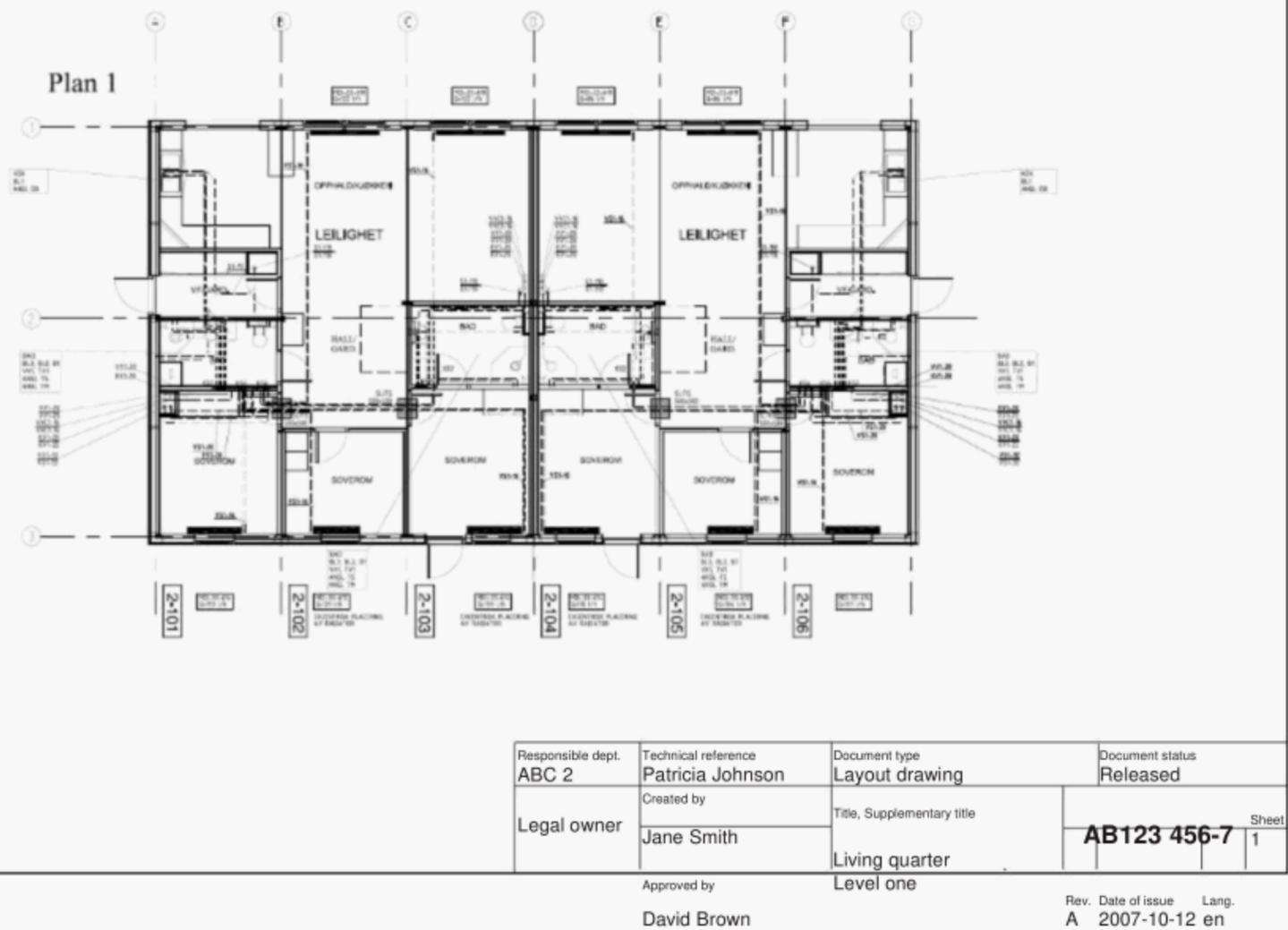
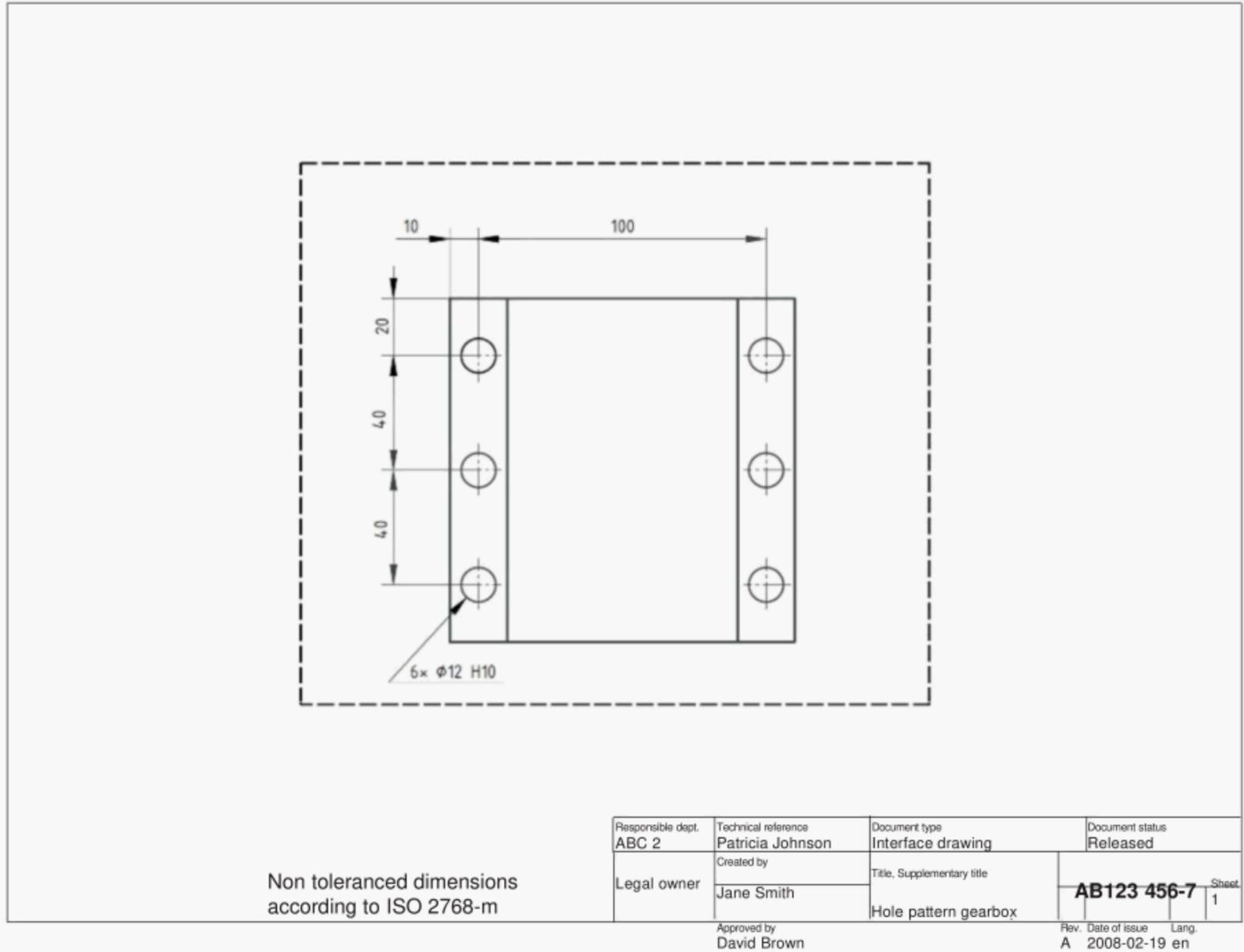


Figure 6 — Layout drawing

An example of a layout drawing from the construction field is a **general arrangement drawing**. The illustration shows one type of general arrangement drawing; elevations/facades and sections are other common types. General arrangement drawings are mostly specific to technical disciplines, e.g. architectural, structural, water and sewage, HVAC, power and lighting, alarm, data networks, furnishing, catering and fire protection.

#### 4.2.7 Interface drawing

An interface drawing (see Figure 7) gives information for the assembly and matching of two parts, concerning, for example, their dimensions, configuration limitations, performance and test requirements.



**Figure 7 — Interface drawing**

This type of drawing is not directly applicable to construction. Interfaces such as hole patterns may be included in detail drawings or manufacturing drawings.

4.2.8 Outline drawing

An outline drawing (see Figure 8) provides the outside peripheral envelope, overall dimensions and the mass of an object, used in the determination of packaging and transportation requirements.

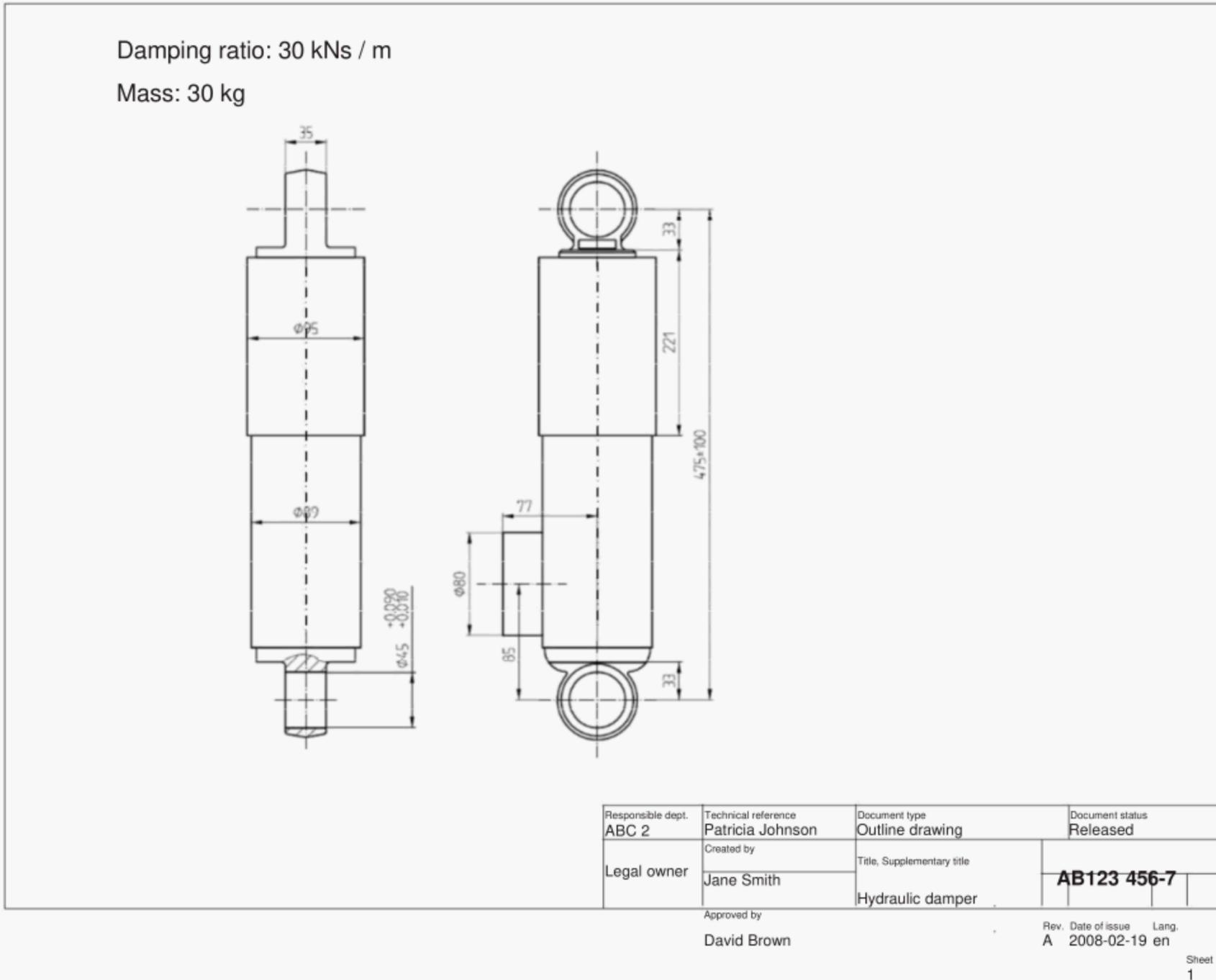
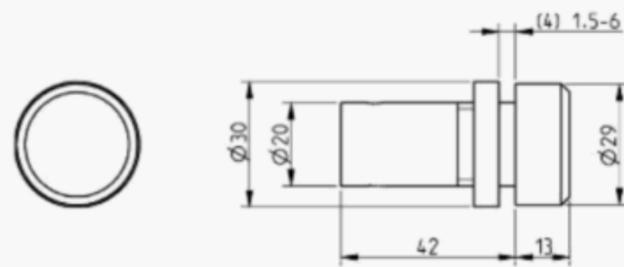


Figure 8 — Outline drawing



**4.2.9 Supplier drawing**

A supplier drawing (see Figure 9) defines a part developed and owned by an external supplier; it can be redrawn [see Figure 9 a)], or pasted on the using company's drawing sheet [see Figure 9 b)].



Mass 0,023 kg  
 Mounting hole 22,5 mm  
 Rated voltage 110-130 V  
 Kind of current AC  
 Rated current 15 mA  
 Colour Green  
 Luminance 126 mcd  
 Wave length 520 nm  
 Protection class IP 65  
 Service life < 50 000 h

Manufacturer AAA Company  
 Type designation BCD

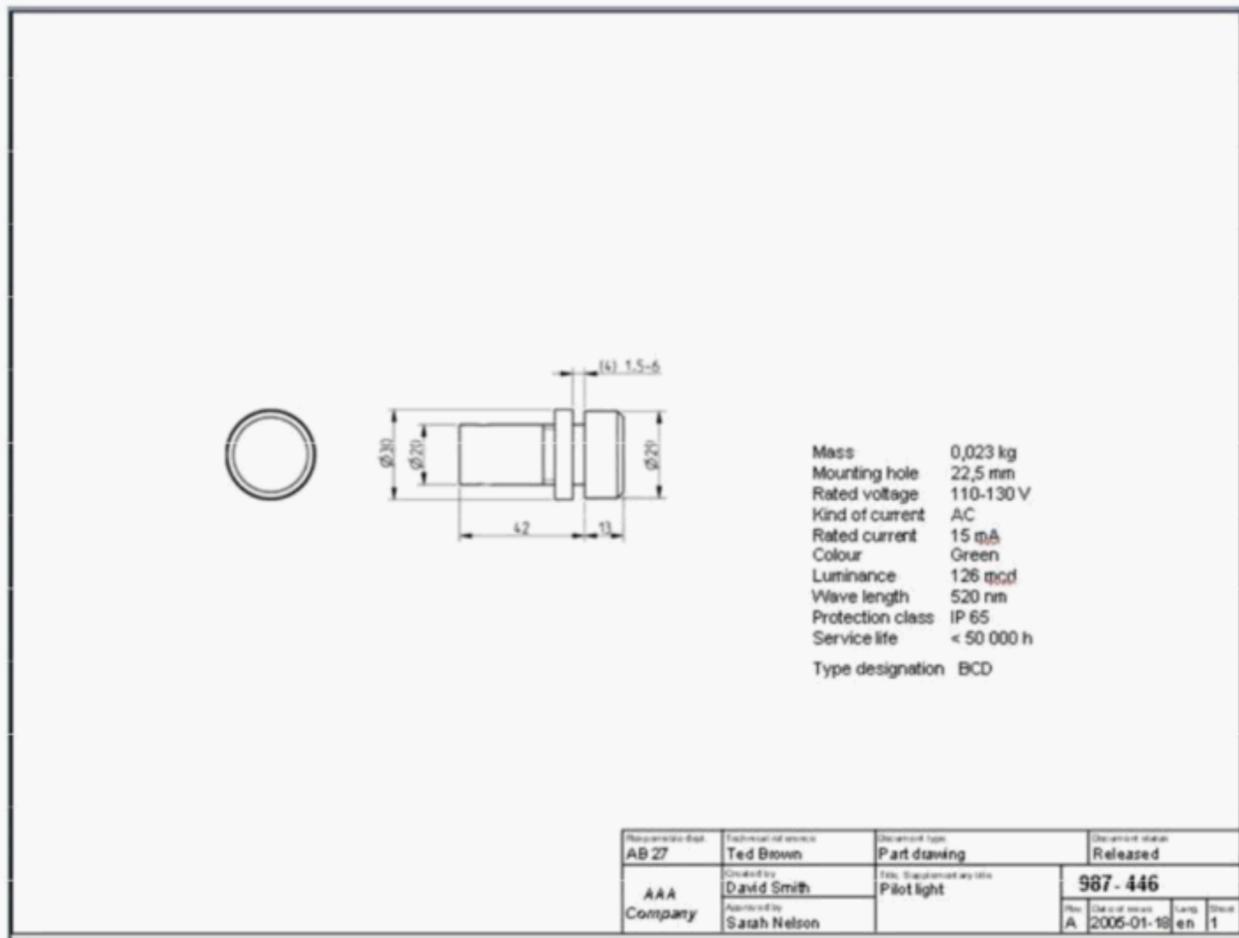
Responsible dept. ABC 2	Technical reference Patricia Johnson	Document type Supplier drawing	Document status Released
Legal owner	Created by Jane Smith	Title, Supplementary title Pilot light	AB123 456-7 <small>Sheet</small> 1

Approved by  
 David Brown

Rev. Date of issue Lang.  
 A 2008-02-19 en

**a) Supplier drawing (redrawn)**

**Figure 9 — Supplier drawings** (continued on next page)



Responsible dept.	Technical reference	Document type	Document status
ABC 2	Patricia Johnson	Supplier drawing	Released
Legal owner	Created by	Title, Supplementary title	AB123 456-7
	Jane Smith	Pilot light	
Approved by		Rev.	Date of issue
David Brown		A	2008-02-19

Rev. Date of issue Lang.  
 A 2008-02-19 en

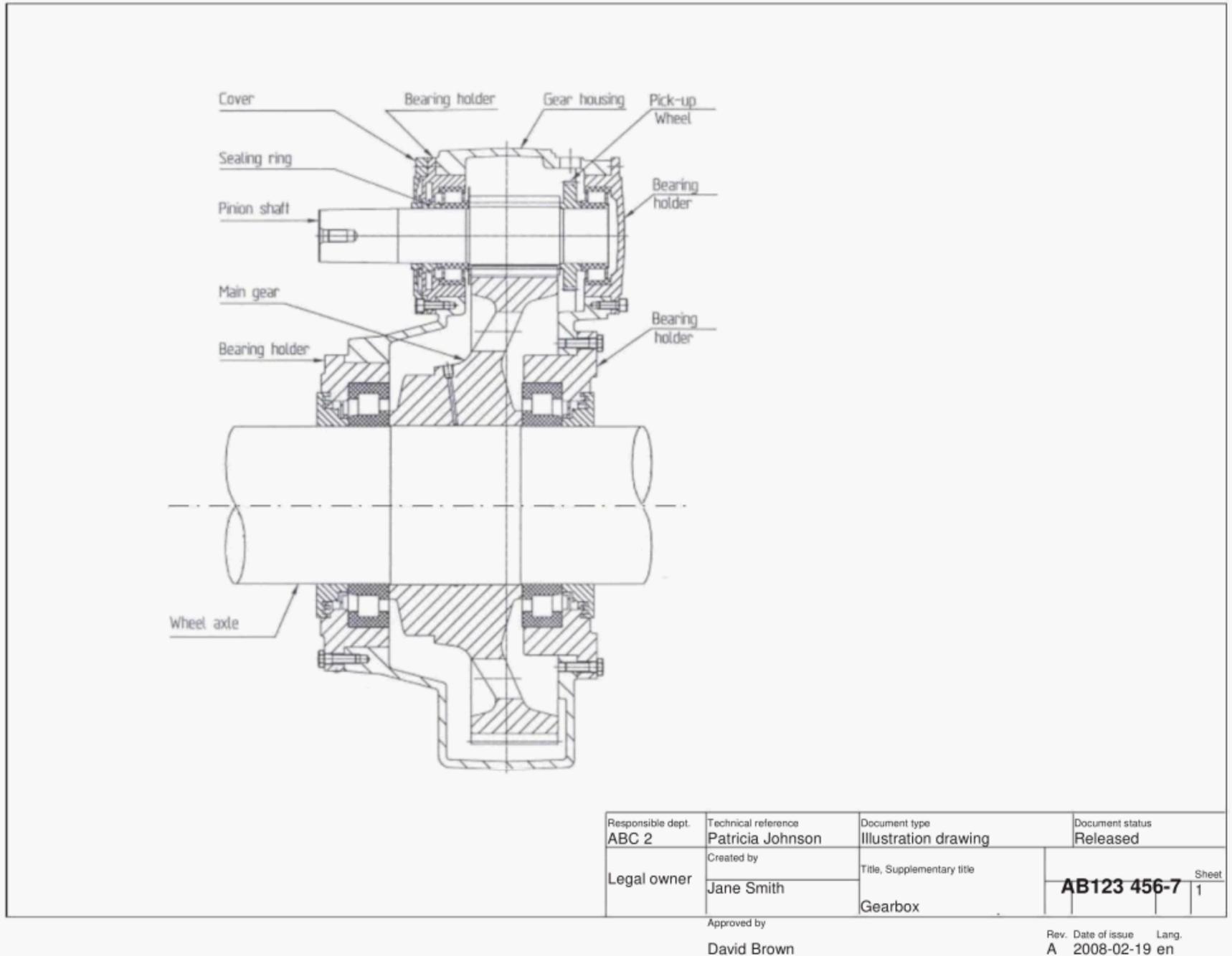
**b) Supplier drawing (pasted)**

**Figure 9 — Supplier drawings**

An example of a supplier drawing from the construction field is a **manufacturing drawing**.

#### 4.2.10 Illustration drawing

An illustration drawing (see Figure 10) shows figures and sketches for any general purpose which is not covered by the more specific document types such as assembly drawing, outline drawing, etc.



