Pre-Classroom

A	22nd/Aug./2022	First issue	T.Yamamoto	T.Yamamoto	Y.Tanaka
REV	DATE	DESCRIPTION	Approved	Checked	Prepared

OWNER

VAN PHONG POWER COMPANY LIMITED

PROJECT

Van Phong 1 BOT Thermal Power Plant Project

OWNER'S ENGINEER

AFRY Switzerland Ltd.

Status
☐Approved
☐Approved with Comment
☐Not Approved
☐Reviewed
☐Reviewed with Comment

EPC CONTRACTORS

IHI-TESSC-CTCI-DHI CONSORTIUM

PROJECT DOCUMENT No	REV
VP1-L2-Training-00007	A

DOCUMENT TITLE

TM-06

Operation for MSV/CV, CRV, lube Oil System, EHC Oil System, LP Turbine Bypass System & Other Oil System

EPC	EPC DOCUMENT No.	REV
Toshiba Energy Systems & Solutions Corporation	VP1-L2-Training-00007	A

Van Phong Thermal Power Plant Project

Turbine and Auxiliaries Course

Group : Mechanical
Item No. TM-06
TURBINE CONTROL EQUIPMENT
-MAIN TURBINE CONTROL-

TOSHIBA
Toshiba Energy Systems & Solutions Corporation

Contents

01

Steam Valves

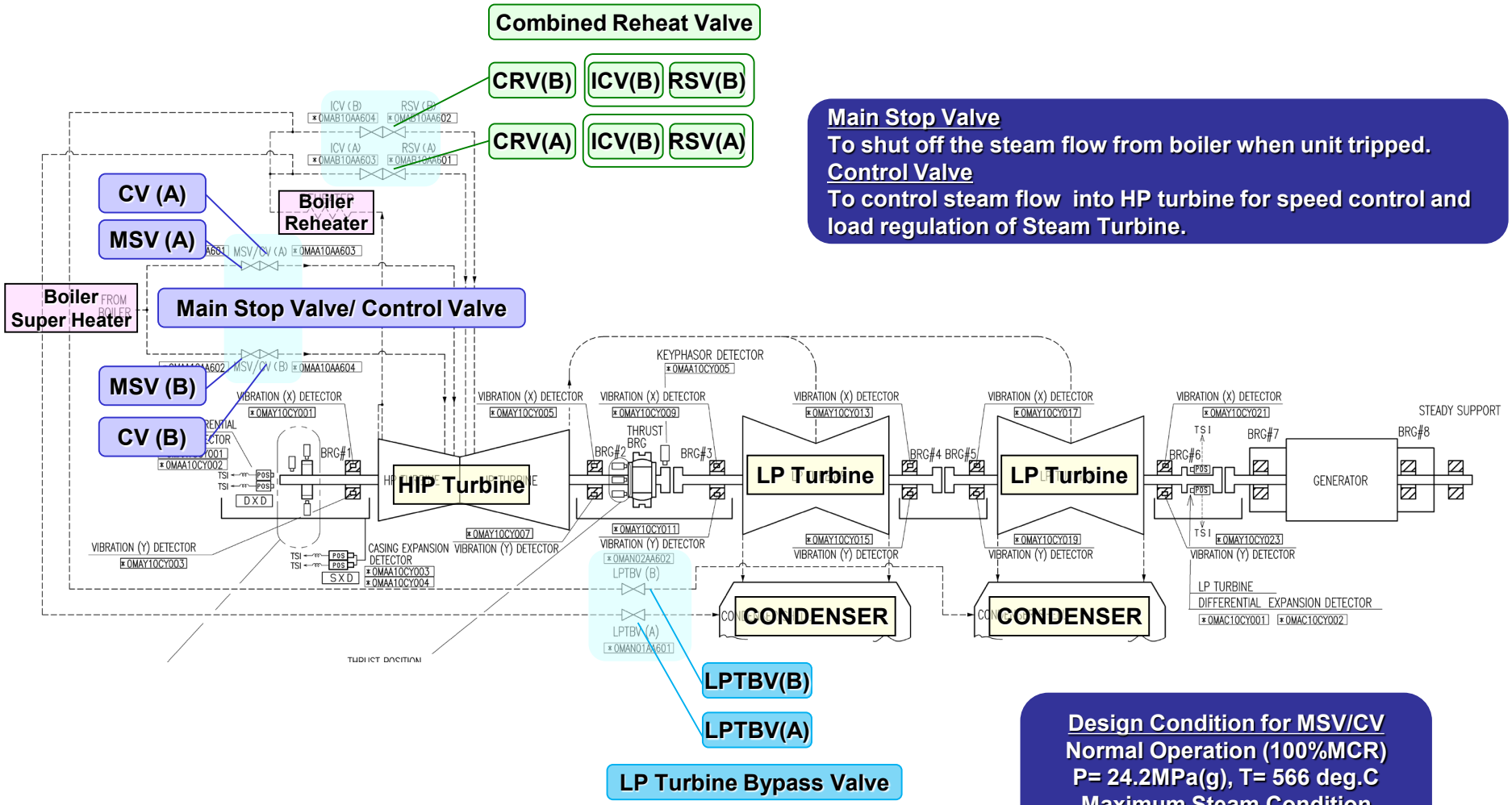
1-1. Main Stop / Control Valve

1-2. Combined Reheat Valve

1-3. Valve Operation – EHC

1-4. LP Turbine Bypass System

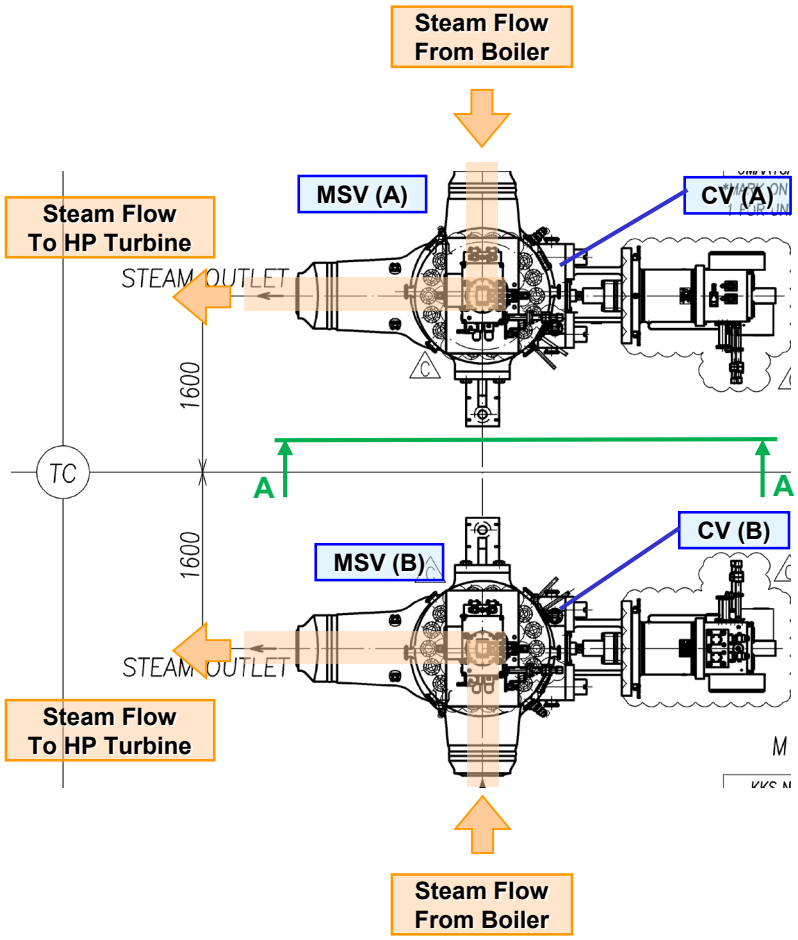
Steam Valves 1-1. Main Stop / Control Valve

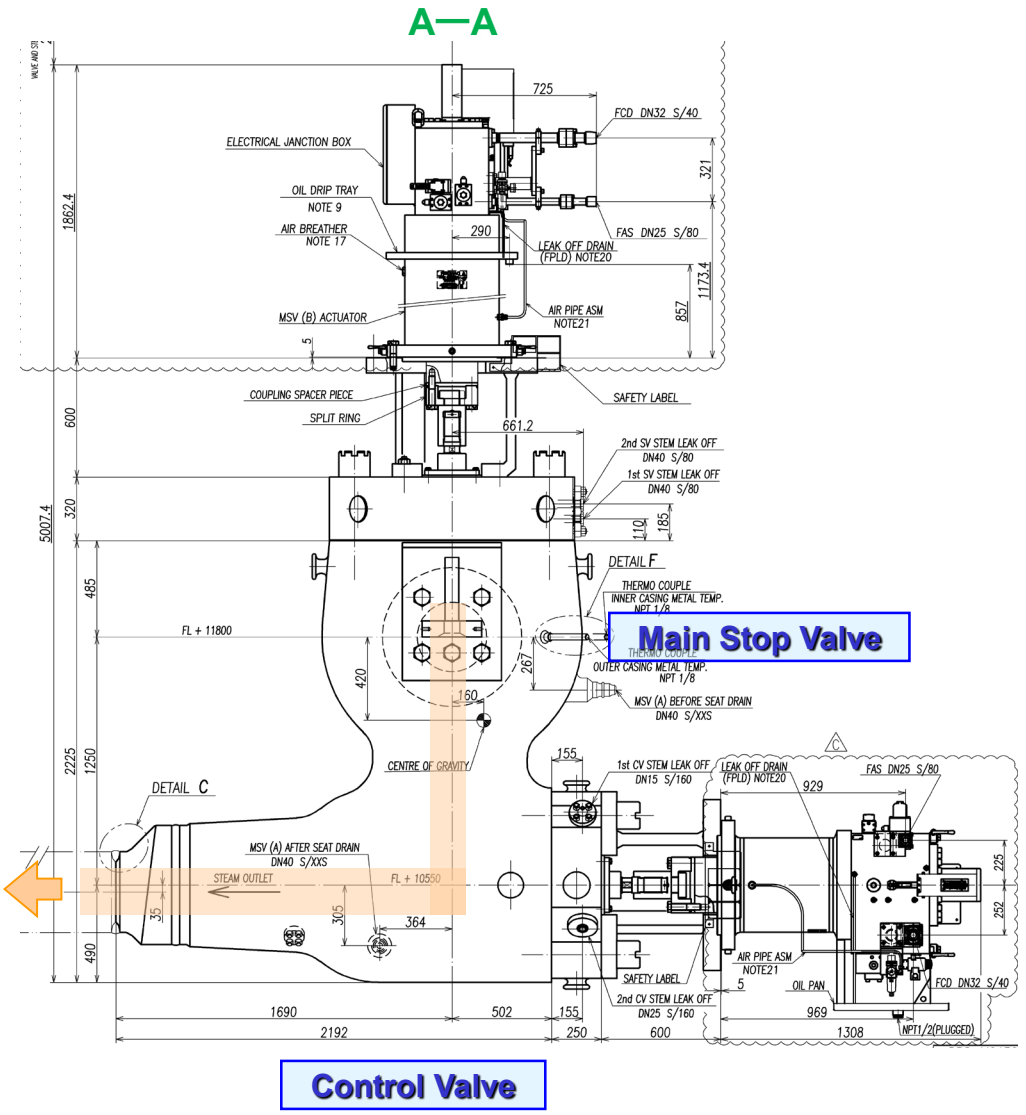


Main Stop Valve
To shut off the steam flow from boiler when unit tripped.
Control Valve
To control steam flow into HP turbine for speed control and load regulation of Steam Turbine.

Design Condition for MSV/CV
Normal Operation (100%MCR)
P= 24.2MPa(g), T= 566 deg.C
Maximum Steam Condition
P= 26.4MPa(g), T= 569 deg.C

Steam Valves 1-1. Main Stop / Control Valve -Outline-





Steam Valves 1-1. Main Stop / Control Valve Sectional Schematics

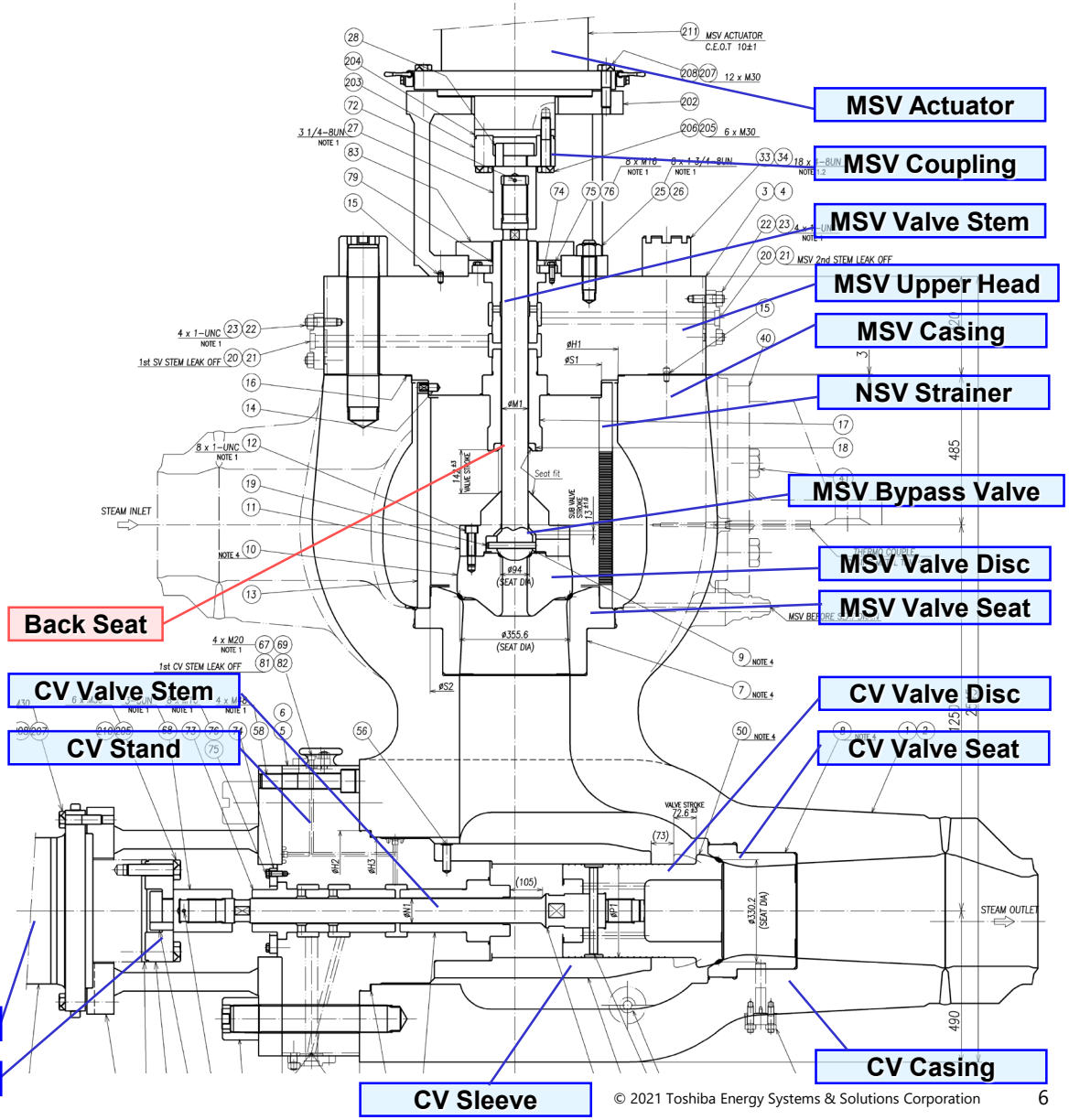
MSVCV (A) & (B)

MSV
With bypass valve
Seating Diameter : 355.6 mm
Bypass Valve Stroke :13 mm
Valve Stroke : 142 mm
Total Stroke : 155 mm

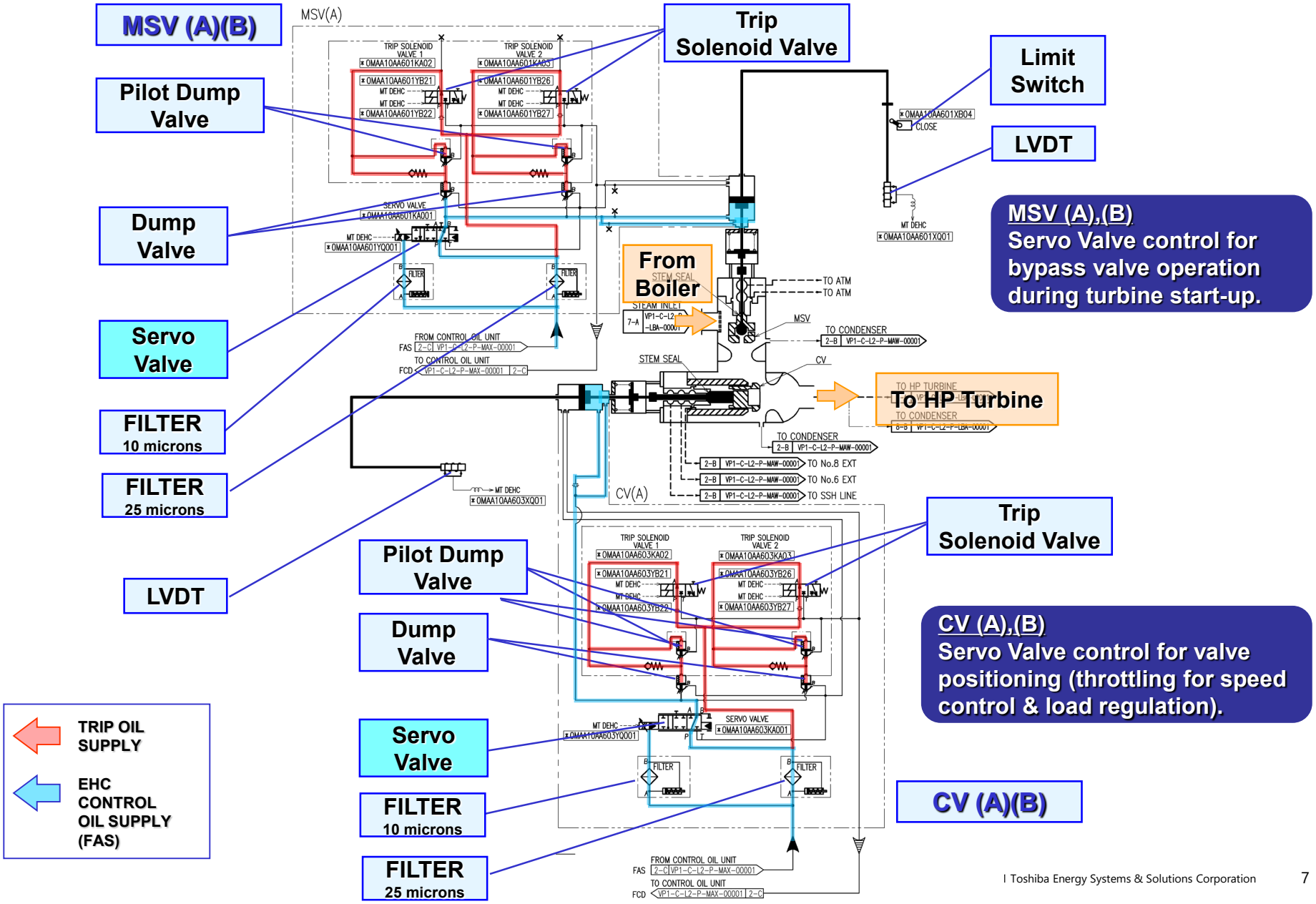
MSV Actuator
Servo Controlled, Single Acting,
Spring return (Fail to Close)
Piston Diameter : 240 mm
Rod Diameter : 90 mm
CEOT : 10 mm
Stroke : 175 mm

ICV
Seating Diameter : 330.2 mm
Valve Stroke : 72.6 mm

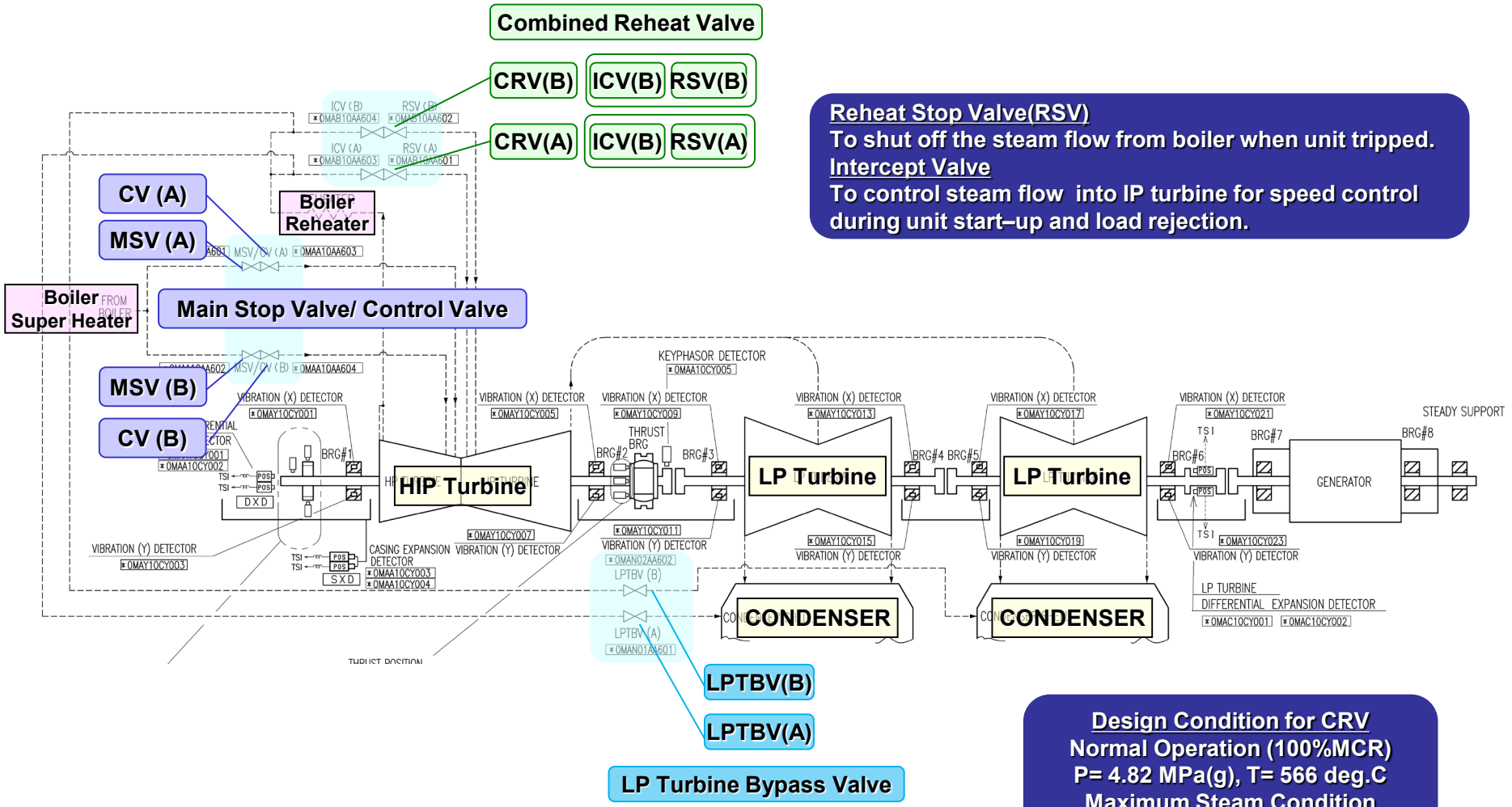
ICV Actuator
Servo Controlled, Single Acting,
Spring return (Fail to Close)
Piston Diameter : 300 mm
Rod Diameter : 125 mm
CEOT : 10 mm
Stroke : 96 mm



Steam Valves 1-1. Main Stop / Control Valve -Control Diagram



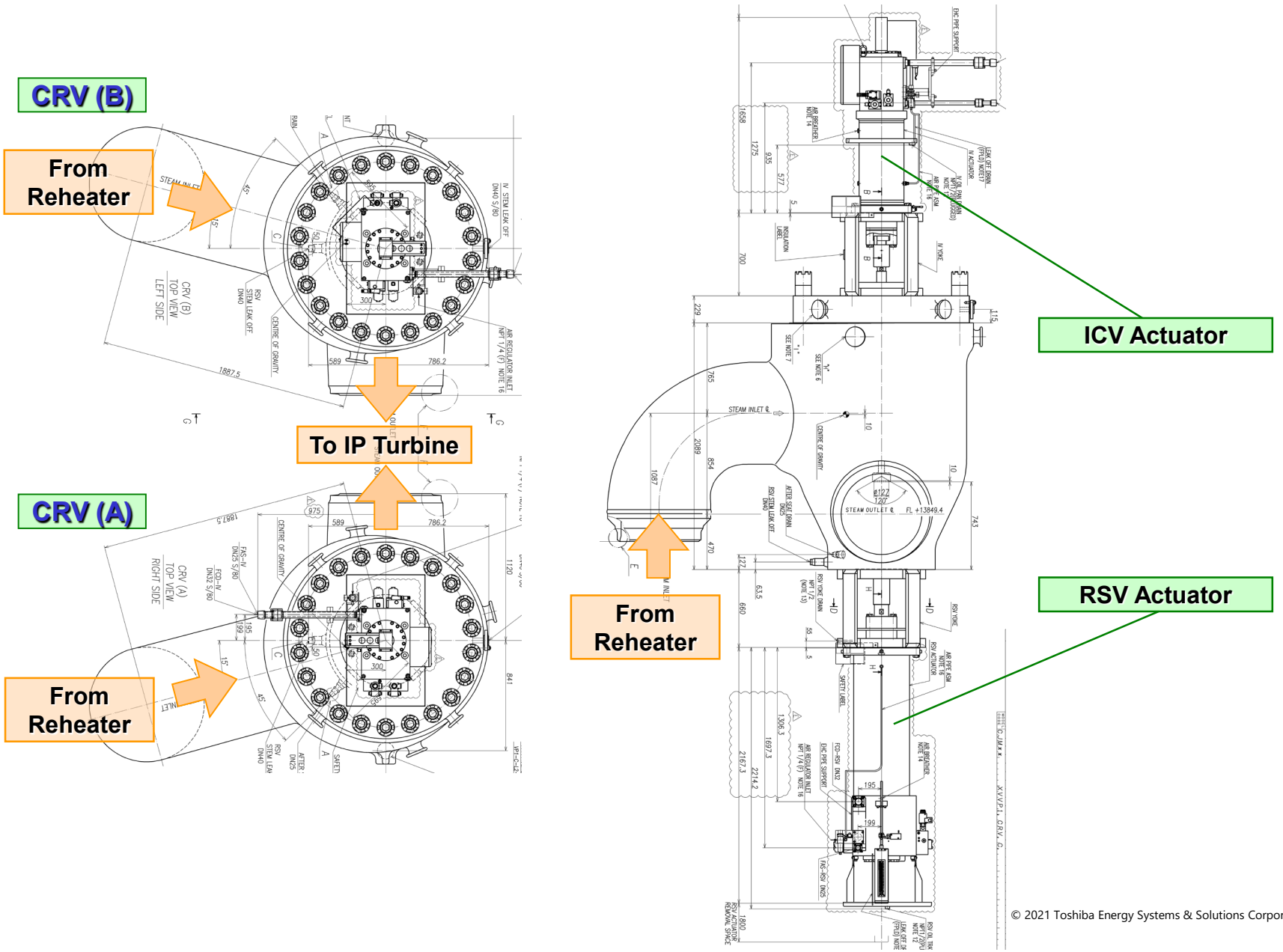
Steam Valves 1-2. Combined Reheat Valve



Reheat Stop Valve(RSV)
To shut off the steam flow from boiler when unit tripped.
Intercept Valve
To control steam flow into IP turbine for speed control during unit start–up and load rejection.

