



**R1 05 80 01      Technical Directive**

Drawing regulations for Tata Steel in  
IJmuiden Netherlands

Author           : H.J. Heinis

Issue            : August 2011

Version          : 2.0

Intended for the Location IJmuiden

If this document is changed in the future, the amendments will not be sent to you.  
The latest version can be retrieved via Intranet of Tata Steel IJmuiden (Projectnet) or  
<https://www.tatasteeleurope.com/ts/nl/gezondheid-en-veiligheid/toegang-en-veiligheid-ijmuiden/voorschriften>

Information and amendments:

Subject of document   M. Ton  
Ptc-adm@tatasteel.com

tel. +31 (0)251-4 94443  
tel. +31 (0)251-4 94443



**Contents:**

<b>1. GENERAL REGULATIONS .....</b>	<b>6</b>
1.1. SCOPE OF THE REGULATIONS .....	6
1.2. FIELDS OF APPLICATION .....	6
1.3. DISCIPLINES.....	6
1.4. STANDARDS.....	6
1.5. DEVIATIONS.....	6
1.6. REFERENCES ON DRAWINGS.....	7
<b>2. REQUIREMENTS CONCERNING FILING AND REPRODUCTION .....</b>	<b>8</b>
2.1. MATERIAL .....	8
2.2. FORMAT AND LAY-OUT.....	8
2.3. TITLE BLOCK.....	8
2.4. RESPONSIBILITY .....	8
2.5. ARCHIVE- AND PAGE NUMBERS.....	9
2.6. TECHNICAL CALCULATIONS.....	9
2.6.1. <i>Presentation</i> .....	9
2.6.2. <i>Accessibility</i> .....	9
2.6.3. <i>Data concerning computer calculations</i> .....	9
2.6.4. <i>Program description</i> .....	10
2.6.5. <i>Availability originals</i> .....	10
2.6.6. <i>Format en material</i> .....	10
2.6.7. <i>Reproducibility</i> .....	10
2.6.8. <i>Additional provisions relating to the technical content</i> .....	10
2.6.9. <i>Calculation check</i> .....	10
2.6.10. <i>Filing digital calculations</i> .....	10
2.7. EXCEPTIONS FOR VENDOR DRAWINGS.....	11
<b>3. GENERAL PROVISIONS FOR DRAWINGS.....</b>	<b>12</b>
3.1. PROJECTION METHOD .....	12
3.2. PLACEMENT NORTH ARROW.....	12
3.3. SCALES.....	12
3.4. MODIFICATIONS .....	12
3.5. EXPIRED DRAWINGS .....	12
3.6. CAD-DRAWINGS.....	12
3.7. THE DELIVERY OF SCANNED DOCUMENTS AND PDF DOCUMENTS.....	13
<b>4. MECHANICAL DRAWINGS.....</b>	<b>14</b>
4.1. DRAWINGS.....	14
4.1.1. <i>Design – and plan drawings</i> .....	14
4.1.2. <i>Instruction drawings</i> .....	14
4.1.3. <i>Lay-out drawings</i> .....	14
4.1.4. <i>Process diagrams (PFD and P&amp;ID's)</i> .....	14
4.1.5. <i>Repair drawings</i> .....	14
4.2. NATIONAL AND INTERNATIONAL STANDARDS .....	15
4.3. DRAWING RULES (METHOD OF DRAWING).....	16
4.4. PART LISTS/PART NUMBERS ON DRAWINGS .....	16
4.4.1. <i>Part number</i> .....	16
4.4.2. <i>Numbers</i> .....	17
4.4.3. <i>Designation</i> .....	17
4.4.4. <i>Material</i> .....	17
4.4.5. <i>Model number</i> .....	17
4.4.6. <i>Weight</i> .....	17



4.4.7.	Remarks.....	17
4.5.	TOLERANCES.....	17
4.5.1.	Form- and place tolerances.....	18
4.5.2.	Roughness Values.....	18
4.6.	WELDING INDICATION.....	18
4.6.1.	Welding advise.....	18
4.7.	SPECIAL TREATMENTS.....	18
4.8.	PAINTING REGULATIONS.....	18
4.9.	CALCULATIONS.....	19
4.10.	DRIVE DIAGRAM.....	19
4.11.	TORQUE.....	19
4.12.	AXIS TRANSITIONS / THREAD RUNOUTS.....	19
4.13.	STAIRS AND PLATFORMS.....	19
4.14.	MODIFYING DRAWINGS.....	19
4.14.1.	Retention of information.....	19
4.14.2.	Guideline for the modification of drawings.....	20
4.14.3.	Modifications.....	20
4.14.4.	Repair drawings.....	20
<b>5.</b>	<b>HYDRAULIC DIAGRAMS'S, CALCULATIONS AND DRAWINGS .....</b>	<b>22</b>
5.1.	GENERAL.....	22
5.2.	WORKING DRAWINGS.....	22
5.3.	DIAGRAMS AND DESCRIPTIONS.....	22
5.4.	NOTATION IN HYDRAULIC DIAGRAMS.....	23
5.5.	LINE WIDTHS ON HYDRAULIC DIAGRAMS.....	24
5.6.	LETTERS AND NUMBERS.....	24
5.7.	SPECIAL REQUIREMENTS FOR SYMBOLS USED.....	25
5.8.	DIAGRAM STRUCTURE.....	25
5.9.	INSTALLATION-OVERVIEW (A1 FORMAT).....	26
5.10.	DIAGRAM AND PART LIST (RESPECTIVELY. A1 AND A3-A4 FORMAT).....	26
5.11.	INSTRUCTION DRAWING (A3-A4 FORMAT).....	26
5.12.	LAMINATING DRAWINGS (A4-A3).....	26
<b>6.</b>	<b>PNEUMATIC DIAGRAMS, CALCULATIONS AND DRAWINGS.....</b>	<b>28</b>
6.1.	GENERAL.....	28
6.2.	WORKING DRAWINGS.....	28
6.3.	DIAGRAMS AND DESCRIPTIONS.....	28
6.4.	NOTATION IN PNEUMATIC DIAGRAMS.....	29
6.5.	IMPLEMENTATION LINE WIDTH ON PNEUMATIC DIAGRAMS.....	30
6.6.	LETTERS AND NUMBERS ON PNEUMATIC DIAGRAMS.....	30
6.7.	SPECIAL REQUIREMENTS FOR SYMBOLS USED.....	30
6.8.	STRUCTURE DIAGRAM PACKAGE.....	30
6.9.	INSTALLATION OVERVIEW (A1 FORMAT).....	30
6.10.	DIAGRAM AND PART LIST (RESP. A1 AND A3-A4 FORMAT).....	30
6.11.	INSTRUCTION DRAWING (A3-A4 FORMAT).....	30
6.12.	LAMINATING DRAWINGS (A4-A3).....	31
<b>7.</b>	<b>LUBRICATION SYSEMS DIAGRAMS, CALCULATIONS AND DRAWINGS .....</b>	<b>32</b>
7.1.	GENERAL.....	32
7.2.	WORKING DRAWINGS.....	32
7.3.	DIAGRAMS AND DESCRIPTIONS.....	32
7.4.	NOTATION IN DIAGRAMS FOR LUBRICATION EQUIPMENT.....	33
7.5.	LINE WIDTHS ON DIAGRAMS FOR LUBRICATION EQUIPMENT.....	34
7.6.	LETTERS AND NUMBERS ON DIAGRAMS.....	34
7.7.	SPECIAL REQUIREMENTS FOR APPLICABLE SYMBOLS.....	34