**Figure 10 — Illustration drawing**

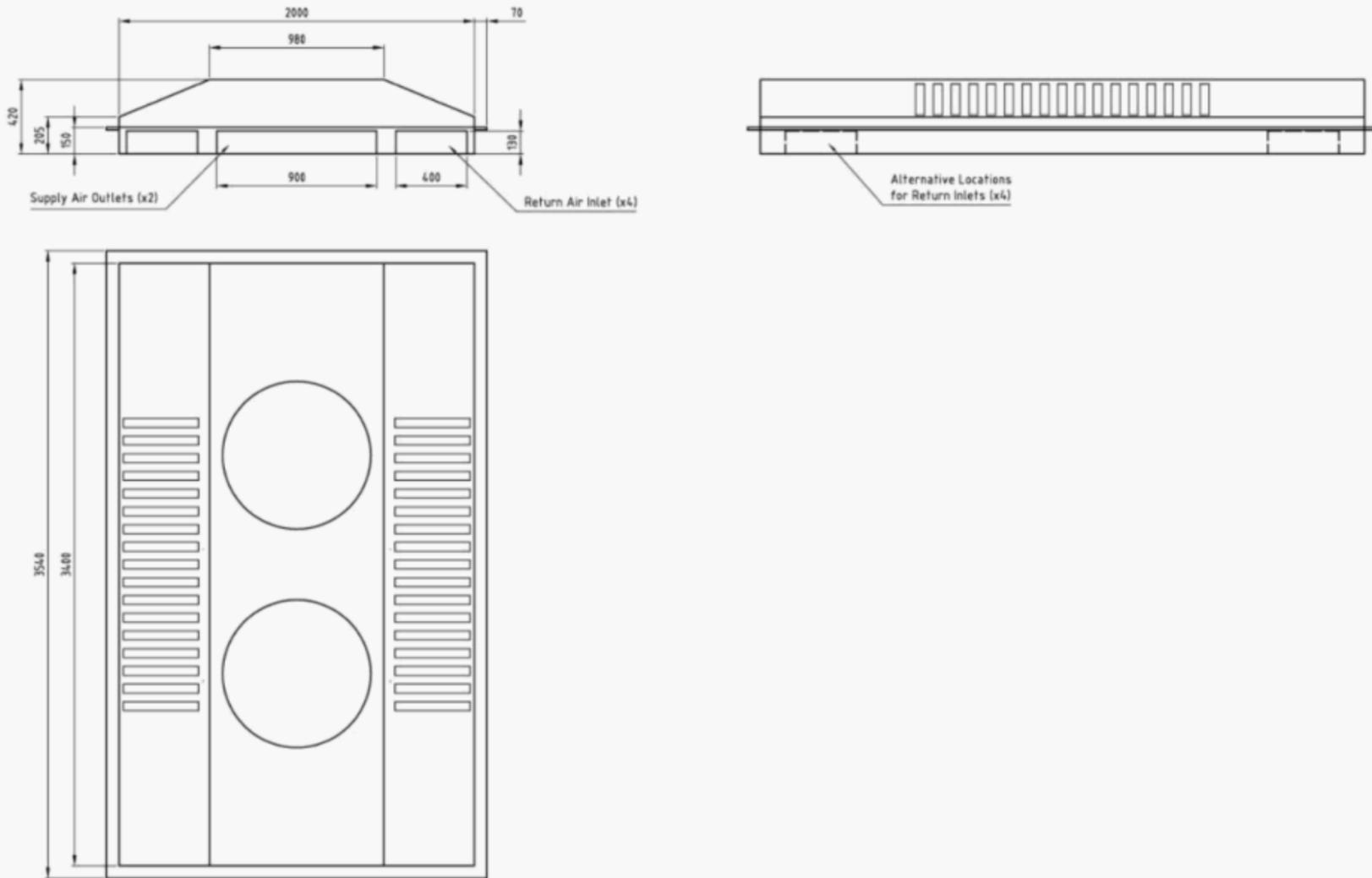
Examples of illustration drawings from the construction field include the following:

- a **pattern drawing**;
- a **masonry drawing**.

**4.2.11 Space envelope drawing**

A space envelope drawing (see Figure 11) is used for communication between one responsible unit or company and another.

The drawing shows maximum space which can be occupied for an intended design solution and the geometrically significant interfaces of components and assemblies which are not yet designed in detail.



Responsible dept. ABC 2	Technical reference Patricia Johnson	Document type Space envelope drawing	Document status Released
Legal owner	Created by Jane Smith	Title, Supplementary title HVAC space envelope	AB123 456-7
	Approved by David Brown	Roof unit	

Rev. Date of issue Lang.  
 A 2008-02-17 en

Sheet  
 1

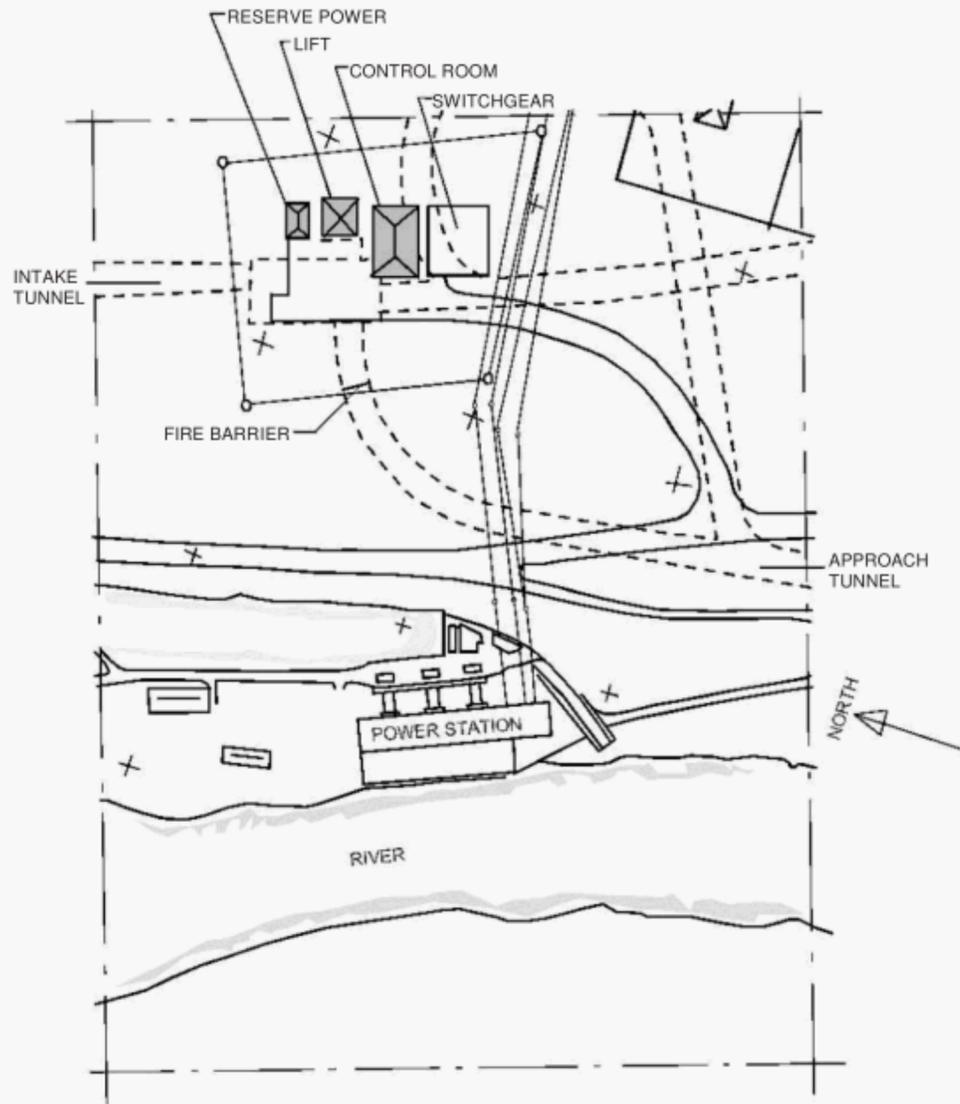
**Figure 11 — Space envelope drawing**

This type of drawing is not directly applicable to construction. Such information may be included in a **coordination drawing**.



### 4.2.12 Block plan

A block plan (see Figure 12) is a drawing which identifies a site and locates the outlines of construction works in relation to a town plan or similar document.



Responsible dept. ABC 2	Technical reference Patricia Johnson	Document type General plan	Document status Released
Legal owner	Created by Jane Smith	Title, Supplementary title <b>AB123 456-7</b>	
	Approved by David Brown		Power station

Extension proposal  
 Rev. Date of issue Lang.  
 A 2007-10-15 en

**Figure 12 — Block plan**

This type of drawing is construction specific.



4.2.13 Site plan

A site plan (see Figure 13) is a layout drawing giving the position of construction works in relation to the setting out points, the means of access and the general layout of a site.

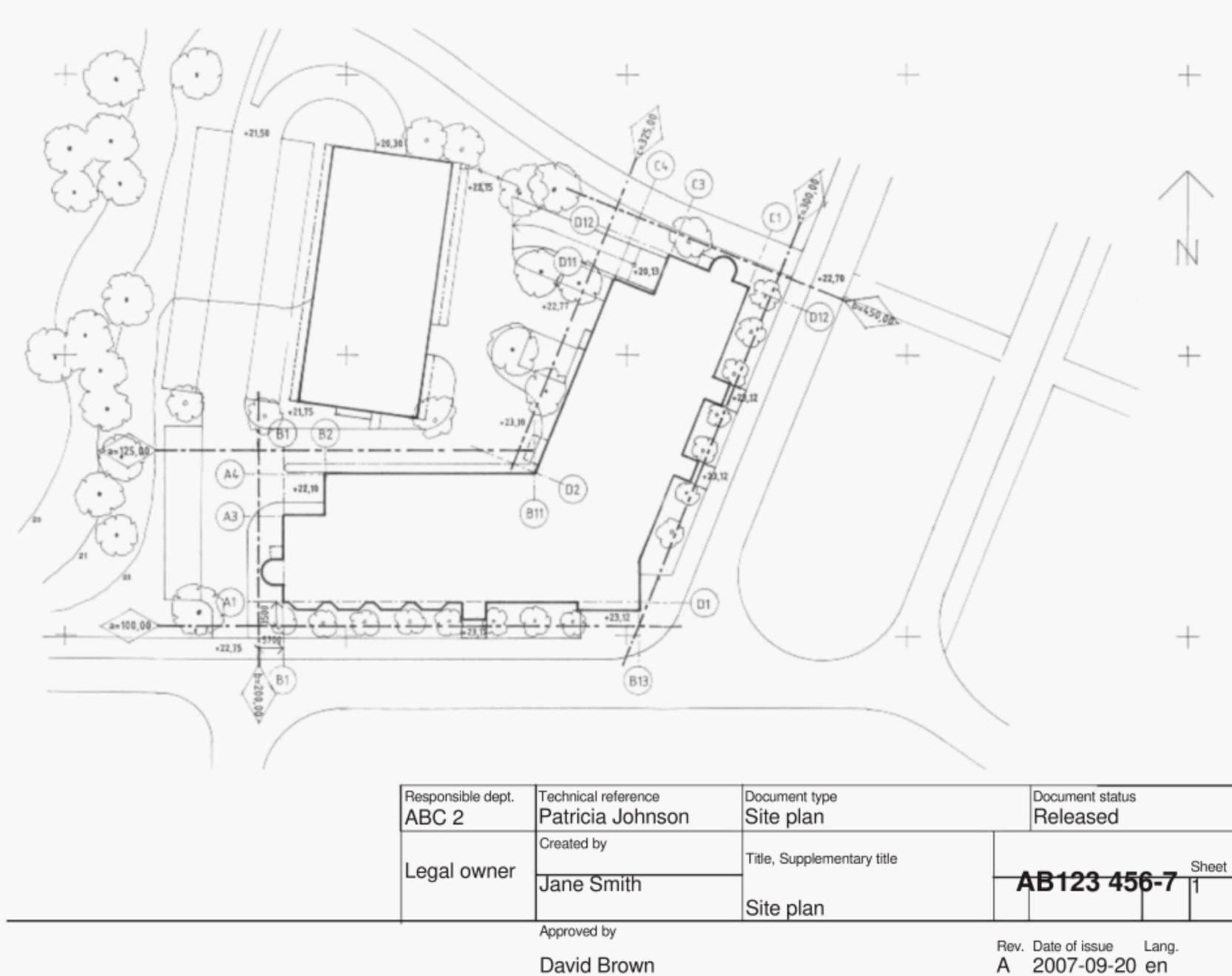


Figure 13 — Site plan

This type of drawing is construction specific. It is also known as a **setting-out drawing** or **levelling drawing**.

## 4.3 Model

### 4.3.1 General

Data needed for unambiguous identification of a model shall be in accordance with ISO 7200.

Common practice in construction, though, is to differentiate between

- a) **graphical models** in 2D or 3D, and
- b) **building information models** (BIM) which are object-oriented – consisting of objects, each having a number of properties (geometrical representations can be among them) and relations to other objects.

Models are generally understood to be “data repositories” that can be filtered in order to produce a presentation for a defined purpose. Examples of presentations include different kinds of drawings or visualization in perspective, as well as text documents or tabular documents.

### 4.3.2 Part model

A part model (see Figure 14) is a model in which the product described is one single item.

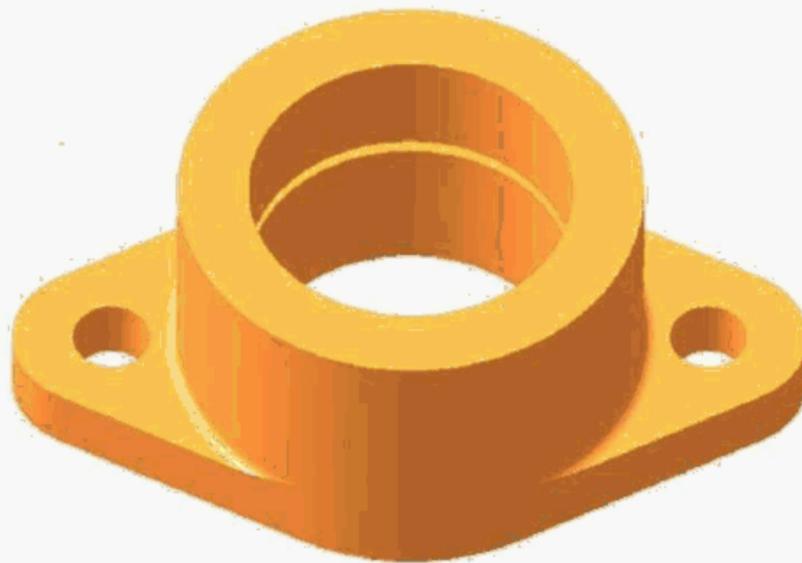


Figure 14 — Part model

### 4.3.3 Assembly model

An assembly model (see Figure 15) is a model in which the product described is an assembly of two or more items.

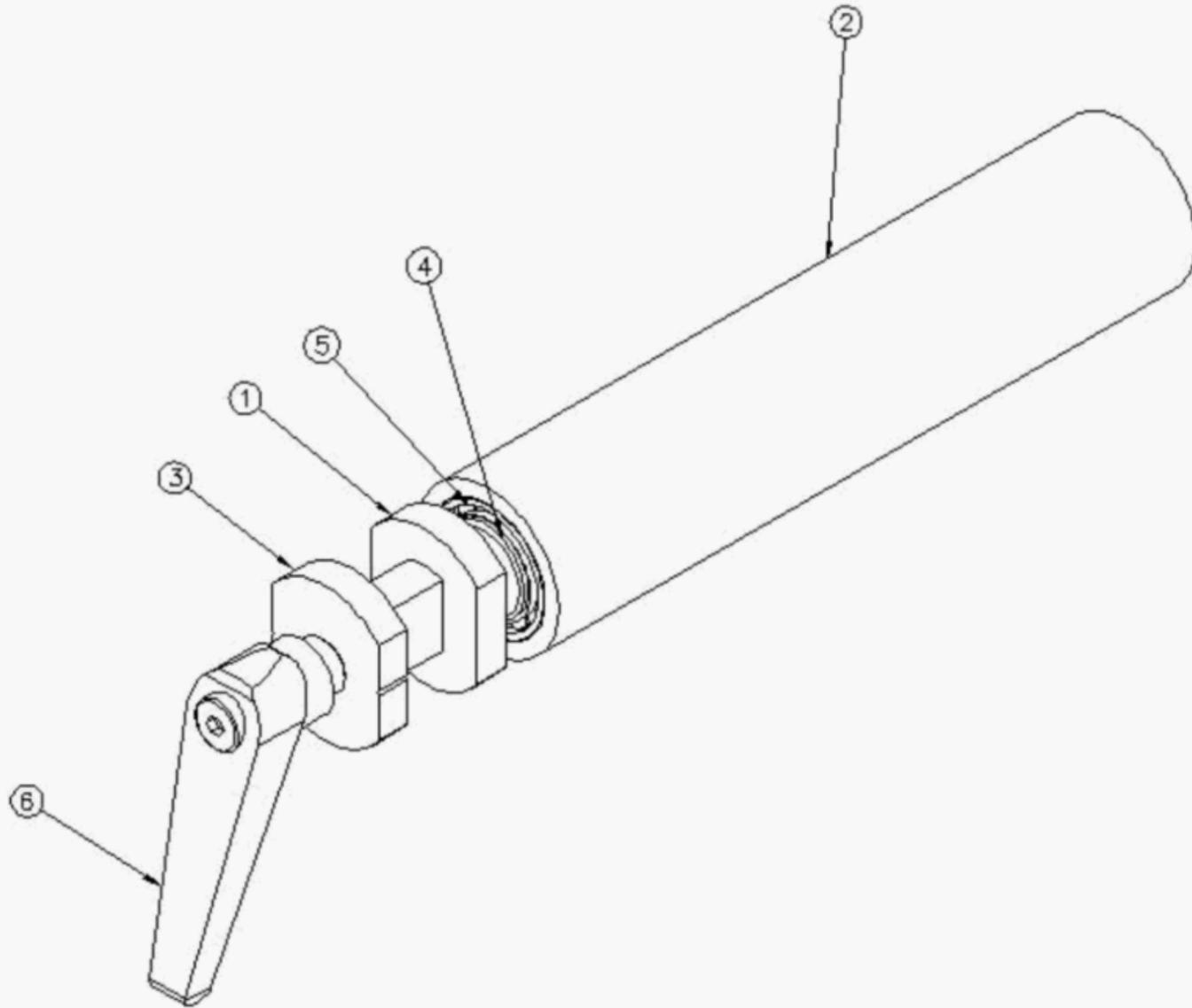


Figure 15 — Assembly model

#### 4.3.4 Installation model

An installation model (see Figure 16) is a model in which the product described is an installation, showing parts or assemblies and a partial or complete representation of the installation site.

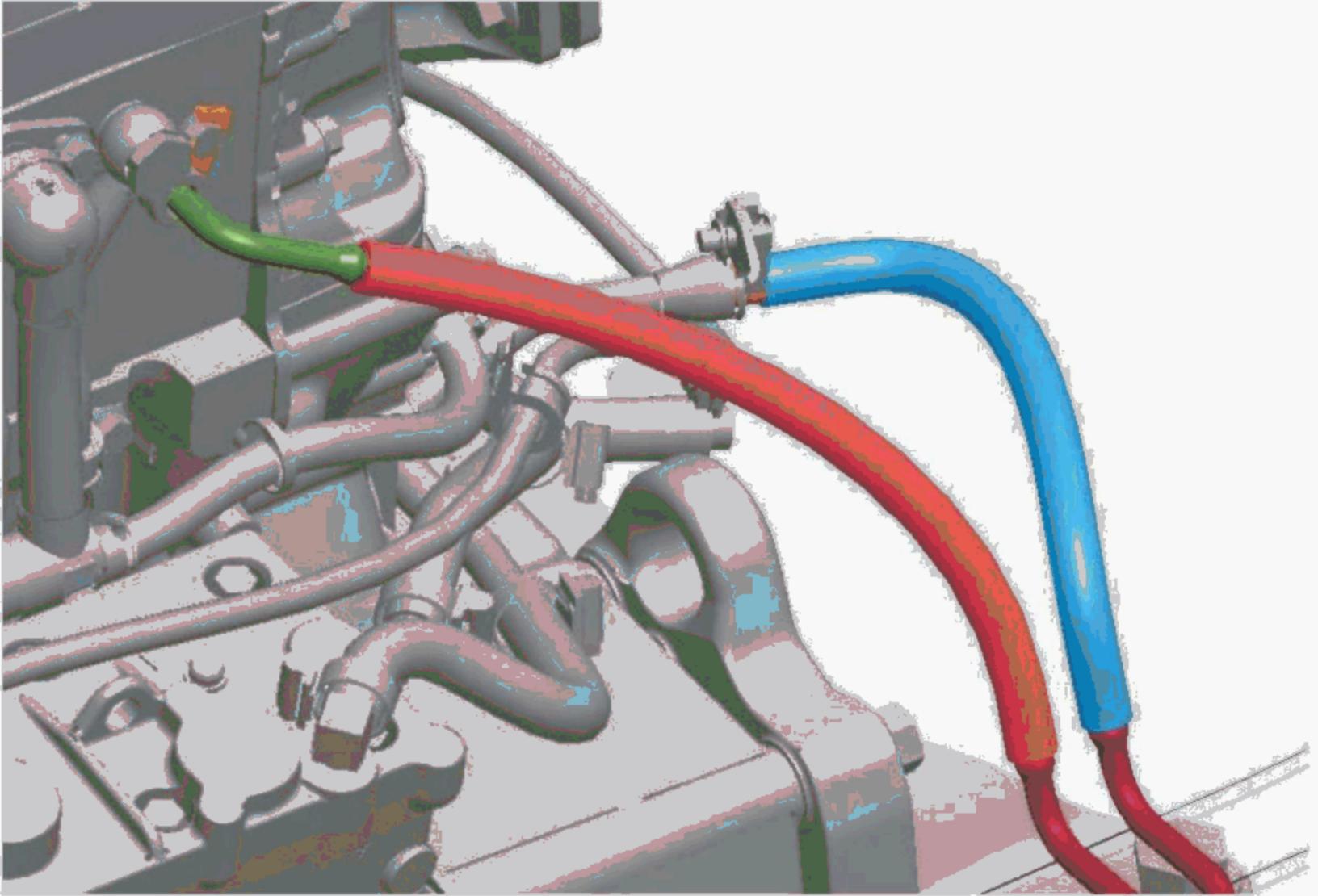


Figure 16 — Installation model

#### 4.3.5 Interference model

An interference model (see Figure 17) shows the overall geometry of an object without giving unnecessary detailed information for the intended purpose, for example, conceptual proposals, space and collision analysis, digital mock-ups and centre of gravity calculations.

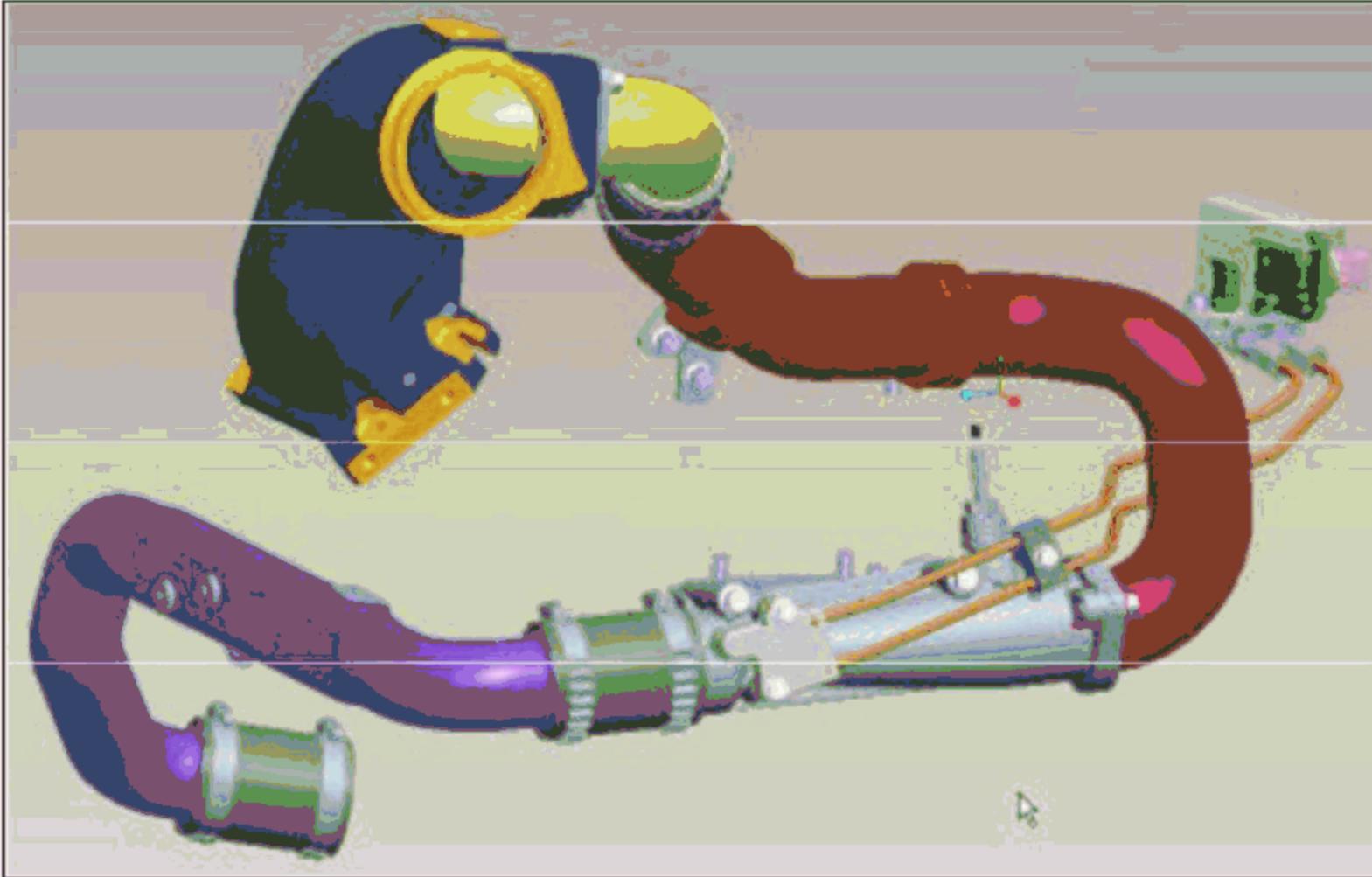


Figure 17 — Interference model

#### 4.3.6 Space envelope model

A space envelope model (see Figure 18) is used in communication between one responsible unit or company and another.

