

PART III-C OF THE TENDER DOCUMENTATION

MOM DOCUMENTATION NS 8401-8405-8407

**INVITATION TO TENDER
Contract: E3 Sea Barriers
Project: 540026 Protection Operational Part**

TABLE OF CONTENTS

1 MOM DOCUMENTATION	3
1.1 Format of MOM documentation.....	3
1.2 Responsibilities	3
2 REQUIREMENTS FOR MOM DOCUMENTATION CONTENT	3
2.1 General information.....	3
2.2 Documentation for building applications and other documents for the authorities.....	3
2.3 Supplier register	4
2.4 Documentation of products, materials and installation	4
2.5 Operating instructions	4
2.6 Maintenance instructions.....	5
2.7 Paper version	5
3 MARKING SYSTEM	6
4 ENERGY LABELLING	6
5 REQUIREMENTS FOR DOCUMENTATION UPON DELIVERY OF SURVEYING DOCUMENTATION	6
6 TRAINING.....	6
6.1 General information.....	6
6.2 Structure of training and documentation of training	6
6.3 Topic list for training	7
APPENDIX 1: PUTTING MOM DOCUMENTATION ON A DVD/CD DISC.....	8
APPENDIX 2: PUTTING ELECTRONIC MOM DOCUMENTATION IN JOBTECH	15
APPENDIX 3: MARKING	16
APPENDIX 4: MARKING IN ACCORDANCE WITH STATBYGG'S SYSTEM.....	18
APPENDIX 5: REQUIREMENTS DOCUMENT SURVEYING	18

1 MOM Documentation

1.1 Format of MOM documentation

The builder has the following requirements for the format of MOM documentation:

(Alternative 1 applies if there is no check mark.)

- MOM documentation must be delivered in both electronic format and in paper format (1 copy) (alternative 1)
- MOM documentation must only be delivered in electronic format (alternative 2)

The following requirements have been set for electronic format:

(Alternative 1 applies if there is no check mark.)

- The MOM documentation must be delivered on a CD/DVD disc in accordance with Appendix 1 (alternative 1)
- The MOM documentation must be delivered in JobTech in accordance with Appendix 2 (alternative 2)

1.2 Responsibilities

Planners (ARK/RI)

ARK/RI is responsible for entering self-produced documentation materials, i.e. construction descriptions and specification of requirements, as well as 'as built' drawings, etc.

Contractor

The contractor is responsible for the inclusion of material specifications, overviews of operation and operating procedures, maintenance routines, troubleshooting procedures, inspection and measuring reports, spare parts lists, photographs and other relevant documents. This documentation must provide satisfactory documentation of the technical specifications, user guidelines, and maintenance routines for the installation's components. Furthermore, all documentation such as surveys, adjustments, self-test protocols, sampling, etc. must be included.

Design and build contractors

In the case of design and build contracts the design and build contractor bears full responsibility for the tasks described above.

2 Requirements for MOM documentation content

2.1 General information

The MOM documentation must cover all structural and technical installations such that the installation's operating personnel can find all the information necessary for rational operation, maintenance and management.

The necessary cross references between floor plans and detail drawings, forms and other documentation must be included.

2.2 Documentation for building applications and other documents for the authorities

The MOM documentation must include either a copy or the original of the following documents:

(Copies of those documents produced for the Norwegian Defence Estates Agency must be requisitioned for inclusion in the MOM documentation):

1. Project application
2. General permission
3. Application for start-up of measures with execution plans/inspections plans

4. Project start-up permission
5. Submission of application for certificate of completion with inspection documentation
6. Final certificate of completion from the local authority
7. Declaration of conformity - electrical works
8. Any inspection documentation from Heiskontrollen AS
9. Control and inspection form with checklists (manufacturer's self-inspection form) for any prefabricated units, e.g. in wet rooms, refrigerated stores, etc.
10. Discharge permit(s)
11. Energy calculations with grade pursuant to NS 3031 as a basis for energy labelling.

2.3 Supplier register

The supplier register contains information about suppliers of equipment and spare parts.

