Table A.66 — Equipment subdivision — Control logic units

Equipment unit	Control logic unit							
Subunit	**Analog input cards**	**Digital input cards**	**Analog output cards**	**Digital output cards**	**Logic solver**	**System bus**	**Power supply**	**Miscel-laneous**
Maintainable items	Input card Connection unit	Input card Connection unit (X-wiring)	Output card Connection unit (X-wiring) Relay	Output card Connection unit (X-wiring) Relay	Central processor unit (CPU) Random access memory (RAM) Watchdog/ diagnostic Software	No subdivision	No subdivision	Galvanic barriers Others

Table A.67 — Equipment-specific data — Control logic units

Name	Description	Unit or code list	Priority
Application – control logic	Where used	Centralized, distributed, man-machine interface	Medium
CLU redundancy configuration	Specify if there are redundant CLUs installed	Yes/No	Low
Self-test feature	Degree of self-testing	No self-test, automatic-loop test, built-in test, combined	High
Fault tolerance	Response at failure	Yes/No	High

A.2.5.4 Valves

NOTE: The valves described in the taxonomy classification given in Table A.68 do not apply for valves used for specific upstream purposes like subsea valves and valves used in downhole completion. These valves are covered in the specific chapters in Annex A on this type of equipment (see A.2.6 and A.2.7). Dry Xmas trees and wellheads are, however, considered as topside valves.

Table A.68 — Type classification — Valves

Equipment class — Level 6		Type	
Description	**Code**	**Description**	**Code**
Valves	VA	Ball	BA
		Gate	GA
		Globe	GL
		Butterfly	BP
		Plug	PG
		Needle	NE
		Check	CH
		Diaphragm	DI
		Flapper	FL
		Multiple orifice	MO
		Three-way	WA
		PSV-conventional	SC
		PSV-conventional with bellow	SB
		PSV-pilot operated	SP
		PSV-vacuum relief	SV
		Plug and cage	PC
		External sleeve	ES
		Disc	DI
		Axial flow	AF
		Pinch	PI
		Others	OH

NOTE 1 Pilot valves are normally non-tagged components used for self-regulation. PSV solenoid valves are normally a sub-tag of a valve tag used for all ESD/PSD. Quick-exhaust dump valves are specific valves used if quick response is required (e.g. HIPPS function). Relief valves are normally PSV valves.

NOTE 2 Valves of a specific type not defined in Table A.68 should be coded as “Others” with a comment specifying type description. Example: Clack- or Elastomer-type Deluge valves).