The model shows the maximum space which can be occupied for an intended design solution and the geometrically significant interfaces of components and assemblies which are not yet designed in detail.

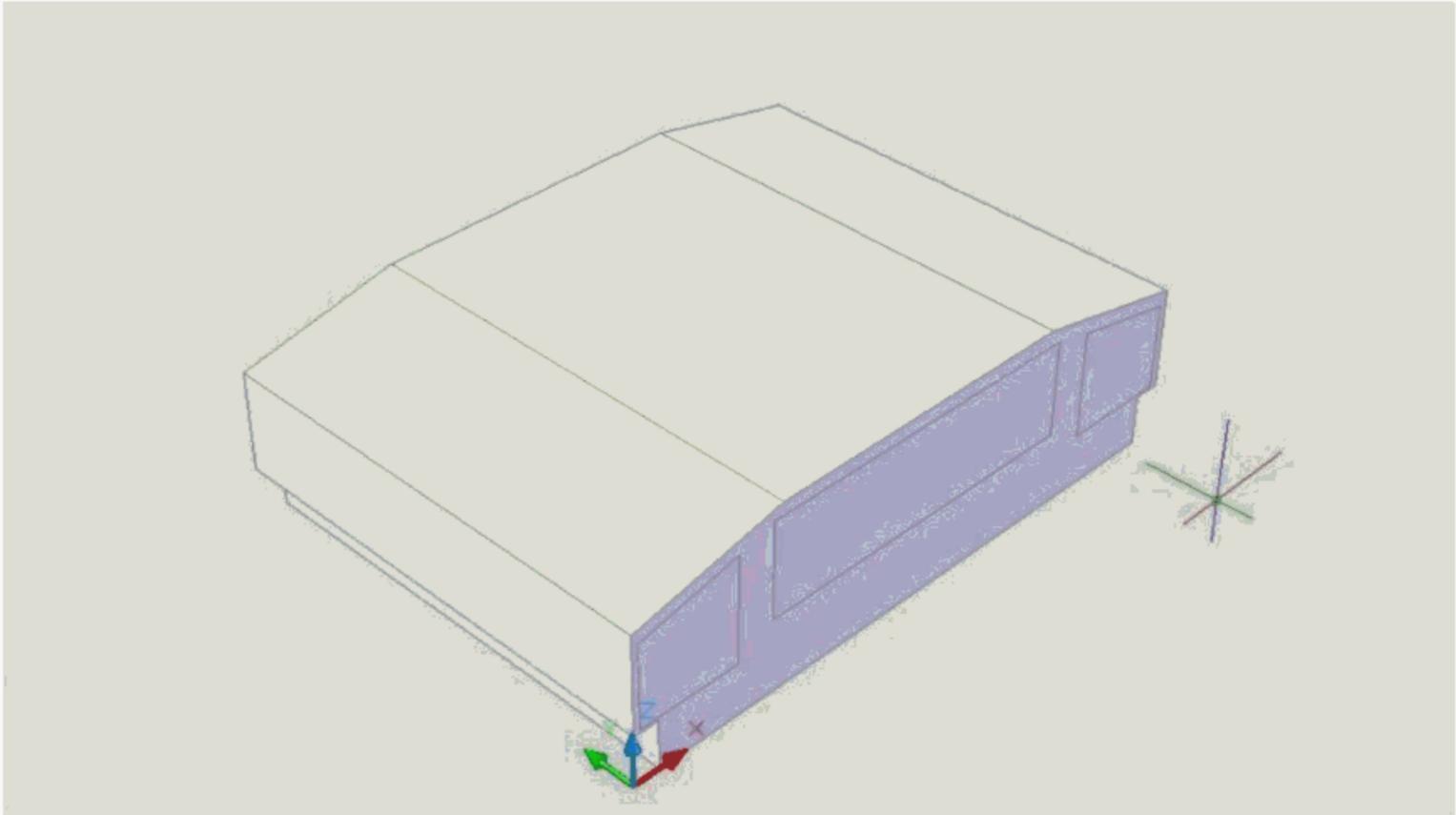


Figure 18 — Space envelope model

### 4.3.7 Annotated design model

An annotated design model (see Figure 19) is a combination of a design model, annotation and attributes that describes a product.

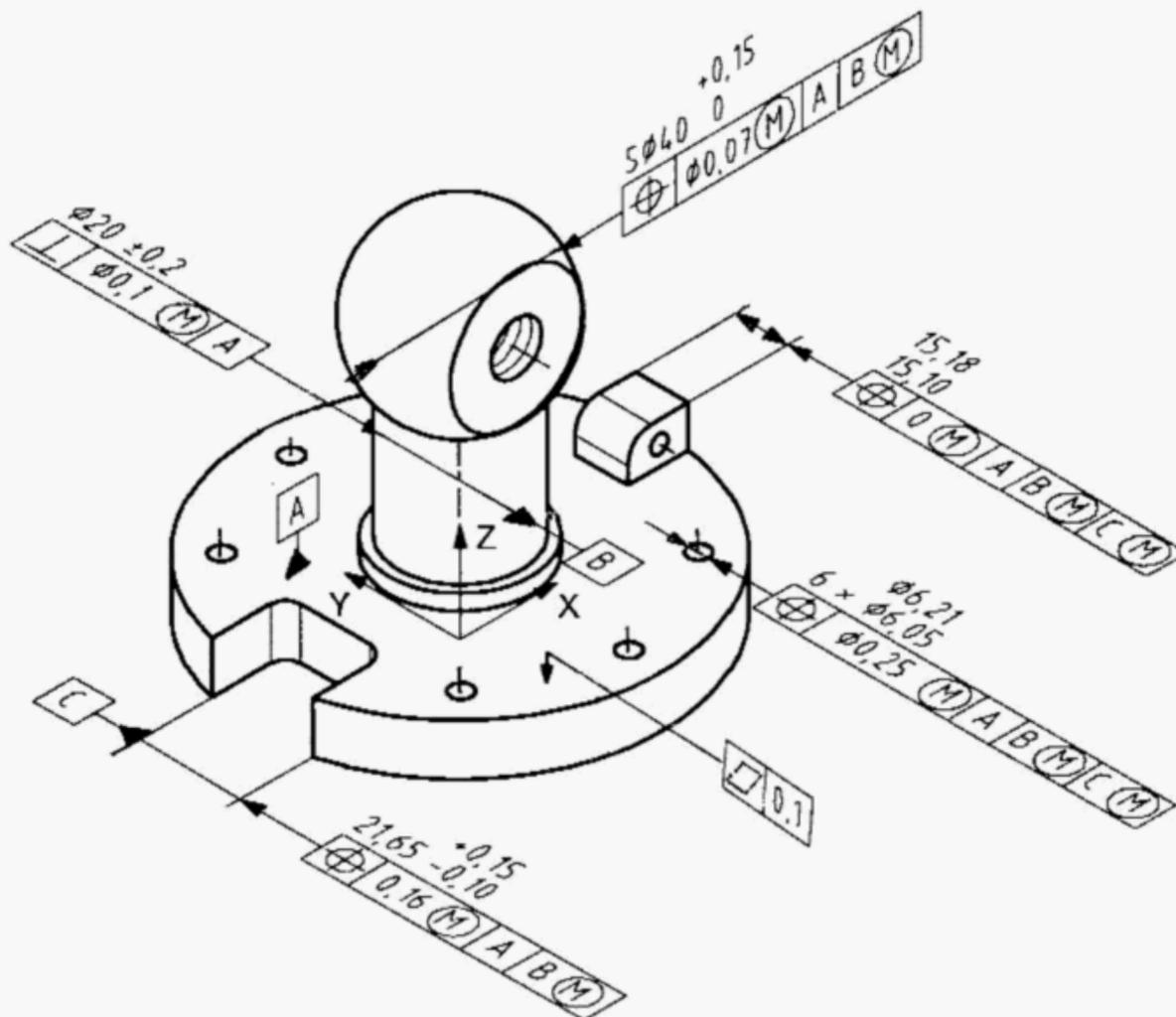


Figure 19 — Annotated design model

## 4.4 Diagram

### 4.4.1 General

A diagram is a technical document showing the functions of the objects composing a system and their interrelations using graphical symbols.

### 4.4.2 Overview diagram

An overview diagram (see Figure 20) provides a comprehensive view of an object with low degree of detailing.

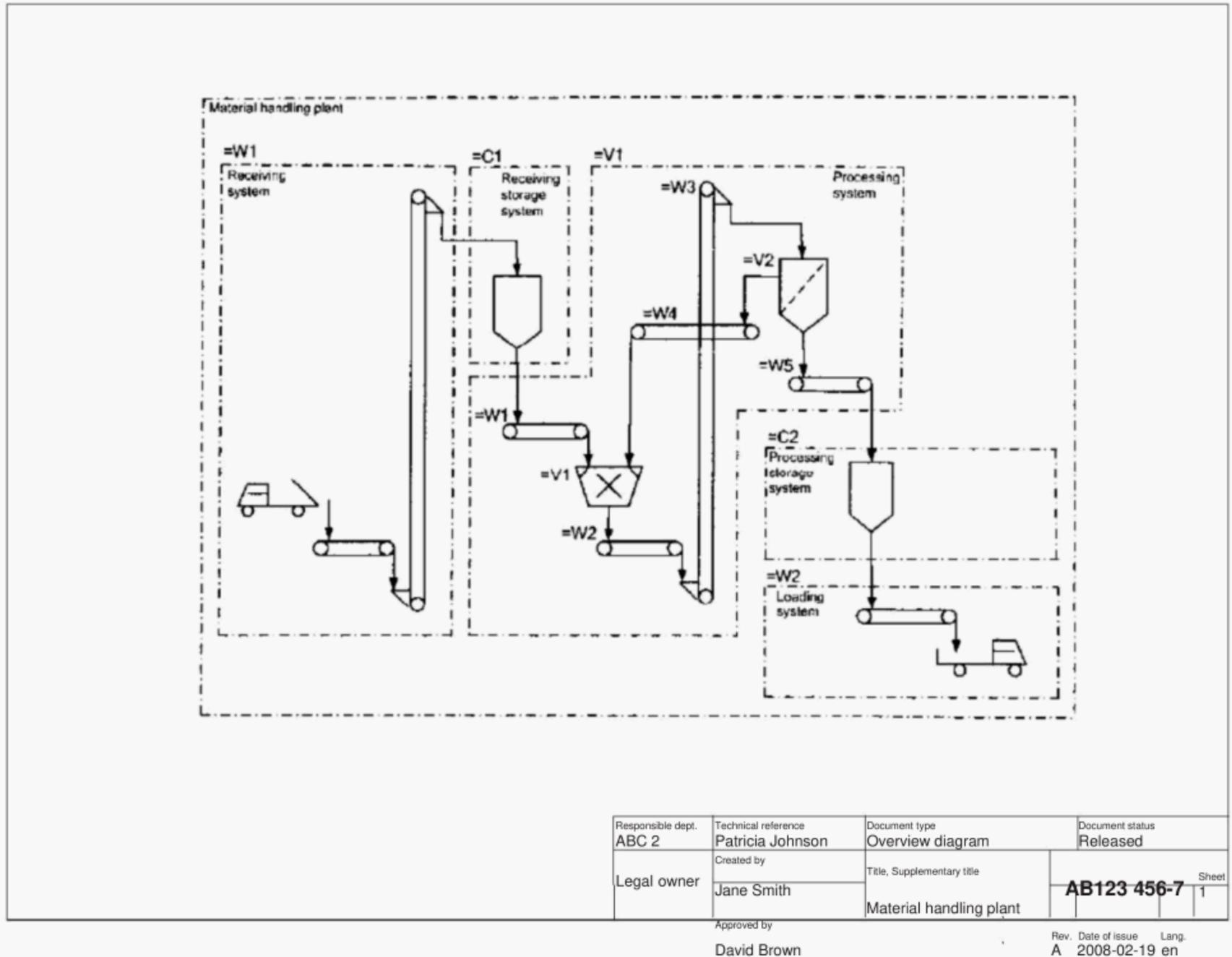
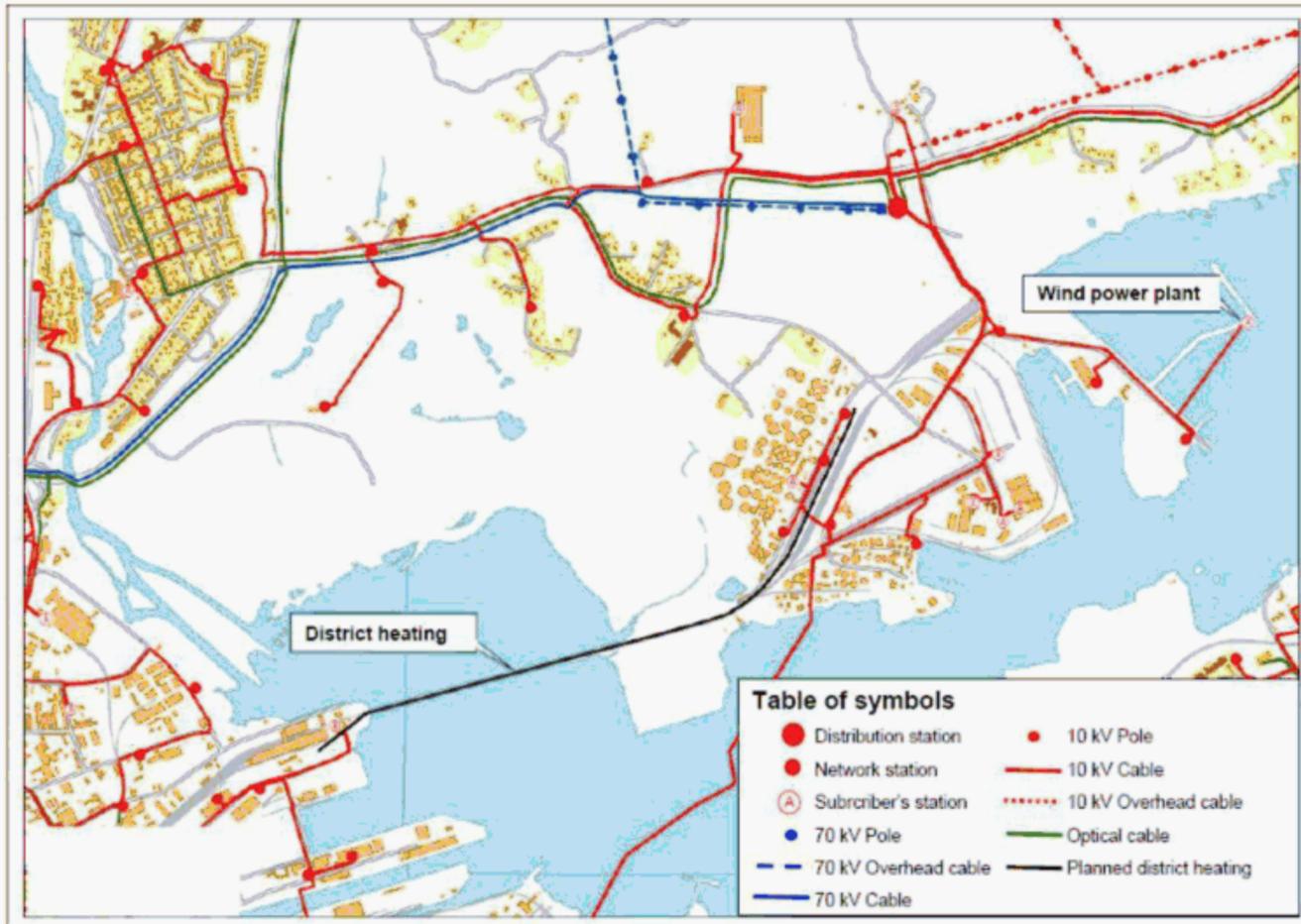


Figure 20 — Overview diagram

An example of an overview diagram from the construction field is a **single-line diagram**. This shows the composition of a service installation in a simplified way.

4.4.2.1 Network map

A network map (see Figure 21) is an overview diagram showing a network on a map, for example, networks for district heating, district cooling, natural gas including generating stations and substations.



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Approved by  
 David Brown

Rev. Date of issue Lang.  
 A 2007-10-12 en

Sheet  
 1

Figure 21 — Network map



4.4.2.2 Block diagram

A block diagram (see Figure 22) is an overview diagram providing a comprehensive view of an object predominantly using block symbols, for example, using rectangular symbols.

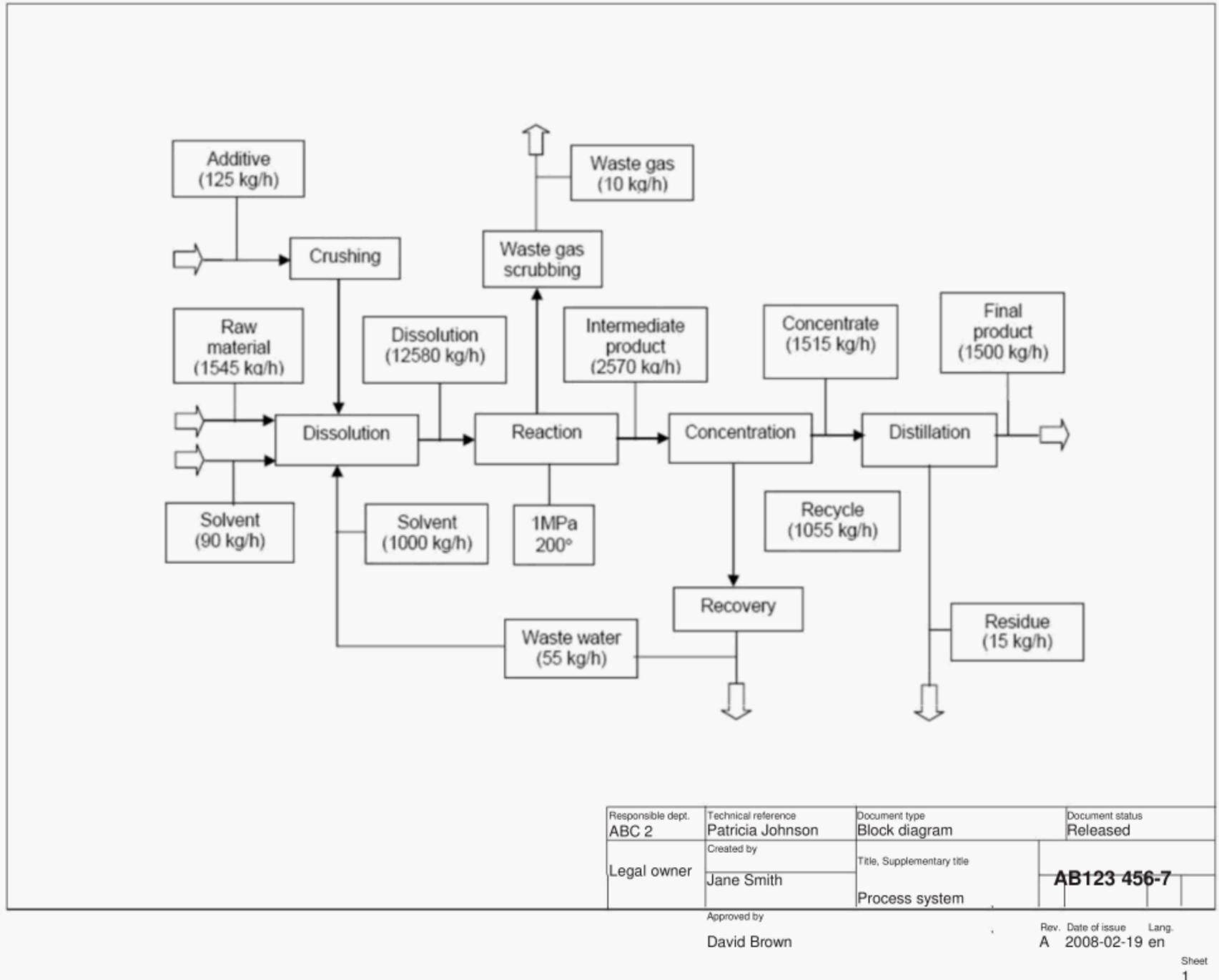


Figure 22 — Block diagram

An example of a block diagram from the construction field is a **room-relation drawing**. This shows the disposition of rooms and their relations to others.



4.4.2.3 Network diagram

A network diagram (see Figure 23) is an overview diagram which shows the connections between different kinds of installations for transmitting of electricity, fluids (e.g. water, gas) or heating/cooling, sewage system, telecommunications, equipment, etc.