7.8.	STRUCTURE DIAGRAM PACKAGE .....	34
7.9.	INSTALLATION-OVERVIEW (A1 FORMAT) .....	34
7.10.	DIAGRAM AND PART LIST (RESPECTIVELY. A1 AND A3-A4 FORMAT) .....	34
7.11.	INSTRUCTION DRAWING (A3-A4 FORMAT) .....	34
7.12.	LAMINATING DRAWINGS (A4-A3) .....	35
<b>8.</b>	<b>ELECTROTECHNICAL, INSTRUMENTTECHNICAL AND COMPUTERTECHNICAL DRAWINGS ( EIC) .....</b>	<b>36</b>
8.1.	GENERAL .....	36
8.2.	EIC-DRAWINGS .....	36
8.3.	STANDARDS/DIRECTIVES .....	36
8.4.	PART LISTS .....	37
8.5.	CABLE LISTS .....	37
8.6.	MARSHALLING RACK .....	37
8.7.	CALCULATIONS .....	37
8.7.1.	<i>General</i> .....	37
8.7.2.	<i>Implementation</i> .....	37
8.8.	PROJECT PROGRESS .....	38
8.8.1.	<i>General</i> .....	38
8.8.2.	<i>Existing installations</i> .....	38
8.8.3.	<i>New installations</i> .....	38
<b>9.</b>	<b>CIVIL ENGINEERING DRAWINGS AND CALCULATIONS .....</b>	<b>39</b>
9.1.	VALIDITY .....	39
9.2.	REQUIREMENTS FOR DRAWINGS .....	39
9.2.1.	<i>General</i> .....	39
9.2.2.	<i>Required information</i> .....	39
9.2.3.	<i>Arrangement</i> .....	39
9.2.4.	<i>Concrete parts</i> .....	40
9.2.5.	<i>Steel constructions</i> .....	40
9.2.6.	<i>Layout charts</i> .....	40
9.2.7.	<i>Roads, railway tracks and sewers</i> .....	40
9.2.8.	<i>Foundation-and anchor plans</i> .....	40
9.2.9.	<i>Layer and line colour structure</i> .....	40
9.3.	REQUIREMENTS FOR DEFINITIVE CALCULATIONS .....	41
<b>10.</b>	<b>MEDIASYSTEMS DIAGRAMS, LISTS AND DRAWINGS .....</b>	<b>42</b>
10.1.	GENERAL .....	42
10.2.	DIAGRAMS .....	42
10.2.1.	<i>Process Flow Diagram (PFD)</i> .....	42
10.2.2.	<i>Piping and Instrumentation Diagram (P&amp;ID)</i> .....	42
10.2.3.	<i>Symbols &amp; standards applied</i> .....	43
10.3.	PIPING LIST .....	43
10.4.	APPENDAGE LIST .....	43
10.5.	EQUIPMENT LIST .....	43
10.6.	KEY PLAN DRAWING (A1 FORMAT) .....	44
10.7.	LAY-OUT DRAWINGS (A1 FORMAT) .....	44
10.8.	DETAIL DRAWINGS (A1 FORMAT) .....	44
<b>11.</b>	<b>REFERENCES .....</b>	<b>45</b>



Blanc page

**TATA STEEL**

**Business Unit / Function / Sector**

Address code 3H-17, PO Box 10.000, 1970 CA IJmuiden, The Netherlands  
T: +31 (0) 251 49443 PTC-ADM@tatasteel.com

Tata Steel IJmuiden BV, Trade register 34.040.331



## 1. GENERAL REGULATIONS

### 1.1. Scope of the regulations

- To promote the consistent use of symbols and text in drawings, diagrams and parts lists. This facilitates the readability and makes it easier to incorporate the data into the installation documentation.
- They prescribe the use of Tata Standards, Technical Directives and (inter-) national standards.
- To increase the efficiency of making CAD drawings, especially by re-using existing information.
- To make sure that the revision of drawings is done in a uniform and structured manner.
- To make sure that the document control of drawing management happens in a uniform, structured and secured manner (drawing captions, title blocks, etc.)
- Ensuring, that the information available on the drawings, is legible and reproducible as long as it remains relevant for Tata.

### 1.2. Fields of application

The provisions of this Technical Directive shall apply to all drawings and technical documents that are filed by Tata Steel IJmuiden, either for conventional drawings and drawings created with a CAD system.

### 1.3. Disciplines

The regulations for the production of drawings, diagrams and calculations are applicable to all disciplines

### 1.4. Standards

EN, ISO, NEN, and DIN standards, which refer to drawings and accompanying documents, are applicable. The EN-standards take priority, then the ISO standards after that the NEN standards, and finally followed by the DIN standards, etc, in the sequence mentioned.

In principal these (inter)national standards will be referred to. Where necessary, specific requirements and regulations made by Tata will be binding, see Tata Steel IJmuiden Standards and Technical Directives.

### 1.5. Deviations

Deviations from this Technical Directive are only allowed with written authorisation from the Tata Steel IJmuiden responsible document owner and after consulting PTC ADM (Asset Data Management). Tel: +31 (0)251 494443



## 1.6. References on drawings

References to other related drawings or documents must be clearly marked on the drawing. The use of Tata Steel IJmuiden drawing numbers is mandatory for these referrals.



## **2. REQUIREMENTS CONCERNING FILING AND REPRODUCTION**

### **2.1. Material**

Drawings must be submitted in CAD format that adhere to the Tata Steel IJmuiden CAD regulations. (R1058002)

### **2.2. Format and lay-out**

All drawings, conventional as well as digital CAD drawings, commissioned by Tata Steel IJmuiden, must comply with ISO 5457 ( NEN 379 and NEN 2119). But the following restrictions are effective:

- Only A0, A1, A2 A3 and A4 formats are permitted,
- the position of the drawing caption (title block) must be placed in accordance with ISO 5457 (NEN 2119), as shown respectively in figure 1 and 3.

The CAD-templates issued by Tata Steel IJmuiden comply with these attributes.

### **2.3. Title Block**

The Title block of a drawing must be completely filled with all relevant Information. This Information must be provided by the Tata Steel IJmuiden responsible document owner. This title must correspond with the 'search path structure' of the DMS system for drawings (SAP\_DMS) The use of abbreviations in the title text is not allowed. The technical contents of the drawing must be representative for the purpose of the drawing. This text must be stated in Dutch.

If changes or amendments have to be made within SAP\_DMS then these changes must have been executed prior to handover to Tata Steel IJmuiden. Changes in the search path must be reported to PTC-ADM with the approval of the Tata Steel IJmuiden responsible document owner. For questions concerning the creation of a new search path structure please contact PTC-ADM phone: +31 (0) 251 494443

### **2.4. Responsibility**

The name of the constructor must be clearly labelled. The column, 'Tata Steel IJmuiden responsible document owner' must be filled in. 'The Tata Steel IJmuiden responsible document owner'. (Tekening verantwoordelijke in Dutch) has the Tata steel IJmuiden authority for the creation of new drawings or drawing modification!





## **2.5. Archive- and page numbers**

Every drawing has its own unique drawing number. This number must be requested in advance at PTC-ADM. Multipage drawings are only allowed for A3 and A4 formats. Multipage drawings must have a completely filled in cover sheet with a layer table. (title page) with the page number 0.

For multipage drawings a maximum of 999 pages is allowed.

Only numerical page numbers are allowed.

Alpha-numerical additions are not allowed. (2a-2b etc.)

## **2.6. Technical Calculations**

Technical calculations usually consist of a lot of text and (sometimes) additional sketches and diagrams. This is subject to some exceptions to the general provisions, the subsections below describe these deviations.

### **2.6.1. Presentation**

Besides the requirements listed in the standards, the calculations must at least contain:

- a) the name and address of the engineering's company and the draftsman/engineer
- b) table of contents
- c) overview of the subjects that must be calculated
- d) overview of the fundamentals, regulations and standards used
- e) overview of stress/load and combinations
- f) description of the basic assumptions and preconditions
- g) description of the arithmetic model, arithmetic method and the chosen schematization diagram of the subject
- h) the motivation of the subjects mentioned under e, f and g.

### **2.6.2. Accessibility**

Calculations should be accessible for third parties.

Therefore, calculations should:

- a) be structured systematically and logically
- b) clearly readable
- c) contain overviews of results and testing criteria, and their assessment

Only contain symbols and units of measure complying with the SI-system, as is indicated in NEN 999, NEN 1000 and NEN 3069.

### **2.6.3. Data concerning computer calculations**

Computer calculations, in addition to the under 2.6.1. mentioned data, must also contain:

- a) name and address of the program supplier, and program expert
- b) name and version of the computer program used
- c) indication of the computing equipment used



#### **2.6.4. Program description**

With computer calculations a program description must be submitted, in which at least the following information is provided:

- a) name and version of the software used
- b) description of the scope
- c) description of the calculation method
- d) Description of the used co-ordinate system, if applicable
- e) explanation of the symbols, abbreviations, codes and units
- f) an indication of the accuracy of the calculation results
- g) description of the significance of the presented values
- h) example of calculation

The subjects referred to under d, e, and f need not be included, if the calculation result can be checked by a simple method.

#### **2.6.5. Availability originals**

Tata Steel IJmuiden makes a cover sheet for calculations available. The tracking sheets with the actual calculations are each clearly numbered with a drawing number and sheet number in the lower right corner.

Calculations may consist of more than 999 sheets.

This cover sheet is available through PTC ADM.

#### **2.6.6. Format en material**

Calculations format must be of A4, loose-leaf white paper. The use of different formats is not allowed. Calculations may also be supplied as PDF file.

See section 3.7 for the guideline on the submission of a PDF file.

#### **2.6.7. Reproducibility**

Calculations must have sufficient contrast so legible reproductions or scans can be made. PTC ADM checks for readability and reproducibility of the document.

#### **2.6.8. Additional provisions relating to the technical content**

Besides the provisions mentioned in the general section of this Technical Guideline, certain business sections may impose additional requirements with regards to their specialty. These are valid if they relate to the technical part of this Technical Guideline and / or are have been declared applicable at the start of a project.

#### **2.6.9. Calculation check**

Calculation results must be checked at one or more normative points by means of a control calculation, this check must be done in a manner independent of the computer program. This calculation check should be included in the calculation.

#### **2.6.10. Filing digital calculations**

See section 3.7



## 2.7. Exceptions for vendor drawings

If standard drawings, are considered as supplier drawings, **and are not specifically commissioned by Tata Steel IJmuiden**, but belong to a standard product from this supplier. Then contact should be made with PTC ADM on how these drawings should be submitted.