2.4 Documentation of products, materials and installation

All contractors/suppliers must deliver documentation that, as a minimum, must contain:

- Product information with material specifications for all of the products used. Maintenance recommendations with specified intervals must be delivered for each product.
- Environmental declarations pursuant to ISO-14025 (EPD) must be delivered for five of the six following product groups:
 - Load bearing structure (e.g. steel and concrete)
 - Deck (e.g. concrete or solid wood)
 - Facade covering (e.g. metal cladding or rendered system)
 - Insulation in outer walls (e.g. mineral wool)
 - Interior sheet cladding (e.g. plasterboard sheets)
 - Roofing materials (e.g. roofing paper or metal cladding)

The construction documentation must contain a special substance index of hazardous substances that were used in the construction process.

The construction documentation for technical disciplines must also contain:

- Reports from measuring and adjustment.
- Connection diagrams.
- Drawings.

2.5 Operating instructions

All operating instructions that **are not** described in the central operation monitoring system must be described in the MOM documentation.

A code structure is required that makes it easy for users to find the documentation upon registration.

The operating instructions must primarily consist of:

- Installation descriptions that describe the installation's/equipment's structure and manner of operation. This should not be a long treatise, but a matter-of-fact description for maintenance personnel.
- Functional description and user manual that in clear language describe the functionality of the installation and how it should be operated.
- Error messages and checks in the event of operating problems that specify all error messages and error situations with an explanation of what is wrong and what needs to be done to rectify the error and get the equipment operating again. Error messages and actions that are described in the central operation monitoring system should not be described here.

2.6 Maintenance instructions

The maintenance instructions must describe:

- What** - What must be maintained, i.e. the work associated with a particular piece of equipment, installation, building or building element.
- When** - Specifies the criterion for managing when work is due as a fixed time interval between each time the work must be done.
- How** - Describes the work that must be carried out. Must be described in the form of a job specification.

Maintenance descriptions (job specifications) must be created for each maintenance object (building elements, technical installations, etc.) registered in the equipment register.

2.7 Paper version

Any paper version must be delivered in a ring binder that must have the following fixed structure:

Page dividers	Divider title	Responsible
1	General information (project information, address lists, etc.)	ARK/RI/PL
2	Installation description (function, structure, main data, system diagram, etc.)	ARK/RI
3	Specification of requirements (conditions, etc.)	ARK/RI
4	Material specifications with supplier addresses Technical documentation (manual, brochures, etc.)	Contractor
5	Service and operating guides	Contractor
6	Maintenance schedule with maintenance activities Log book	Contractor
7	Troubleshooting procedures	Contractor
8	Inspection and measuring reports	Contractor
9	List of consumables and spare parts	Contractor
10	Photographs (buried, concealed and critical installation components)	Contractor

11	Drawing lists (all relevant drawings, up-to-date)	ARK/RI
12	Drawings (all relevant drawings in the same scale as working drawings, up-to-date)	ARK/RI

3 Marking system

All building elements and all equipment must be numbered and marked pursuant to:
(Alternative 1 applies if there is no check mark.)

- The Norwegian Defence Estates Agency's marking system based on the NS 3451 building elements table, see Appendix 3 (alternative 1)
- Multidisciplinary marking system, see Appendix 4 (alternative 2)

4 Energy labelling

A sign must be posted at the main entrances to all buildings. The sign must display the grade the building has received based on calculations pursuant to the Energy Labelling Regulations. (Ref. www.energimerke.no)

5 Requirements for documentation upon delivery of surveying documentation

The following documents/files must accompany the delivery for the Norwegian Defence Estates Agency:

1. Land survey report
2. SOSI file
3. Plotted map/sketch of surveyed situation and surrounding situation
4. SOSI inspection report
5. Image files of manholes and routes

The delivery must satisfy Appendix 5 Requirements document surveying

6 Training

6.1 General information

Operating personnel must receive training immediately after the documentation has been approved and the documentation element must be used actively in this phase.

The training and documentation of the training must be carried out in accordance with:

- Structure of training and documentation of training, see section 6.2.
- Topic list for training, see section 6.3.

