# TFM-AMENDMENT

# TFM-TAGGING OF USER EQUIPMENT AT OCEAN SPACE CENTRE

| | | | | | |
|---|---|---|---|---|---|
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# 1 OBJECTIVES

This document is an amendment to tagging requirements in TFM NS-3457 part 7, 8 and 9.

In general, this amendment outline principals for tagging and marking of user equipment (Brukerutstyr) at Ocean Space Centre.

The purpose of this document is to describe the overall coding structure's to be used during engineering and thereby give the same overall unique coding structure for all Contractors and Suppliers of user equipment in Ocean Space Centre.

# 2 Main process equipment

Ocean Space Centre includes the following main laboratories and facilities:

| | **[ENG]** | [**Norwegian term**] |
|---|---|---|
| • | Ocean Laboratorium | Havlaboratorium |
| • | Seakeeping and Manoeuvring Laboratorium | Sjøgangs- og manøvreringslaborium |
| • | Marine Structures Laboratorium | Konstruksjonslaboratorium (K-lab) |
| • | Machinery Laboratorium | Maskinlaboratorium (M-lab) |
| • | NTNU Research and Education Laboratorium | NTNU Forsknings- og undervisningslaboratorium |
| • | NTNU Flex Lab, Hydrodynamic Laboratorium | NTNU Flex lab, hydrodynamiske laboratorium |
| • | Fjord Laboratorium | Fjordlaboratorium |
| • | Workshop and Storage | Verksted og lager |
| • | *Cavitation Laboratorium** | *Kavitasjonslaboratorium* |

*** NOTE**: The Cavitation Laboratorium is an existing laboratory and not a part of the OSC-project but is included for the purpose of describing integrations, i.e. technical, functional etc.

## 2.1 Abbreviations and translations

| **Abbreviation [ENG]** | **Explanation English** | **Abbreviation [NO]** | **Explanation Norwegian** |
|---|---|---|---|
| DG | Design Group | PG | Prosjekteringsgruppe |
| UE | User Equipment | BUT | Brukerutstyr |
| OB | Ocean Basin | | Havbasseng |
| SMB | Seakeeping and Manoeuvring Basin | | Sjøgangs- og manøvreringslaboratorium |
| | Ministry of Trade, Industry and Fisheries | NFD | Nærings- og Fiskeridepartementet |
| NTNU | Norwegian University of Science and Technology | NTNU | Norges teknisk-naturvitenskapelige universitet |
| OSC | Ocean Space Centre | OSC | Ocean Space Centre |
| | Carriage | | Kjørevogn |
| FRC | Fast Running Carriage | | Hurtiggående kjørevogn |
| WGS | Wave Generation System | | Bølgegenereringssystem |
| WAS | Wave Absorption System | | Bølgeabsorberingssystem |

| Abbreviation [ENG] | Explanation English | Abbreviation [NO] | Explanation Norwegian |
|---|---|---|---|
| WTP | Water Treatment Plant | VBH | Vannbehandlingsanlegg |

# 3 GENERAL REQUIREMENTS

Contractor or supplier shall follow the requirements in this document to structure tagging in all parts of their work for engineering, procurement, construction, installation and commissioning of user equipment.

## 3.1 TAG CODES

All physical user equipment such as valves, instruments, pumps, cables, piping, units, skids and mechanical structures (e.g. cranes, towing carriage, lifting beams etc.) shall be uniquely identified with a tag identification number.

## 3.2 Tagging & Marking Guideline

A “Tagging and Marking Guideline” shall be developed by Contractor and Supplier to further clarify and describe Contractor's/Supplier's tagging and marking solutions based on TFM NS-3457 part 7, 8 and 9, OSC-SB-O-SD-00004 Tagging requirements and requirements in this amendment.

## 3.3 ENGINEERING DATABASE

Tag identification numbers must be listed in an Engineering Database and indicated at drawings and relevant documents in the same code format by the contractor.