Design Condition for CRV
Normal Operation (100%MCR)
P= 4.82 MPa(g), T= 566 deg.C
Maximum Steam Condition
P=6.1 MPa(g), T= 568 deg.C

Steam Valves 1-2. Combined Reheat Valve -Outline-



Steam Valves 1-2. Combined Reheat Valve - Sectional Schematics

CRV (A) & (B)

RSV
With bypass valve

Seating Diameter :	673.1 mm
Bypass Valve Stroke :	20 mm
Valve Stroke :	203 mm
Total Stroke :	220 mm

RSV Actuator
Servo Controlled, Single Acting, Spring return (Fail to Close)

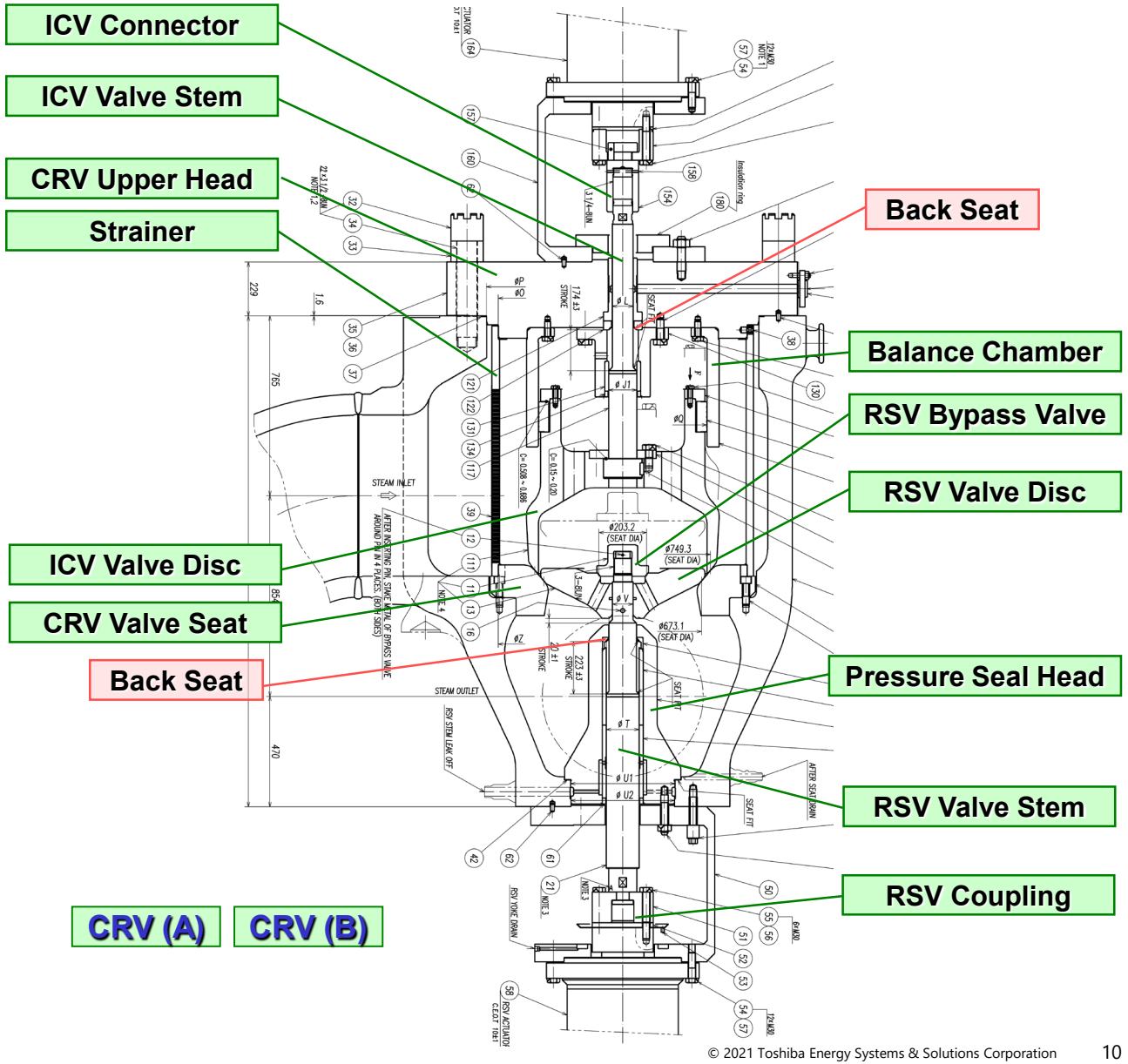
Piston Diameter :	230 mm
Rod Diameter :	90 mm
CEOT :	10 mm
Stroke :	245 mm

ICV

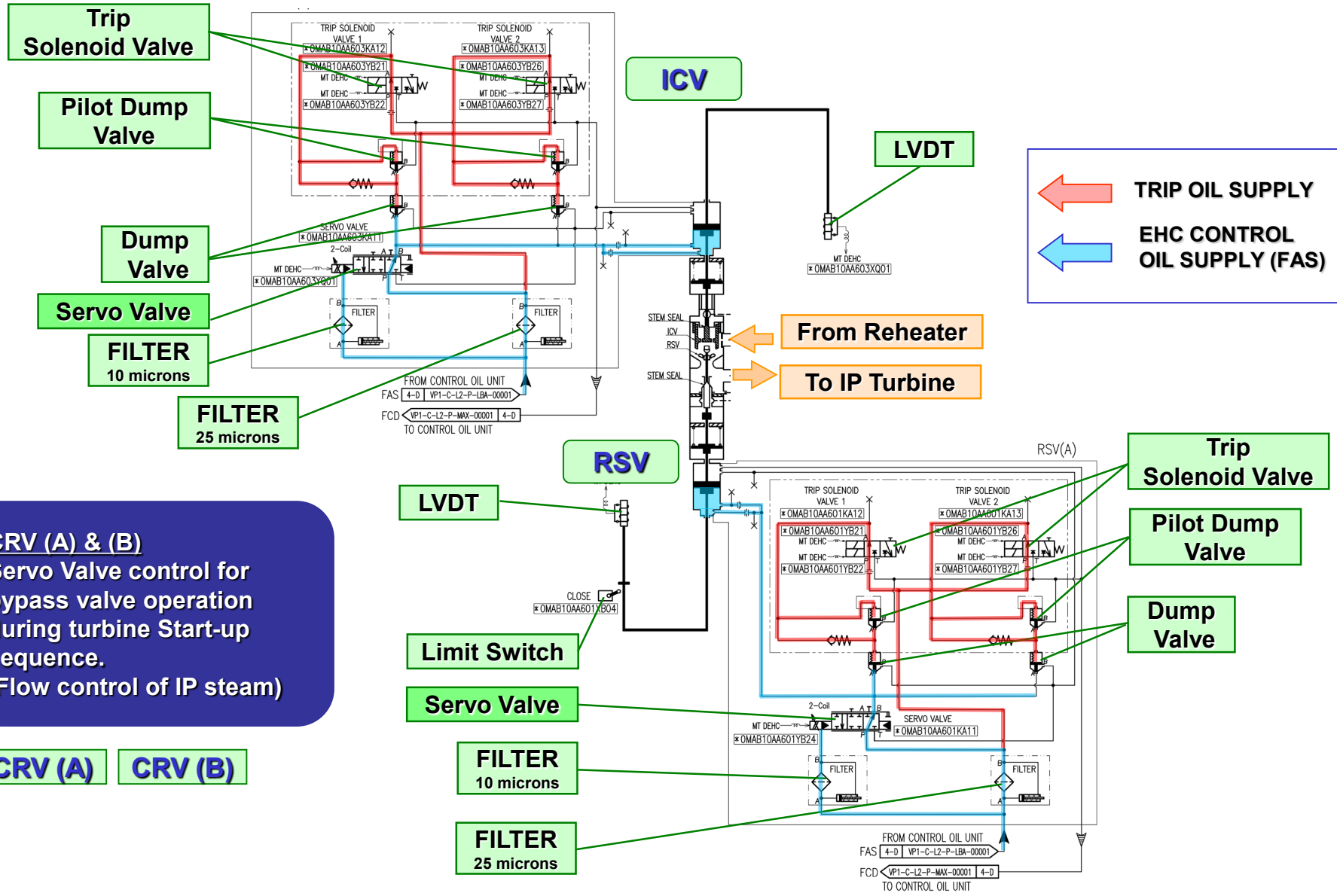
Seating Diameter :	749.3 mm
Valve Stroke :	174 mm

ICV Actuator
Servo Controlled, Single Acting, Spring return (Fail to Close)

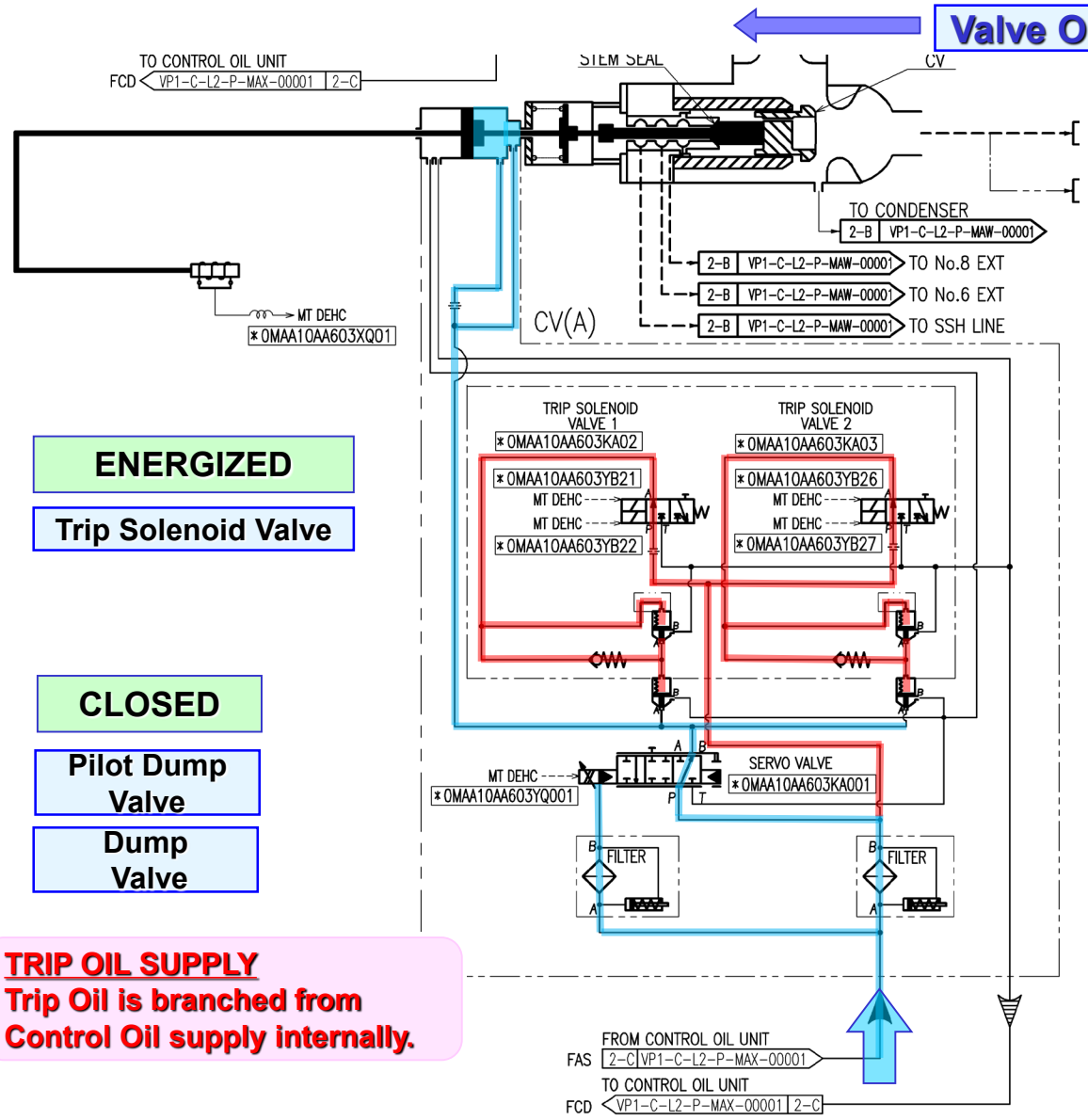
Piston Diameter :	190 mm
Rod Diameter :	90 mm
CEOT :	10 mm
Stroke :	194 mm



Steam Valves 1-2. Combined Reheat Valve -Control Diagram



Steam Valves 1-3. Valve Operation
EHC : Normal Operation



ENERGIZED

Trip Solenoid Valve

CLOSED

Pilot Dump Valve

Dump Valve

TRIP OIL SUPPLY
Trip Oil is branched from Control Oil supply internally.

Trip Solenoid Valve
To drain the Trip Oil when tripped, to open the Pilot Dump Valve.
Operated by the EHC signal.
De-Energized to Trip.

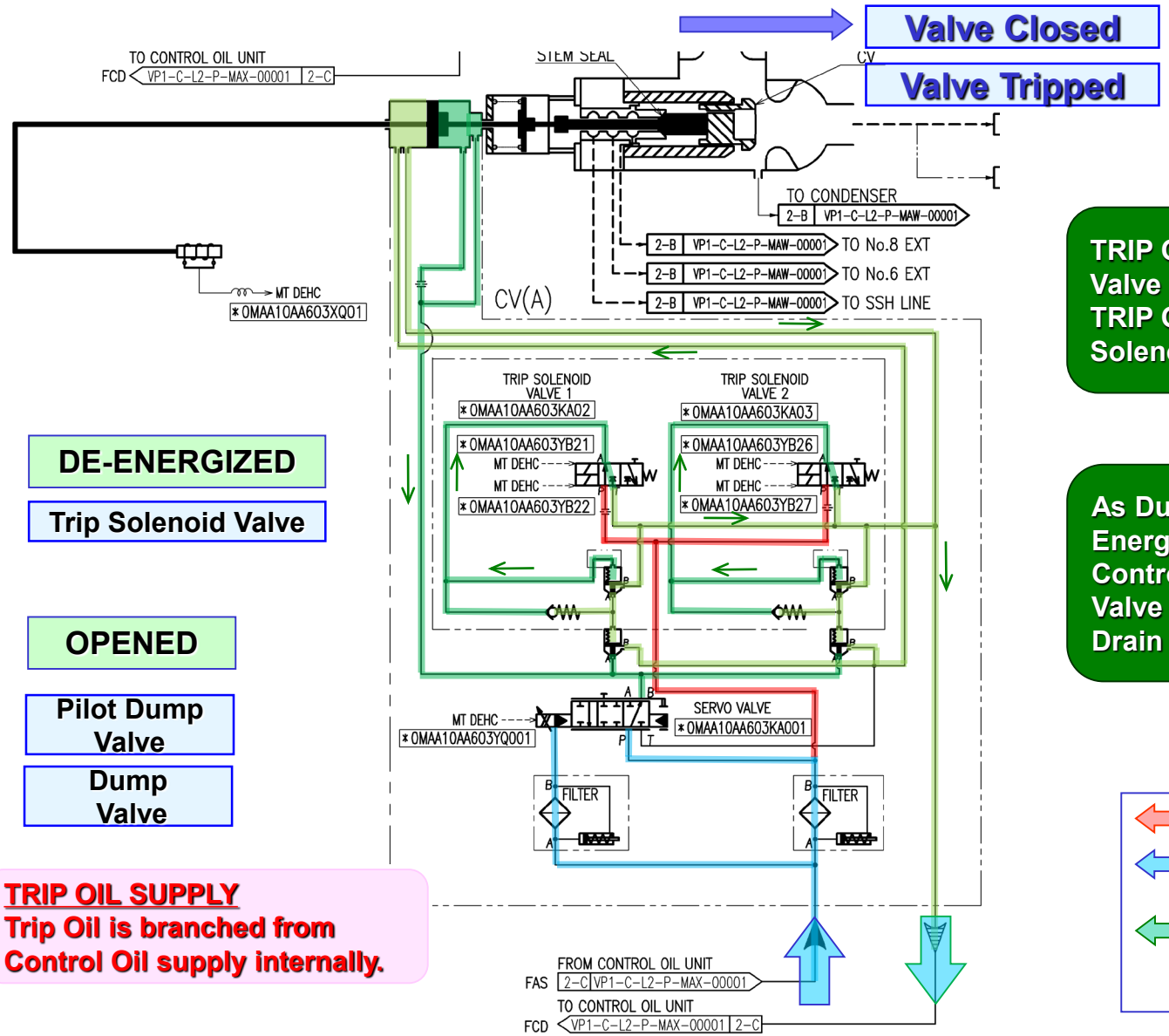
Pilot Dump Valve
To control the on-off position of Dump Valve.
Actuated by Trip Oil via Trip Solenoid Valve.
Open to Trip.

Dump Valve
To drain the control oil from Actuator Cylinder when Tripped.
Actuated by Trip Oil via Pilot Dump Valve.
Open to Trip.

TRIP OIL SUPPLY

EHC CONTROL OIL SUPPLY (FAS)

Steam Valves 1-3. Valve Operation
EHC : Trip Mode



DE-ENERGIZED

Trip Solenoid Valve

OPENED

Pilot Dump Valve

Dump Valve

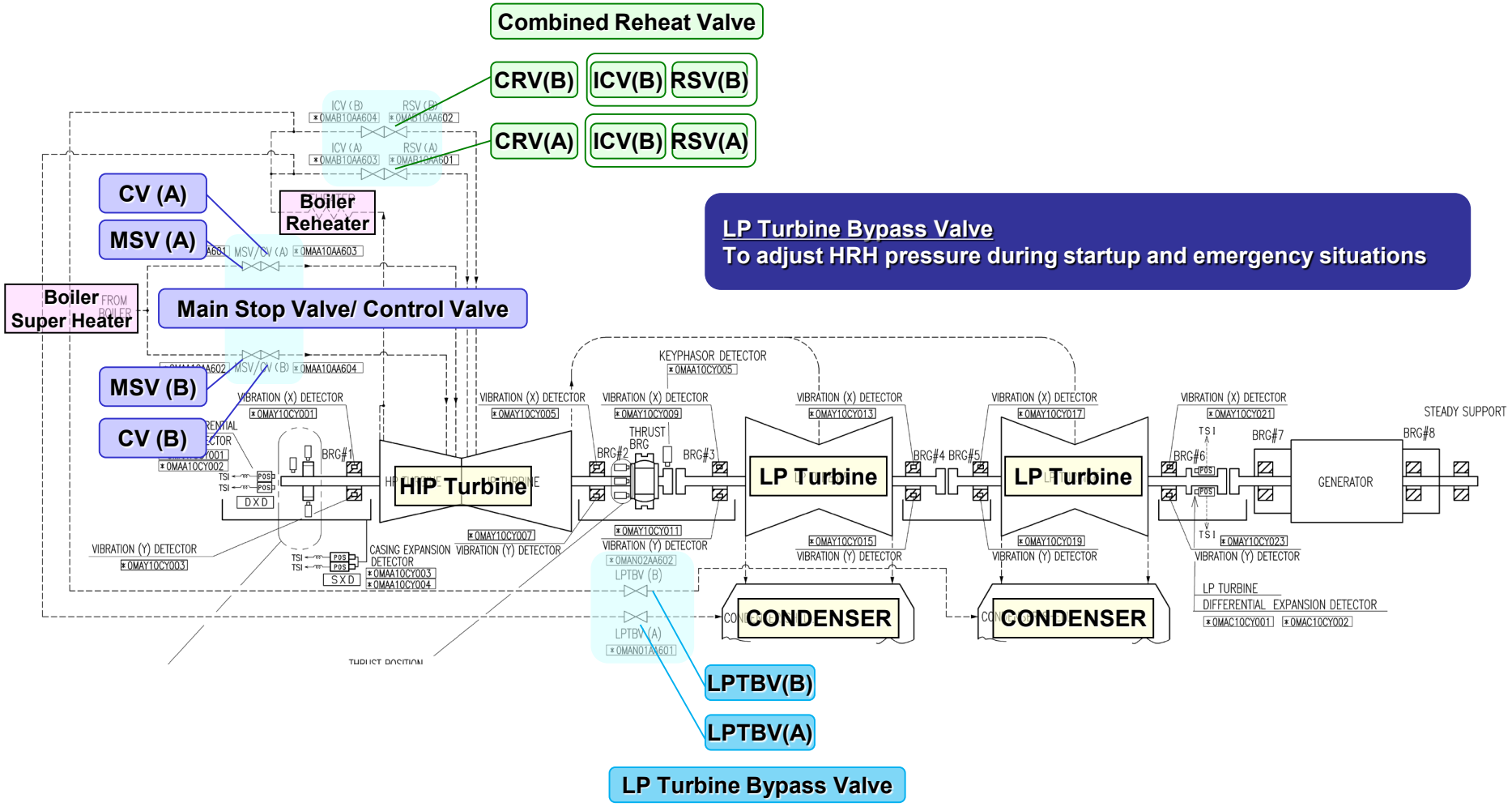
TRIP OIL SUPPLY
Trip Oil is branched from Control Oil supply internally.

TRIP OIL is drained thru Dump Valve to Drain system.
TRIP OIL is interrupted by Trip Solenoid Valve.

As Dump Valve opened by De-Energizing Trip Solenoid Valve, Control Oil Supply between Servo Valve and Cylinder is connected to Drain system.

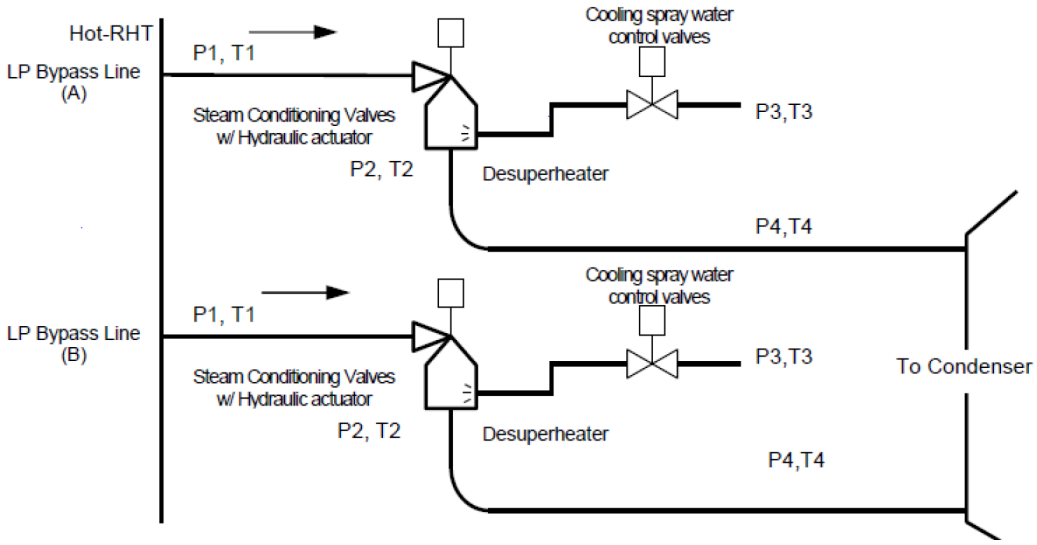
- TRIP OIL SUPPLY
- EHC CONTROL OIL SUPPLY (FAS)
- EHC OIL DRAIN (FCD)

Steam Valves 1-4. LP Turbine Bypass Valve System



Steam Valves 1-4. LP Turbine Bypass Valve System
System Arrangement & Scope of Supply (Main equipment/unit)

System Arrangement



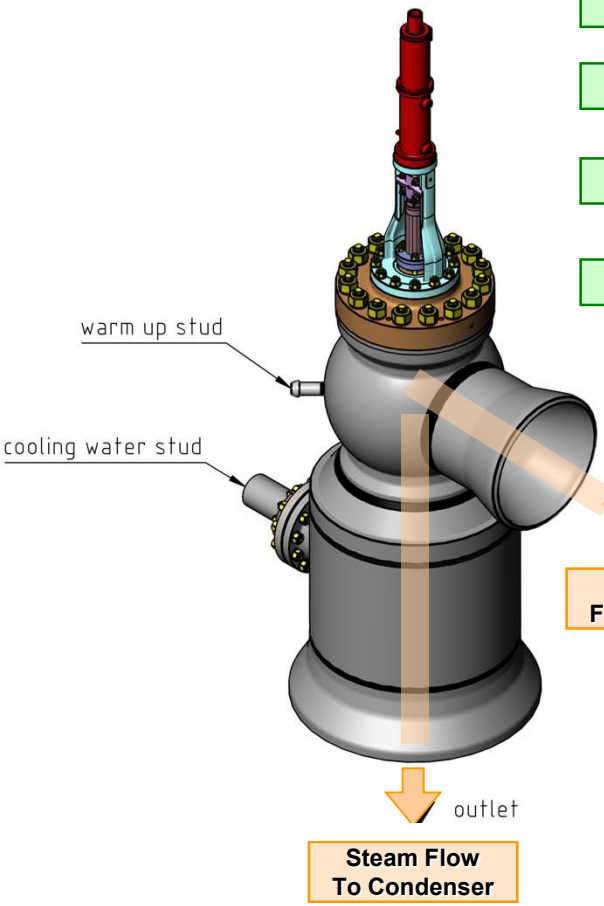
LP Bypass valve
- Design Press: 6.0 MPa(G) / 1.15 MPa(G)
- Design Temp.: 568 deg. C / 557 deg.C

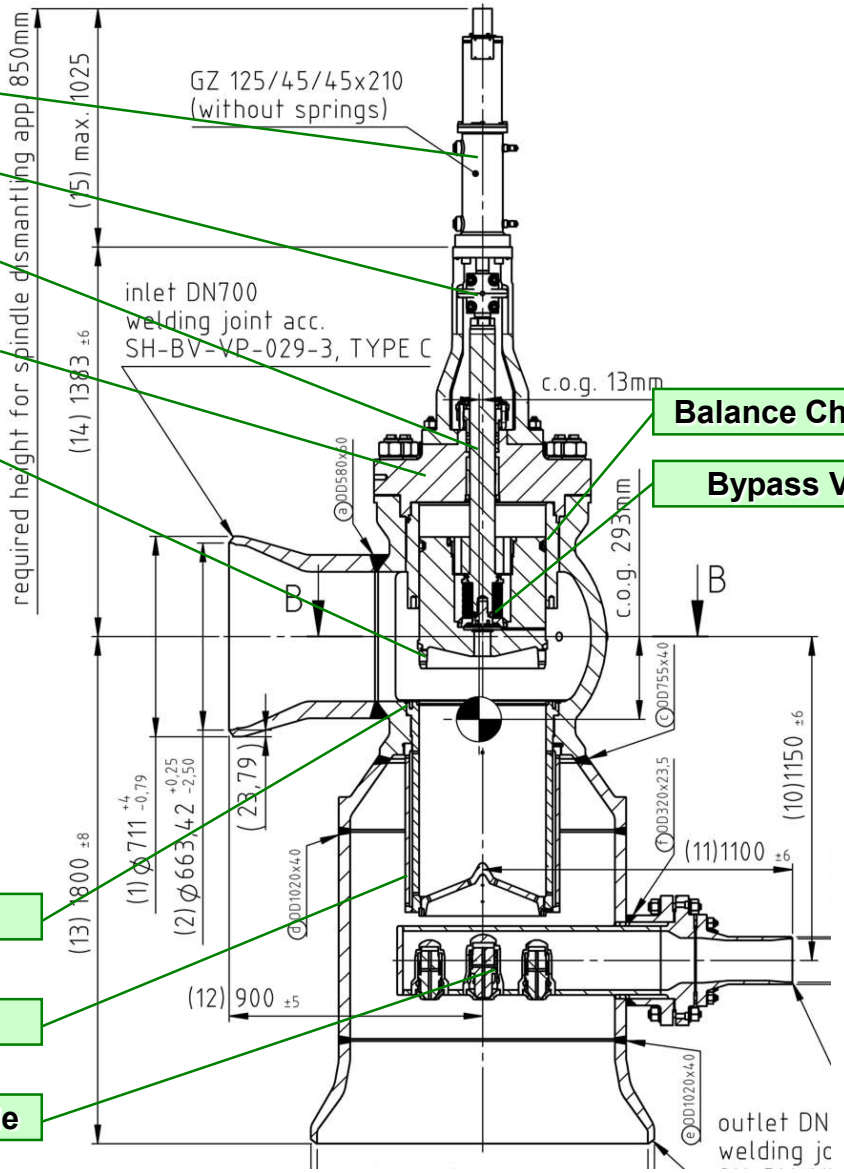
LP Bypass Spray valve
- Design Press: 4.49 MPa(G)
- Design Temp.: 70 deg. C

Scope of Supply (Main equipment/unit)

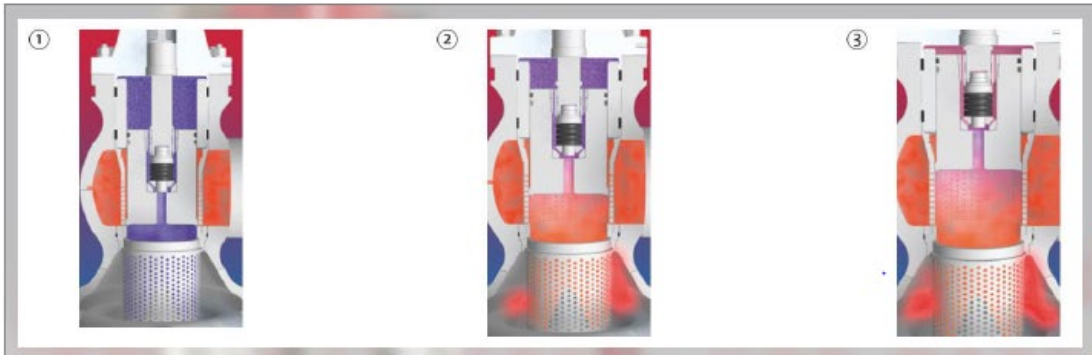
- 2 x LP Turbine bypass valve
  - F92/F91 Angle body
  - Spring loaded nozzles
  - Hydraulic actuator
- 2 x LP Turbine Spray control valve
  - Globe body, SA105
  - Pneumatic Diaphragm (DA) actuator
  - E/P positioner
- 2 x Open rack for Hydraulic control unit
  - 1 x 50L accumulator
  - 1 x Proportional solenoid valve
  - 1 x Fast close/open solenoid valve
  - 1 x Fail safe solenoid valve