These drawings are only filed by PTC ADM Tata Steel IJmuiden if:

- they comply with the requirements stated in Chapter 2, except for section 2.4.,
- the paper size is not greater than A0,
- the suppliers drawing number is crossed out but still legible.



### **3. GENERAL PROVISIONS FOR DRAWINGS**

#### **3.1. Projection method**

The placement of the viewing aspect must match the third quadrant projection method according to ISO 128 (NEN 2351) (American projection method). This should be indicated on the drawing.

#### **3.2. Placement north arrow**

If applicable, the drawings must be arranged in such a way that the North arrow points to the top of each drawing, the title block is located on the bottom right. The position of the north arrow is preferably placed top left on the drawing.

#### **3.3. Scales**

The applied scales, according to ISO 5455, should be indicated in the Title Block. If multiple scales are applied this must then be indicated connected to the relevant part.

#### **3.4. Modifications**

With each modification, the version number (numeric) and a clear description must be taken down in the Title Block.

#### **3.5. Expired drawings**

If a drawing expires, this should be indicated to the Tata Steel IJmuiden responsible document owner. After approval it passes to PTC-ADM. PTC ADM processes this request.

#### **3.6. CAD-drawings**

CAD drawings must comply with the Tata Steel IJmuiden CAD Drawing Requirements R1058002.



### 3.7. The delivery of scanned documents and PDF documents

Delivering Calculations and Technical Construction Files at ADM must be done in Portable Data Format (PDF).

If the document is a digital file, the PDF must be generated from the application in which the document was created (e.g. Word, Excel, etc.).

If the document has to be scanned, the document must meet the following requirements:

- Resolution of DPI = 200x200 dpi.
- Scanned information must be in a vertical position.
- Scanned information must be legible.
- The document must have a Tata Steel cover sheet with a completed version table.
- Tata Steel IJmuiden has a template available. This template can be requested at PTC ADM
- Filename PDF document: B41046-0000-00-000.pdf-000.PDF or X12345-000.PDF
- Page numbers must be present at the bottom of each page, aligned to the right. The cover sheet of Tata Steel carries page number 0.
- If the document is black and white it must be scanned as such. No blue haze on the document.
- Documents should be A3 or A4.
- A PDF should not replace an existing CAD drawing.
- A technical drawing may not be offered as a PDF file.

PTC ADM checks for readability and reproducibility of the scanned document.



## 4. MECHANICAL DRAWINGS

### 4.1. Drawings

In this Technical Directive, We understand drawings to mean:

- assembly drawings
- sub- assembly drawings
- detail drawings

In this Technical Directive, We understand drawings to mean:

Those drawings necessary for the assembly and maintenance of installations

Drawings are broadly divided as follows:

#### 4.1.1. *Design – and plan drawings*

In these drawings the pre-design phases are recorded and serve as a basis for detailed design.

#### 4.1.2. *Instruction drawings*

These Drawings are exclusively produced to serve a special purpose and they have no function for maintenance, etc

#### 4.1.3. *Lay-out drawings*

Overviews and cross-sections of the situation.

#### 4.1.4. *Process diagrams (PFD and P&ID's)*

For a guideline on Process Flow Diagrams (PFD's) and Piping and Instrumentation Diagrams (P & IDs) see section 10 on Media.

#### 4.1.5. *Repair drawings*

Concerns drawings in principle produced to support a one-time repair. When new items are ordered it will in general desire a different structure.



#### 4.2. National and international standards

For mechanical drawings the following national and international standards are applicable:

**Table 1**

Name	National and international standards					
	NEN	NEN-ISO	DIN	ISO	NPR	EN
Axis transitions			DIN 76			
Calculations						
Casting			1683-1	8062		
Cones and taper conoids	11027					
Welding symbols			1912-5	2553		22553
Length and angel tolerances			7168			
Letters and numbers	3225		1451	3098, 1 t/m 4		
Line thicknesses				128		
Dimensions	2058			129		
Material designation ferrous metals		10025				
Fits and tolerances		286-1		286-1		20286-1
Surface roughness values				1302		
Scales		5455		5455		
Thread	NEN-EN-ISO 6410, 1 t/m 3			6410		6410, 1 t/m 3
Symbols for piping					2196	
Gears	74			2203		
Tensile and compression springs		T-2162-1 D-2162-1		T-2162-1 D-2162-1		T-2162-1
Shape and position tolerances		2768				
Stairs and working platforms						
Projection Methods	2351			128		
Paper sizes of drawings	2119			5457		
Lay-out of drawings	2119			5457		



#### 4.3. Drawing rules (method of drawing)

If, it is necessary for the sake of clarity, in addition to assembly drawings, sub-assembly drawings must be made. If parts of standard drawings are used or drawings that do not belong to the installation, then they must be listed in the part list next to the drawing number under the heading remarks.

Detailed drawings (parts, etc.) should be divided in frames whose dimensions meet standard paper sizes.

For each frame a parts list must be drawn, beside the parts number the drawing number must be listed here.

In the column name, the name of the particular component and the 'clean sizes' must be stated.

Components that are also implemented in a mirror image, in addition to the normal construction design should also be drawn mirrored and both parts will therefore get two different part numbers.

It concerns only those parts that undergo a metal cutting process and of which it may reasonably be assumed to be included in the installation documentation. For larger steel parts such as conveyor belts, machine supports and the like, separate mirror image drawings are not necessary.

In the division of the detailed drawing it should be taken into account that machined parts and subassemblies where possible should be grouped.

#### 4.4. Part lists/part numbers on drawings

In or beside the assembly or sub-assembly drawing a bill of material must be made in which all commercial and manufacturing parts are included.

On the BOM, related to the detail or working drawings, all plates, rods and shafts are listed in relation to their individual components.

For servicing parts Internal to Tata Steel in IJmuiden, the following procedure has been established:

Parts Welded Together are given an item number. The plates and profiles from which the component is created are indicated with a sequential letter (A, B, C, D, etc.).

NOTE: The letters I and O may not be used.

If 24 positions are not sufficient, the remaining part numbers must be designated BB, BC, BD, etc.

When this procedure is used it must be done in consultation with the Tata Steel responsible document owner to determine which drawings this method is applicable. Supplier Drawings are not covered by this rule, unless otherwise agreed.

The procedure for completing the part lists are shown in the guidelines listed below.

##### 4.4.1. Part number

Each assembly or sub-assembly drawing should be started using parts number 1





#### **4.4.2. Numbers**

On the parts list of the Assembly or sub-assembly drawing, the numbers are indicated independently per machine or autonomous system component.

If for reasons of clarity the necessity arises this rule is to be ignored. Provided the parts list 'shows' numbers related per .....".

On detail or work drawings the numbers of the composite parts are not indicated.

On Plates and profiles, from which a part is built up, the numbers for each composite element is indicated.

#### **4.4.3. Designation**

In case commercial parts are ordered, the full specification and for specific parts the name of the supplier must be mentioned also.

If one line of text is not sufficient, a second (consecutive) line is used.

Any DIN, NEN and other similar numbers must be declared in the column model NR

#### **4.4.4. Material**

The material designation should be indicated according to the NEN-EN standards (see also Technical Directive R3 78 33 01 'Material Designations "). With the materials description the material number should be stated. To determine the appropriate material specification number, the (internal) Tata Steel IJmuiden list or the 'Stahlschlüssel' cross reference book can be consulted.

Example S235JR\*1.0037 NEN-EN 10025-2

If drawings / parts lists, are indicated which the old material designations they, must be adjusted, but the old material designation shall also be indicated.

#### **4.4.5. Model number**

With cast work the model number should be indicated on the drawing.

#### **4.4.6. Weight**

Weight should be indicated only if the assembled part ways more than approximately 25 kg. For cranes the total weight per drawing must be specified.

#### **4.4.7. Remarks**

In addition to the above observations, the column remarks shall only contain the information that according to the applicable rules can not be stated on the drawing in any other way and only the information which is relevant for procurement and / or manufacture.

#### **4.5. Tolerances**

As a rule the 'basic hole' system is used.

If, for the purpose of length tolerances DIN 7168 is used, then this should be listed on the drawing as general comment including the desired degree of accuracy.



Example: tolerances according to DIN 7168-m.

All different tolerances should be indicated separately. The length tolerances are only valid for non-machined parts. For machined parts, all tolerances in the nominal sizes are indicated. For an accurate tolerance for-perpendicular angles a deviation (in degrees and minutes must be provided. For parts of steel construction and for mechanically machined parts, it is desirable for system sizes to be used.

Accurate right-angled corners to be tolerated should be indicated with a form and orientation tolerance. The use of DIN 7168 for is not permitted for angle tolerances.

#### **4.5.1. Form- and place tolerances**

If form and place tolerances are used, NEN-ISO 2768 must be implemented

#### **4.5.2. Roughness Values**

With components a general surface roughness value will suffice. The deviating values must be stated separately in the relevant area.

Behind the general roughness value the deviating values must be listed. All values must be specified according to Ra values. If it is left to the supplier whether or not to use some machining to reach the desired roughness, 'open' machining symbols may be used.