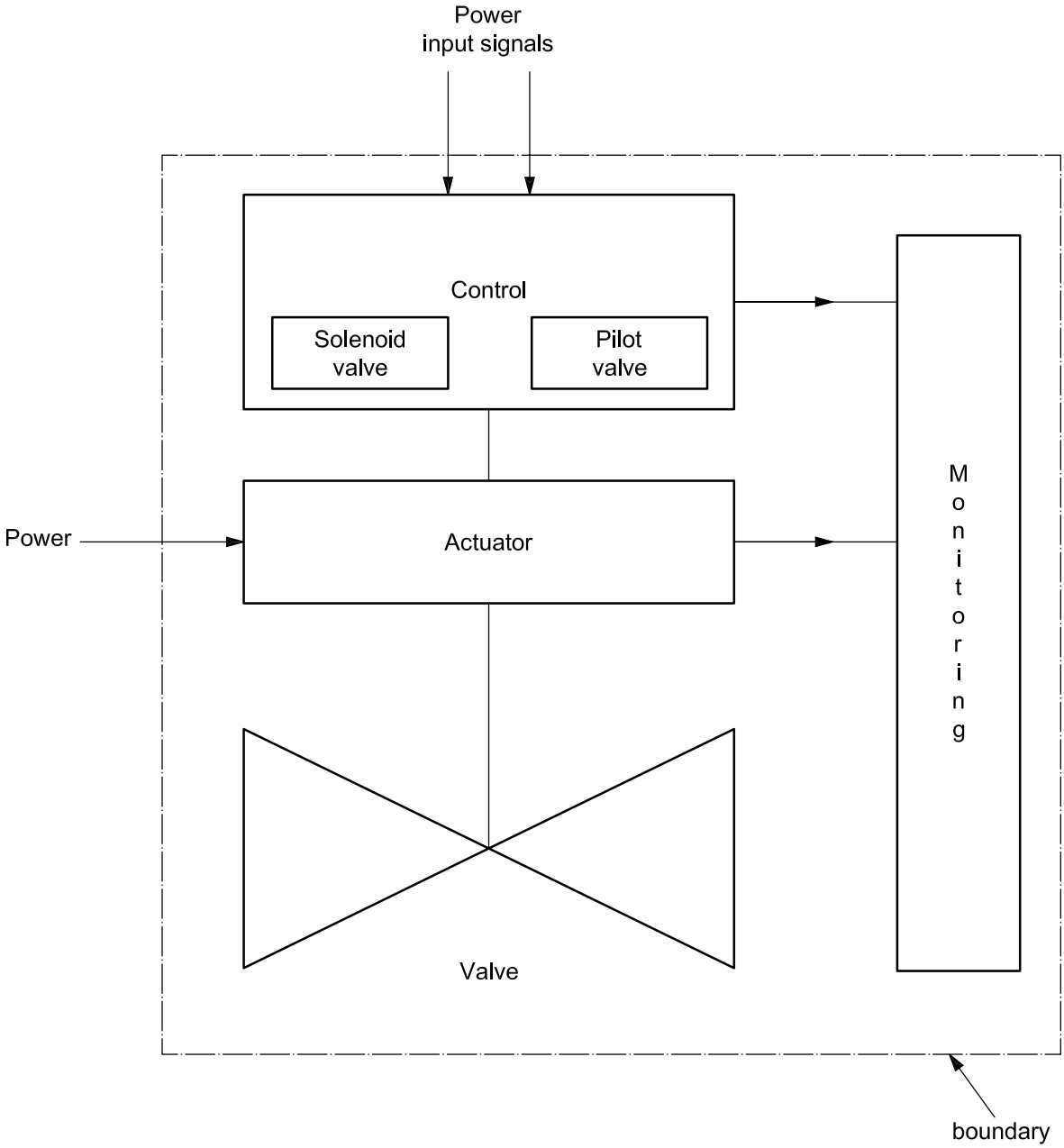


Figure A.22 — Boundary definition — Valves

Table A.69 — Equipment subdivision — Valves

Equipment unit	Valves			
Subunit	**Valves**	**Actuator** [a]	**Control and monitoring** [a]	**Miscellaneous**
Maintainable items	Valve body	Diaphragm	Wiring	Accumulator
	Bonnet	Spring	Indicator	Others
	Flange joints	Case	Instrument, general	
	Seat rings	Piston	Instrument, position	
	Packing/stem seal	Stem	Monitoring	
	Seals	Seals/gaskets	Solenoid valve	
	Closure member	Electrical motor [b]	Pilot valve [c]	
	Stem	Gear	Quick exhaust dump valve	
		Travel stop	Internal power supply	
			Limit switch	

[a] Not applicable for all valve categories.

[b] Electric-motor actuator only.

[c] Applicable for hydraulic/pneumatically actuated valves.