The coding shall ensure traceability throughout all project phases. Contractor/Supplier shall develop, administrate, and continuously update an engineering tag database as required to hold all relevant information during project execution. Each entity of tags in the database shall have a reference to relevant drawings and documents where tags are referenced (tag/document mapping). Necessary fields and properties in the database shall be allocated so that mappings between Contractor/Supplier and Statsbygg systems (dRofus) can easily be performed.

The unique engineering database Tag code shall be the written reference on all drawings and documents, regardless of where the source information came from, unless otherwise agreed with Statsbygg.

## 3.4 Tagging of software and hardware signals

Tagging of software and hardware signals and identification of internal components and items e.g. for electrical systems and wiring diagrams, shall follow international standards and be outlined as part of the Contractor’s or Supplier's “Tagging and Marking Guideline”.

## 3.5 Tagging of electrical equipment, cables and cabinets

NS-3457 and OSC-SB-O-SD-00004 Tagging requirements describes how this is to be completed.

# 4 Area Codes

The following area codes shall apply for OSC when it is completed**:

| Area Code | Area Name | Area Name [Norwegian term] |
|---|---|---|
| 6000 | Outdoor Area and Plants | Uteareal og -anlegg |
| 6010 | The New Building ( A ) | Nybygget ( A ) |
| 6020 | Flexlab ( C ) | Flexlab ( C ) |
| 6030 | Wet Labs ( B ) | Våte Laboratorier ( B ) |
| 6040 | Bike Parking | Sykkelparkering |
| 6050 | Tank Head | Tankhodet |
| 6400 | Cavitation lab* | Kavitasjonstanken* |
| 6381 | Towing tank, existing | Slepetank, eksisterende |

* **NOTE**: The Cavitation Laboratorium is an existing laboratory and not a part of the OSC-project but is included for the purpose of describing interfaces, i.e. technical, functional etc.

**NOTE**: The towing tank is the existing shortened towing tank. This installation will not be in use after OSC is completed.