#### **4.6. Welding indication**

A Weld must be designated according to the ISO 2553z indication.

Tata Steel IJmuiden prefers a non-interrupted line to be placed at the top. For Tata Steel IJmuiden users and engineering firms, this method of drawing is mandatory.

#### **4.6.1. Welding advise**

If, for the purpose of welding, special processing, treatment or electrodes are required, this should be clearly defined with the particular component.

In cases where an opinion is provided by the welding expert this relevant information must also be defined with this particular components general indications.

Example:

General indications should be placed left next to the drawing captions

- Welds not indicated z = 6 - Cat. 3 (IV)
- Break Sharp edges 1 x 45 °
- rounding's not indicated R = 2.

Mind that deviations' from these indications are clearly marked.

#### **4.7. Special treatments**

Special treatments, annealing, tempering, nitrating, etc. must be indicated per relevant component with all necessary parameters (hardness, depth etc.)

#### **4.8. Painting regulations**

For applying the proper preservatives you must be adhere to the Tata Steel IJmuiden Standard S3105601 'Conservation and coating application.



#### **4.9. Calculations**

For all eligible components, the calculations shall be made according to the general requirements as stated in section 2.6.

Calculations, like other drawings must be archived in the Asset Data Management (ADM).

#### **4.10. Drive diagram**

On drawings, where more complex drive mechanisms are shown, a drive diagram must be present. All relevant information, such as power, rpm, gear ratios, should be listed in this diagram. The purpose of this diagram is to assess the nature of the overall transmission without making use of the detailed drawings.

#### **4.11. Torque**

If bolt connections must be tightened with a certain torque then this must be listed by the connection concerned.

#### **4.12. Axis transitions / thread runouts**

With the use of machining tools, and normalized numerically controlled machines, it is necessary to consult DIN 76 509 and DIN be.

For more complicated axis transitions it is necessary to draft a detail drawing.

#### **4.13. Stairs and platforms**

Of stairs and platforms only so-called functional drawings are made. This means that only the main dimensions and the profile dimensions are indicated so that the supplier using standard sheets can produce drawings if necessary. (see Tata Steel IJmuiden Standard S3298001 and drawing A33910).

#### **4.14. Modifying drawings**

Note: Modifying drawings may, if not performed correctly have unpleasant consequences for the executing technical services.

##### **4.14.1. Retention of information**

When modifying existing drawings, the most current information must be retained because it is necessary for:

- Installation documentation
- Spare parts list
- interchange ability of parts
- effective maintenance
- orders (procurement)

The destruction of current information can originate as:



- the original drawing is modified while the existing installation has not yet been adapted or is only partially adapted
- The original drawing is modified but in a later stage is decided not to carry out the modification
- The original drawing is valid for multiple installations but only one installation is modified

In order to accommodate for the drawbacks mentioned, it is necessary to execute the modifications of drawings according to the guidelines specified in the next section.

#### **4.14.2. Guideline for the modification of drawings**

1. Drawings meant for multiple installations over several business units
2. Drawings meant for multiple installations over one business unit
3. Drawings meant for a single installation

Remark:

In case of modifications consultations must be conducted first with the relevant business units to determine whether the requested change can be universally implemented.

In all cases checks must be made for all drawings relating to their components that the accompanying referrals, titling and SAP\_DMS structure are adapted to conform to the new situation.

#### **4.14.3. Modifications**

In case of drawing modifications where the circumstances (see issues above) dictate that the original version must be retained. The following procedure must be adhered to.

1. A copy must be made of the existing drawing; this drawing is valid for the non-modified installation. Title, references etc. must be checked and adjusted where necessary. The original document is modified and equipped with a new number + title. The nature of the application or use must be expressed in the title. In the file copy, referrals and remarks must be stated with the components involved. The nature of the modification must be expressed in the referral. Example: for new design with larger shaft diameter, see fig. ... / part.nr. ...
2. If it is known in advance that the amended component is only valid for one installation of which the modification will be executed in the very short term then it is possible to waive the previously defined guidelines.
3. If a drawing contains more components of which only a limited number is modified, then these relevant components must be placed on separate drawing.

#### **4.14.4. Repair drawings**

If a system component must be modified, but it is predetermined that when ordered an alternative component is desired, the following procedure should be followed.



- For changes (repair proposals) a separate drawing must be produced a referral to these will be listed on the existing drawing.
- After consultation with the technical service department adjust the existing document in such a way that by new orders the correct implementation is provided

Pay attention to the preservation of the relevant information for the remaining components

**TATA STEEL**

**Business Unit / Function / Sector**

Address code 3H-17, PO Box 10.000, 1970 CA IJmuiden, The Netherlands  
T: +31 (0) 251 49443 PTC-ADM@tatasteel.com

Tata Steel IJmuiden BV, Trade register 34.040.331



## **5. HYDRAULIC DIAGRAMS'S, CALCULATIONS AND DRAWINGS**

### **5.1. General**

For the making of hydraulic diagrams, calculations and drawings the general drawing regulations apply as stated in Chapter 1 to 3.

The following additional requirements apply for hydraulics drawings.

### **5.2. Working drawings**

Of hydraulic units, parts of units and piping, which are assembled according to drawings, working drawings must be made according to this guideline Chapter 4, "Mechanical Drawings" are included. In addition to this the standards EN 982 (Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics) and NPR 7401 (Hydraulics and Pneumatics) must be adhered to.

### **5.3. Diagrams and descriptions**

For every hydraulic installation should be made:

- a sequence-time diagram.
- an operating description of the installation.
- a hydraulic diagram.
- an electrical/hydraulically control description.
- an instruction drawing.

These reports should comply with the following requirements:

- the operation of the installation should become clear when reading the diagram and the accompanying descriptions (see ISO 1219-2).
- the symbols used should comply with NEN 3348 (ISO 1219-1).
- the units, quantities and accompanying symbols used should comply with NEN 1000.
- in the parts lists of the diagram drawings all the components should have the following specifications:
  - designation
  - operating conditions
  - relevant pressure and temperature
  - product, catalogue and/or order number
  - Tata Steel IJmuiden standard number or article number

Possible dimensional drawings should be added.



The diagram should contain:

Table 1

Cylinder	<ul style="list-style-type: none"> <li>- cylinder bore</li> <li>- suction hose diameter</li> <li>- hose length</li> <li>- time for in- and out movement of cylinder rod</li> <li>- volume flow with in- and out movement of cylinder rod</li> </ul>	D in mm d in mm s in mm T in s  qv in dm <sup>3</sup> /min.
Pipe	<ul style="list-style-type: none"> <li>- function</li> <li>- external diameter</li> <li>- wall thickness</li> </ul>	D in mm s in mm
Pump	<ul style="list-style-type: none"> <li>- yield</li> <li>- pressure</li> <li>- capacity and rpm of the drive</li> </ul>	qv in dm <sup>3</sup> /min. p in bar p in kW n in rpm
Hydro motor	<ul style="list-style-type: none"> <li>- torque</li> <li>- rpm</li> <li>- piston displacement</li> </ul>	M in Nm n in rpm Vsl in cm <sup>3</sup> /rt
Pressure switch for pressure valve	<ul style="list-style-type: none"> <li>- number *</li> <li>- set pressure</li> </ul>	p in bar
Accumulator	<ul style="list-style-type: none"> <li>- pre-pressure (gas pressure)</li> <li>- volume</li> </ul>	po in bar V in m <sup>3</sup>
Tank	<ul style="list-style-type: none"> <li>- volume</li> <li>- medium</li> </ul>	V in m <sup>3</sup>
Filter	<ul style="list-style-type: none"> <li>- absolute fineness</li> </ul>	in μm
Heating element	<ul style="list-style-type: none"> <li>- capacity</li> </ul>	P in kW
Cooler	<ul style="list-style-type: none"> <li>- capacity</li> <li>- amount of water/oil</li> </ul>	P in kW qv in dm <sup>3</sup> /min.
Valve	<ul style="list-style-type: none"> <li>- number *</li> <li>- (function of valve control)</li> </ul>	

\* Tata Steel IJmuiden will specify the numbers of electrical terminal connections.

#### 5.4. Notation in hydraulic diagrams

- Function descriptions should be noted conveniently-arranged as close as possible to the relevant symbol.
- The part- or pos. number of a component consist of the number of the relevant component in the parts list and a sequence number. The sequence number once given to the pos. number of the component stays inextricable connected to the component. This is because the components can be mentioned in the description of the installation with their pos. number and sequence number.
- References should be noted above the bottom right corner as much as possible



## 5.5. line widths on hydraulic diagrams

See NEN 3348 (ISO1219-1) for a clear understanding of the matter.