6.2 Structure of training and documentation of training

The training must be structured as follows:

1. Topics that training/instruction must be provided in:
The topic list must be used to document what must be gone through. See separate section below.
2. The purpose of the training is as follows:
After undergoing training the user must be fully capable of operating/maintaining the installation the training has covered.
3. When the training must be undergone:

The training must be undergone before the installations are taken over.

4. How the training/instruction must be provided:
The training must be provided as classroom instruction for the orientation and theoretical part, but for the practical part, the training must be provided out on the installation in the building element concerned. A daily schedule must be prepared for each day the training is provided.
5. References/aids/documentation:
The finished MOM documentation must be used in the training for all building elements.
6. Who must participate in the training (recipient):
The builder will select the people it wants to participate in the training.
7. Who is responsible for training (operational responsibility):
 - The contractor is responsible for carrying out the training in accordance with the set schedule. This must take place in close cooperation with the builder and user.
 - The contractor must use personnel who are very familiar with the installation(s) the training covers to provide the training.
 - The builder will make suitable teaching premises and training aids available.
8. Evaluation:
 - The contractor must clearly state the basic knowledge/prerequisites that participants in the training must possess to get the maximum out of their participation.
 - What the pupils have understood of the training must be evaluated and presented after it ends.
9. Signatures:
Documentation, once training has been completed, must be signed by the company responsible for providing the training/instruction in accordance with the contract with the Norwegian Defence Estates Agency. Each individual recipient of the training must sign their signature.

6.3 Topic list for training

The topic list below must be used as documentation that the training has been carried out:

Main topic:	Date of training	Responsible for training Signature	User signature for received training Signature:

Appendix 1: Putting MOM documentation on a DVD/CD disc

Planners and contractors that have to produce these can obtain an electronic template upon request that they should use for building and construction documentation (B/C documentation).

1.1 Menu

The electronic documentation part contains six menu groups:

- First page
- General information
- B/C - doc
- Drawings
- Fire protection
- Help

1.2 Folder structure

The system is divided up into three main folders with associated subfolders.

The main folders are:

Main folder:	Comments:
<i>/system</i>	The contents of the "System" folder must not be changed!
<i>/forside</i>	The file " <i>forside.html</i> " in <i>/forside</i> must be adapted.
<i>/kataloger</i>	This contains the entire folder structure based on 1st, 2nd and 3rd digit levels pursuant to the table of building elements (NS 3451). The folder names are generally only stated as a number code. It is important to note the number code that applies for the relevant installation element. See the NS 3451 table. All existing data files must be adapted and new data files placed in the correct folders. The filenames of existing files must not be changed!
<i>/tegninger</i>	This folder has subfolders. <i>/tegninger/arkitekt</i> <i>/tegninger/bygg</i> <i>/tegninger/vvs</i> <i>/tegninger/elektro</i> <i>/tegninger/brann</i> <i>/tegninger/annet</i> All drawing files (DWG and PDF files) must be placed in their respective subfolder and the associated HTML files must be edited such that they are complete drawing lists. The "drawing name" in the drawing list must be linked to the associated PDF file. The filenames of DWG files must comply with NS 8351. The requirements are defined under specification of requirements "Drawings".

1.3 Data files

The data files must be in standard file formats. The relevant file formats are:

HTML (Microsoft Internet Explorer. Preferably edited using Microsoft FrontPage)

DOC (Microsoft Word)

XLS (Microsoft Excel)

PPT (Microsoft PowerPoint)

PDF (Adobe Acrobat/Adobe Acrobat Reader)

DWG (Autocad)

JPEG (Foto)

The data files must be named using filenames that are as self-explanatory as possible with respect to their contents and the files must be placed in the correct subject folder. NB! [The CAD files \(DWG\) must be named as specified under the chapter Drawings.](#)

Filenames shall be limited to a maximum length of 25 characters.

1.4 First page

First page of the B/C documentation,

Information about the property manager, establishment, equipment name, equipment number, location and representative photograph of the installation must be placed in the "*forside.html*" file in the folder */fdv/forside*. Performed by FBU.