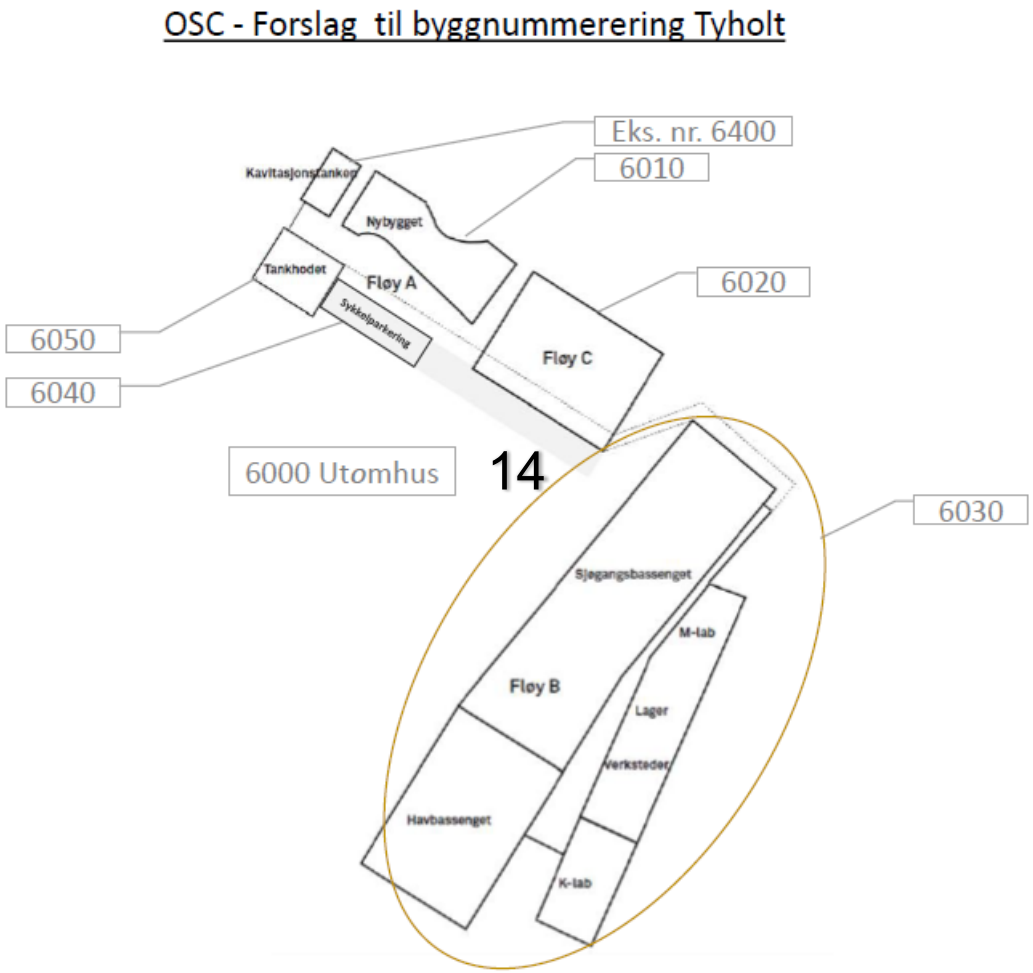


**Figure**: Area Coding

# 5 System Codes

In addition to the system codes in SB doc. NS3457, and NS3451 the following system codes shall apply for OSC:

| System Codes | System Name [Norwegian term] | System Name | Note |
|---|---|---|---|
| 345 | Trykkluftsystem<br><br>Tekniske rom k-lab:<br>1 kompressor | Compressed air system | From TFM NS-3451: Gass og trykkluft |
| 349 | Hydraulikksystem | Hydraulic system | TFM NS-3451: Andre installasjoner til gass- og trykkluft |
| 354 | Kjølesystem | Cooling system | TFM NS-3451: Kjølesystem for produksjonsprosesser |
| 389 | Vannbehandlingssystem | Water treatment system | From TFM NS-3451: Annen vannbehandling |
| 391 | Tungolje system | Heavy oil system | TFM NS-3451: Andre VVS-installasjoner |
| 392 | Diesel system | Diesel system | TFM NS-3451: Andre VVS-installasjoner |
| 393 | Hydrogen system | Hydrogen system | TFM NS-3451: Andre VVS-installasjoner |
| 394 | Ammoniakk system | Ammonia system | TFM NS-3451: Andre VVS-installasjoner t |
| 395 | Flytende naturgass system | Liquid natural gas (LNG) system | TFM NS-3451: Andre VVS-installasjoner |
| 396 | Avgassbehandlingssystem | Exhaust treatment system | TFM NS-3451: Andre VVS-installasjoner |
| 397 | Kjøle-/varmesystem for dynamiske testrigger | Heating-/Cooling system for dynamic test rigs | TFM NS-3451: Andre VVS-installasjoner |
| 660 | Vinsjsystem for hybrid testing | Winch for hybrid testing | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 661 | Strømningssystem | Flow generation system | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 662 | Bølgegenereringssystem | Wave generation system | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 663 | Bølgeabsorbsjonssystem | Wave absorption system | From TFM NS-3451: Fastmontert |

| System Codes | System Name [Norwegian term] | System Name | Note |
|---|---|---|---|
| | | | spesialutrustning for virksomhet |
| 664 | Bevegelig bunnsystem | Movable floor system | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 665 | Kjørevognsystem | Carriage system | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 666 | Fastmonterte verkstedsmaskiner | Fixed workshop machines | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 667 | Dynamiske testmaskiner | Dynamic machines for testing | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 668 | Bølgerenne | Wave chute | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 669 | Diverse fastmontert utstyr | Fixed equipment | From TFM NS-3451: Fastmontert spesialutrustning for virksomhet |
| 671 | Vindgenereringssystem | Wind generation system | From TFM NS-3451: Løs spesialutrustning for virksomhet |
| 672 | Flyttbare maskiner og utstyr | Movable workshop machines and equipment | From TFM NS-3451: Løs spesialutrustning for virksomhet |
| 673 | Dykkerutrustning | Diving equipment | From TFM NS-3451: Løs spesialutrustning for virksomhet |

Any additional system codes required to tag user equipment must be approved by Company and shall be listed as part of the Contractor's/Supplier's "Tagging and marking guideline".