Table A.70 — Equipment-specific data — Valves

Name	Description	Unit or code list	Priority
Main function	Main functional category	Flow control, on/off, non-return, pressure safety valves, instrument or hydraulic control	High
Application	Specify function in the process	Annulus (Xmas tree), blowdown, bypass, injection, X-over, Deluge, ESD, ESD/PSD, PSD, HIPPS, swab, wing, relief, control, choke	High
Where mounted	Equipment on which the valve is installed	Wellhead, Xmas tree, wellhead flow line, wellhead injection line, pump, turbine, generator, separator, heat exchanger, vessel, header, electric motor, diesel motor, turboexpander, drilling, pipeline, mud process, utility, living quarter, air inlet, riser	High
Size	Internal diameter	Millimetres (inches)	Medium
Fluid handled	Main fluid only	Oil, gas, condensate, freshwater, steam, sea water, crude oil, oily water, flare gas, fuel gas, water/glycol, methanol, nitrogen, chemicals, hydrocarbon combined, gas/oil, gas/condensate, oil/water, gas/oil/water, NGL, LPG, LNG, slurry, etc.	High
Fluid temperature	Operating temperature main fluid	Degrees Celsius	Medium
Fluid corrosiveness/ erosiveness	Classify as shown in the footnote [a]	Benign, moderate, severe	Medium
Flowing pressure	Normal operating pressure (inlet)	Pascal (bar)	Medium
Shut-off pressure	Maximum differential pressure when valve closed (design) For PSVs: set-point opening pressure	Pascal (bar)	Low

Table A.70 (*continued*)

Name	Description	Unit or code list	Priority
Valve material	Type	Carbon steel (CS), stainless steel (SST), duplex, alloy type, composite, titanium	High
Stem sealing	Type	Stuffing box, duplex, lip seal, O-ring	High
Seat design	Type of seat design	Soft seated, metal-to-metal seated	Medium
Actuation principle [b]	Actuator operating principle	Single-acting, double-acting, actuation by line/process pressure, actuation by gravity	Medium
Actuation – opening	Type of actuation force	Electrical, hydraulic, pneumatic, mechanical (spring), manual, combinations, none	High
Actuation – closing	Type of actuation force	Electrical, hydraulic, pneumatic, mechanical (spring), manual, combinations, none	Medium
Manufacturer – actuator	Name of actuator manufacturer	Specify	Low
Manufacturer – pilot valve	Name of pilot-valve manufacturer	Specify	Low
Manufacturer – solenoid valve	Name of solenoid-valve manufacturer	Specify	Low
Pilot-valve configuration	Number and configuration (applicable for pilot-operated valves only)	Specify, e.g. 1 × 3/2 (= single 3/2 pilot valve), 2 × 4/3 (= double 4/3 pilot valve)	Low
Fail-safe principle pilot valve	Fail-safe principle	Energized, de-energized	Low
Solenoid-valve configuration	Number and configuration (applicable for solenoid-operated valves only)	Specify, e.g. 1 × 3/2 (= single 3/2 pilot valve), 2 × 4/3 (= double 4/3 pilot valve)	Low
Fail-safe principle solenoid valve	Fail-safe principle	Energized, de-energized	Low
Trim type	Type (applicable for control valves only)	Noise reduction, anti cavitation, multi-stage, single-stage	High
Valve leakage class	Specify according to applicable reference standard (e.g. for valves complying with API 6D, see ISO 5208)	ISO 5208:1993, Annexes A, B, C and D	High

[a] Benign (clean fluids, e.g. air, water, nitrogen).

Moderately corrosive/erosive (oil/gas not defined as severe, sea water, occasionally particles).

Severe corrosive/erosive [sour gas/oil (high H_2S), high CO_2 content, high sand content].

[b] Primary actuation principle:

a) single-acting = actuation force by gas (air) or hydraulic fluid for either opening or closing the valve;

b) double-acting = actuation force by gas (air) or hydraulic fluid for both opening and closing the valve;

c) actuation by line/process pressure or actuation by gravity = no actuation apart from possible backup actuation.

A.2.5.5 Nozzles

Table A.71 — Type classification — Nozzles

Equipment class — Level 6		Equipment type	
Description	**Code**	**Description**	**Code**
Nozzles	NO	Deluge	DN
		Sprinkler	SR
		Water mist	WM
		Gaseous	GA