Steam Valves 1-4. LP Turbine Bypass Valve System Drawing -LPTBV



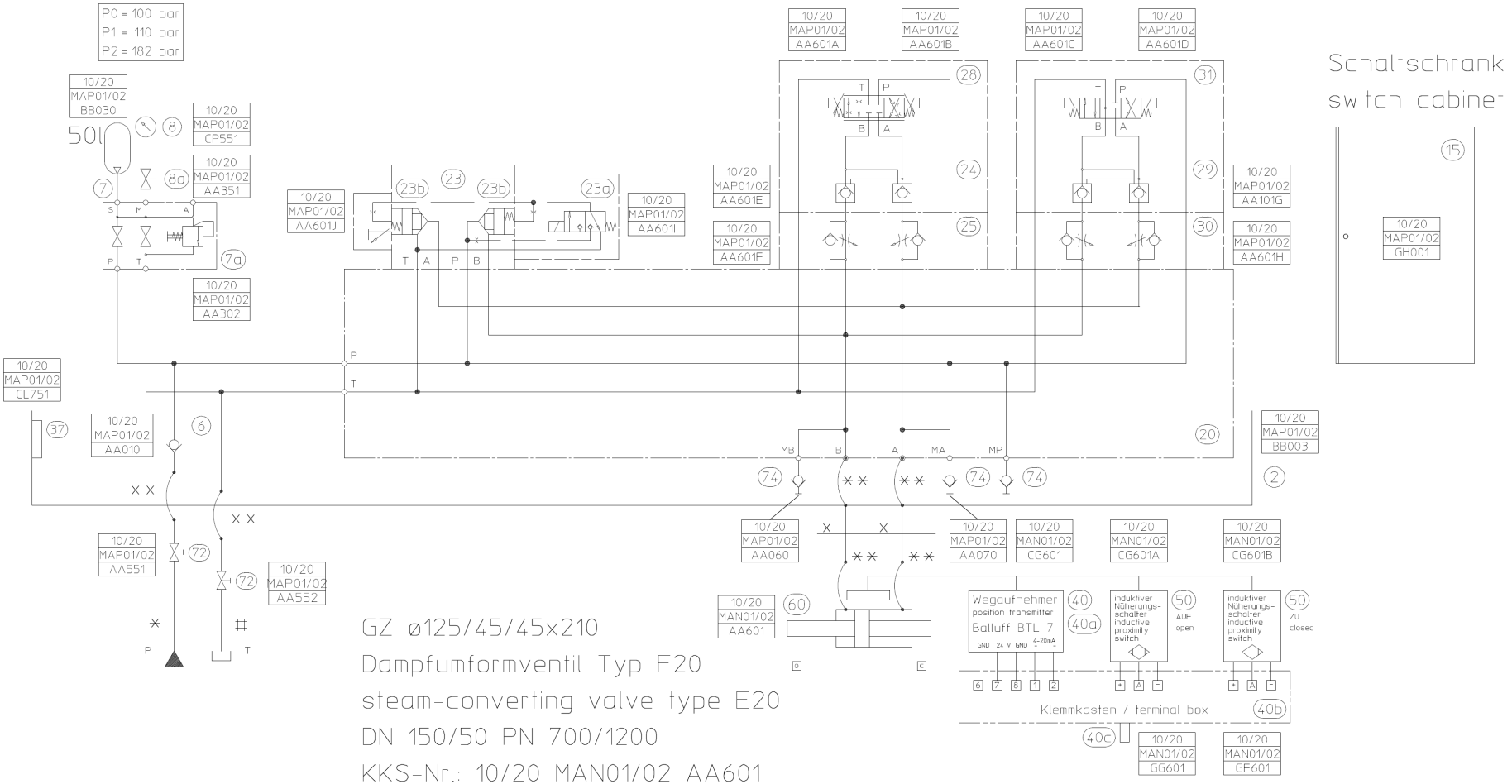


Steam Valves 1-4. LP Turbine Bypass Valve System Drawing -LPTBV

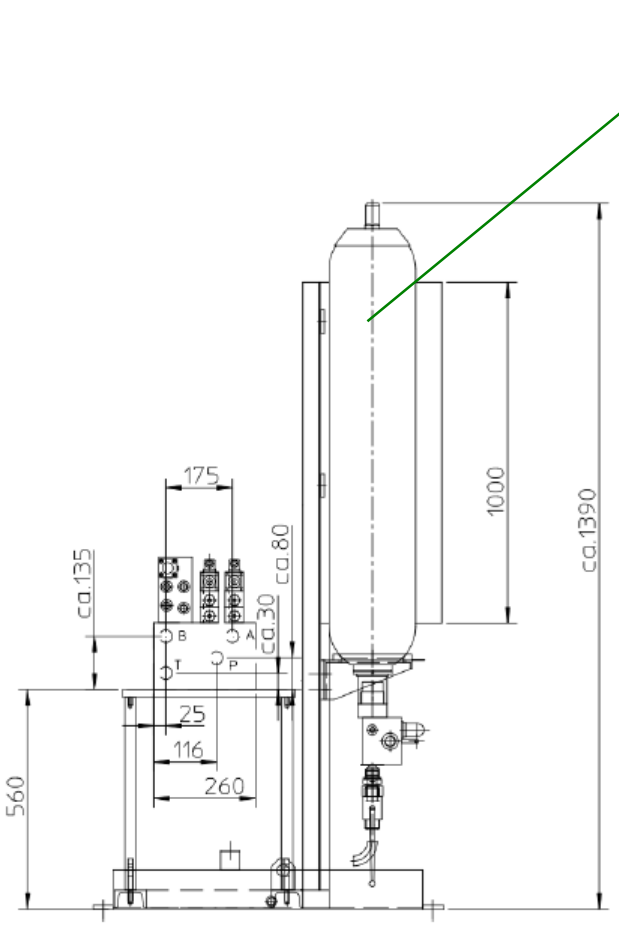


- Turbine Bypass Valve with nozzle lance in the valve outlet
- Spray water will be injected by means of pressure-controlled nozzles
- The nozzles in the steam flow ensure homogeneous temperature distribution in the exhaust pipe

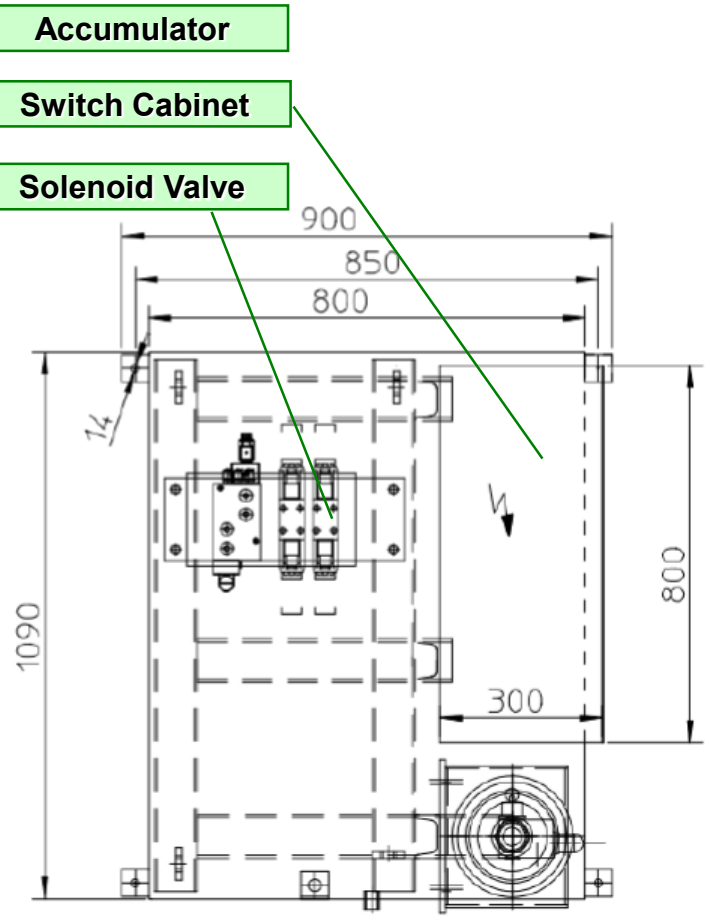
Steam Valves 1-4. LP Turbine Bypass Valve System
Hydraulic system



Steam Valves 1-4. LP Turbine Bypass Valve System
Hydraulic system-Control Unit Outline

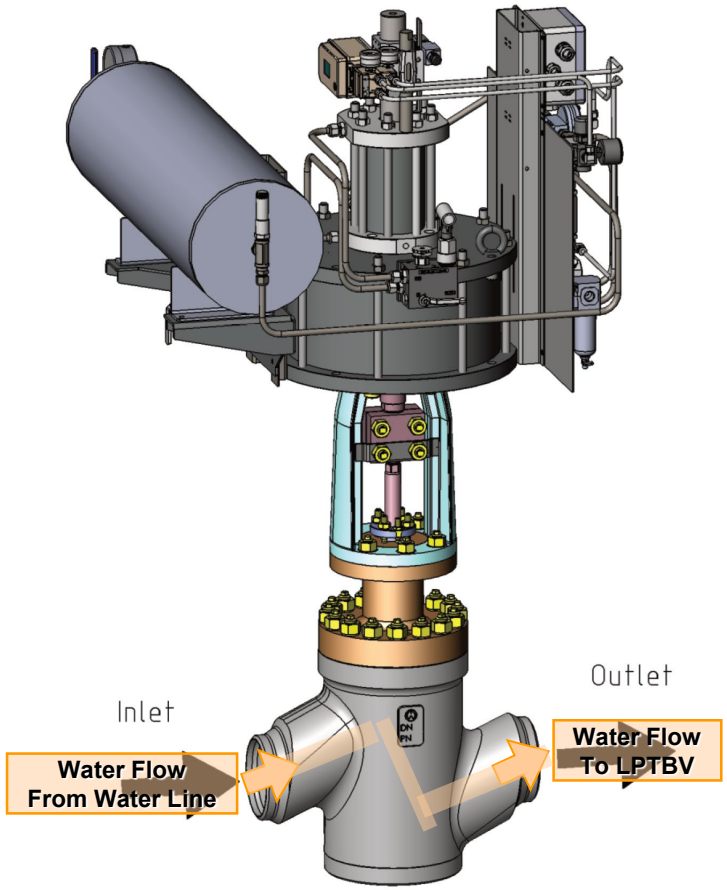


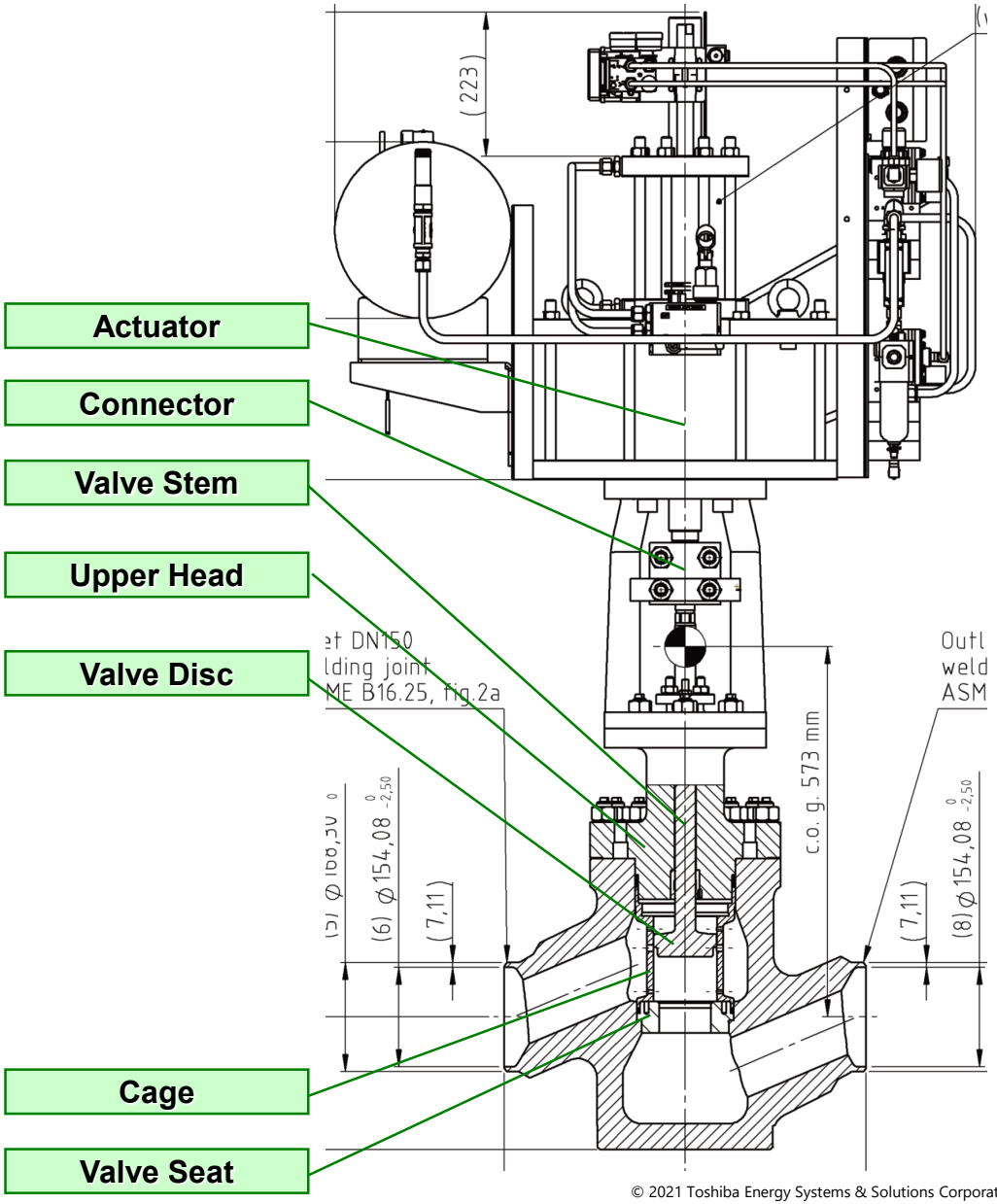
Side View



Top View

Steam Valves 1-4. LP Turbine Bypass Valve System Drawing –Spray Water Valve



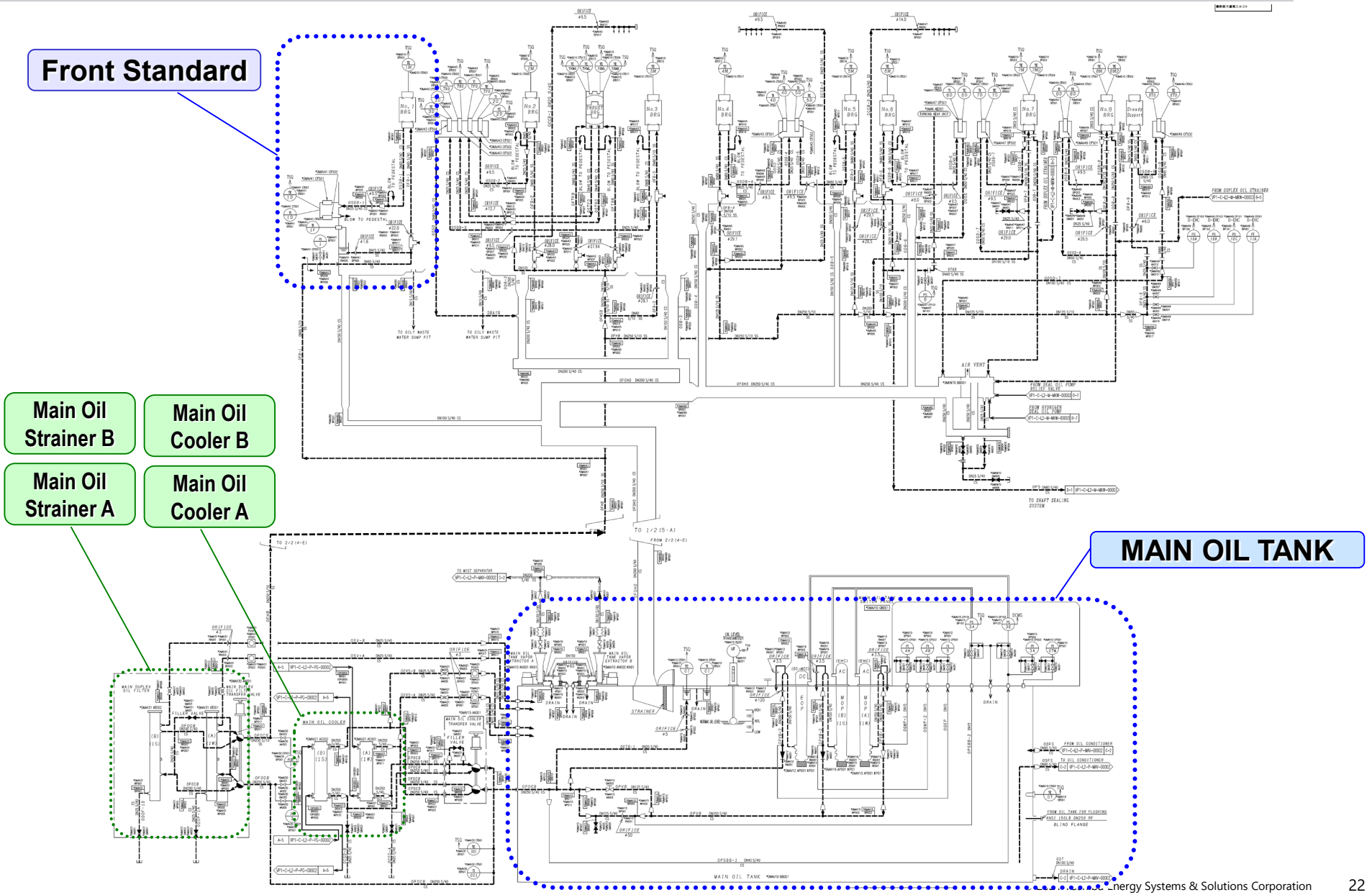


02

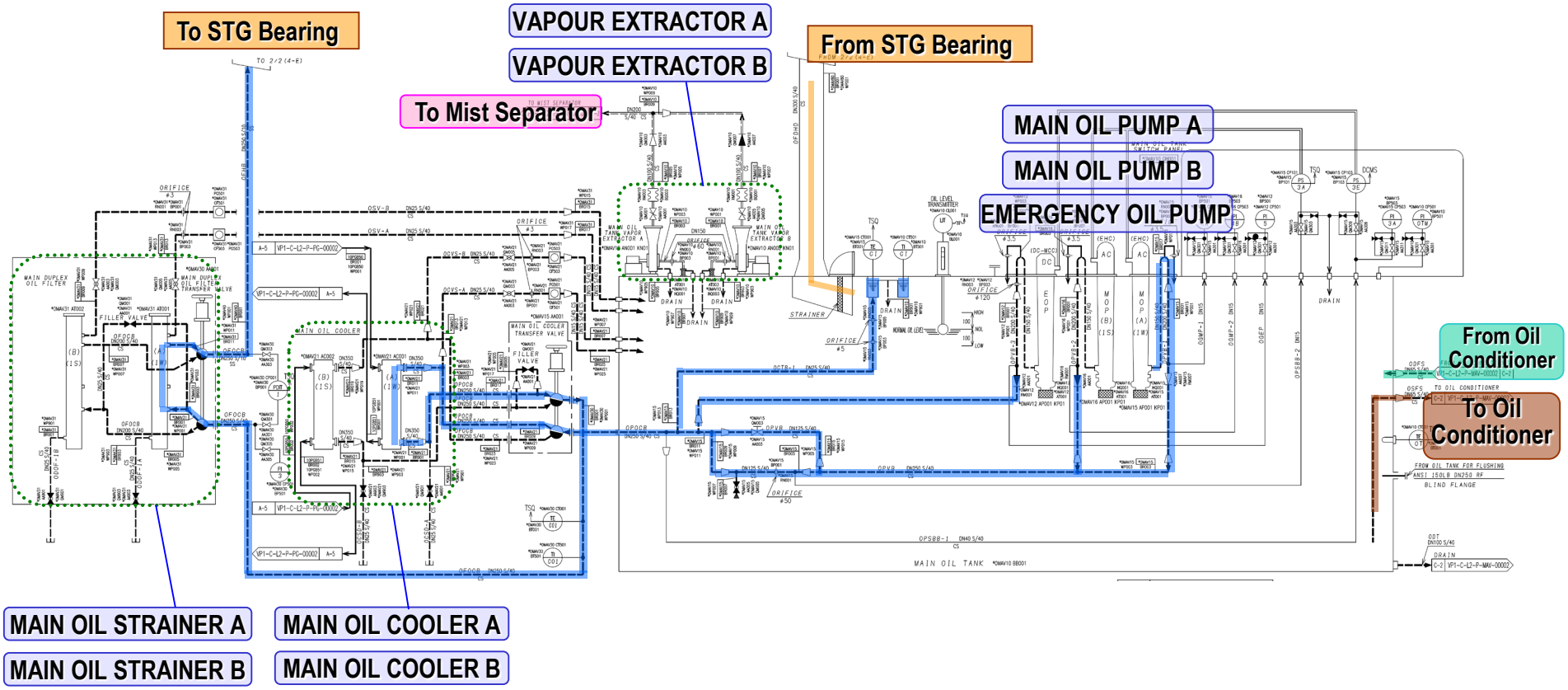
Lube Oil System

2-1. Lube Oil Flow Diagram
2-2. Main Oil Tank
2-3. Front Standard
2-4. Lube Oil Conditioner

Lube Oil System 2-1. Lube Oil Flow Diagram



Lube Oil System 2-1. Lube Oil Flow Diagram
Main Oil Tank Flow Diagram

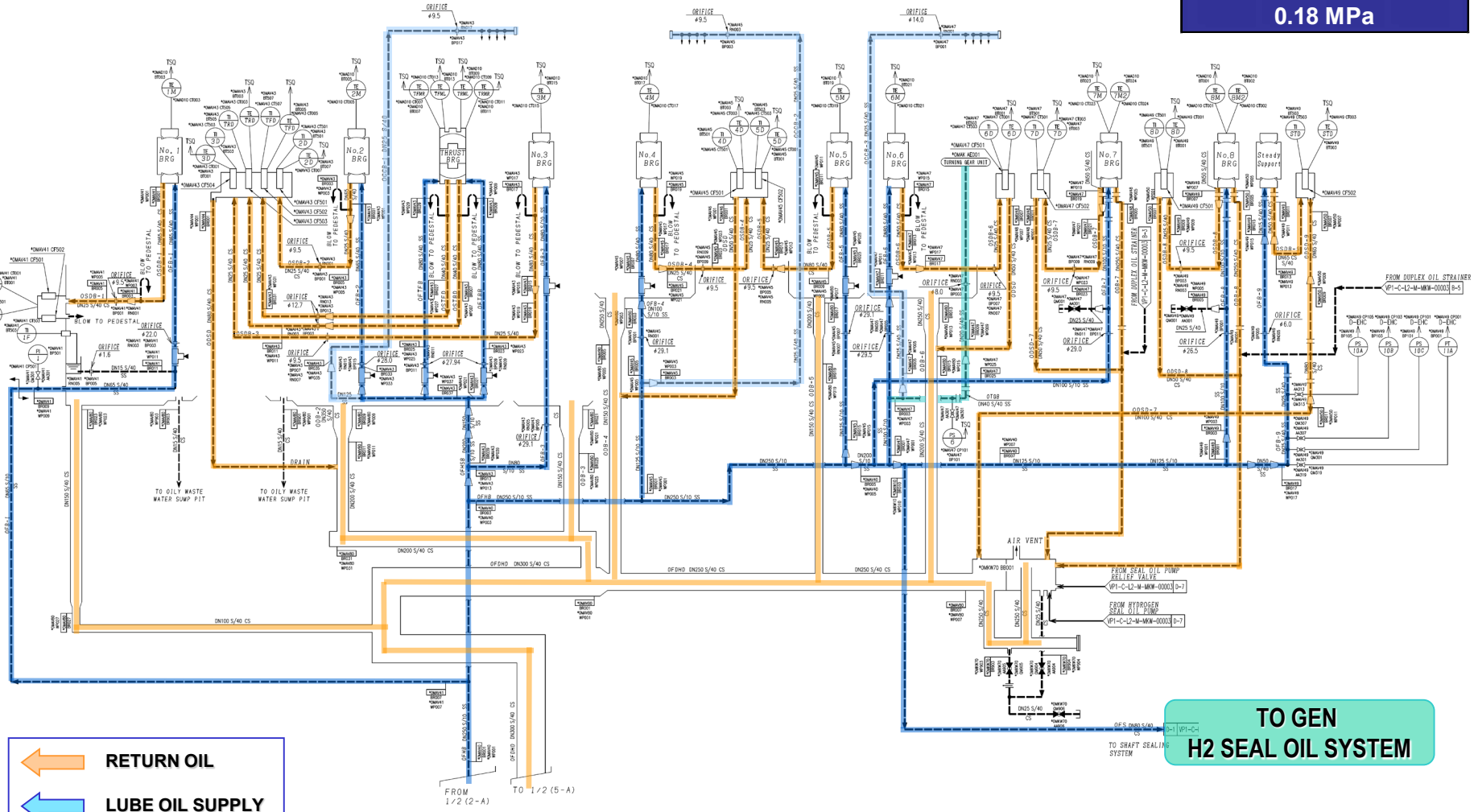


Main Oil Tank CAPACITY
Full : 59,000L
NOL : 35,000L

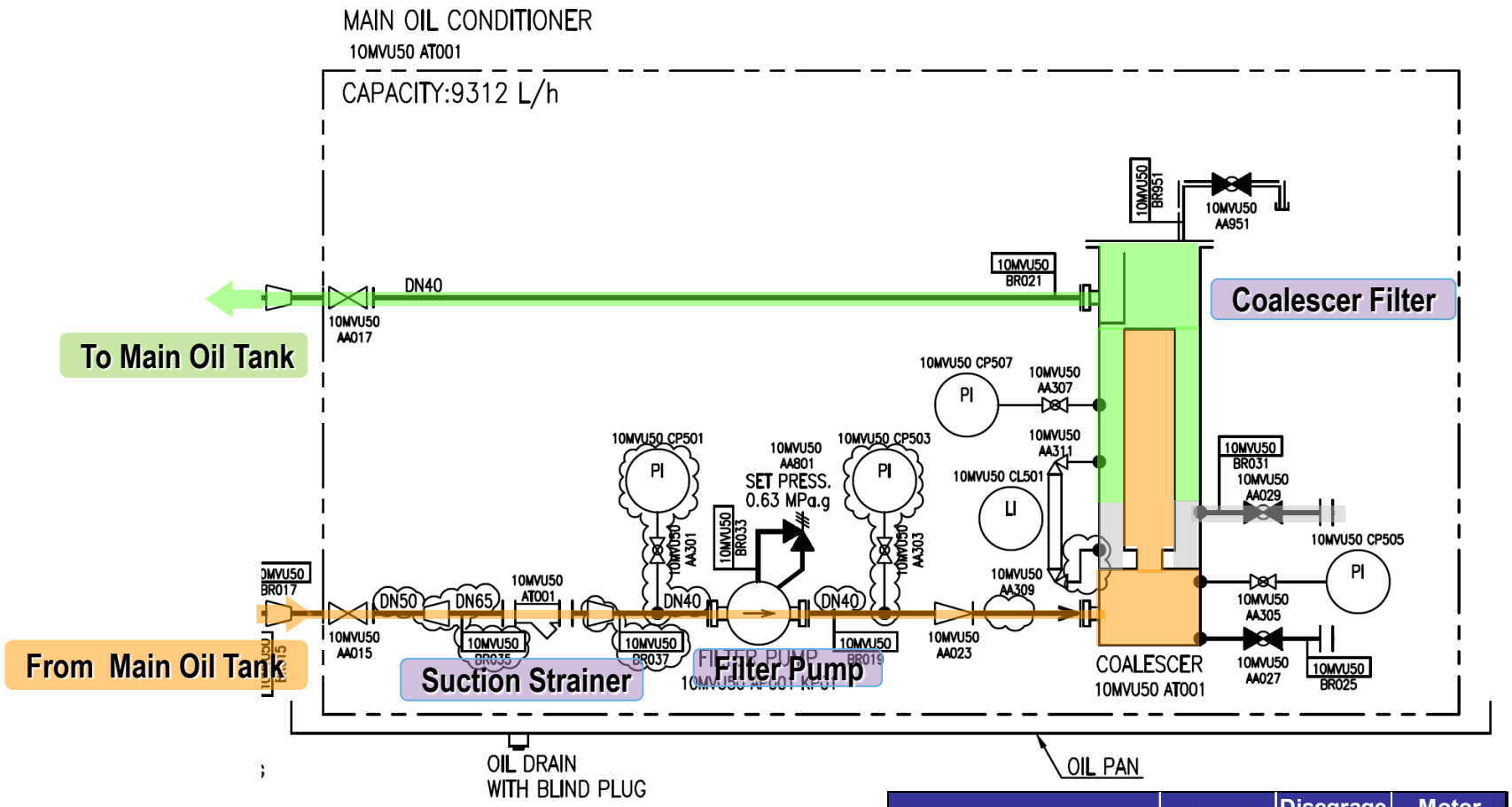
Pump Design Condition		Flow Rate L/min	Discgrage Press. MPa	Motor Power KW
Main Oil Pump A / B	MOP	5740	0.68	150
Emergency Oil Pump	EOP	4687	0.32	65

Lube Oil System 2-1. Lube Oil Flow Diagram
STG Bearing & Front Standard

Bearing Pressure at Normal Operation
0.18 MPa



Lube Oil System 2-1. Lube Oil Flow Diagram
Lube Oil Conditioner



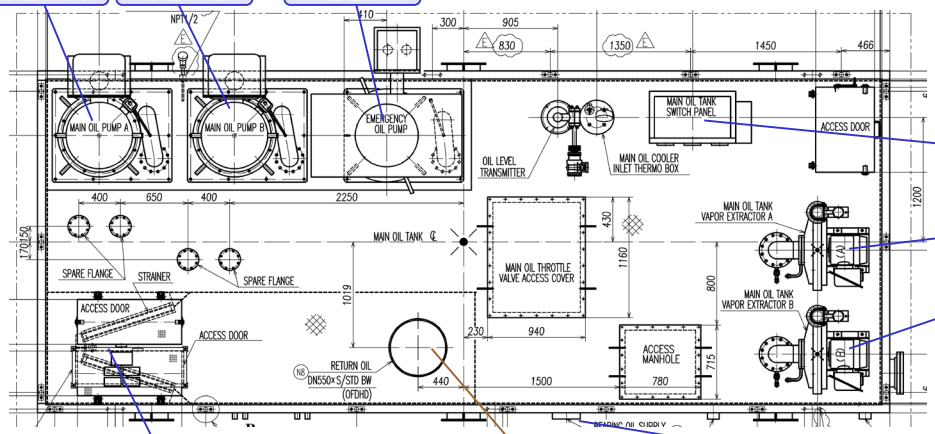
Design Condition	Flow Rate L/min	Discgrage Press. bar	Motor Power KW
Filter Pump	166	3.4	3.7

Performance	(Within 5 cycle)
Seperation Capability	NAS 12 -> NAS7
Water Separation	10,000ppm -> 500 ppm