1.4.1 General information

Contains text document concerning guidelines for the B/C documentation (this text file), as well as the table above, NS 3451 - the table of building elements.

This information in this section must **not** be changed.

1.5 B/C Documentation

The following must be adapted when preparing the B/C documentation.

Contents:

Responsible:

General information

Opens table overview of project organisation (/kataloger/0/prosjektorg.html)	Advisory group
Opens table overview of addresses for all parties involved in the project. Addresses, telephone, email, etc. (/kataloger/0/adresser.html)	Advisory group
Opens table overview of service agreements. Info on installation element, company, address, phone/fax and email. Must be linked to relevant contract documents. (/kataloger/0/serviceavtaler.html)	Operating organisation
Opens table overview of inspections performed in the operational/use phase. E.g. Eco-profile analyses, condition analyses, etc. Must be linked to relevant documents. (/kataloger/0/inspeksjoner.html)	Operating organisation
Opens table overview of the installation's HSE/internal control documents. Must be linked to relevant documents. (/kataloger/0/hms.html)	Operating organisation
Opens table overview of new regulatory requirements after the installation is put into use. Must be linked to relevant documents. (/kataloger/0/myndighet.html)	Operating organisation

Information

Brief information text about whole installation. (/kataloger/1/beskrivelse.html)	Advisory group
Overview of room diagrams . Must be linked to relevant documents. (/kataloger/1/romskjema.html)	Advisory group

For **EACH** installation element (2nd digit level), **ONE** file has been inserted that must be adapted. (E.g. "[32fdv.html](/kataloger/3/32/)" located in */kataloger/3/32/*).

Each of these files has the same structure and contains from one-nine topics that must be adapted. The following list shows these nine topics and who is normally responsible for them:

Contents

Responsible

Installation description Each element of the installation must be described with respect to function, structure and main data . (It is not the quantity specific tender description that must be inserted here.)	Advisory group
--	----------------

<p>Specification of requirements Design assumptions for the installation elements. (E.g. loads, climate requirements, power needs, etc.)</p>	Advisory group
<p>Materials specification Table containing an overview of all delivered and installed equipment. The contents of the table must be linked to the pertinent documentation files. The documentation must be technical in nature and only cover the installed equipment. (If the documentation contains information that covers multiple products, the installed products must be clearly specified.) The documentation files must be placed in the correct three-digit folder for the discipline. (E.g. Documentation files concerning guttering must be placed in /kataloger/2/26/266.)</p>	Contractors
<p>Service/operation Table containing overview of service and operation procedures. The table content must be linked to files with specifying descriptions of the service and operation of the installation elements. The specifying files must be placed in the pertinent three-digit folder that ends in 0. (E.g. Service/operating descriptions for backup power generating set must be placed in /kataloger/6/61/610.)</p>	Contractors and advisory group
<p>Maintenance Table containing overview of maintenance routines. The table content must be linked to files that provide specifying descriptions of activities for the correct technical, financial and functional use of the installations. The specifying files must be placed in the pertinent three-digit folder ending in 0. (E.g. Maintenance descriptions for flooring must be placed in /kataloger/2/25/250.)</p>	Contractors
<p>Troubleshooting Table containing overview of troubleshooting procedures. The table content must be linked to files that provide readily understood statements concerning how a USER can find faults that have occurred in the installation and the procedures for rectifying these. The specifying files must be placed in the pertinent three-digit folder ending in 0. (E.g. Troubleshooting procedures for heating system must be placed in /kataloger/3/32/320.)</p>	Contractors
<p>Inspection and measuring reports Table of relevant reports concerning the installation. The contents of the table must be linked to files that contain the contents of reports. The files must be given short, self-explanatory names and placed in the pertinent three-digit folder ending in 0. (E.g. Adjustment procedures for ventilation system must be placed in /kataloger/3/36/360.)</p>	Contractors and advisory group
<p>Spare parts list List of various spare parts/consumables, number and supplier.</p>	Contractors
<p>Photographs Table with list of images of relevance for understanding the installation. The table must have specifying text for each image. The contents of the table must be linked to the pertinent image file and image view must open in a new window. The image files must have short, self-explanatory filenames and be placed in the subfolders /bilder in the pertinent two-digit folder. (E.g. Images concerning Outdoor HVAC and sanitary must be placed in /katalog/7/73/bilder.) Special concealed, buried and critical installations must be documented using images!</p>	Advisory group