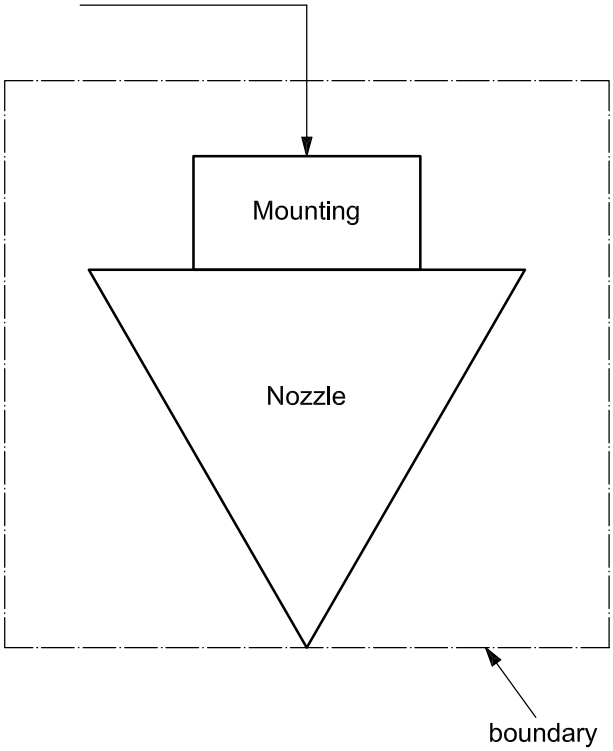


Figure A.23 — Boundary definition — Nozzles

Table A.72 — Equipment subdivision — Nozzles

Equipment unit	Nozzles		
Subunit	**Nozzle**	**Mounting assembly**	**Miscellaneous**
Maintainable items	Fusible bulb Nozzle body with internals Nozzle head Protective coating Screen Solder	Mounting connector Seals	Others

Table A.73 — Equipment-specific data — Nozzles

Name	Description	Unit or code list	Priority
Application	Where in the process applied	Deluge, sprinkler	High
Hazards protection	Type of protection	Electrical, Ex, fuel oil, glycol, HC gas, hydrogen gas, lubricants, methanol, combustibles, radioactivity, toxic gas, toxic liquid	High
Location on plant	Where located in the plant	Air inlet, compressor, diesel engine, drilling, electric motor, FW inlet, gas-metering, generator, header, heat exchanger, living qt., mud-processing, pigging station, pipeline, pump, separator, turbine, utility, vessel, wellhead, wellhead flowline, wellhead injection line, Xmas tree	High
Nozzle material	Specify	Brass, chrome-plated, electrode-less nickel-plated, lead-coated, stainless steel	High
Nozzle length	Specify	Millimetres	High
Nozzle width	Specify	Millimetres	High
Installation category	How installed	Concealed, horizontal sidewall, pendent, recessed, upright, vertical sidewall	Low
Fluid handled – nozzles	Main fluid only	Potable water, sea water, Inergen, CO_2	Medium
Fluid corrosiveness/ erosiveness	Classify as shown in the footnote [a]	Benign, moderate, severe	Medium
Discharge temperature	At operating condition	Degrees Celsius	Low
Flowing pressure	Specify	Pascal (bar)	Medium
Flow rate	Specify	Litres per minute	Medium
Shut-off pressure	Maximum differential pressure when valve closed (design) For safety pressure-relief valves: set-point opening pressure	Pascal (barg)	Low
Fluid temperature	Specify	Degrees Celsius	Low
Connection size	Specify	Millimetres (inches)	High
Type of nozzle end	Specify	Bolted flange, clamped flange, screwed, welded	Medium
Spray angle	Specify	Degrees	Medium
Spray type	Specify	Droplets, mist	Medium
Actuation	Specify	Fusible bulb, solder, external	Medium
Nozzle screen	Whether or not installed	Yes/No	Low

[a] Benign (clean fluids, e.g. air, water, nitrogen).

Moderately corrosive/erosive (oil/gas not defined as severe, sea water, occasionally particles).

Severe corrosive/erosive [sour gas/oil (high H_2S), high CO_2 content, high sand content].