Lube Oil System 2-2. Main Oil Tank OUTLINE

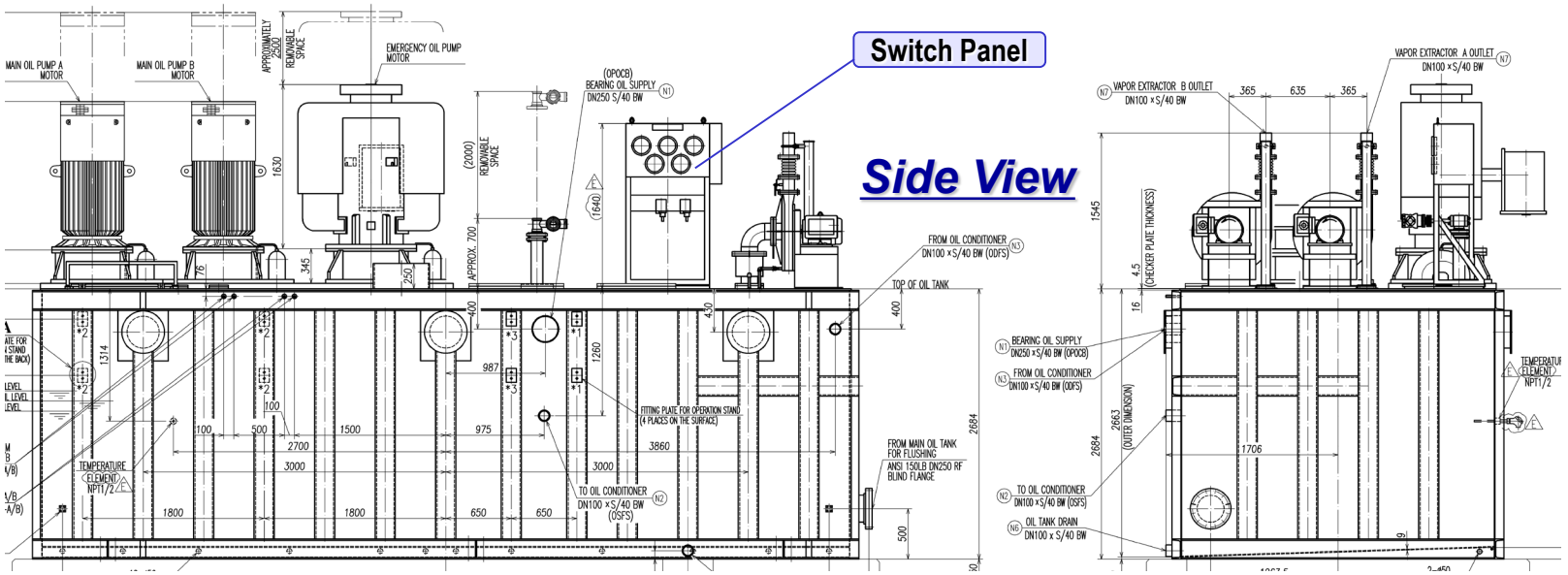
MOP-A
MOP-B
EOP

Top View



Switch Panel
VAPOUR EXTRACTOR A
VAPOUR EXTRACTOR B
Strainer Access Door
OIL RETURN PIPE
BRG OIL FEED

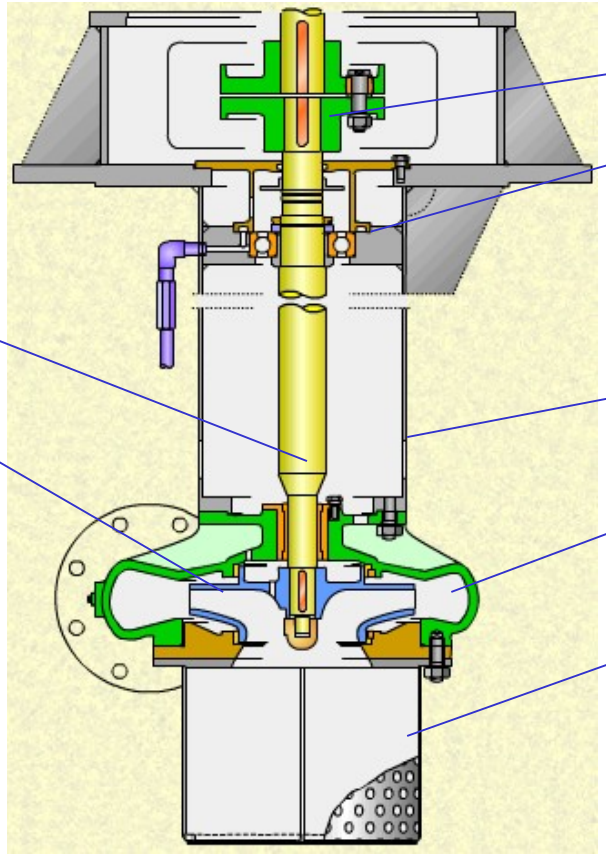
Side View



Switch Panel

Lube Oil System 2-2. Main Oil Tank – MOP & EOP Assembly Drawing

Centrifugal pump
Vertical installation



Typical Assembly Drawing For MOP & EOP

Lube Oil System 2-3. Front Standard – OUTLINE

Oil Sight

Shell Expansion Detector

Eccentricity Indicator

Control Rotor

No.1 BRG

Oil Deflector

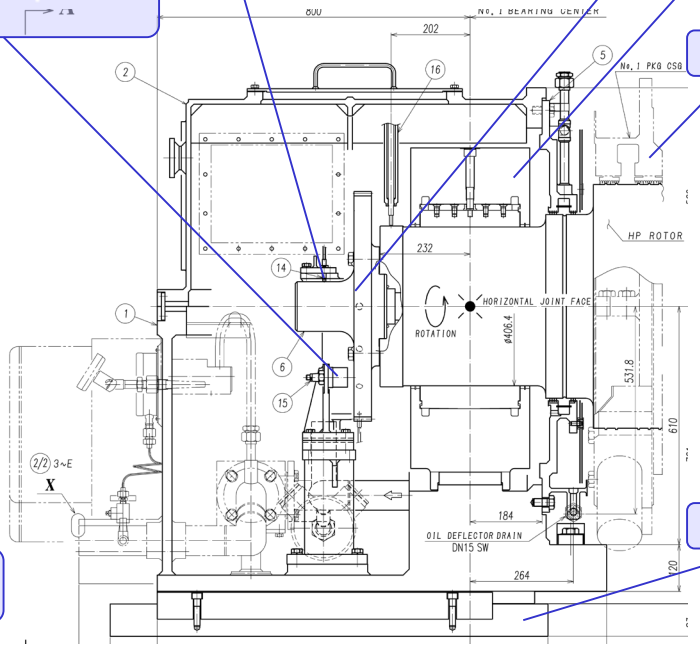
Differential Expansion Detector

Sole Plate

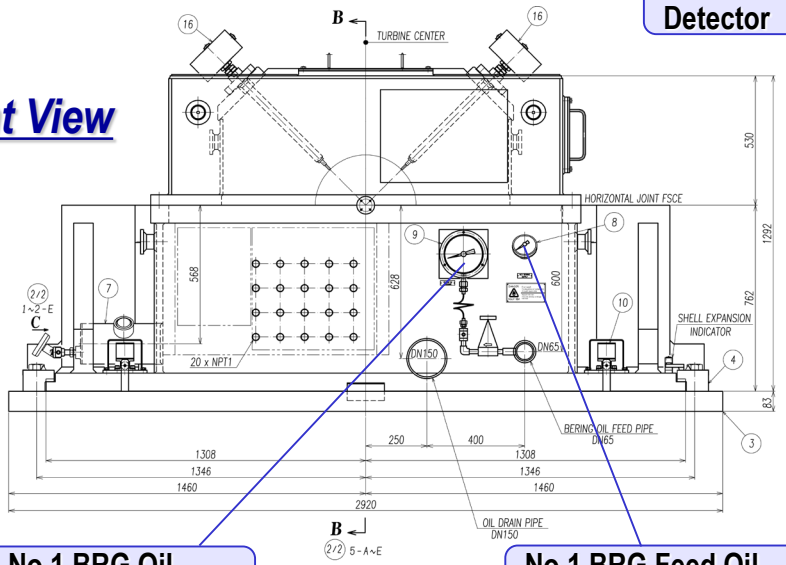
No.1 BRG Oil Pressure Indicator

No.1 BRG Feed Oil Temperature Indicator

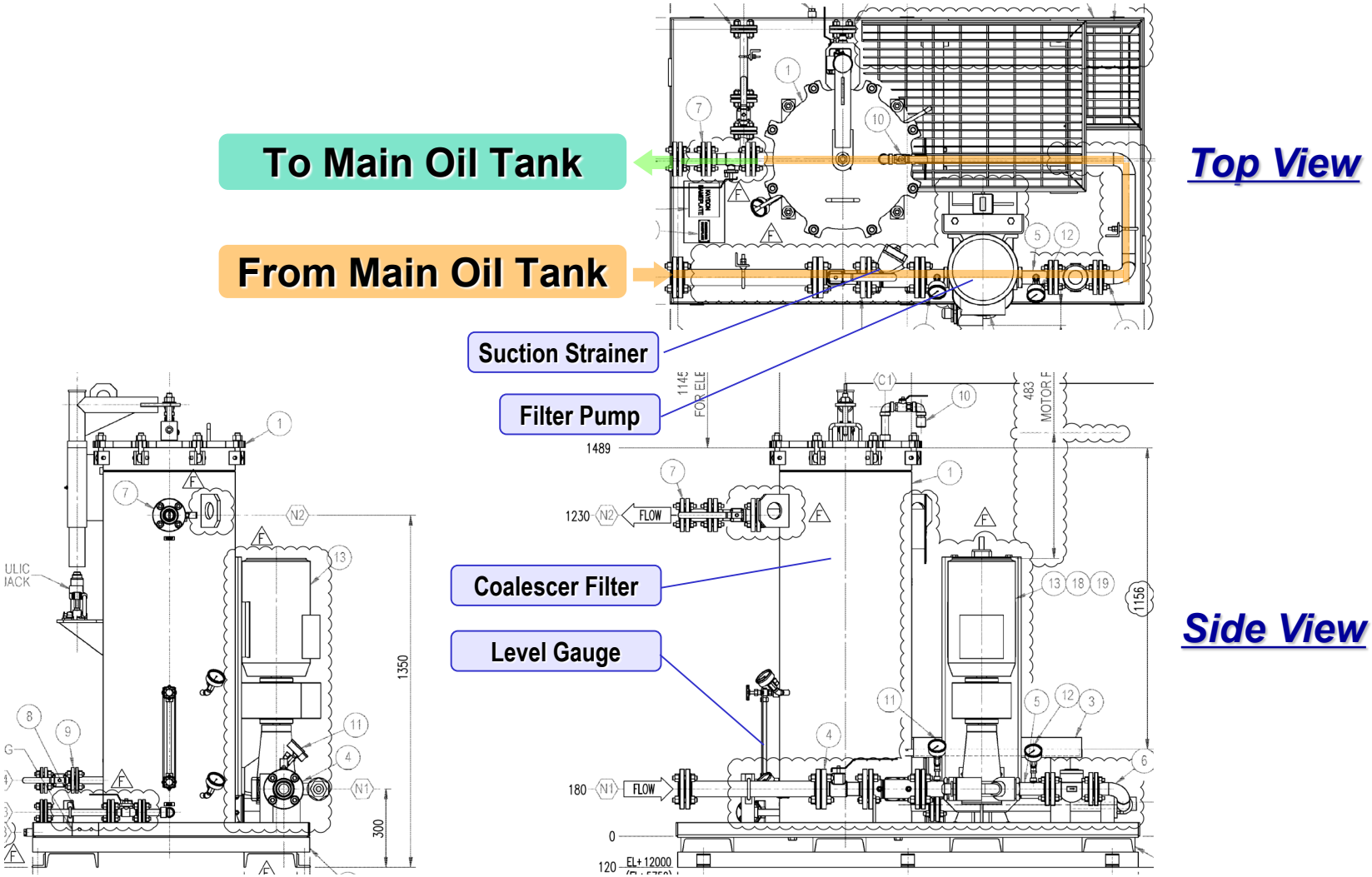
Center Section



Front View



Lube Oil System 2-4. Lube Oil Conditioner Outline

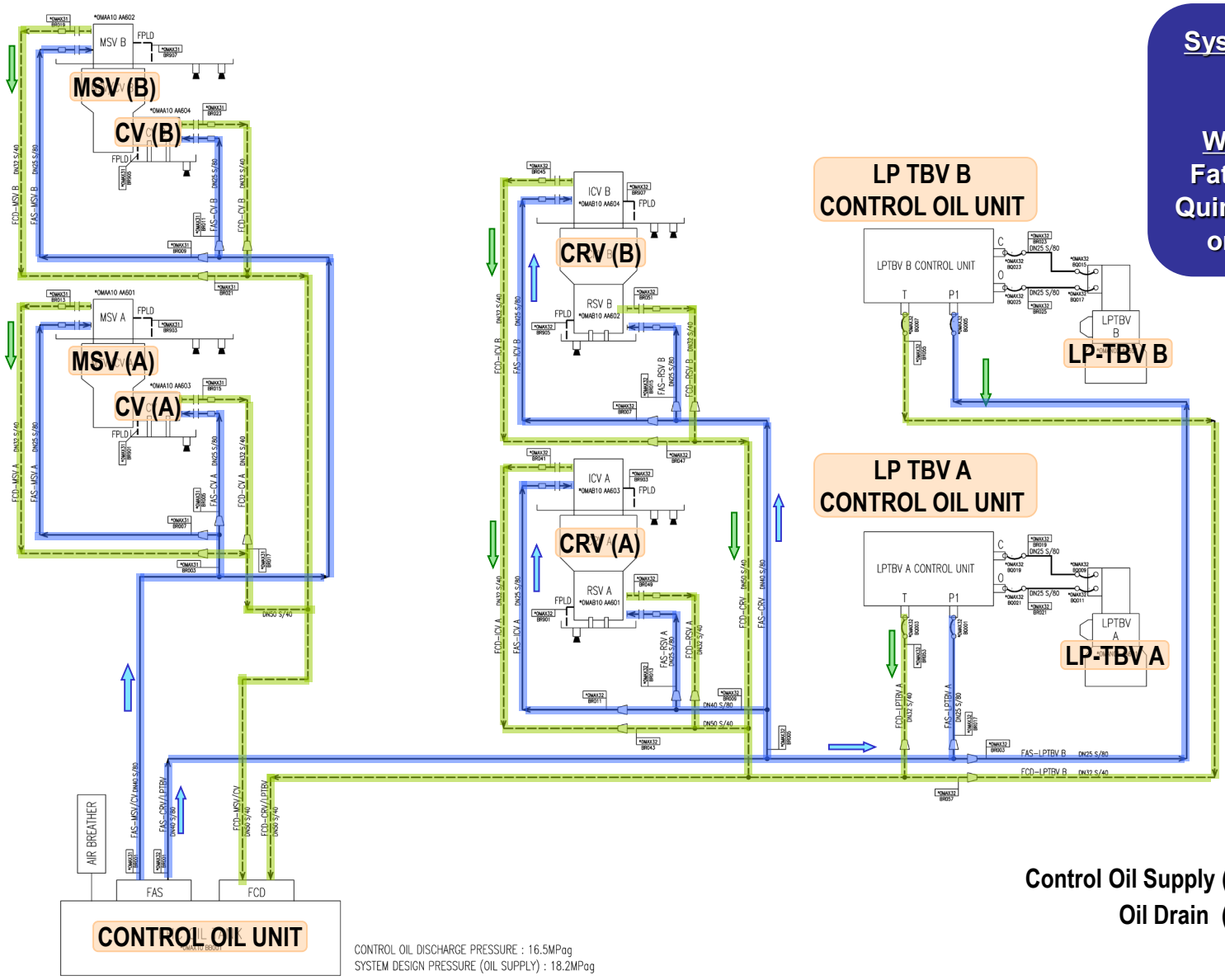


03

EHC Oil System

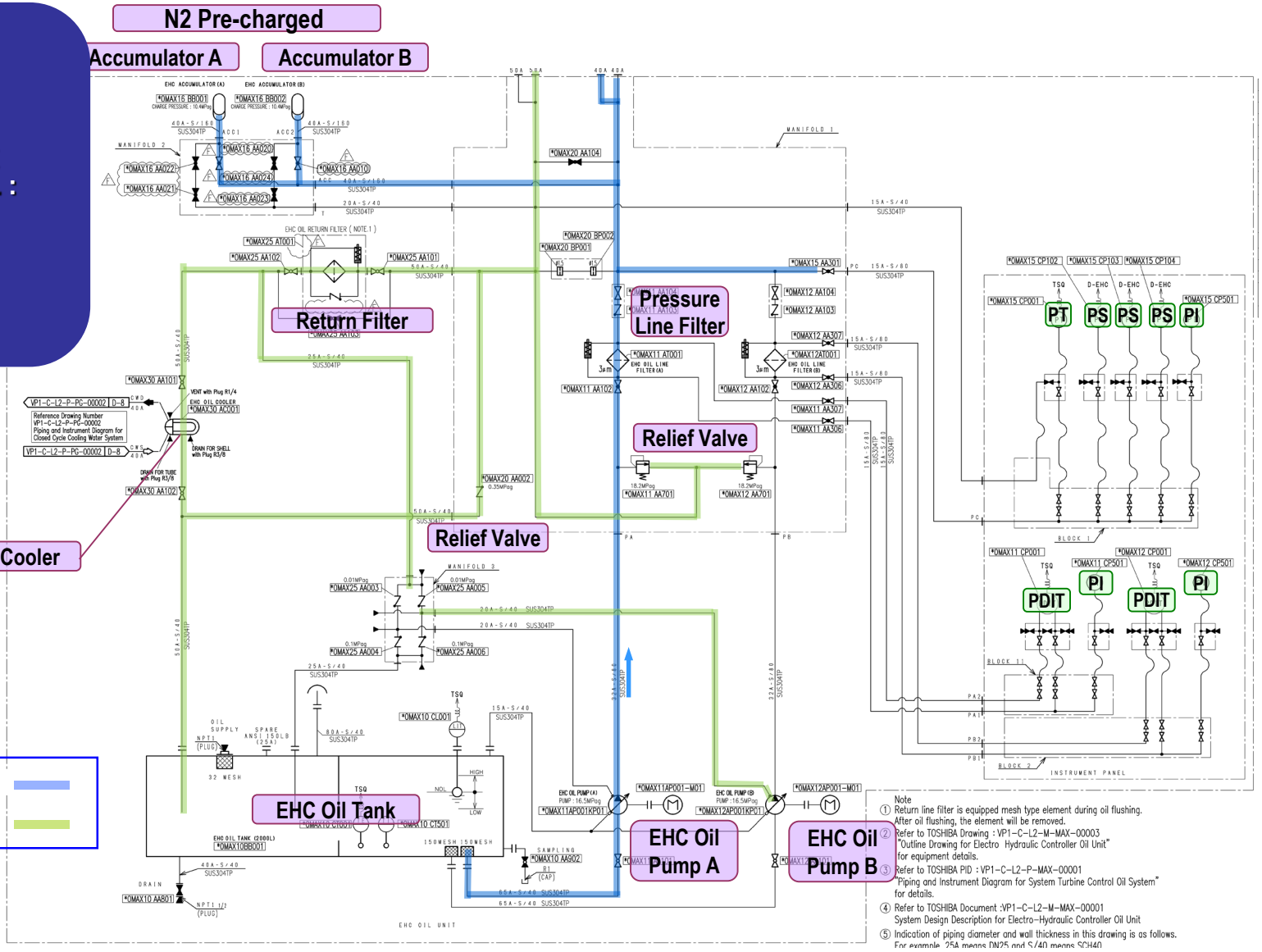
3-1. EHC Oil System
3-2. EHC Unit

EHC Oil System 3-1. EHC Oil System Flow Diagram



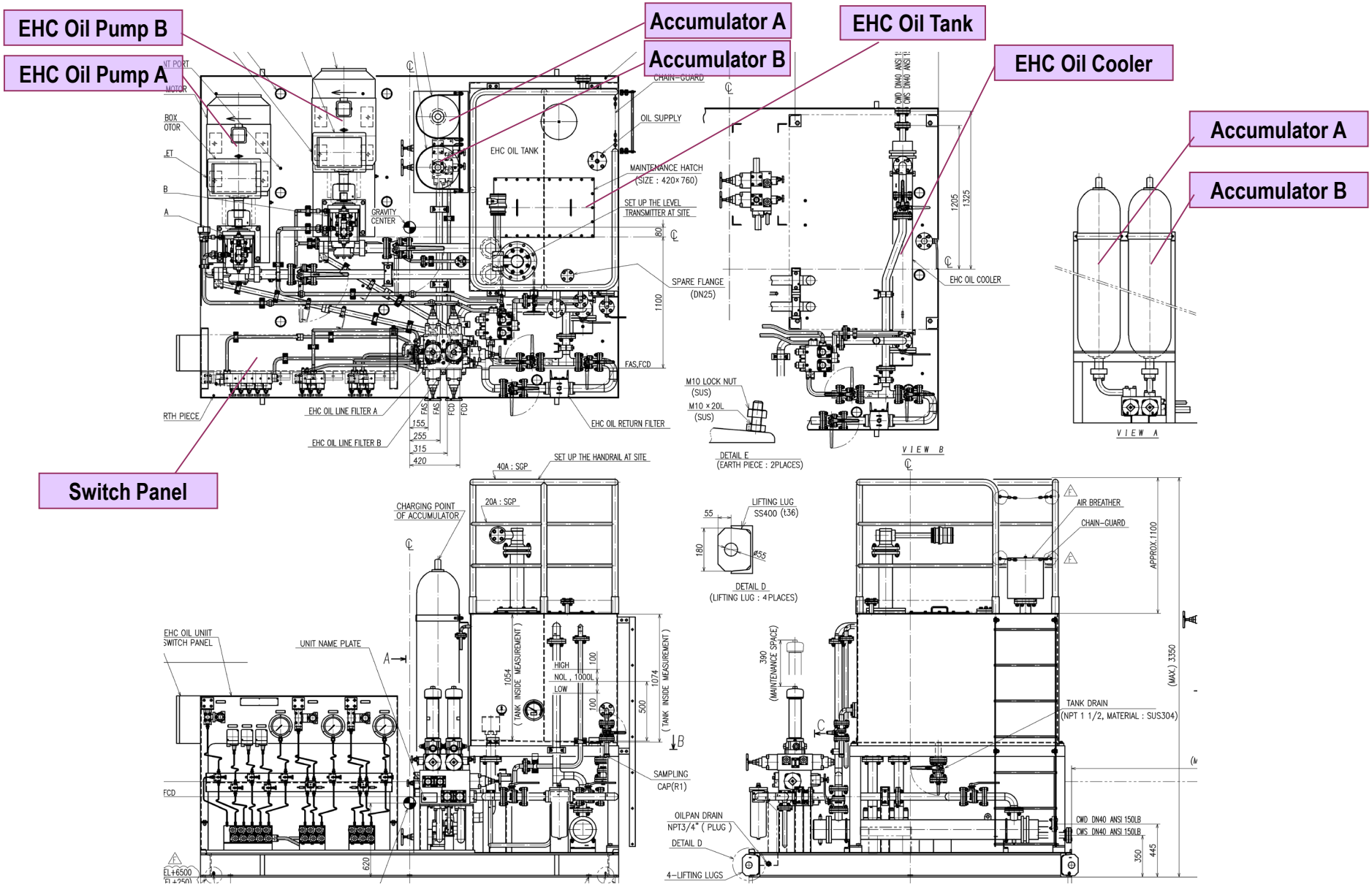
EHC Oil System 3-2. EHC Unit Flow Diagram

EHC Oil Unit
Tank Capacity :
Full 2000L
NOL 1000L
Pump Capacity
Discharge Press. :
16.5MPa
Flow Rate :
160 L/min
Accumulator
2 x 120 L



Note
① Return line filter is equipped mesh type element during oil flushing. After oil flushing, the element will be removed.
② Refer to TOSHIBA Drawing : VP1-C-L2-M-MAX-00003 "Outline Drawing for Electro Hydraulic Controller Oil Unit" for equipment details.
③ Refer to TOSHIBA PID : VP1-C-L2-P-MAX-00001 "Piping and Instrument Diagram for System Turbine Control Oil System" for details.
④ Refer to TOSHIBA Document :VP1-C-L2-M-MAX-00001 System Design Description for Electro-Hydraulic Controller Oil Unit
⑤ Indication of piping diameter and wall thickness in this drawing is as follows. For example, 25A means DN25 and S/40 means SCH40

EHC Oil System 3-2. EHC Unit Outline



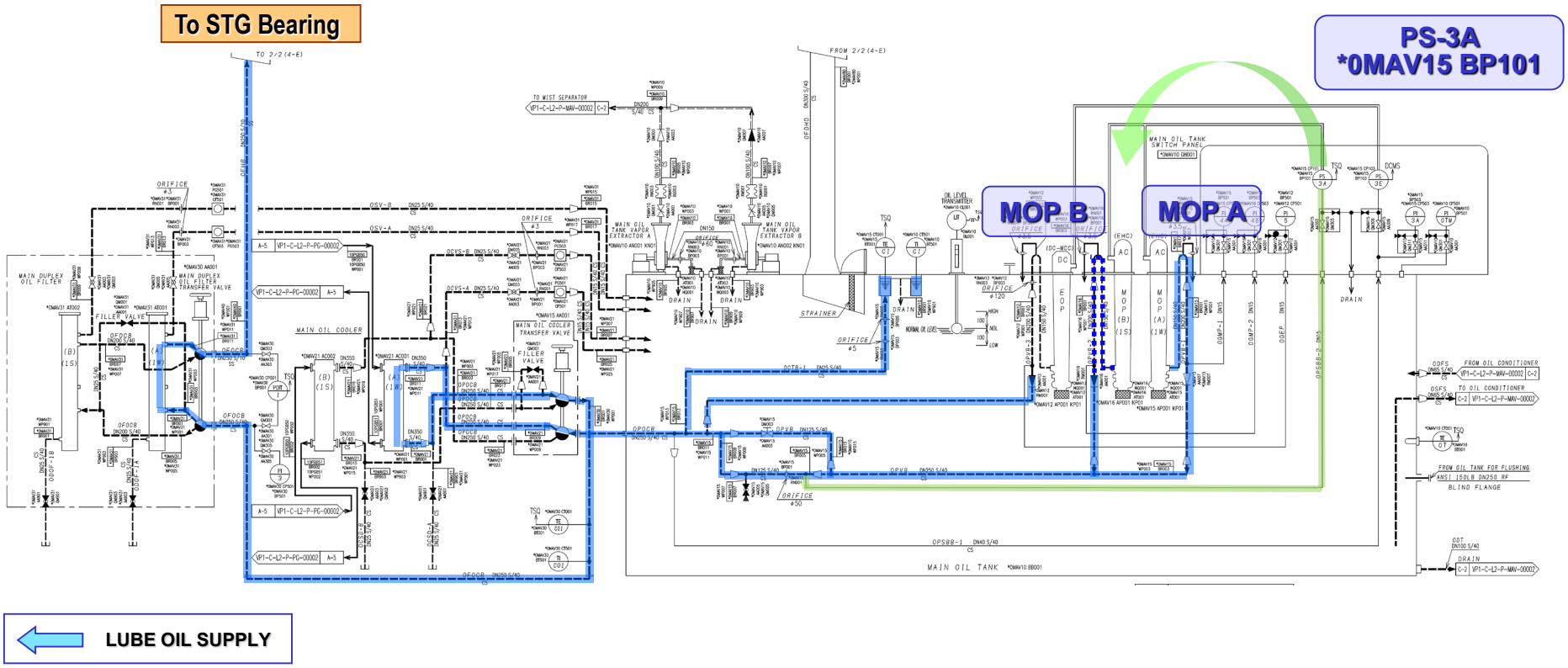
04

Turbine Protection

4-1. Turbine Protection - Lube Oil Back Up
4-2. Turbine Protection - EHC Oil Back Up
4-3. Turbine Protection – Trip Function

Turbine Protection 4-1. Turbine Protection Lube Oil Back Up –MOP automatic start

MOP Auto Start



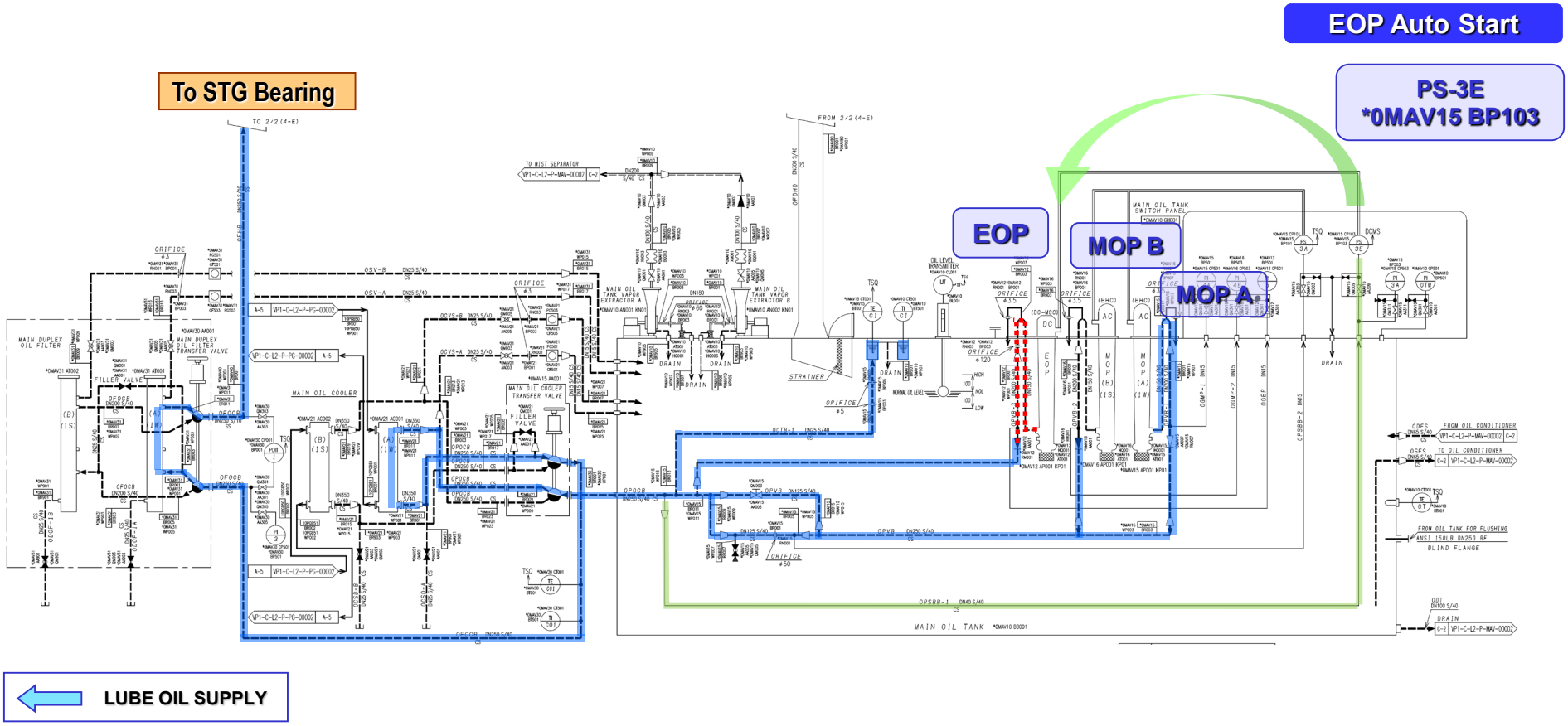
Stand-by Main Oil Pump(MOP)

Stand-by MOP must be started automatically in case MOP discharge pressure is decreased.