# 6 Component Codes

Component codes in NS 3457 part 8, "Klassifikasjon av byggverk Del 8 Komponentkoder i bygninger" shall apply for user equipment in OSC.

In addition to the component codes in NS 3457 part 8, the following main component codes shall apply for OSC:

| Component Codes | Component Name [Norwegian] | Component Name | Note |
|---|---|---|---|
| AWK | Kran | Crane | TFM NS-3457: Bærende/ Romdannende Kran |
| AWS | Søylekran | Column crane | TFM NS-3457: Bærende/ Romdannende Kran |
| AWT | Traverskran | Traverse crane | TFM NS-3457: Bærende/ Romdannende Kran |
| GAA | Plansliper og høvel | Planer and planer | TFM NS-3457: Automat eller maskin |
| GAB | Boremaskin | Drilling machine | TFM NS-3457: Automat eller maskin |
| GAC | Sandblåsekabinett | Sandblasting cabinet | TFM NS-3457: Automat eller maskin |
| GAD | Dreiebenk | Lathe | TFM NS-3457: Automat eller maskin |
| GAE | Skrogfres | Hull milling machine | TFM NS-3457: Automat eller maskin |
| GAF | Fresemaskin | Milling Machine | TFM NS-3457: Automat eller maskin |
| GAG | Pusseboks | Grinding box | TFM NS-3457: Automat eller maskin |
| GAK | Platekutter | Cutting Machine | TFM NS-3457: Automat eller maskin |
| GAK | Plateknekker | Folding machine | TFM NS-3457: Automat eller maskin |
| GAK | Profilklipper | Profile cutter | TFM NS-3457: Automat eller maskin |
| GAL | Lakkboks | Painting box | TFM NS-3457: Automat eller maskin |
| GAM | Sag | Saw | TFM NS-3457: Automat eller maskin |
| GAN | Sveiseutstyr | Welding equipment | TFM NS-3457: Automat eller maskin |
| GAU | Gnistmaskin | Spark machine | TFM NS-3457: Automat eller maskin |
| GAP | 3D-printer | 3D printer | TFM NS-3457: Automat eller maskin |

| Component Codes | Component Name [Norwegian] | Component Name | Note |
|---|---|---|---|
| GAR | Presse | Press | TFM NS-3457: Automat eller maskin |
| GAS | Platesaks | Guillotine | TFM NS-3457: Automat eller maskin |
| GAV | Valse | Rolling machine | TFM NS-3457: Automat eller maskin |
| GAW | Vannskjærer | Water cutting machine | TFM NS-3457: Automat eller maskin |
| GAO | Skjærebrenner og plasmakutter | Cutting torch and plasma cutter | TFM NS-3457: Automat eller maskin |
| GAY | Vinkelsliper | Grinder | TFM NS-3457: Automat eller maskin |
| GAZ | Diverse maskiner | Various engines | TFM NS-3457: Automat eller maskin |
| GIA | Materiallager | Material storage | TFM NS-3457: Automat eller maskin |
| GIB | Verktøylagring | Tool storage | TFM NS-3457: Automat eller maskin |
| IHB | Hydraulisk brems | Hydraulic brake | TFM NS-3457: Produserende |
| IMZ | Forbrenningsmotor | Combustion engine | TFM NS-3457: Produserende |
| IME | Elektrisk motor | Electrical engine | TFM NS-3457: Produserende |
| IKK | Kjøleanlegg | Cooling system | TFM NS-3457: Produserende |
| IGD | Diverse utstyr generator | Various equipment generator | TFM NS-3457: Produserende |
| JPA | Sirkulasjonspumpe, vannstrøm | Circulating pump, Flow Generation | TFM NS-3457: Sirkulasjonspumpe |
| MZE | Eksosrensig | Exhaust cleaning | TFM NS-3457: Filtrerende |
| MWS | Scrubber | Scrubber | TFM NS-3457: Filtrerende |
| OFF | Drivstoffsystem | Fuel system | TFM NS-3457: Prosesserende |
| RYP | Partikkeldetektor | Particle detector | TFM NS-3457: Registrerende |
| ZAB | Bølgedemper | Wave attenuator | TFM NS-3457: Spesielt prosessutstyr Absorberende |
| ZAS | Støydemper | Silencer | TFM NS-3457: Spesielt prosessutstyr Absorberende |