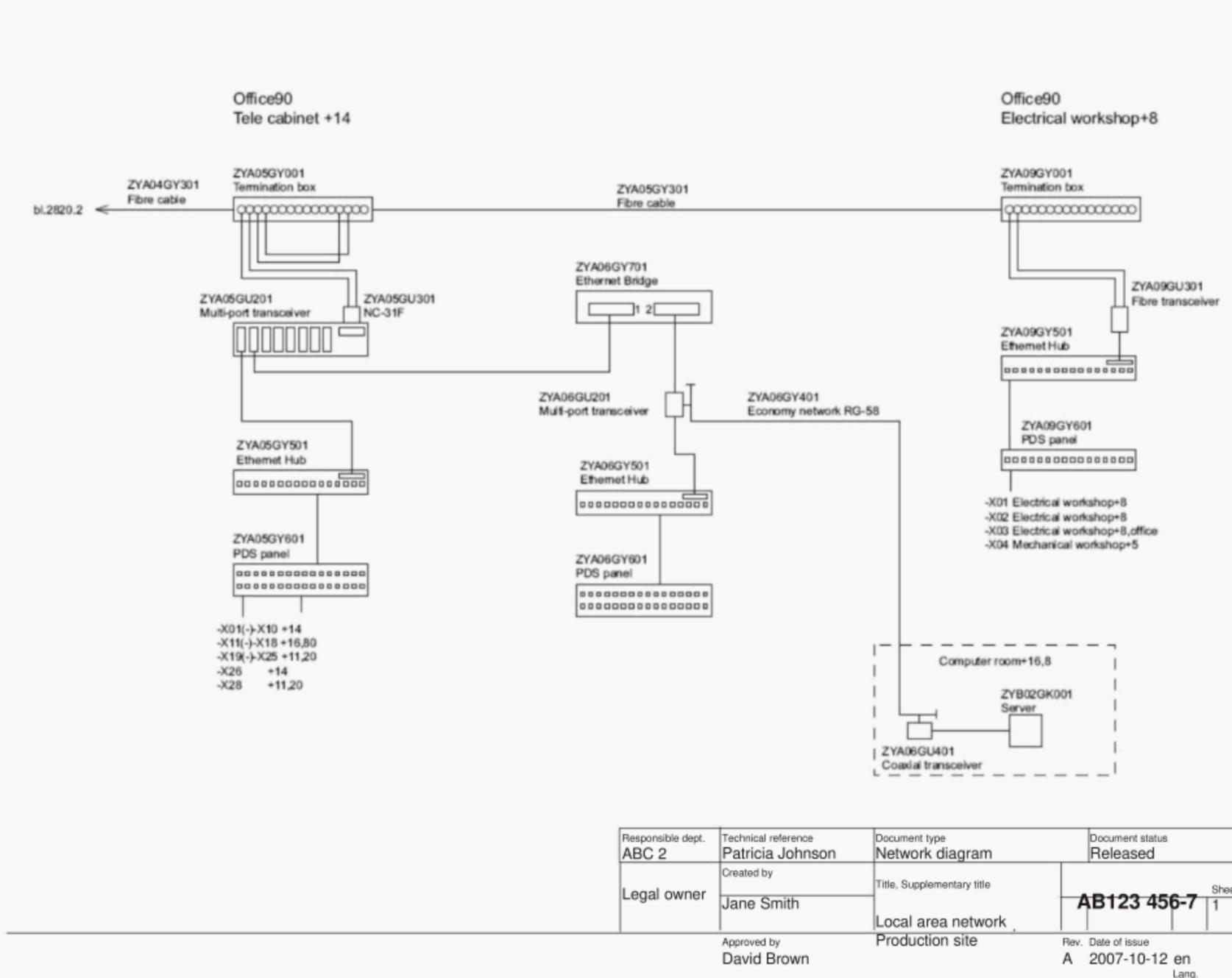


Figure 23 — Network diagram

An example of a network diagram from the construction field is a **flow diagram**.

### 4.4.3 Circuit diagram

A circuit diagram (see Figure 24) is a diagram providing information about the circuitry of an object(s).

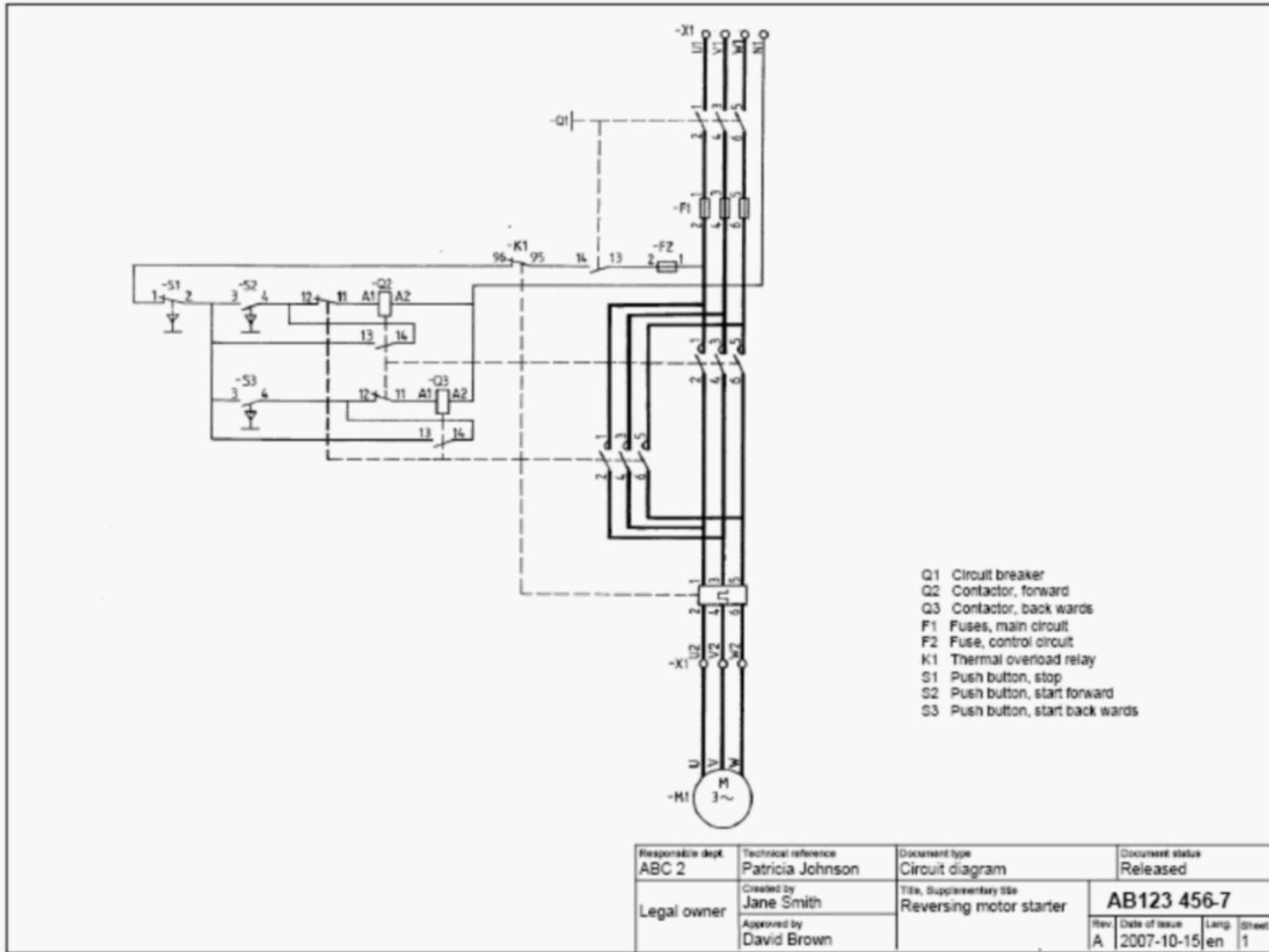


Figure 24 — Circuit diagram

4.4.4 Function diagram

A function diagram (see Figure 25) provides information about the functional behaviour of a system or an object. The diagram shall present the systems or objects and their interconnections independent of physical implementation. Information on function diagrams is provided in ISO 15519-1.

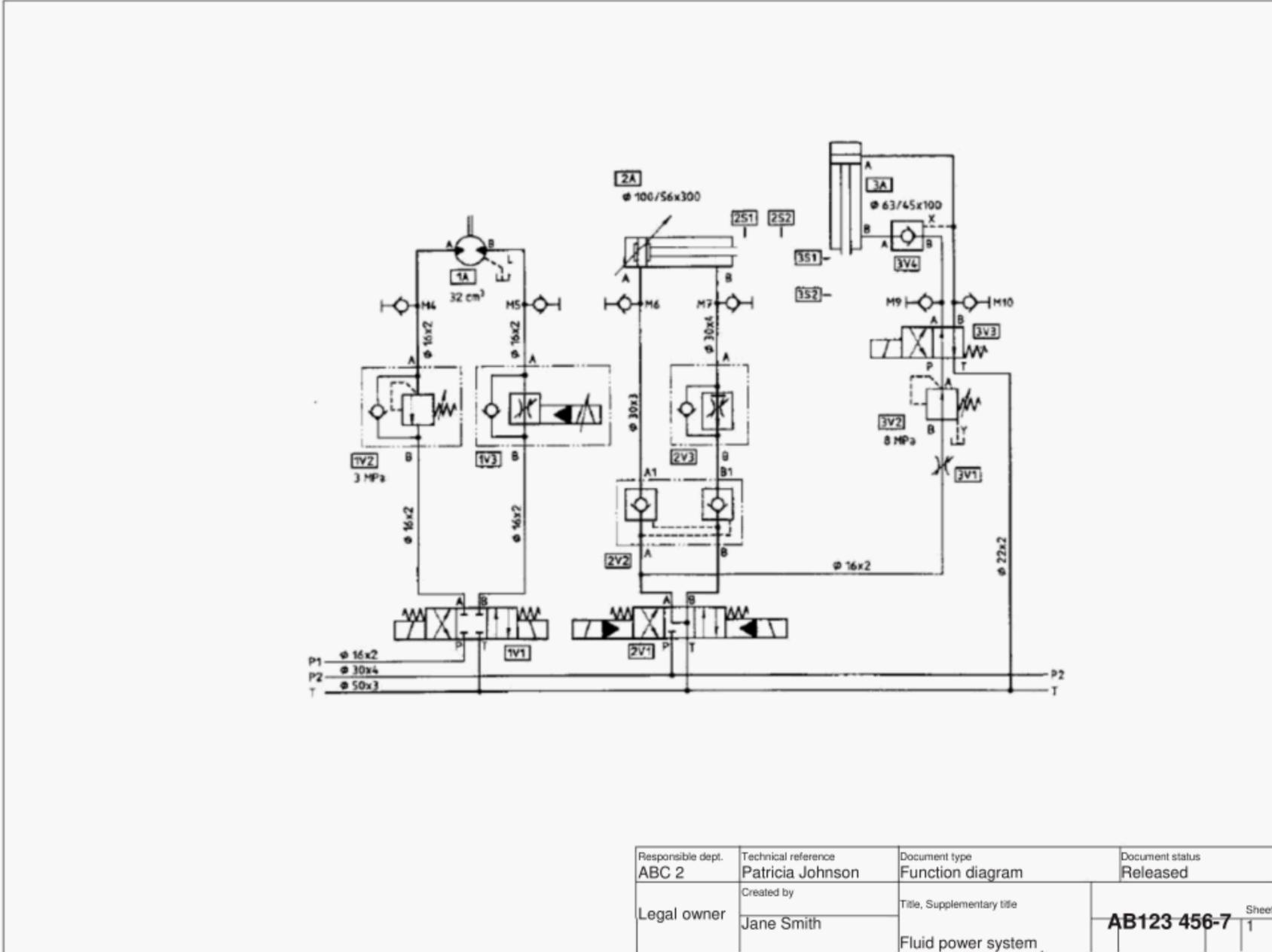
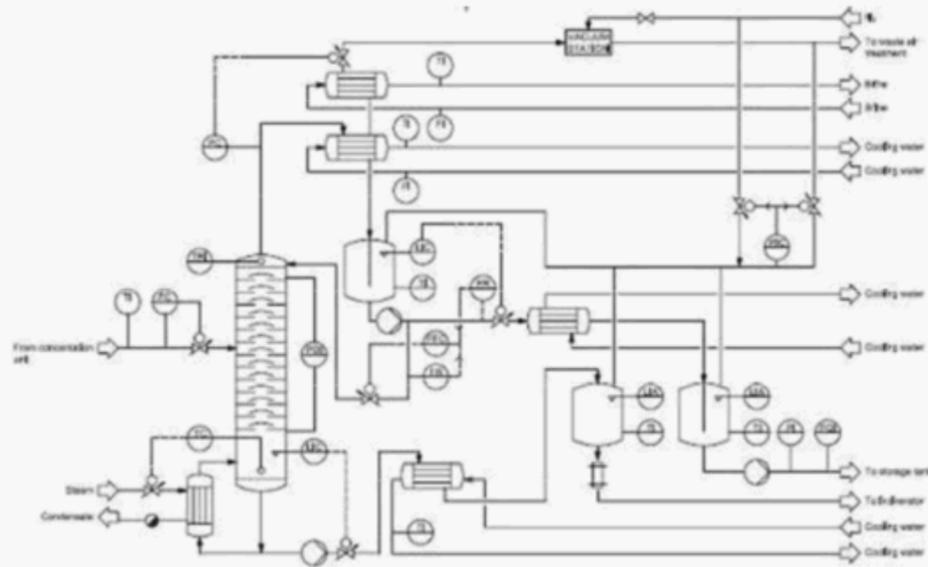


Figure 25 — Function diagram



4.4.4.2 P&I diagram (piping and instrumentation diagram)

A P&I diagram (see Figure 27) illustrates the configuration of a process system or process plant representing the technical realization by means of graphical symbols for equipment, connections and process measurement and control functions.



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Rev. Date of issue Lang.  
 A 2007-10-12 en

Figure 27 — P&I diagram

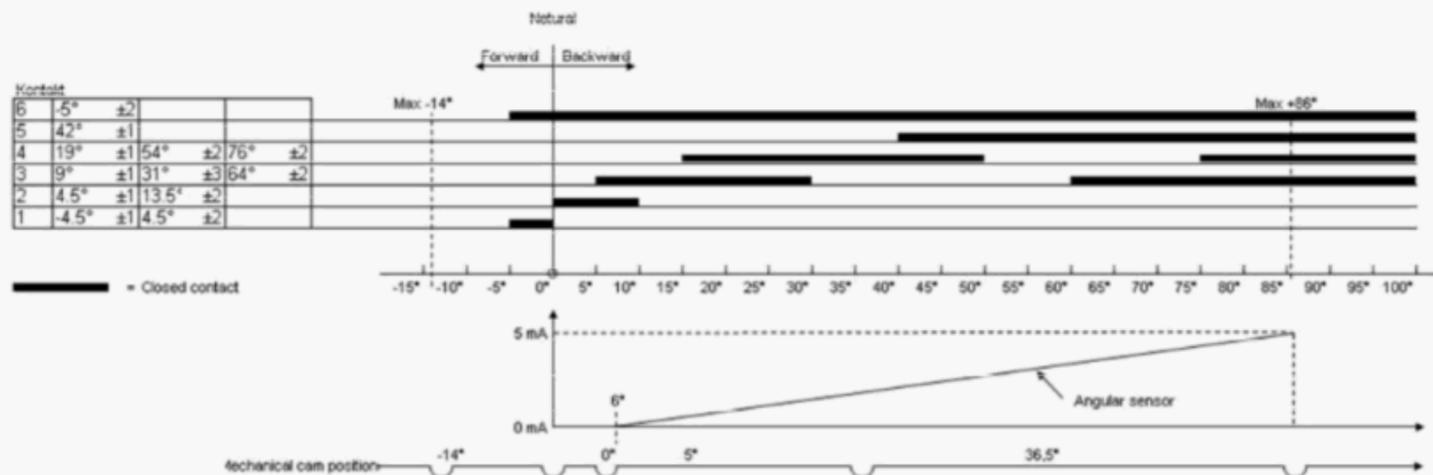
## 4.5 Chart

### 4.5.1 General

A chart is a document in the form of a table, graph, or diagram, e.g. an angular chart, a function chart, a sequence chart, a structure diagram and a nomogram.

### 4.5.2 Angular chart

An angular chart (see Figure 28) shows the relation between the angular position of an object and the function, e.g. a cam shaft and a cam shaft pulley.



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	Approved by Lang. David Brown	Type ABC	

Figure 28 — Angular chart

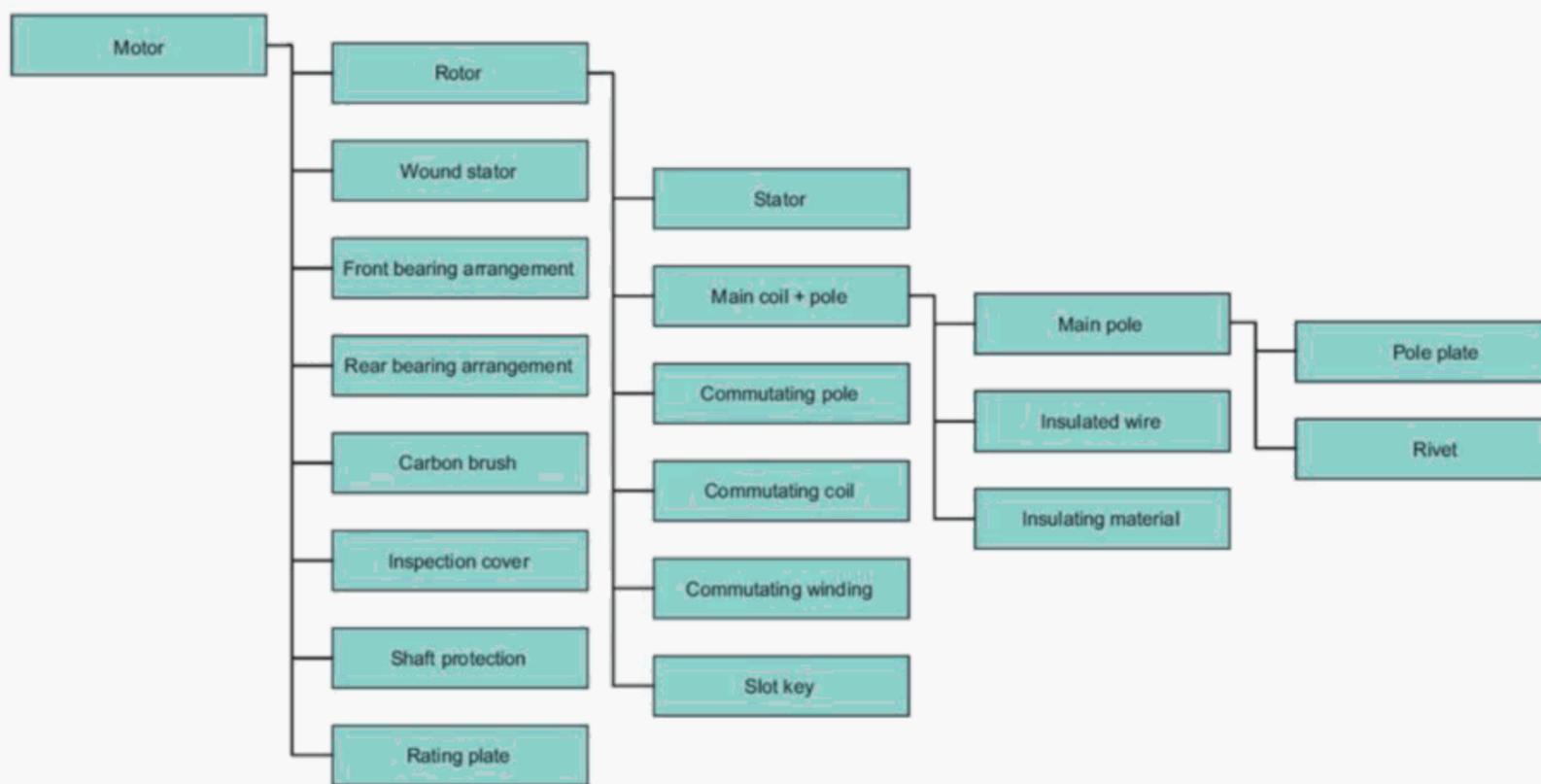
Charts are mostly used for other purposes than construction. No specific examples are suggested.



### 4.5.3 Structure diagram

A structure diagram (see Figure 29) is a chart which shows the relation between different objects in a system or a product from different points of view, e.g. presenting functional objects, objects used to build a system or a product and documents relevant for a system or a product.

The structure is presented graphically as a hierarchical tree, which shows the constituent's identification numbers and descriptions. The presentation may vary from case to case depending on the purpose of the diagram.



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Legal owner	Created by Jane Smith	Title, Supplementary title Motor	AB123 456-7 <small>Sheet 1</small>

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Rev. Date of issue Lang.  
A 2007-10-12 en

Figure 29 — Structure diagram

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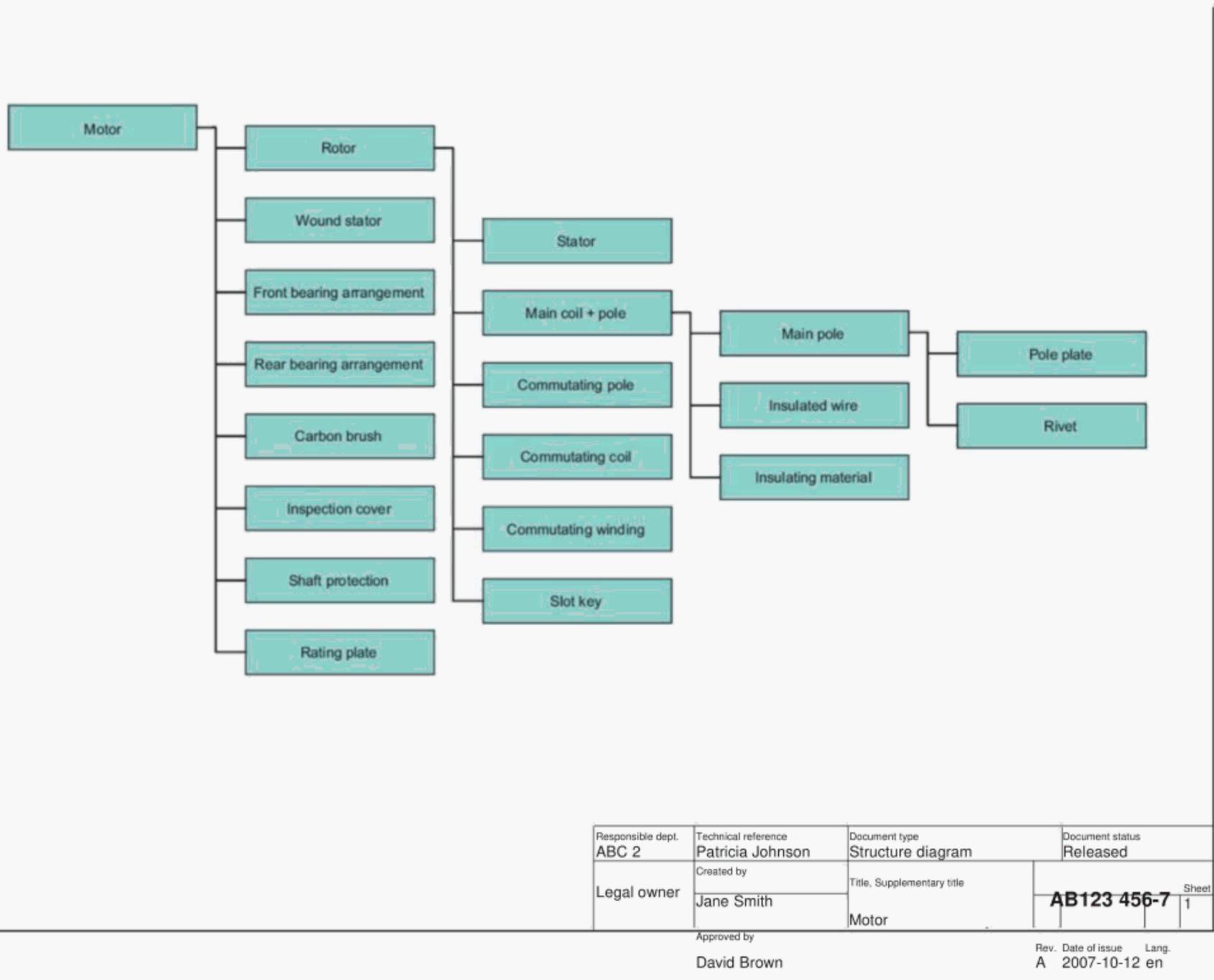