This Backup system is measured as following pressure switch set point of PS-3A (*0MAV15 BP101).

PS-3A < 0. 58 MPa at MOP discharge header

Turbine Protection 4-1. Turbine Protection Lube Oil Back Up –EOP automatic start

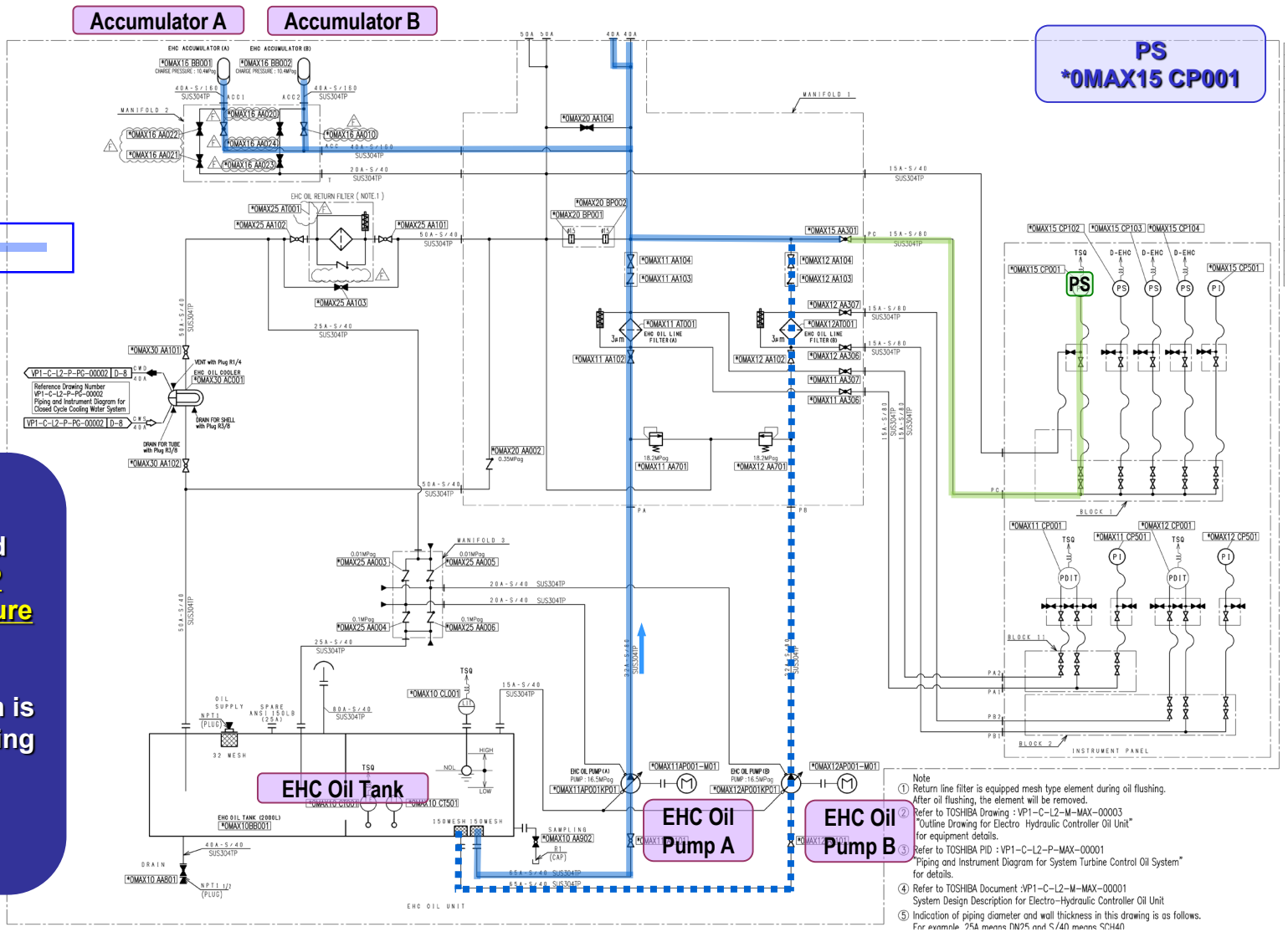


Emergency Oil Pump(EOP)
EOP must be started automatically if Bearing Header oil pressure is decreased.
This Backup system is measured as following pressure switch set point of PS-3E (*0MAV15 BP103).

PS-3E < 0.11 MPa at Turbine On Center

Turbine Protection 4-2. Turbine Protection
EHC Oil Back Up –HFP automatic start

HFP Auto Start

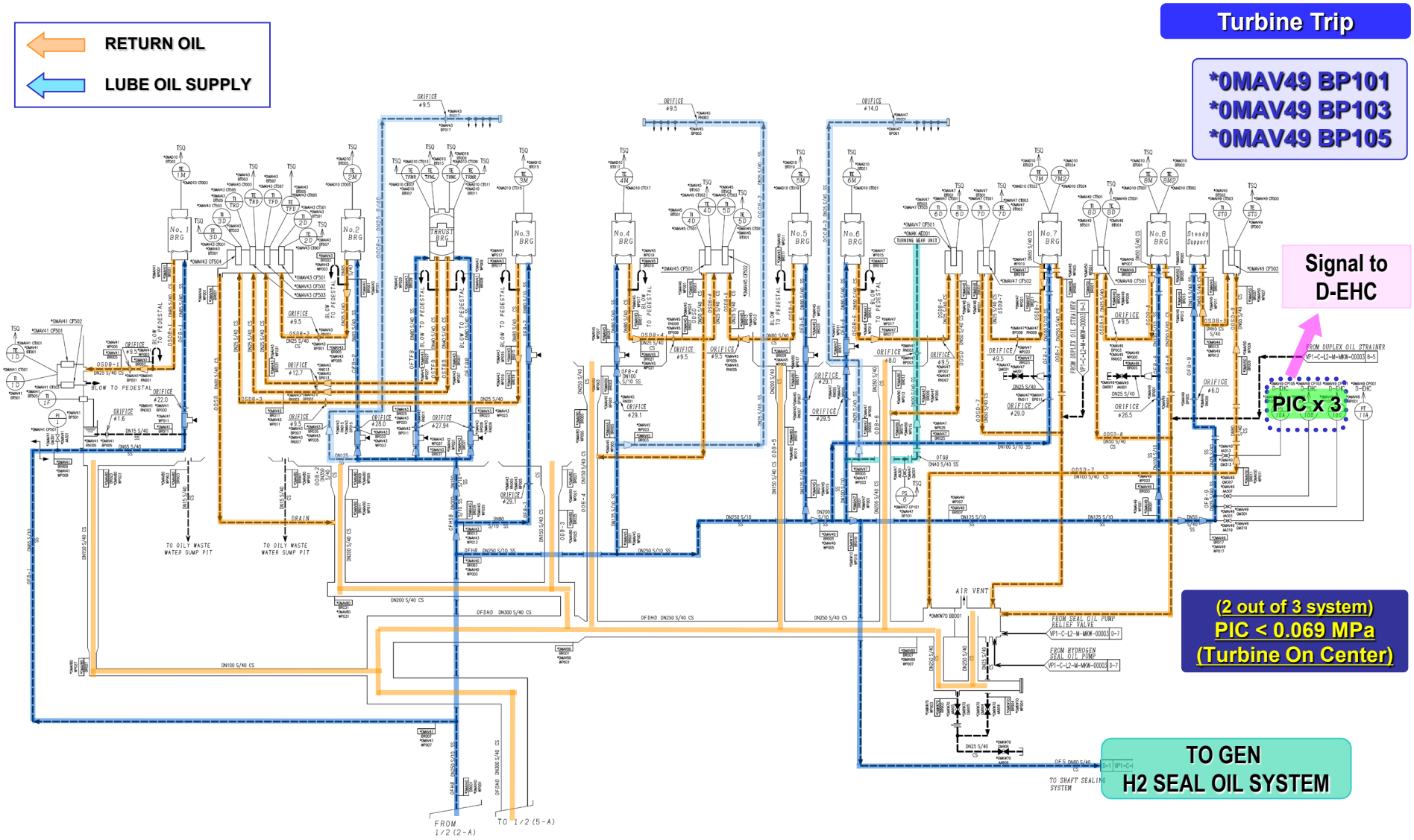


Hydraulic Control Pump(HFP)
HFP must be started automatically if HFP discharge oil pressure is decreased.

This Backup system is measured as following pressure switch set point.

PIC < 13.5 MPa

Turbine Protection 4-3. Trip function
STG Bearing Oil Pressure Low-Low Turbine Trip



At normal operation, bearing oil pressure is 0.18 bar (turbine on center).
If bearing oil pressure is reduced, STG turbine shall be tripped.

Turbine Protection 4-3. Trip function
HFP Discharge Pressure Low-Low Turbine Trip

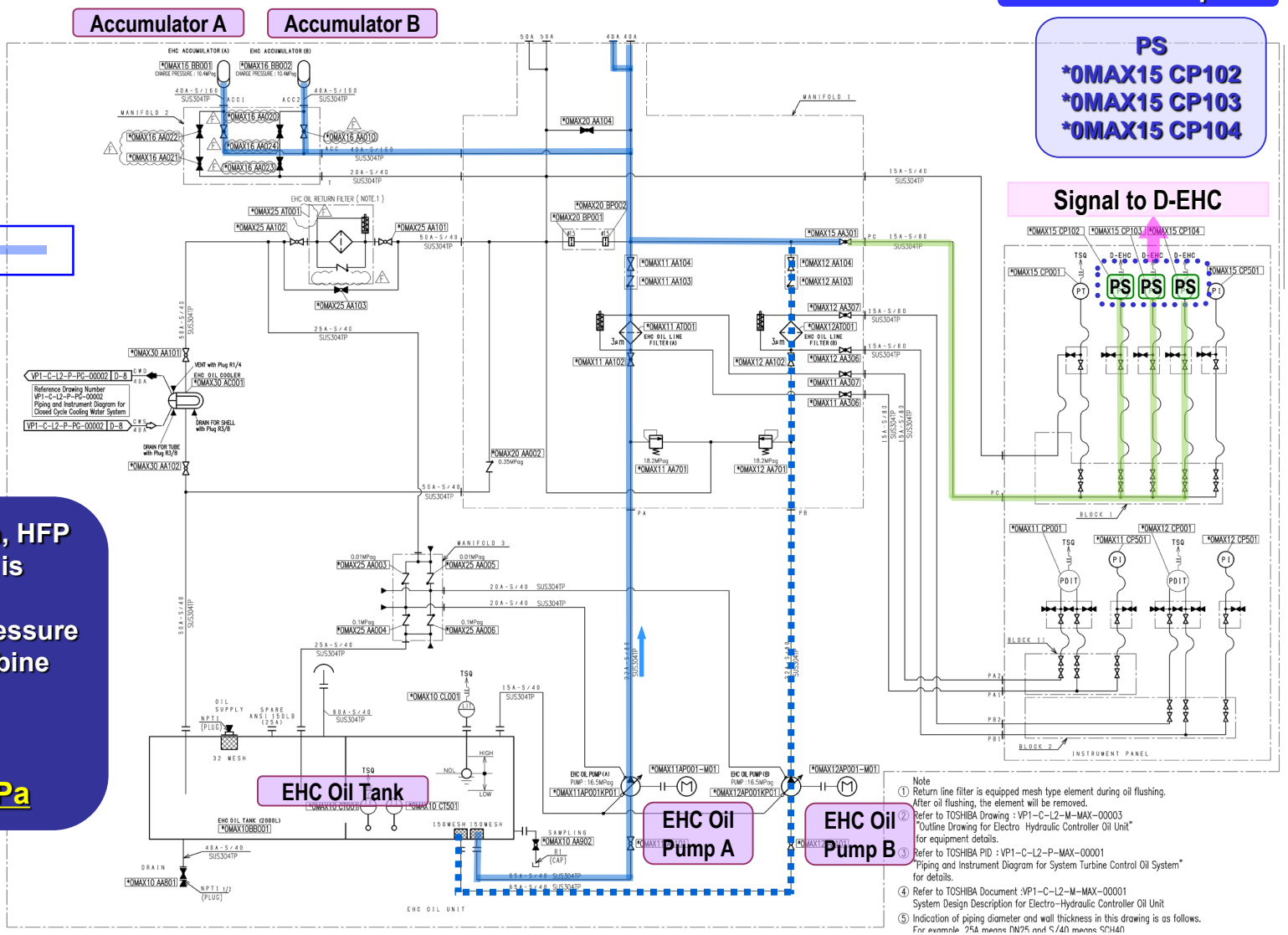
Turbine Trip

PS
***0MAX15 CP102**
***0MAX15 CP103**
***0MAX15 CP104**

Signal to D-EHC

Accumulator A **Accumulator B**

Control Oil Supply (FAS)



At normal operation, HFP discharge pressure is 16.5 MPa.
If HFP discharge pressure is reduced, STG turbine shall be tripped.

2 out of 3 system
PS A～C < 11.4 MPa

Note
① Return line filter is equipped mesh type element during oil flushing. After oil flushing, the element will be removed.
② Refer to TOSHIBA Drawing : VP1-C-L2-M-MAX-00003 "Outline Drawing for Electro Hydraulic Controller Oil Unit" for equipment details.
③ Refer to TOSHIBA PID : VP1-C-L2-P-MAX-00001 "Piping and Instrument Diagram for System Turbine Control Oil System" for details.
④ Refer to TOSHIBA Document :VP1-C-L2-M-MAX-00001 System Design Description for Electro-Hydraulic Controller Oil Unit
⑤ Indication of piping diameter and wall thickness in this drawing is as follows. For example, 25A means DN25 and S/40 means SCH40

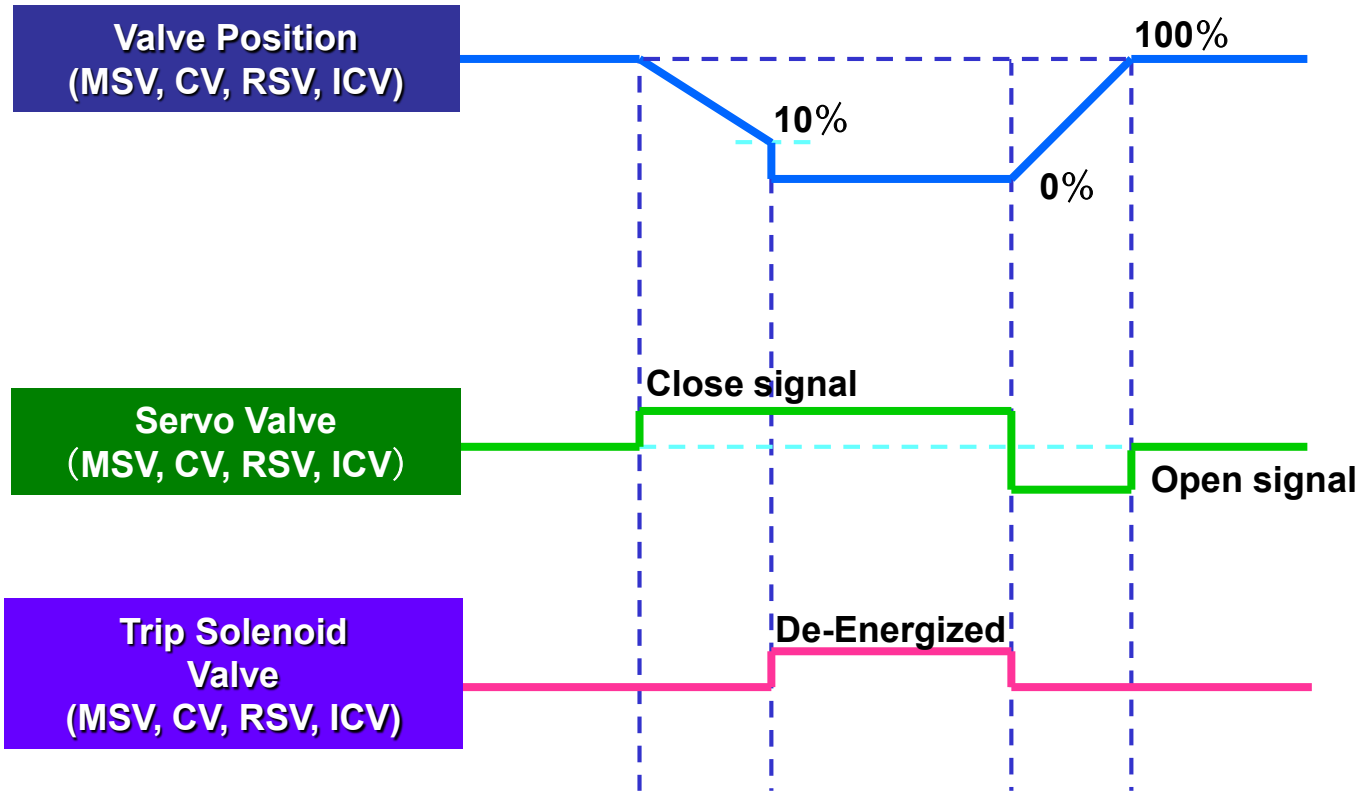
05

Surveillance Test

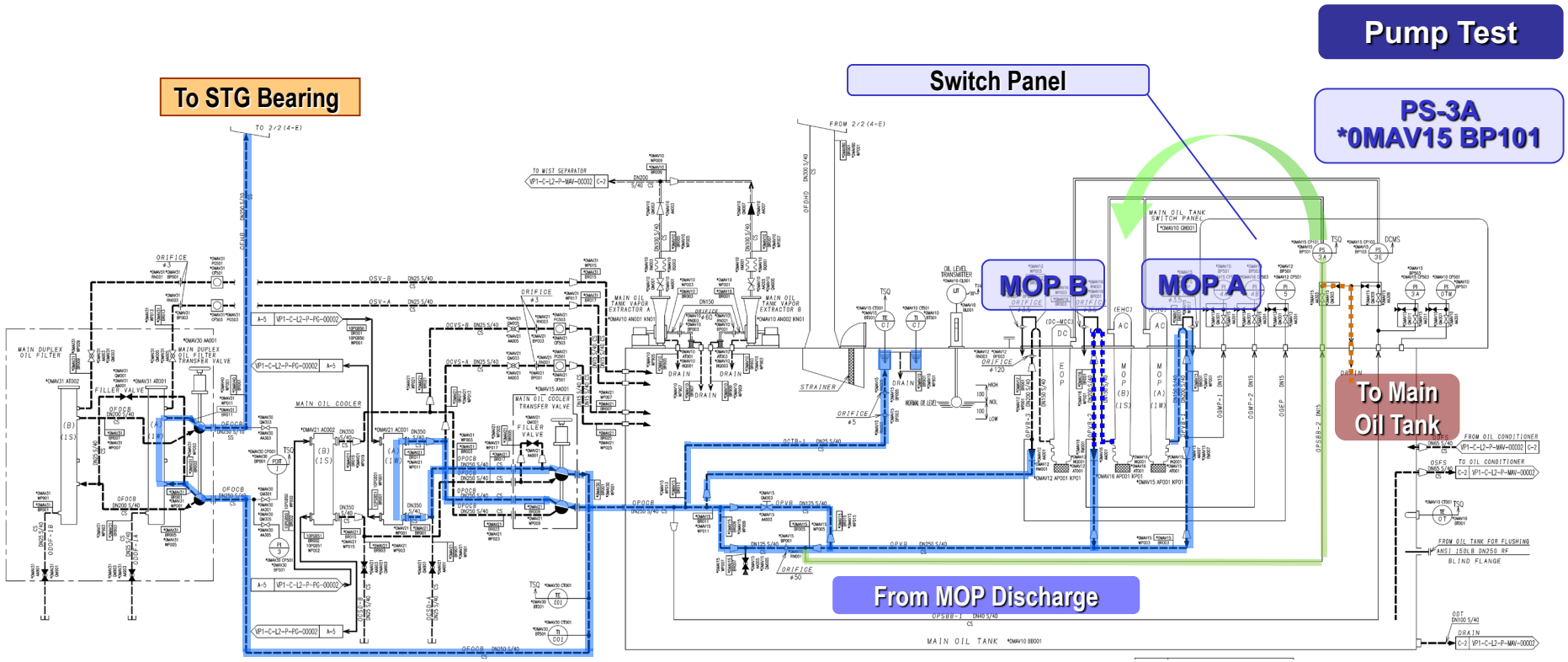
5-1. Valve Test
5-2. Lube Oil Pump
5-3. EHC Oil Pump

Surveillance Test 5-1. Valve Test

Valve Test Sequence

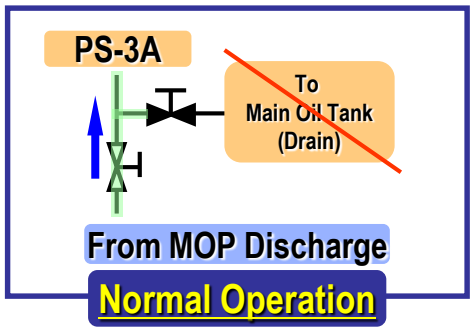


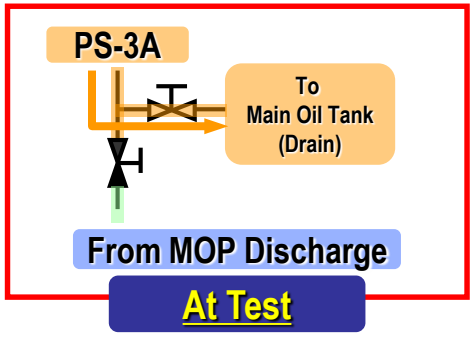
Surveillance Test 5-2. Lube Oil Pump MOP Automatic Start Test



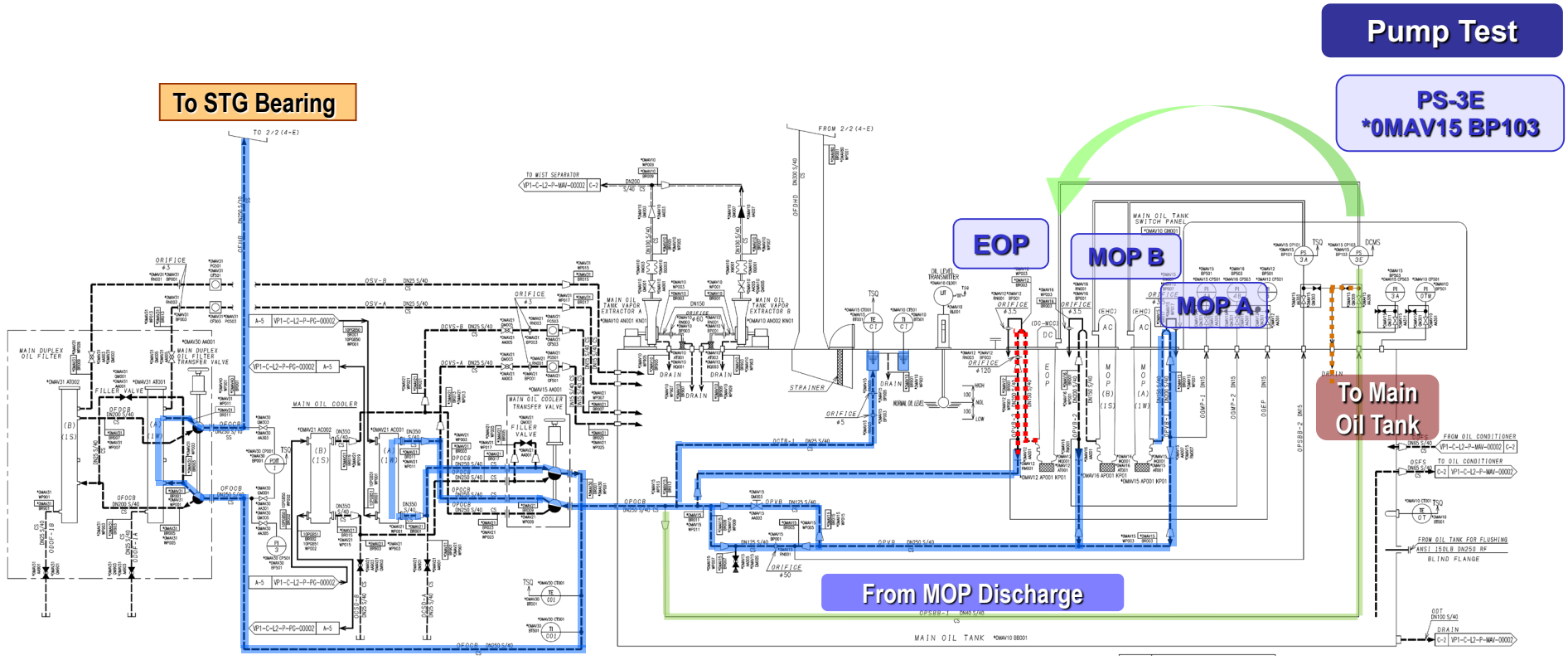
MOP must be started automatically if MOP discharge oil pressure is decreased. This MOP discharge oil pressure is measured by PS-3A, (*0MAV15 BP101).

Test order :
1) Close the Instrument Valve
2) Open the Test Valve slowly to release the oil to drain.
3) When the oil pressure become lower than the pre-set pressure, MOP will be automatically started.
4) Open the Instrument Valve and close the Test Valve.



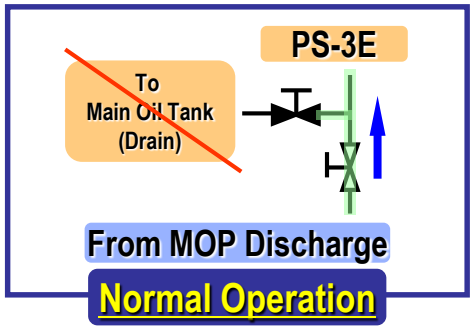


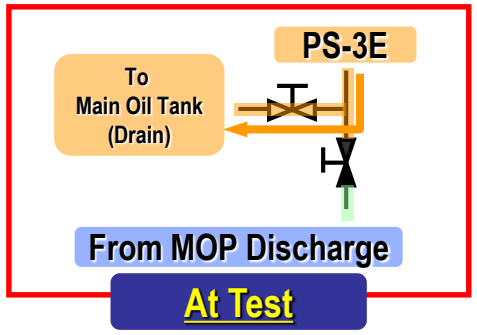
Surveillance Test 5-2. Lube Oil Pump EOP Automatic Start Test



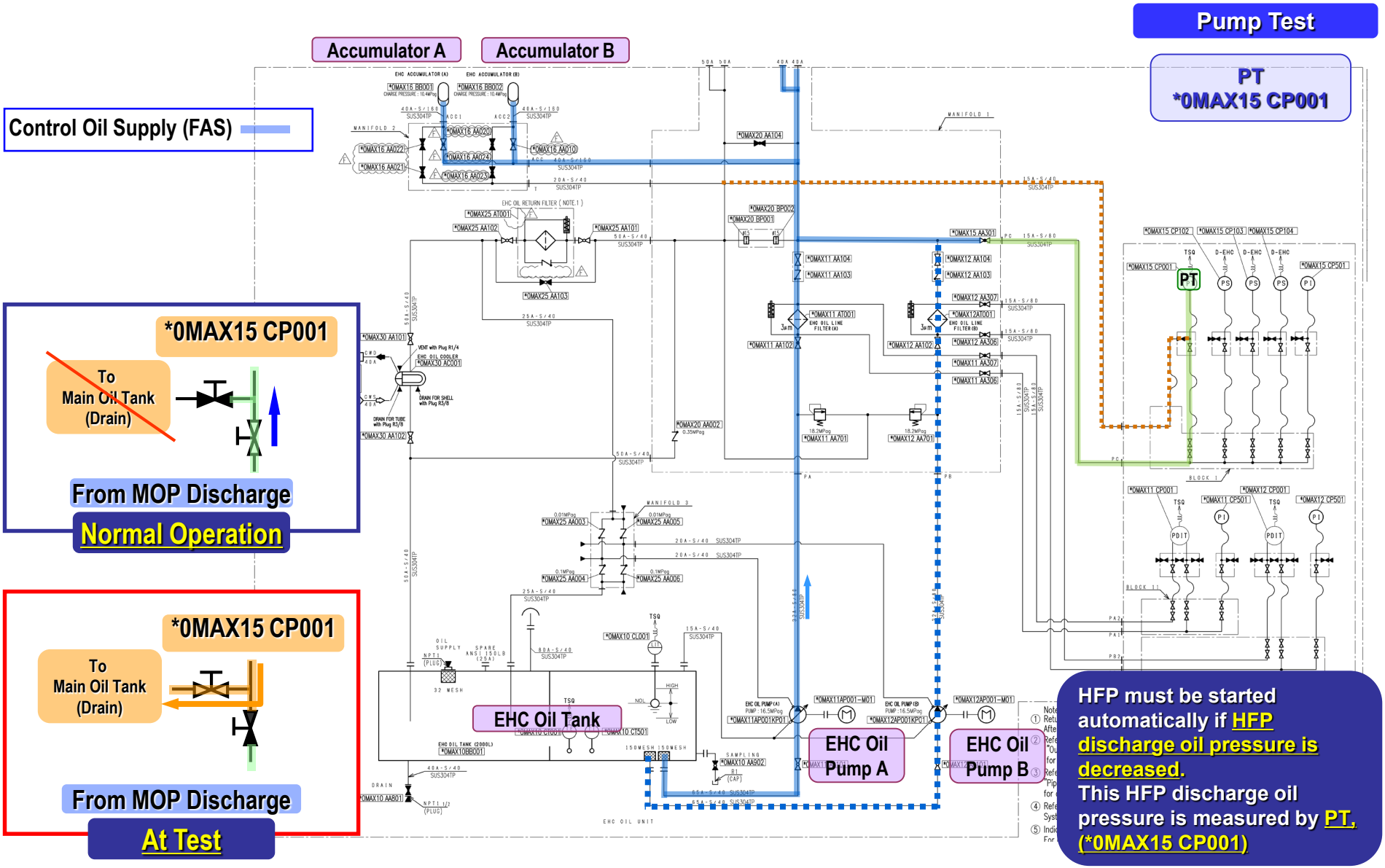
EOP must be started automatically if MOP discharge oil pressure is decreased (measured after PRV).
This MOP discharge oil pressure is measured by PS-3E, (*0MAV15 BP103).