**Table 2**

Line type	Description	Example	Line width in mm
Bold Line continuous	Component symbols		0,5
Normal line continuous	Primary piping		0,35
Dotted line large	Secondary piping		0,35
Mixed dotted line	Frame for different merged components. Frames for units on the installation overview		0,35
			0,5

## 5.6. Letters and numbers

**Table 3**

Description	Letters and numbers	Character height in mm
Drawing title	large	3.5
Function description	large	3.5
Part or position numbers	large	3.5
Annotations, pipe diameter. Identification of components of connections to piping, manifolds	small	3.5
Drawing number in the bottom right corner	large	7





5.7. Special requirements for symbols used

Table 4

Symbol	Line thickness in mm	Application
	0,5	Symbol size
	0,5	Flow valve
	0,5	Pump - motor
	0,5	Back flow valve
	0,5	Hose
	0,35	Mechanical connection
	0,35	Circling of part- or pos.nr.
	0,35	Lining of electrical connection numbers
	0,35	Connection of piping to collection blocks or ground- or bezel plates or diversion connection
	0,35	For crossing of unconnected piping in deviation of NEN 3348, art. 1.2.2.

5.8. Diagram structure

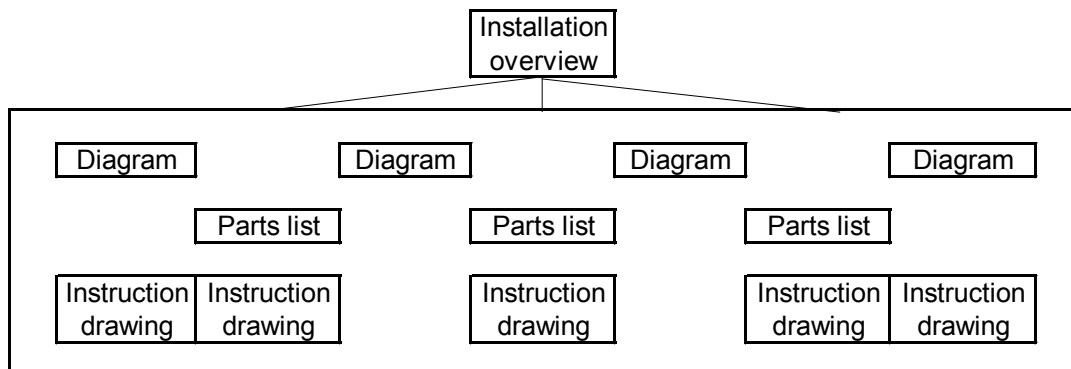


Figure 1



A complex system is divided into units, whereby each unit comes with a parts list, one or more diagrams and one or more accompanying instruction drawings.  
 The diagrams should be build logically and display a clear overview. The layout and sequence of the components on the diagram must match the sequence and layout in the installation.

**5.9. Installation-overview (A1 format)**

The installation summary shows the structure of the complete installation with the interconnecting piping between units.  
 Also, the functional designations to the relevant units are listed.

**5.10. Diagram and part list (respectively. A1 and A3-A4 format)**

With a simple installation one diagram and one parts list will contain all units (As a unit we understand: pumping stations, battery stations, valves table and / or valve cabinets and the like).

**5.11. Instruction drawing (A3-A4 format)**

The instruction drawing contains a simplified composition of a unit or part of a unit to show its assembly All the pos. numbers relevant to the description must be mentioned on this drawing. E.g. part numbers of:

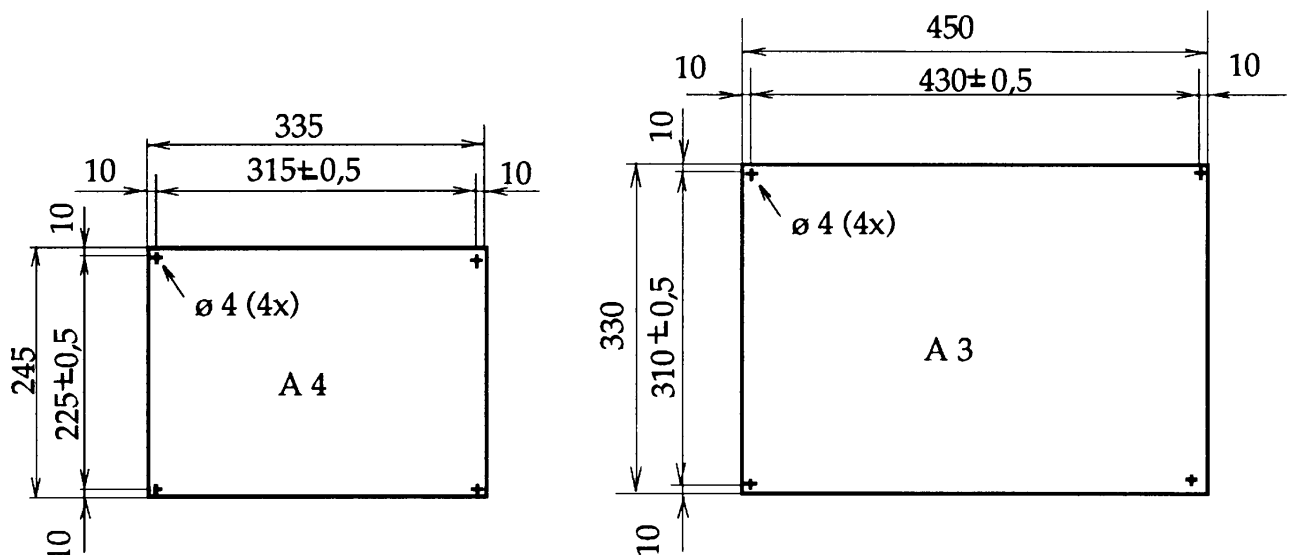
- valves
- ball valves
- intermediate blocks
- manifolds
- monitor equipment

All monitoring points shall be listed and named as well as functional and piping designations.

A function table is required, For defining which magnet(s) must be actuated to perform what function.

**5.12. Laminating drawings (A4-A3)**

Figure 2





The diagrams and accompanying drawings in the installation, are to be laminated on both sides with a thickness of 2 mm and an edge width of 20 mm, at the corners mounting plates with a 4 mm diameter are drilled.  
The corners must be rounded also.



## 6. PNEUMATIC DIAGRAMS, CALCULATIONS AND DRAWINGS

### 6.1. General

When pneumatic diagrams, drawings and calculations are made, the requirements as specified in Section 1 through 3 apply.

The additional requirements for pneumatic drawings are listed in the sections below.

### 6.2. Working drawings

Of units, parts of units and piping, which are assembled according to drawings, working drawings must be included that comply to Chapter 4, "Mechanical Drawings". In addition EN 983 (Safety of pneumatic equipment and NPR 7401 (Hydraulics and Pneumatics) must be followed.

### 6.3. Diagrams and descriptions

The following reports should be made for every pneumatic installation:

- a sequence-time diagram.
- an operating description of the installation.
- a pneumatic diagram.
- an electrical/pneumatic control description.
- an instruction drawing.

These reports should comply to the following requirements:

- These reports should comply with the following requirements:
- the operation of the installation should be clear when reading the diagram and the accompanying descriptions (see ISO 1219-2).
- the symbols used should comply with NEN 3348 (ISO 1219-1).
- the units, quantities and accompanying symbols must comply with NEN 1000.
- in the parts lists of the diagram drawings all the components should have the following specifications listed:
  - designation
  - operating conditions
  - relevant pressure
  - temperature
  - Manufacturer (Brand)
  - product, catalogue and/or order number
  - Tata Steel IJmuiden standard number or article number

Possible dimensional drawings should be added.



**Table 5**

Cylinder	<ul style="list-style-type: none"> <li>- cylinder bore</li> <li>- suction hose diameter</li> <li>- hose length</li> <li>- time for in- and out movement of cylinder rod</li> </ul>	D in mm d in mm s in mm T in s
Turning cylinder	<ul style="list-style-type: none"> <li>- angle</li> <li>- theoretical. moment</li> <li>- piston displacement</li> </ul>	in degrees M in Nm3 in dm
Air motor	<ul style="list-style-type: none"> <li>- torque</li> <li>- rpm</li> <li>- piston displacement</li> </ul>	M in Nm n in rpm Vsl in cm3 /rotation
Pipe	<ul style="list-style-type: none"> <li>- function</li> <li>- external diameter</li> <li>- wall thickness</li> </ul>	D in mm s in mm
Pressure switch pressure valve	<ul style="list-style-type: none"> <li>- number *</li> <li>- set pressure</li> </ul>	p in bar
Air tank	<ul style="list-style-type: none"> <li>- pressure</li> <li>- volume</li> </ul>	p0 in bar V in m3
Filter	<ul style="list-style-type: none"> <li>- absolute fineness</li> </ul>	in $\mu\text{m}$
Air dryer	<ul style="list-style-type: none"> <li>- capacity</li> <li>- pressure</li> <li>- dew point</li> </ul>	qv in dm3/min. p in bar T in °C
Valve	<ul style="list-style-type: none"> <li>- number *</li> <li>- (function of valve control)</li> </ul>	

\* Tata Steel IJmuiden will specify the electrical connection (terminal) number.

#### 6.4. Notation in pneumatic diagrams

- Functional descriptions should be listed neatly-arranged as close as possible to the relevant symbol.
- The part- or position number of a component consist of the number of the relevant component in the parts list and a sequence number. The sequence number once given to a position number of the component stays inextricable connected to the component, this is because the components can be mentioned in the description of the installation with their position number and serial number.
- References should be listed above the bottom right corner as much as possible.