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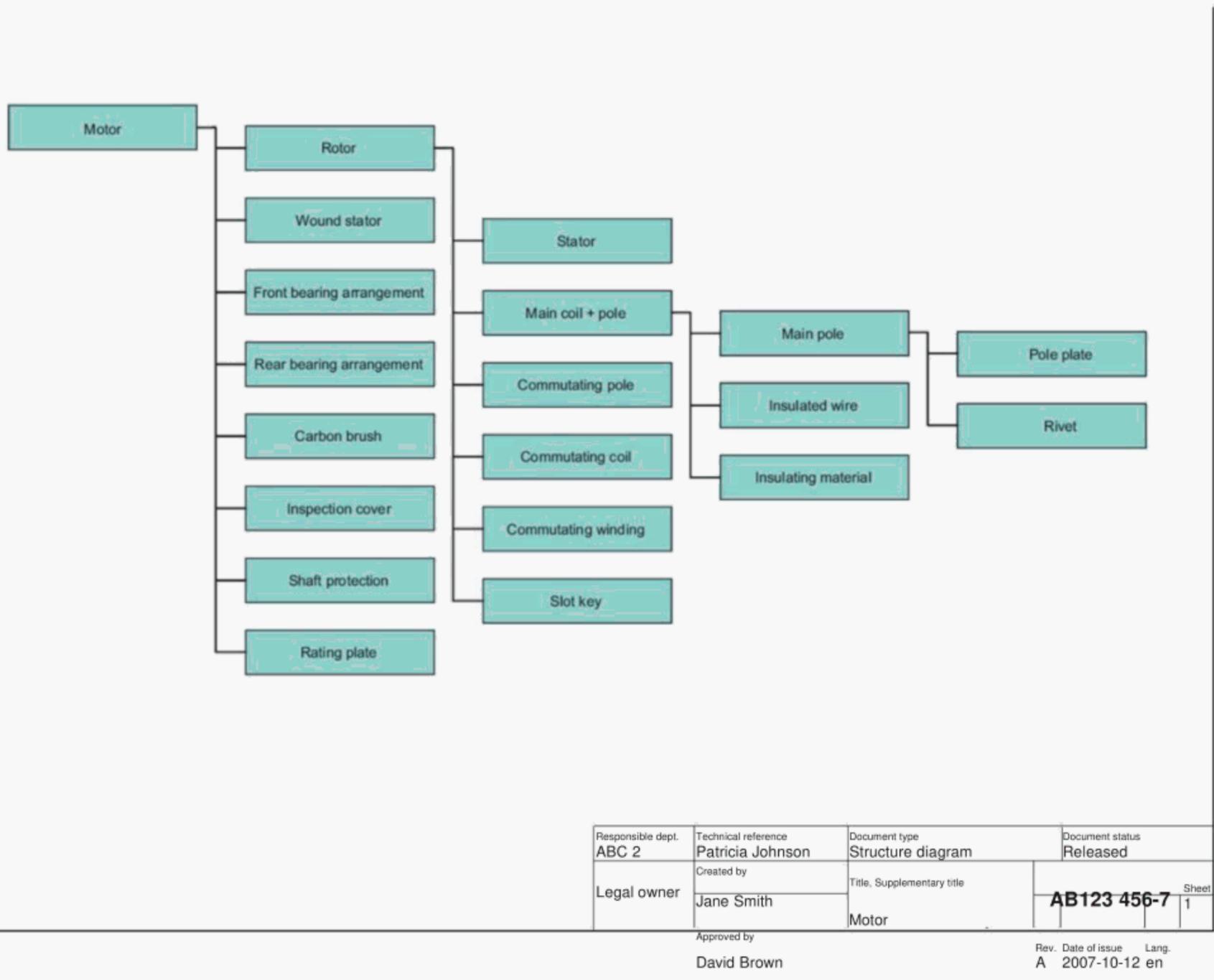
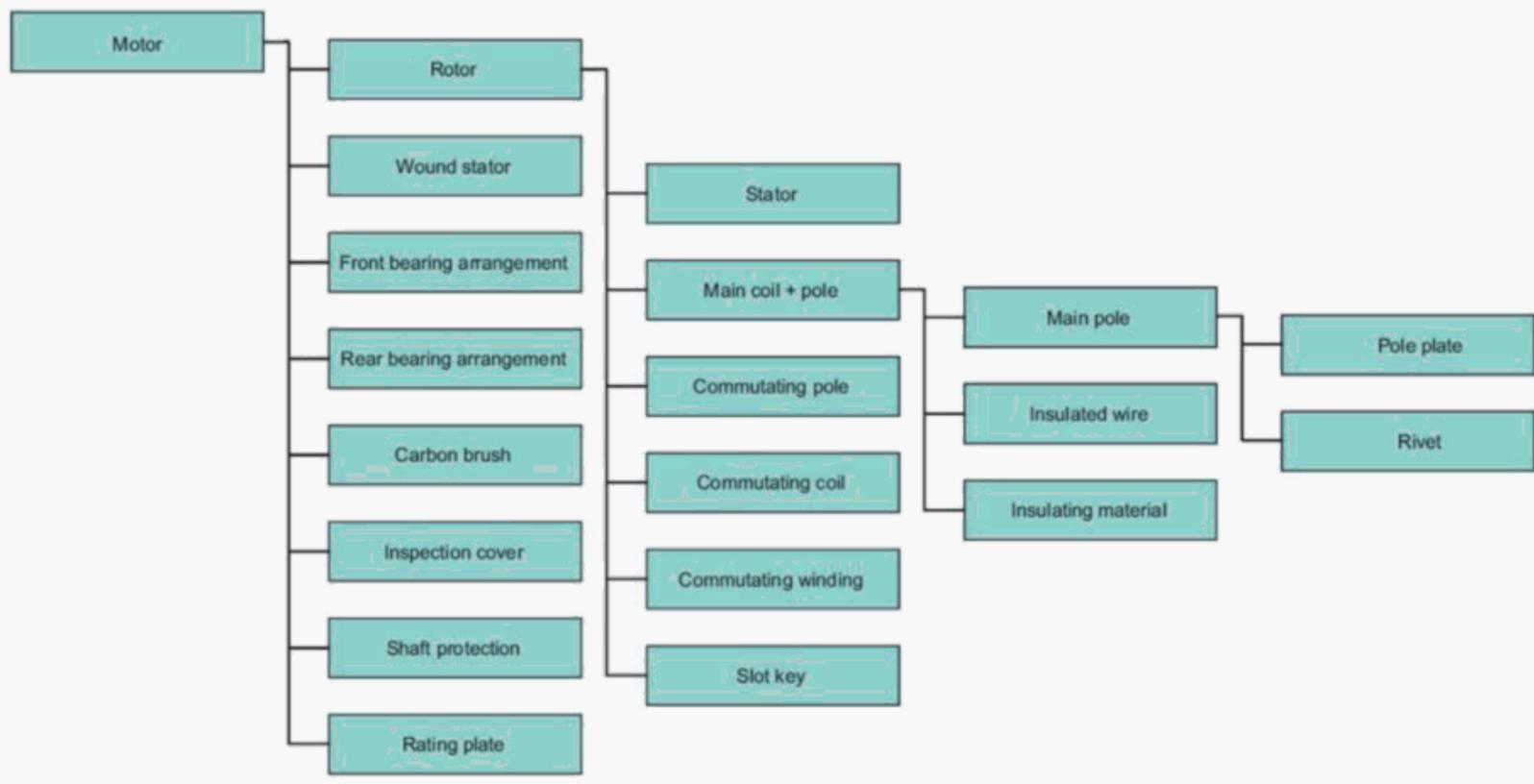


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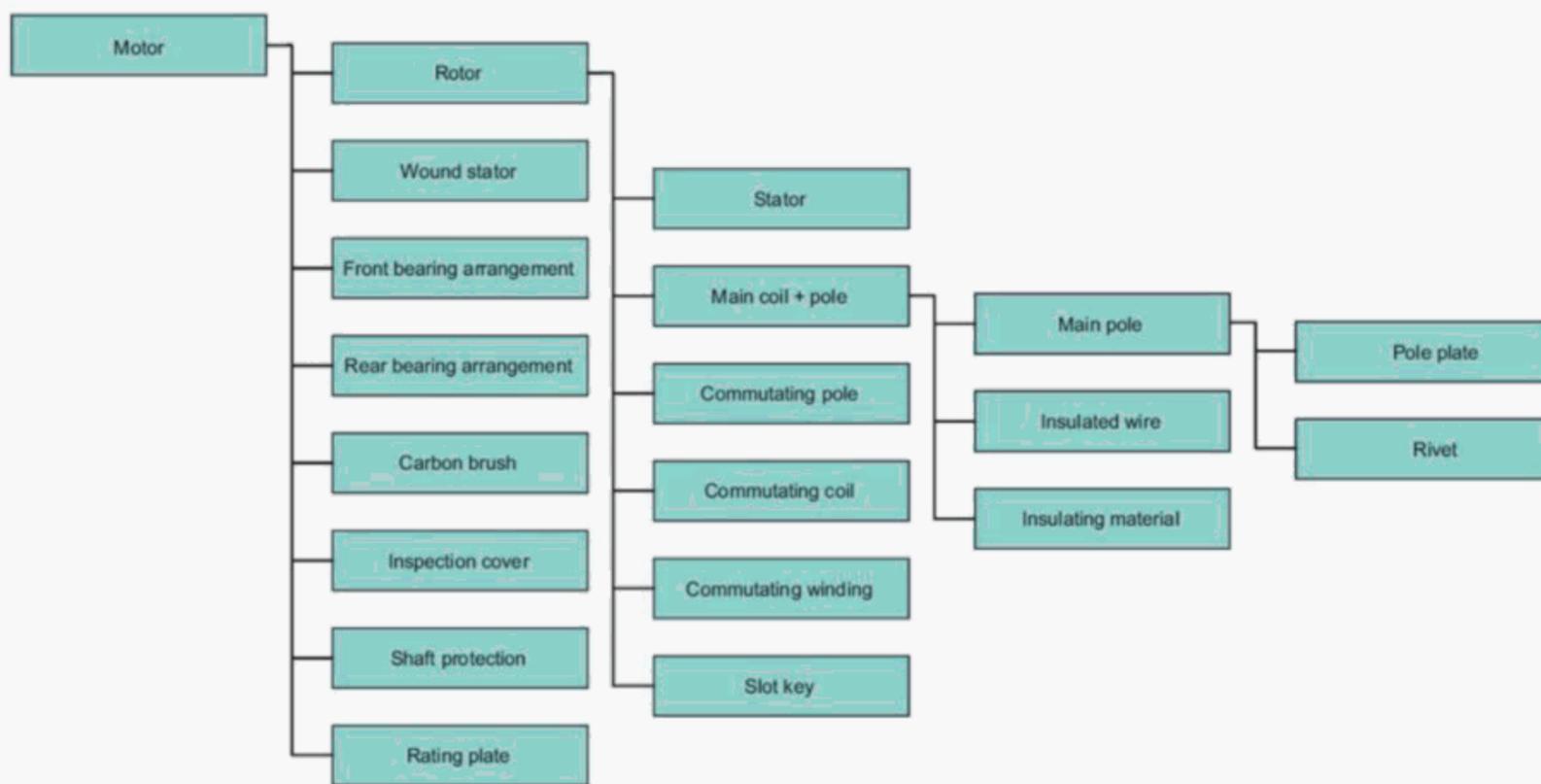
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Figure 29 — Structure diagram

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Legal owner	Created by Jane Smith	Title, Supplementary title Motor	AB123 456-7 <small>Sheet</small> 1

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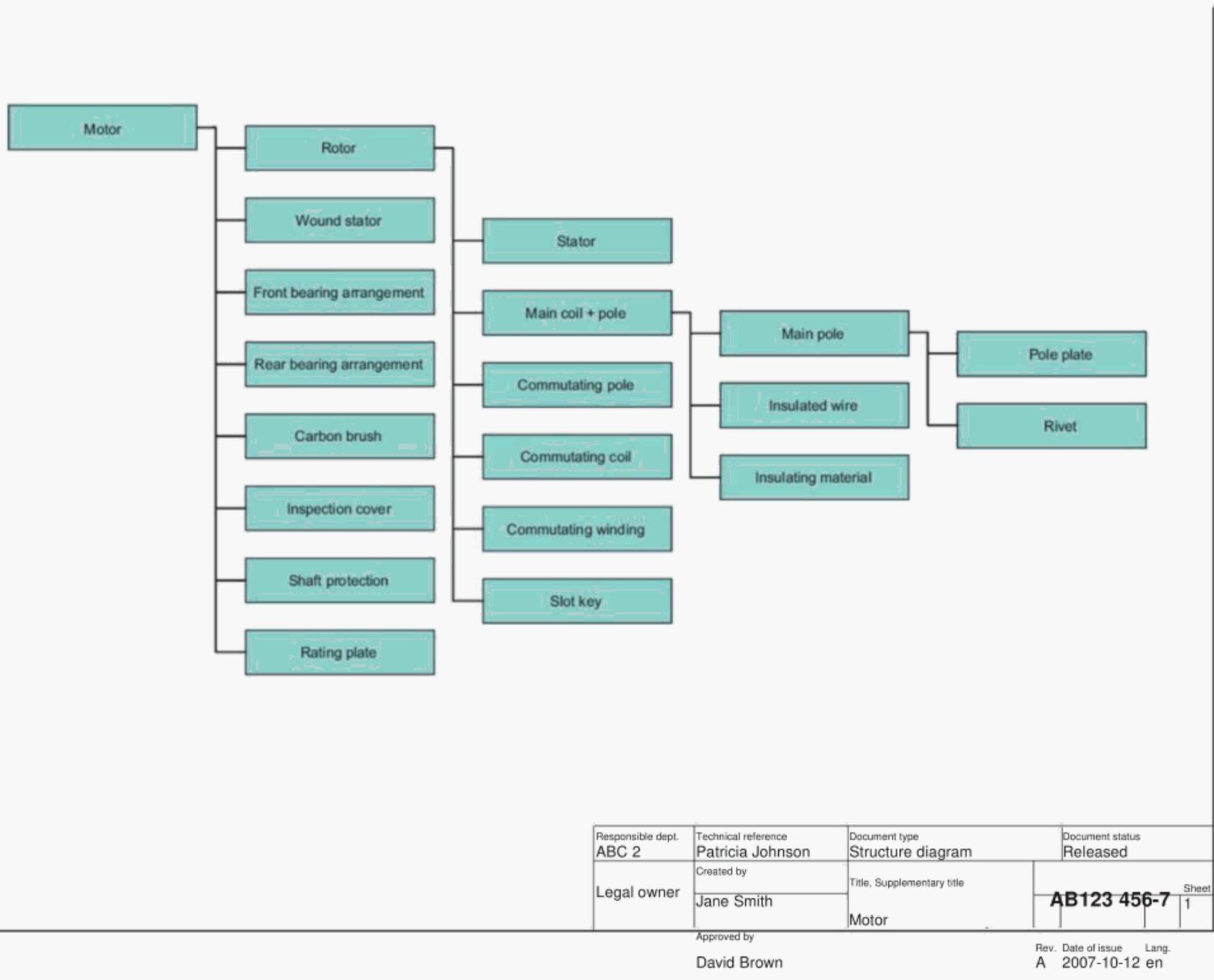


Figure 29 — Structure diagram

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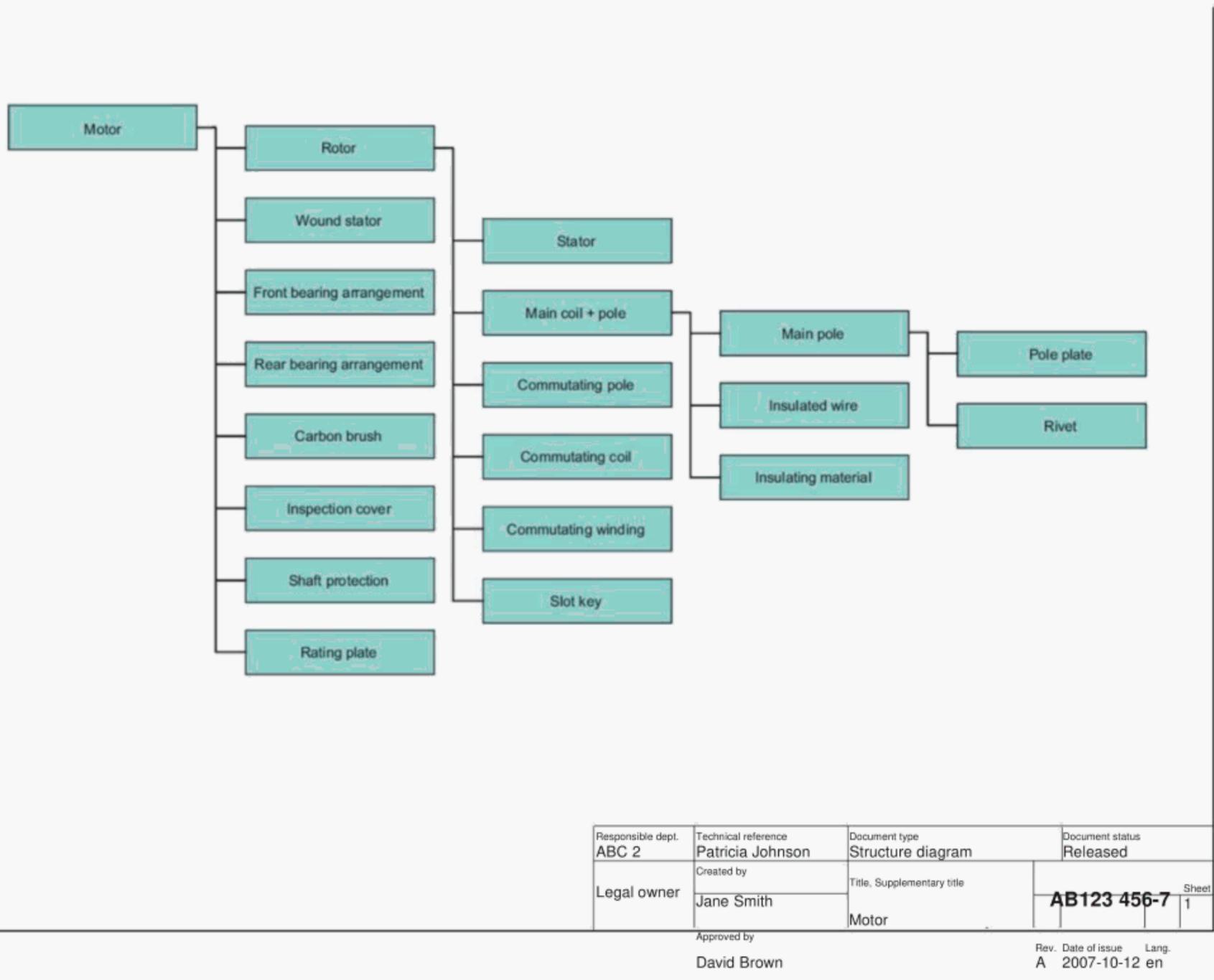


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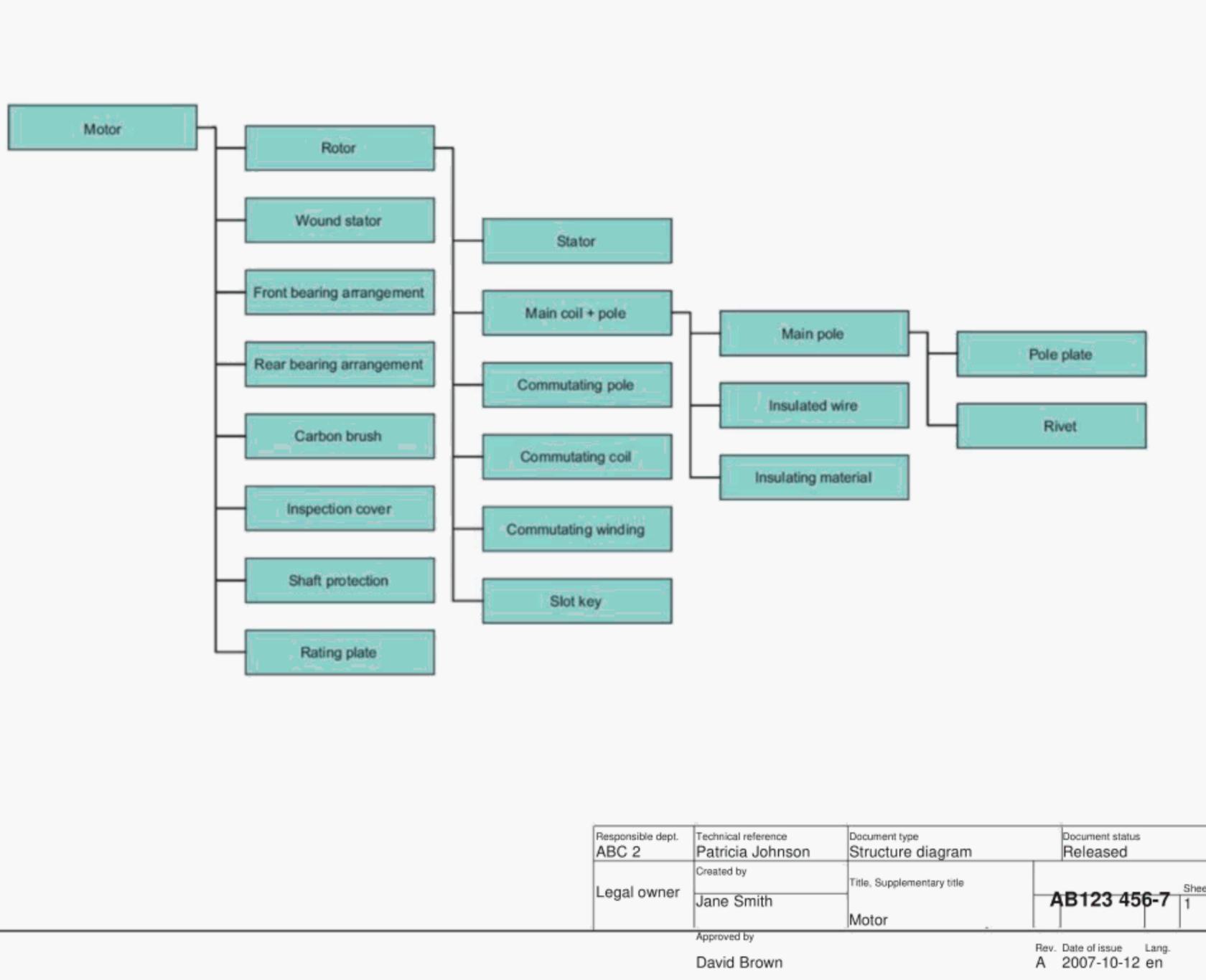