A.2.6 Subsea production

NOTE Valves used on subsea equipment are considered as specific valves within the taxonomy examples shown in chapter A.2.6 for this equipment class. Valves used on dry Xmas trees and wellheads are considered as topside valves (see chapter A.2.5.4)

A.2.6.1 Subsea production control

Table A.74 — Type classification — Subsea production control

Equipment class — Level 6		Equipment type	
Description	**Code**	**Description**	**Code**
Subsea-production-control system	CS	Direct hydraulic	DH
		Direct electro-hydraulic	EH
		Multiplexed electro-hydraulic	MX
		Discrete pilot hydraulic	PH
		Sequential piloted hydraulic	SH
		Telemetric hydraulic	TH

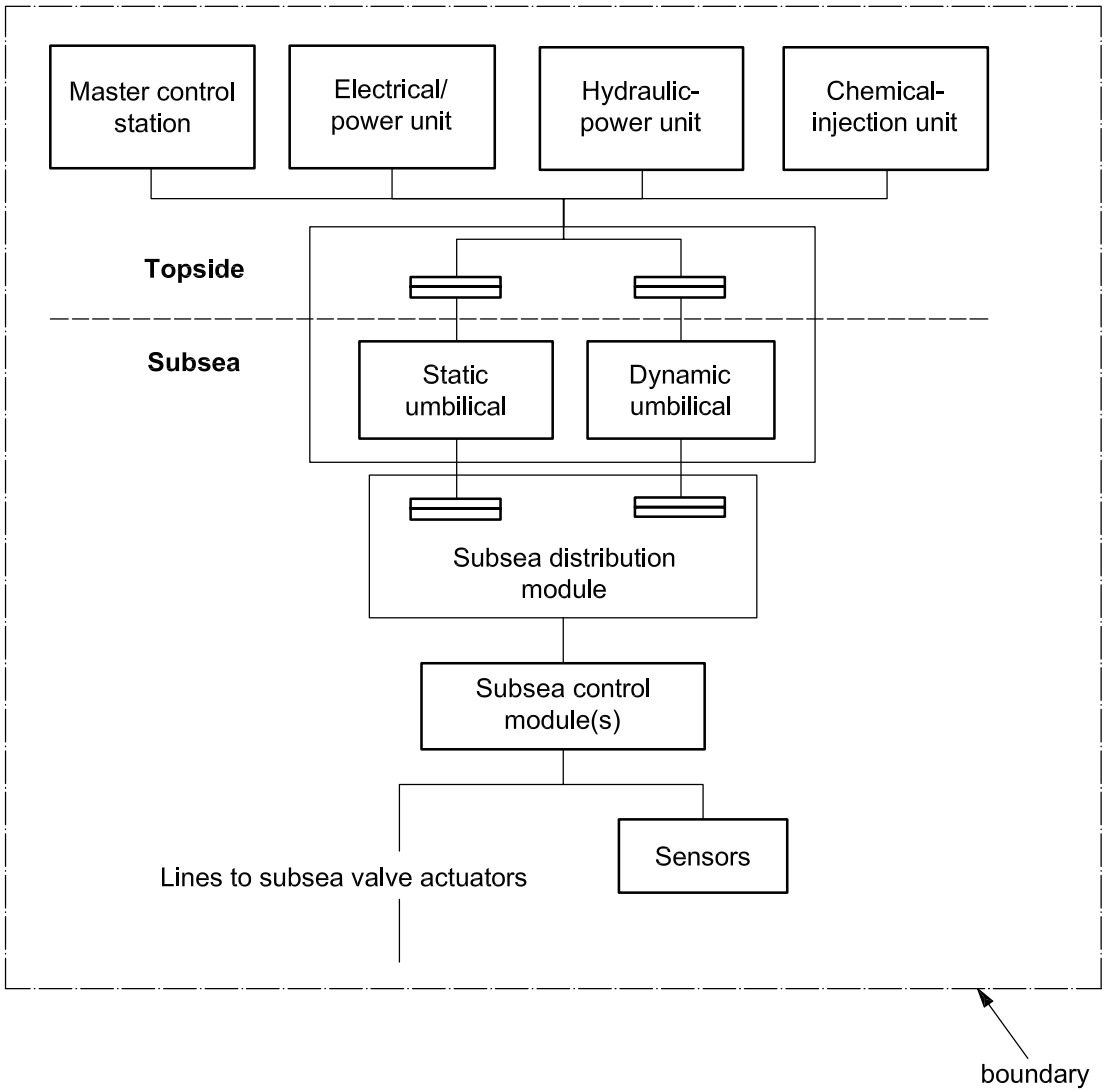


Figure A.24 — Boundary definition — Subsea production control

Table A.75 — Equipment subdivision — Subsea production control

Equipment unit	Subsea production control								
Subunit	**Chemical Injection (topside)**	**Dynamic umbilical**	**Static umbilical**	**Electric-power unit (topside)**	**Hydraulic-power unit (topside)**	**Master control (topside)**	**Subsea control module**	**Subsea distr. module**	**Sensors**
