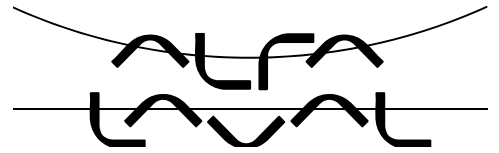


GENERAL INSTRUCTION



Subject Drafting of P&IDs	Document no. TBA	Page 1 / 6	
Group Instruction	Issued (by / date) TSN 15.5.2017	Revised (by / date) -	Rev. -

1 General

The P&ID (Piping & Instrumentation Diagram) is typically the first document to be created after purchase has been confirmed. The responsibility of creating and updating the P&ID as necessary during the project belongs to the responsible project team in Alfa Laval Aalborg. Often a preliminary P&ID has been created during the sales phase already.

1.1 P&ID layout

The layout should be compact but not too packed; packing everything into a small space hinders readability and makes making changes difficult, whereas drawing the P&ID too “loosely” means having to use a very small scale which makes printed diagrams impossible to read.

The recommended flow direction of the displayed process is from left to right and from top to bottom. Typically the waste heat recovery boilers are placed in the top left part of the diagram, the steam header (if delivered) in the top right, condensate and feed water tanks (if delivered) to the bottom/middle right. Normally the auxiliary container (if delivered) is placed at the very bottom, as well as fuel oil tanks, blow down tanks etc.

Elevations of equipment are not normally shown in P&ID but equipment should be placed logically so that for example pumps are typically placed below tanks etc. Elevations can be shown if it is absolutely necessary for technical reasons.

A legend for symbols as well as line types shall be placed in the drawing. This can be provided on a separate sheet if necessary.

1.2 The purpose of a P&ID

The purpose of a P&ID is to;

- Give the reader (for example the customer and ALA design engineers) a clear big picture of the delivery scope of the project, the process flow, the equipment and all necessary details about the technical functions of all equipment.
- Show all the piping connections between the equipment
- Give necessary details for further design work (both electrical and mechanical)
- Give necessary details in order to generate the project's component list.

1.3 Items displayed in a P&ID

- All equipment belonging to the scope of supply (excluding doubles that are not normally displayed in the P&ID)
- All piping using distinctive line types and line weights in order to demonstrate different media in the process.
- All piping codes and nominal sizes of all piping

- Valves, instruments, etc. other single components using defined symbols as well as position/tag numbers for all such components
- Delivery and device limits
- All nozzles of all equipment, including unused spare connections
- For the main piping all necessary flow data, for example mass flow, pressure, temperature, ref. figure below
- All energy carrier lines (for example pneumatic air)

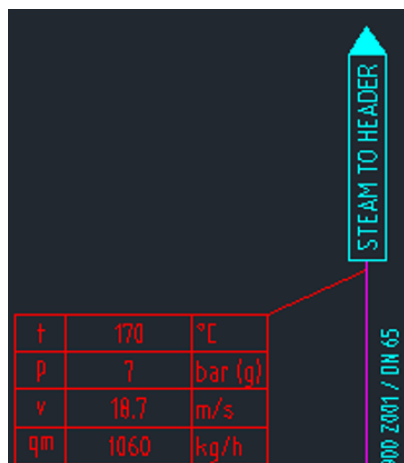


Figure 1. Flow data of main steam line in an ESC (engine self consumption) system

2 Drafting rules

Drafting rules are based on international standards ISO 10628 and ISO 15519, adapted to needs of Alfa Laval Aalborg as necessary.

2.1 Drawing sheet

A1 is the recommended sheet size for P&IDs. For smaller projects, smaller sheet sizes may be used.

Normally the standard ALA title block is used, for Wärtsilä projects the Wärtsilä title block shall be used.

2.2 Scale

The scale for the drawing sheet shall be as large as possible, very small scales such as 1:20 shall be avoided. Normally P&IDs are not drawn to scale, however it is recommended to display the main equipment so that their relative size is as realistic as possible.