**6.5. Implementation line width on pneumatic diagrams**

See section 5.5.

**6.6. Letters and numbers on pneumatic diagrams**

See section 5.6.

**6.7. Special requirements for symbols used**

See section 5.7.

**6.8. Structure diagram package**

See section 5.8. for the illustration.

A complex system is divided into units, whereby each unit is provided with a parts list, one or more diagrams and one or more instructional drawings. The diagrams should be logically structured and classified. The components on the diagram must correspond to the structure of the components in the system.

**6.9. Installation overview (A1 format)**

The installation overview shows the structure of the complete installation with the interconnecting piping between units.

Also, the functional designations are indicated with their corresponding unit.

**6.10. Diagram and part list (resp. A1 and A3-A4 format)**

A basic installation includes a diagram and parts list of all units (definition of a unit: valve cabinet, conditioning unit, etc.).

**6.11. Instruction drawing (A3-A4 format)**

The instructional drawing includes a simplified composition of a unit, or part of a unit and shows their construction.

In this drawing, all relevant pos.nrs are stated:  
part numbers of:

- valves
- ball valves
- intermediate blocks
- ground- and tack plates
- monitoring equipment.



All monitoring points shall be listed and named as well as functional and piping designations.

A function table is required, for defining which magnet(s) must be actuated to perform what function.

#### **6.12. Laminating drawings (A4-A3)**

The diagrams and accompanying drawings in the installation, are to be laminated on both sides with a thickness of 2 mm and an edge width of 20 mm, at the corners mounting plates with a 4 mm diameter are drilled.

The corners must be rounded also.

For details on dimensions see section 5.12.



## **7. LUBRICATION SYSEMS DIAGRAMS, CALCULATIONS AND DRAWINGS**

### **7.1. General**

For the production of diagrams, drawings and calculations for lubrication equipment, general drawing regulations apply as stated in Chapter 1 through 3.

The additional requirements for pneumatic drawings are listed in the sections below.

### **7.2. Working drawings**

Of units, parts of units and piping, which are assembled according to drawings, working drawings must be included that comply to Chapter 4, "Mechanical Drawings".

### **7.3. Diagrams and descriptions**

For each lubrication system must be provided:

- a description of the operation of the installation
- a diagram for lubrication equipment
- a control description
- a instruction drawing

These reports should comply to the following requirements:

- The operation of the installation should be clear when reading the diagram and the accompanying descriptions
- The symbols used should comply with DIN 24271.
- The units, quantities and accompanying symbols must comply with NEN 1000.
- In the parts lists of the diagram drawings all the components should have the following specifications listed: designation, operating conditions, relevant pressure, temperature, Manufacturer (Brand), product-catalogue and/or order number. Tata Steel IJmuiden standard number.

Possible dimensional drawings should be added.

Part list must be made with a program supplied by Tata Steel IJmuiden for digital part lists.





In the diagram the following Information per part must be listed:

**Table 6**

Grease divider	<ul style="list-style-type: none"> <li>- mass of the lubricant</li> <li>- frequency of application</li> </ul>	m in g/hour
Oil lubrication point	<ul style="list-style-type: none"> <li>- flow volume</li> </ul>	qv in dm <sup>3</sup> /min
Piping	<ul style="list-style-type: none"> <li>- function</li> <li>- outside diameter</li> <li>- wall thickness</li> </ul>	D in mm s in mm
Pump	<ul style="list-style-type: none"> <li>- capacity</li> <li>- pressure</li> <li>- power and speed of the drive</li> </ul>	qv in dm <sup>3</sup> /min p in bar p in kW n in rpm
Pressure switch Pressure valve	<ul style="list-style-type: none"> <li>- number*)</li> <li>- set pressure</li> </ul>	p in bar
Tank	<ul style="list-style-type: none"> <li>- contents</li> <li>- vehicle</li> </ul>	V in m <sup>3</sup>
Filter	<ul style="list-style-type: none"> <li>- fineness (absolute)</li> </ul>	in micrometer
Filter with timer	<ul style="list-style-type: none"> <li>- fineness (absolute)</li> <li>- amount of back flushing's</li> </ul>	in micrometer per day
Heat exchanger	<ul style="list-style-type: none"> <li>- power</li> <li>- amount of steam</li> <li>- amount of oil</li> </ul>	P in kW kg steam/min dm <sup>3</sup> /min
Cooler	<ul style="list-style-type: none"> <li>- capacity</li> <li>- amount of water/oil</li> </ul>	P in kW qv in dm <sup>3</sup> /min
Valve	<ul style="list-style-type: none"> <li>- number*)</li> <li>- (function of the valve control)</li> </ul>	

\* The Electric connection terminal number is given by Tata Steel IJmuiden.

#### 7.4. Notation in diagrams for lubrication equipment

- Functional descriptions should be conveniently arranged listed as close as possible to relevant symbol..
- Part or Pos.numbers of a component consists of a number as listed in the parts list for that component followed by a sequence number.
- This number once given to the Pos.-number of the component remains inseparably linked to that component, this is because, in the operational description of the installation these pos. numbers with their component could be referred to.
- References should be listed as far as possible above the lower right corner.



**7.5. Line widths on diagrams for lubrication equipment**

See section 5.5.

**7.6. Letters and numbers on diagrams**

See section 5.6.

**7.7. Special requirements for applicable symbols**

See section 5.7.

**7.8. Structure diagram package**

A complex system is divided into units, whereby each unit comes with a parts list, one or more diagrams and one or more accompanying instruction drawings. The diagrams should be build logically and display a clear overview. The layout and sequence of the components on the diagram must match the sequence and layout in the installation.

**7.9. Installation-overview (A1 format)**

The installation summary shows the structure of the complete installation with the interconnecting piping between units. Also, the functional designations to the relevant units are listed.

**7.10. Diagram and part list (respectively. A1 and A3-A4 format)**

With a simple installation one diagram and one parts list will contain all units (as unit we understand: pumping stations, battery stations, valves table and / or valve cabinets and the like.

**7.11. Instruction drawing (A3-A4 format)**

The instruction drawing contains a simplified composition of a unit or part of a unit to show its assembly.

All the pos. numbers relevant to the description must be mentioned on this drawing. E.g. part numbers of:

E.g. part numbers of:

- valves
- ball valves
- distribution blocks
- manifolds
- monitoring equipment



All monitoring points shall be listed and named as well as functional and piping designations.

A function table is required, For defining which magnet(s) must be actuated to perform what function.

#### **7.12. Laminating drawings (A4-A3)**

De The diagrams and accompanying drawings in the installation, are to be laminated on both sides with a thickness of 2 mm and an edge width of 20 mm, at the corners mounting plates with a 4 mm diameter are drilled.

The corners must be rounded also.

For details on dimensions see section 5.12.



## 8. ELECTROTECHNICAL, INSTRUMENTTECHNICAL AND COMPUTERTECHNICAL DRAWINGS ( EIC)

### 8.1. General

For EIC drawings the general drawing regulations apply as stated in Chapter 1 through 3.

### 8.2. EIC-Drawings

EIC drawings are usually composed of several schematic diagram drawings merged into one drawing package. The desired composition is determined together with the Tata Steel responsible document owner. The most widely used schematic drawings are:

- Main and control circuit diagrams
- Circuit diagrams
- Connection diagrams
- Cable (block) diagrams
- Classification and overview drawings
- Material Lists
- Lighting and grounding diagrams.

### 8.3. Standards/Directives

On EIC-drawings the standards listed below apply.

#### International/European:

NEN-ISO 128	Technical drawings - General principles of presentation
NEN-EN-ISO 3098	Technical product documentation - Lettering
NEN-ISO 5455	Technical drawings - Scales
NEN-ISO 5456	Technical drawings – Projection methods
NEN-ISO 7000	Graphical symbols for use on equipment - Index and synopsis
NEN-EN-EIC 60027	Letter symbols to be used in electrical technology
NEN-EN-EIC 60204	Safety of machinery - Electrical Equipment of machinery
NEN-EN-EIC 61082	Preparation of documents used in electro technology
NEN-EN-IEC 60617	Graphical symbols for diagrams

#### National(Dutch):

NEN 3347	Technical drawings - Symbols for process and control
NEN 5152	Technical drawings - Electrical symbol
NPR 5164	Process and control - Theoretical logic diagrams for securing, controlling and reporting - Symbols and examples
NPR 5269	Industrial-process measurement and control - Basic documentation set for process control installations



#### **8.4. Part lists**

Are part of the drawing package during the engineering phase.

#### **8.5. Cable lists**

Cable Registration is centrally controlled at Tata Steel IJmuiden. The issuing of cable numbers takes place through the authorized Tata Steel cable coordinator. The cable data must be supplied in advance and in digital format by the Tata Steel cable coordinator. To do this, a Tata template is used. This template is available on request from PTC ADM. Tel: +31 (0) 251 494443 or PTC-ADM@tatasteel.com.