| Component Codes | Component Name [Norwegian] | Component Name | Note |
|---|---|---|---|
| ZBK | Kjørevogn | Carriage | TFM NS-3457: Spesielt prosessutstyr Bevegende |
| ZBD | Dynamisk testmaskiner | Dynamic testing rig (DTR) | TFM NS-3457: Spesielt prosessutstyr Bevegende |
| ZD | Dykke- og undervannssystem | Diving- and under water system | TFM NS-3457: Spesielt prosessutstyr |
| ZGB | Bølgegeneringsmaskin | Wave generation machine | TFM NS-3457: Spesielt prosessutstyr Genererende |
| ZGV | Vindgenereringsvifte | Wind generation fan | TFM NS-3457: Spesielt prosessutstyr Genererende |
| ZGS | Strømgenereringssystem | Flow generation system | TFM NS-3457: Spesielt prosessutstyr Genererende |
| ZH | Havinstallasjoner | Ocean Basin installations | TFM NS-3457: Spesielt prosessutstyr |
| ZK | Kjøle/Varmeanlegg | Cooling- and heating system | TFM NS-3457: Spesielt prosessutstyr |
| ZMD | Diverse instrumentering | Various instrumentation | TFM NS-3457: Spesielt prosessutstyr |
| ZMG | Gasskromotograf | Gas chromotograph | TFM NS-3457: Spesielt prosessutstyr |
| ZMK | Kontrollenheter, mobile | Control units, mobile | TFM NS-3457: Spesielt prosessutstyr |
| ZMS | Simulatorer | Simulator | TFM NS-3457: Spesielt prosessutstyr |
| ZMT | Testrigger | Test units | TFM NS-3457: Spesielt prosessutstyr |
| ZMZ | Annet utstyr | Other equipment | TFM NS-3457: Spesielt prosessutstyr |
| ZV | Verneutstyr | Safety equipment | TFM NS-3457: Spesielt prosessutstyr |
| Å | Diverse arbeid | Various work | |

Any additional component codes required to tag user equipment shall be listed as part of the Contractor's/Supplier's "Tagging and marking guideline".

# 7 Sequence Line Number for Piping

The sequence line number will change as follows:

a) At equipment connections
b) At pipe material changes
c) At pipe dimension changes
d) At pipe pressure changes

The sequence line number shall not change at following cases:

e) At valves (even if line is reduced locally to accommodate the valve)
f) At tees for the main flow
g) At floor or wall penetrations
h) At change of Area Code

# 8 Examples of user equipment tagging

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ++ | Lokaliserings-ID | = | Systemforekomst-ID | | | | | | - | Komponentforekomst-ID | | % | Komponenttype-ID | | | | | |
| | | | Systemkomponent | | | | Under-nummer | | | Komponent-kode[b] | Nummer | | Komponent-kode[b] | . | Nummer | : | Under-nummer | |
| | | | System kode[a] | . | Nummer | : | | | | | | | | | | | | |

**Tegnforklaring**
a Se veiledning til NS 3451
b Se NS 3457-8:2020

**Figure**: User equipement tag format

«LokaliseringsID» or Localization code shall be 4-digit, where the first digit represents what NTNU Campus this is, and the last 3 digits represents what building on campus the tag represents. See the figure for area coding above.