2.3 Inscription

Following settings shall be used for inscription in P&ID

- Text type shall be either "ISOCP" or "STANDARD" but both shall not be used in one diagram
- Text height 2,5mm shall be used for notes, tag numbers, piping codes, etc.
- Text height 5,0mm shall be used for main equipment designations
- All text shall be placed on same layer (TEXT)

Capital letters shall generally be used for all text excluding chemical formulae (e.g NaCl) and other such cases where a significant risk of confusion exists if using only capital letters.

Following rules apply for text positioning

a) Equipment

Designations of equipment shall be positioned so that their relationship is obvious but normally the designation shall not be placed inside the graphical symbol of the equipment. Additional information (model/type, capacity, etc.) shall be placed directly below the designation if necessary

b) Piping

In horizontal pipe lines the pipe code shall be placed above and parallel to the line
In vertical pipe lines the pipe code shall be placed to the left and parallel to the line

c) Valves and other components

Tag numbers shall be placed near the graphical symbol of the component and parallel to the line

d) Units

Units used in diagrams shall be according to SI system



EXHAUST GAS BOILER
RCC 021

A dark blue rectangular box containing the text 'EXHAUST GAS BOILER' on the top line and 'RCC 021' on the bottom line, both in a light blue, bold, sans-serif font.

Figure 2. Equipment designation and tag number



RCC 010 Z002/DN125

A dark blue vertical rectangular box containing the text 'RCC 010 Z002/DN125' written vertically in a light blue, bold, sans-serif font.

Figure 3. Pipe code in vertical pipe line

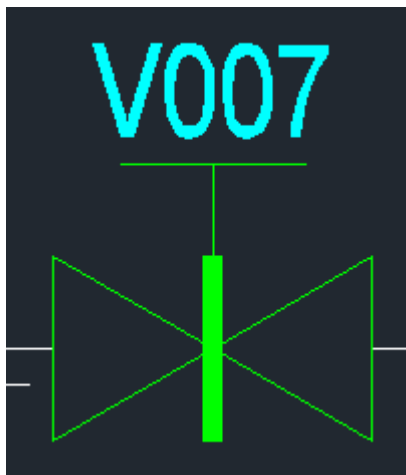


Figure 4. Valve designation

2.4 Connecting lines

Different line weights and types should be used to display different flow media, e.g. steam, water etc.

A line type legend shall be included in the drawing.

Accepted line weights are 0,25mm, 0,50mm, 1,0mm; main flows shall be drawn with a wider line weight and auxiliary/secondary lines with smaller line weight. Attention is to be paid to the plotter settings; the different line weights shall be displayed in PDF and paper format as well!

The distance between two parallel lines shall be at least 10mm.

Lines shall be drawn as short as possible and unnecessary crossings shall be avoided. When lines need to cross, following rules apply:

- In the case of two lines with same line weight, the vertical line shall be interrupted
- In the case of different line weights, the thinner line shall be interrupted
- The line that is interrupted is drawn with an arc as per figure below