Test order :
1) Close the Instrument Valve
2) Open the Test Valve slowly to release the oil to drain.
3) When the oil pressure become lower than the pre-set pressure, EOP will be automatically started.
4) Open the Instrument Valve and close the Test Valve.





Surveillance Test 5-3. EHC Oil Pump HFP automatic start



TOSHIBA

Thank you

Rev.	Date	Changed Content	Approved by	Reviewed by	Prepared by
a	22.Aug. 2022	First Issue	T.Yamamoto 22.Aug. 2022	T.Yamamoto 22.Aug. 2022	Y.Tanaka 22.Aug. 2022

Revision history

Van Phong Thermal Power Plant Project

Turbine and Auxiliaries Course

Group : Mechanical
Item No. TM-06 & TM-07 (BFPT)
TURBINE CONTROL EQUIPMENT
-MAIN TURBINE CONTROL-

TOSHIBA
Toshiba Energy Systems & Solutions Corporation

Contents

01

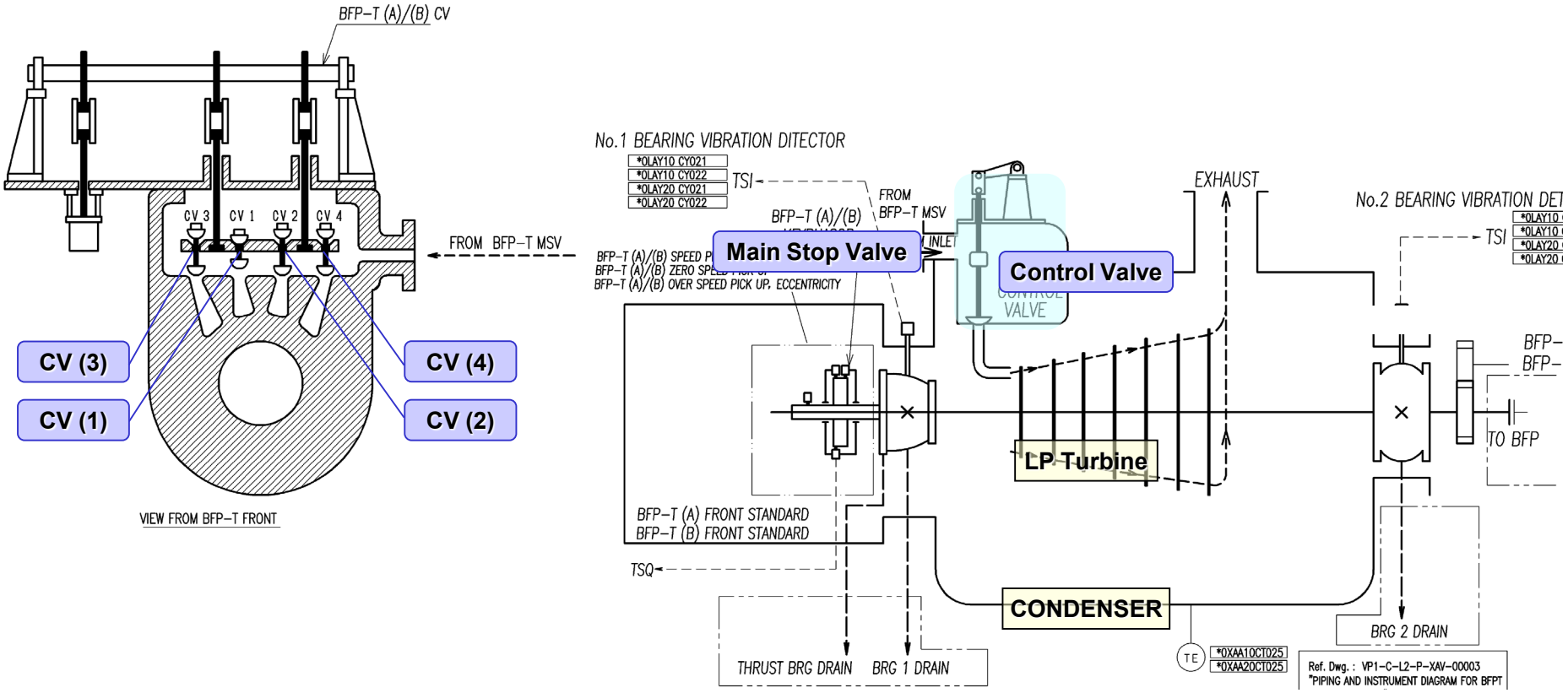
Steam Valves

1-1. BFPT Main Stop Valve

1-2. BFPT Control Valve

1-3. Valve Operation – EHC

Steam Valves 1. BFPT Main Stop / Control Valve

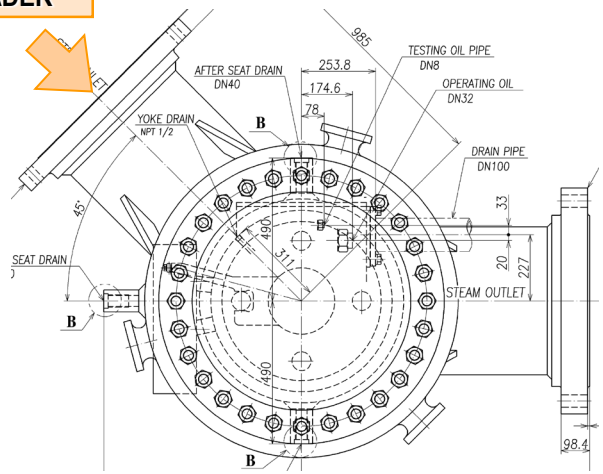


Main Stop Valve
To shut off the steam flow from boiler when unit tripped.
Control Valve
To control steam flow into BFP turbine for speed control and load regulation of Steam Turbine.

Design Condition for MSV/CV
Normal Operation (100%MCR)
P= 0.89 MPa(g), T= 323.6 deg.C
Maximum Steam Condition
P= 0.97 MPa(g), T= 380 deg.C

Steam Valves 1-1. BFPT Main Stop Valve -Outline

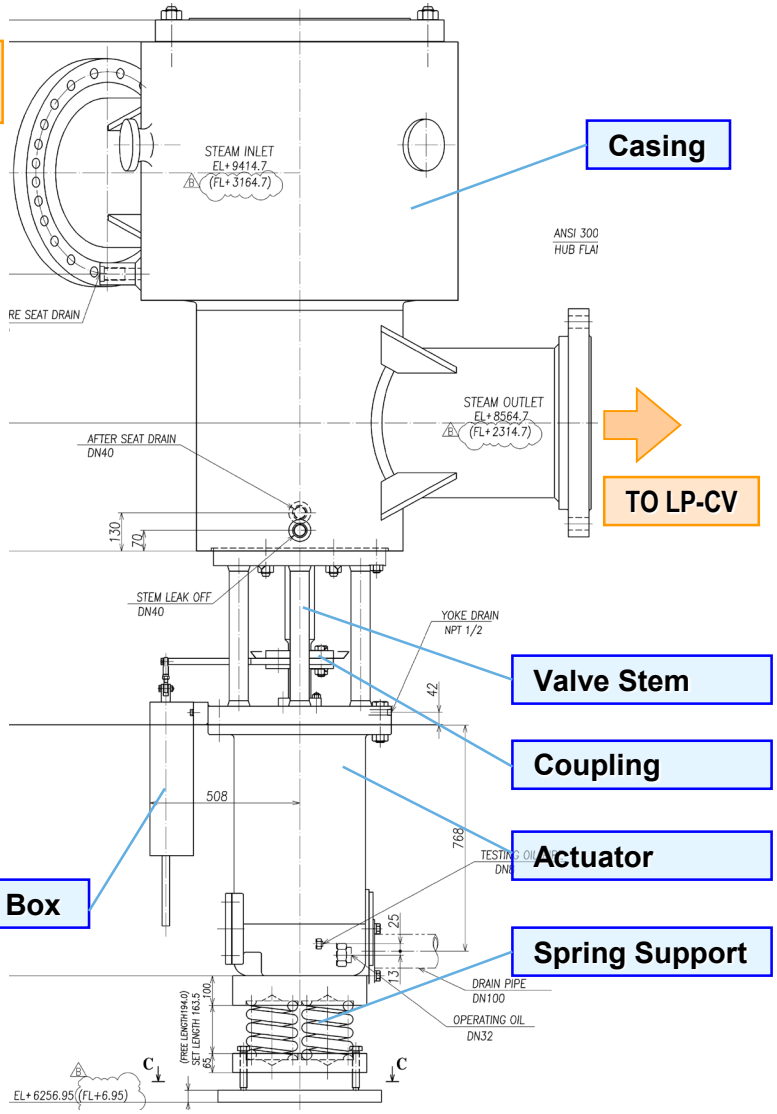
FROM BFP TURBINE HEADER



TOP VIEW

TO LP-CV

FROM BFP TURBINE HEADER



Casing

TO LP-CV

Valve Stem

Coupling

Actuator

Switch Box

Spring Support

Design Condition for MSV/CV
Normal Operation (100%MCR)
P= 0.89 MPa(g), T= 323.6 deg.C
Maximum Steam Condition
P= 0.97 MPa(g), T= 380 deg.C

BFPT(A) MSV

BFPT(B) MSV

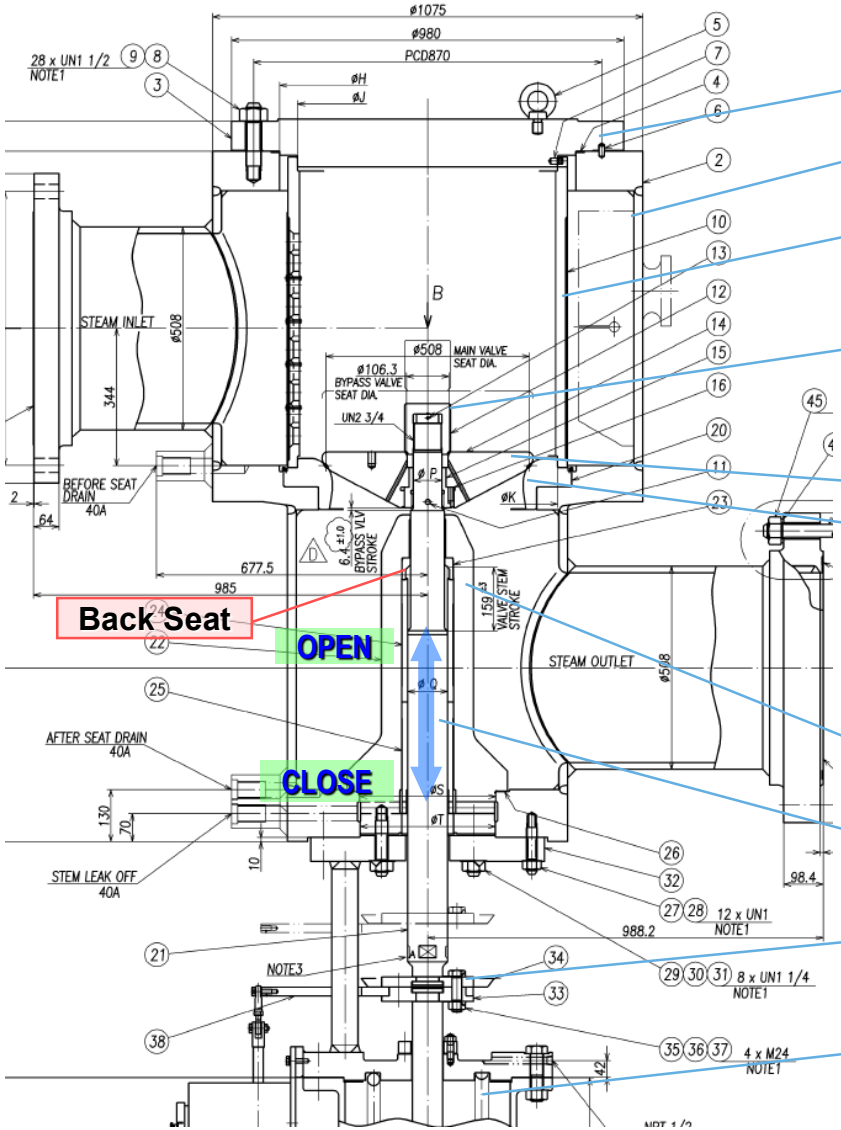
Steam Valves 1-1. BFPT Main Stop Valve -Sectional Schematics

BFPT MSV
With Bypass Valve

Seating Diameter :	508 mm (20”)
Valve Stroke :	152.6 mm
Bypass Valve Stroke :	6.4 mm
Total Stem Stroke :	159 mm

BFPT MSV Actuator
Servo Controlled, Single Acting, Spring return (Fail to Close)

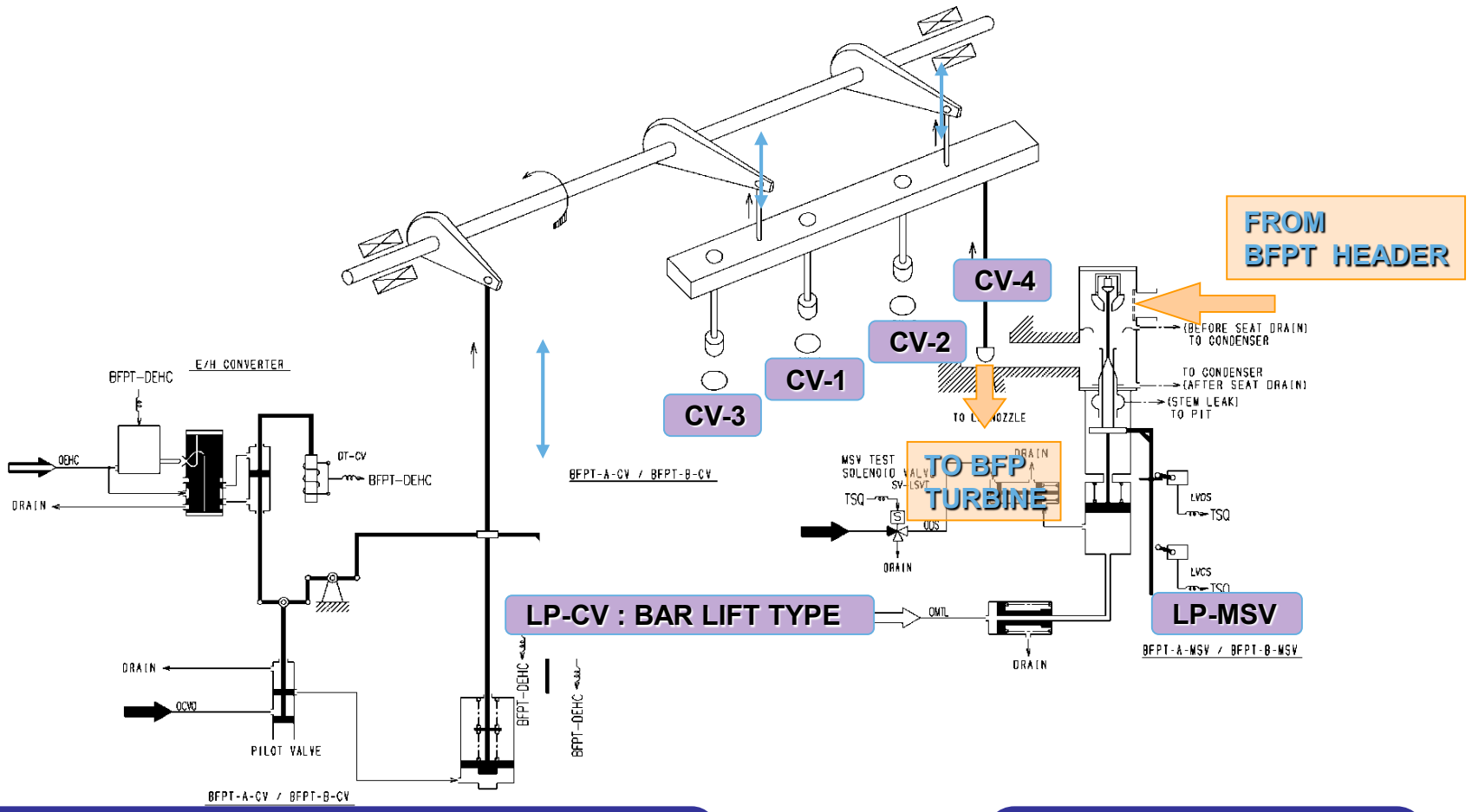
Piston Diameter :	381 mm
CEOT :	13 mm
Stroke :	159 mm



Upper Head
Casing
Strainer
Bypass Valve
Valve Disc
Valve Seat
Pressure Seal Head
Valve Stem
Coupling
Spring Housing
Actuator

BFPT(A) MSV
BFPT(B) MSV

Steam Valves 1-2. BFPT Control Valve



Main Stop Valve
To shut off the steam flow from boiler when unit tripped.
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To control steam flow into BFP turbine for speed control and load regulation of Steam Turbine.

Design Condition for MSV/CV
Normal Operation (100%MCR)
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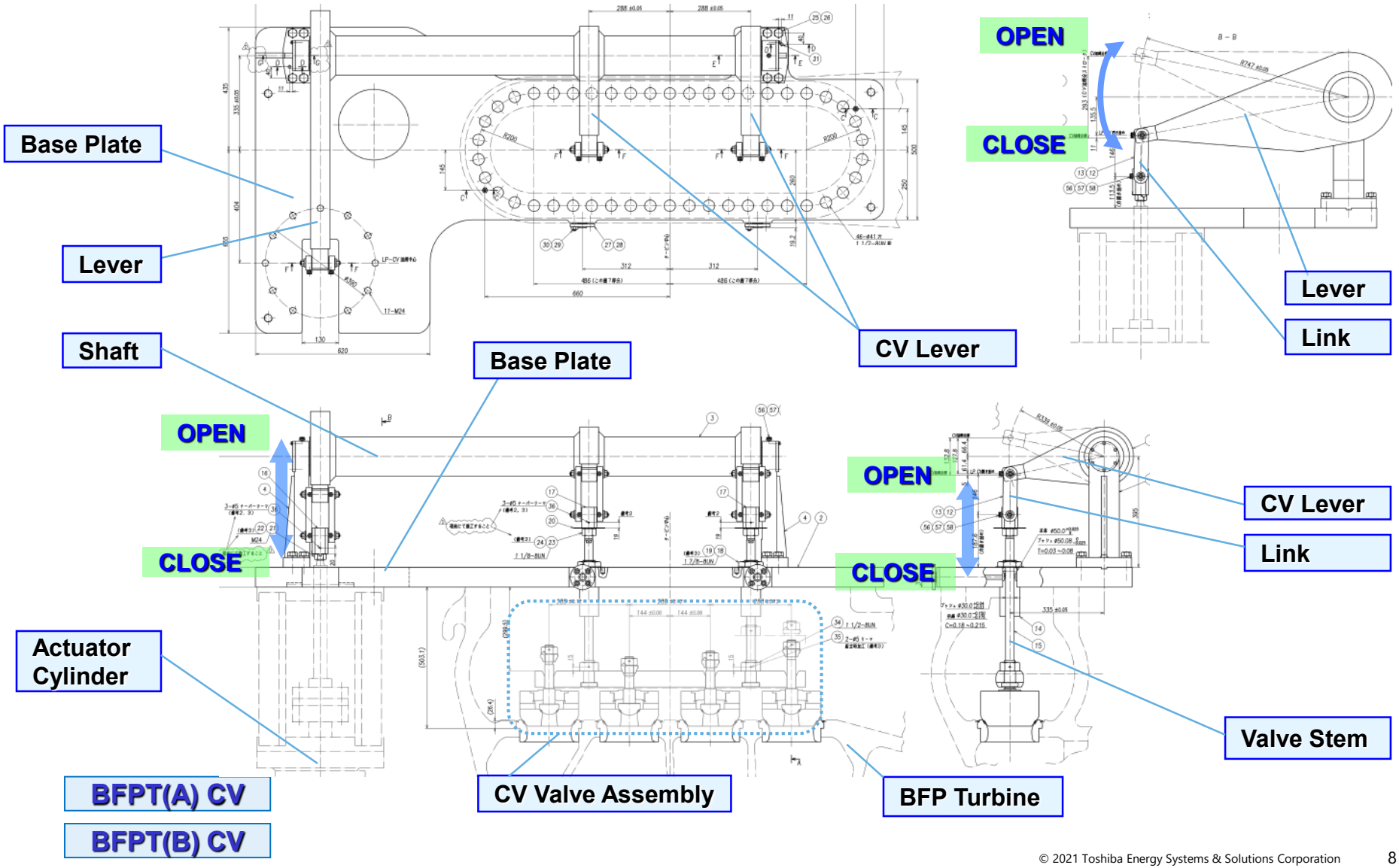
Maximum Steam Condition
P= 0.97 MPa(g), T= 380 deg.C

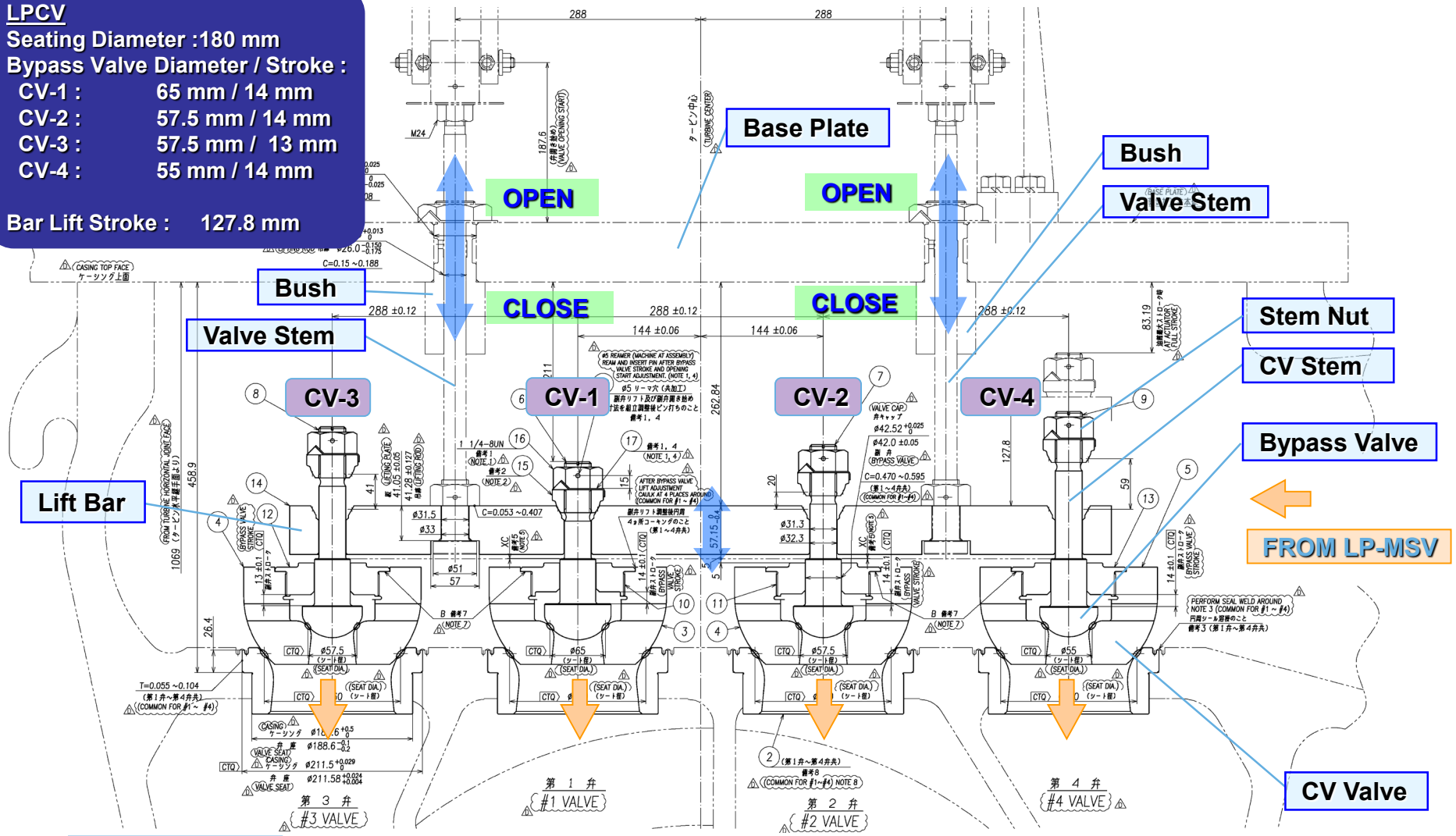
Steam Valves 1-2. BFPT Control Valve -Outline



Steam Valves 1-2. BFPT Control Valve -Sectional Schematics

LPCV
Seating Diameter :180 mm
Bypass Valve Diameter / Stroke :
CV-1 : 65 mm / 14 mm
CV-2 : 57.5 mm / 14 mm
CV-3 : 57.5 mm / 13 mm
CV-4 : 55 mm / 14 mm