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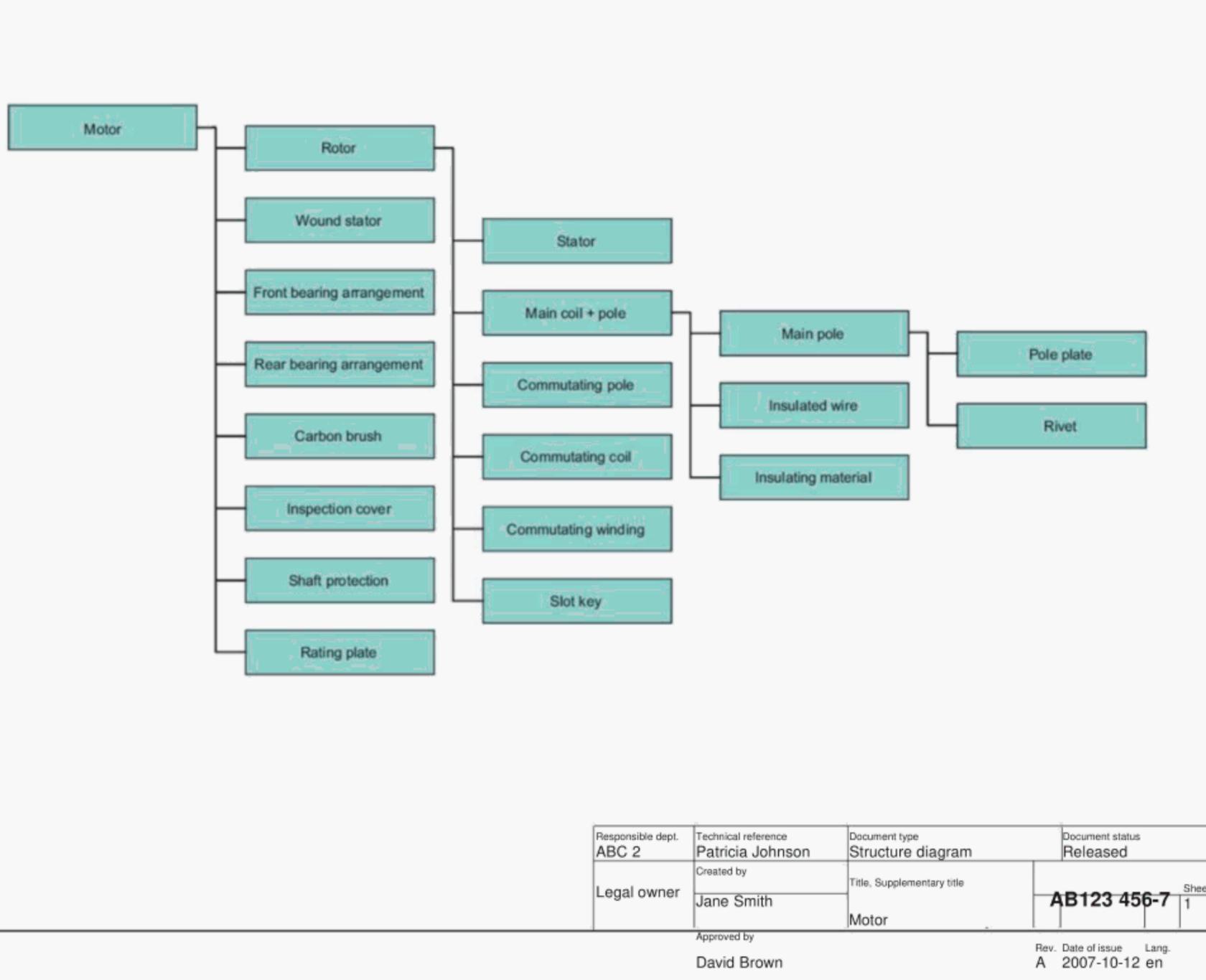


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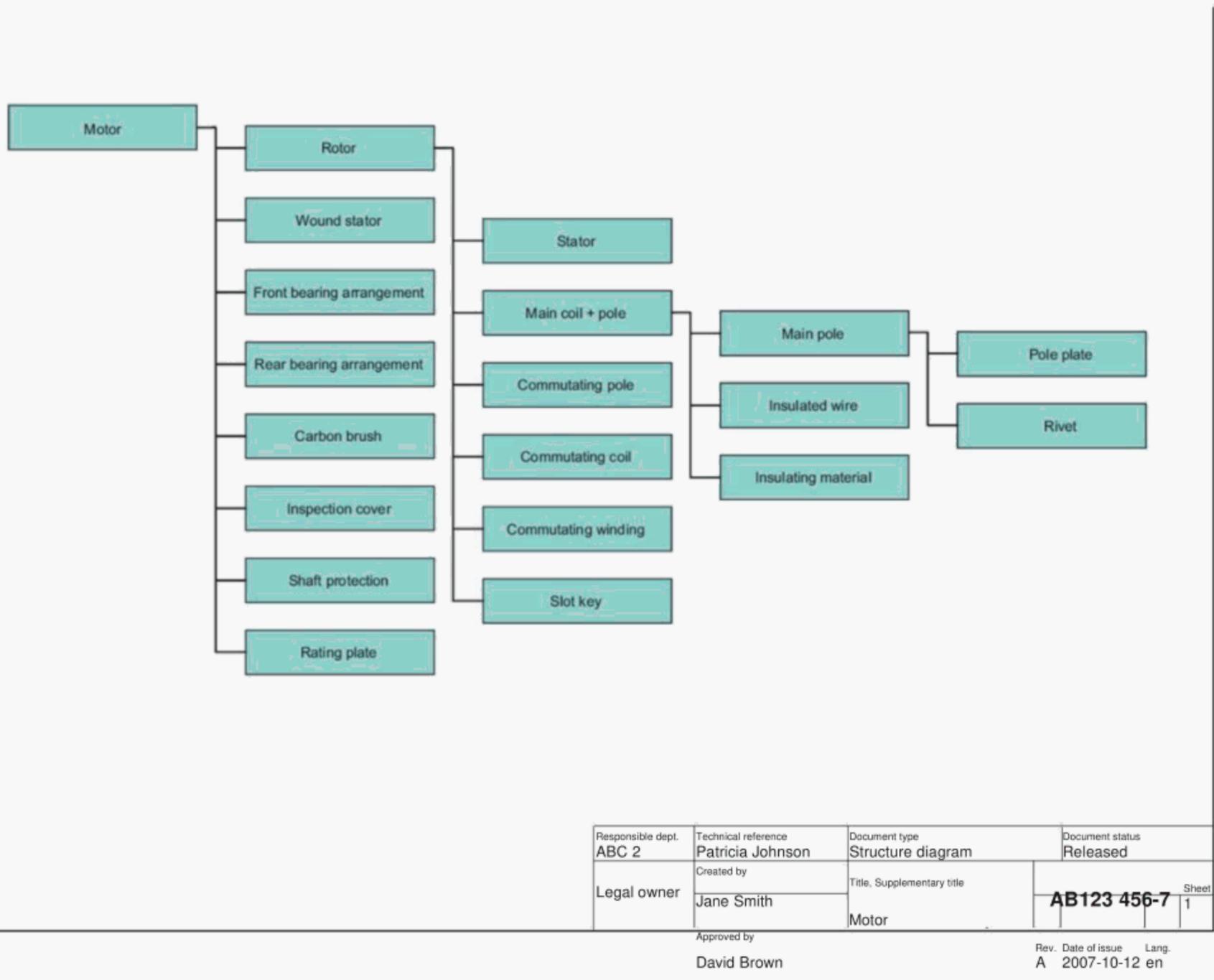
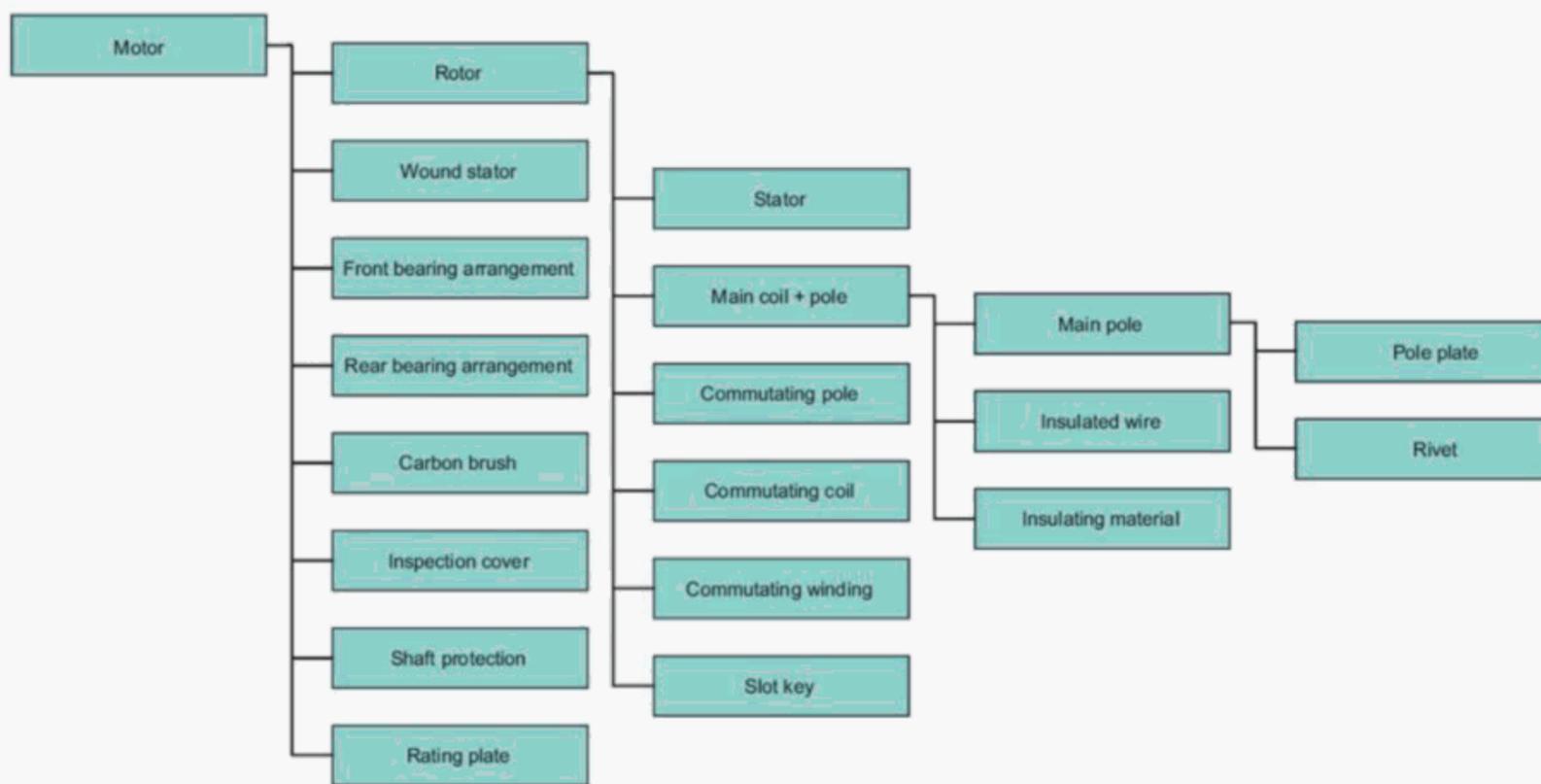


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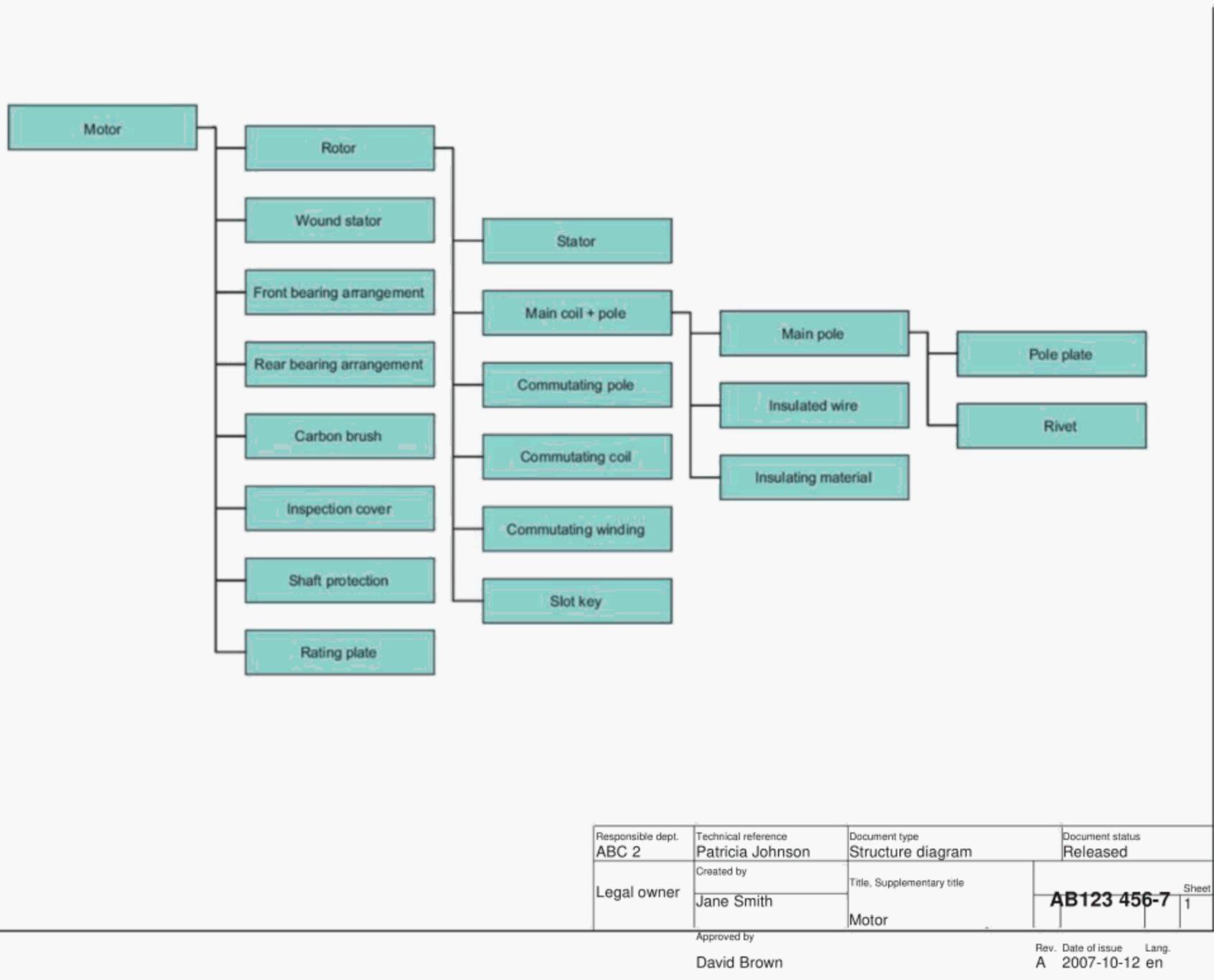


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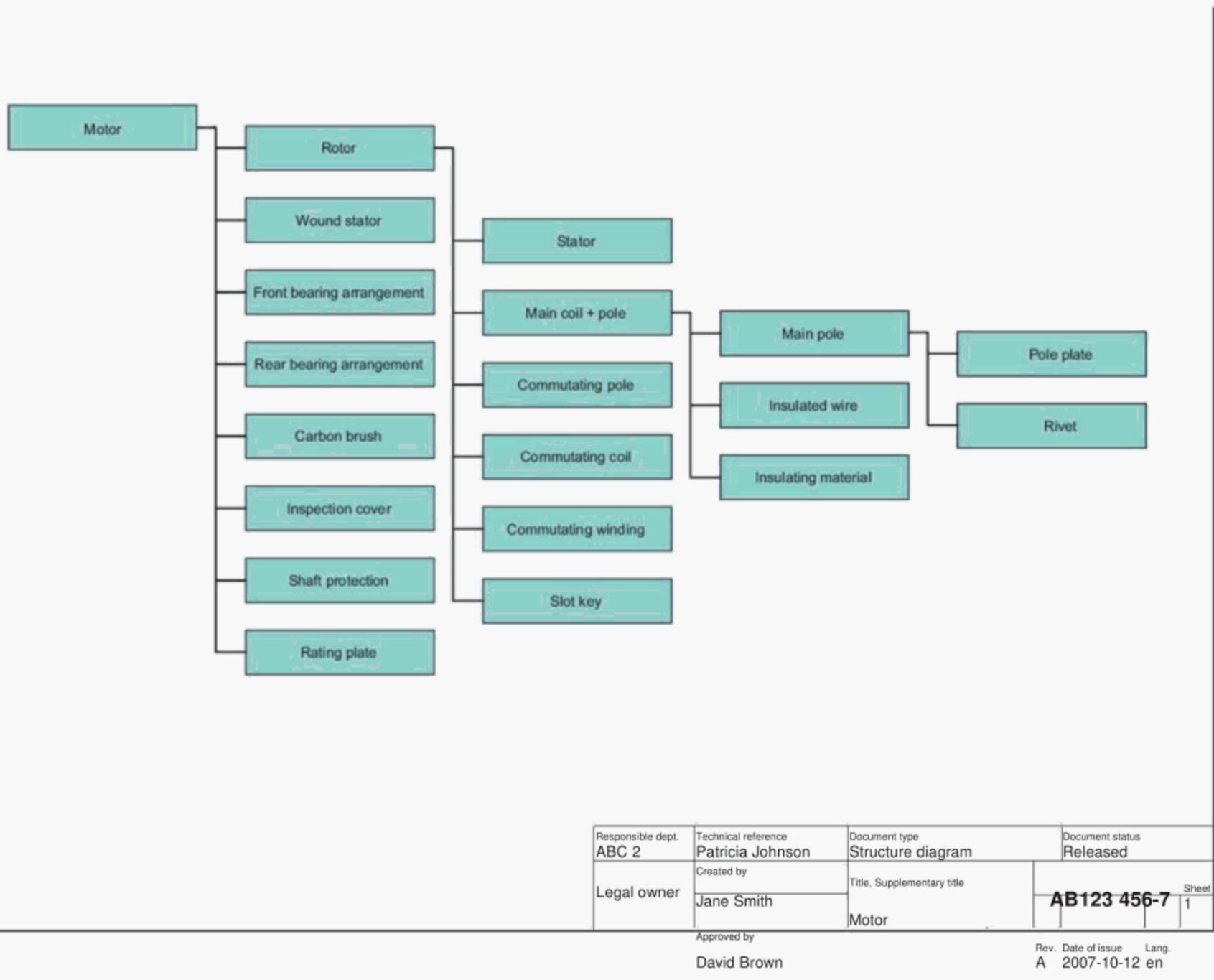


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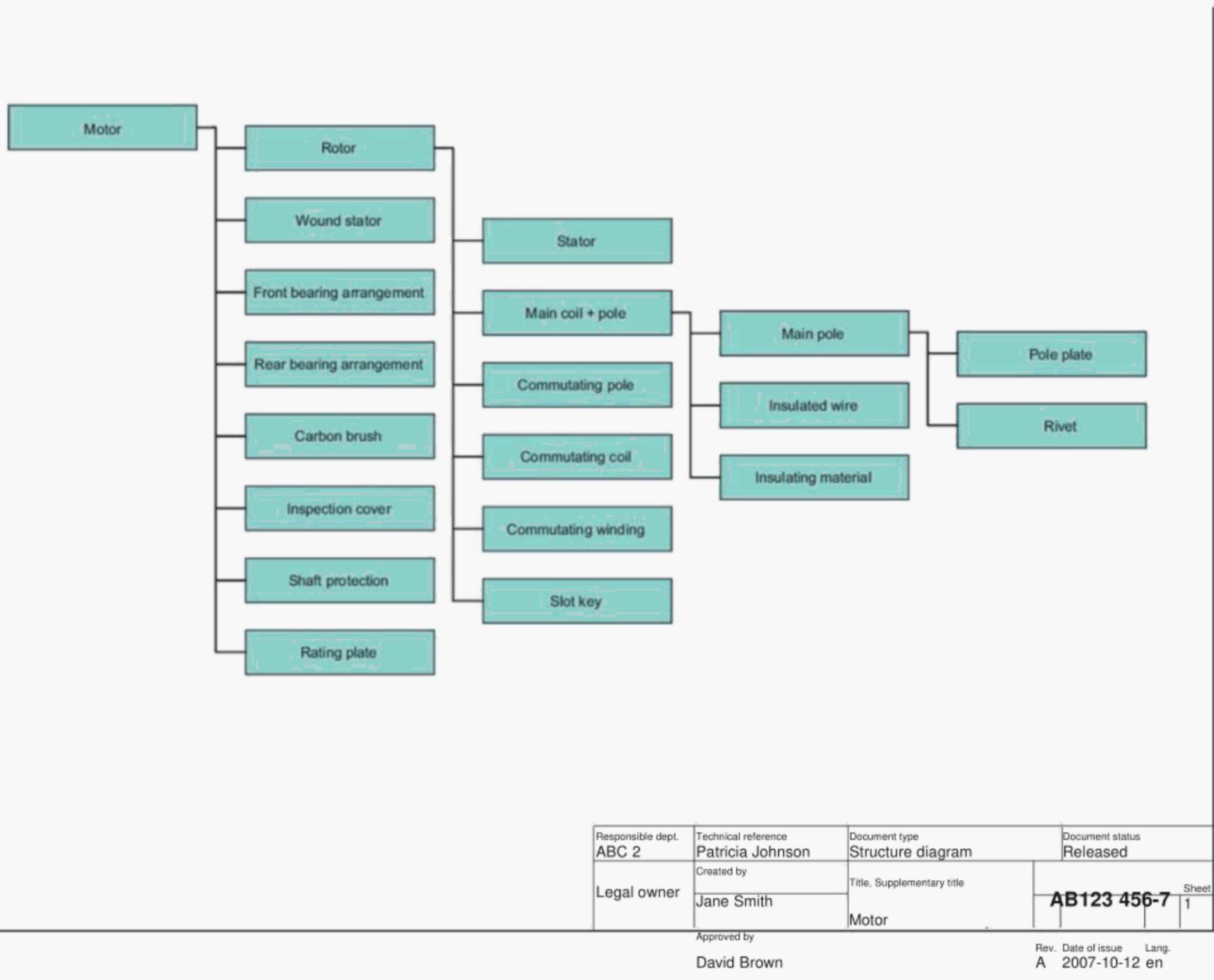


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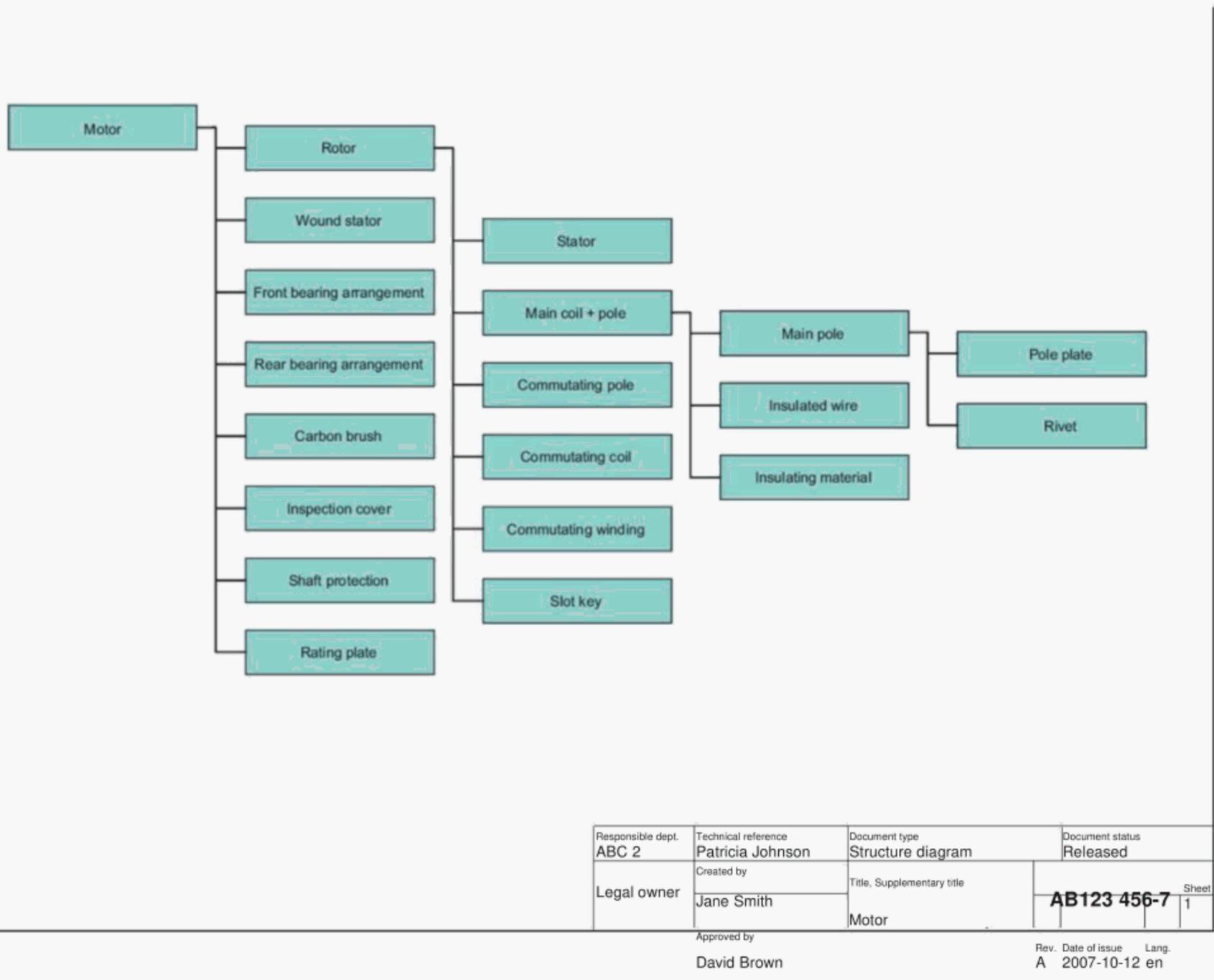