| Equipment tag | Example | Explanation |
|---|---|---|
| Ocean Laboratorium | | |
| Flow generation unit | ++6002=661.001-JPA-000%JPA.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>661.001 = Flow generation system<br>JPA-000 = Flow generation (component main tag)<br>%JPA.nn:nn = Flow generation unit type |
| Flow generation module 1<br>pump no. 001 | ++6002=661.001:01-JPA-001%JPA.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>661.001:01 = Flow generation system module 1<br>JPA-001 = Flow generation pump no. 001<br>%JPA.nn:nn = Flow generation pump type |
| Flow generation module 2<br>pump no. 002 | ++6002=661.001:02-JPA-002%JPA.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>661.001:02 = Flow generation system module 2<br>JPA-002 = Flow generation pump no. 002<br>%JPA.nn:nn = Flow generation pump type |
| Flow generation system module 2 & flow transmitter no. 002 | ++6002=661.001:02-RFB-002%RFB.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>661.001:02 = Flow generation system module 2 |

| Equipment tag | Example | Explanation |
|---|---|---|
| | | RFB-002 = Flow transmitter transmitter no. 002<br>%RFB.nn:nn = Flow transmitter type |
| Flow generation system module 3 & flow transmitter no. 001 | ++6002=661.001:03-RFB-001%RFB.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>661.001:03 = Flow generation system module 3<br>RFB-001= Flow transmitter no. 001<br>%RFB.nn:nn = Flow transmitter type |
| Wave generation unit<br>(Stemplet på maskinskilt bølgemaskin) | ++6002=662.001-ZGZ-000%ZGZ.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>662.001 = Wave generation system<br>ZGZ-000 = Wave generation Unit (component code main tag)<br>ZGZ.nn:nn = Wave generation type |
| Wave generation module no.1 | ++6002=662.001:01-ZGZ-000%ZGZ.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>662.001:01 = Wave generation system module 1<br>ZGZ-000 = Wave generation Unit (component code main tag)<br>ZGZ.nn:nn = Wave generation module type |
| Wave generation system in Ocean Laboratoriummodule no 1 & actuator no: 001 | ++6002=662.001:01-XMZ-001%XMZ.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>662.001:01 = Wave generation system module 1<br>XMZ-001 = Motor/actuator no: 001<br>XMZ.nn:nn = Motor/actuator type |
| Wave generation system in Ocean Laboratoriummodule no 1 & actuator no: 002 | ++6002=662.001:01-XMZ-002%XMZ.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>662.001:01 = Wave generation system module 1<br>XMZ-002 = Motor/actuator<br>no: 002<br>%XMZ.nn:nn = Motor/actuator type |
| Wave generation system in Ocean Laboratoriummodule no 2 & actuator no: 001 | ++6002=662.001:02-XMZ-001%XMZ.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>662.001:02 = Wave generation system module 2 |

| Equipment tag | Example | Explanation |
|---|---|---|
| | | XMZ-01 = Motor/actuator no. 001<br>%XMZ.nn:nn = Motor/actuator type |
| Wave generation system in Ocean Laboratoriummodule no 2 & actuator no: 002 | ++6002=662.001:02-XMZ-002%XMZ.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>662.001:02 = Wave generation system module 2<br>XMZ-02 = Motor/actuator<br>no.: 002<br>%XMZ.nn:nn = Motor/actuator type |
| Seakeeping and Manoeuvring Basin | | |
| Kjørevogn Sjøgangs- og manøvreringslaborium/ Carriage unit Sea keeping<br>(Stemplet på maskinskilt til Slepevogn) | ++6006=665.001-ZCZ-000%ZCZ.nn:nn | ++6006= Sjøgangs- og manøvreringslaborium/Sea keaping<br>665.001 = Carriage system<br>ZCZ-000 = Spesielt prosessutstyr, kjørevogn. (component code main tag)<br>%XMZ.nn:nn = Tow carriage type |
| Motor for Carriage system in Sea keeping basin | ++6006=665.001-XMZ-001%XMZ.nn:nn | ++6006= Sjøgangs- og manøvreringslaborium/Sea keaping<br>665.001 = Carriage system<br>XMZ = Engine<br>001 = Serial number<br>%XMZ.nn:nn = Engine type |
| Instrumentation Carriage system in Sea keeping basin | ++6006=665.001-RSZ-001%RSZ.nn:nn | ++6006= Sjøgangs- og manøvreringslaborium/Sea keaping<br>665.001 = Carriage system<br>RSZ = speedometer<br>001 = Serial number<br>%RSZ.nn:nn = Instrument type |
| HMI-control of Carriage system in Sea keeping basin | ++6006=665.001-UKZ-001%UKZ.nn:nn | ++6006= Sjøgangs- og manøvreringslaborium/Sea keaping<br>665.001 = Carriage system<br>UKZ = Control panel<br>001 = Serial number<br>%UKZ.nn:nn = HMI/PLC type |
| Piping | | |
| Piping Havbasseng TFM | ++6002=661.001-KRA-001%KRA.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>661.001 = Flow system |