Bar Lift Stroke : 127.8 mm

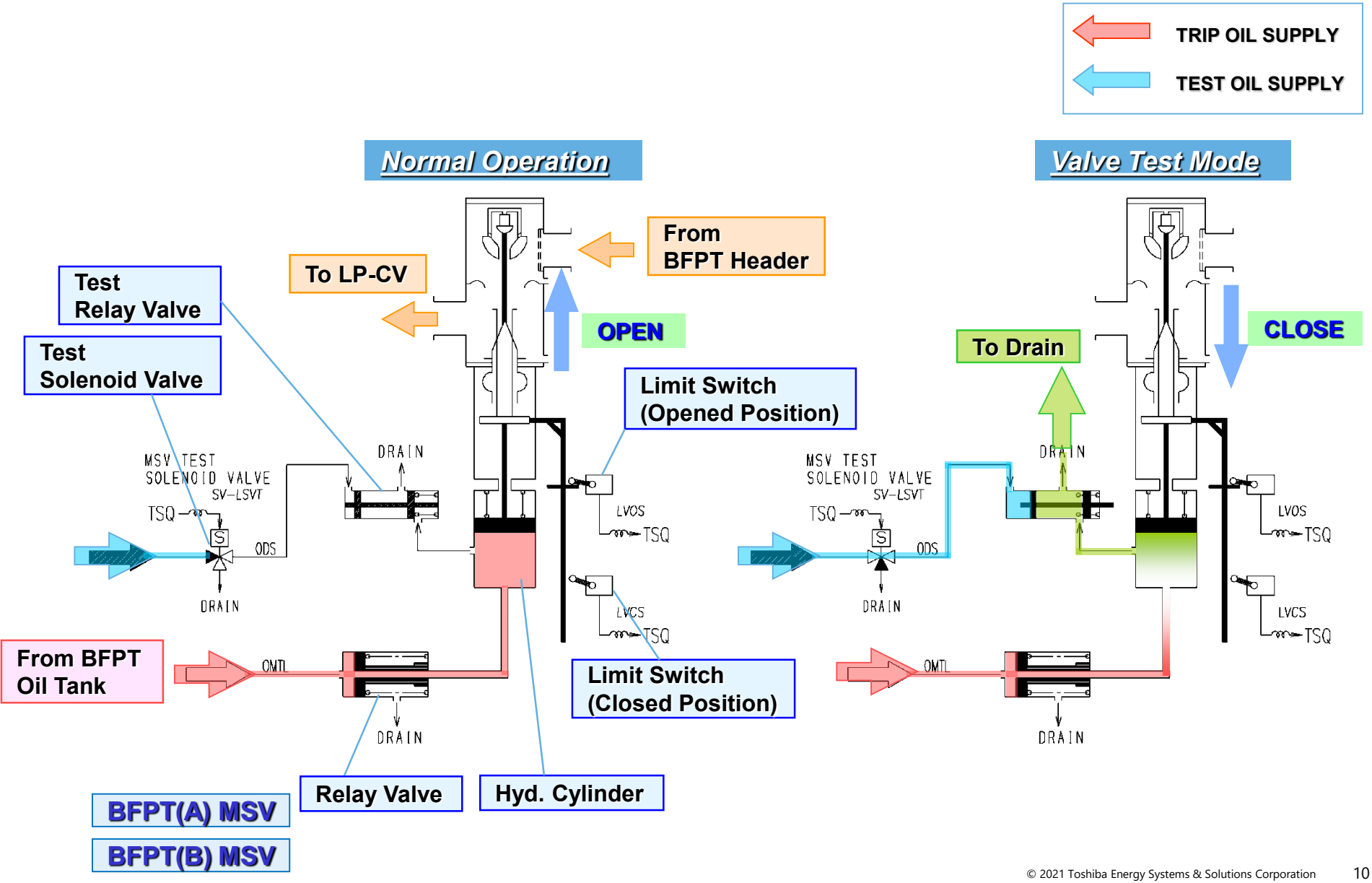


BFPT(A) CV

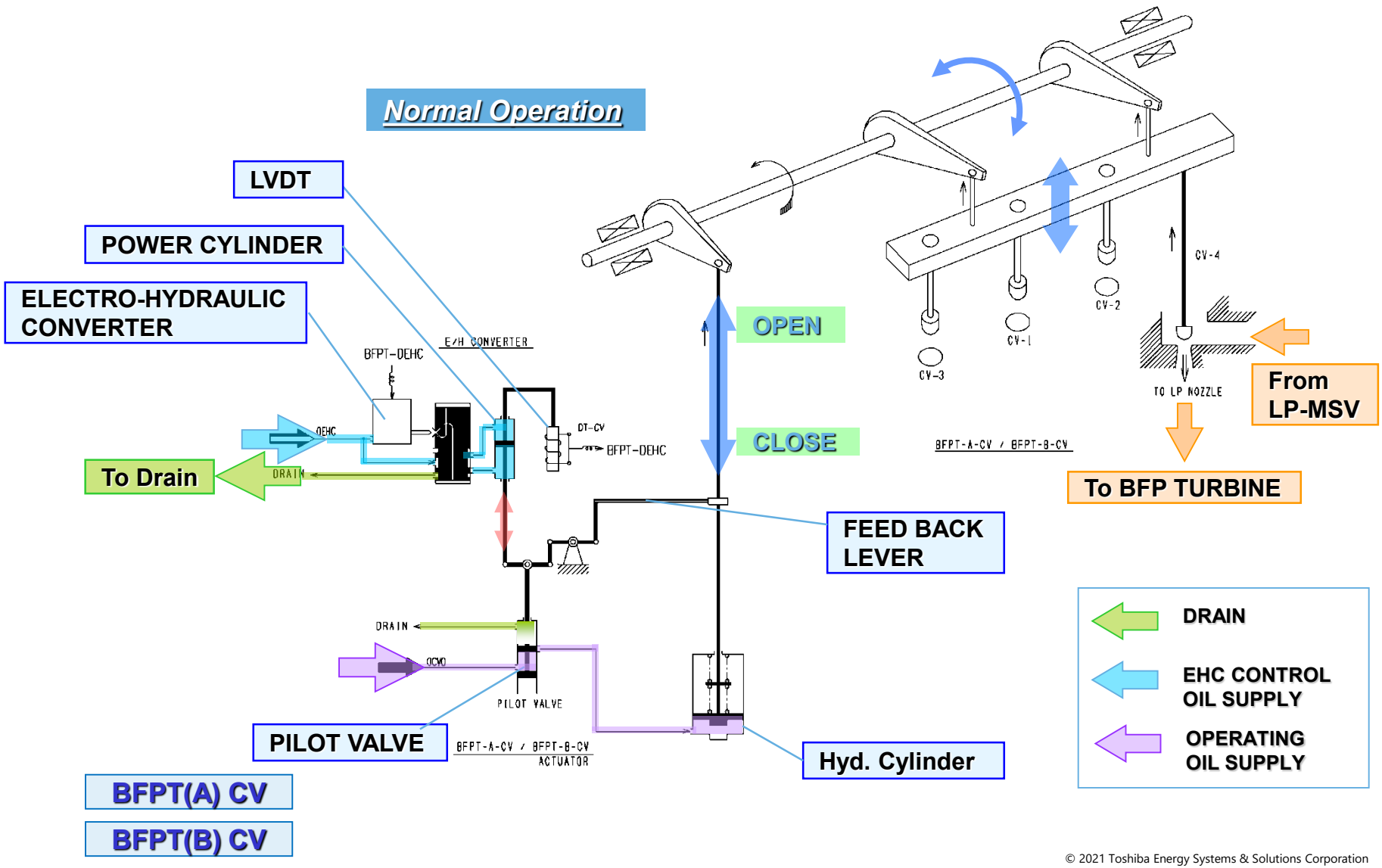
BFPT(B) CV

To BFP Turbine

Steam Valves 1-3. BFPT Main Stop Valve -Control Diagram



Steam Valves 1-3. BFPT Control Valve -Control Diagram

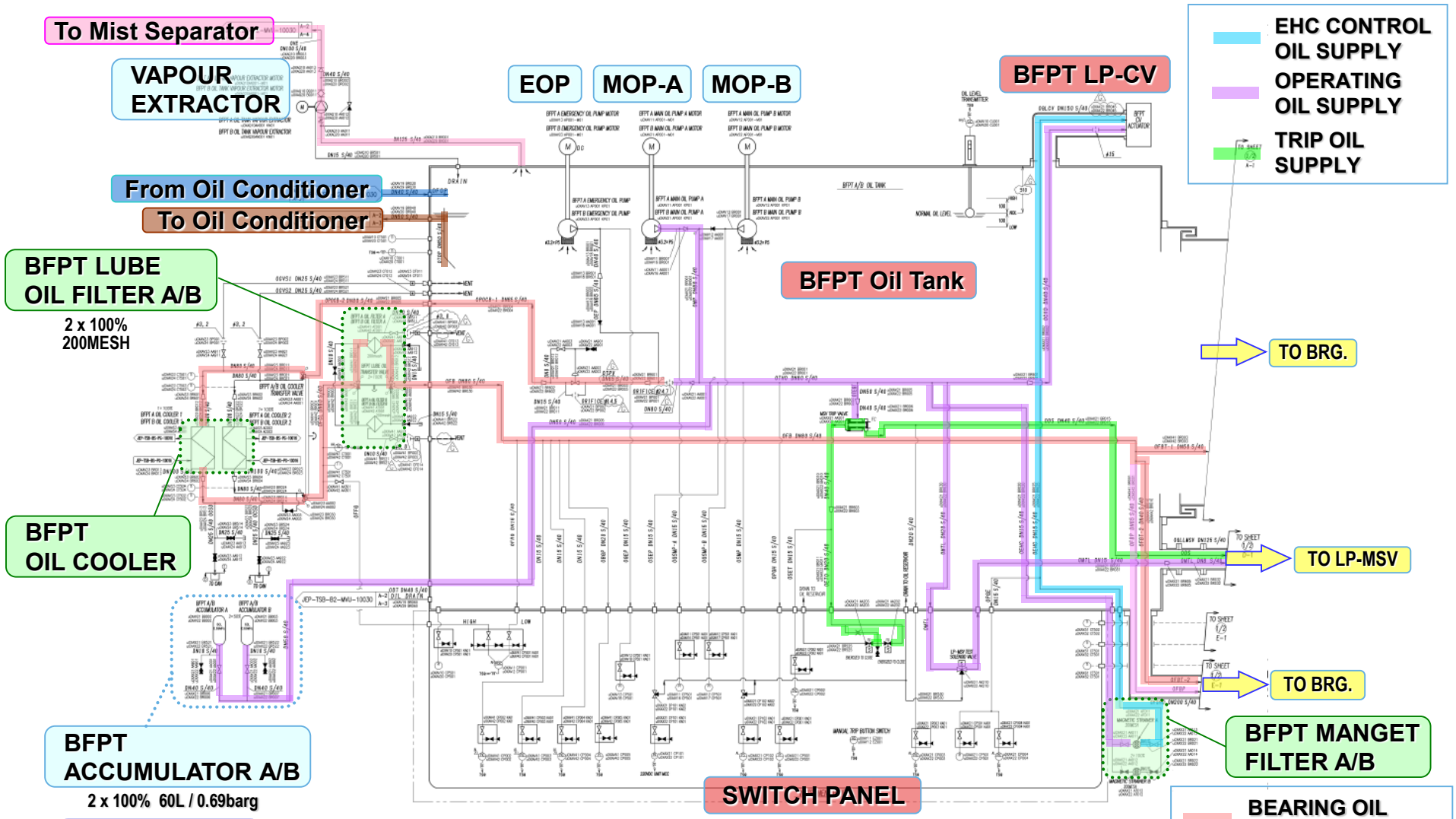


02

Lube Oil / EHC Oil System

2-1. Lube Oil Flow Diagram
2-2. BFPT Oil Tank
2-3. BFPT Front Standard
2-4. BFPT Lube Oil Conditioner

Lube Oil System 2-1. Lube Oil Flow Diagram
BFPT Oil Tank Flow Diagram

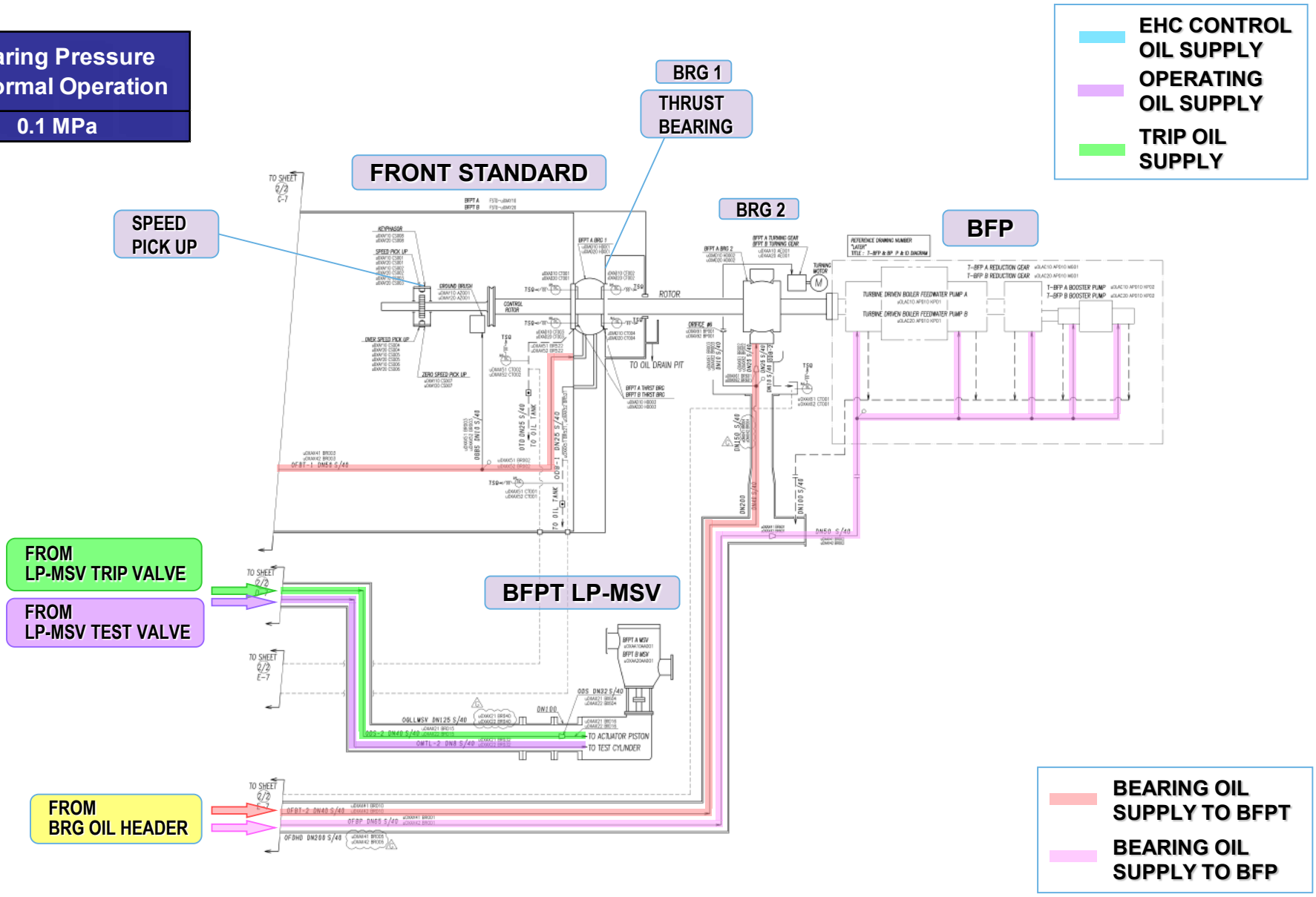


Main Oil Tank
CAPACITY
Full : 11,300L
NOL : 6,900L

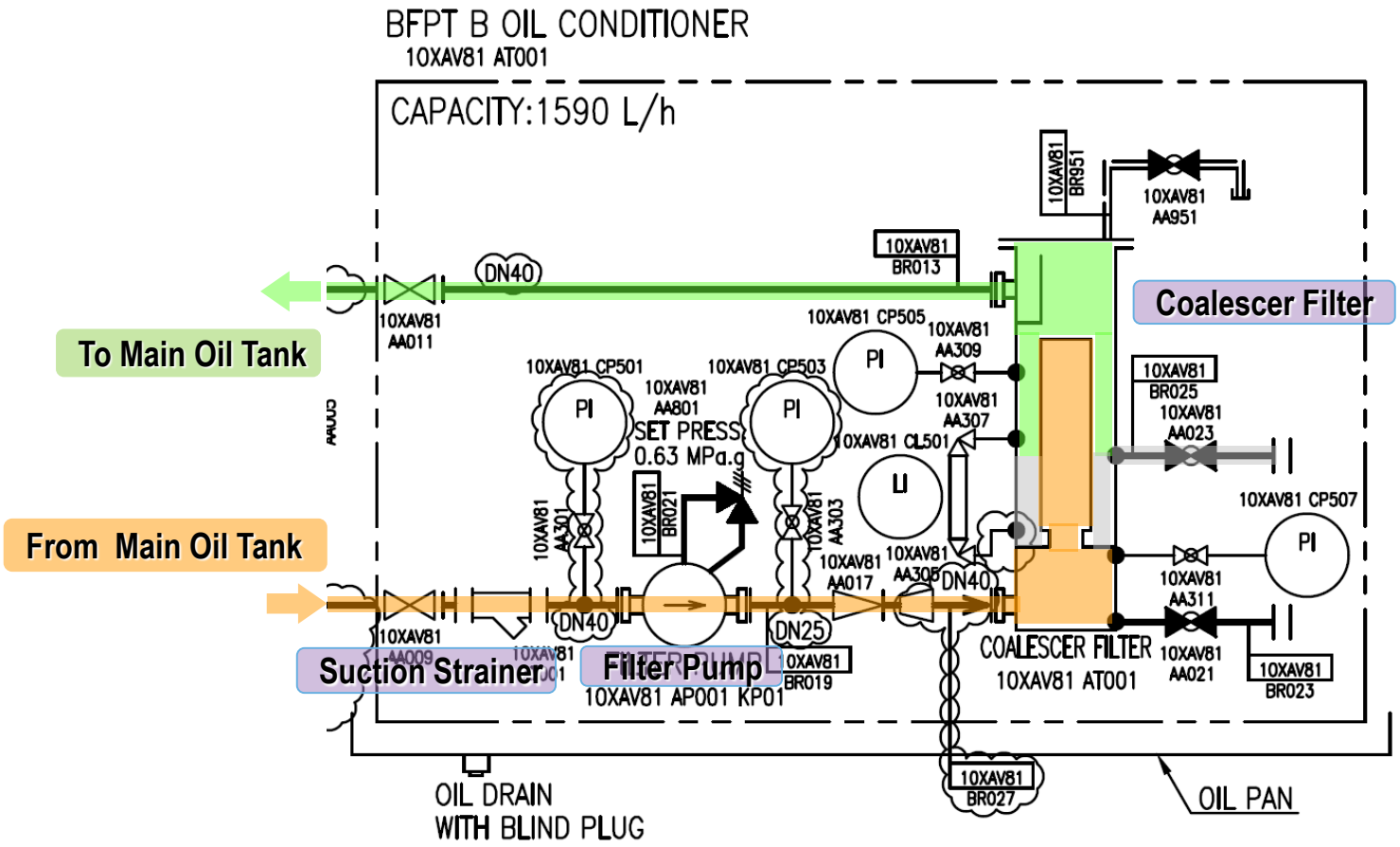
Pump Design Condition		Flow Rate L/min	Discgrage Press. MPa	Motor Power KW
Main Oil Pump A / B	MOP	767	1.39	65
Emergency Oil Pump	EOP	589	0.36	11

Lube Oil System 2-1. Lube Oil Flow Diagram
BFPT Bearing & Front Standard

Bearing Pressure at Normal Operation
0.1 MPa



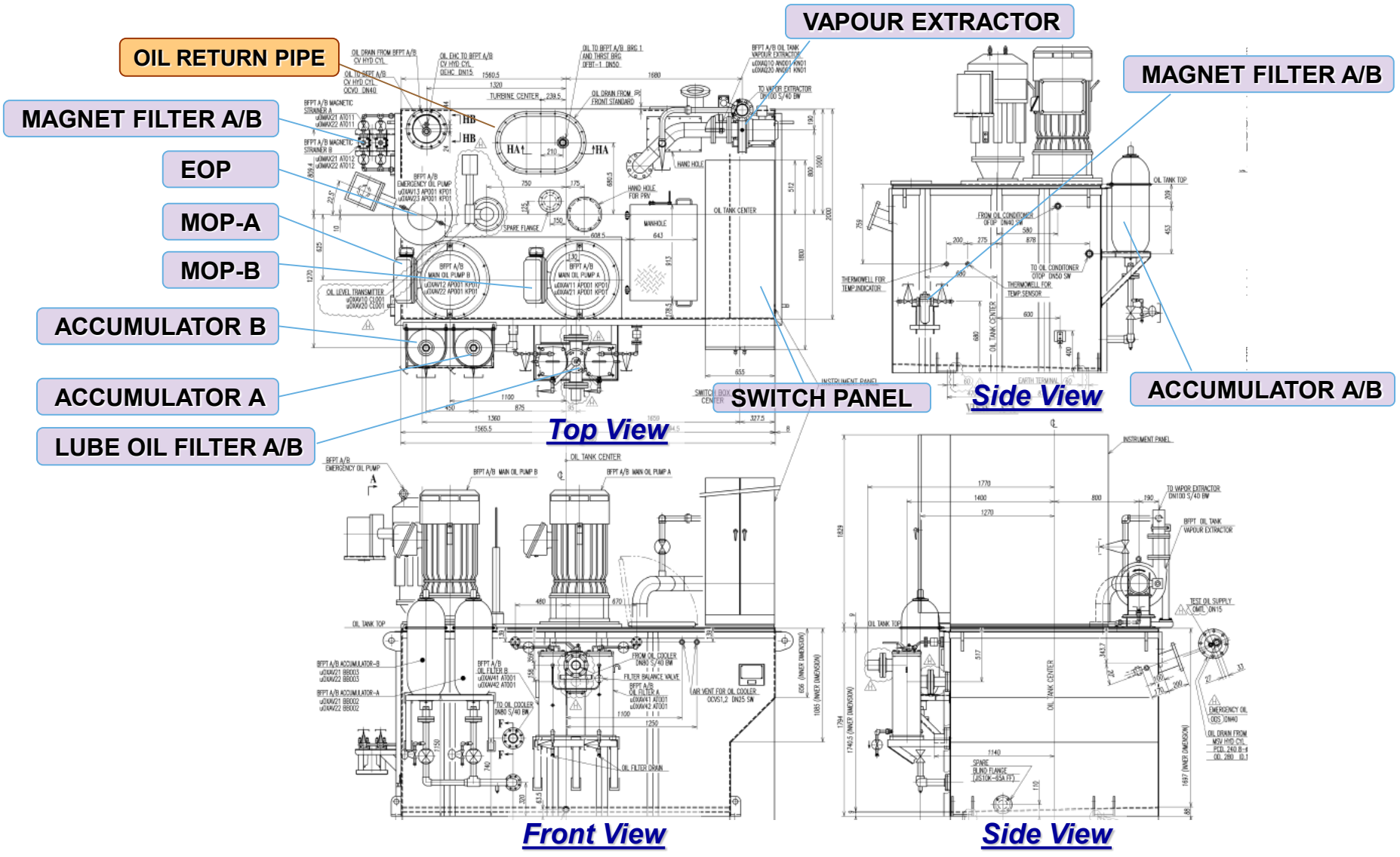
Lube Oil System 2-1. Lube Oil Flow Diagram
BFPT Lube Oil Conditioner



Design Condition	Flow Rate L/min	Discgrage Press. MPa	Motor Power KW
Filter Pump	26.5	0.34	0.75

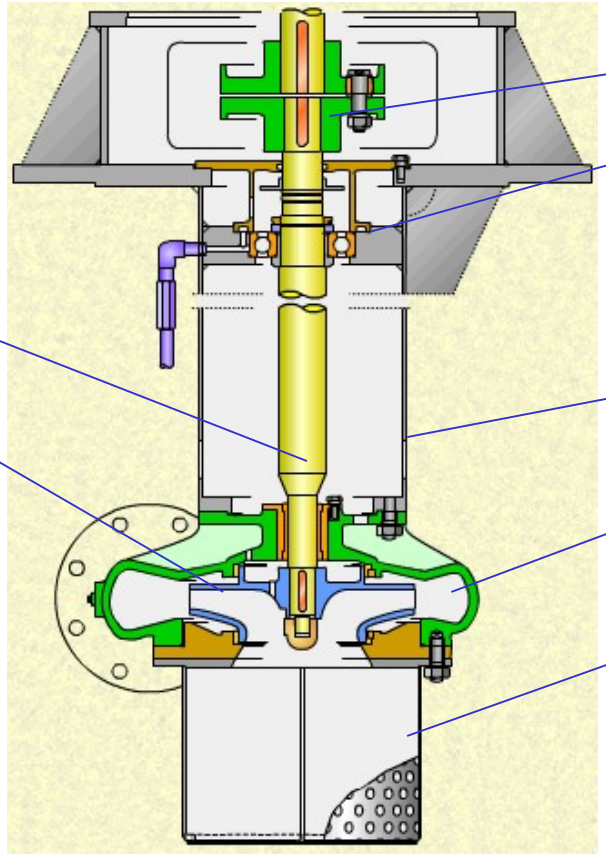
Performance	(Within 5 cycle)
Seperation Capability	NAS 12 -> NAS7
Water Separation	10,000ppm -> 500 ppm

Lube Oil System 2-2. BFPT Oil Tank OUTLINE



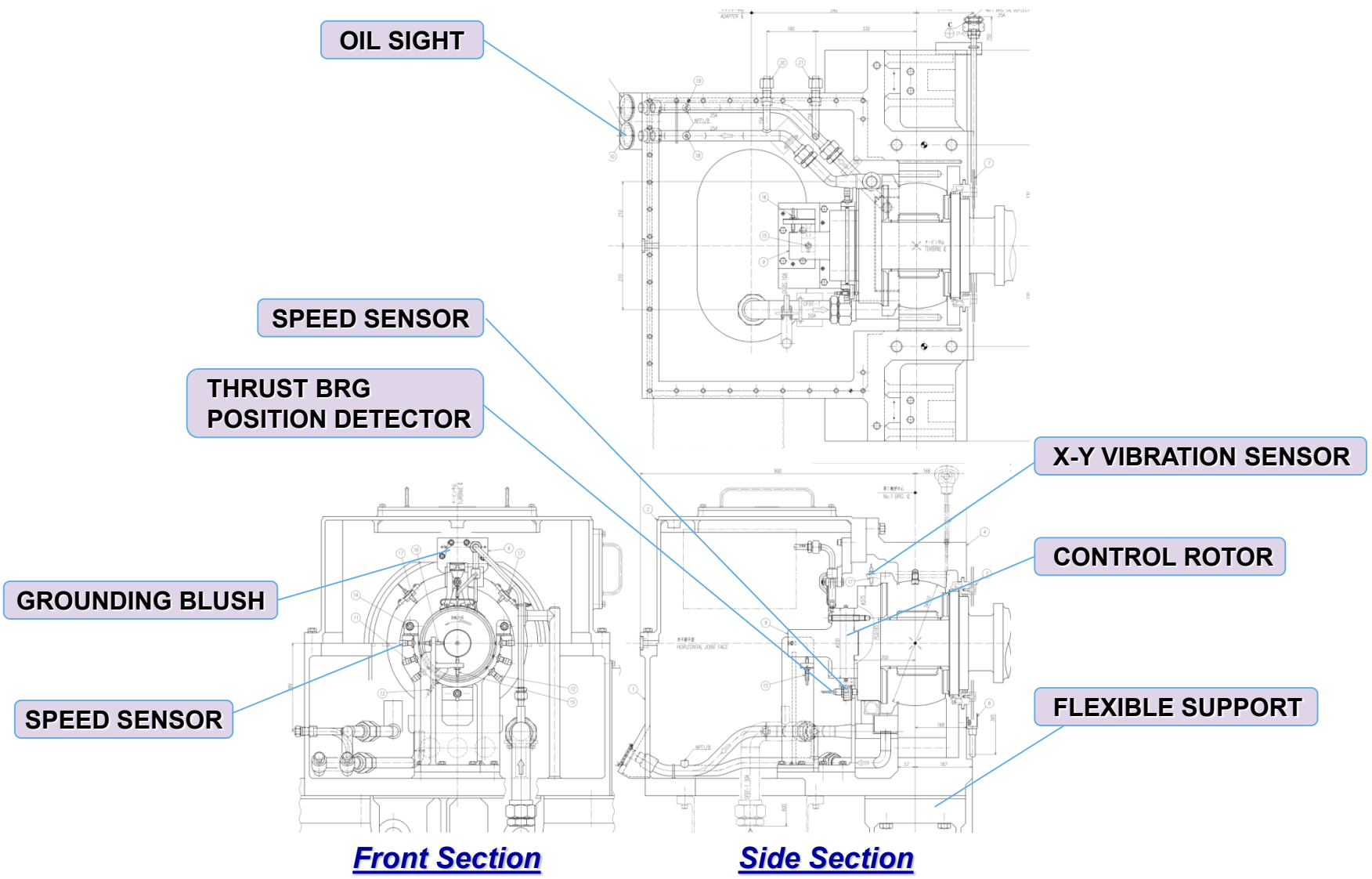
Lube Oil System 2-2. BFPT Oil Tank – MOP & EOP Assembly Drawing

Centrifugal pump
Vertical installation

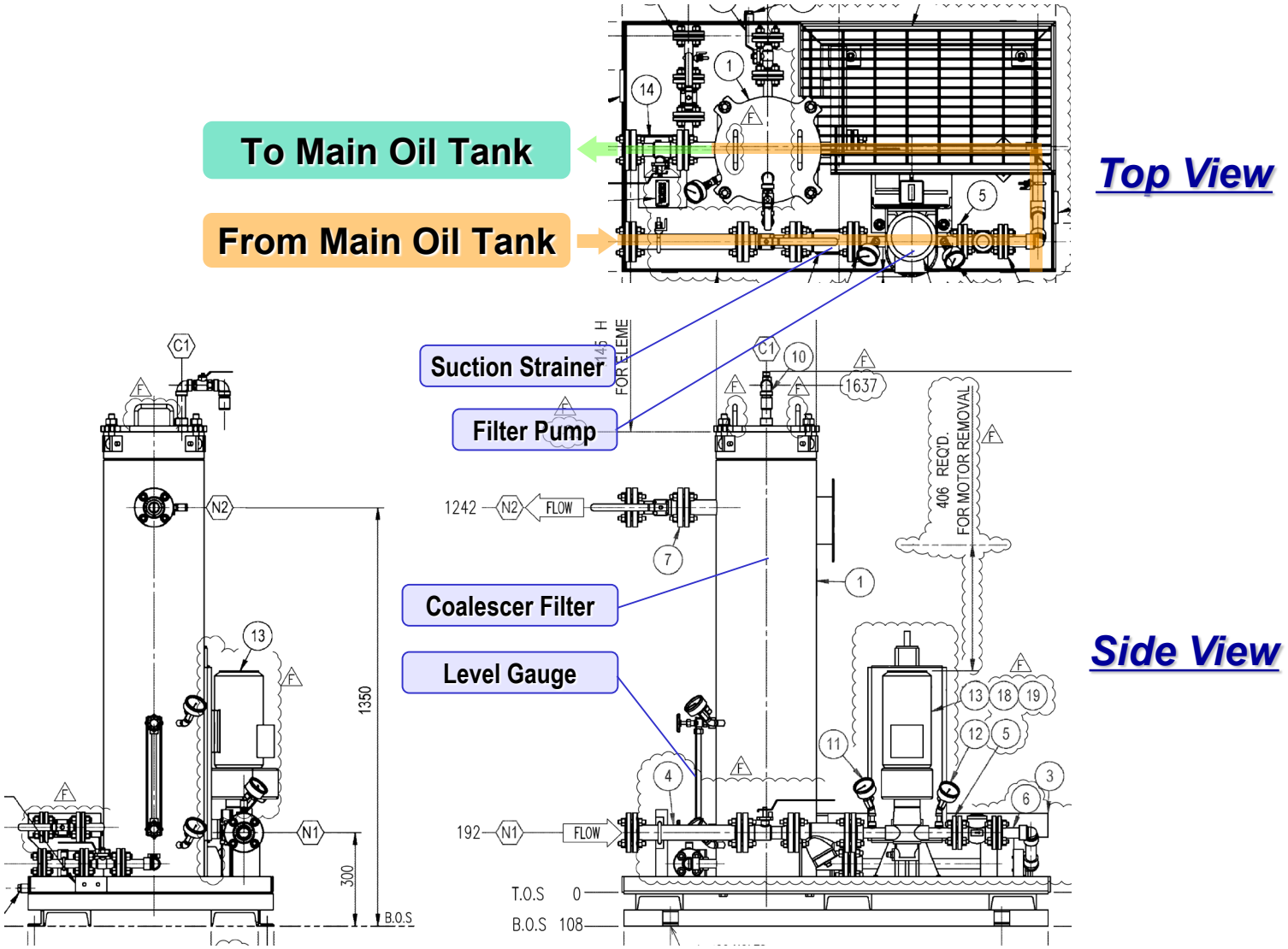


Typical Assembly Drawing For MOP & EOP

Lube Oil System 2-3. BFPT Front Standard – OUTLINE



Lube Oil System 2-4. Lube Oil Conditioner Outline



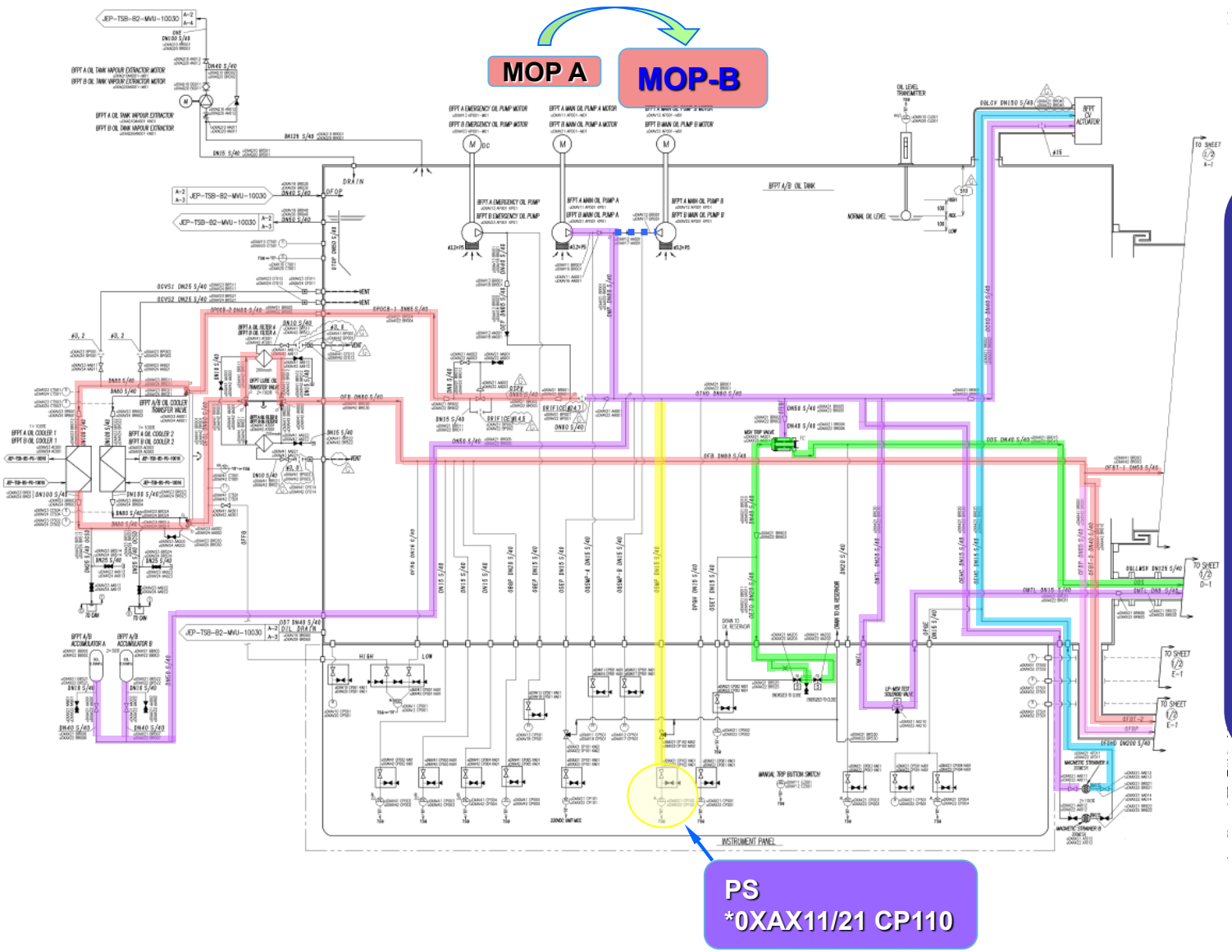
03

Turbine Protection

3-1. Turbine Protection - Lube Oil Back Up
3-2. Turbine Protection – Trip Function