#### **8.6. Marshalling Rack**

Marshalling rack data is recorded digitally at Tata Steel. In addition, marshalling rack data is also shown on drawings to be recorded in the form of CAD-format. Marshalling rack data must be supplied to Tata Steel in a format which is determined in advance by the cable coordinator in consultation with PTC-ADM.

#### **8.7. Calculations**

##### **8.7.1. General**

Examples of calculations are:

- Cable calculations
- Short circuit calculations
- Marked route calculations
- Power calculations
- Ground resistance dissemination calculations
- Cos Phi calculations
- Measuring flange calculations
- Voltage loss calculations
- Lighting calculations

On calculations the definitions apply as stated in section 2.6.

##### **8.7.2. Implementation**

The Tata Steel cable coordinator determines which calculations must be supplied and which calculations should be filed.



## **8.8. Project progress**

### **8.8.1. General**

During the course of a project different formats of drawings can be distinguished, e.g. PDF, white paper, CAD files, etc.

### **8.8.2. Existing installations**

- Existing installation documentation in the form of hard copy or digital files (PDF, Tif or CAD files).
- Demolition-/Assembly package in the form of edited hard copies, made up sketches and / or CAD drawings.
- As-built package in the form of new or updated cable drawings, cable and marshalling data and calculations in accordance with the agreements made. All in a regulation conforming format hat can be handled and filed by Tata Steel IJmuiden.

### **8.8.3. New installations**

- Specifications with proposal drawings / sketches.
- Installation drawings needed for maintenance in the form of sketches and / or CAD drawings.
- "As built" package in the form of new drawings, cable and marshalling data and calculations in accordance with the agreements made.

All in a regulation conforming format hat can be handled and filed by Tata Steel IJmuiden.



## 9. CIVIL ENGINEERING DRAWINGS AND CALCULATIONS

### 9.1. Validity

The provisions are applicable to drawings and calculations that are made on behalf of Tata Steel IJmuiden.

These provisions are in addition to general standards and regulations and Tata Steel IJmuiden standards relating to the content of the drawings and calculations.

**All applicable standards and guidelines pertaining to NPR civil calculations and drawings are hereby declared applicable.**

### 9.2. Requirements for drawings

#### 9.2.1. General

At the completion of the work drawings must have been updated in accordance with the provisions referred to in these paragraphs.

#### 9.2.2. Required information

In addition to the required information in the standard sheets, drawings should at least contain:

- a) situation-overview and / or a location overview to aid determination of location coordinates for the structural elements .
- b) materials and their properties (including soil constants).
- c) surface treatment
- d) loads
- e) list of accompanying drawings
- f) special assumptions;
- g) outlines of joined structures
- h) assembly sequence and regulations;
- i) refer only to drawings with Tata Steel IJmuiden numbering
- j) permitted tolerances
- k) phase / assembly drawings must be in agreement with the Tata Steel responsible document owner and submitted as as-built drawings if necessary.

Planning application drawings are subject to the requirements as specified in the WABO Act.

#### 9.2.3. Arrangement

Drawings must be arranged in such a way that:

- a) the upper side of the drawing points to the north;
- b) the quadrant in the right corner below , with format A4, is used for:
  - Corus transfer
  - contractors transfer;
  - situation identifications
  - material data;
  - (agreement-) stamps on a free space of 100 x 200 mm;
  - general text and instructions
  - references to drawings and standards



#### **9.2.4. Concrete parts**

On drawings for concrete components also indicate:

- a) recesses or facilities for later work to be performed (e.g. drilling holes);
- b) joints;
- c) used additives with dosage
- d) Environmental Class
- e) flatness
- f) Surface processing
- g) Reinforcement Class

#### **9.2.5. Steel constructions**

On drawings for steel construction with the component details the following info must be listed:

- a) length dimensions of profiles with plus and minus parameters on dimensions in respect to the main axis;
- b) outline of joint profiles;
- c) profiles with position numbers (worked out in as close proximity to each other)

#### **9.2.6. Layout charts**

On drawings of constructional layout charts the sewer system of a building must be presented, including the connections to the existing (main) sewer.

#### **9.2.7. Roads, railway tracks and sewers**

On drawings of roads, railway tracks and sewers also note:

- a) manhole numbers (in consultation with the Department SF (site facilities));
- b) road markings and street furniture.

#### **9.2.8. Foundation-and anchor plans**

Drawings of foundation and anchor plans should also indicate:

The layout data, such as measurement lines, fixed points, height markers with corresponding levels, if these are supplied an indicated by the TSPY-PTC-CTY-IMA .

#### **9.2.9. Layer and line colour structure**

These are described in CAD requirement R1058002.





### 9.3. Requirements for definitive calculations

Calculations at the completion of the work are updated according to the following provisions and have status as-built.

1. Calculations must be performed as integral calculations.
2. Calculations, in addition to the in standard sheets required information must additionally contain the provisions in subsection 2.6., which are:
  - a) table of contents;
  - b) statement of used drawings and calculations with mention of the Tata Steel IJmuiden archive number (with respect to new work);
  - c) statement of used materials and their properties;
  - d) statement of loads and load combinations;
  - e) description of the starting points;
  - f) description of the calculation model, the method of calculation and the chosen way of recording it in a diagram (if necessary, refer to the literature);
  - g) motivation of the subject, mentioned under ad g;
  - h) stress calculations of the main steel construction;
  - i) stability calculation of the main steel construction;
  - j) distortion calculation of the main steel construction.
3. The calculations must be accessible for third parties.

This means that:

  - a) calculation assumptions must be motivated sufficiently by the design engineer;
  - b) the schematic view of the construction is made clear sufficiently by means of sketches;
  - c) the (detail) parts of the calculations can be tracked from the table of contents;
  - d) the calculation results, if used again, are equipped with a reference (to origin and sheet number).
4. Calculations of steel constructions also must be mentioned;
  - a) detail calculations of connections in the main steel construction;
  - b) detail calculations of parts with respect to strength, rigidity, and stability (including anchors and connections);
  - c) list of characteristics of the foundation load shown in a table, divided into kinds of load.
5. Calculations of foundations must also contain;
  - a) statement of the carried out soil investigation (report as attachment), assumed soil constants and groundwater levels;
  - b) calculation of permitted ground load or plate load.
  - c) statement of occurring ground stress or plate load shown in a table and divided to the kind of load;
  - d) statement of permitted de-excavate level with accompanying safety coefficient.
6. Calculations for concrete constructions must also contain detailed calculations of parts with respect to strength, rigidity and stability (including anchors).

If less accepted calculations methods, tables etc. are used, these must be added as an appendix to the calculations.



## 10. MEDIASYSTEMS DIAGRAMS, LISTS AND DRAWINGS

### 10.1. General

For making schedules, lists and drawings for media systems use the general drawing requirements apply as stated in Chapter 1 through 3 The following requirements are a addition for drawings for media systems.

### 10.2. Diagrams

#### 10.2.1. Process Flow Diagram (PFD)

Of a complete new installation should a Process Flow Diagram (PFD) must be made This PFD must comply with NEN 3347.

A PFD must at least contain the following information:

- equipment used
- Data of equipment (capacities, flow programs, press, temp., Etc.)
- Most important control circuits & Fittings
- Differential in main flows and sub flows
- Table of data flows (pipes equipped with numbers which correspond to the number in the Table)

The PFD is the basis for the specifications of the equipment components.

In the diagram must be specified for a:

**Table 8**

Piping	<ul style="list-style-type: none"> <li>- Indicator medium</li> <li>- DN-size</li> <li>- Flow Number</li> </ul>	<ul style="list-style-type: none"> <li>- D in mm</li> <li>-</li> </ul>
Pump	<ul style="list-style-type: none"> <li>- Yield</li> <li>- head</li> <li>- power and rpm of the drive</li> <li>- Item Number</li> </ul>	<ul style="list-style-type: none"> <li>qv in m<sup>3</sup> /hr</li> <li>p in bar of mWK</li> <li>P in kW</li> <li>n in rpm</li> <li>-</li> </ul>
Tank	<ul style="list-style-type: none"> <li>- Contents</li> <li>- Medium</li> <li>- Item number</li> </ul>	<ul style="list-style-type: none"> <li>V in m<sup>3</sup></li> <li>Designation</li> <li>-</li> </ul>
Filter	<ul style="list-style-type: none"> <li>- Mesh</li> <li>- Item number</li> </ul>	<ul style="list-style-type: none"> <li>in micrometer</li> <li>-</li> </ul>
Heat Exchange	<ul style="list-style-type: none"> <li>- Power</li> <li>- Flow's van de media</li> <li>- Item number</li> </ul>	<ul style="list-style-type: none"> <li>P in kW</li> <li>kg steam/hr or m<sup>3</sup>/hr</li> <li>-</li> </ul>
Cooler	<ul style="list-style-type: none"> <li>- Capacity</li> <li>- Flow's van de media</li> <li>- Item number</li> </ul>	<ul style="list-style-type: none"> <li>P in kW</li> <li>qv in m<sup>3</sup>/hr</li> <li>-</li> </ul>
Valve	<ul style="list-style-type: none"> <li>- Fitting number</li> </ul>	<ul style="list-style-type: none"> <li>-</li> </ul>

#### 10.2.2. Piping and Instrumentation Diagram (P&ID)



The P&ID's must be derived from the PFD. IF an amendment is to be made to an existing installation then this is done in agreement with the Tata Steel controller he determines whether the PFD's must be adapted or not. A piping and instrumentation diagram is a schematic representation of piping and other components in a process installation.