1.6 Drawings

UNIQUE NUMBERING STRING:

CAD drawings in the **NORWEGIAN DEFENCE ESTATES AGENCY** must be uniquely defined based on the following numbering string:

Establishment code	Equipment no.	Discipline index	Drawing no.	Rev. index	Rev. no.

Also see the Norwegian Defence Estates Agency's CAD manual.

1.7 Explanation

Establishment code	Six-digit identification code for the establishment/camp. This is obtained from the NORWEGIAN DEFENCE ESTATES AGENCY.
Equipment number	Four-digit identification code for the building/installation within the respective establishment. This is obtained from the NORWEGIAN DEFENCE ESTATES AGENCY.
Discipline index Follows NS 8351	A- Architect B- Building engineering E- Electrical/electrical power G- Geotechnical I- Interior architect K- Road construction L- Landscape architect R- Regulation architect T- Telecommunications and automation V- HVAC W- Energy Z- Sanitary X- Fire
Drawing number	0000 - equipment chart 0001 - 0099 site plans, etc. 0101 - 0199 floor plans for ground floor 0201 - 0299 floor plan for first floor 0301 - 0399 floor plan for second floor etc. U101 - U199 floor plans for first level below ground level U201 - U299 floor plans for second level below ground level etc. 1001 - 1199 elevations 1201 - 1399 sections 1401 - 1599 details 1601 - 1699 key plans 2001 - 2999 construction drawings For lofts use the drawing number for the first available floor.
Revision index The revision index marks milestones in the project/for the building.	A Submission the Norwegian Defence Estates Agency and consultants. B Completed pre-project. C Application drawings D Engineering

	E As tender attachment F For contract document. G For production/construction H As built
--	---

Revision number
Consecutive number (two digits) used in addition to the revision index. Starts at 01 for each revision index/phase.

Example of numbering of drawings (CAD files):

Four-man house at Skjold Garrison. "As built" documentation has been received for the building, including architect/floor plans for level 2. The basis for numbering this drawing would thus be:	Establishment code: 192406 Equipment number: 0011 Discipline index: A Drawing no.: 0201 Rev. index: H Rev. no.: 01	This results in: 1924060011A0201H01.dwg
--	---	---

1.8 Location of drawings

The drawings must be delivered in digital format – **both as DWG files and PDF files** - and be up-to-date in relation to the delivery and executed work. ("As built" drawings.) The drawing files must be placed in their respective subfolders.

The main folder */tegninger* is divided into the following subfolders:

- /tegninger/arkitekt*
- /tegninger/bygg*
- /tegninger/vvs*
- /tegninger/elektro*
- /tegninger/brann*
- /tegninger/andre*

The subfolder *"/andre"* (other) is used for all drawings that do not belong in the discipline categories "Arkitekt" (architect), "Bygg" (building), "VVS" (HVAC and sanitary), "Elektro" (electrical) and "Brann" (fire).

The subfolders contain **drawing lists** named as follows:

- "arkitekt.html"* in the folder */tegninger/arkitekt*
- "bygg.html"* in the folder */tegninger/bygg*
- "vvs.html"* in the folder */tegninger/vvs*
- "elektro.html"* in the folder */tegninger/elektro*
- "brann.html"* in the folder */tegninger/brann*
- "andre.html"* in the folder */tegninger/andre*

The drawing lists must contain the **drawing name, drawing no./rev. index and filename** of the pertinent DWG file.

The drawing names must be linked to the pertinent PDF file, which must open in a new window.

1.9 Fire protection

Fire protection is so important and spans so many installation areas that the topic has been given its own section in the main menu.