Turbine Protection 3-1. Turbine Protection Lube Oil Back Up –MOP automatic start

MOP Auto Start

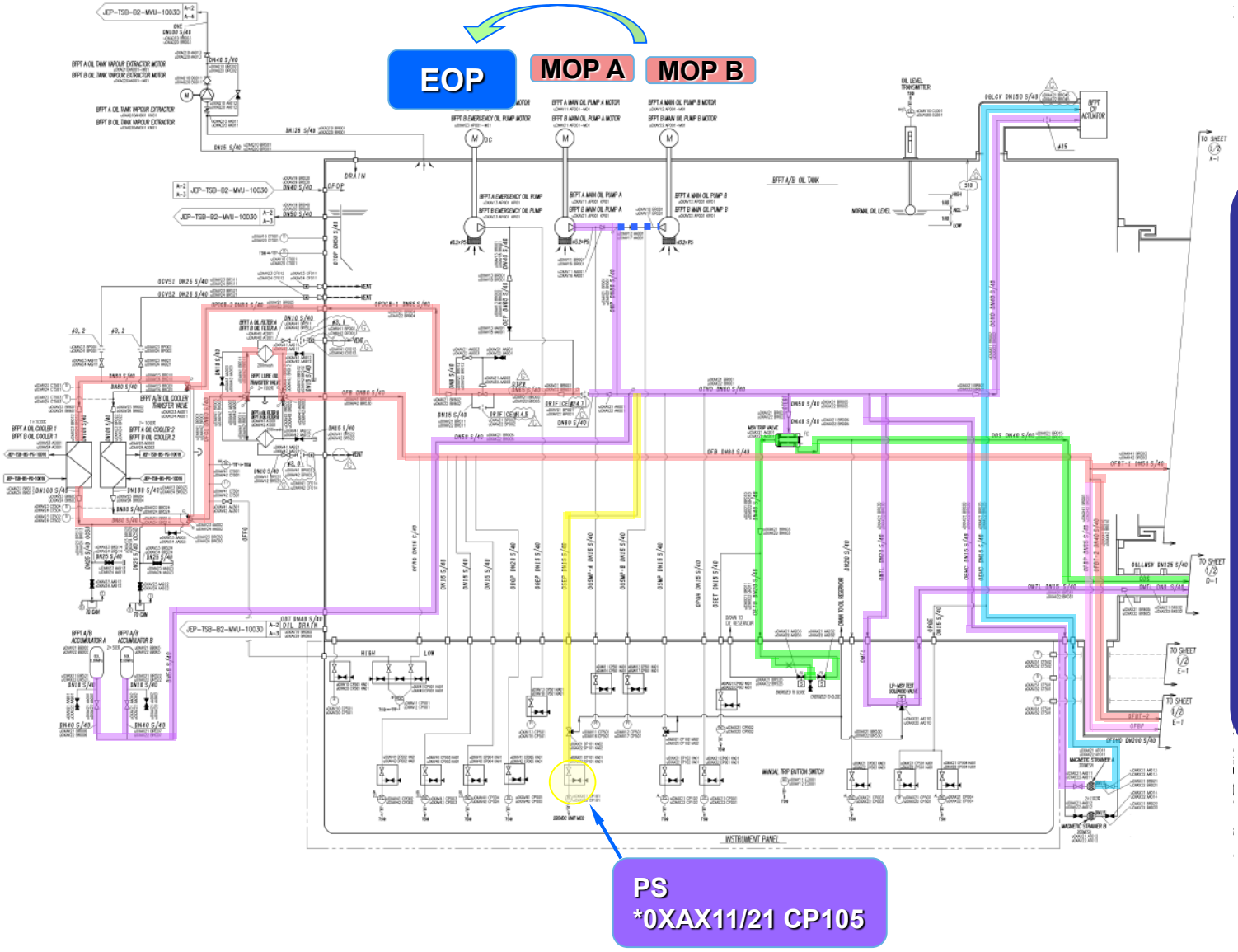


Stand-by Main Oil Pump(MOP)
Stand-by MOP must be started automatically in case **MOP discharge pressure is decreased.**
This Backup system is measured as following pressure switch set point of **PS(*0XAX11/21 CP110).**

PS < 1.17 MPa at MOP discharge header

Turbine Protection 3-1. Turbine Protection Lube Oil Back Up –EOP automatic start

EOP Auto Start

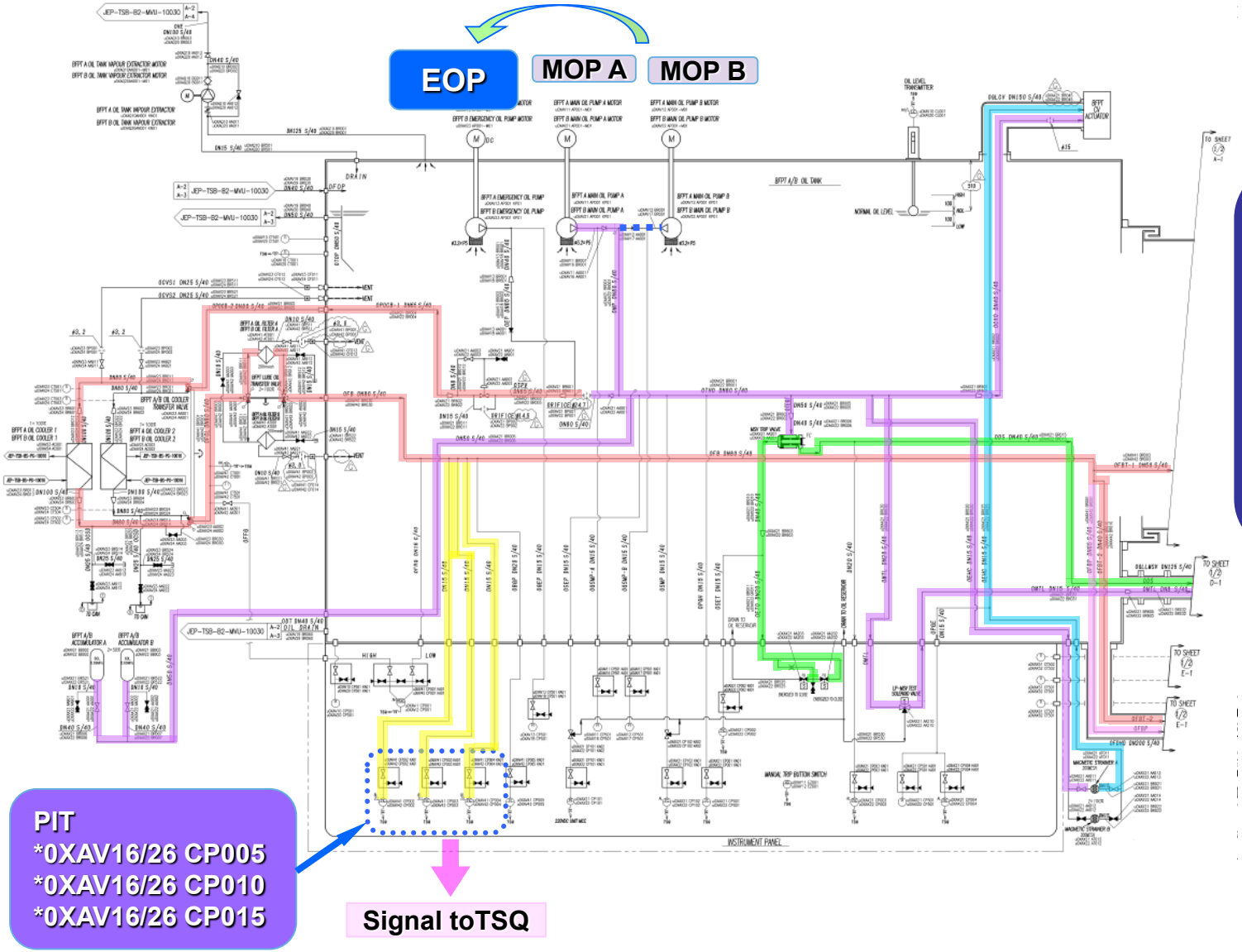


Emergency Oil Pump(EOP)
EOP must be started automatically if **Oil pressure is decreased.**
This Backup system is measured as following pressure switch set point of **PS(*0XAX11/21 CP105).**

PS < 0.78 MPa at MOP discharge header

Turbine Protection 3-2. Trip function
STG Bearing Oil Pressure Low-Low Turbine Trip

Turbine Trip



At normal operation, bearing oil pressure is 0.1 MPa (turbine on center).
If bearing oil pressure is decreased, BFPT shall be tripped.

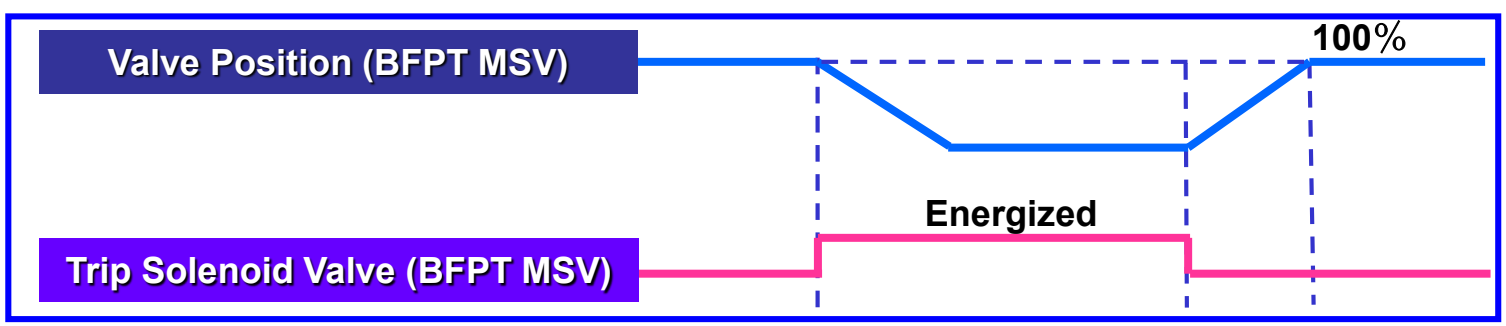
PIT < 0.0275 MPa
(2 out of 3 system)

04

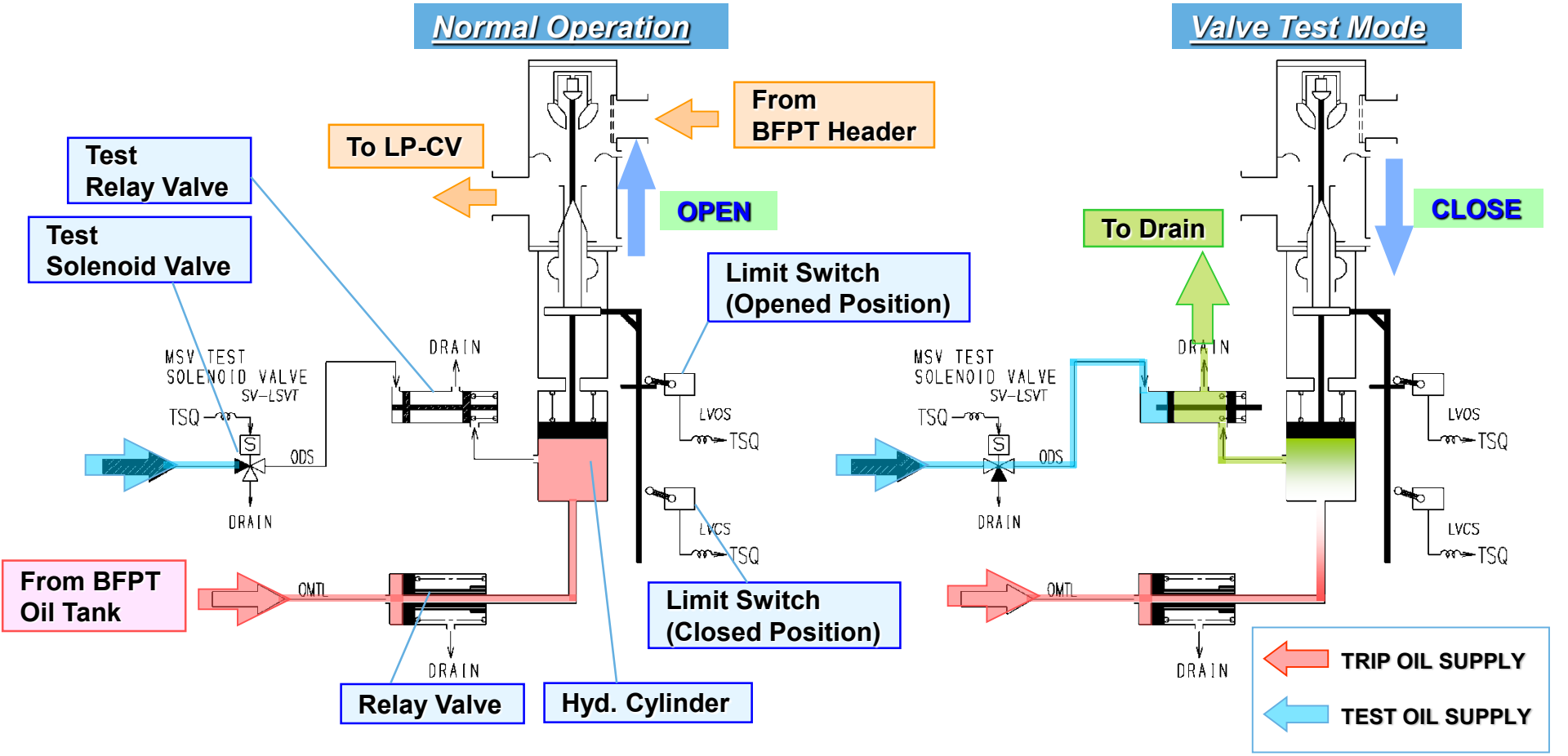
Surveillance Test

4-1. Valve Test
4-2. Lube Oil Pump

Surveillance Test 4-1. BFPT Main Stop Valve Test

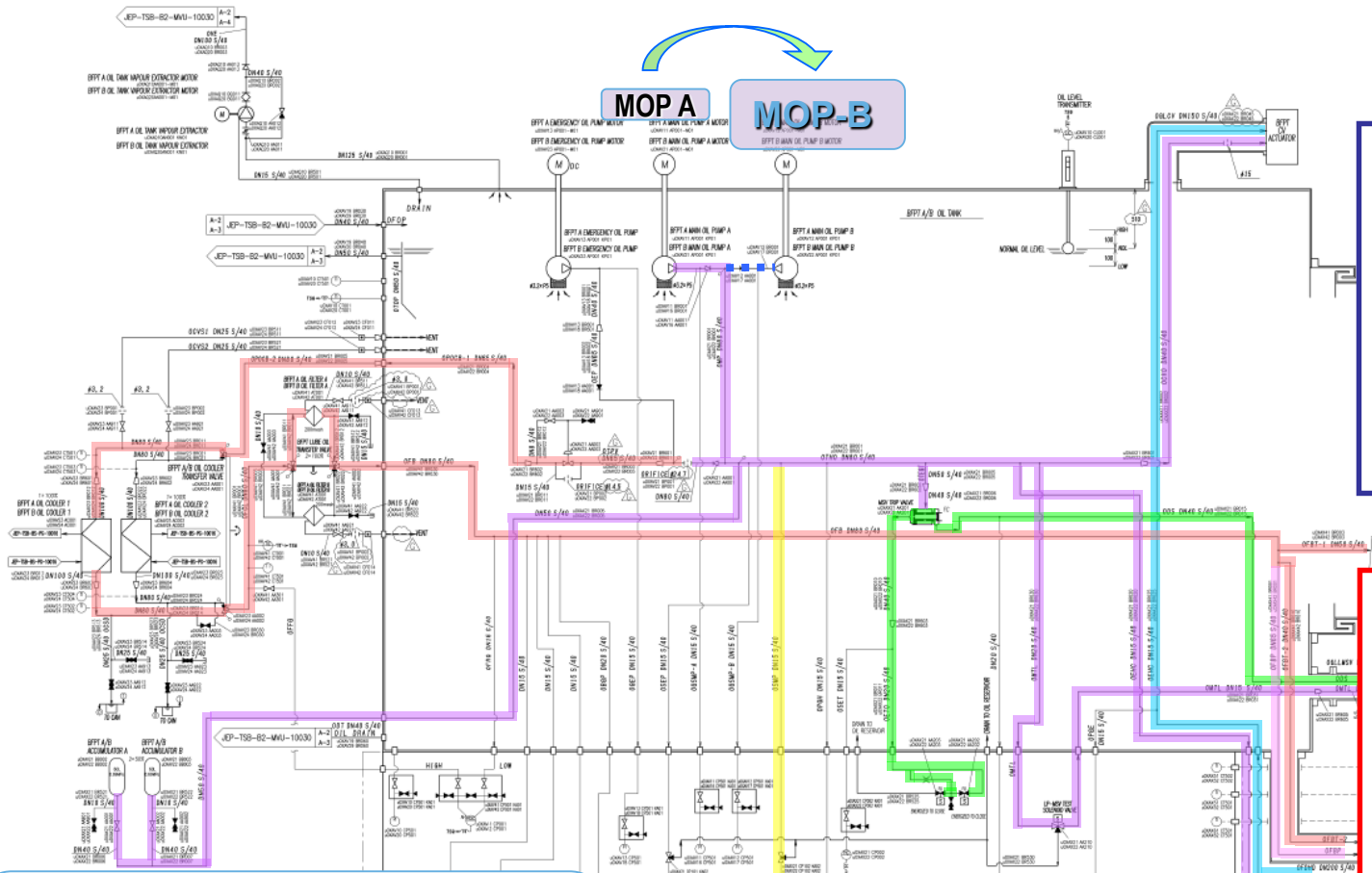


Valve Test Sequence



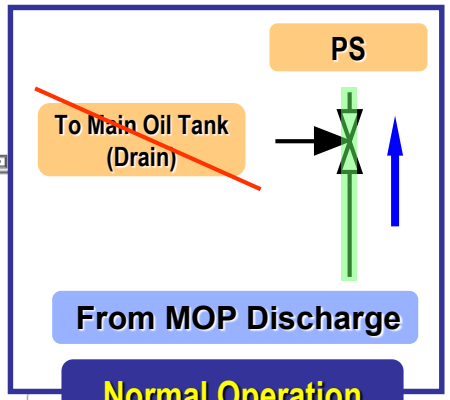
Surveillance Test 4-2. Lube Oil Pump MOP Automatic Start Test

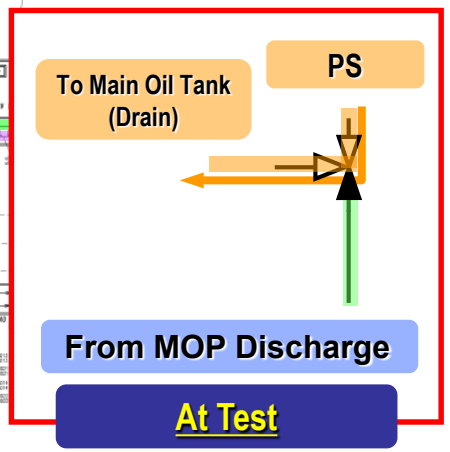
MOP must be started automatically if MOP discharge oil pressure is decreased.
This MOP discharge oil pressure is measured by PS(*0XAX11/21 CP110).



Pump Test

PS
*0XAX11/21 CP110



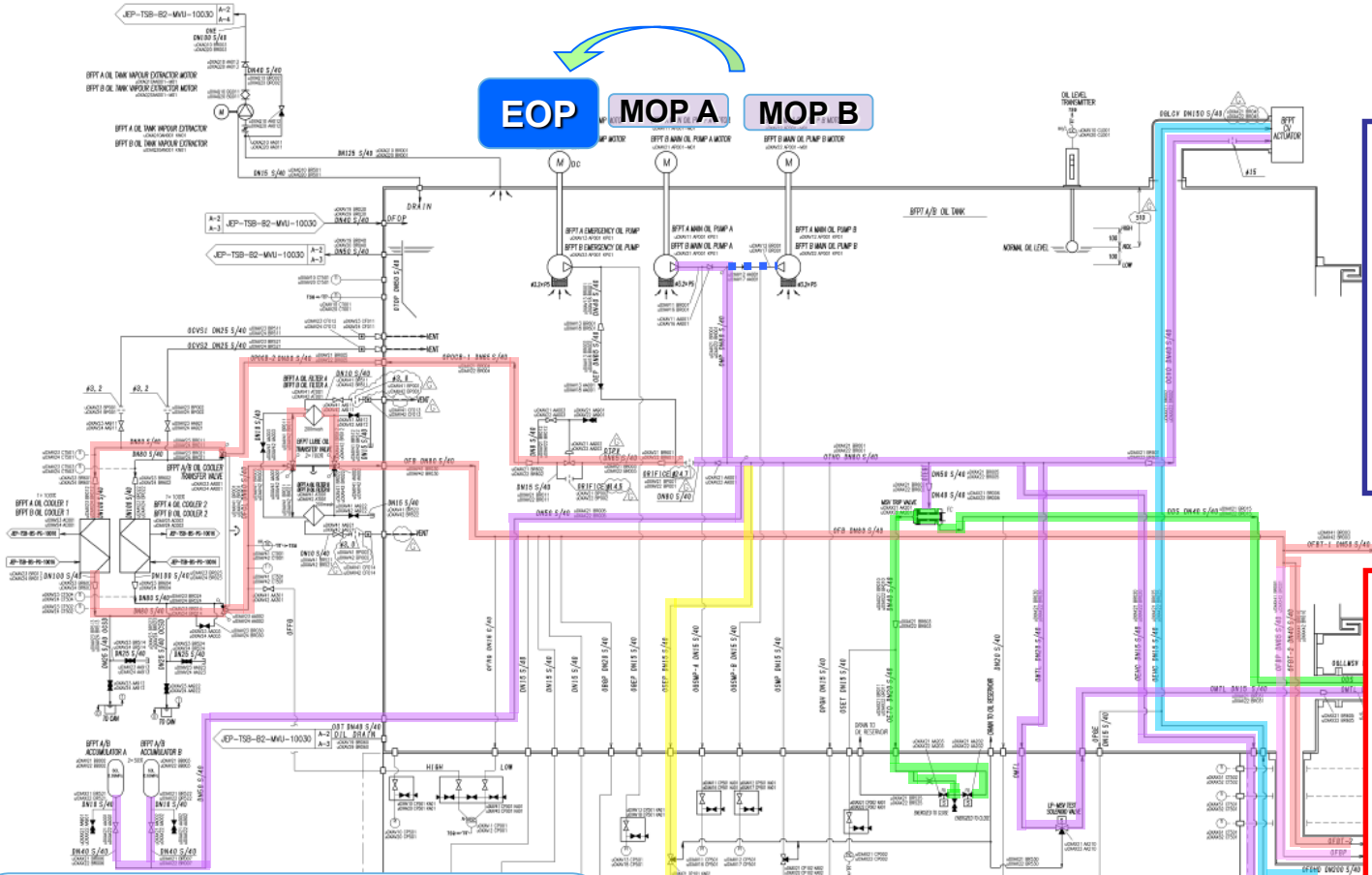


Test order :

1) Make the Test Valve at test position slowly to release the oil to drain.
2) When the oil pressure become lower than the pre-set pressure, MOP will be automatically started.
3) Make the Test Valve at normal position.

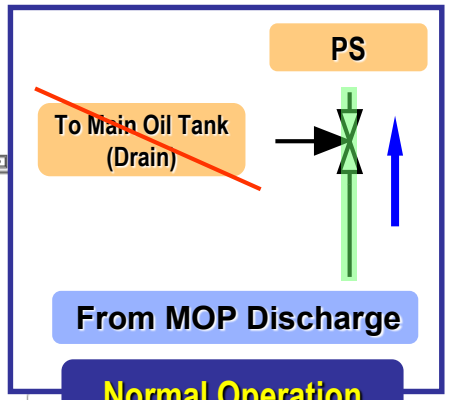
Surveillance Test 4-2. Lube Oil Pump
EOP Automatic Start Test

EOP must be started automatically if MOP discharge oil pressure is decreased.
This MOP discharge oil pressure is measured by PS(*0XAX11/21 CP105).

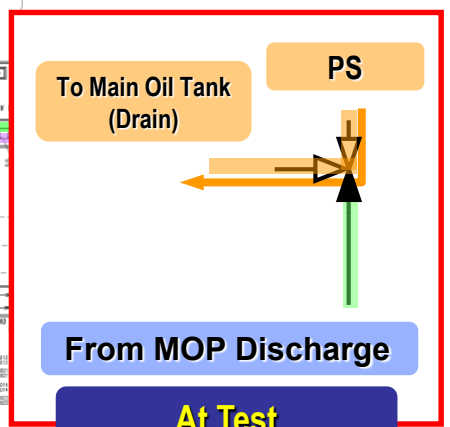


Pump Test

PS
*0XAX11/21 CP105



Normal Operation



At Test

Test order :

1) Make the Test Valve at test position slowly to release the oil to drain.
2) When the oil pressure become lower than the pre-set pressure, EOP will be automatically started.
3) Make the Test Valve at normal position.

TOSHIBA

Thank you

Rev.	Date	Changed Content	Approved by	Reviewed by	Prepared by
a	22.Aug. 2022	First Issue	T.Yamamoto 22.Aug. 2022	T.Yamamoto 22.Aug. 2022	Y.Tanaka 22.Aug. 2022

Revision history

Reference document

Document No.	Document Name
VP1-C-L2-M-MAX-00001	System Design Description for Electro-Hydraulic Controller Oil Unit
VP1-C-L2-M-MAV-00002	System Design Description For Lube Oil System
VP1-C-L2-M-XAV-00009	System Design Description For BFPT Lube Oil System
VP1-C-L2-M-MAA-00009	Control Diagram for Steam Turbine
VP1-C-L2-M-XAA-00007	Control Diagram for BFP Turbine
VP1-C-L2-P-MAX-00001	Piping and Instrument Diagram for Steam Turbine Control Oil System
VP1-C-L2-P-MAX-00002	Piping and Instrument Diagram for Steam Turbine Electro Hydraulic Control Oil Unit
VP1-C-L2-P-MAV-00001	Piping and Instrument Diagram for Steam Turbine Generator Lube Oil System
VP1-C-L2-P-XAV-00003	Piping and Instrument Diagram for BFP Turbine Lube Oil System
VP1-C-L2-M-MAA-00002	Outline Drawing for Main Stop / Control Valve
VP1-C-L2-M-MAA-00005	Section Drawing for Main Stop / Control Valve
VP1-C-L2-M-MAB-00001	Outline Drawing for Combined Reheat Valve
VP1-C-L2-M-MAB-00002	Section Drawing for Combined Reheat Valve

Reference document

Document No.	Document Name
VP1-C-L2-M-MAX-00003	Outline Drawing for Electro-Hyduaulic Controller Oil Unit
VP1-C-L2-M-MAV-00006	Outline Drawing for Main Oil Tank
VP1-C-L2-M-MAV-00009	Outline Drawing for Oil Conditioner
VP1-C-L2-M-MAN-00001	Outline drawing of LOW PRESSURE TURBINE BYPASS VALVE
VP1-C-L2-M-MAN-00002	Outline drawing of LPTB SPRAY CONTROL VALVE
VP1-C-L2-M-MAN-00003	Outline drawing of LOW PRESSURE TURBINE BYPASS VALVE HYDRAULIC OPEN RACK
VP1-C-L2-M-XAV-00003	Outline Drawing for BFPT Oil Conditioner
VP1-C-L2-M-XAA-00002	Outline Drawing for BFPT Main Stop Valve
VP1-C-L2-M-XAA-00004	Section Drawing for BFPT Main Stop Valve
VP1-C-L2-M-XAV-00004	Outline Drawing for BFPT Oil Tank