Maintainable items	Number breakdown	Bend restrictor Buoyancy device Hydraulic/ chemical line J/I-tube seal Power/signal line Sheath/ armour Stabilizer Tension- and motion-compensation equilibrium	Hydraulic/ chemical line Power/signal line Sheath/ armour Subsea umbilical-termination unit Topside umbilical-termination unit	No breakdown	No breakdown	No breakdown	Accumulator subsea Module base plate Chemical inj. coupling Fibre optic coupler Filter Hydr. coupling Power supply unit Power/signal coupler Subsea electronic module Solenoid valve	Accumulator subsea Subsea bypass panel Chemical inj. coupling Fibre-optic coupler Fibre optic jumper Hose Hydr./ chemical jumper Hydr. coupling Piping Power/signal coupler Power/signal jumper Subsea cabling	Flow Leak Level Position Combined pressure and temp. Pressure Temp. Sand

Table A.76 — Equipment-specific data — Subsea production control

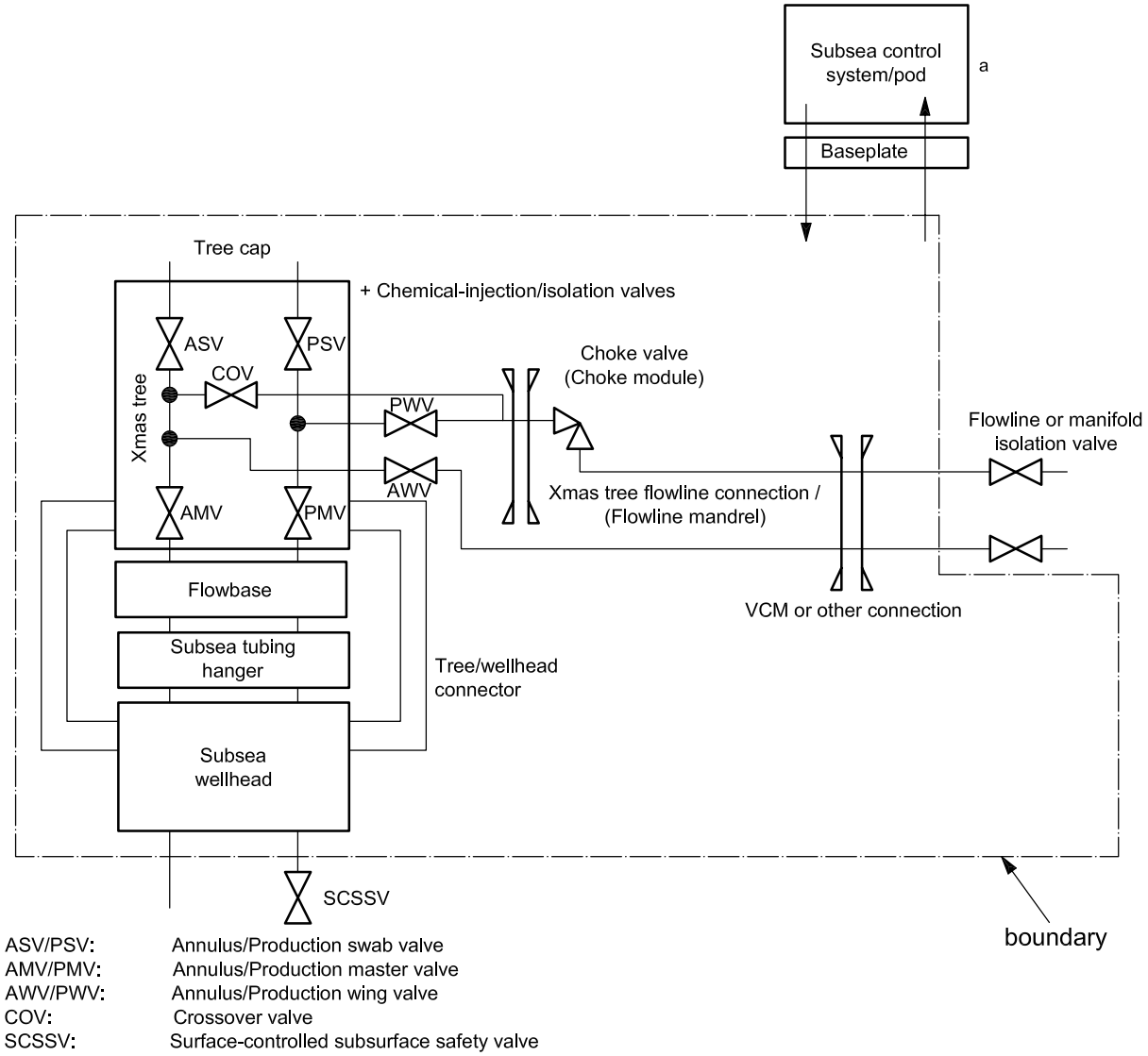
Name	Description	Unit or code list	Priority
Well identification number	Operator description	Number or name	High
Application	Where used	HIPPS, manifold, SSIV, pump, wellhead, Xmas tree, multi-purpose	Medium
Type of control fluid	—	Oil-based, water-based	Medium
Type of control system	—	Closed, open	Medium
Redundancy	—	Yes/no	Medium
Manufacturer	Specify	Free text	High
Model type	Specify	Free text	Low
Multilateral wells	—	Yes/no	Low