The following submenus have been included under fire protection:

Organisational First and foremost applies to "Special fire objects" pursuant to the Regulations on Fire Prevention Measures	Personnel	The fire protection organisation must be visible with, among other things, the "Name of the fire protection contact" at the user and the "Name of the fire protection manager" at the Norwegian Defence Estates Agency. Must be prepared by the operating organisation.
	Training and fire drills	Training and fire drills for all users (managers, employees and conscripts) is a requirement. Participant lists must be prepared. Must be prepared by the operating organisation.

and Supervision, but can also be added for other buildings and installations.	Instructions and plans	House fire instructions (or equivalent) must be prepared. " Instructions for fire protection contact " and " Instructions for fire protection manager " must be added. " Fire instructions for guard function " must be prepared for buildings used for overnight accommodation. Buildings with a reception must have " Fire instructions for reception guards ". Other fire instructions may be relevant and must be considered. Buildings in risk classes 5 and 6 are required to have rescue and preparedness plans. Link to examples of Fire instructions and Rescue and preparedness plans . Must be prepared by the operating organisation.
	Guard or other monitoring.	Places used for overnight accommodation (risk class 6) must have guard systems/equivalent monitoring with associated instructions in accordance with "Instructions and plans". Must be prepared by the user.
Drawings	Opens drawings list for fire drawings .	
Fire alarm	Opens the B/C information concerning 54 - Alarms and signals .	
Fire extinguishing	Opens the B/C information concerning 33 - Fire extinguishing .	
Fire ventilation	Opens overview table of fire ventilation and links to these.	
Other	Opens overview table of other relevant documents relating to fire protection and links to these.	

1.10 Help

The main menu consists of five points:

- * **First page** (start page)
- * **Information** (provides information on the structure, execution requirements, etc. as well as submenu with NS 3451)
- * **B/C-Doc** (see below)
- * **Drawings** (see below)
- * **Fire protection** (see below)

<p>Selecting B/C-Doc brings up a box of options for selecting the required installation element. Selecting the desired installation element directly brings up the B/C information with the following submenu: The menu items link directly to the relevant information concerning the relevant installation element.</p>	<input type="checkbox"/> Description of installation <input type="checkbox"/> specification of requirements <input type="checkbox"/> Materials specifications <input type="checkbox"/> Service/operation <input type="checkbox"/> Maintenance <input type="checkbox"/> Troubleshooting <input type="checkbox"/> Inspection/measuring reports <input type="checkbox"/> Spare parts <input type="checkbox"/> Photographs
--	--

<p>Selecting "Tegninger" (drawings) brings up the following submenu: The discipline options provide access to drawings lists with links to the drawings.</p>	<input type="checkbox"/> Architect <input type="checkbox"/> Building <input type="checkbox"/> HVAC and sanitary <input type="checkbox"/> Electrical <input type="checkbox"/> Fire <input type="checkbox"/> Other
--	---

<p>Selecting "Brannvern" (fire protection) brings up the following submenu: The menu items link to tables containing an overview of relevant information.</p>	<input type="checkbox"/> Organisational <input type="checkbox"/> Drawings <input type="checkbox"/> Fire alarm <input type="checkbox"/> Fire extinguishing <input type="checkbox"/> Fire ventilation <input type="checkbox"/> Other
---	---

Selecting B/C-doc takes you to a menu like "Innhold" (Contents) with 1st and 2nd digit levels in the table of building elements.

Selecting this from the "Innhold" menu brings up a list of the files stored in the folder with the same name as the digit code.

Familiarity with the table of buildings elements is important when it comes to navigating this menu. This can also be found under the main menu "**Orientering**" (**information**) and then clicking on **NS 3451**.

Appendix 2: Putting electronic MOM documentation in JobTech

Most of the final documentation must be registered in an electronic database called "JobTech".

When the registration work starts, the party that will execute the delivery should requisition the Norwegian Defence Estates Agency's guidance document: **"Veiledning med å utarbeide FDV- dokumentasjon der Forsvarsbygg benytter JobTech systemet"** (Guidance on preparing MOM documentation where the Norwegian Defence Estates Agency uses the JobTech system). (This contains no other/new requirements than those that are listed here, but the document does contain some guidelines and examples of what the electronic MOM documentation could be like.)