| Equipment tag | Example | Explanation |
|---|---|---|
| | | KRA = Rør for væske<br>001 = Serial number<br>%KRA.nn:nn = Pipe type |
| Piping Water treatment Ocean basin | ++6002=389.001-KRA-001%KRA.nn:nn | ++6002= Havlaboratorium/Ocean Laboratorium<br>389.001 = Water treatment system<br>KRA = Rør for væske<br>001 = Serial number<br>%KRA.nn:nn = Pipe type |
| Piping Water treatment Sea keeping basin | ++6002=389.001 -KRA-001%KRA.nn:nn | ++6002= Sea keeping<br>389.001 = Water treatment system<br>KRA = Rør for væske<br>001 = Serial number<br>%KRA.nn:nn = Pipe type |
| Piping Diesel M-Lab | ++6005=392.001-KQA-001%KQA.nn:nn | ++6005= M-Lab<br>392.001 = Diesel system<br>KQA = Rør for drivstoff<br>001 = Serial number<br>%KQA.nn:nn = Pipe type |
| Piping Hydrogen M-Lab | ++6005=393.001 -KRC-001%KRC.nn:nn | ++6005= M-Lab<br>393 = Hydrogen system<br>KRC = Rør for gass<br>001 = Serial number<br>%KRC.nn:nn = Pipe type |
| Piping ammonia M-Lab | ++6005=394.001 -KRC-001%KRC.nn:nn | ++6005= M-Lab<br>394.001 = Ammonia system<br>KRC = Rør for gass<br>001 = Serial number<br>%KRC.nn:nn = Pipe type |
| Piping LNG M-Lab | ++6005=395.001-KRC-001%KRC.nn:nn | ++6005= M-Lab<br>395.001 = LNG system<br>KRC = Rør for gass<br>001 = Serial number<br>%KRC.nn:nn = Pipe type |
| Piping Trykkluft M-Lab | ++6005=345.001 -KRC-001%KRC.nn:nn | ++6005= M-Lab<br>345.001 = Trykkluftsystem<br>KRC = Rør for gass |

| Equipment tag | Example | Explanation |
|---|---|---|
| | | 001 = Serial number<br>%KRC.nn:nn = Pipe type |
| Piping Hydraulikk M-Lab | ++6005=349.001-KRA-001%KRA.nn:nn | ++6005= M-Lab<br>349.001 = LNG system<br>KRA = Rør for væske<br>001 = Serial number<br>%KRA.nn:nn = Pipe type |

# 9 References

Veiledning til NS 3457-7 Veiledning til bruk av TFM-systemet

Veiledning til NS3451 Veiledning til bruk av systemkoder fra NS3451 i identifikasjon og merking

NS3457-7 Klassifikasjon av byggverk Del 7 Identifikasjon i digitale modeller for merking i bygninger

NS3457-8 Klassifikasjon av byggverk Del 8 Komponentkoder i bygninger

NS3457-9 Klassifikasjon av byggverk Del 9 Merking av systemer og komponenter i bygninger