Often, control loops are schematically represented in the P&ID's. Piping is represented in a P & ID diagram with a solid line, control loops with a dotted line. Within the dotted line connections to the different instruments that provide data to the control system are also represented.

### **10.2.3. Symbols & standards applied**

To create process diagrams Tata Steel has its own symbol library. For the latest version of the symbols contact Tata Steel. The applicable symbols lists are:

- Tata Steel Symbol Table 040.DWG
- Tata Steel Symbol Table 041.

The symbols are based on NEN 3157 and NEN-EN-ISO 10628:2001(en). Moreover, the NEN-EN-ISO 10628:2001 (en) will be replaced in the foreseeable future by NEN-EN-ISO 10628-2:2010(en). The default symbol size (=length valve) is 7 mm. The diagrams should be drawn "object snap tracking" (10 mm) to For further standards on diagrams see NEN-EN-ISO 10628:2001(en).

### **10.3. Piping list**

In the piping list on the diagram drawings some specifications must be shown on this piping, including the following: item number, designation, to/from/to), dimensions, process conditions (pressure and temperature), piping specs and PED data.

The piping list must be issued in Excel in a prescribed format for Tata Steel. Tata Steel makes this template available.

### **10.4. Appendage list**

With the appendage list for schematic-diagram drawings all components (valves, instrumentation) must have the following specifications listed: item number, designation, dimensions, process conditions (pressure and temperature), makers brand and if applicable a Tata Steel part number.

The appendage list must be issued in Excel in a prescribed format for Tata Steel. Tata Steel makes this template available.

### **10.5. Equipment list**

With the equipment list for schematic-diagram drawings all components (valves, instrumentation) must have the following specifications listed: item number, designation, dimensions, process conditions (pressure and temperature), makers brand and if applicable a Tata Steel part number.

The equipment list must be issued in Excel in a prescribed format for Tata Steel. Tata Steel makes this template available.



#### **10.6. Key plan drawing (A1 format)**

For a complete overview of a new or modified installation, a key plan is to be made. This drawing gives a complete overview of the installation and may be divided into sections. The Dimensioning of the system parts is in principle not necessary. The drawing must include references to the accompanying drawings and other relevant information.

#### **10.7. Lay-out drawings (A1 format)**

In the layout drawings (plan views and cross sections) state in detail the piping installation + components. Dimensions and item numbers, as indicated already in the diagrams, must be indicated on these drawings. The layout drawings must provide references of the key plan and the subsequent layout drawings.

#### **10.8. Detail drawings (A1 format)**

Detailed drawings are made, if the level of detail of the layout drawings is not enough.

If there is lack of space and clarity then it is necessary for a section of the drawing to be split in more separate drawings. These subsequent drawings must be made so, that through photographic reproduction techniques, the component sections can be composed into a the whole drawing once more. Here an overlap of 100 mm is recommended. This means that the same scale is used on all drawings and that the drawing lines should have the same distance to the side lines.



## 11. REFERENCES

This Technical Directive reference is made to the following standards, Tata Steel IJmuiden Standards and Technical Directives:

### Standards

Number:	Title:
EN-standards	
EN 982	Safety of machinery; Safety requirements fluid power systems and their components - Hydraulics
EN 983	Safety of machinery; Safety requirements for fluid power systems and their components - Pneumatics
NEN-standards	
N 1180	Doors for buildings; Indication of turning direction and move-ability
N 1181	Windows; Indication of turning direction and move-ability
NEN 47	Technical drawings; Indications of material sections on architectural drawings
NEN 74	Technical drawings; Representation of gears
NEN 270	Direction of closing of doors, windows and shutters
NEN 379	Technical drawings; Sizes of drawings; Folding and filling
NEN 449	Technical drawings; Designations for length- and cross section
NEN 999	The International System of Units (SI)
NEN 1000	Rules for the use of the International System of Units (SI)
NEN 1010	Safety requirements for low-voltage installations (all parts)
NEN 1997	Engineering drawings; Cylindrical extension and compression springs; Directives for ordering
NEN 2058	Technical drawings; Size tolerances, Bases, Definitions, Ways of execution and Special marks
NEN 2119	Technical drawings; Layout of drawing sheets
NEN 2302	Construction drawings; General rules
NEN 2351	Technical drawings; Views



Number:	Title:
NEN 2571	Construction drawings; Indication of maximum permissible dimensional deviations
NEN 2574	Construction drawings; Arrangement of data on drawings
NEN 3069	Qualities, units and numbers; Rules for writing and printing
NEN 3098	Plug-cocks for gas
NEN 3140	Low-voltage installations; Regulations for safe works, inspection and maintenance
NEN 3157	Technical drawings; Symbols for instrumentation; Basic symbols for process instrumentation
NEN 3214	Sewage inside dwellings; Representation of parts on drawings
NEN 3225	Netherlands examples of lettering
NEN 3256	Construction drawings; General rules and symbols for basic maps
NEN 3283	Flowchart symbols for information processing
NEN 3347	Technical drawings; Symbols for instrumentation; Detailed symbols for process instrumentation
NEN 3348	Fluid power systems and components; Graphical symbols
NEN 3870	Drawings for concrete structures
NEN 5152	Technical drawings; Graphical symbols for electro technology
NEN 5848	Preparation of function charts for control systems
NEN 11082	Making of documents for use in the electro technology



NEN-ISO-standards

NEN-ISO 286-1/2	ISO-fitting system
NEN-ISO 2162-1/3	Technical products documentation; Springs
NEN-ISO 2553	Weld- and soldered joints; Symbolic representation on drawings
NEN-ISO 3098-1/2	Technical drawings; Writing
NEN-ISO 5455	Technical drawings; Scaling
NEN-ISO 6428	Technical drawings; Requirements for micro-filming
NEN-EN-ISO 6410	Technical drawings; Screw thread and parts with screw thread

ISO-standards

ISO 128/-2/-21	Technical drawings
ISO 1219-1/2	Fluid power systems and components; Graphic symbols and circuit diagrams - part 1: Graphic symbols
ISO 1302	Technical drawings; Method of indicating surface texture
ISO 2553	Welded, brazed and soldered joints; symbolic representation on drawings

NEN-ISO-standards

NEN-ISO 286-1/2	ISO-fitting system
NEN-ISO 2162-1/3	Technical products documentation; Springs
NEN-ISO 2553	Weld- and soldered joints; Symbolic representation on drawings
NEN-ISO 3098-1/2	Technical drawings; Writing
NEN-ISO 5455	Technical drawings; Scaling

ISO-standards

ISO 128/-2/-21	Technical drawings
ISO 1219-1/2	Fluid power systems and components; Graphic symbols and circuit diagrams - part 1: Graphic symbols
ISO 1302	Technical drawings; Method of indicating surface texture
ISO 2553	Welded, brazed and soldered joints; symbolic representation on drawings
ISO 3098	Technical drawings; Lettering - part 1: Currently used characters
ISO 3272	Microfilming of technical drawings and other drawing office documents
ISO 3511	Process measurements control functions and instrumentation
ISO 5455	Technical drawings; Scales
ISO 5457	Technical drawings; Sizes and layout of drawing sheets
ISO 6428	Technical drawings; Requirements for micro copying



NPR-standards	
NPR 2196	Technical drawings; Directives for the application and drawing of process diagrams
NPR 2570	Construction drawings; Co-ordination of data on building drawings
NPR 3592	Automatic data processing; Conventions for incorporating flowchart symbols in flowcharts
NPR 5161	Electrical drawings; Examples of electric power systems
NPR 5163	Electrical drawings; Examples for control technology
NPR 5164	Process measurement control; Functions and instrumentation; Pure logic diagrams for protection
NPR 5269	Industrial process measurement and control; Basic documentation set for process control
NPR 7401	Fluid power systems; Survey of Dutch, European and International standards
DIN-standards	
DIN 76	Thread run-outs acc. to resp. DIN 13, ISO 228-1 and other threads ISO 3508
DIN 128	Curved spring lock washers
DIN 509	Undercuts and relief grooves - Types and dimensions
DIN 997	Tracing Dimensions for Bars and Rolled Steel Sections
DIN 1683	Steel raw castings; general tolerances, machining allowances (ISO 8063)
DIN 7168	General tolerances for linear and angular dimensions and geometrical tolerances (not to be used for new designs)
DIN 24271	Centralised lubrication systems

ISA 520

V969 Division and designation of soils; Signature and drawing symbols

IEC 617  
IEC 750  
IEC 848

Tata Steel in IJmuiden Standard S3 10 56 01

Technical Directive R3 78 33 01

Technical Directive R1 05 80 02 CAD- Drawing regulations, latest version