With the exception of drawings and reference documentation, all of the documentation must be registered electronically in JobTech. Reference documentation means documentation that it is not appropriate to register in JobTech. This includes data sheets, measurement results, handbooks, etc. This documentation should only be included in the "paper version".

The technical descriptions registered electronically in JobTech must be based on coding similar to that in the standard NS 3451. (NB! Newer versions of NS 3451 may have been developed further since the layout in JobTech was created.)

Besides digital fire drawings, fire related components/equipment must also be registered. Ref. requirements in the chapter on fire and smoke tightening.

One part of the fire documentation must be included as part of the technical description in the description of maintenance and operating instructions.

Appendix 3: Marking

1. Localisation code

All of the described maintenance objects must have a localisation code. The localisation code shows where the equipment/building element is located in the establishment. All equipment codes must be based on the Norwegian Armed Forces' establishment coding, modified for maintenance management.

2. Code principles

- Installations are coded based on function.
- Buildings are coded based on type.

3. Structure of NS 3451

NS3451 is built up according to the following system:

- 1st digit level: Main classification according to discipline (building, HVAC, electrical/telecommunication, etc.)
- 2nd ----"----: Main component in main category
- 3rd ----"----: Elements included in the main components

Example:

- 1st digit level: 2 Main category (building)
- 2nd ----"----: 23 Main component (secondary building elements, exterior)
- 3rd ----"----: 233 Element (windows)

4. Code structure for numbering and marking

All described building elements and equipment units must have an object code based on the structure described below:

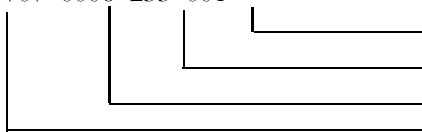
BBBBBB OOOO HHH EEE KKKK DD

Where:

BBBBBB	Base name (LFM)	Establishment	6 digits
OOOO	Area	Equipment number	4 digits
HHH	Main group	NS3451	3 "
EEE	Unit	Equipment code/system number	3 "
KKKK	Component	Serial number/component code	4 "
DD	Subcomponent	Serial number	2 "

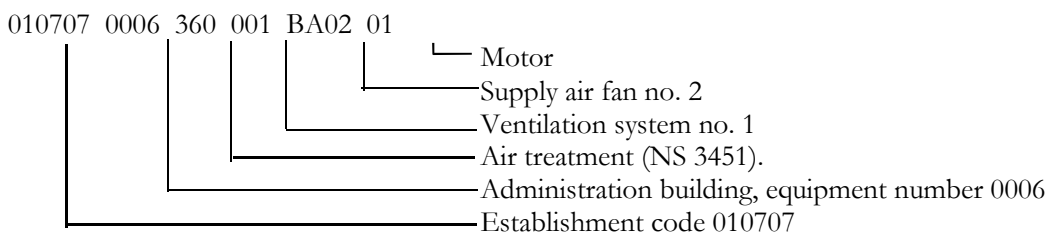
Example 1: BUILDING

010707 0006 233 001



- Main entrance door
- Windows and doors, etc. (NS3451)
- Administration building, equipment number 0006
- Establishment code 010707

Example 2: HVAC and sanitary



- Installations are coded based on function.
- Buildings are coded based on type.

It is important that the numbering and marking of building elements and equipment is based on the need for maintenance, i.e. that all building elements and equipment that require maintenance are numbered and marked. In some cases it might be sufficient for building elements/equipment to be broken down to component level (2nd digit level), but in most cases it will be necessary to go down to element level (3rd digit level).

5. Localisation codes

All of the described building elements and equipment units must also have a localisation code. The localisation code shows where the equipment/building element is located in the establishment. All equipment codes must be based on the Norwegian Armed Forces' establishment coding, modified for maintenance management.