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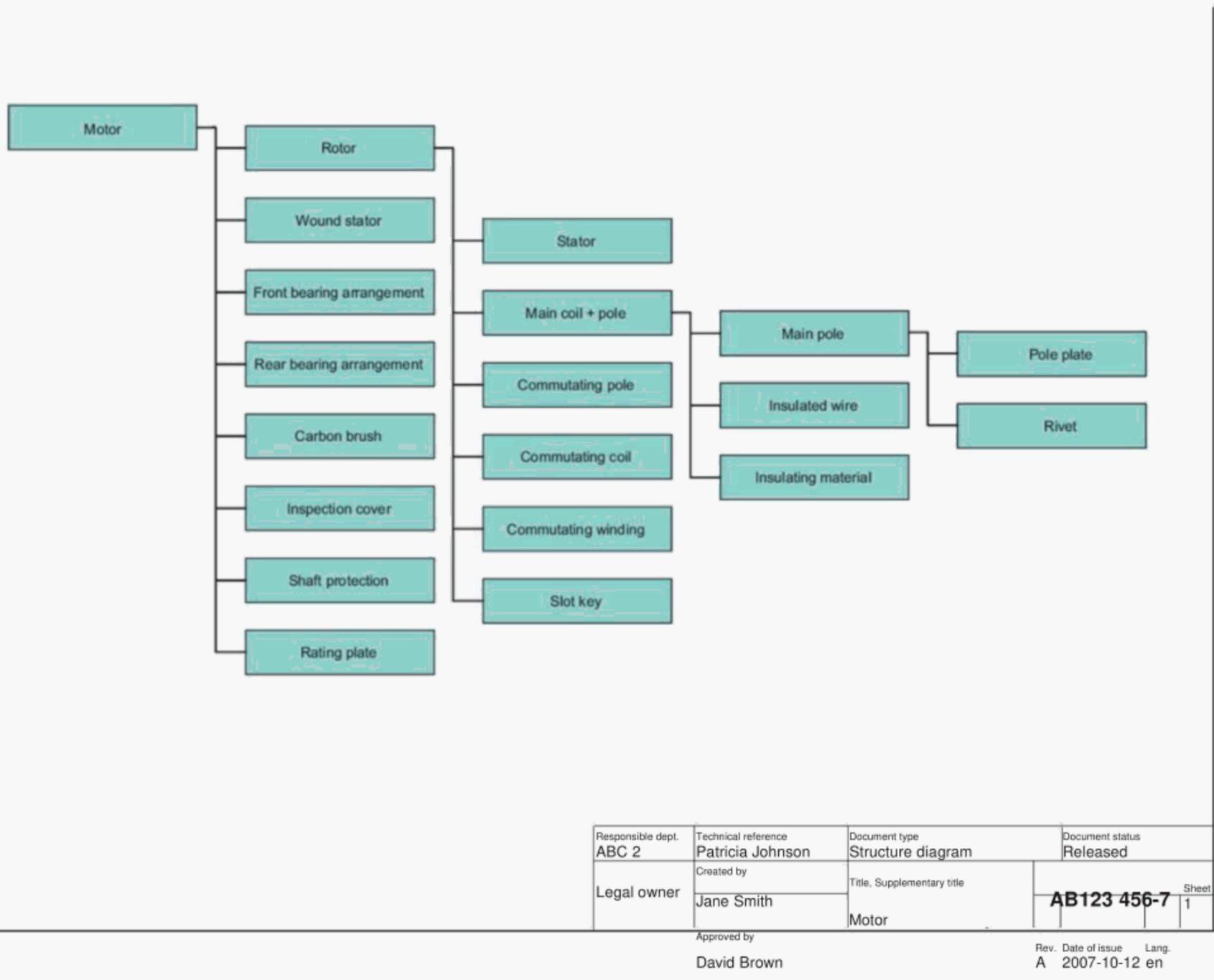


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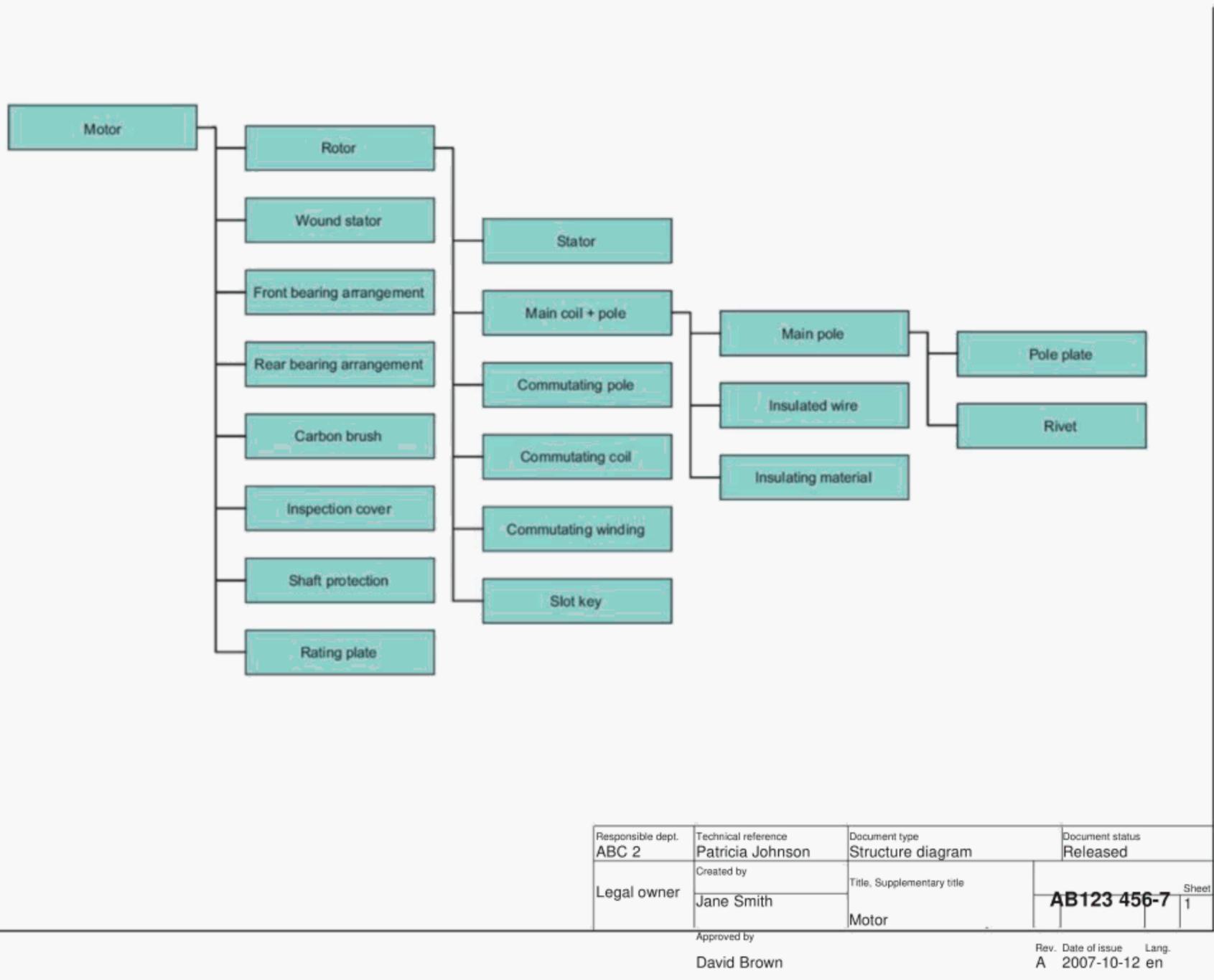


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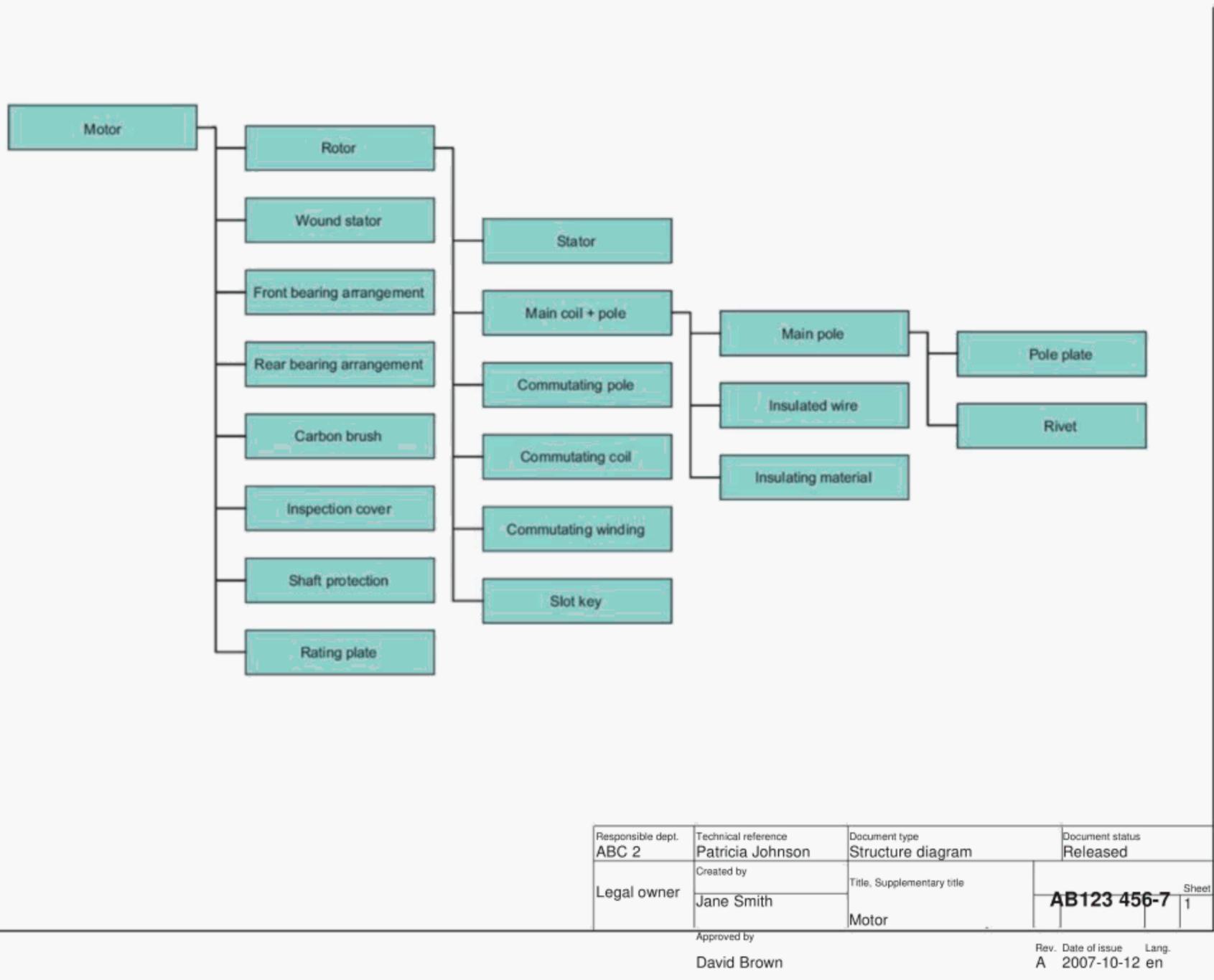
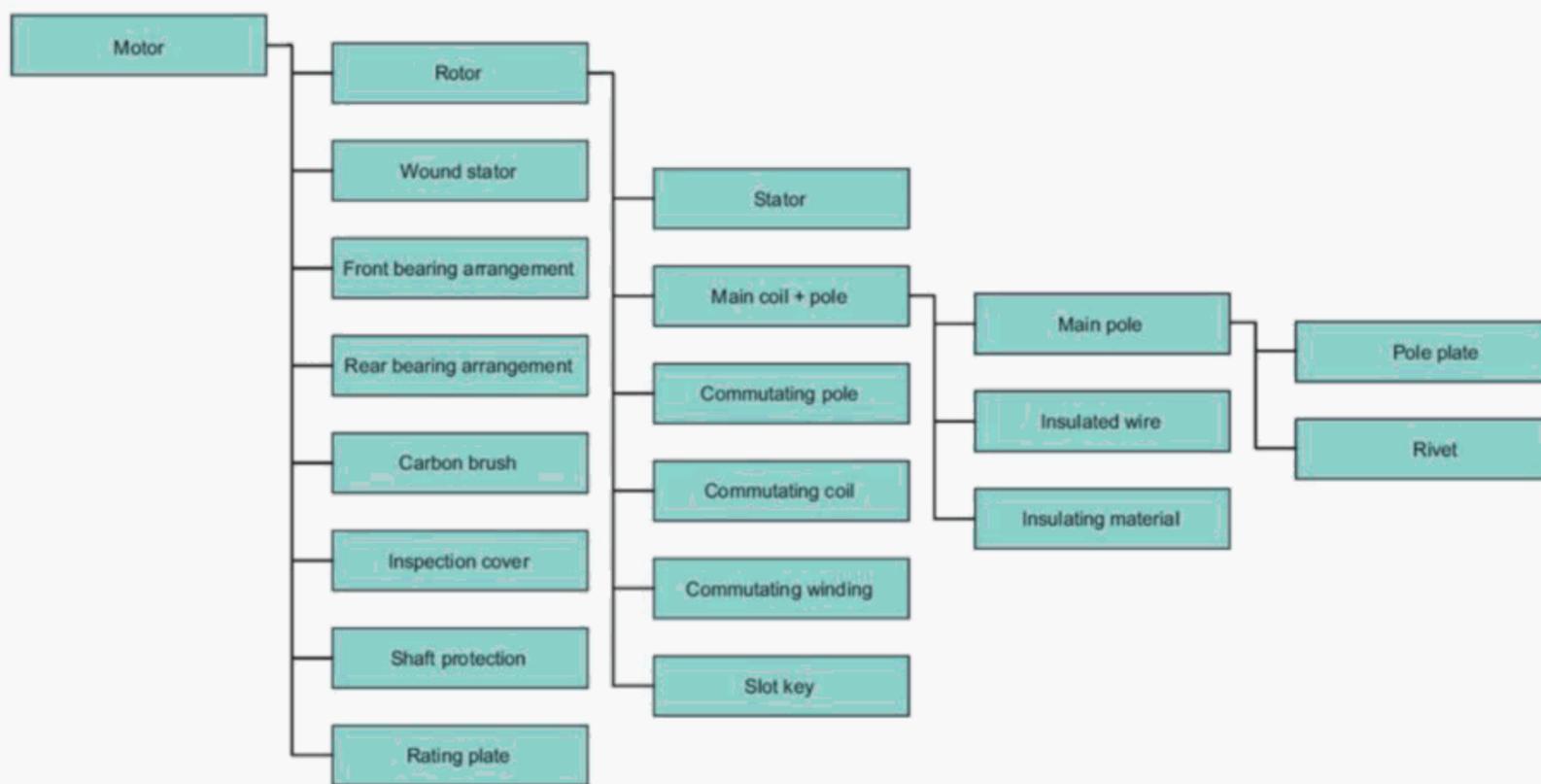


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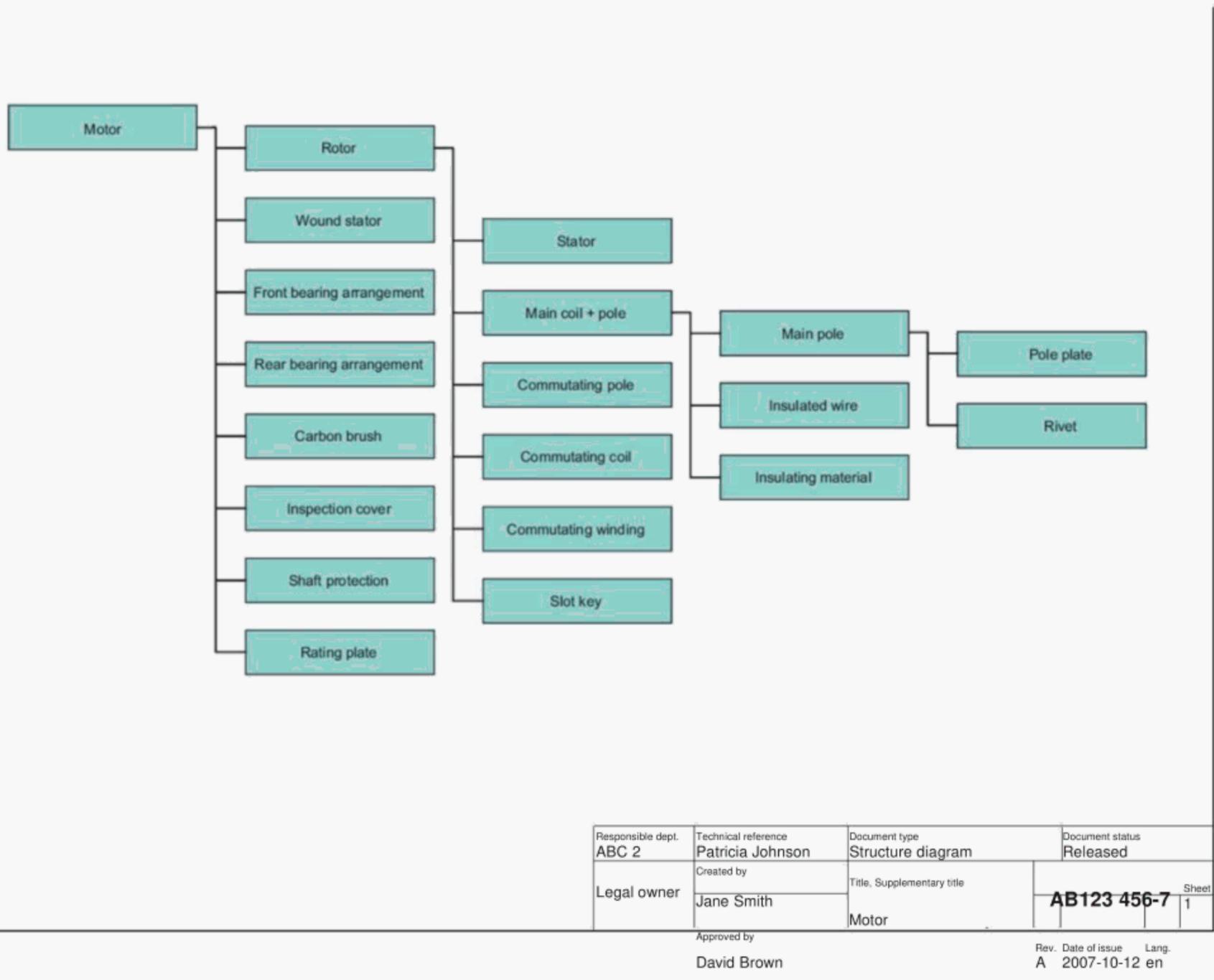