A.2.6.2 Xmas trees

NOTE Applies mainly for (wet) subsea Xmas trees.

Table A.77 — Type classification — Xmas trees

Equipment class — Level 6		Equipment type	
Description	Code	Description	Code
Wellhead and Xmas trees	WC	Vertical	VE
		Horizontal	HO



[a] Sensors mounted on the tree.

Figure A.25 — Boundary definition — Xmas trees

Table A.78 — Equipment subdivision — Xmas trees

Equipment unit	Wellhead and Xmas trees [a]					
Subunit	**Subsea wellhead**	**Subsea Xmas tree**	**Tubing hanger**	**Flowbase**	**Flow control module [b]**	**Vertical connection module (VCM)**
Maintainable items	Permanent guide base (PGB) Temporary guide base (TGB) Conductor housing Wellhead housing (high-pressure housing) Casing hangers Annulus seal assemblies (packoffs)	Chem. inj. coupling Flowspool Piping (hard pipe) Hoses (flexible piping) Debris cap Tree-guide frame Connector Internal isolation cap Internal tree-cap valve Internal tree-cap plug Tree cap [c] Valve, check Valve, choke Valve, control Valve, other Valve, process isolation Valve, utility isolation Valve, workover	Chem. inj. coupling Hydr. coupling Power/signal coupler Tubing-hanger body Tubing-hanger isolation plug	Frame Hub/mandrel [d] Valve, check Valve, process isolation Valve, utility isolation	Chem. inj. coupling Connector Flow loop Frame Hoses Hydr. connector Piping Valve, check Valve, choke Valve, control	VCM connector Valve and actuator Control system compensation Swivel Funnel guide ROV-panel override system ROV panel

[a] SCM (subsea control module) as well as other control-system parts can also be considered as subunits or maintainable items of the Xmas tree and failure data collected within this equipment class.

[b] This can also be designated as choke module.

[c] The tree cap, which is able to be replaced independently, can also be considered as a subunit of the Xmas tree.

[d] This can also be designated as flowline mandrel as well as be considered as a subunit of the Xmas tree.