FF KK OO AAAA CCC DDD EEEE FF

where

FF	County
KK	Municipality
OO	Area
AAAA	Equipment number (building/system)
CCC	System type (pursuant to NS 3451)
DDD	System number
EEEE	Component name
FF	Component serial number

6. Physical marking

All objects/components referred to in the MOM documentation must be physically marked with the same code. The contractor must mark building elements and technical installations in accordance with:

- Pipes and cables must be marked with special marking of the type that is standard for the discipline.
- Unless otherwise is agreed, the equipment must be marked with engraved signs affixed with two screws, where this is possible, or strips where this is most appropriate.
 - Signs, black lettering on white background, sign size approx. 60 x 20 mm
 - Letter size 4.5 mm.

Appendix 4: Marking in accordance with Statbygg's system

1. General information

All building elements and all equipment must be numbered and marked in accordance with Statbygg's engineering instructions PA 0802 "**Tverrfaglig Merkesystem**" (TFM) (multidisciplinary marking system) based on the latest edition of NS 3451 - the table of building elements.

RI, ARK, contractors and suppliers must use a uniform, multidisciplinary marking/ID numbering system to identify all products (doors, surfaces, installations, equipment, pipes, ducts, wires/cables, outlets, etc.). The ID marking must be shown on all building and installation drawings and all other documentation that is produced.

Statsbygg's engineering instructions PA 0802 (TFM) also includes some general provisions that must be used (including sign design, scope of physical marking, etc.).

2. Exceptions

A different system is used for high-voltage electrical infrastructure at Haakonsværn. The Norwegian Defence Estates Agency has prepared special instructions for the use of this system.

The system applies for the feeding of infrastructure cables up to the first point (feeder pillar) in the relevant building. From the feeder pillar and inside the building TFM is used.

3. Code structure

It is important that the numbering and marking of building elements and equipment is based on the need for maintenance, i.e. that all building elements and equipment that require maintenance are numbered and marked. In some cases it might be sufficient for building elements/equipment to be broken down to 2nd digit level, but in most cases it will be necessary to go down to 3rd digit level.

All of the described building elements and equipment units must also have a localisation code.

The localisation code shows where the equipment/building element is located in the establishment.

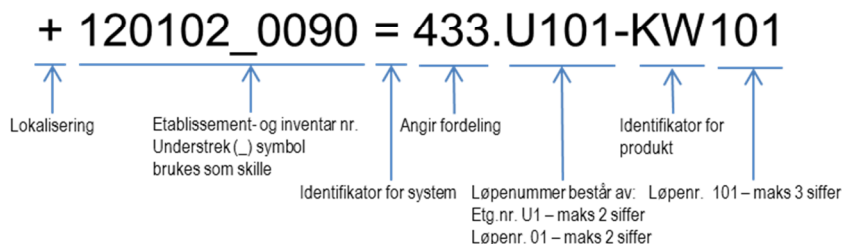
All equipment codes must be based on the Norwegian Armed Forces' establishment coding.

TFM (Tverrfaglig Merkesystem for bygninger). Konf. NS 3451

PA 0802

Lokalisering består av: Etablissementskode **xxxxxx** og Inventarnr. **yyyy**.

Eksempel: +xxxxxx_yyyy=433.U101(AAAnn)-KW.101



Tilleggsinformasjon (AAAnn) skal alltid angis i parentes. Denne informasjonen benyttes kun etter behov. Ved merking på tegninger skal Etablissementsnummer og inventarnummer angis i tittelfelt. Merking på tegninger og på komponent, kabel o.l. skal ikke inneholde etablissementsnummer og inventarnummer.

Kap. 4 – 7

4 – Elektroteknisk anlegg, 5 – Tele- og automatisering, 6 – Andre anlegg og 7 – utendørs anlegg:

Stigekabler: 001 – 099 Lokalkabler: 101 - 999

4. Physical marking

All equipment/components must be physically marked before completion. The requirements for physical marking and sign design are specified in PA0802.

5. Link to PA0802:

www.statsbygg.no/tfm

Appendix 5: Requirements document surveying

See separate document:

External users can download the document under engineering guides on www.eprosjekt.no

Internal users can download the document from the quality system under "fremskaffelse/prosjekteringsveiledere" or "eiendomsinformasjon/FDVU".