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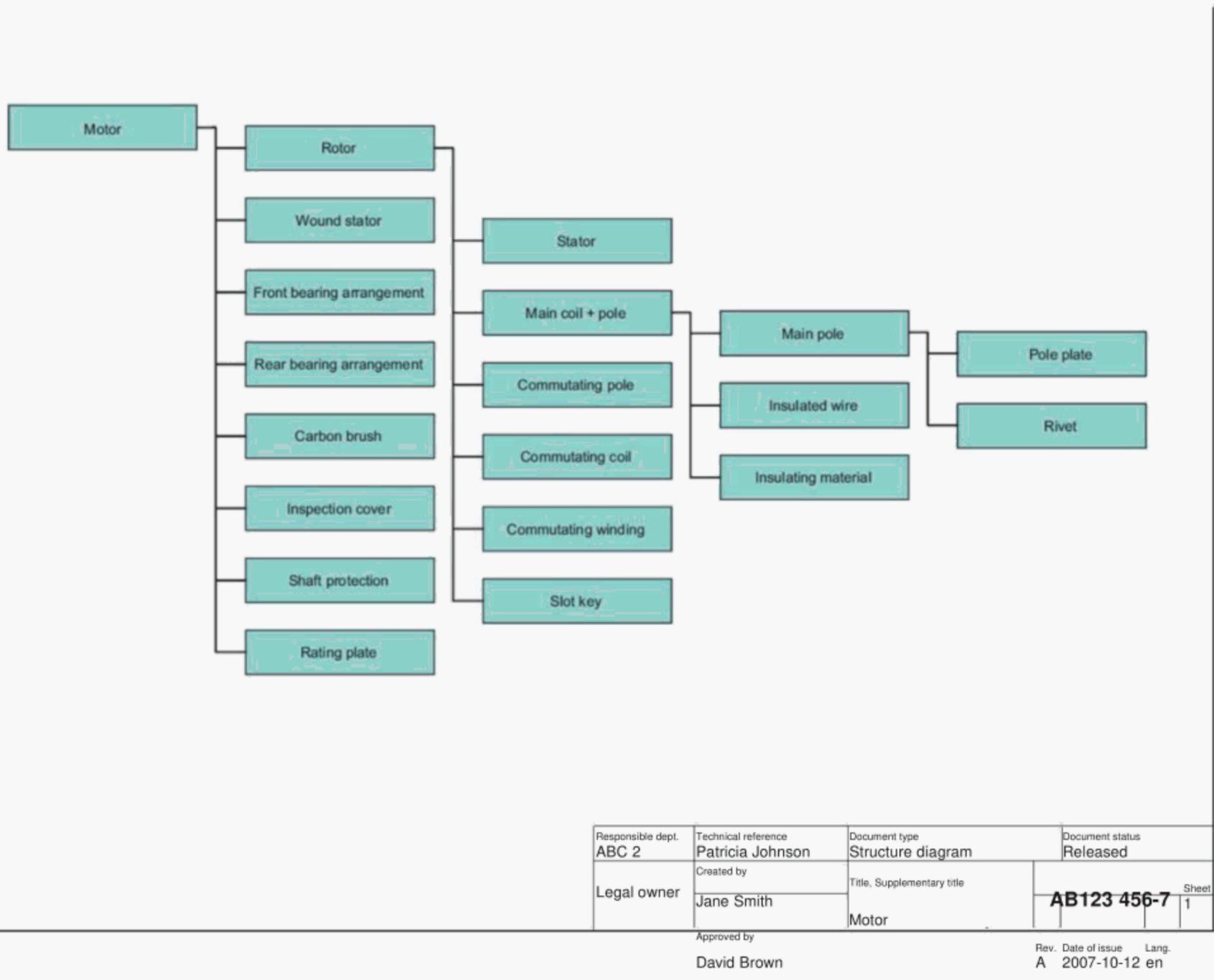
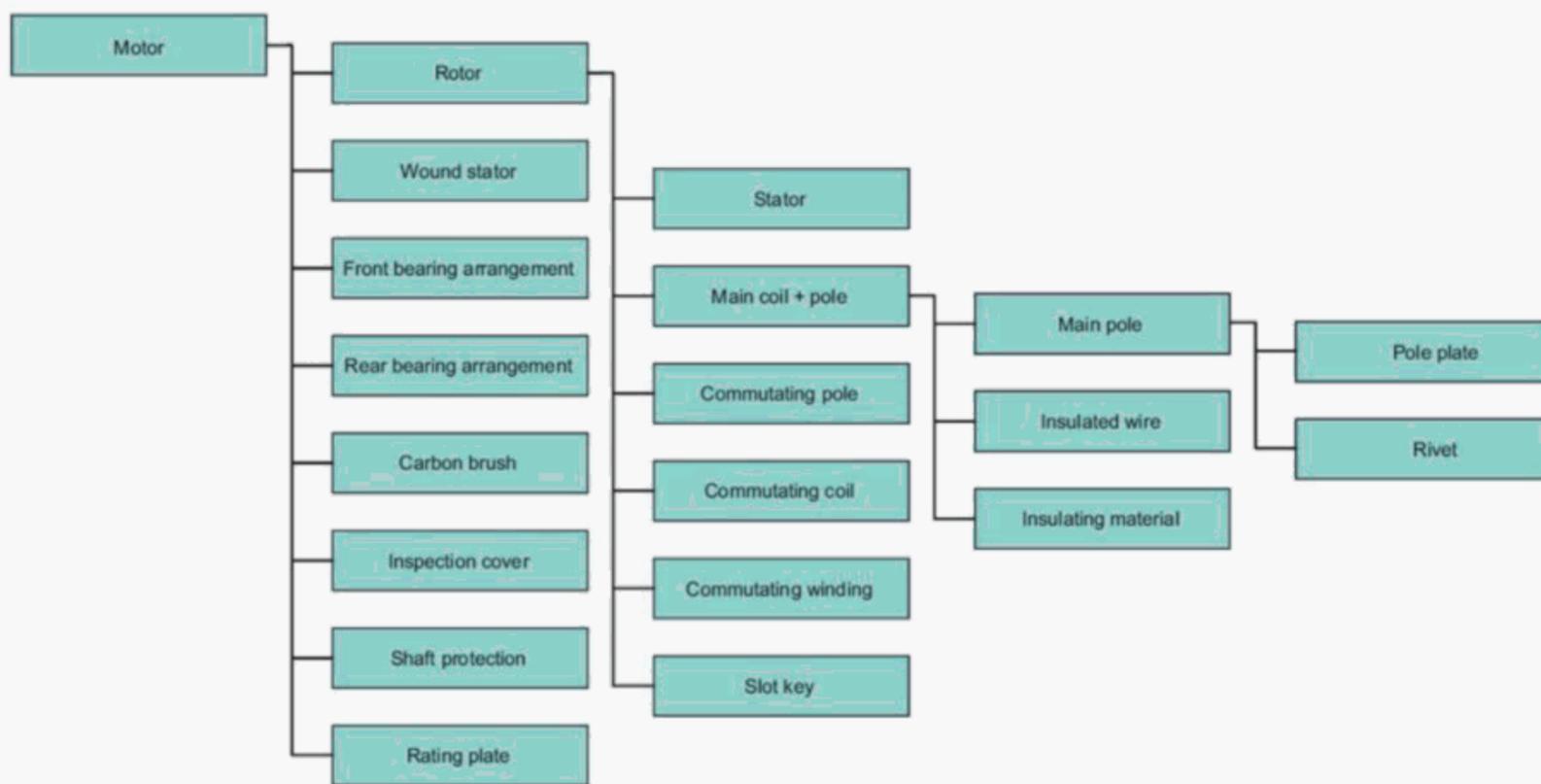


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Legal owner	Created by Jane Smith	Title, Supplementary title Motor	AB123 456-7 <small>Sheet</small> 1

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A 2007-10-12 en

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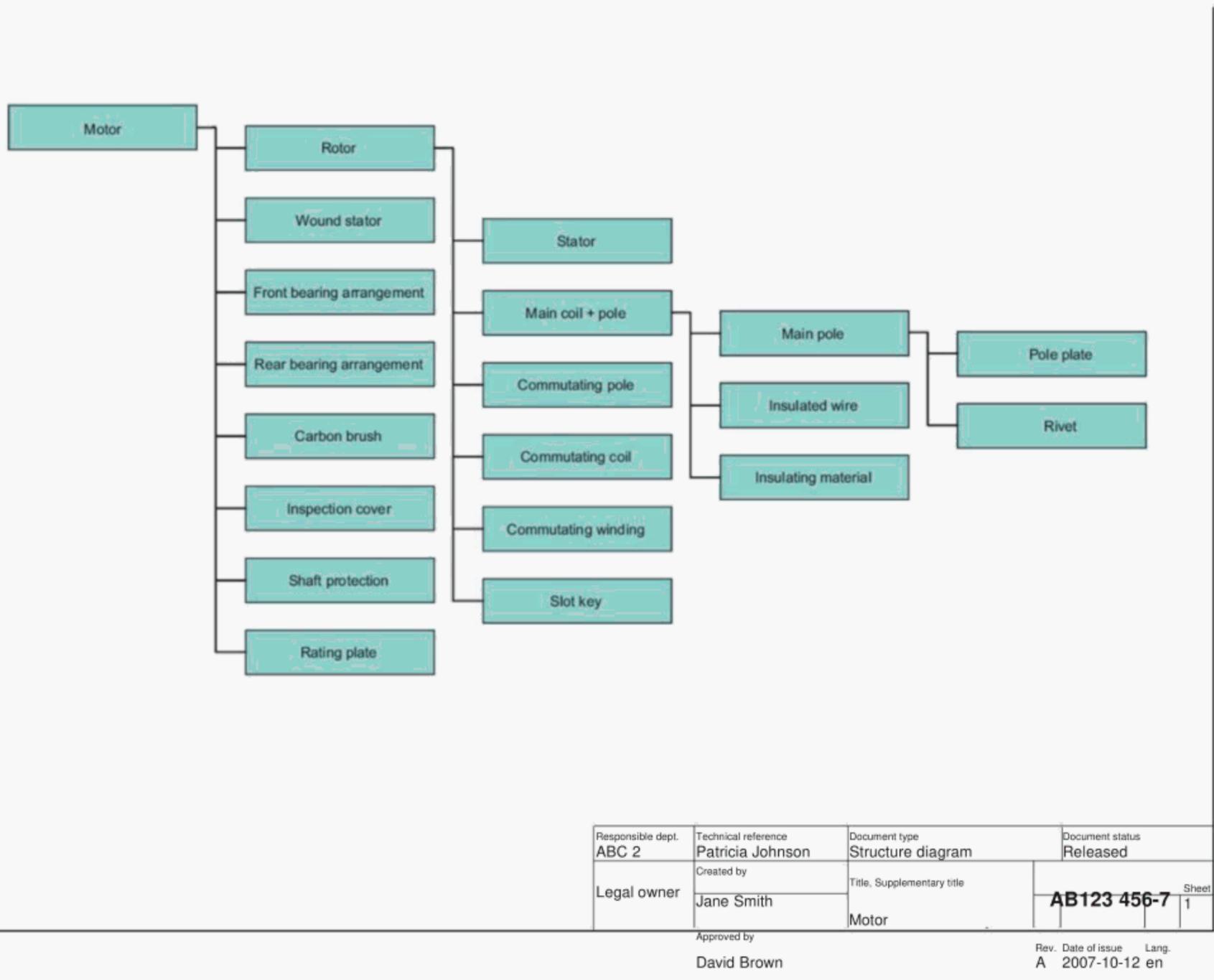


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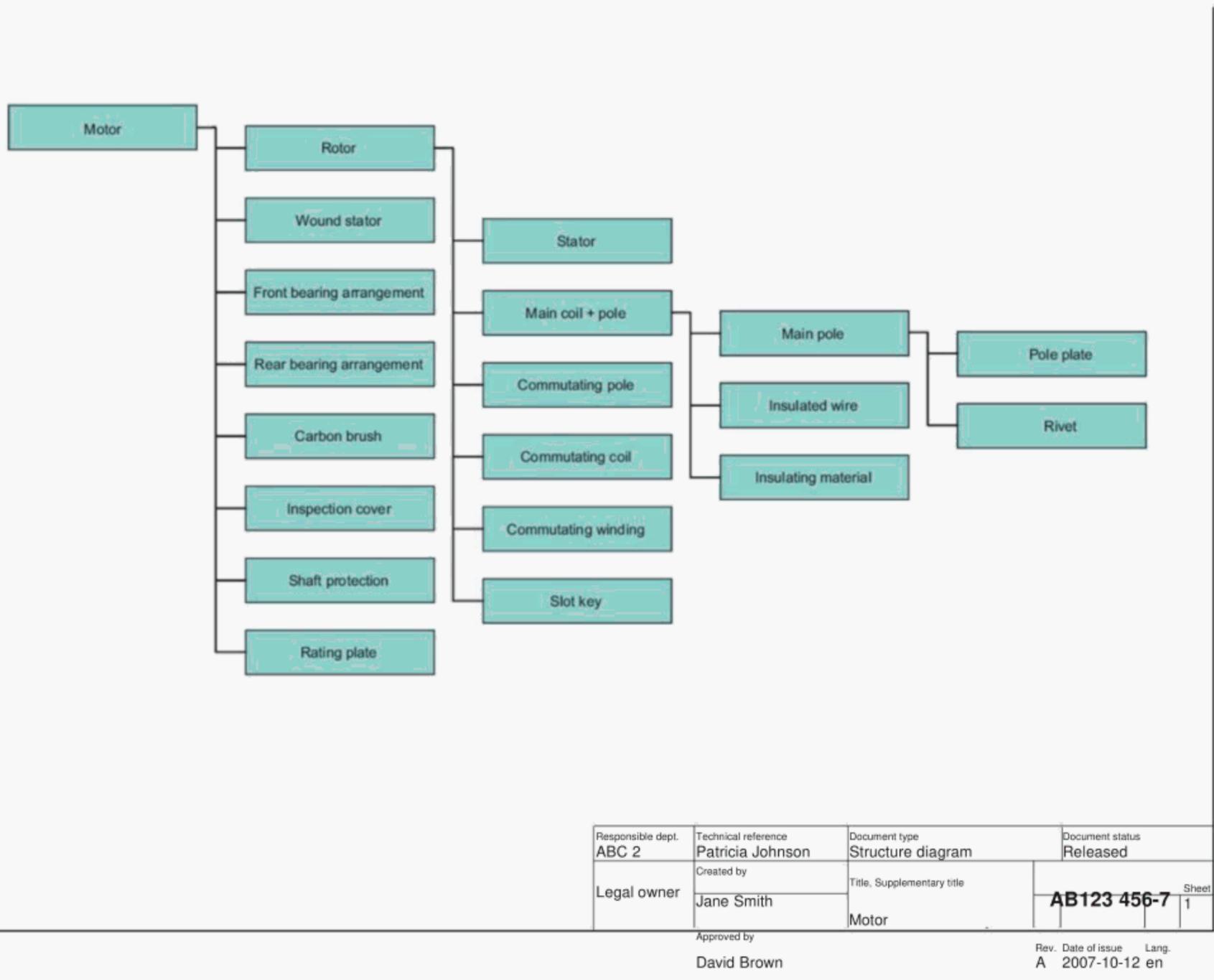


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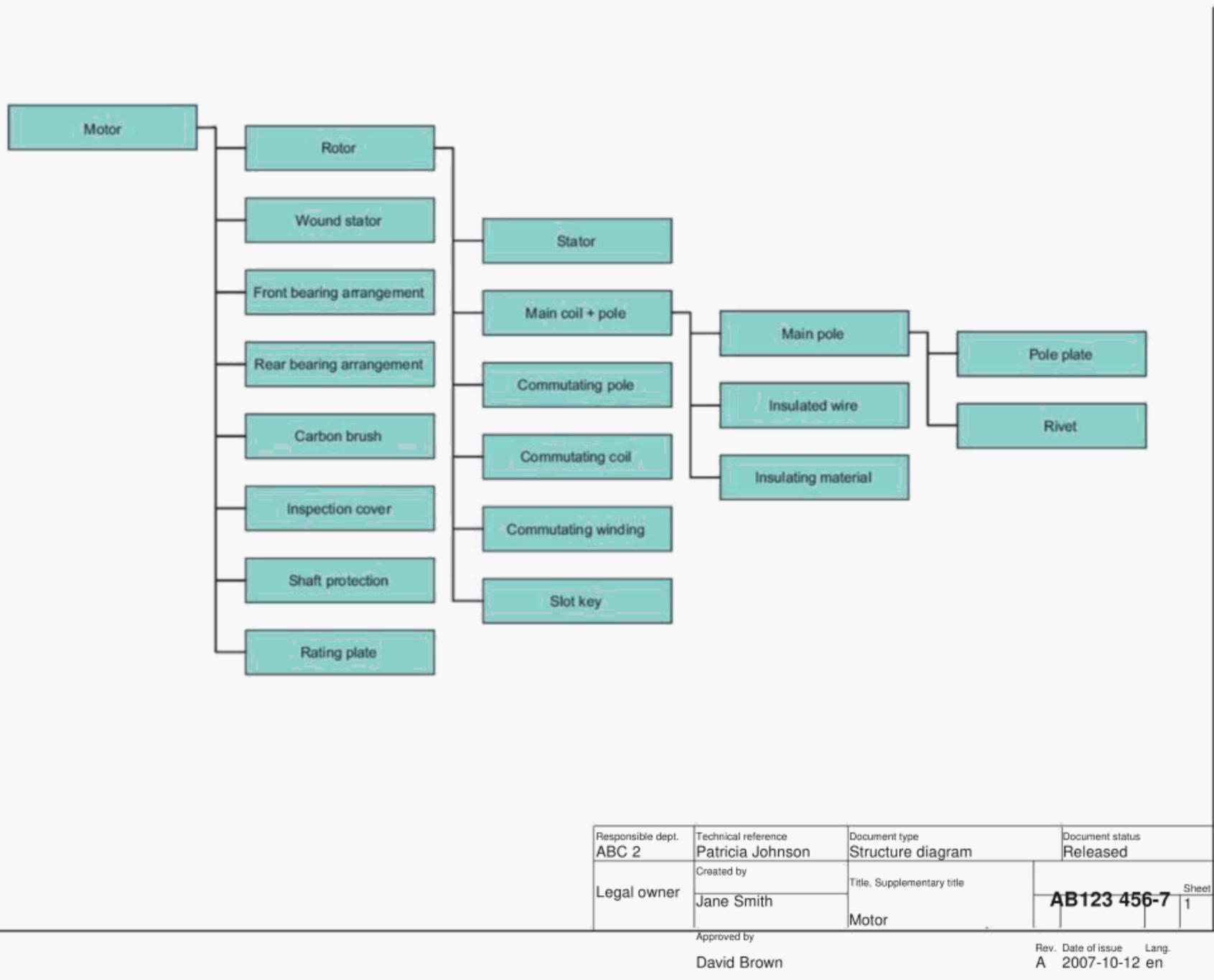
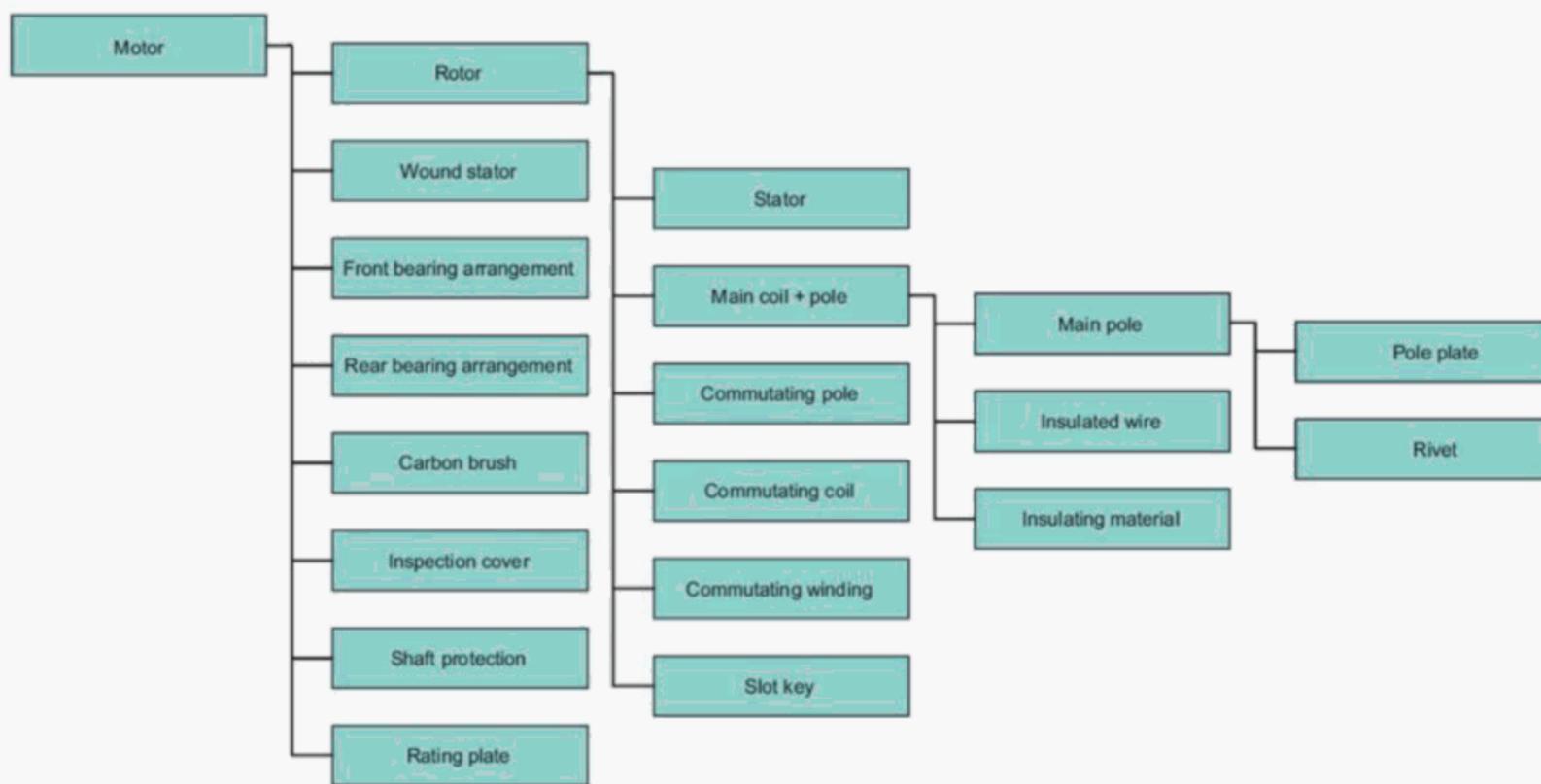


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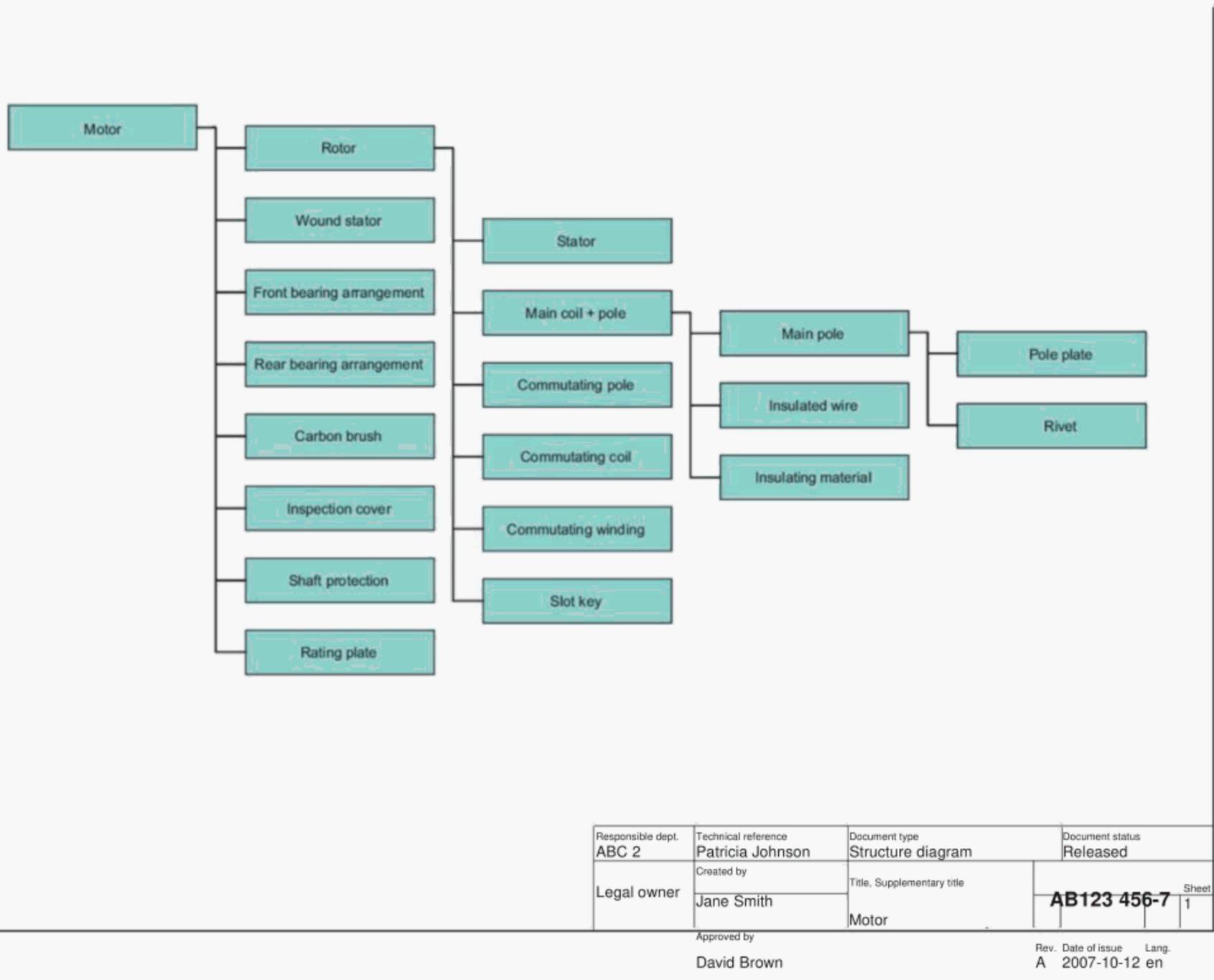


Figure 29 — Structure diagram