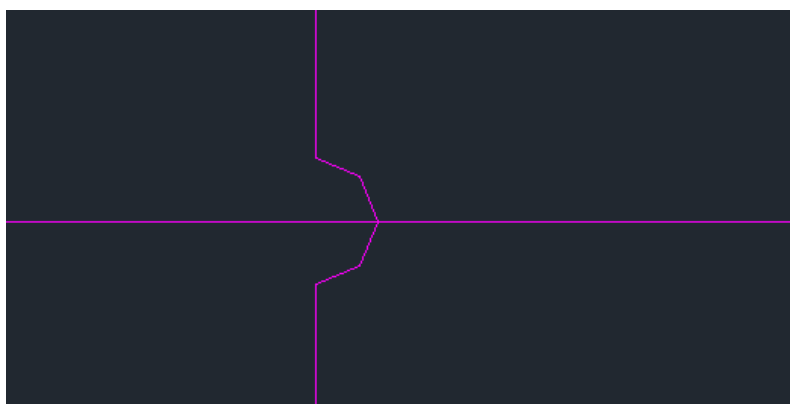


Figure 5. Crossing of equal lines

Pipe connections are displayed using a filled dot as per figure below

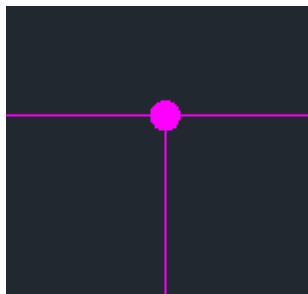


Figure 6. Pipe connection

2.5 Symbols

The effective symbol library shall be used. If additional symbols are needed, ISO 10628 and/or ISO 14617 shall be referenced and the necessary symbol created but normally this is not necessary. All symbols shown in the diagram shall be included in the symbol legend included in the drawing.

It is not allowed to modify the proportions of single components such as valves by scaling.

For symbols of main equipment, the symbols found in the standard drawings folder shall be used whenever possible. For such standard equipment, nozzle sizes shall not be modified without consideration. If unsure, consult your superior.

2.6 Limits

The limits of the scope of supply, devices and auxiliary container shall be displayed in the P&ID.

Limits are normally shown with designated line types, additionally a standardized symbol may be used.

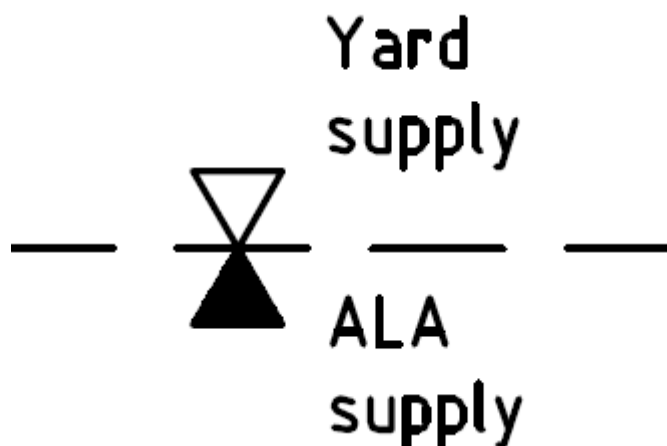


Figure 7. Limit symbol showing scope of supply

2.7 Flow direction

The flow direction of piping shall be displayed with arrows defined in the symbol library. Following rules apply:

- a) Arrows are placed on the inlet and outlet nozzles of equipment excluding pumps
- b) Arrows are placed directly after pipe branches
- c) Arrows are not placed on valve bypass pipes etc.



Figure 8. Flow direction arrows after pipe branches

2.8 In- and outgoing flows

Flows going out of the diagram or coming into the diagram are displayed with designated arrows defined in the symbol library. If necessary, further details such as reference drawings may be included.

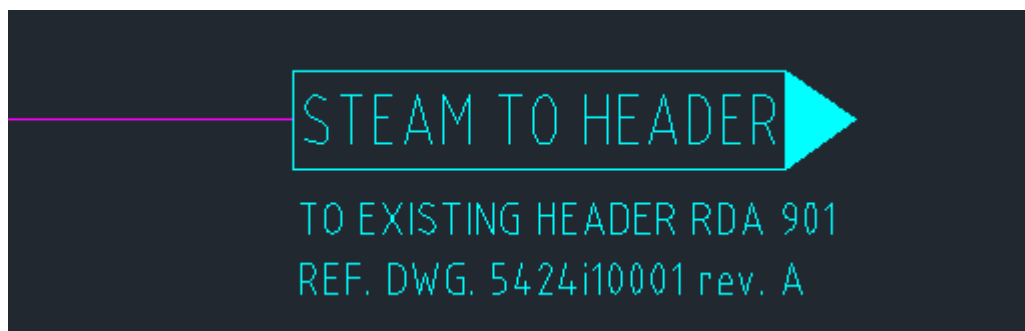


Figure 9. Outgoing flow and designation